CAWG 7 CHARACTERIZE FISH POPULATIONS

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The objectives of this study focused on collecting information to characterize the abundance, distribution, and structure of fish populations in the Big Creek ALP Project Area (Project). The CAWG 7 Study Plan was implemented in the summer and fall of 2002. Elements of the plan included a review of available data and stocking records for Project study streams and reservoirs, as well as fish sampling in representative locations. Sampling was conducted within study streams, which include: 1) Project bypass reaches, 2) reaches above small and several mid-sized diversions, and 3) flow augmented stream reaches. In addition, Project reservoirs and impoundments also were sampled. Netting, electrofishing, and snorkeling were used to sample and observe fish. These data were used to estimate fish abundance, biomass, and densities in streams and relative abundance and biomass in impoundments. Hydroacoustic surveys were conducted in the large reservoirs to characterize densities and distributions of fish. In addition, tissue samples from non-hatchery rainbow trout were collected from sites in the lower portion of the Project.

Summaries of fish species collected from study streams and reservoirs are summarized in Tables CAWG 7-ES-1 and CAWG 7-ES-2, respectively. The distribution of salmonids (members of the salmon and trout family) and hardhead minnow are presented in Maps CAWG 7 ES-1 through CAWG 7-ES-11.

During August 2002 in Florence Lake, only brown trout were collected, with the highest catch per unit effort (CPUE) for gillnet samples of all the large Project reservoirs (it should be noted that CPUE in large and small impoundments are not directly comparable because fish are more likely to be caught in smaller impoundments for a similar level of effort). The persistence of brown trout, despite the lack of stocking since 1969, indicates that the population is self-sustaining in Florence Lake. Although rainbow trout were not collected, they were observed during a subsequent visit. A hydroacoustic survey found that overall, the highest fish densities were between 4.0 and 5.9 meters deep. Near the dam. The higher fish densities were in the upper portion of the water column within a depth of 15.7 meters from the surface or less. In the mid-lake region, higher densities were found near the bottom. The lowest fish densities were at the upstream end, where the South Fork San Joaquin River (SFSJR) flows into the lake.

In the mainstem of the SFSJR downstream of Florence Lake, both brown trout and rainbow trout were collected. Hatchery rainbow trout are still stocked in this drainage, but no stocking of brown trout or other non-native trout species has occurred for many years. Most of the rainbow trout collected were presumed to be wild fish based on their appearance[1] and scales. Both species were relatively abundant, with higher densities of brown trout occurring further upstream. The presence of multiple age classes of wild fish of both species indicates that reproduction and successful recruitment occur in the mainstem.

In study streams of the South Fork San Joaquin River, not a single fish was found in either North Slide or South Slide Creeks, whose diversions are no longer in operation, or in Tombstone Creek above its diversion. Tombstone Creek Diversion is no longer operated either. In other tributaries, brown trout, rainbow trout, brook trout, or golden x rainbow trout hybrids were found. Brook trout (found in 10 sites) density estimates averaged 1,066 fish/km and brown trout (three sites) averaged 647 fish/km. Brook and brown trout have not been stocked in recent years. Brown trout density in Mono Creek downstream of Mono Diversion was 64 fish/km. Brown trout have not been stocked in Mono Creek for many years. Rainbow trout occurred at a density of 11 fish/km in Mono Creek below the Mono Diversion. Rainbow trout are stocked in Mono Creek above the diversion. Golden x rainbow trout hybrid density estimates in Hooper Creek averaged 812 fish/km. Spawning and recruitment of these species was indicated by their persistence despite the lack of stocking in recent years. There was no statistically significant difference in trout condition factors between sites above and below diversions in any tributary, other than for brook trout in Chinquapin Creek.

In the medium-sized impoundment created by the Bear Creek Diversion Dam, brown (93 percent of the fish collected) and rainbow trout (seven percent) were the only species collected. The CPUE for brown trout captured in gillnets was the highest of the six medium-sized impoundments sampled, but for rainbow trout it was the lowest. The persistence of wild fish upstream of the diversion without stocking shows that trout populations are self-maintaining.

In the impoundment above Mono Creek Diversion, brown trout and catchable-sized hatchery rainbow trout were collected. Rainbow trout have been regularly stocked in Mono Creek above the diversion for many years. It is likely that there is little to no recruitment of wild rainbow trout in or above the impoundment, as indicated by the absence of young rainbow trout and only hatchery catchable fish. The presence of numerous young-of-the-year brown trout despite the lack of stocking indicates successful spawning of this species takes place upstream of Mono Diversion Dam.

In Mammoth Pool Reservoir, both brown trout (71 percent of the total fish collected) and rainbow trout (29 percent) were collected. Rainbow trout is the only species currently stocked and the rainbow trout collected were likely to have been primarily of hatchery origin. No trout of either species under age 3+ was

[1] Hatchery trout generally have worn fins from being raised in a crowded pen. Fish scales also can show hatchery influence by large amounts of growth without seasonal differences or annulae, while being raised in the hatchery.

collected, which suggests young brown trout may not rear in the reservoir or that they are subject to predation. A hydroacoustic survey found the highest overall fish densities were between 4.0 and 5.9 meters deep. The fish density near the dam was relatively low. The mid-lake region had high densities of fish in all depth strata shallower than 19.7 meters, while the inflow area of the lake had the highest near surface (above 11.8 meters) density.

Sacramento sucker dominated the fish community of the Mammoth Reach of the San Joaquin River (downstream of Mammoth Pool Dam). Rainbow and brown trout were present, but in substantially smaller numbers. Multiple age classes of wild fish were present for all three species, which suggests reproduction and recruitment occurs in this portion of the San Joaquin River. In Rock Creek, wild rainbow and brown trout were collected above and below the diversion, and differences in trout condition factors were not statistically significant between these locations.

In the Big Creek Powerhouse 3 Forebay (formed by Dam 6), Sacramento sucker dominated the sampled fish community, with smaller components of brown and rainbow trout, as was the case in the river upstream and downstream of the forebay.

Downstream of Dam 6, in the Stevenson Reach of the San Joaquin River, two sites were sampled. The fish community in the sample site in the upper portion of the reach was dominated by Sacramento sucker (as was the Mammoth Reach) with smaller numbers of rainbow trout, brown trout and prickly sculpin. The downstream site was warmer and located upstream of Big Creek Powerhouse 3 and Redinger Lake. The native transition zone community fish community was present, which included Sacramento pikeminnow, hardhead (a USFS sensitive species and a California species of special concern), and a smaller component of Sacramento sucker. Multiple age classes were present, including young-of-the-year, suggesting these species spawn and rear in this portion of the river.

In Huntington Lake, species collected included brown and rainbow trout, Sacramento sucker, prickly sculpin and kokanee. Rainbow trout and kokanee are the only fish currently stocked. The CPUEs for trout captured in gillnets were the lowest for all large Project reservoirs. Most of the rainbow trout collected were catchable-sized fish that originated from the CDFG San Joaquin Fish Hatchery. A hydroacoustic survey found the highest fish densities between 3.9 and 5.9 meters deep. Near the dam, there were no fish near the bottom (19.6 to 37.3 meters). The mid-lake region had the lowest fish density, and most fish were in the upper layers (2.0 to 19.6 meters). The highest fish densities were at the inflow area of the lake near the confluences of Big Creek and the Portal Powerhouse tailrace/Rancheria Creek.

In Big Creek, brown trout dominated the fish community in the upper portion of Big Creek between Huntington Lake Dam 1 and Big Creek Powerhouse 1 (average estimated fish density 670 fish/km). Rainbow trout dominated the lower portion of Big Creek between Dam 5 and Big Creek Powerhouse 8 (average of 847 fish/km) with a lower density of brown trout (average of 381 fish/km). Equal fish densities for brown and rainbow trout were found in the middle reach, between Dam 4 and Big Creek Powerhouses 2/2A (363 fish/km). Multiple age classes were found in all three reaches, but the greatest number of age 0+ rainbow trout was collected between Dam 5 and Big Creek Powerhouse 8, suggesting rainbow trout spawning or survival may be more successful in this reach.

Fish communities in tributaries of Big Creek were dominated by rainbow trout, with smaller numbers of brook trout, brown trout, and golden x rainbow trout hybrids. Rainbow trout densities above and below the diversion in Pitman Creek were 1,066 and 613 fish/km (average of densities within the different channel types sampled) respectively; in Balsam Creek densities were 1,335 and 12 fish/km respectively; and in Ely Creek densities were 190 and 266 fish/km, respectively. Golden x rainbow trout hybrids downstream of the diversion in Ely Creek had an estimated density of 102 fish/km. There was no statistically significant difference between condition factors above and below the diversions for any of the species.

In the Big Creek Powerhouse 2 Forebay (formed by Dam 4), rainbow trout dominated the fish community, but brown trout and prickly sculpin were well represented. Rainbow trout are not stocked in the forebay, but occasionally escape from the nearby SCE hatchery. In Big Creek Powerhouse 8 Forebay (formed by Dam 5), the fish community was dominated by brown trout (84 percent), although one rainbow trout and one prickly sculpin were found.

In the Balsam Meadow Forebay (Eastwood Powerhouse forebay), brown and rainbow trout, Sacramento sucker, prickly sculpin, kokanee, and smallmouth bass were collected. The most abundant species were prickly sculpin (41 percent), kokanee (28 percent), and Sacramento sucker (19 percent). Many of these species were likely transported from Shaver and Huntington Lakes with the movement of water. Multiple age classes were represented in all species except brown trout. Fish may move from Huntington Lake with the diversion of water to Balsam Meadow Forebay. Fish may be moved between the Balsam Meadow Forebay and Shaver Lake in either direction by operation of the Eastwood Powerhouse and pumpback. Stocking also takes place in Balsam Meadow Forebay.

In North Fork Stevenson Creek, not a single fish was found upstream of the Tunnel 7 outlet, which is the source of augmented flow to this creek. The site sampled immediately downstream of Tunnel 7 outlet contained only golden x rainbow trout hybrids at a density of 583 fish/km. Farther downstream, in the site upstream of the gaging station, the densities of rainbow trout, brown trout, and Sacramento sucker were 210, 305, and 11 fish/km respectively, and in the site upstream of Shaver Lake were 314, 430, and 42 fish/km respectively.

Successful trout reproduction and rearing continues to occur, but Sacramento sucker recruitment may not have been successful in recent years.

In Stevenson Creek below Shaver Lake, multiple age classes of rainbow trout were found, including young-of-the-year, which indicates successful reproduction and rearing occurred. Rainbow trout densities in Stevenson Creek were 751, 966, and 128 fish/km in the three sampled sites.

In Shaver Lake, rainbow trout, Sacramento sucker, kokanee, smallmouth bass, bluegill, crappie, centrarchids and a carp were collected. However, a variety of other species have been introduced to the lake and are still found there, although in lower numbers than previously. Rainbow trout and kokanee from the CDFG San Joaquin Fish Hatchery are the only species that are currently stocked. The CPUE for rainbow trout collected in gill nets was the highest calculated of all the large Project reservoirs. The CPUE for kokanee collected in gill nets was higher than for Huntington Lake, where kokanee also are stocked. A hydroacoustic survey found the highest fish densities between 3.9 and 5.9 meters deep. Most fish were concentrated in surface waters: between 2.0 to 21.6 meters near the dam, between 2.0 to 5.9 in the mid-lake region, and between 2.0 and 5.9 meters near the inflow area.

The study objectives of the CAWG 7 Characterize Fish Populations Study Plan are:

1. Characterize the abundance, distribution and structure of target resource fish populations and communities in Project-affected waters.

2. Characterize the growth of target fish species.

3. Determine whether rainbow trout in previous anadromous fish areas are of steelhead origin.

4. Characterize fish stocking and potential impacts to native fish populations.

3.1 GENERAL APPROACH AND ELEMENTS IMPLEMENTED

Implementation of the CAWG 7 Study Plan was designed to take place through a general approach that contained the following elements:

Study Elements to be Implemented	Elements Implemented
1. Review existing CDFG, USFS, and SCE fish survey data, fish stocking records, and other relevant information prior to performing any instream or lake/reservoir sampling. Available data from these documents will assist in the design of related habitat and fisheries studies.	1. Available data and stocking records were reviewed for Project-affected streams and reservoirs. Data were summarized in Appendix C of this report.
2. Sample representative habitat areas in Project bypass reaches by various methods, including: • Direct observation of fish by snorkel surveys in habitats that are too deep for effective sampling by electrofishing. • Electrofishing surveys in shallow water habitats and use of mark recapture or multiple removal population estimates.	2. Representative locations were sampled within Project bypass reaches and above diversions or other Project features on small streams including mid-sized diversions. Sampling was conducted for representative Rosgen Level I channel areas. Electrofishing was the primary sampling approach used. This was supplemented by direct observation (snorkeling), where deep water rendered electrofishing unsafe or inefficient.
3. Sample Project reservoirs by various methods, including: • Netting (minnow, gill and trap nets) to determine fish species composition and relative abundance. Where the CDFG or USFS are currently conducting studies, existing data will be used. • Hydroacoustic fish density surveys in all large reservoirs.	3. Project reservoirs and mid-sized impoundments were sampled for fish using several gear-types including gill nets, trap nets, minnow traps, electrofishing and hydroacoustics (large reservoirs only).

In addition to the general approach elements, two other fish sampling activities were planned. The first of these is fish sampling in conjunction with out of season, controlled, whitewater flow releases, which did not take place in 2002. The second was collection of non-hatchery rainbow trout tissue samples for possible analysis by CDFG to determine if stocks are of native steelhead origin. These samples were collected, but have not been analyzed. These samples will be provided to CDFG for possible analysis.

3.2 OUTSTANDING STUDY ELEMENTS

Fish sampling in conjunction with out of season whitewater flows has not been implemented at this time. Analyses related to Project effects have not been conducted at this time.

A summary of growth rate data from the scientific literature has been requested by the CAWG. This information will be provided separately.

This section presents a summary of study methods, a more detailed description is presented in CAWG 7-Appendix A.

4.1 REVIEW EXISTING DATA

Prior to initiating field data collection, available information was reviewed and summarized by stream. The summary for each stream for which information was available includes a table with the year the sampling was conducted, sampling locations, site characteristics, the species present and their estimated abundance and biomass. Information on fish stocking was reviewed and records of historic introductions were compiled (CAWG 7-Appendix C).

4.2 STREAM SITE SELECTION

Sampling sites were selected in major Rosgen Level I channel types within river and stream reaches associated with Project diversions, impoundments, or flow augmentation (study streams). Within each major channel type, potential 100 meter-long candidate fish population sampling sites were identified based on the presence of representative habitats. In the case of small and medium-sized diversions, sites were selected in the reach above the diversion in addition to sites within the bypass reach. Prior to sampling, the candidate sample sites were discussed with the CAWG. Sampling for each site was conducted only after CAWG approval was obtained. The sites sampled during these studies are shown in Maps CAWG 7-1 through CAWG 7-7.

4.3 ELECTROFISHING SAMPLING

Table CAWG 7-1 presents the study streams and sampling methods used. Electrofishing was conducted using Smith-Root Type 12B backpack electrofishing units. This sampling technique was used in habitats sufficiently shallow (under normal Project operating conditions) to allow adequate sampling. The upstream and downstream ends of the site were blocked using 0.25-inch mesh block nets. Sampling was conducted using multiple pass depletion, in which fish are stunned and removed from the site in multiple sequential passes. In this case, population estimates were based on the maximum likelihood technique of Zippin (1958).

Sampling was performed in an upstream direction beginning at the downstream block net and finishing at the upstream block net. A typical electrofishing team consisted of one backpack electrofisher, one or two net persons, and one net/livecar person for streams smaller than 20 feet wide. Additional backpack electrofishers and net persons were necessary for streams greater than 20 feet wide. Electrofishing was generally conducted as described by Reynolds (1996).

4.4 Snorkel Survey Sampling

Snorkel surveys were conducted in habitat units (*i.e.,* pool habitats) that were too deep to be effectively sampled using electrofishing. The snorkeled habitat units were divided into one or more swimming lanes parallel to the direction of stream flow. Methods were generally similar to those presented in Griffith (1972), Platts et al. (1983), Hicks and Watson (1985), Hankin and Reeves (1988), and Hillman et al. (1992). Divers identified and counted fish species in their lane while moving slowly upstream at a uniform, even, pace with no abrupt movements. A bank-side observer monitored and verbally directed diver distribution and sampling rate. Fish lengths were estimated by comparison with a fish length calibration cord. Hankin and Reeves (1988) recommended that visual fish counts should be calibrated using electrofishing techniques. Three run habitats in large stream bypass reaches of the upper (upstream of Mammoth Pool) and lower basins (downstream of Mammoth Pool) were sampled using snorkel and electrofishing methods for calibration of pool habitats (See CAWG 7-Appendix A). Calibration results were inconsistent for complex habitats sufficiently shallow to electrofish. Therefore, direct observation counts should be considered minimum estimates of fish in pools sampled by this technique. Direct observation was only used in mainstem sites of the SFSJR and SJR, and one tributary, Rock Creek.

4.5 Fish Measurement and Handling

All captured fish were identified to species, measured for length to the nearest millimeter total length or fork length, and weighed to the nearest 0.1 g for fish up to two kg, or to the nearest one g for fish over two kg. If very large numbers (>100) of a species were captured, the measurements were collected from 10 fish within each 25-mm size range. Scale samples were collected from trout and hardhead for age and growth determinations.

4.6 Physical Condition Measurements

Routine observations were made of habitat and physical conditions in the specific areas sampled. These observations included physical measurements of water temperature, specific conductance, and dissolved oxygen. These measurements were made using either a Hydrolab Quanta or Horiba U-10 water quality meter. Water quality meters were calibrated at least once a day prior to use, to correct for altitude and dissolved oxygen saturation among sites. Water transparency in the Project Area is typically high, where discoloration or turbidity was found, it was noted. In impoundments, Secchi disk transparency was recorded. These results are summarized in Appendix F.

4.7 Reservoir Sampling

Reservoirs (large and mid-sized diversions) were sampled through a variety of techniques including electrofishing, minnow traps, and trap nets set in shallow areas. Gill and trap nets were set in deeper areas. All sample locations for each method were recorded by GPS coordinates. Set and retrieval times for each method also were recorded to provide Catch-per-Unit Effort (CPUE) estimates for nets. Sampling locations for these gear types are shown in Maps CAWG 7-8 through CAWG 7-17.

Hydroacoustic surveys (see CAWG 7-Appendix A) were used to characterize overall fish density and distribution in large reservoirs (e.g., Lake Edison, Florence Lake, Shaver Lake, and Mammoth Pool Reservoir). Areas included in the hydroacoustic surveys are shown in Maps CAWG 7-18 through CAWG 7-21.

5.1 OVERVIEW

Results of the CAWG 7 study are presented for streams as organized by sub-watersheds within the Project Area including the South Fork San Joaquin River, the Mammoth and Stevenson reaches of the San Joaquin River, Big Creek, and the Stevenson Creek drainage including Stevenson Creek and North Fork Stevenson Creek. A summary of the fish species collected in each sampled stream reach is presented in Table CAWG 7-2. Study results for reservoirs and impoundments are presented separately in Section 5.7. The status of fish species within the Big Creek System is given in Table CAWG 7-3.

The life histories and phenologies of key fish species found in the Project Area are presented in CAWG 7-Appendix B. A review of existing fish survey data, fish stocking records, and other relevant historical data for Project area streams and reservoirs is presented in CAWG 7-Appendix C. Results of the fish-scale growth analysis is presented in CAWG 7-Appendix D.

5.2 SOUTH FORK SAN JOAQUIN BASIN

The mainstem of the South Fork San Joaquin River (SFSJR) ranges from the confluence with the San Joaquin River (SFSJR RM 0.0) to upstream of Florence Lake (SFSJR RM 30.7). Tributaries subject to diversion or augmentation by the Project (study streams), excluding tributaries that have been included in SCE's traditional licensing processes, also were sampled (Maps CAWG 7-1 and CAWG 7-2). Table CAWG 7 ES-1 summarizes the results by stream, reach, and Rosgen Level I type channels, including results from traditional relicensing studies.

5.2.1 SOUTH FORK SAN JOAQUIN RIVER MAINSTEM

Five segments of the mainstem of the SFSJR were sampled including the SFSJR upstream of Florence Lake; the remaining four included downstream of Florence Lake to Bear Creek (confluence), Bear Creek to Mono crossing, Mono Crossing to Rattlesnake crossing, and Rattlesnake crossing to the confluence with San Joaquin River. Within each of the segments, a sampling site was located in each of the major Rosgen Level I channel types present. Sites were selected that contained representative habitats. The representative mainstem sites (located in Rosgen Level I channel types B, C, and G) were sampled between August and October of 2002. Table CAWG 7-2 shows the fish species found during this study by river reach and channel type.

The mainstem fish communities were composed of brown trout and rainbow trout (Figures CAWG 7-1 through CAWG 7-7). Since the 1930s, both species have been stocked in the SFSJR by CDFG at various times from various hatchery sources. Other trout species also have been stocked. Currently, the SJSFR is stocked primarily with rainbow trout from the CDFG San Joaquin Hatchery at Friant Dam. Brown trout are not currently stocked (CAWG 7-Appendix C). In the SFSJR upstream of Florence Lake, only brown trout were collected. However other species, including rainbow trout and golden trout, are known to occur. Brown trout were observed moving upstream from Florence Lake to the river, likely part of their spawning migration, which occurs in fall when the sampling was performed.

The fish communities in the mainstem SFSJR between Florence Lake Dam (SFSJR RM 27.85) and Bear Creek (SFSJR RM 22.3), as well as the Rosgen Level I type G site in the reach between Bear Creek and Mono Crossing, were dominated by brown trout. The Rosgen Level I type C and B sites between Bear Creek and Mono Crossing and the remainder of the sites downstream were dominated by rainbow trout. Estimates for fish populations, density and biomass are given in Tables CAWG 7-4 and CAWG 7-5. Biomass estimates are based on the captures from electrofishing. Brown trout population densities ranged from 206 to 522 fish/km and averaged 315 fish/km among sites. Rainbow trout densities ranged from 21 to 984 fish/km and averaged 483 fish/km among the SFSJR sites downstream of Florence Lake.

Length-frequency histograms are plotted with age breaks determined from scale analysis to show the age distribution of the fish collected (Figures CAWG 7-8 through CAWG 7-21). Multiple age classes were present for both species, and juvenile wild rainbow trout smaller than the catchable-sized (approximately 200 mm TL) hatchery trout typically stocked were collected. This suggests that both rainbow and brown trout reproduction and rearing occur in the SFSJR subwatershed. The largest numbers of age 0+ brown trout were collected in the reach between Florence Lake and Bear Creek, while the largest numbers of age 0+ rainbow trout were collected downstream of Mono Crossing. Most of the rainbow trout collected in the SFSR were presumed to be wild fish based on their appearance; they did not exhibit signs of fin erosion, a trait common to hatchery reared fish, and scales appeared to be typical of wild fish.

Condition factors for sampled fish are summarized in Figures CAWG 7-22 and CAWG 7-23[1]. There was no significant statistical difference between condition factors between sites for either brown trout ($p=0.17$) or rainbow trout ($p=0.16$). Back-calculated estimates of growth from fish scales are presented in CAWG 7-Appendix D.

[1] Due to malfunction of the scales used to weigh fish, no biomass data were collected upstream of Florence Lake and no condition factors could be calculated for comparison.

5.2.2 TRIBUTARIES OF THE SOUTH FORK SAN JOAQUIN RIVER

Tributaries of the SFSJR, subject to diversion or augmentation by the Project, were sampled. These are, from upstream to downstream, Tombstone, South Slide, North Slide, Hooper, and Crater Creeks, Crater Creek Diversion Channel, and Bear, Chinquapin, Camp 62, Bolsillo and Mono Creeks (Maps CAWG 7-1 and CAWG 7-3). Sampling was conducted at representative sites above and below diversions. However, diversions on Tombstone, North and South Slide Creeks are no longer in operation. In addition, the Rosgen Level I channel type C/E site in Tombstone Creek below the diversion (BD) and the Rosgen Level I channel type C site in Crater Creek BD were dry and had no fish. Historical fisheries information and stocking records are summarized in CAWG 7-Appendix C.

Not a single fish was found above the diversion in Tombstone Creek, or in any location in North Slide, or South Slide Creeks. Historically, golden trout was the only species reported in Tombstone Creek above the diversion and no historical record was found for fish in the reach below the diversion (CAWG 7-Appendix C). Similarly, rainbow trout were only reported below the diversion in South Slide Creek and not a single fish was reported as having been collected in North Slide Creek.

Fish communities in Tombstone Creek below the diversion and in Bear Creek above and below the diversion were composed entirely of brown trout, although other species have been reported. The fish community of Hooper Creek was composed entirely of golden trout (golden x rainbow trout) hybrids. In Crater, Chinquapin, Camp 62, and Bolsillo Creeks, only brook trout were collected above and below the diversions. Brown trout and rainbow trout were found in Mono Creek downstream of the Mono Diversion (Figures CAWG 7-24 and CAWG 7-25).

Estimates for fish populations, densities and biomass are given in Tables CAWG 7-6 and CAWG 7-7). Golden trout hybrid densities ranged from 662.5 to 962.4 fish/km and averaged 812.5 fish/km in the two sites in Hooper Creek in which they were found. Among the eight SFSJR tributary study streams with fish, brook trout, were found in four, represented by 10 sampling sites. Brook trout densities ranged from 142.7 to 2,187.3 fish/km and averaged 1,066.1 fish/km among the 10 sites. Brown trout occurred in three sampling sites among the tributaries and ranged in density from 64.3 to 1,406.1 fish/km, averaging 646.9 fish/km. Among the SFSJR tributary study streams, rainbow trout were found only in Mono Creek below the Mono Diversion and had a density of 11 fish/km.

Fish from multiple age classes, including age 0+, were collected at most sites that had fish, indicating reproduction and rearing occurred (Figures CAWG 7-26 through CAWG 7-41). However, no age 0+ golden trout hybrids were found in Hooper Creek above the diversion and no age 0+ brook trout were found in Bolsillo Creek below the diversion (Rosgen Level I type Aa+ channel sites).

Condition factors for sampled fish are summarized in Figures CAWG 7-42 through CAWG 7-47. There was no significant statistical difference between condition factors for each fish species above and below the diversions in Hooper ($p=0.74$), Bear, and Camp 62 Creeks ($p=0.98$). In Crater Creek, the condition factors above the diversion (average of 1.46), Crater Creek below the diversion (average of 1.05) and the Crater Creek diversion channel (average of 1.33) were statistically significantly different among sites ($p=0.05$). In Chinquapin Creek, the brook trout condition factors above the diversion were different (average of 1.35), at a statistically significant level ($p<0.05$) from those below the diversion (average of 1.01) (both sites were in Rosgen Level I type Aa+ channels). In Bolsillo Creek, the brook trout condition factors at the Rosgen B site below the diversion (average of 1.24) were different at a statistically significant level ($p<0.05$) from those in the Rosgen Aa+ site above the diversion (average of 1.11). However, there was no significant statistical difference between condition factors between the Rosgen Aa+ sites above and below the diversion, or between sites below the diversion in Bolsillo Creek. Back calculated estimates of growth from scales are presented in CAWG 7-Appendix D.

5.3 MAMMOTH REACH OF THE SAN JOAQUIN RIVER

The Mammoth Reach of the San Joaquin River (SJR) extends from Mammoth Pool Dam (SJR RM 25.55) to Mammoth Pool Powerhouse (SJR RM 18.2). Historical fisheries information and stocking records are summarized in CAWG 7-Appendix C for this reach. Two diverted tributaries, Rock and Ross Creeks, were included among the study streams. Sampling locations are shown in Map CAWG 7-4.

5.3.1 SAN JOAQUIN RIVER MAINSTEM

Two sites (both located in the Rosgen Level I type B channel) were sampled in the Mammoth Reach during 2002. The presence of large pools at the upper end (Mammoth Pool Dam) and lower end (Rock Creek) restricted safe access to the G channel section of stream. The pools at both ends were large and deep, and prohibited the safe transportation of electrofishing equipment into the reach. A site was therefore selected immediately downstream of this reach so that a comparison could be made between the upstream and downstream sites. However, this was in a B type channel.

The fish communities at both sites were predominantly composed of Sacramento sucker, which represented over 70 percent of the fish abundance at both sites. Rainbow and brown trout were present, but less abundant (Figures CAWG 7-48 through CAWG 7-50). Estimates for fish populations, densities and biomass are given in Tables CAWG 7-8 to CAWG 7-9. Sacramento sucker densities were greater than other species at both sites with densities of 498 and 1,197 fish/km, for the upper and lower sites, respectively. Among the trout, rainbow trout had greater densities in the lower site and brown trout had greater density in the upper site. Rainbow trout densities were 91 and 384 fish/km for the upper and lower sites, respectively. Brown trout densities were 125 and 52 fish/km for the upper and lower sites, respectively.

Length-frequency histograms with age breaks from scale analysis show the age distribution (for trout) of the fish sampled (Figure CAWG 7-51 through CAWG 7-60). Multiple age classes were present for all three species, which suggests reproduction and rearing occurs in this portion of the San Joaquin River.

Condition factors for sampled fish are summarized in Figures CAWG 7-61 through CAWG 7-62. There was no significant statistical difference between condition factors between the two sites for rainbow trout ($p=0.67$) and brown trout ($p=0.27$). Back calculated estimates of growth are presented in CAWG 7-Appendix D.

5.3.2 Tributaries of the Mammoth Reach

Rock and Ross Creeks are tributaries of the San Joaquin River located downstream of the Mammoth Pool Reservoir (Map CAWG 7-4). Ross Creek was not sampled because the reach upstream of the diversion and a large segment below the diversion go dry in the summer and were dry during summer 2002 (see CAWG 1 Report).

Sampling sites above and below the diversion on Rock Creek (both are Rosgen Aa+ channels) contained brown trout and rainbow trout (Figures CAWG 7-63 and CAWG 7-64). Estimates for fish populations, densities and biomass are given in Tables CAWG 7-10 and CAWG 7-11. Rainbow trout densities were 241 and 432 fish/km above and below the diversion, respectively. Brown trout densities were 930 and 481 fish/km above and below the diversion, respectively. Biomass also differed between the two reaches.

There was a wide range of sizes among fish collected, which correspond to multiple age classes that were present above and below the Rock Creek diversion (Figures CAWG 7-65 through CAWG 7-68). The presence of rainbow trout smaller than the catchable-sized hatchery fish planted suggests that successful rainbow trout reproduction occurs in Rock Creek or its tributaries. The persistence of brown trout, despite the lack of stocking since 1953 is indicative of a self-sustaining population.

Condition factors for sampled fish are summarized in Figures CAWG 7-69 and CAWG 7-70. There was no significant statistical difference between brown trout condition factors between sites above and below the diversion ($p=0.76$). Rainbow trout condition factors were statistically significantly different between sites above (average of 1.19) and below (average of 1.46) the diversion ($p<0.05$). Back calculated estimates of growth from scales are presented in CAWG 7-Appendix D.

5.4 STEVENSON REACH OF THE SAN JOAQUIN RIVER

The Stevenson Reach of the San Joaquin River extends from Dam 6 (SJR RM 17.0) to Big Creek Powerhouse 3 (SJR RM 11.2) above Redinger Lake. Two representative sites, both in Rosgen Level I type G channels, were sampled in the upper and lower portions of the reach, respectively, during the late summer of 2002 (MAP CAWG 7-5).

The fish communities differed between the upper and lower sites (Figures CAWG 7-71 and CAWG 7-72). The fish community at the upper site was dominated by Sacramento sucker, which made up 76 percent of the fish collected. There were smaller numbers of rainbow trout, brown trout, Sacramento pikeminnow, and prickly sculpin, which made up approximately nine, two, two, and eleven percent of the total, respectively. One juvenile Sacramento pikeminnow was observed during snorkeling at the upper site. Another juvenile cyprinid, either Sacramento pikeminnow or hardhead, also was observed at the upper site, but the species could not be determined. At the lower site, Sacramento pikeminnow, hardhead (a US Forest Service sensitive species and a California Species of Special Concern), and a very small number of Sacramento sucker (two fish) were present, representing components of the native transition zone community. Sacramento pikeminnow made up 56 percent of the total fish collected at this site, and hardhead made up 40 percent. Brown trout also was present. Estimates for fish populations, densities and biomass are given in Tables CAWG 7-12 and CAWG 7-13. Densities of Sacramento suckers at the upper and lower sites were 514 and 15 fish/km. respectively. Sacramento pikeminnow and hardhead densities at the lower site were 597 and 295 fish/km, respectively. Rainbow trout had a density of 100 fish/km at the upper site only. Brown trout densities were seven fish/km at both sites.

Length-frequency histograms for sampled fish are presented in Figures CAWG 7-73 through CAWG 7-84). From the upper site, multiple year classes for Sacramento sucker and prickly sculpin were collected. Prickly sculpin were collected in two size ranges, suggesting at least two age classes were present in this sample. The presence of age 0+ and 1+ rainbow trout suggests that this species may spawn in the vicinity of this site.

At the lower site, the wide distribution of size classes of Sacramento pikeminnow and hardhead suggest that multiple age classes are present, including age 0+ (Figures CAWG 7-80 through CAWG 7-82). In addition, large numbers of small (0 to 3 inches Total Length [TL]) unidentified cyprinids in were found in the margins of the snorkeled pool habitat. These small fish were identified as cyprinids, and were likely to be either Sacramento pikeminnow or hardhead, based on their morphological features. While distinctive features (e.g. body plan, scales) make it relatively easy to differentiate the native species of minnow from many of the possible introduced minnows (e.g. carp, goldfish, golden shiner, etc.), it is more difficult to distinguish between small pikeminnow and hardhead without capturing them for close observation. These observations suggest these species are capable of successfully spawning and rearing in the vicinity of this site (Figure CAWG 7-83).

Condition factors for rainbow trout at the upper site ranged from 0.98 to 1.61. Brown trout condition factors for the upper and lower site, each represented by a single specimen, were 1.22 and 1.16, respectively. Hardhead condition factors ranged from 0.69 to 1.51. Back calculated estimates of growth are presented in CAWG 7-Appendix D.

5.5 BIG CREEK DRAINAGE

The Big Creek Drainage addressed in this study extends from Big Creek Dam 1 at Huntington Lake (Big Creek RM 9.9) to Big Creek Powerhouse 8 (Big Creek RM 0.0) and includes both Big Creek and its tributaries downstream of Huntington Lake. Historical fisheries information and stocking records are summarized in CAWG 7-Appendix C for this drainage basin. Big Creek study stream tributaries include Pitman, Balsam, Ely and Adit No. 8 Creeks. Sampling locations are shown in Map CAWG 7-5 and CAWG 7-6.

5.5.1 BIG CREEK

The three reaches of Big Creek used in this study are defined by the presence of Project features. The most upstream reach extends from downstream of Dam 1 at Huntington Lake to upstream of Big Creek Powerhouse 1. The second reach extends from Dam 4 (Powerhouse 1 tailrace) to upstream of Big Creek Powerhouse 2. The third reach extends from Dam 5 (Powerhouse 2 and 2A tailraces) to upstream of Big Creek Powerhouse 8. Sites representing typical habitats in major Rosgen Level I channel types were sampled in each of the three reaches of Big Creek. These included sites located in Rosgen Level I type Aa+, A, B and G channels, which were sampled in the fall of 2002.

Estimates for fish populations, densities and biomass are given in Tables CAWG 7-14 and CAWG 7-15. Brown trout had greater abundance and density estimates than other fish species in the upstream, higher elevation sites of Big Creek, and rainbow trout had greater abundance and density estimates than other fish species in the lower elevation sites (Figures CAWG 7-85 through CAWG 7-89).

In the reach from Dam 1 at Huntington Lake to upstream of Big Creek Powerhouse 1, sites in Rosgen Level I type A, Aa+, B, and G channels were sampled. Brown trout and prickly sculpin were the only species collected in this reach. Brown trout densities ranged from 320 to 1,214 fish/km with an average of 670 fish/km, among sites in this reach. Prickly sculpin, which was only found in the G channel site, had a density of 14 fish/km.

In the Dam 4 to upstream of Big Creek Powerhouse 2 reach, a Rosgen Level I channel type A site was sampled. Rainbow and brown trout were found there at equal densities, 363 fish/km, but at lower densities than in upstream and downstream reaches.

In the Dam 5 to upstream of Big Creek Powerhouse 8 reach, both A and Aa+ Rosgen Level I channel types were sampled. Both sites included rainbow and brown trout. Rainbow trout densities were 930 and 769 fish/km for the A and Aa+ sites, respectively. Brown trout densities were 602 and 160 fish/km for the A and Aa+ sites, respectively.

Length-frequency histograms with age breaks from scale analysis show the age distribution of the fish sampled (Figure CAWG 7-90 through CAWG 7-99). Although there were few or no age 0+ fish at most sites, there were multiple age classes present for all three species, which suggests reproduction and rearing occurs in this drainage. However, there were many age 0+ rainbow trout collected in the A channel site between Dam 5 and Big Creek Powerhouse 8, which suggests reproduction occurs in or near this reach. Age 1+ brown and rainbow trout were more common in sites downstream of Dam 4 than in the upstream reach between Dam 1 and Powerhouse 1. However, the presence of brown trout, which is no longer stocked, in each reach indicates the presence of self-sustaining populations.

Condition factors for sampled fish are summarized in Figure CAWG 7-100. The condition factors for brown trout in the Rosgen Aa+ site of Big Creek between Dam 1 and Big Creek Powerhouse 1, (average of 1.42) was statistically significantly different ($p<0.001$) than in the B channel (average of 0.92) of this reach. There was no statistically significant difference between condition factors at other sites, where biomass data were available. Due to failure of electronic scales used to weigh fish, weights for fish collected in other reaches of Big Creek were not available and condition factors could not be calculated or compared in those reaches. Back calculated estimates of growth are presented in CAWG 7-Appendix D.

5.5.2 Tributaries of Big Creek

Study streams that are tributaries of Big Creek including Pitman (confluence at Big Creek RM 6.3), Balsam (confluence at Big Creek RM 4.8), Ely (confluence at Big Creek RM 3.3), and Adit No. 8 Creeks (confluence at Big Creek RM 2.6) were sampled in the fall of 2002. Sampling was conducted at representative sites above and below the diversions (Map CAWG 7-6). Sampling could not be conducted above the diversion in Adit No. 8 Creek because the stream above the diversion could not be safely accessed. Adit No. 8 Creek Diversion, which was used when the Project was under construction, is no longer in service. Balsam, Ely, and Adit No. 8 Creeks are classified as having Rosgen Level I type Aa+ channels. Pitman Creek was the only creek of these four study streams to have Rosgen Level I type Aa+ and B channel segments.

Not a single fish was collected from Adit No. 8 Creek below the diversion. The fish communities at all other sites were composed predominantly of rainbow trout. There were smaller components of brook trout and brown trout in Pitman Creek above and below the diversion, and golden x rainbow trout hybrids were collected below the diversion in Ely Creek (Figures CAWG 7-101 through CAWG 7-105).

In Pitman Creek (also known as Tamarack Creek), a Rosgen Level I type B channel was sampled upstream of the diversion, and Rosgen Level I type B and Aa+ channels below the diversion. Above the diversion, rainbow trout made up almost 73 percent of the fish collected, with brown and brook trout making up about 21 and six percent respectively. The estimated densities for these species were 1,066, 338, and 82 fish/km, respectively. In the Rosgen B channel site below the diversion, rainbow trout made up about 94 percent of the total abundance. Densities for the three trout species were estimated to be 613, 22, and 22 fish/km for rainbow, brown, and brook trout, respectively. In the Rosgen Aa+ channel site, only rainbow trout were found, at a density of 1,647 fish/km.

In Balsam Creek, rainbow trout was the only species collected from the Rosgen Aa+ channel sites above and below the diversion. The estimated densities of rainbow trout above and below the diversion were approximately 1,335 and 12 fish/km, respectively.

Rosgen Level I channel type Aa+ sites were sampled above and below the diversion in Ely Creek. Rainbow trout was the only species collected above the diversion, with a density of 190 fish/km. Downstream of the diversion, rainbow trout and golden/rainbow trout hybrids were collected. The densities of these fish were 266 and 102 fish/km, respectively.

Length-frequency histograms with age breaks from scale analysis for sampled fish are summarized in Figures CAWG 7-106 through CAWG 7-117. In Pitman Creek, brown and rainbow trout from all age classes (including age 0+) and brook trout from at least two age classes were collected above the diversion, despite the lack of stocking, which indicate self-sustaining populations. In Pitman Creek below the diversion, rainbow trout from multiple age classes, including age 0+ were collected. Two brown trout (age 4+) and two brook trout (age 2+) also were collected there.

In Balsam Creek, rainbow and brown trout from multiple age classes, including age 0+, were collected above the diversion. Below the diversion, only one rainbow trout (age 2+) was collected. In Ely Creek above the diversion, only rainbow trout aged 3+ and greater were collected. In Ely Creek below the diversion, multiple age classes of rainbow trout and golden x rainbow trout hybrids were collected. The presence of age 0+ and older fish in Pitman Creek, Balsam Creek above the diversion, and Ely Creek below the diversion suggests reproduction and recruitment occurs in the vicinity of the these sites. The limited observed age classes in Balsam Creek below the diversion and Ely Creek above the diversion may be due to the lack of suitable spawning and rearing habitat. Both stream reaches, Balsam Creek below the diversion and Ely Creek above the diversion, are bedrock-dominated streams with steep channel slopes (see CAWG 1 Report).

Condition factors for sampled fish are summarized in Figures CAWG 7-118 through CAWG 7-122. There was no statistically significant difference between rainbow trout condition factors above and below the diversions in Balsam (p=0.42) and Ely Creeks (p=0.15). In Pitman Creek, condition factors for rainbow trout in the Rosgen B channel site above the diversion were statistically significantly lower ($p<0.05$) than the Rosgen B channel site below the diversion (Figure CAWG 7-119). There was no significant statistical difference in rainbow trout condition factors between the Rosgen Aa+ channel site below the diversion and the other sites. There also was no statistically significant difference in brown and brook trout condition factors (p=0.64 and 0.91, respectively). Back calculated estimates of growth are presented in CAWG 7-Appendix D.

5.6 STEVENSON AND NORTH FORK STEVENSON CREEKS

Stevenson Creek is a tributary of the San Joaquin River; its confluence with the San Joaquin River is located at SJR RM 13.6. Natural flow in North Fork Stevenson Creek, a tributary of Stevenson Creek that flows to Shaver Lake, is controlled and augmented by releases made at Gate 2 from Tunnel 7. Prior to the operation of the Balsam Meadow Project, water was transferred from Huntington Lake to Shaver Lake through this channel. Currently, water from Huntington Lake enters Shaver Lake through Eastwood Powerhouse. Flows in Stevenson Creek below Shaver Lake originate from a release at the base of Shaver Lake Dam.

5.6.1 NORTH FORK STEVENSON CREEK

Sampling was conducted at four locations in North Fork Stevenson Creek in 2002, including three Rosgen Level I channel types. These included channel type Aa+, G and C sites (Map CAWG 7-7). The sampled G channel site was initially identified as a B channel sample site, based on physical appearance and location. The sampled site occurs in an area of transition from G to C channel at RM 1.75, which is located close to the candidate sample site identified in *CAWG 7 Fish Candidate Reference Sites and Bypass Reach Sampling Locations,* July 2002.

Several recent studies have been performed in North Fork Stevenson Creek. A study was implemented beginning in October of 2000 to monitor fish populations of North Fork Stevenson Creek downstream of the Tunnel 7 outlet after a failure of Gate 2 resulted in higher than normal (since operation of the Balsam Meadow Project was initiated) streamflows occurring in this channel (ENTRIX 2001 and 2002). Smaller fish populations and changes in year class structure were documented following this high-flow event compared to a five-year study conducted from 1988-1992 (BioSystems 1992).Data from earlier North Fork Stevenson Creek studies are presented with those collected as part of this study and summarized in Appendix G.

In the current study, not a single fish was found in the Aa+ channel site upstream of the Tunnel 7 outlet. An augmented instream flow release is made to the creek from the Tunnel 7 outlet. The fish communities downstream of the Tunnel 7 outlet in 2002 were predominantly composed of brown trout, rainbow trout and golden x rainbow trout hybrids (which were classified with rainbow trout in earlier studies), with a small component of Sacramento sucker. The Rosgen Aa+ site downstream of Tunnel 7 contained only golden x rainbow trout hybrids. The Rosgen Level I channel type G and C sites (Figures CAWG 7-123 and CAWG 7-124, respectively) were primarily composed of brown and rainbow trout. Estimates for fish populations, densities and biomass are given in Tables CAWG 7-16 and CAWG 7-17. The density of golden x rainbow trout hybrids was 583 fish/km. In the Rosgen Level I channel type G site (RM 1.7), the densities of rainbow trout, brown trout, golden x rainbow trout hybrids and Sacramento sucker were 210, 305, 11, and 11 fish/km, respectively. In the C channel site, densities of rainbow trout, brown trout, and Sacramento sucker were 314, 430, and 42 fish/km, respectively. Compared to 2001, density estimates for trout in 2002 were lower in the Rosgen G and C channels, but higher in the Rosgen Aa+ channel. Sacramento sucker density estimates were higher in the Rosgen C site and lower in the Rosgen G site compared to 2001. Riffle sculpin were collected in 2000 and 2001, but not in 2002.

Length-frequency histograms show the age distribution of the fish sampled (Figures CAWG 7-125 through CAWG 7-130). Multiple age classes of trout species were found, although age 0+ fish (brown trout and rainbow trout) were found primarily in the downstream site (Rosgen C site). This indicates that successful reproduction and rearing continues to occur in North Fork Stevenson Creek. Only age 4+ and greater Sacramento suckers were found, suggesting that recruitment may not have been successful in recent years.

Condition factors for sampled fish are summarized in figures CAWG 7-131 through CAWG 7-133. Brown trout condition factors were statistically significantly different ($p<0.05$) between the Rosgen G channel site (average of 1.39) and the Rosgen C channel site (average of 1.23). Average condition factors for rainbow trout were not statistically significantly different ($p=0.93$) between North Fork Stevenson Creek sites. Golden x rainbow trout average condition factors were statistically significantly different ($p<0.05$) between the Rosgen G channel site (average of 1.35) and Rosgen Aa+ channel site below the Tunnel 7 outlet (average of 0.98). Back calculated estimates of growth are presented in CAWG 7-Appendix D.

5.6.2 STEVENSON CREEK

Representative sites were sampled in Rosgen Level I type B, Aa+, and A channels downstream of Shaver Lake Dam. Sampling was conducted in late fall of 2002. Rainbow trout was the only species found at all sites. Estimates for fish population densities and biomass are given in Tables CAWG 7-18 and CAWG 7-19. Trout densities were highest in the Rosgen B and Aa+ sites. Rainbow trout densities were 751, 966, and 128 fish/km in the Rosgen B, Aa+, and A sites, respectively.

Multiple age classes were found, including age 0+ rainbow trout, which indicates that successful reproduction and rearing occurs in Stevenson Creek (Figures CAWG 7-134 through CAWG 7-136). The average rainbow trout condition factor in the Rosgen Aa+ channel site (average of 1.34) was significantly statistically different ($p<0.05$) than the Rosgen B channel site (average of 1.04) (Figure CAWG 7-137). Due to failure of the electronic scales used to weigh fish in the field, weights for fish collected in the Rosgen A site were not available and condition factors could not be calculated (nine fish). Back-calculated estimates of growth are presented in CAWG 7-Appendix D.

5.7 RESERVOIRS

This section presents the results of fish sampling in Project reservoirs and medium-sized impoundments. Reservoirs and impoundments are classified based on storage capacity. Large Project reservoirs include Florence Lake, Mammoth Pool Reservoir, Huntington Lake, and Shaver Lake. Medium-sized Project impoundments include Bear Creek Diversion Dam Forebay, Mono Creek Diversion Dam Forebay, Big Creek Powerhouse 3 Forebay (Dam 6), Big Creek Powerhouse 2 Forebay (Dam 4), Big Creek Powerhouse 8 Forebay (Dam 5), and Balsam Meadow Forebay. A general summary of net catch per effort data for each impoundment is provided in Table CAWG 7 ES-2. The discussion starts with the upstream-most impoundment, Florence Lake, and proceeds to discuss the impoundments in a downstream direction.

5.7.1 FLORENCE LAKE

Florence Lake is located on the SFSJR and is impounded by Florence Dam at SFSJR RM 28.0 (Map CAWG 7-8). Historical fisheries information and stocking records for Florence Lake are summarized in CAWG 7-Appendix C. Species historically introduced to Florence Lake include rainbow/steelhead trout, brown trout, brook trout, kokanee, and golden shiner. Fish (rainbow trout) were last stocked in Florence Lake in 1998.

Nineteen locations in Florence Lake were sampled with gill nets, minnow traps, and trap nets between August 14 through 16, 2002 (Map CAWG 7-8). An attempt was made to electrofish the shallow water habitat on July 10, 2002 (Map CAWG 7-8). It was determined that electrofishing could not be effectively conducted in Florence Lake due to the steep shoreline, limited shallow water habitat, and low specific conductance. As with all the reservoirs, gill nets were utilized in deeper water, while minnow traps and trap nets were set in shallow areas.

Brown trout was the only fish species collected with gill nets and minnow traps. No fish were collected in the trap nets. After 278.80 hours of fishing with gill nets, 39 brown trout were collected (Table CAWG 7-20). The catch per unit effort (CPUE) was 0.14 fish/hour, or 3.36 fish/day (Table CAWG 7-20), the highest CPUE calculated for brown trout collected in gill nets for all large Project reservoirs. Minnow traps collected only two brown trout after fishing for 1,394 hours, which yielded a CPUE of less than 0.01 fish/hour, or 0.03 fish/day (Table CAWG 7-20). Rainbow trout, although not collected during this survey, were observed by ENTRIX fishery biologists during a subsequent visit to the reservoir in October.

Brown trout collected in Florence Lake represented multiple age classes, most from age 4+ to age 6+ and greater (Figure CAWG 7-138). The presence of multiple age classes, despite the lack of stocking since 1969, indicates that the brown trout population is self-sustaining in Florence Lake and its tributaries, where spawning is likely to occur. The average condition factor for brown trout was calculated to be 1.47 (Table CAWG 7-21). Growth information for brown trout collected in Florence Lake is presented in CAWG 7-Appendix D.

A hydroacoustic survey was conducted in Florence Lake to examine the density and distribution of fish in the lake. A distance of 19.4 km was sampled within the lake on August 15, 2002. The results of the survey were used to characterize three areas of the lake and depth intervals within each, including the dam area, mid-lake, and the inflow area (Map CAWG 7-18). The dam area of the lake was near the Ward Tunnel Intake and the Florence Lake Dam, the inflow area was near the SFSJR input into Florence Lake, and the mid-lake area was between the dam and inflow areas. Table CAWG 7-22 presents the density of fish in the lake and Figure CAWG 7-139 presents the distribution by area. The greatest fish density was in the layer between 4.0 and 5.9 meters deep for all areas of the lake. In the dam area of the lake, there were very few fish near the bottom (21.6 to 23.5 meters deep). Most of the fish in the dam area of the lake were shallower than 15.7 meters in depth. The mid-lake region of the lake had fish at all depth strata, with the highest density near the bottom (21.6 to 23.5 meters). The inflow area of the lake had the lowest density of fish. The fish at the inflow area were mostly located between 7.9 and 11.8 meters.

5.7.2 Bear Creek Diversion Dam Forebay

Bear Creek Diversion Dam creates a medium-sized Project impoundment located approximately 1.57 miles upstream of the confluence of Bear Creek with the SFSJR (Map CAWG 7-9). Brown trout, rainbow trout, brook trout, golden trout, and rainbow-golden trout hybrids were historically present in or near the impoundment. Historical fisheries information and stocking records are summarized in CAWG 7-Appendix C.

Fish were collected from five sampling locations within the impoundment (Map CAWG 7-9). Gill nets were set between June 27 and 29, 2002, and electrofishing was conducted on July 11, 2002. Brown and rainbow trout were the only species collected, representing 93 and seven percent of the catch, respectively.

Brown trout was the dominant species based on sampling by both gill nets and electrofishing (Figure CAWG 7-140). After 88.50 hours of fishing with gill nets, the CPUE was 0.44 fish/hour, or 10.58 fish/day (Table CAWG 7-23). This was the highest CPUE for brown trout collected in gill nets for all six of the medium-sized Project impoundments. After electrofishing for 0.72 hours, 11 brown trout were collected (Table CAWG 7-23).

Only one rainbow trout was collected in the gill nets, for a CPUE of 0.01 fish/hour, or 0.27 fish/day (Table CAWG 7-23). This was the lowest CPUE calculated for rainbow trout collected in gill nets out of the medium-sized Project impoundments. Three rainbow trout were collected through electrofishing (Table CAWG 7-23).

Length-frequency histograms with age breaks from scale analysis show the age distribution of the fish sampled (Figures CAWG 7-141 and CAWG 7-142). Multiple age classes were present for brown trout, while only two age classes were present for rainbow trout (age 0+ and an older fish of undetermined age). The presence of young-of-the-year (age 0+) brown and rainbow trout shows that successful spawning occurs in the area of (upstream of) the Bear Creek Diversion Forebay, despite the absence of fish stocking since 1948.

Condition factors for fish collected in Bear Creek Diversion Forebay are summarized in Table CAWG 7-21. The average condition factors for brown and rainbow trout were 1.38 and 0.85, respectively. Growth information for brown and rainbow trout collected from the Bear Creek Diversion Dam Forebay is presented in CAWG 7-Appendix D.

5.7.3 MONO CREEK DIVERSION DAM FOREBAY

Mono Creek Diversion Dam is located on Mono Creek approximately 5.8 miles upstream of the confluence with the SFSJR (Map CAWG 7-10). Brown and rainbow trout were historically present in the impoundment, and both species are also found upstream.

Rainbow, brown, and brook trout, as well as several strains of rainbow trout hybrids, have historically been stocked in Lake Edison by CDFG. Rainbow trout and brook trout also have been stocked in Mono Creek downstream of Vermilion Valley Dam. Catchable-sized rainbow trout is the only species currently stocked in Mono Creek upstream of the diversion. Historical fisheries information and stocking records are summarized in CAWG 7-Appendix C.

The Mono Creek Diversion Dam Forebay was sampled utilizing gill nets (from June 19 through June 21, 2002) and electrofishing on June 20, 2002 (Map CAWG 7-11). Brown and rainbow trout were collected from the forebay, representing 24 and 76 percent of the total catch, respectively (Figure CAWG 7-143). Rainbow trout have been regularly stocked in Mono Creek above the diversion dam for many years (CAWG 7-Appendix C), which explains the large number of catchable-sized rainbow trout collected in the Forebay.

Seven brown trout were collected from the gill nets after fishing for 61.65 hours, for a CPUE of 0.11 fish/hour, or 2.73 fish/day (Table CAWG 7-24). Five brown trout were collected by electrofishing for a duration of 0.45 hours (Table CAWG 7-24).

Rainbow trout were only collected in the gill nets, with a CPUE of 0.62 fish/hour, or 14.79 fish/day (Table CAWG 7-24). This was the highest CPUE for rainbow trout collected in gill nets for all six of the medium-sized Project impoundments. This is likely due to the influence of current stocking practices.

Length-frequency histograms for collected fish are presented in Figures CAWG 7-144 and CAWG 7-145. Only adult hatchery rainbow trout were collected in Mono Creek Diversion Dam Forebay. The absence of fish smaller than 200 mm FL indicates the lack of rainbow trout recruitment and hatchery influence in this area. Scale analysis and appearance revealed that all of the rainbow trout collected from Mono Creek Diversion Dam Forebay were of hatchery origin.

Both juvenile (age 0+ and age 1+) and adult brown trout were collected in the impoundment. Numerous young-of-the-year brown trout were observed in the reach of Mono Creek immediately upstream of the forebay, and Mono Creek downstream of Vermilion Valley Dam, in 2001 (SCE 2001, Vermilion Exhibit E). Since brown trout have not been stocked in this creek for many years, this indicates that successful recruitment of brown trout is taking place in Mono Creek upstream of Mono Diversion, including the impoundment.

The average condition factors for brown and rainbow trout were 1.41 and 2.19, respectively (Table CAWG 7-21). The high value observed for rainbow trout is likely to be the result of their hatchery origin. Growth information for brown trout collected from Mono Diversion Dam Forebay brown is presented in CAWG 7-Appendix D. The scale circuli observed for the rainbow trout were evenly spaced, suggesting that the growth of these fish was uniform throughout the year. This scale pattern is typical of hatchery-reared fish, which are generally protected from seasonal changes in food availability and temperature.

5.7.4 MAMMOTH POOL RESERVOIR

Mammoth Pool Dam, located on the San Joaquin River (SJR RM 26), impounds water in Mammoth Pool Reservoir. Species historically stocked in Mammoth Pool Reservoir include rainbow trout, brook trout, coho salmon, and Eagle Lake trout. Other species found include Sacramento sucker and golden shiner (BSAI 1987, CDFG 1999, and CDFG 2002). The presence of coho salmon has not been documented since 1977, the last year they were stocked in Mammoth Pool Reservoir. The presence of golden shiner was documented as recently as 1998 and may represent a baitfish introduction. Rainbow trout and Eagle Lake trout are the only species currently stocked in Mammoth Pool Reservoir. Historical fisheries information and stocking records are summarized in CAWG 7-Appendix C.

Nineteen locations in Mammoth Pool Reservoir were sampled with gill nets, minnow traps, and trap nets between September 27 and September 29, 2002 (Map CAWG 7-11). Fish were only collected in gill nets. Both brown and rainbow trout were collected from Mammoth Pool (Figure CAWG 7-146), representing 71 and 29 percent of the catch, respectively. It was determined that electrofishing could not be effectively conducted in Mammoth Pool Reservoir due to the steep shoreline and limited shallow water habitat.

Twelve brown trout were collected from the gill nets after fishing for 278.00 hours, for a CPUE of 0.04 fish/hour, or 1.04 fish/day (Table CAWG 7-25). This CPUE was lower than the CPUE for brown trout collected in gill nets in Florence Lake (0.14 fish/hour), but similar to Huntington Lake (0.03 fish per hour).

Five rainbow trout were collected, for a CPUE of 0.02 fish/hour, or 0.43 fish/day (Table CAWG 7-25). This was a lower CPUE than for rainbow trout collected in gill nets from Shaver Lake (0.08 fish/hour), but slightly higher than that from Huntington Lake. These fish were likely of hatchery origin. One of the five rainbow trout collected was determined to be of hatchery origin based on its physical appearance and the result of its scale analysis (the other four rainbow trout were heavily eaten by crayfish and their origin could not be determined).

Length frequency is presented in Figures CAWG 7-147 and CAWG 7-148. Brown trout were represented by multiple ages in the sampled fish. No brown trout under age 3+ were collected, which suggests that young-of-the-year fish may not move downstream to the reservoir to rear in every year, or that younger fish reaching the reservoir are subject to predation. The presence of multiple age classes of larger fish indicates that recruitment to the local population is limited to larger fish (130 mm FL and greater). The age analysis of the rainbow trout scales was inconclusive. This is likely due to their hatchery origin and the difficulty of discerning clear annuli from hatchery-derived fish scales.

Condition factors for sampled fish are summarized in Table CAWG 7-21. Brown trout had an average condition factor as high as 1.10. Rainbow trout condition factors averaged 1.33. Growth information for brown trout collected in Mammoth Pool Reservoir is presented in CAWG 7-Appendix D.

A hydroacoustic survey was conducted in Mammoth Pool Reservoir to examine the density and distribution of fish in the lake. A distance of 19.2 km was sampled within the lake on September 26, 2002. Results of the survey were used to characterize three areas of the lake and depth intervals within each, including the dam area, mid-lake, and the inflow area (Map CAWG 7-19). The dam area of the lake was near the Mammoth Pool Powerhouse Intake and the Mammoth Pool Dam, the inflow area was near the SJR input into Florence Lake, and the mid-lake area was between the dam and inflow areas (from the Chiquito Creek inflow to the Jackass Creek inflow). Table CAWG 7-26 presents the density of fish in the lake and Figure CAWG 7-149 presents the distribution by area. The highest fish density was in the layer between 4.0 and 5.9 meters deep for all areas of the lake. The fish density of the dam area of the lake was relatively low (in comparison to the other two regions of the lake). Fish in the dam area of the lake were detected in nearly all of the depth strata. The mid-lake region had high densities of fish (greater than 20 percent of maximum density) in all depth strata shallower than 19.7 meters. The inflow area of the lake had the highest near surface density of fish (above 11.8 meters deep).

5.7.5 San Joaquin River Big Creek Powerhouse 3 Forebay (Dam 6)

The Big Creek Powerhouse 3 Forebay is located behind Dam 6 at San Joaquin RM 17.0 (upstream of the confluence with Big Creek). This medium-sized Project impoundment is approximately one mile long and less than 91 meters wide. Brown trout, rainbow trout and Sacramento sucker have historically been present in the forebay. Brook trout was thought to be present, although its presence was not verified. Historical fisheries information and stocking records are summarized in CAWG 7-Appendix C.

Five sites were sampled in the forebay using gill nets and minnow traps between June 24 and 26, 2002 (Map CAWG 7-12), but fish were only collected in the gill nets. Electrofishing also was conducted on July 11, 2002. Figure CAWG 7-150 presents the composition of fish collected. Sacramento sucker was the most abundant species (79 percent), with smaller components of brown (15 percent) and rainbow trout (six percent). The fish community composition of the forebay resembled that of the San Joaquin River upstream and downstream of the forebay.

Eleven brown trout were collected from the gill nets after fishing for 77.60 hours, for a CPUE of 0.14 fish/hour, or 3.40 fish/day (Table CAWG 7-27). No brown trout was collected by electrofishing. Four rainbow trout were collected for a CPUE of 0.05 fish/hour, or 1.24 fish/day (Table CAWG 7-27). Fifty-six Sacramento suckers were collected from the gill nets, for a CPUE of 0.72 fish/hour, or 17.32 fish/day (Table CAWG 7-27).

Length-frequency histograms with age breaks from scale analysis show the age distribution of sampled trout (Figures CAWG 7-151 through CAWG 7-153). Although scales were not aged for Sacramento sucker (Figure CAWG 7-152), multiple age classes can be discerned. Multiple age classes for all fish species were represented. However, no juvenile brown or rainbow trout under age 2+ were collected, which suggests that either young fish do not move downstream to rear in the forebay until they are larger than age 0+, or that age 0+ fish are subject to predation if they reach the forebay.

Condition factors for sampled fish are summarized in Table CAWG 7-21. The average condition factors for brown trout and rainbow trout were 1.11 and 1.36, respectively. Growth information for brown trout and rainbow trout collected in Dam 6 Forebay is presented in CAWG 7-Appendix D.

5.7.6 HUNTINGTON LAKE

Dam 1 on Big Creek impounds Huntington Lake at Big Creek RM 9.9. Many fish species were introduced to Huntington Lake, including brown trout, rainbow trout, brook trout, Sacramento sucker, and kokanee. Rainbow trout and kokanee are the only fish that are currently stocked in Huntington Lake. Stocking levels of kokanee are used to adjust for growing conditions and predation. CDFG believes that reproduction of kokanee in lake tributaries is undesirable and could contribute to lowered growth rates (Wickwire pers. comm.). Historical fisheries information and stocking records are summarized in CAWG 7-Appendix C.

Twenty-two sites were sampled throughout Huntington Lake with gill nets, trap nets and minnow traps between June 17 and 20, 2002 (Map CAWG 7-13). An attempt was made to electrofish the shallow water habitat on July 10, 2002 (Map CAWG 7-15). It was determined that electrofishing could not be effectively conducted in Huntington Lake due to the steep shoreline, limited shallow water habitat, rough water conditions, and low specific conductance. Species collected included brown trout (11 percent), rainbow trout (five percent), Sacramento sucker (39 percent), prickly sculpin (40 percent), and kokanee (five percent) (Figure CAWG 7-154). Additionally, a hydroacoustic survey was conducted on June 18, 2002 to characterize overall fish density and distribution (Map CAWG 7-20).

Seven brown trout were collected from gill nets after fishing for 269.35 hours, for a CPUE of 0.03 fish/hour, or 0.62 fish/day (Table CAWG 7-28). This was the lowest CPUE calculated for brown trout collected in gill nets for all large Project reservoirs, but similar to Mammoth Pool Reservoir. Brown trout were only collected in the gill nets.

One rainbow trout was collected from gill nets for a CPUE of 0.00 fish/hour, or 0.09 fish/day (Table CAWG 7-28). This was the lowest CPUE calculated for rainbow trout collected in gill nets for all large Project reservoirs, despite hatchery stocking. Rainbow trout collected in trap nets had a higher CPUE than those collected in gill nets. Most rainbow trout collected were catchable-sized fish, which originated from the CDFG San Joaquin Fish Hatchery.

Ten Sacramento suckers were collected from gill nets for a CPUE of 0.04 fish/hour, or 0.89 fish/day (Table CAWG 7-28). This was higher than the CPUE calculated for Sacramento suckers in Shaver Lake, the only other large reservoir where these fish were collected in gill nets. CPUE was higher with trap nets than with gill nets for Sacramento sucker (Table CAWG 7-28).

Prickly sculpin was the most frequently caught fish species in Huntington Lake (Figure CAWG 7-154). Fifteen prickly sculpin were collected from trap nets after fishing for 133.15 hours, for a CPUE of 0.11 fish/hour, or 2.70 fish/day (Table CAWG 7-28). Eleven prickly sculpin were collected in minnow traps, for a CPUE of 0.01 fish/hour, or 0.17 fish/day, with a fishing time of 1,598.40 hours (Table CAWG 7-28).

Two kokanee were collected from gill nets for a CPUE of 0.01 fish/hour, or 0.18 fish/day (Table CAWG 7-28), which is a lower CPUE than for kokanee collected in gill nets in Shaver Lake. The CPUE of kokanee collected in trap nets was the same as for gillnets. About 10,428 fingerling kokanee were planted in Huntington Lake during 2002 (CDFG 2002), and there was likely a smaller contribution from naturally spawning kokanee. Although kokanee have been observed spawning in Rancheria Creek, primarily downstream of the Portal Powerhouse, CDFG has characterized their contribution as minor.

Multiple age classes for all fish species were represented in the sampled fish, which suggests that all fish species rear in Huntington Lake (Figures CAWG 7-155 through CAWG 7-159). The presence of young-of-the-year rainbow trout and Sacramento sucker indicates that these species are likely to reproduce in streams tributary to Huntington Lake.

Condition factors for sampled fish are summarized in Table CAWG 7-21. Brown trout, rainbow trout and kokanee had average condition factors of 2.28 and 1.97, and 2.94 respectively. Growth information for fish collected in Huntington Lake is presented in CAWG 7-Appendix D.

A hydroacoustic survey was conducted in Huntington Lake to examine the density and distribution of fish in the lake. A distance of 22.4 km was sampled within the lake on June 18, 2002. The results of the survey were used to characterize three areas of the lake and depth intervals within each, including the dam area, mid-lake, and the inflow area (Map CAWG 7-20). The dam area of the lake was near all three of the dams in the lake, the inflow area was near the Portal Powerhouse tailrace/Rancheria Creek input and the Big Creek input into the lake, and the mid-lake area was between the dam and inflow areas. Table CAWG 7-29 presents the density of fish in the lake and Figure CAWG 7-160 presents the distribution by area. The highest fish density was in the layer between 3.9 and 5.9 meters deep for all areas of the lake. In the dam area of the lake, there were no fish detected near the bottom (from 19.6 to 37.3 meters deep). All of the fish in the dam area of the lake were shallower than 19.6 meters deep. The fish density of the mid-lake region was lower than the other two areas of the lake. Most of the fish in the mid-lake region were within the upper layers (from 2.0 to 19.6 meters deep). The inflow area of the lake had the highest density of fish. The fish at the inflow area were mostly located between 2.0 and 15.7 meters deep.

5.7.7 Big Creek Powerhouse 2 Forebay (Dam 4)

Dam 4, located at Big Creek RM 6.0, creates a medium-size pool (60 acre-feet) in Big Creek, which is the Powerhouse 2 Forebay. Rainbow trout have historically been present in the forebay. Brown trout and brook trout were thought to have been present, although no specimens were collected in the previous studies. Although rainbow trout are not stocked in the forebay, rainbow trout occasionally escape from the nearby SCE hatchery (BSAI 1987) and are present in waters upstream of the forebay. Historical fisheries information and stocking records are summarized in CAWG 7-Appendix C.

Four sites were sampled throughout the forebay with gill nets and minnow traps (Map CAWG 7-14). Gill nets were set from June 4 through 6, 2002. Minnow traps were set on June 5 through 6, 2002. Fish were also collected by electrofishing on June 4, 2002. Brown trout, rainbow trout, and prickly sculpin were collected from the forebay, representing 21, 46, and 33 percent of the total collected fish, respectively (Figure CAWG 7-161).

Eight brown trout were collected from gill nets after fishing for 48.00 hours, for a CPUE of 0.17 fish/hour, or 4.00 fish/day (Table CAWG 7-30). This was similar to the CPUE for brown trout captured in gill nets in the impoundment behind Dam 5 (0.21 fish/hour). Only one brown trout was collected by electrofishing (Table CAWG 7-30).

Rainbow trout was the dominant species collected in the forebay (Figure CAWG 7-161). Eleven rainbow trout were collected in gill nets for a CPUE of 0.23 fish/hour, or 5.50 fish/day (Table CAWG 7-30), which was a higher CPUE than for rainbow trout captured in gillnets in the Powerhouse 8 (Dam 5) forebay. Rainbow trout were collected by electrofishing in addition to those that were captured with nets (Table CAWG 7-30).

Prickly sculpin were collected in the minnow traps (CPUE of 0.01 fish/hour, or 0.67 fish/day) and by electrofishing (Table CAWG 7-30).

The age distributions of the sampled fish are presented in length-frequency histograms with age breaks from scale analysis (Figures CAWG 7-162 through CAWG 7-164). Multiple age classes for brown trout were represented, which indicates that rearing occurs. The presence of young-of-the-year brown trout and age 1+ rainbow trout indicate that these species probably reproduce upstream of the forebay.

Condition factors for sampled fish are summarized in Table CAWG 7-21. The average condition factors for brown trout and rainbow trout were 1.24 and 1.47, respectively. Growth information for fish collected in Dam 4 Forebay is presented in CAWG 7-Appendix D.

5.7.8 BIG CREEK POWERHOUSE 8 FOREBAY (DAM 5)

Dam 5 impounds Big Creek Powerhouse 8 Forebay at Big Creek RM 1.65. It is a medium-sized Project impoundment. Rainbow trout were historically present in the forebay. Brown trout and brook trout were thought to have been present, although no specimens were collected in previous studies. Historical fisheries information and stocking records are summarized in CAWG 7-Appendix C.

Four sites were sampled throughout the forebay with gill nets and minnow traps (Map CAWG 7-15). Gill nets and minnow traps were set from June 5 to June 7, 2002. Brown trout, rainbow trout, and prickly sculpin were collected, representing 84, eight, and eight percent of the total collected fish, respectively (Figure CAWG 7-165).

Brown trout was the dominant species collected. Ten brown trout were collected from gill nets after fishing for 47.87 hours, for a CPUE of 0.21 fish/hour, or 5.01 fish/day (Table CAWG 7-31). This was the second highest calculated CPUE for brown trout collected in gill nets out of all medium-sized Project impoundments.

One rainbow trout was collected in the gill nets, for a CPUE of 0.02 fish/hour, or 0.50 fish/day (Table CAWG 7-31). This was a lower CPUE than for rainbow trout captured in the Big Creek Powerhouse 2 forebay.

One prickly sculpin was collected in gill nets (CPUE of 0.02 fish/hour, or 0.50 fish/day) (Table CAWG 7-31).

The age distribution of the sampled fish is presented in length-frequency histograms with age breaks from scale analysis (Figures CAWG 7-166 through CAWG 7-168). Multiple age classes for brown trout were represented, which indicates that recruitment occurs upstream of and to the forebay. The lack of age 0+ and age 1+ brown trout and rainbow trout suggests that young-of-the-year fish do not move downstream to rear in the forebay until they are larger, or that young fish are subjected to predation once they reach the forebay.

The average condition factor for brown trout was 1.34 (Table CAWG 7-21). The condition factor for rainbow trout was 1.85. Growth information for fish collected from Dam 5 Forebay sampled is presented in CAWG 7-Appendix D.

5.7.9 BALSAM MEADOW FOREBAY

Balsam Meadow Forebay is located on Balsam Creek, approximately 2.7 miles upstream of the confluence with Big Creek. Water moves from Huntington Lake to Balsam Meadow Forebay and from there to Shaver Lake through Eastwood Powerhouse. Water also is pumped from Shaver Lake to Balsam Meadow Forebay for pump-storage operation. Brown trout, rainbow trout, brook trout, prickly sculpin, kokanee, smallmouth bass, green sunfish, black crappie, carp, golden shiner, brown bullhead, and an unidentifiable catfish species were all found in Balsam Meadow Forebay in previous studies. Most of these species originated from Shaver Lake through pumpback and did not occur in the Balsam Creek. Historical records indicate rainbow trout was not stocked before the late 1990s, but were stocked in 1999 (CDFG 2002). Historical fisheries information and stocking records are summarized in CAWG 7-Appendix C.

Eleven sites were sampled throughout Balsam Meadow Forebay with gill nets, trap nets, and minnow traps (Map CAWG 7-19). Gill nets were set from June 11 to June 13, 2002. Trap nets and minnow traps were set from June 10 to June 12, 2002. Additionally, electrofishing was conducted on June 21, 2002. Fish collected in Balsam Meadow Forebay included brown trout (two percent), rainbow trout (seven percent), Sacramento sucker (19 percent), and prickly sculpin (41 percent). This was the only medium-sized impoundment where kokanee (28 percent) and smallmouth bass (three percent) were collected (Figure CAWG 7-169).

Three brown trout were collected from gill nets after fishing for 123.22 hours, for a CPUE of 0.02 fish/hour, or 0.58 fish/day (Table CAWG 7-32). This was the lowest calculated CPUE for brown trout collected in gill nets out of all medium-sized Project impoundments.

Seven rainbow trout were collected in gill nets, which resulted in a CPUE of 0.06 fish/hour, or 1.36 fish/day (Table CAWG 7-32). An additional three rainbow trout were collected in trap nets after 152.00 hours of fishing (CPUE of 0.02 fish/hour, or 0.47 fish/day) (Table CAWG 7-32).

Twenty-three Sacramento suckers were collected in gill nets, for a CPUE of 0.19 fish/hour, or 4.48 fish/day (Table CAWG 7-32). This calculated CPUE was lower than for Sacramento suckers collected in the forebay behind Dam 6, the only other medium-sized impoundment where Sacramento suckers were collected. An additional six Sacramento suckers were collected in trap nets (CPUE of 0.04 fish/hour or 0.95 fish/day). It should be noted that CPUE calculated for gill nets is not directly comparable to CPUE calculated for other capture methods because gear capture effectiveness varies by species and life-history stage.

Prickly sculpin was the dominant species collected in Balsam Meadow Forebay. Sixty-four prickly sculpin were collected in trap nets (CPUE of 0.42 fish/hour, or

10.11 fish/day) (Table CAWG 7-32). Prickly sculpin were not collected with gill nets or electrofishing.

Forty-three kokanee were collected in gill nets, for a CPUE of 0.35 fish/hour, or 8.38 fish/day (Table CAWG 7-32).

One smallmouth bass was collected in gill nets (CPUE of 0.01 fish/hour or 0.19 fish/day), while three smallmouth bass were collected utilizing electrofishing, after fishing for 0.64 hours (Table CAWG 7-32).

The age distribution of the sampled fish is presented in length-frequency histograms with age breaks from scale analysis (Figures CAWG 7-170 through CAWG 7-175). Multiple age classes, including younger fish, were represented in the sampled fish except brown trout, which indicates that rearing may occur in the forebay or that multiple age classes originate from Shaver or Huntington Lakes. Only age 6+ and older brown trout were identified in this location.

The average condition factors for sampled fish are summarized in Table CAWG 7-21. Average condition factors of brown trout, rainbow trout, kokanee, and smallmouth bass were 1.14, 1.19, 1.31, and 1.56 respectively. Growth information for fish collected in Balsam Meadow Forebay is presented in CAWG 7-Appendix D.

5.7.10 SHAVER LAKE

Shaver Lake Dam impounds Shaver Lake on Stevenson Creek at RM 4.25. Brown trout, rainbow trout, brook trout, Sacramento sucker, prickly sculpin, kokanee, largemouth bass, smallmouth bass, bluegill, black and brown bullhead, black crappie, carp, goldfish, threadfin shad, and green sunfish have all been historically collected in Shaver Lake (BSAI 1987; CDFG 1999; CDFG 2002; ENTRIX 1992; ESA 1985). Rainbow trout and kokanee are the only species that are currently stocked in Shaver Lake. Historical fisheries information and stocking records are summarized in CAWG 7-Appendix C.

Twenty sites were sampled throughout Shaver Lake with gill nets, trap nets, and minnow traps (Map CAWG 7-17). Gill nets, trap nets and minnow traps were set from July 30 to August 1, 2002. Shaver Lake was not sampled with an electrofisher due to safety concerns associated with the high amount of recreation activity in the lake. The sampled fish community in Shaver Lake included rainbow trout (37 percent), Sacramento sucker (three percent), kokanee (19 percent), smallmouth bass (27 percent), bluegill (six percent), crappie (four percent), unidentified centrarchids (three percent), and carp (one fish) (Figure CAWG 7-176). Shaver Lake was the only large Project reservoir where smallmouth bass were collected.

Rainbow trout was the dominant species collected in Shaver Lake. Twenty-four rainbow trout were collected in gill nets, for a CPUE of 0.08 fish/hour, or 2.02

fish/day (Table CAWG 7-33). This was the highest calculated CPUE for rainbow trout collected in gill nets for all large Project reservoirs. The collected rainbow trout originated from the CDFG San Joaquin Fish Hatchery, which stocked 34,632 catchable fish in 2002 (CDFG 2002).

Two Sacramento suckers were collected in gill nets, for a CPUE of 0.01 fish/hour, or 0.17 fish/day (Table CAWG 7-33), which was the lowest CPUE for suckers captured in gillnets in all large sampled Project reservoirs.

Thirteen kokanee were collected in gill nets for a CPUE of 0.05 fish/hour, or 1.10 fish/day (Table CAWG 7-33), which is a higher CPUE than for kokanee collected in Huntington Lake. These kokanee originated from the CDFG San Joaquin Fish Hatchery, which stocked 50,132 fingerling in 2002 (CDFG 2002).

Twelve smallmouth bass were collected in gill nets (CPUE of 0.04 fish/hour or 1.01 fish/day), while six smallmouth bass were collected in trap nets (CPUE of 0.04 fish/hour or 0.98 fish/day), after fishing for 147.07 hours (Table CAWG 7-33).

Four bluegill (CPUE of 0.03 fish/hour or 0.65 fish/day), three crappie (CPUE of 0.02 fish/hour or 0.49 fish/day), and two unidentified centrarchid species (less than 20 mm FL) (CPUE of 0.01 fish/hour or 0.33 fish/day) were collected in trap nets (Table CAWG 7-33). One carp was collected in a gill net for a CPUE of 0.00 fish/hour, or 0.08 fish/day (Table CAWG 7-33).

The age distribution of the sampled fish is presented in length-frequency histograms (Figures CAWG 7-177 through CAWG 7-184). Multiple age classes were represented, which indicates that rearing and recruitment for most fish species occurs in Shaver Lake. The absence of smaller sized rainbow trout and kokanee and the results of the scale analysis suggest that these fish are likely of hatchery origin. The scale analysis of both species revealed uniform circuli formation and a lack of clear annuli throughout the scale.

The average condition factors for sampled fish are summarized in Table CAWG 7-21. Rainbow trout and kokanee had an average condition factor of 1.27 and 1.83 respectively. Growth information for sampled fish in Shaver Lake is presented in CAWG 7-Appendix D.

A hydroacoustic survey was conducted in Shaver Lake to examine the density and distribution of fish in the lake. A distance of 31.3 km was sampled within the lake on July 31, 2002. The results of the survey were used to characterize three areas of the lake and depth intervals within each, including the dam area, mid-lake, and the inflow area (Map CAWG 7-21). The dam area of the lake was near the intake and Shaver Lake Dam, the inflow area was near the Stevenson Creek and North Fork Stevenson Creek inputs into the lake, and the mid-lake area was between the dam and inflow areas. Table CAWG 7-34 presents the density of fish in the lake and Figure CAWG 7-185 presents the distribution by area. The highest fish density was in the layer between 3.9 and 5.9 meters deep for all areas of the lake. In the dam area of the lake, most fish were in the upper section (between 2.0 and 21.6 meters deep). There were fewer fish in the lower section (between 21.6 and 41.2 meters deep). The mid-lake region of the lake had most fish near the surface (between 2.0 and 5.9 meters), with fish detected as deep as 29.4 meters. The inflow area of the lake also had most fish near the surface (between 2.0 and 5.9 meters), with additional fish located between 5.9 to 19.6 meters deep.

Baltz, D. M., and P. B. Moyle. 1993. Invasion resistance to introduced species by a native assemblage of California stream fishes. Ecological Applications 3:246-255.

Bartholomew, P. and W. Loudermilk. 1985. San Joaquin River 1984 to 1985 Fisheries Data collection reports below Mammoth Pool Dam.

BioSystems Analysis Inc. (BSAI). 1987a. A Technical Report on Riverine Fishery Studies Conducted in Support of the Big Creek Expansion Project.

_____. 1987b. A Technical Report on Existing Reservoir Fishery Information Conducted in Support of the Big Creek Expansion Project.

_____. 1987c. A Technical Report on Shaver Lake Fishery Studies Conducted in Support of the Big Creek Expansion Project.

_____. 1988. Comparison of Fish Populations in Stevenson Creek in 1986 and 1988.

_____. 1989. Fisheries Studies of Shaver Lake: 1988 Annual Report. 44 pp. + Appendices.

_____. 1987. A Technical Report on Riverine Fishery Studies Conducted in Support of the Big Creek Expansion Project.

_____. 1993. Fish Populations in North Fork Stevenson Creek 1988-1992. Final Report.

BioSystems Analysis, Inc. and UC Davis Department of Wildlife and Fisheries Biology. 1985. Pit 3, 4 and 5 Project: Bald Eagle and Fish Study. Prepared for PG&E.

Burns, J. W. 1966. Species accounts. A. Calhoun, ed. Inland fisheries management. Sacramento: California Department of Fish and Game.

California Department of Fish and Game (CDFG). 1934a. Stream Survey, South Fork San Joaquin River. California Dept. of Fish and Game, Fresno, California.

_____. 1934b. Fish stocking record for Bear Creek to Huntington Lake. California Dept. of Fish and Game, Fresno, California.

_____. 1934c. Stream Survey, Bear Creek. California Department of Fish and Game, Fresno County, California.

_____. 1934d. Lake Survey, Florence Lake. California Department of Fish and Game, Fresno County, California.

_____. 1934e. CDFG Lake Survey, Huntington Lake. California Department of Fish and Game, Fresno County, California.

_____. 1937a. Reservoir Project Scouting Data, Florence Lake. California Dept. of Fish and Game, Fresno, California.

_____. 1937b. Trout from Fresno County Reservoirs. California Department of Fish and Game, Fresno County, California.

_____. 1939. Stocking Records from 1930-1939 for South Fork San Joaquin River. California Dept. of Fish and Game, Fresno, California.

_____. 1940. Stream Survey, Bolsillo Creek. California Dept. of Fish and Game, Fresno, California.

_____. 1941a. Stream Survey, Bear Creek. California. California Dept. of Fish and Game, Fresno, California.

_____. 1941b. Supplementary sheet for Bear Creek to Huntington Lake, San Joaquin River system. California. California Dept. of Fish and Game, Fresno, California.

_____. 1941c. Lake Survey, Florence Lake. California. California Dept. of Fish and Game, Fresno, California.

_____. 1943. Supplementary sheet. Trip of Aug. 21-22, 1943 by W. A. Dill. California. California Dept. of Fish and Game, Fresno, California.

_____. 1945a. Stream Survey, South Fork San Joaquin River. California Dept. of Fish and Game, Fresno, California.

_____. 1945b. Stream Survey Supplementary Sheet, South Fork San Joaquin River. California Dept. of Fish and Game, Fresno, California.

_____. 1945c. Stocking Record, Bolsillo Creek, 1940-1945. California. California Dept. of Fish and Game, Fresno, California.

_____. 1945d. CDFG: Stream Survey Balsam Creek. California. California Dept. of Fish and Game, Fresno, California.

_____. 1946a. Supplementary sheet. Trip of Aug. 24-25, 1946 by C. K. Fisher, Jr. California. California Dept. of Fish and Game, Fresno, California.

_____. 1946b. Supplementary sheet. Trip of Aug 31 to Sept. 2, 1946 by C. K. Fisher, Jr. California. California Dept. of Fish and Game, Fresno, California.

_____. 1948a. Lake Survey, Bear Creek Reservoir. California. California Dept. of Fish and Game, Fresno, California.

_____. 1948b. Stocking Record, Bear Creek. California. California Dept. of Fish and Game, Fresno, California.

_____. 1948c. Stream Survey Supplementary Sheet, East Fork Bear Creek. California. California Dept. of Fish and Game, Fresno, California.

_____. 1949. Field Correspondence, Hooper Creek Drainage: Planting with Golden Trout. California. California Dept. of Fish and Game, Fresno, California.

_____. 1950. Fish stocking record for Slide Creek, Madera County. California. California Dept. of Fish and Game, Fresno, California.

_____. 1951a. Field Correspondence, Hooper Creek Drainage: Success of Golden Trout Plant. California. California Dept. of Fish and Game, Fresno, California.

_____. 1951b. Field Correspondence, Hooper Creek: Unauthorized Plant of Rainbow. California. California Dept. of Fish and Game, Fresno, California.

_____. 1951c. Fish planting receipt, Bear Creek. California. California Dept. of Fish and Game, Fresno, California.

_____. 1952a. Stocking Records from 1940-1952 for South Fork San Joaquin River. California Dept. of Fish and Game, Fresno, California.

_____. 1952b. Stream Survey, Hooper Creek (1945-1952). California. California Dept. of Fish and Game, Fresno, California.

_____. 1952c. Stocking Record, Florence Lake (1930-1952). California. California Dept. of Fish and Game, Fresno, California.

_____. 1952d. Field Correspondence, Florence Lake. California. California Dept. of Fish and Game, Fresno, California.

_____. 1952e. Stocking record for Huntington Lake Reservoir from 1940 through 1952, Fresno County. California. California Dept. of Fish and Game, Fresno, California.

_____. 1954. Stream survey for Slide Creek. California. California Dept. of Fish and Game, Fresno, California.

_____. 1957-1982. Memoranda regarding Huntington Lake gill net sampling, 1957, 1964, 1969, 1970, 1972, 1974, 1980, 1981, 1982. California Department of Fish and Game, Fresno County, California.

_____. 1957-1978. Memoranda on Creel Census from Huntington Lake, 1957, 1964, 1965, 1968, 1972, 1973, 1978. California Department of Fish and Game, Fresno County, California.

_____. 1959. Correspondence to Mr. Schmidtmann regarding fishing in Bear Creek area. California. California Dept. of Fish and Game, Fresno, California.

_____. 1960. Report of the 19th annual cooperative lake and stream survey of the Fresno County Sportsmen's Club and California Department of Fish and Game - 1960. California. California Dept. of Fish and Game, Fresno, California.

_____. 1964. Memorandum, Florence Lake, Fresno County, Gill Net Sampling. California. California Dept. of Fish and Game, Fresno, California.

_____. 1964-1978. Memoranda regarding fish sampling in Huntington Lake, 1964, 1974, 1978. California Department of Fish and Game, Fresno County, California.

_____. 1965. Memorandum, Florence Lake, Fresno County, Gill Net Sampling. California. California Dept. of Fish and Game, Fresno, California.

_____. 1967. Memorandum, Florence Lake, Fresno County, Gill Net Sampling. California. California Dept. of Fish and Game, Fresno, California.

_____. 1968a. Fish Planting Receipt, South Fork San Joaquin River. California Dept. of Fish and Game, Fresno, California.

_____. 1968b. Memorandum, Florence Lake, Fresno County, Gill Net Sampling. California. California Dept. of Fish and Game, Fresno, California.

_____. 1969. Memorandum, Florence Lake, Fresno County, Gill Net Sampling.

_____. 1969 & 1974. Memoranda regarding electrofishing & gill net surveys in Huntington Lake, 1969 & 1974. California Department of Fish and Game, Fresno County, California.

_____. 1970a. Preliminary Evaluation Report on Southern California Edison Company Big Creek Project (FPC No. 67) in Respect to Streamflow. California. California Dept. of Fish and Game, Fresno, California.

_____. 1970b. Memorandum, Florence Lake, Fresno County, Gill Net Sampling. California. California Dept. of Fish and Game, Fresno, California.

_____. 1971. Memorandum, Florence Lake, Fresno County, Gill Net Sampling. California. California Dept. of Fish and Game, Fresno, California.

_____. 1973. Memorandum, Florence Lake, Fresno County, Gill Net Sampling. California. California Dept. of Fish and Game, Fresno, California.

_____. 1975. Memorandum, Florence Lake, Fresno County, Gill Net Sampling. California. California Dept. of Fish and Game, Fresno, California.

_____. 1978. East Fork Bear Creek Stream Survey. California Department of Fish and Game.

_____. 1983. Stream survey, agency file data, or personal communication. As cited in: ESA Planning and Environmental Services. 1985. Draft Upper San Joaquin Basin Cumulative Impact Study for Hydroelectric Developments. Prepared for: State Water Resources Control Board, Division of Water Rights. December.

_____. 1998. Historical Stocking Records, Fresno County. California Dept. of Fish and Game, Fresno, California.

_____. 1999a. Fish Stocking Records for Big Creek through 1999.

_____. 1999b. Stocking Records for Mammoth Pool from 1960 through 1999. California Dept. of Fish and Game, Fresno, California.

_____. 2002. CDFG Fish Stocking Records. California Dept. of Fish and Game, Fresno, California.

Cech, J. J. Jr., S. J. Mitchell, D. T. Castleberry, and M. McEnroe. 1990. Distribution of California stream fishes: influence of environmental temperature and hypoxia. Env. Biol. Fish. 29:95-105.

Dill, W. A. 1943a. CDFG Administrative Reports 1943, A Fisheries Survey of the Upper Bear Creek Drainage, Fresno County, California. California Dept. of Fish and Game, Fresno, California.

_____. 1943b. Memorandum regarding results of 1943 planting in Huntington Lake, Fresno County, California. California Dept. of Fish and Game, Fresno, California.

_____. 1944. A Preliminary Survey of Big Creek Below Huntington Lake, Fresno County, California. California Dept. of Fish and Game, Fresno, California.

_____. 1945a. Correspondence and reports for 1945 application of SCE to divert water from South Fork San Joaquin River Drainage. California Dept. of Fish and Game, Fresno, California.

_____. 1945b. Stream Survey, Balsam Creek. California. California Dept. of Fish and Game, Fresno, California.

Douglas, P.A. 1950. Field Notes for Bear Creek, tributary to South Fork San Joaquin. California Dept. of Fish and Game, Fresno, California.

Dunham, L. R. 1952. Report on the Success of the Golden Trout Transplant to Hooper Creek, Fresno County, California.

Ellis, S. L. N. 1910. Partial List of fish plants made in the waters of Kings, Fresno, and San Joaquin rivers covering the period 1884 and 1909. Mimeograph report. 7 pp. Calif. Dept. of Fish and Game. Fresno, California.

Ellis, S. L. N. 1915. A record of fish plants made in the waters of the Fresno Division Fish and Game Commission, comprising the counties of Kern, Tulare, Kings, Fresno, Madera, Merced, Mariposa, Tuolumne, and Stanislaus, 1870-1915. Manuscript. Calif. Dept. of Fish and Game, Fresno, CA 34 pp.

ENTRIX, Inc. 1991a. Balsam Meadow Pumped Storage Project. FERC Project no. 67 Fish Entrainment Study July 1991 Progress Report.

_____. 1991b. Balsam Meadow Pumped Storage Project. FERC Project no. 67 Fish Entrainment Study August 1991 Progress Report.

_____. 1991c. Balsam Meadow Pumped Storage Project. FERC Project no. 67 Fish Entrainment Study September 1991 Progress Report.

_____. 1991d. Balsam Meadow Pumped Storage Project. FERC Project no. 67 Fish Entrainment Study October 1991 Progress Report.

_____. 1991e. Balsam Meadow Pumped Storage Project. FERC Project no. 67 Fish Entrainment Study December 1991 Progress Report.

_____. 1992a. Balsam Meadow Pumped Storage Project. FERC Project no. 67 Fish Entrainment Study May 1992 Progress Report.

_____. 1992b. Balsam Meadow Pumped Storage Project. FERC Project no. 67 Fish Entrainment Study June 1992 Progress Report.

_____. 1992c. Balsam Meadow Pumped Storage Project. FERC Project no. 67 Fish Entrainment Study Final Report. November 20, 1992.

_____. 2001. Fisheries reconnaissance of North Fork Stevenson Creek, October 2000. ENTRIX, Inc., Walnut Creek, California.

_____. 2002. North Fork Stevenson Creek fish population monitoring. ENTRIX, Inc., Walnut Creek, California.

ESA Planning and Environmental Services (ESA). 1985. Draft Upper San Joaquin Basin Cumulative Impact Study for Hydroelectric Developments. Prepared for: State Water Resources Control Board, Division of Water Rights. December.

FERC. 1982a. Balsam Meadow Misc. Documents Vol. One. Project No. 67.

_____. 1982b. Balsam Meadow Development of Big Creek Project No. 67 Final Environmental Impact Statement.

Fresno Bee. 1945. Bee Sports photo caption and note on photo copy. August 8, 1945.

_____. 1949. Slower Downer - record brown trout caught in Huntington Lake. May 23, 1949.

Grant, G. C. 1992. Selected life history aspects of Sacramento squawfish and hardhead in Pine Creek, Tehama County, California. M. S. thesis. Calif. State Univ., Chico. 86 pp.

Griffith, J.S., Jr. 1972. Comparative behavior and habitat utilization of brook trout (*Salvelinus fontinalis*) and cutthroat trout (*Salmo clarki*) in small streams in northern Idaho. Journal of Fishery Research Board of Canada 29:265-273.

Hankin, D.G. and G.H. Reeves. 1988. Estimation total fish abundance and total habitat area in small streams based on visual estimation methods. Canadian Journal of Fisheries and Aquatic Sciences 45:834-844.

Hicks, B.J., and N.R.N. Watson. 1985. Seasonal changes in abundance of brown trout (*Salmo trutta*) and rainbow trout (*S. gairdnerii*) assessed by drift diving in the Rangitikei River, New Zealand. New Zealand Journal of Marine and Freshwater Research. 19:1-10.

Hillman, T.W., J.W. Mullan, and J.S. Griffith. 1992. Accuracy of underwater counts of juvenile chinook salmon, coho salmon, and steelhead. North American Journal of Fisheries Management 12:596-603.

Hoss, V. 1964. Letter to S.M. Soule (CDFG) regarding fishing trip to Hooper Creek lakes.

Knight, N. J. 1995. Microhabitats and temperature requirements of hardhead (*Mylopharodon conocephhalus*) and Sacramento squawfish (*Ptychocheilus grandis*), with notes for some other native California stream fishes. M. S. thesis. University of California at Davis. 161 pp.

Lewis, R.C. 1962. Letter to C. Miller re: Fisherman's Log from the Sierra Club Back-Country Camp.

Loudermilk, W. 2001. California Department of Fish and Game comments on draft application for new license package for Southern California Edison

McAfee, W. R. 1966 "Rainbow Trout" *in* A. Calhoun, ed., Inland Fisheries Management. CDFG. pp 192-215.

Moyle, P. B. 1982. Distribution and Ecology of Stream Fishes of the Sacramento-San Joaquin Drainage System, California. Publications in Zoology 115, University of California Press, Berkeley, California.

_____. 2002. Inland Fishes of California. University of California Press, Berkeley, California. Revised Edition. 502 pp.

Moyle, P. B., and D. M. Baltz. 1985. Microhabitat use by an assemblage of California stream fishes: Developing criteria for instream flow determinations. Transactions American Fisheries Society 114:695-704.

Moyle, P. B., and R. Nichols. 1973. Ecology of some native and introduced fishes of the Sierra Nevada foothills in central California. Copeia 1973(3):478-490.

Moyle, P. B., R. M. Yoshiyama, J. E. Williams, and E. D. Wikramanayake. 1995. Fish species of special concern of California. California Department of Fish and Game, Sacramento, California. 2nd ed. 272 pp.

Mulligan, M. J. 1975. The ecology of fish populations in Mill Flat Creek: tributary to the Kings River. M. S. thesis, Calif. State Univ., Fresno. 135 pp.

Platts, W.S., W.F. Megahan, and G.W. Minshall. 1983. Methods for evaluating stream, riparian, and biotic conditions. USDA For. Serv. Gen. Tech. Rep. INT-138.

Reeves, J. E. 1964. Age and growth of the hardhead minnow, *Mylopharodon conocephalus* (Baird and Gerard), in the American River Basin of California with notes on its ecology. Masters Thesis in Zoology. University of California at Berkeley.

Reynolds, J.B. 1996. Chapter 8, Electrofishing. *In:* Fisheries Techniques, 2nd Edition. *Edited by* B.R. Murphy and D.W. Willis. American Fisheries Society. Bethesda, Maryland.

Shebley. 1911. Citation from CDFG not available at this time.

Southern California Edison Company (SCE). 1963. Letter to R.C. Lewis regarding stocking of rainbow trout in pond at Hooper Cr. diversion dam.

_____. 1968. Preliminary data, Big Creek-San Joaquin River F.P.C. Projects 67 and 120, cooperative field study on fisheries and recreation. Southern California Edison Company, Rosemead, CA. As cited in: ESA Planning and Environmental Services. 1985. Draft Upper San Joaquin Basin Cumulative Impact Study for Hydroelectric Developments. Prepared for: State Water Resources Control Board, Division of Water Rights. December.

_____. 1971. Exhibit S. Fish and Wildlife Resources, Big Creek No. 2A and 8 Project.

_____. 1990. Letter to CDFG Regarding Southern California Edison Trout Plants for 1990. Submitted by E. Martinez (Manager), Northern Hydro Division, SCE. November 7, 1990.

_____. 2000a. Technical Resources Document concerning environmental baseline conditions.

_____. 2000b. Technical Resources Document for Valuation of SCE's Hydroelectric Facilities.

_____. 2001. Vermilion Valley Hydroelectric Project (FERC Project No. 2086) Final Application for New License for Minor Project-Existing Dam. Volume 2 of 4: Exhibit E. Southern California Edison, Big Creek, California.

_____. 2003. Portal Hydroelectric Power Project (FERC Project No. 2174) Application for New License for Major Project-Existing Dam. Volume 2 of 6: Exhibit E. March, 2003. Southern California Edison, Big Creek, California.

State Fish and Game Commission Biennial Reports 1913-14, 1915-16, 1919-20.

Stickney, R. R. 1991. Chapter 1, Salmonid Life Histories in Culture of Salmonid Fishes, Stickney, R. R. editor, CRC Press. 189 pp.

Taft and Murphy. 1950. Life history of the Sacramento squawfish (*Ptychocheilus grandis*). Calif. Fish Game 36:147-164.

United States Forest Service (USFS). 1979. Stream Survey for Bear Creek.

U.S. Forest Service. 1998. Sensitive Species List. June 10, 1998.

Vestal, E. 1958. Pers. comm. Bear Creek fishing conditions (above Edison C. diversion dam).

Wang, J. C. S. 1986. Fishes of the Sacramento-San Joaquin estuary and adjacent waters, California: a guide to the early life histories. IEP Tech. Rpt. 9. ca. 800 pp.

Wickwire, R. 2002. Personal Communication with Wayne Lifton of ENTRIX, Inc.

Zippin, C. 1958. The removal method of population estimation. J. Wildl. Manage. 22(1):82-90.

TABLES

Table CAWG 7 ES-1. Summary of Fish Abundance by Stream and Location.

Drainage Sub-Basin		**South Fork San Joaquin River Basin**							
	Stream	South Fork San Joaquin River							
	Order	5	5	5	5	5	5	5	5
	Reach	Upstream of Florence Lake	Florence Lake to Bear Creek		Bear Creek to Mono Crossing			Mono Crossing to Rattlesnake Creek	Rattlesnake Creek to SJR
	Rosgen Level I Channel Type	B	B	C	G	C	B	B	G
Species	**Estimate of**								
Brown Trout	Density (#/km)	206	522	303	306	226	220	350	385
	Density (#/ha)	225	713	312	261	137	123	174	262
	Biomass (kg/ha)	N/A	35.1	11.1	8.6	9.3	8.3	4.7	10.2
	Condition Factor		1.37	1.45	1.38	1.35	1.32	1.24	1.27
Rainbow Trout	Density (#/km)		174	21	32	632	700	984	837
	Density (#/ha)		238	22	27	382	391	490	571
	Biomass (kg/ha)		13.0	2.0	0.4	6.7	23.9	5.8	9.3
	Condition Factor		1.31	1.84	1.44	1.60	1.31	1.38	1.43
Brook Trout	Density (#/km)								
	Density (#/ha)								
	Biomass (kg/ha)								
	Condition Factor								
Rainbow x Golden Trout Hybrid	Density (#/km)								
	Density (#/ha)								
	Biomass (kg/ha)								
	Condition Factor								
Sacramento Sucker	Density (#/km)								
	Density (#/ha)								
	Biomass (kg/ha)								
Hardhead	Density (#/km)								
	Density (#/ha)								
	Biomass (kg/ha)								
	Condition Factor								
Sacramento Pikeminnow	Density (#/km)								
	Density (#/ha)								
	Biomass (kg/ha)								
Prickly Sculpin	Density (#/km)								
	Density (#/ha)								
	Biomass (kg/ha)								

[1] Data collected in 2002 for Portal Hydroelectric Power Project Relicensing
[2] In 2001, brook trout were also captured with a density estimate of 1,299 fish/km
[3] Data collected in 2000 for Vermilion Valley Hydroelectric Project Relicensing

Table CAWG 7 ES-1. Summary of Fish Abundance by Stream and Location (cont).

Drainage Sub-Basin		South Fork San Joaquin River Basin						
	Stream	Tombstone Creek			South Slide Creek		North Slide Creek	
	Order	1	1	1	1	1	1	1
	Reach	Above Diversion	Below Diversion		Above Diversion	Below Diversion	Above Diversion	Below Diversion
Rosgen Level I Channel Type		Aa+	Aa+	C/E	Aa+	Aa+	Aa+	Aa+
Species	**Estimate of**							
Brown Trout	Density (#/km)	No Fish	416	No Fish	No Fish	No Fish	No Fish	No Fish
	Density (#/ha)		2,960					
	Biomass (kg/ha)		188.4					
	Condition Factor		1.37					
Rainbow Trout	Density (#/km)							
	Density (#/ha)							
	Biomass (kg/ha)							
	Condition Factor							
Brook Trout	Density (#/km)							
	Density (#/ha)							
	Biomass (kg/ha)							
	Condition Factor							
Rainbow x Golden Trout Hybrid	Density (#/km)							
	Density (#/ha)							
	Biomass (kg/ha)							
	Condition Factor							
Sacramento Sucker	Density (#/km)							
	Density (#/ha)							
	Biomass (kg/ha)							
Hardhead	Density (#/km)							
	Density (#/ha)							
	Biomass (kg/ha)							
	Condition Factor							
Sacramento Pikeminnow	Density (#/km)							
	Density (#/ha)							
	Biomass (kg/ha)							
Prickly Sculpin	Density (#/km)							
	Density (#/ha)							
	Biomass (kg/ha)							

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[3] Data collected in 2000 for Vermilion Valley Hydroelectric Project Relicensing

Table CAWG 7 ES-1. Summary of Fish Abundance by Stream and Location (cont).

Drainage Sub-Basin		South Fork San Joaquin River Basin					
	Stream	Hooper Creek		Crater Creek			
	Order	3	3	1	1	1	1
	Reach	Above Diversion	Below Diversion	Above Diversion	Below Diversion	Below Diversion	Diversion Channel
Rosgen Level I Channel Type		Aa+	Aa+	Aa+	Aa+	C	Aa+
Species	**Estimate of**						
Brown Trout	Density (#/km)					No Fish	
	Density (#/ha)						
	Biomass (kg/ha)						
	Condition Factor						
Rainbow Trout	Density (#/km)						
	Density (#/ha)						
	Biomass (kg/ha)						
	Condition Factor						
Brook Trout	Density (#/km)			547	276		1,193
	Density (#/ha)			1,495	1,919		3,872
	Biomass (kg/ha)			21.2	29.8		81.4
	Condition Factor			1.46	1.05		1.33
Rainbow x Golden Trout Hybrid	Density (#/km)	663	962				
	Density (#/ha)	2,029	4,229				
	Biomass (kg/ha)	71.3	124.9				
	Condition Factor	1.23	1.31				
Sacramento Sucker	Density (#/km)						
	Density (#/ha)						
	Biomass (kg/ha)						
Hardhead	Density (#/km)						
	Density (#/ha)						
	Biomass (kg/ha)						
	Condition Factor						
Sacramento Pikeminnow	Density (#/km)						
	Density (#/ha)						
	Biomass (kg/ha)						
Prickly Sculpin	Density (#/km)						
	Density (#/ha)						
	Biomass (kg/ha)						

[1] Data collected in 2002 for Portal Hydroelectric Power Project Relicensing
[2] In 2001, brook trout were also captured with a density estimate of 1,299 fish/km
[3] Data collected in 2000 for Vermilion Valley Hydroelectric Project Relicensing

Table CAWG 7 ES-1. Summary of Fish Abundance by Stream and Location (cont).

Drainage Sub-Basin		South Fork San Joaquin River Basin					
	Stream	Bear Creek		Chinquapin Creek		Camp 62 Creek	
	Order	4	4	1	1	2	2
	Reach	Above Diversion	Below Diversion	Above Diversion	Below Diversion	Above Diversion	Below Diversion
Rosgen Level I Channel Type		B	A	Aa+	Aa+	Aa+	Aa+
Species	**Estimate of**						
Brown Trout	Density (#/km)	470	1,406				
	Density (#/ha)	514	3,211				
	Biomass (kg/ha)	18.6	131.3				
	Condition Factor	1.20	1.23				
Rainbow Trout	Density (#/km)						
	Density (#/ha)						
	Biomass (kg/ha)						
	Condition Factor						
Brook Trout	Density (#/km)			665	2,034	945	1,162
	Density (#/ha)			5,452	13,094	5,928	6,780
	Biomass (kg/ha)			122.3	215.8	152.3	124.4
	Condition Factor			1.35	1.01	1.21	1.21
Rainbow x Golden Trout Hybrid	Density (#/km)						
	Density (#/ha)						
	Biomass (kg/ha)						
	Condition Factor						
Sacramento Sucker	Density (#/km)						
	Density (#/ha)						
	Biomass (kg/ha)						
Hardhead	Density (#/km)						
	Density (#/ha)						
	Biomass (kg/ha)						
	Condition Factor						
Sacramento Pikeminnow	Density (#/km)						
	Density (#/ha)						
	Biomass (kg/ha)						
Prickly Sculpin	Density (#/km)						
	Density (#/ha)						
	Biomass (kg/ha)						

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[3] Data collected in 2000 for Vermilion Valley Hydroelectric Project Relicensing

Table CAWG 7 ES-1. Summary of Fish Abundance by Stream and Location (cont).

Drainage Sub-Basin		South Fork San Joaquin River Basin							
	Stream	Bolsillo Creek			Adit No. 2[1]		East Fork Camp 61[1]	West Fork Camp 61[1]	Camp 61 Creek[1]
	Order	1	1	1	1	1	1	1	1
	Reach	Above Diversion	Below Diversion	Below Diversion	Upper Site	Lower Site	Above Portal Forebay	Above Portal Forebay	Below Portal Forebay[2]
Rosgen Level I Channel Type		B	Aa+	B	Aa+	Aa+	Aa+	Aa+	B
Species	**Estimate of**								
Brown Trout	Density (#/km)				No Fish	601	49		940
	Density (#/ha)								
	Biomass (kg/ha)								
	Condition Factor					1.07	1.00		1.07
Rainbow Trout	Density (#/km)						81	65	
	Density (#/ha)								
	Biomass (kg/ha)								
	Condition Factor						0.90	1.00	
Brook Trout	Density (#/km)	2,187	143	1,509			1,299	2,040	
	Density (#/ha)	20,503	1,087	12,378					
	Biomass (kg/ha)	431.9	22.6	216.5					
	Condition Factor	1.11	1.22	1.24			0.97	1.02	
Rainbow x Golden Trout Hybrid	Density (#/km)						16		
	Density (#/ha)								
	Biomass (kg/ha)								
	Condition Factor						1.11		
Sacramento Sucker	Density (#/km)								
	Density (#/ha)								
	Biomass (kg/ha)								
Hardhead	Density (#/km)								
	Density (#/ha)								
	Biomass (kg/ha)								
	Condition Factor								
Sacramento Pikeminnow	Density (#/km)								
	Density (#/ha)								
	Biomass (kg/ha)								
Prickly Sculpin	Density (#/km)								
	Density (#/ha)								
	Biomass (kg/ha)								

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[2] In 2001, brook trout were also captured with a density estimate of 1,299 fish/km
[3] Data collected in 2000 for Vermilion Valley Hydroelectric Project Relicensing

Table CAWG 7 ES-1. Summary of Fish Abundance by Stream and Location (cont).

Drainage Sub-Basin		South Fork San Joaquin River Basin						
	Stream	Cold Creek[3]	Mono Creek			Boggy Meadow Creek[3]	Warm Creek[3]	
	Order	4	4	4	4	2	2	2
	Reach		Above Lake Edison	Below Lake Edison	Below Diversion		Upper	Lower
	Rosgen Level I Channel Type	B	C	B	B	C/G	G	G
Species	**Estimate of**							
Brown Trout	Density (#/km)	632	2,462	1,259	64	848		
	Density (#/ha)				113			
	Biomass (kg/ha)				3.3			
	Condition Factor	1.01	1.07	1.17	1.10	1.08		
Rainbow Trout	Density (#/km)	74	393	259	11	141		
	Density (#/ha)				19			
	Biomass (kg/ha)				0.9			
	Condition Factor	1.05	1.09	1.20	0.91	1.02		
Brook Trout	Density (#/km)	11	243			576		
	Density (#/ha)							
	Biomass (kg/ha)							
	Condition Factor	N/A	1.07			1.05		
Rainbow x Golden Trout Hybrid	Density (#/km)	11					440	374
	Density (#/ha)							
	Biomass (kg/ha)							
	Condition Factor	N/A					1.06	1.08
Sacramento Sucker	Density (#/km)							
	Density (#/ha)							
	Biomass (kg/ha)							
Hardhead	Density (#/km)							
	Density (#/ha)							
	Biomass (kg/ha)							
	Condition Factor							
Sacramento Pikeminnow	Density (#/km)							
	Density (#/ha)							
	Biomass (kg/ha)							
Prickly Sculpin	Density (#/km)							
	Density (#/ha)							
	Biomass (kg/ha)							

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Table CAWG 7 ES-1. Summary of Fish Abundance by Stream and Location (cont).

Drainage Sub-Basin		San Joaquin River Basin					
	Stream	Mammoth Reach		Rock Creek		Stevenson Reach	
	Order	6	6	3	3	6	6
	Reach	Upper Site	Lower Site	Above Diversion	Below Diversion	Upper Site	Lower Site
	Rosgen Level I Channel Type	B	B	Aa+	Aa+	G	G
Species	**Estimate of**						
Brown Trout	Density (#/km)	125	52	930	481	7	7
	Density (#/ha)	83	46	2,407	1,155	5	6
	Biomass (kg/ha)	2.0	4.7	91.5	42.4	0.1	0.0
	Condition Factor	1.09	1.18	1.31	1.30	1.22	1.16
Rainbow Trout	Density (#/km)	91	384	241	432	100	
	Density (#/ha)	61	340	623	1,037	76	
	Biomass (kg/ha)	2.1	12.5	29.5	29.0	0.3	
	Condition Factor	1.69	2.25	1.19	1.46	1.36	
Brook Trout	Density (#/km)						
	Density (#/ha)						
	Biomass (kg/ha)						
	Condition Factor						
Rainbow x Golden Trout Hybrid	Density (#/km)						
	Density (#/ha)						
	Biomass (kg/ha)						
	Condition Factor						
Sacramento Sucker	Density (#/km)	498	1,197			514	15
	Density (#/ha)	331	1,061			389	12
	Biomass (kg/ha)	29.3	35.7			3.6	2.5
Hardhead	Density (#/km)						295
	Density (#/ha)						233
	Biomass (kg/ha)						2.2
	Condition Factor						0.97
Sacramento Pikeminnow	Density (#/km)						597
	Density (#/ha)						471
	Biomass (kg/ha)						4.6
Prickly Sculpin	Density (#/km)					43	
	Density (#/ha)					32	
	Biomass (kg/ha)					0.2	

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Table CAWG 7 ES-1. Summary of Fish Abundance by Stream and Location (cont).

Drainage Sub-Basin		Big Creek Basin						
	Stream	Big Creek						
	Order	4	4	4	4	5	5	5
	Reach	Dam 1 to Powerhouse 1				Dam 4 to Powerhouse 2	Dam 5 to Powerhouse 8	
	Rosgen Level I Channel Type	B	G	A	Aa+	A	A	Aa+
Species	**Estimate of**							
Brown Trout	Density (#/km)	320	648	1,214	497	363	602	160
	Density (#/ha)	462	1,852	3,572	1,579	811	946	331
	Biomass (kg/ha)	16.0	50.9	N/A	117.6	N/A	N/A	N/A
	Condition Factor	0.92	1.17		1.42			
Rainbow Trout	Density (#/km)					363	930	769
	Density (#/ha)					811	1,463	1,594
	Biomass (kg/ha)					N/A	N/A	N/A
	Condition Factor							
Brook Trout	Density (#/km)							
	Density (#/ha)							
	Biomass (kg/ha)							
	Condition Factor							
Rainbow x Golden Trout Hybrid	Density (#/km)							
	Density (#/ha)							
	Biomass (kg/ha)							
	Condition Factor							
Sacramento Sucker	Density (#/km)							
	Density (#/ha)							
	Biomass (kg/ha)							
Hardhead	Density (#/km)							
	Density (#/ha)							
	Biomass (kg/ha)							
	Condition Factor							
Sacramento Pikeminnow	Density (#/km)							
	Density (#/ha)							
	Biomass (kg/ha)							
Prickly Sculpin	Density (#/km)		14					
	Density (#/ha)		41					
	Biomass (kg/ha)		0.5					

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Table CAWG 7 ES-1. Summary of Fish Abundance by Stream and Location (cont).

Drainage Sub-Basin		Big Creek Basin						
	Stream	Pitman Creek			Balsam Creek		Ely Creek	
	Order	3	4	4	3	3	1	2
	Reach	Above Diversion	Below Diversion		Above Diversion	Below Diversion	Above Diversion	Below Diversion
	Rosgen Level I Channel Type	B	B	Aa+	Aa+	Aa+	Aa+	Aa+
Species	**Estimate of**							
Brown Trout	Density (#/km)	338	22					
	Density (#/ha)	780	50					
	Biomass (kg/ha)	45.4	3.2					
	Condition Factor	1.12	1.23					
Rainbow Trout	Density (#/km)	1,066	613	1,647	1,335	12	190	266
	Density (#/ha)	2,458	1,426	5,496	8,101	33	1,605	1,635
	Biomass (kg/ha)	57.3	38.2	77.5	171.6	2.3	133.9	76.7
	Condition Factor	1.20	1.71	1.45	1.56	2.07	1.25	1.38
Brook Trout	Density (#/km)	82	22					
	Density (#/ha)	189	50					
	Biomass (kg/ha)	1.5	1.0					
	Condition Factor	1.00	1.06					
Rainbow x Golden Trout Hybrid	Density (#/km)							102
	Density (#/ha)							629
	Biomass (kg/ha)							31.4
	Condition Factor							1.40
Sacramento Sucker	Density (#/km)							
	Density (#/ha)							
	Biomass (kg/ha)							
Hardhead	Density (#/km)							
	Density (#/ha)							
	Biomass (kg/ha)							
	Condition Factor							
Sacramento Pikeminnow	Density (#/km)							
	Density (#/ha)							
	Biomass (kg/ha)							
Prickly Sculpin	Density (#/km)							
	Density (#/ha)							
	Biomass (kg/ha)							

[1] Data collected in 2002 for Portal Hydroelectric Power Project Relicensing
[2] In 2001, brook trout were also captured with a density estimate of 1,299 fish/km
[3] Data collected in 2000 for Vermilion Valley Hydroelectric Project Relicensing

Table CAWG 7 ES-1. Summary of Fish Abundance by Stream and Location (cont).

Drainage Sub-Basin		Big Creek			
	Stream	Adit No 8	Rancheria Creek[1]		
	Order	1	3	3	3
	Reach	Below Diversion	Above Energy Dissipater	Below Energy Dissipater	Below Energy Dissipater
Rosgen Level I Channel Type		Aa+	B	B	A
Species	**Estimate of**				
Brown Trout	Density (#/km)	No Fish	132	110	22
	Density (#/ha)				
	Biomass (kg/ha)				
	Condition Factor		1.71	1.40	1.11
Rainbow Trout	Density (#/km)		963	679	580
	Density (#/ha)				
	Biomass (kg/ha)				
	Condition Factor		1.39	1.39	1.18
Brook Trout	Density (#/km)		569	154	33
	Density (#/ha)				
	Biomass (kg/ha)				
	Condition Factor		1.40	1.12	1.06
Rainbow x Golden Trout Hybrid	Density (#/km)				
	Density (#/ha)				
	Biomass (kg/ha)				
	Condition Factor				
Sacramento Sucker	Density (#/km)		307	88	33
	Density (#/ha)				
	Biomass (kg/ha)				
Hardhead	Density (#/km)				
	Density (#/ha)				
	Biomass (kg/ha)				
	Condition Factor				
Sacramento Pikeminnow	Density (#/km)				
	Density (#/ha)				
	Biomass (kg/ha)				
Prickly Sculpin	Density (#/km)				
	Density (#/ha)				
	Biomass (kg/ha)				

[1] Data collected in 2002 for Portal Hydroelectric Power Project Relicensing
[2] In 2001, brook trout were also captured with a density estimate of 1,299 fish/km
[3] Data collected in 2000 for Vermilion Valley Hydroelectric Project Relicensing

Table CAWG 7 ES-1. Summary of Fish Abundance by Stream and Location (cont).

Drainage Sub-Basin		Stevenson and North Fork Stevenson Reach						
	Stream	North Fork Stevenson Creek				Stevenson Creek		
	Order	2	2	2	2	3	3	3
	Reach	Upstream of Tunnel 7 Outlet	Downstream of Tunnel 7 Outlet			Downstream of Shaver Lake Dam		
Rosgen Level I Channel Type		Aa+	Aa+	G	C	B	Aa+	A
Species	**Estimate of**							
Brown Trout	Density (#/km)	No Fish		305	430			
	Density (#/ha)			703	2,170			
	Biomass (kg/ha)			43.7	33.2			
	Condition Factor			1.23	1.39			
Rainbow Trout	Density (#/km)			210	314	751	966	128
	Density (#/ha)			485	1,588	2,829	3,161	309
	Biomass (kg/ha)			13.5	29.8	52.3	74.9	N/A
	Condition Factor			1.27	1.27	1.04	1.34	
Brook Trout	Density (#/km)							
	Density (#/ha)							
	Biomass (kg/ha)							
	Condition Factor							
Rainbow x Golden Trout Hybrid	Density (#/km)		583	11				
	Density (#/ha)		487	24				
	Biomass (kg/ha)		9.0	1.3				
	Condition Factor		0.98	1.35				
Sacramento Sucker	Density (#/km)			11	42			
	Density (#/ha)			24	212			
	Biomass (kg/ha)			13.5	65.9			
Hardhead	Density (#/km)							
	Density (#/ha)							
	Biomass (kg/ha)							
	Condition Factor							
Sacramento Pikeminnow	Density (#/km)							
	Density (#/ha)							
	Biomass (kg/ha)							
Prickly Sculpin	Density (#/km)							
	Density (#/ha)							
	Biomass (kg/ha)							

[1] Data collected in 2002 for Portal Hydroelectric Power Project Relicensing
[2] In 2001, brook trout were also captured with a density estimate of 1,299 fish/km
[3] Data collected in 2000 for Vermilion Valley Hydroelectric Project Relicensing

Table CAWG 7 ES-2. Reservoir and Impoundment Fish Netting Summary.

	Florence Lake			Bear Diversion Forebay		Mono Diversion Forebay	
Species	Gillnet CPUE (Fish/Day)	Minnow Trap CPUE (Fish/Day)	Mean Condition Factor	Gill Net CPUE (Fish/Day)	Mean Condition Factor	Gill Net CPUE (Fish/Day)	Mean Condition Factor
Brown Trout	3.36	0.03	1.47	10.58	1.38	2.73	1.41
Rainbow Trout				0.27	0.85	14.79	2.19
Brook Trout							
Kokanee							
Smallmouth Bass							
Sacramento Sucker							
Largemouth Bass							
Prickly Sculpin							
Bluegill							
Crappie							
Unidentified Centrarchid							
Carp							

Table CAWG 7 ES-2. Reservoir and Impoundment Fish Netting Summary (cont).

	Mammoth Pool Reservoir		Dam 6 Forebay		Huntington Lake			
Species	Gill Net CPUE (Fish/Day)	Mean Condition Factor	Gill Net CPUE (Fish/Day)	Mean Condition Factor	Trap Net CPUE (Fish/Day)	Gillnet CPUE (Fish/Day)	Minnow Trap CPUE (Fish/Day)	Mean Condition Factor
Brown Trout	1.04	1.10	3.40	1.11		0.62		2.28
Rainbow Trout	0.43	1.33	1.24	1.36	0.36	0.09		1.97
Brook Trout								
Kokanee					0.18	0.18		2.94
Smallmouth Bass								
Sacramento Sucker			17.32		2.70	0.89		
Largemouth Bass								
Prickly Sculpin					2.70		0.17	
Bluegill								
Crappie								
Unidentified Centrarchid								
Carp								

Table CAWG 7 ES-2. Reservoir and Impoundment Fish Netting Summary (cont).

	Dam 4 Forebay			Dam 5 Forebay		Balsam Meadow Forebay		
Species	Gillnet CPUE (Fish/Day)	Minnow Trap CPUE (Fish/Day)	Mean Condition Factor	Gillnet CPUE (Fish/Day)	Mean Condition Factor	Trap Net CPUE (Fish/Day)	Gillnet CPUE (Fish/Day)	Mean Condition Factor
Brown Trout	4.00		1.24	5.01	1.34		0.58	1.14
Rainbow Trout	5.50		1.47	0.50	1.85	0.47	1.36	1.19
Brook Trout								
Kokanee							8.38	1.31
Smallmouth Bass							0.19	
Sacramento Sucker						0.95	4.48	
Largemouth Bass								
Prickly Sculpin		0.67		0.50		10.11		
Bluegill								
Crappie								
Unidentified Centrarchid								
Carp								

Table CAWG 7 ES-2. Reservoir and Impoundment Fish Netting Summary (cont).

	Shaver Lake		
Species	Trap Net CPUE (Fish/Day)	Gillnet CPUE (Fish/Day)	Mean Condition Factor
Brown Trout			
Rainbow Trout		2.02	1.27
Brook Trout			
Kokanee		1.10	1.83
Smallmouth Bass	0.98	1.01	
Sacramento Sucker		0.17	
Largemouth Bass			
Prickly Sculpin			
Bluegill	0.65		
Crappie	0.49		
Unidentified Centrarchid	0.33		
Carp		0.08	

Table CAWG 7 ES-2. Reservoir and Impoundment Fish Netting Summary (cont).

	Lake Thomas A. Edison*		Portal Forebay**	
Species	**Gillnet CPUE (Fish/Set)++**	**Mean Condition Factor**	**Gillnet CPUE (Fish/Day)**	**Mean Condition Factor**
Brown Trout	34.00		4.5	1.01-1.10+
Rainbow Trout	12.6		11	1.06-1.16+
Brook Trout			3.5	1.00
Kokanee				
Smallmouth Bass				
Sacramento Sucker				
Largemouth Bass				
Prickly Sculpin				
Bluegill				
Crappie				
Unidentified Centrarchid				
Carp				

+ Range for fish by size category
++ Average fish per net set from CDFG 2000-2001
* Information from Vermilion Valley Project Exhibit E
**Information from Portal Project Exhibit E

Table CAWG 7-1. Fish Sampling Techniques for Project Study Streams During the CAWG 7 Study 2002.

STREAM NAME	REACH NAME	DOMINANT ROSGEN LEVEL I CHANNEL TYPE and SAMPLE SITE	ELECTRO-FISHING	DIRECT OBSERVATION
South Fork San Joaquin River	Upstream of Florence Lake	B	C, 2002	C, 2002
	Florence Lake to Bear Creek	C	C, 2002	
		B	C, 2002	C, 2002
	Bear Creek to Mono Crossing	B	C, 2002	C, 2002
		C	C, 2002	C, 2002
		G	C, 2002	
	Mono Crossing to Rattlesnake Crossing	B	C, 2002	C, 2002
	Rattlesnake Crossing to SJR Confluence	G	C, 2002	C, 2002
Tombstone Creek	Above Diversion	Aa+	C, 2002	
	Below Diversion	Aa+	C, 2002	
	Below Diversion	C/E	NA	
South Slide Creek	Above Diversion	Aa+	C, 2002	
	Below Diversion	Aa+	C, 2002	
North Slide Creek	Above Diversion	Aa+	C, 2002	
	Below Diversion	Aa+	C, 2002	
Hooper Creek	Above Diversion	Aa+	C, 2002	
	Below Diversion	Aa+	C, 2002	
Crater Creek	Above Diversion	Aa+	C, 2002	
	Below Diversion	Aa+	C, 2002	
	Below Diversion	C	NA	
	Diversion Channel	Aa+	C, 2002	
Bear Creek	Above Diversion	B	C, 2002	
	Below Diversion	A	C, 2002	
Chinquapin Creek	Above Diversion	Aa+	C, 2002	
	Below Diversion	Aa+	C, 2002	
Camp 62 Creek	Above Diversion	Aa+	C, 2002	
	Below Diversion	Aa+	C, 2002	
Bolsillo Creek	Above Diversion	B	C, 2002	
	Below Diversion	B	C, 2002	
		Aa+	C, 2002	

Table CAWG 7-1. Fish Sampling Techniques for Project Study Streams During the CAWG 7 Study 2002 (Continued).

STREAM NAME	REACH NAME	DOMINANT ROSGEN LEVEL I CHANNEL TYPE and SAMPLE SITE	ELECTRO-FISHING	DIRECT OBSERVATION
Mono Creek	Below Diversion	B	C, 2002	
San Joaquin River, Mammoth Reach	Upper Site	B	C, 2002	C, 2002
	Lower Site	B	C, 2002	C, 2002
Rock Creek	Above Diversion	Aa+	C, 2002	
	Below Diversion	Aa+	C, 2002	C, 2002
Ross Creek	Above Diversion	Aa+	NA	
	Below Diversion	Aa+	NA	
Big Creek	Dam 1 to PH 1 Reach	B	C, 2002	
		G	C, 2002	
		A	C, 2002	
		Aa+	C, 2002	
	Dam 4 to PH 2 Reach	A	C, 2002	
	Dam 5 to PH 8 Reach	A	C, 2002	
		Aa+	C, 2002	
Pitman Creek	Above Diversion	B	C, 2002	
	Below Diversion	B	C, 2002	
		Aa+	C, 2002	
Balsam Creek	Above Diversion	Aa+	C, 2002	
	Below Diversion	Aa+	C, 2002	
Ely Creek	Above Diversion	Aa+	C, 2002	
	Below Diversion	Aa+	C, 2002	
Adit 8 Creek	Above Diversion	Aa+[1]		
	Below Diversion	Aa+	C, 2002	
San Joaquin River, Stevenson Reach	Upper Site	G	C, 2002	C, 2002
	Lower Site	G	C, 2002	C, 2002
North Fork Stevenson Creek	Above Tunnel 7 Outlet	Aa+	C, 2002	
	Below Tunnel 7 Outlet	Aa+	C, 2002	
		G	C, 2002	
		C	C, 2002	

Table CAWG 7-1. Fish Sampling Techniques for Project Study Streams During the CAWG 7 Study 2002 (Continued).

STREAM NAME	REACH NAME	DOMINANT ROSGEN LEVEL I CHANNEL TYPE and SAMPLE SITE	ELECTRO-FISHING	DIRECT OBSERVATION
Stevenson Creek	Below Shaver Lake	Aa+	C, 2002	
		B	C, 2002	
		A	C, 2002	

C - Completed

NA - Data not available because stream was dry at the time of sampling

[1] Access to Adit No. 8 Creek above the diversion was unsafe with the electrofishing equipment.

Table CAWG 7-2. Distribution of Fish Species Collected in the Big Creek Project Area, CAWG 7 Sampling, 2002.

STREAM NAME	REACH NAME	DOMINANT ROSGEN LEVEL I CHANNEL TYPE and SAMPLE SITE	Rainbow Trout	Golden Trout (golden x rainbow trout hybrids)	Brown Trout	Brook Trout	Sacramento Pikeminnow	Hardhead	Sacramento Sucker	Prickly Sculpin
South Fork San Joaquin River	Upstream of Florence Lake	B			X					
	Florence Lake to Bear Creek	C	X		X					
		B	X		X					
	Bear Creek to Mono Crossing	B	X		X					
		C	X		X					
		G	X		X					
	Mono Crossing to Rattlesnake Crossing	B	X		X					
	Rattlesnake Crossing to SJR Confluence	G	X		X					
Tombstone Creek	Above Diversion	Aa+								
	Below Diversion	Aa+			X					
		C/E*	No Fish Collected							
South Slide Creek	Above Diversion	Aa+	No Fish Collected							
	Below Diversion	Aa+	No Fish Collected							
North Slide Creek	Above Diversion	Aa+	No Fish Collected							
	Below Diversion	Aa+	No Fish Collected							
Hooper Creek	Above Diversion	Aa+		X						
	Below Diversion	Aa+		X						
Crater Creek	Above Diversion	Aa+				X				
	Below Diversion	Aa+				X				
		C	No Fish Collected							
	Diversion Channel	Aa+				X				
Bear Creek	Above Diversion	B			X					
	Below Diversion	A			X					
Chinquapin Creek	Above Diversion	Aa+				X				
	Below Diversion	Aa+				X				

Table CAWG 7-2. Distribution of Fish Species Collected in the Big Creek Project Area, CAWG 7 Sampling, 2002 (Continued).

STREAM NAME	REACH NAME	DOMINANT ROSGEN LEVEL I CHANNEL TYPE and SAMPLE SITE	Rainbow Trout	Golden Trout (golden x rainbow trout hybrids)	Brown Trout	Brook Trout	Sacramento Pikeminnow	Hardhead	Sacramento Sucker	Prickly Sculpin
Camp 62 Creek	Above Diversion	Aa+				X				
	Below Diversion	Aa+				X				
Bolsillo Creek	Above Diversion	B				X				
	Below Diversion	B				X				
		Aa+				X				
Mono Creek	Below Diversion	B	X		X					
San Joaquin River, Mammoth Reach	Upper Site	B	X		X				X	
	Lower Site	B	X		X				X	
Rock Creek	Above Diversion	Aa+	X		X					
	Below Diversion	Aa+	X		X					
Ross Creek	Above Diversion	Aa+	No Fish Collected							
	Below Diversion	Aa+	No Fish Collected							
Big Creek	Dam 1 to PH 1 Reach	B			X					
		G			X					X
		A			X					
		Aa+			X					
	Dam 4 to PH 2 Reach	A	X		X					
	Dam 5 to PH 8 Reach	A	X		X					
		Aa+	X		X					
Pitman Creek	Above Diversion	B	X		X	X				
	Below Diversion	B	X		X	X				
		Aa+	X							
Balsam Creek	Above Diversion	Aa+	X							
	Below Diversion	Aa+	X							
Ely Creek	Above Diversion	Aa+	X							
	Below Diversion	Aa+	X	X						
Adit 8 Creek	Above Diversion	Aa+	No Fish Collected							
	Below Diversion	Aa+	No Fish Collected							

Table CAWG 7-2. Distribution of Fish Species Collected in the Big Creek Project Area, CAWG 7 Sampling, 2002 (Continued).

STREAM NAME	REACH NAME	DOMINANT ROSGEN LEVEL I CHANNEL TYPE and SAMPLE SITE	Rainbow Trout	Golden Trout (golden x rainbow trout hybrids)	Brown Trout	Brook Trout	Sacramento Pikeminnow	Hardhead	Sacramento Sucker	Prickly Sculpin
San Joaquin River, Stevenson Reach	Upper Site	G	X		X				X	X
	Lower Site	G			X		X	X	X	
North Fork Stevenson Creek	Above Tunnel 7 Outlet	Aa+	No Fish Collected							
	Below Tunnel 7 Outlet	Aa+		X						
		G	X		X				X	
		C	X		X				X	
Stevenson Creek	Below Shaver Lake	Aa+	X							
		B	X							
		A	X							

Table CAWG 7-3. The Status of Fish Species of Waters Within the Big Creek System.

Common Name	Scientific Name	Status	Special Status
Hardhead	*Mylopharodon conocephalus*	N	CSC, USFS
Sacramento pikeminnow	*Ptychocheilus grandis*	N	
Carp	*Cyprinus carpio*	I	
Sacramento sucker	*Catostomus occidentalus*	N	
Kokanee	*Oncorhynchus nerka*	I	
Rainbow trout	*Oncorhynchus mykiss*	N/I[1]	
Golden trout	*Oncorhynchus mykiss aguabonita*	I[3]	FSC, CSC[2]
Brown trout	*Salmo trutta*	I	
Brook trout	*Salvelinus fontinalis*	I	
Bluegill	*Lepomis macrochirus*	I	
Crappie	*Pomoxis spp.*	I	
Smallmouth bass	*Micropterus dolomieui*	I	
Prickly sculpin	*Cottus asper*	N	

Legend:

N = Native

I = Introduced

FSC = Federal Species of Concern

CSC = California Species of Special Concern

USFS = Sensitive Species

[1] Rainbow trout are native to California, and were historically absent from the upper-most reaches of the South Fork San Joaquin River. Spawning anadromous rainbow trout (steelhead) may have migrated up the San Joaquin River into the lower reaches of the Project area prior to the installation of dams. Stocking of rainbow trout into the Project area included a variety of genetic strains of fish, including Kamloops, B.C., Whitney, and Coleman.

[2] The special status of golden trout is only applicable to populations in their native range, the South Fork Kern River.

[3.] Golden trout are introduced to this watershed, but are native to the South Fork Kern River.

Table CAWG 7-4. Estimated Fish Populations and Densities By Sample Site, South Fork San Joaquin River (SFSJR), CAWG 7 Sampling, 2002.

Stream	Reach	Site	Species	Size Range (mm)	Number of Fish Captured/ Observed[1]	Estimated Fish Population				
						Population Estimate (N)	Lower 95 Percent Confidence Limit[3]	Upper 95 Percent Confidence Limit	Density Estimate Number Per Kilometer (#/km)	Density Estimate Number Per Hectare (#/ha)
SFSJR	Upstream of Florence Lake	B Channel	Brown Trout	58-300	16 (1)	19[2]	17	25	206	225
	Florence Lake to Bear Creek	B Channel	Brown Trout	61-226	51 (2)	60[2]	53	70	522	713
			Rainbow Trout	108-268	12 (6)	20[2]	18	22	174	238
		C Channel	Brown Trout	53-241	21	29	21	51	303	312
			Rainbow Trout	168-208	2	2	2	n/a	21	22
	Bear Creek to Mono Crossing	G Channel	Brown Trout	64-198	22	29	22	47	306	261
			Rainbow Trout	62-138	3	3	3	n/a	32	27
		C Channel	Brown Trout	86-232	14 (4)	24[2]	18	43	226	137
			Rainbow Trout	58-204	15 (47)	67[2]	62	67	632	382
		B Channel	Brown Trout	83-260	15 (4)	22[2]	19	22	220	123
			Rainbow Trout	60-280	8 (62)	70[2]	70	70	700	391

Table CAWG 7-4. Estimated Fish Populations and Densities By Sample Site, South Fork San Joaquin River (SFSJR), CAWG 7 Sampling, 2002 (Continued).

Stream	Reach	Site	Species	Size Range (mm)	Number of Fish Captured/ Observed[1]	Estimated Fish Population				
						Population Estimate (N)	Lower 95 Percent Confidence Limit[3]	Upper 95 Percent Confidence Limit	Density Estimate Number Per Kilometer (#/km)	Density Estimate Number Per Hectare (#/ha)
SFSJR	Mono Crossing to Rattlesnake Crossing	B Channel	Brown Trout	83-217	29 (2)	32[2]	31	34	350	174
			Rainbow Trout	48-225	59 (31)	90[2]	90	90	984	490
	SJR Confluence to Rattlesnake Crossing Reach	G Channel	Brown Trout	90-210	17 (15)	34[2]	32	34	385	262
			Rainbow Trout	58-203	29 (36)	74[2]	65	74	837	571

[1] Number of fish collected (number of fish observed in habitats too deep for electrofishing methods in parentheses).
[2] Fish population estimates were calculated from the electrofishing data, and the number of fish observed by direct observation were added to the population estimate (since, at a minimum, there were at least that many more fish at the sampling site.
[3]The calculated lower confidence interval for the population estimate was lower than the number of fish captured/observed; the lower confidence interval was therefore set equal to the total number of fish captured plus the number of fish observed.
[Population estimates were created using USFS's MICROFISH program (ver. 3.0) (1986)]

Table CAWG 7-5. Estimated Fish Biomass By Sample Site Based on Electrofishing, South Fork San Joaquin River, CAWG 7 Sampling, 2002.

Stream	Reach	Site	Species	Size Range (mm)	Number of Fish Captured	Population Estimate (N)	Biomass		
							Biomass per Site (kg)	Biomass per Kilometer (kg/km)	Biomass per Hectare (kg/ha)
South Fork San Joaquin River	Upstream of Florence Lake	B Channel	Brown Trout	58-300	16	19	n/a[1]	n/a	n/a
	Florence Lake to Bear Creek	B Channel	Brown Trout	61-226	51	60	3.0	25.7	35.1
			Rainbow Trout	108-268	12	20	1.1	9.5	13.0
		C Channel	Brown Trout	53-241	21	29	1.0	10.8	11.1
			Rainbow Trout	168-208	2	2	0.2	1.9	2.0
	Bear Creek to Mono Crossing	G Channel	Brown Trout	64-198	22	29	1.0	10.1	8.6
			Rainbow Trout	62-138	3	3	0.0	0.4	0.4
		C Channel	Brown Trout	86-232	14	24	1.6	15.3	9.3
			Rainbow Trout	58-204	15	67	1.2	11.1	6.7
		B Channel	Brown Trout	83-260	15	22	1.5	14.8	8.3
			Rainbow Trout	60-280	8	70	4.3	42.8	23.9

Table CAWG 7-5. Estimated Fish Biomass By Sample Site Based on Electrofishing, South Fork San Joaquin River, CAWG 7 Sampling, 2002 (Continued).

Stream	Reach	Site	Species	Size Range (mm)	Number of Fish Captured	Population Estimate (N)	Biomass		
							Biomass per Site (kg)	Biomass per Kilometer (kg/km)	Biomass per Hectare (kg/ha)
	Mono Crossing to Rattlesnake Crossing	B Channel[2]	Brown Trout	83-217	29	32	0.9	9.5	4.7
			Rainbow Trout	48-225	59	90	1.1	11.7	5.8
	SJR Confluence. To Rattlesnake Crossing	G Channel[2]	Brown Trout	90-210	17	34	1.3	14.9	10.2
			Rainbow Trout	58-203	29	74	1.2	13.6	9.3

[1] Biomass could not be calculated due to equipment malfunction.
[2] Fish population estimates were calculated from the electrofishing data, and the number of fish observed by direct observation were added to the population estimate (since, at a minimum, there were at least that many more fish at the sampling site. Fish counted by direct observation were not weighed.

Table CAWG 7-6. Estimated Fish Populations and Densities By Sample Site, South Fork San Joaquin River Project Affected Tributaries, CAWG 7 Sampling 2002.

							Estimated Fish Population			
Stream	Reach	Site	Species	Size Range (mm)	Number of Fish Captured	Population Estimate (N)	Lower 95 Percent Confidence Limit*	Upper 95 Percent Confidence Limit	Population Estimate Per Kilometer (#/km)	Population Estimate Per Hectare (#/ha)
Tombstone Creek	Above Diversion	Aa+ Channel	No Fish							
	Below Diversion	Aa+ Channel	Brown Trout	43-414	37	38	37	42	416	2960
		C/E Channel	No Fish							
South Slide Creek	Above Diversion	Aa+ Channel	No Fish							
	Below Diversion	Aa+ Channel	No Fish							
North Slide Creek	Above Diversion	Aa+ Channel	No Fish							
	Below Diversion	Aa+ Channel	No Fish							
Hooper Creek	Above Diversion	Aa+ Channel	Golden x Rainbow Trout	91-230	13	21	13	55	663	2029
	Below Diversion	Aa+ Channel	Golden x Rainbow Trout	70-230	68	88	68	117	962	4229
Crater Creek	Above Diversion	Aa+ Channel	Brook Trout	49-179	26	27	26	31	547	1495
	Below Diversion	Aa+ Channel	Brook Trout	49-171	21	21	21	23	276	1919
		C Channel	No Fish							
	Diversion Channel	Aa+ Channel	Brook Trout	47-191	80	80	80	82	1193	3872

Table CAWG 7-6. Estimated Fish Populations and Densities By Sample Site, South Fork San Joaquin River Project Affected Tributaries, CAWG 7 Sampling 2002 (Continued).

Stream	Reach	Site	Species	Size Range (mm)	Number of Fish Captured	Population Estimate (N)	Estimated Fish Population			
							Lower 95 Percent Confidence Limit*	Upper 95 Percent Confidence Limit	Population Estimate Per Kilometer (#/km)	Population Estimate Per Hectare (#/ha)
Bear Creek	Above Diversion	B Channel	Brown Trout	65-225	43	43	43	44	470	514
	Below Diversion	A Channel	Brown Trout	63-292	110	117	110	126	1406	3211
Camp 62 Creek	Above Diversion	Aa+ Channel	Brook Trout	42-202	87	89	87	94	945	5928
	Below Diversion	Aa+ Channel	Brook Trout	44-228	92	96	92	102	1162	6780
Chinquapin Creek	Above Diversion	Aa+ Channel	Brook Trout	48-190	31	31	31	33	665	5452
	Below Diversion	Aa+ Channel	Brook Trout	43-199	176	186	176	196	2034	13094
Bolsillo Creek	Above Diversion	B Channel	Brook Trout	44-205	195	200	195	206	2187	20503
	Below Diversion	Aa+ Channel	Brook Trout	70-166	15	15	15	15	143	1087
		B Channel	Brook Trout	43-191	135	138	135	143	1509	12378
Mono Creek	Below Diversion	B Channel	Brown Trout	65-180	6	6	6	7	64	113
			Rainbow Trout	168	1	1	n/a	n/a	11	19

*The calculated lower confidence interval was less than the total catch, therefore, the lower confidence limit of the population estimate was set to equal the total catch.

[Population estimates were created using USFS's MICROFISH program (ver. 3.0) (1986)]

Table CAWG 7-7. Estimated Fish Biomass By Sample Site Based on Electrofishing, South Fork San Joaquin River Diverted Tributaries, CAWG 7 Sampling, 2002.

Stream	Reach	Site	Species	Size Range (mm)	Number of Fish Captured	Population Estimate (N)	Biomass		
							Biomass per Site (kg)	Biomass per Kilometer (kg/km)	Biomass per Hectare (kg/ha)
Tombstone Creek	Above Diversion	Aa+ Channel	No Fish						
	Below Diversion	Aa+ Channel	Brown Trout	43-414	37	38	2.4	26.5	188.4
		C/E Channel	No Fish						
South Slide Creek	Above Diversion	Aa+ Channel	No Fish						
	Below Diversion	Aa+ Channel	No Fish						
North Slide Creek	Above Diversion	Aa+ Channel	No Fish						
	Below Diversion	Aa+ Channel	No Fish						
Hooper Creek	Above Diversion	Aa+ Channel	Golden x Rainbow Trout	91-230	13	21	0.7	23.3	71.3
	Below Diversion	Aa+ Channel	Golden x Rainbow Trout	70-230	68	88	2.6	28.4	124.9
Crater Creek	Above Diversion	Aa+ Channel	Brook Trout	49-179	26	27	0.4	7.7	21.2
	Below Diversion	Aa+ Channel	Brook Trout	49-171	21	21	0.3	4.3	29.8
		C Channel	No Fish						
	Diversion Channel	Aa+ Channel	Brook Trout	47-191	80	80	1.7	25.1	81.4
Bear Creek	Above Diversion	B Channel	Brown Trout	65-225	43	43	1.6	17.0	18.6
	Below Diversion	A Channel	Brown Trout	63-292	110	117	4.8	57.5	131.3
Camp 62 Creek	Above Diversion	Aa+ Channel	Brook Trout	42-202	87	89	2.3	24.3	152.3
	Below Diversion	Aa+ Channel	Brook Trout	44-228	92	96	1.8	21.3	124.4
Chinquapin Creek	Above Diversion	Aa+ Channel	Brook Trout	48-190	31	31	0.7	14.9	122.3
	Below Diversion	Aa+ Channel	Brook Trout	43-199	176	186	3.1	33.5	215.8

Table CAWG 7-7. Estimated Fish Biomass by Sample Site Based on Electrofishing, South Fork San Joaquin River Diverted Tributaries, CAWG 7 Sampling 2002 (Continued).

Stream	Reach	Site	Species	Size Range (mm)	Number of Fish Captured	Population Estimate (N)	Biomass		
							Biomass per Site (kg)	Biomass per Kilometer (kg/km)	Biomass per Hectare (kg/ha)
Bolsillo Creek	Above Diversion	B Channel	Brook Trout	44-205	195	200	4.2	46.1	431.9
	Below Diversion	Aa+ Channel	Brook Trout	70-166	15	15	0.3	3.0	22.6
		B Channel	Brook Trout	43-191	135	138	2.4	26.4	216.5
Mono Creek	Below Diversion	B Channel	Brown Trout	65-180	6	6	0.2	1.9	3.3
			Rainbow Trout	168	1	1	0.0	0.5	0.9

Table CAWG 7-8. Estimated Fish Populations and Densities by Sample Site, San Joaquin River Mammoth Reach, CAWG 7 Sampling, 2002.

Stream	Reach	Site	Species	Size Range (mm)	Number of Fish Captured/ Observed[1]	Estimated Fish Population: Population Estimate (N)[2]	Lower 95 Percent Confidence Limit[3]	Upper 95 Percent Confidence Limit	Density Estimate Number Per Kilometer (#/km)	Density Estimate Number Per Hectare (#/ha)
SJR Mammoth Reach	Upper Site	B Channel	Brown Trout	79-215	11	1			125	83
			Rainbow Trout	59-210	10 (4)	14	14	15	116	78
			Sacramento Sucker	50-410	15 (48)	63	63	64	523	348
	Lower Site	B Channel	Brown Trout	55-438	13	14	13	19	52	46
			Rainbow Trout	46-203	19 (9)	104	28	766	384	340
			Sacramento Sucker	23-335	135 (26)	329	161	565	1215	1077

[1] Number of fish collected (number of fish observed in habitats too deep for electrofishing methods in parentheses).

[2] Fish population estimates were calculated from the electrofishing data, and the number of fish observed by direct observation were added to the population estimate (since, at a minimum, there were at least that many more fish at the sampling site.

[3] The calculated lower confidence interval for the population estimate was lower than the number of fish captured/observed; the lower confidence interval was therefore set equal to the total number of fish captured plus the number of fish observed.

[Population estimates were created using USFS's MICROFISH program (ver. 3.0) (1986)]

Table CAWG 7-9. Estimated Fish Biomass By Sample Site Based on Electrofishing, San Joaquin River Mammoth Reach, CAWG 7 Sampling, 2002.

Stream	Reach	Site	Species	Size Range (mm)	Number of Fish Captured	Biomass		
						Biomass per Site (kg)	Biomass per Kilometer (kg/km)	Biomass per Hectare (kg/ha)
SJR Mammoth Reach	Upper Site	B Channel	Brown Trout	79-215	11	0.4	3.0	2
			Rainbow Trout	59-210	10	0.4	3.1	2.1
			Sacramento Sucker	50-410	15	5.3	44.2	29.3
	Lower Site	B Channel	Brown Trout	55-438	13	1.4	5.3	4.7
			Rainbow Trout	46-203	19	3.8	14.1	12.5
			Sacramento Sucker	23-335	135	10.9	40.3	35.7

Table CAWG 7-10. Estimated Fish Populations and Densities By Sample Site, Rock Creek, CAWG 7 Sampling, 2002.

Stream	Reach	Site	Species	Size Range (mm)	Number of Fish Captured/ Observed[1]	Estimated Fish Population				
						Population Estimate (N)	Lower 95 Percent Confidence Limit[3]	Upper 95 Percent Confidence Limit	Density Estimate Number Per Kilometer (#/km)	Density Estimate Number Per Hectare (#/ha)
Rock Creek	Above Diversion	Aa+ Channel	Brown Trout	43-305	84	85	84	88	930	2407
			Rainbow Trout	90-200	22	22	20	28	241	623
	Below Diversion	Aa+ Channel	Brown Trout	67-277	39	39	39	41	481	1155
			Rainbow Trout	67-332	35 (10)	45[2]	45	46	432	1037

[1] Number of fish collected (number of fish observed in habitats too deep for electrofishing methods in parentheses).

[2] Fish population estimates were calculated from the electrofishing data, and the number of fish observed by direct observation were added to the population estimate (since, at a minimum, there were at least that many more fish at the sampling site.

[3] The calculated lower confidence interval for the population estimate was lower than the number of fish captured/observed; the lower confidence interval was therefore set equal to the total number of fish captured plus the number of fish observed.

Table CAWG 7-11. Estimated Fish Biomass by Sample Site Based on Electrofishing, Rock Creek, CAWG 7 Sampling, 2002.

Stream	Reach	Site	Species	Size Range (mm)	Number of Fish Captured	Population Estimate (N)	Biomass		
							Biomass per Site (kg)	Biomass per Kilometer (kg/km)	Biomass per Hectare (kg/ha)
Rock Creek	Above Diversion	Aa+ Channel	Brown Trout	43-305	84	85	3.2	35.3	91.5
			Rainbow Trout	90-200	22	22	1.0	11.4	29.5
	Below Diversion	Aa+ Channel	Brown Trout	67-277	39	39	1.4	17.7	42.4
			Rainbow Trout	67-332	35	45	1.0	12.1	29

Table CAWG 7-12. Estimated Fish Populations and Densities By Sample Site, San Joaquin River Stevenson Reach, CAWG 7 Sampling, 2002.

						Estimated Fish Population				
Stream	**Reach**	**Site**	**Species**	**Size Range (mm)**	**Number of Fish Captured**	**Population Estimate[2] (N)**	**Lower 95 Percent Confidence Limit[3]**	**Upper 95 Percent Confidence Limit**	**Density Estimate Number Per Kilometer (#/km)**	**Density Estimate Number Per Hectare (#/ha)**
San Joaquin River Stevenson Reach	Upper Site	G Channel	Brown Trout	98	1	1	1	-	7	5
			Rainbow Trout	54-78	4 (6)	14	10	50	100	76
			Sacramento Sucker	38-229	36 (33)	72	69	46	514	389
			Prickly Sculpin	42-105	5	6	5	15	43	32
			Sacramento Pikeminnow[4,5]	75-150	1					
	Lower Site	G Channel	Brown Trout	87	1	1	1	-	7	6
			Hardhead[6]	42-163	30 (6)	40	36	45	295	233
			Sacramento Pikeminnow[6]	29-191	41 (19)	81	60	102	597	471
			Sacramento Sucker	195-301	2	2	2	7	15	12

[1] Number of fish collected (number of fish observed in habitats too deep for electrofishing methods in parentheses).

[2] Fish population estimates were calculated from the electrofishing data, and the number of fish observed by direct observation were added to the population estimate (since, at a minimum, there were at least that many more fish at the sampling site.

[3] The calculated lower confidence interval for the population estimate was lower than the number of fish captured/observed; the lower confidence interval was therefore set equal to the total number of fish captured plus the number of fish observed.

[4] One Sacramento pikeminnow observed during snorkel survey.

[5] One unidentified cyprinid was observed during snorkeling, not included in totals.

[6] Seventy-one unidentified cyprinids were observed during snorkeling, not included in totals. The cyprinids were likely hardhead or Sacramento pikeminnow, or a combination of both species.

[Population estimates were created using USFS's MICROFISH program (ver. 3.0) (1986)]

Table CAWG 7-13. Estimated Biomass[1] by Sample Site Based on Electrofishing, San Joaquin River Stevenson Reach, CAWG 7 Sampling, 2002.

Stream	Reach	Site	Species	Size Range (mm)	Number of Fish Captured	Population Estimate (N)	Biomass		
							Biomass per Site (kg)	Biomass per Kilometer (kg/km)	Biomass per Hectare (kg/ha)
San Joaquin River Stevenson Reach	Upper Site	G Channel	Brown Trout	98	1	1	0.0	0.1	0.1
			Rainbow Trout	54-78	4	14	0.1	0.4	0.3
			Sacramento Sucker	38-229	36	72	0.7	4.8	3.6
			Prickly Sculpin	42-105	5	6	0.0	0.2	0.2
	Lower Site	G Channel	Brown Trout	87	1	1	0.0	0.1	0.0
			Hardhead	42-163	29	40	0.4	2.8	2.2
			Sacramento Pikeminnow	29-191	41	81	0.8	5.9	4.6
			Sacramento Sucker	195-301	2	2	0.4	3.2	2.5

[1] Does not include fish observed during snorkeling.

Table CAWG 7-14. Estimated Fish Populations and Densities by Sample Site, Big Creek and Diverted Tributaries, CAWG 7 Sampling, 2002.

Stream	Reach	Site	Species	Size Range (mm)	Number of Fish Captured	Population Estimate (N)	Estimated Fish Population			
							Lower 95 Percent Confidence Limit*	Upper 95 Percent Confidence Limit	Density Estimate Number Per Kilometer (#/km)	Density Estimate Number Per Hectare (#/ha)
Big Creek	Dam 1 (Huntington Lake) to Powerhouse 1	B Channel	Brown Trout	99-190	16	21	16	37	320	462
		G Channel	Brown Trout	65-199	44	45	44	49	648	1852
			Prickly Sculpin	94	1	1			14	41
		A Channel	Brown Trout	49-222	72	74	72	79	1214	3572
		Aa+ Channel	Brown Trout	78-305	43	43	43	45	497	1579
	Dam 4 to Powerhouse 2	A Channel	Brown trout	76-260	25	26	25	31	363	811
			Rainbow Trout	79-200	26	26	26	29	363	811
	Dam 5 to Powerhouse 8	A Channel	Brown Trout	75-238	42	55	42	78	602	946
			Rainbow Trout	54-178	79	85	79	94	930	1463
		Aa+ Channel	Brown Trout	95-194	11	11	11	13	160	331
			Rainbow Trout	73-202	51	53	51	58	769	1594
Pitman Creek	Above Diversion	B Channel	Brown Trout	70-294	28	33	28	45	338	780
			Rainbow Trout	46-264	96	104	96	115	1066	2458
			Brook Trout	60-170	8	8	8	35	82	189

Table CAWG 7-14. Estimated Fish Populations and Densities by Sample Site, Big Creek and Diverted Tributaries, CAWG 7 Sampling, 2002 (Continued).

							Estimated Fish Population			
Stream	Reach	Site	Species	Size Range (mm)	Number of Fish Captured	Population Estimate (N)	Lower 95 Percent Confidence Limit*	Upper 95 Percent Confidence Limit	Density Estimate Number Per Kilometer (#/km)	Density Estimate Number Per Hectare (#/ha)
	Below Diversion	B Channel	Brown Trout	175-182	2	2	2	7	22	50
			Rainbow Trout	36-179	56	57	56	60	613	1426
			Brook Trout	121-132	2	2	2	15	22	50
		Aa+ Channel	Rainbow Trout	47-187	114	118	114	124	1647	5496
Balsam Creek	Above Diversion	Aa+ Channel	Rainbow Trout	41-262	112	129	112	147	1335	8101
	Below Diversion	Aa+ Channel	Rainbow Trout	169	1	1			12	33
Ely Creek	Above Diversion	Aa+ Channel	Rainbow Trout	155-235	15	15	15	17	190	1605
	Below Diversion	Aa+ Channel	Rainbow Trout	23-205	26	26	26	27	266	1635
			Golden x Rainbow Trout Hybrids	99-175	10	10	10	11	102	629
Adit No. 8 Creek	Below Diversion	Aa+ Channel	No Fish							

*The calculated lower confidence interval was less than the total catch, therefore, the lower confidence limit of the population estimate was set to equal the total catch.

[Population estimates were created using USFS's MICROFISH program (ver. 3.0) (1986)]

Table CAWG 7-15. Estimated Fish Biomass by Sample Site Based on Electrofishing, Big Creek and Diverted Tributaries, CAWG 7 Sampling, 2002.

Stream	Reach	Site	Species	Size Range (mm)	Number of Fish Captured	Population Estimate (N)	Biomass		
							Biomass per Site (kg)	Biomass per Kilometer (kg/km)	Biomass per Hectare (kg/ha)
Big Creek	Dam 1 (Huntington Lake) to Powerhouse1	B Channel	Brown Trout	99-190	16	21	0.7	11.1	16.0
		G Channel	Brown Trout	65-199	44	45	1.2	17.8	50.9
			Prickly Sculpin	94	1	1	0.0	0.2	0.5
		A Channel	Brown Trout	49-222	72	74			
		Aa+ Channel	Brown Trout	78-305	43	43	3.2	37.0	117.6
	Dam 4 to Powerhouse 2	A Channel	Brown Trout*	76-260	25	26			
			Rainbow Trout*	79-200	26	26			
	Dam 5 to Powerhouse 8	A Channel	Brown Trout*	75-238	42	55			
			Rainbow Trout*	54-178	79	85			
		Aa+ Channel	Brown Trout*	95-194	11	11			
			Rainbow Trout*	73-202	51	53			
Pitman Creek	Above Diversion	B Channel	Brown Trout	70-294	28	33	1.9	19.7	45.4
			Rainbow Trout	46-264	96	104	2.4	24.8	57.3
			Brook Trout	60-170	8	8	0.1	0.6	1.5

Table CAWG 7-15. Estimated Fish Biomass by Sample Site Based on Electrofishing, Big Creek and Diverted Tributaries, CAWG 7 Sampling, 2002 (Continued).

Stream	Reach	Site	Species	Size Range (mm)	Number of Fish Captured	Population Estimate (N)	Biomass: Biomass per Site (kg)	Biomass: Biomass per Kilometer (kg/km)	Biomass: Biomass per Hectare (kg/ha)
	Below Diversion	B Channel	Brown Trout	175-182	2	2	0.1	1.4	3.2
			Rainbow Trout	36-179	56	57	1.5	16.4	38.2
			Brook Trout	121-132	2	2	0.0	0.4	1.0
		Aa+ Channel	Rainbow Trout	47-187	114	118	1.7	23.2	77.5
Balsam Creek	Above Diversion	Aa+ Channel	Rainbow Trout	41-262	112	129	2.7	28.3	171.6
	Below Diversion	Aa+ Channel	Rainbow Trout	169	1	1	0.1	0.8	2.3
Ely Creek	Above Diversion	Aa+ Channel	Rainbow Trout*	155-235	15	15	1.3	16.3	133.9
	Below Diversion	Aa+ Channel	Rainbow Trout*	23-205	26	26	0.9	9.4	76.7
			Golden x Rainbow Trout Hybrids*	99-175	10	10	0.4	3.8	31.4
Adit No. 8 Creek	Below Diversion	Aa+ Channel	No Fish						

*Biomass could not be calculated due to equipment malfunction

Table CAWG 7-16. Estimated Fish Populations and Densities By Sample Site, North Fork Stevenson Creek, CAWG 7 Sampling, 2002.

Stream	Reach	Site	Species	Size Range (mm)	Number of Fish Captured	Estimated Fish Population				
						Population Estimate (N)	Lower 95 Percent Confidence Limit*	Upper 95 Percent Confidence Limit	Density Estimate Number Per Kilometer (#/km)	Density Estimate Number Per Hectare (#/ha)
North Fork Stevenson Creek	Upstream of Tunnel 7 Outlet	Aa+ Channel	No fish							
	Downstream of Tunnel 7 Outlet	Aa+ Channel	Golden x Rainbow Trout Hybrid	86-188	48	48	48	50	583	487
		G Channel	Brown Trout	40-237	28	29	28	33	305	703
			Rainbow Trout	101-175	20	20	20	22	210	485
			Golden x Rainbow Trout Hybrid	168	1	1	-	-	11	24
			Sacramento Sucker	342	1	1	-	-	11	24
		C Channel	Brown Trout	38-208	39	41	39	46	430	2170
			Rainbow Trout	35-218	30	30	30	38	314	1588
			Sacramento Sucker	237-331	4	4	4	6	42	212

*The calculated lower confidence interval was less than the total catch, therefore, the lower confidence limit of the population estimate was set to equal the total catch.

[Population estimates were created using USFS's MICROFISH program (ver. 3.0) (1986)]

Table CAWG 7-17. Estimated Fish Biomass by Sample Site Based on Electrofishing, North Fork Stevenson Creek, CAWG 7 Sampling, 2002.

Stream	Reach	Site	Species	Size Range (mm)	Number of Fish Captured	Population Estimate (N)	Biomass		
							Biomass per Site (kg)	Biomass per Kilometer (kg/km)	Biomass per Hectare (kg/ha))
North Fork Stevenson Creek	Upstream of Tunnel 7 Outlet	Aa+ Channel	No fish						
	Downstream of Tunnel 7 Outlet	Aa+ Channel	Golden x Rainbow Trout Hybrid	86-188	48	48	0.9	10.8	9.0
		G Channel	Brown Trout	40-237	28	29	1.8	18.9	43.7
			Rainbow Trout	101-175	20	20	0.6	5.8	13.5
			Golden x Rainbow Trout Hybrid	168	1	1	0.1	0.6	1.3
			Sacramento Sucker	342	1	1	0.6	5.9	13.5
		C Channel	Brown Trout	38-208	39	41	0.6	6.6	33.2
			Rainbow Trout	35-218	30	30	0.6	5.9	29.8
			Sacramento Sucker	237-331	4	4	1.2	13.0	65.9

Table CAWG 7-18. Estimated Fish Populations and Densities By Sample Site, Stevenson Creek, CAWG 7 Sampling, 2002.

Stream	Reach	Site	Species	Size Range (mm)	Number of Fish Captured	Estimated Fish Population				
						Population Estimate (N)	Lower 95 Percent Confidence Limit*	Upper 95 Percent Confidence Limit	Density Estimate Number Per Kilometer (#/km)	Density Estimate Number Per Hectare (#/ha)
Stevenson Creek	Downstream of Shaver Lake Dam	B Channel	Rainbow Trout	42-165	62	65	62	71	751	2,829
		Aa+ Channel	Rainbow Trout	43-193	73	78	73	86	966	3,161
		A Channel	Rainbow Trout	95-195	9	9	9	9	128	309

*The calculated lower confidence interval for the population estimate was lower than the number of fish captured; the lower confidence interval was therefore set equal to the total catch.

[Population estimates were created using USFS's MICROFISH program (ver. 3.0) (1986)]

Table CAWG 7-19. Estimated Fish Biomass by Sample Site Based on Electrofishing, Stevenson Creek, CAWG 7 Sampling, 2002.

							Biomass		
Stream	Reach	Site	Species	Size Range (mm)	Number of Fish Captured	Population Estimate (N)	Biomass per Site (kg)	Biomass per Kilometer (kg/km)	Biomass per Hectare (kg/ha)
Stevenson Creek	Downstream of Shaver Lake Dam	B Channel	Rainbow Trout	42-165	62	65	1.2	13.9	52.3
		Aa+ Channel	Rainbow Trout	43-193	73	78	1.8	22.9	74.9
		A Channel	Rainbow Trout	95-195	9	9	0.0	0.0	0.0

Table CAWG 7-20. Catch Per Unit Effort of Fish Species Collected in Florence Lake.

Gear Type	Species	Number Collected	Hours Fished	CPUE (Fish/Hour)	CPUE (Fish/Day)
Gill Nets	Brown Trout	39	278.80	0.14	3.36
Minnow Traps	Brown Trout	2	1,394.00	< 0.01	0.03

Table CAWG 7-21. Mean Condition Factors and 95 Percent Confidence Intervals for Fish Species Collected in Project Reservoirs, CAWG 7 Sampling, 2002.

Trout Species	Mean	Lower 95 Percent Confidence Intervals	Upper 95 Percent Confidence Intervals
Florence Lake			
Brown Trout	1.47	0.92	2.01
Bear Division			
Brown Trout	1.38	1.06	1.71
Rainbow Trout	0.85	0.22	1.49
Mono Diversion Reservoir			
Brown Trout	1.41	0.99	1.82
Rainbow Trout[1]	2.19	1.17	3.22
Mammoth Pool Reservoir			
Brown Trout	1.10	0.00[2]	1.48
Rainbow Trout[1]	1.33	1.11	1.55
Dam 6 Forebay			
Brown Trout	1.11	0.90	1.32
Rainbow Trout	1.36	1.07	1.65
Huntington Lake			
Brown Trout	2.28	1.22	3.33
Rainbow Trout	1.97	0.36	3.58
Kokanee	2.94	0.06	5.83
Dam 4 Forebay			
Brown Trout	1.24	0.93	1.56
Rainbow Trout	1.47	1.18	1.76
Dam 5 Forebay			
Brown Trout	1.34	1.02	1.66
Rainbow Trout	1.85	N/A[3]	N/A[3]
Balsam Meadow Forebay			
Brown Trout	1.14	0.74	1.54
Rainbow Trout	1.19	0.88	1.49
Kokanee	1.31	1.22	1.40
Shaver Lake			
Rainbow Trout[1]	1.27	0.95	1.58
Kokanee	1.83	0.92	2.74

[1] All fish were determined to be of hatchery origin.

[2] Calculated value was negative; re-entered as a zero value.

[3] Not enough data to calculate confidence limits. (1 fish collected)

Table CAWG 7-22. Vertical Distribution of Fish Densities Detected During Florence Lake Hydroacoustic Survey for All Areas, August 2002.

STRATA	TOP	BOTTOM	Density of Fish
	Depth (m)	Depth (m)	(fish per cu. m)
1*	2	4	1.33E-04
2	4	5.9	2.99E-04
3	5.9	7.9	9.37E-05
4	7.9	9.8	2.27E-05
5	9.8	11.8	3.11E-05
6	11.8	13.8	1.01E-04
7	13.8	15.7	1.32E-04
8	15.7	17.7	5.21E-05
9	17.7	19.6	1.11E-04
10	19.6	21.6	9.61E-05
11	21.6	23.5	1.95E-04

* Fish density is potentially underestimated near the surface of the reservoir due to small sample volumes.

Table CAWG 7-23. Catch Per Unit Effort of Fish Species Collected in Bear Diversion Forebay.

Gear Type	Species	Number Collected	Hours Fished	CPUE (Fish/Hour)	CPUE (Fish/Day)
Gill Nets	Brown Trout	39	88.50	0.44	10.58
	Rainbow Trout	1	88.50	0.01	0.27
	All Species	**40**	**88.50**	**0.45**	**10.85**
Electrofisher	Brown Trout	11	0.72	-	-
	Rainbow Trout	3	0.72	-	-
	All Species	**14**	**0.72**	**-**	**-**

Table-CAWG 7-24. Catch Per Unit Effort of Fish Species Collected in Mono Diversion Forebay.

Gear Type	Species	Number Collected	Hours Fished	CPUE (Fish/Hour)	CPUE (Fish/Day)
Gill Nets	Brown Trout	7	61.65	0.11	2.73
	Rainbow Trout	38	61.65	0.62	14.79
	All Species	**45**	**61.65**	**0.73**	**17.52**
Electrofisher	Brown Trout	5	0.45	-	-

Table CAWG 7-25. Catch Per Unit Effort of Fish Species Collected in Mammoth Pool Reservoir.

Gear Type	Species	Number Collected	Hours Fished	CPUE (Fish/Hour)	CPUE (Fish/Day)
Gill Nets	Brown Trout	12	278.00	0.04	1.04
	Rainbow Trout	5	278.00	0.02	0.43
	All Species	**17**	**278.00**	**0.06**	**1.47**

Table CAWG 7-26. Vertical Distribution of Fish Densities Detected During Mammoth Pool Reservoir Hydroacoustic Survey for All Areas, September 2002.

STRATA	TOP	BOTTOM	Density of Fish
	Depth (m)	Depth (m)	(fish per cu. m)
1*	2	4	3.31E-04
2	4	5.9	7.95E-04
3	5.9	7.9	6.99E-04
4	7.9	9.9	6.78E-04
5	9.9	11.8	7.04E-04
6	11.8	13.8	3.25E-04
7	13.8	15.8	2.14E-04
8	15.8	17.8	2.98E-04
9	17.8	19.7	1.35E-04
10	19.7	21.7	3.25E-05
11	21.7	23.7	5.09E-05
12	23.7	25.6	1.81E-04
13	25.6	27.6	4.11E-05
14	27.6	29.6	2.38E-10
15	29.6	31.6	3.62E-05
16	31.6	33.5	1.55E-05
17	33.5	35.5	4.03E-05
18	35.5	37.5	9.39E-05
19	37.5	39.5	1.31E-05
20	39.5	41.4	2.72E-11
21	41.4	43.4	4.21E-11
22	43.4	45.4	2.24E-06
23	45.4	47.3	3.91E-05
24	47.3	49.3	1.97E-05
25	49.3	51.3	1.38E-10

* Fish density is potentially underestimated near the surface of the reservoir due to small sample volumes.

Table CAWG 7-27. Catch Per Unit Effort of Fish Species Collected in Dam 6 Forebay.

Gear Type	Species	Number Collected	Hours Fished	CPUE (Fish/Hour)	CPUE (Fish/Day)
Gill Nets	Brown Trout	11	77.60	0.14	3.40
	Rainbow Trout	4	77.60	0.05	1.24
	Sacramento Sucker	56	77.60	0.72	17.32
	All Species	**71**	**77.60**	**0.91**	**21.96**
Electrofisher	Sacramento Sucker	9	0.40	-	-

Table CAWG 7-28. Catch Per Unit Effort of Fish Species Collected in Huntington Lake.

Gear Type	Species	Number Collected	Hours Fished	CPUE (Fish/Hour)	CPUE (Fish/Day)
Gill Nets	Brown Trout	7	269.35	0.03	0.62
	Rainbow Trout	1	269.35	0.00	0.09
	Kokanee	2	269.35	0.01	0.18
	Sacramento Sucker	10	269.35	0.04	0.89
	All Species	**20**	**269.35**	**0.07**	**1.78**
Trap Nets	Rainbow Trout	2	133.15	0.02	0.36
	Kokanee	1	133.15	0.01	0.18
	Sacramento Sucker	15	133.15	0.11	2.70
	Prickly Sculpin	15	133.15	0.11	2.70
	All Species	**33**	**133.15**	**0.25**	**5.95**
Minnow Traps	Prickly Sculpin	11	1,598.40	0.01	0.17

Table CAWG 7-29. Vertical Distribution of Fish Densities Detected During Huntington Lake Hydroacoustic Survey for All Areas, June 2002.

STRATA	TOP	BOTTOM	Density of Fish
	Depth (m)	Depth (m)	(fish per cu. m)
1*	2	3.9	1.47E-04
2	3.9	5.9	5.28E-04
3	5.9	7.9	3.07E-04
4	7.9	9.8	4.91E-04
5	9.8	11.8	2.48E-04
6	11.8	13.8	3.78E-05
7	13.8	15.7	1.43E-04
8	15.7	17.7	1.13E-08
9	17.7	19.6	8.31E-05
10	19.6	21.6	6.84E-06
11	21.6	23.6	7.79E-06
12	23.6	25.5	3.33E-12
13	25.5	27.5	1.63E-12
14	27.5	29.4	0.00E+00
15	29.4	31.4	4.91E-13
16	31.4	33.3	3.45E-06
17	33.3	35.3	3.31E-12
18	35.3	37.3	0.00E+00

* Fish density is potentially underestimated near the surface of the reservoir due to small sample volumes.

Table CAWG 7-30. Catch Per Unit Effort of Fish Species Collected in Dam 4 Forebay.

Gear Type	Species	Number Collected	Hours Fished	CPUE (Fish/Hour)	CPUE (Fish/Day)
Gill Nets	Brown Trout	8	48.00	0.17	4.00
	Rainbow Trout	11	48.00	0.23	5.50
	All Species	**19**	**48.00**	**0.40**	**9.50**
Minnow Traps	Prickly Sculpin	2	144.00	0.01	0.67
Electrofisher	Brown Trout	1	0.49	-	-
	Rainbow Trout	19	0.49	-	-
	Prickly Sculpin	12	0.49	-	-
	All Species	**32**	**0.49**	**-**	**-**

Table CAWG 7-31. Catch Per Unit Effort of Fish Species Collected in Dam 5 Forebay.

Gear Type	Species	Number Collected	Hours Fished	CPUE (Fish/Hour)	CPUE (Fish/Day)
Gill Nets	Brown Trout	10	47.87	0.21	5.01
	Rainbow Trout	1	47.87	0.02	0.50
	Prickly Sculpin	1	47.87	0.02	0.50
	All Species	**12**	**47.87**	**0.25**	**6.02**

Table CAWG 7-32. Catch Per Unit Effort of Fish Species Collected in Balsam Meadow Forebay.

Gear Type	Species	Number Collected	Hours Fished	CPUE (Fish/Hour)	CPUE (Fish/Day)
Gill Nets	Brown Trout	3	123.22	0.02	0.58
	Rainbow Trout	7	123.22	0.06	1.36
	Kokanee	43	123.22	0.35	8.38
	Smallmouth Bass	1	123.22	0.01	0.19
	Sacramento Sucker	23	123.22	0.19	4.48
	All Species	**77**	**123.22**	**0.62**	**15.00**
Trap Nets	Rainbow Trout	3	152.00	0.02	0.47
	Sacramento Sucker	6	152.00	0.04	0.95
	Prickly Sculpin	64	152.00	0.42	10.11
	All Species	**73**	**152.00**	**0.48**	**11.53**
Electrofisher	Smallmouth Bass	3	0.64	-	-

Table CAWG 7-33. Catch Per Unit Effort of Fish Species Collected in Shaver Lake.

Gear Type	Species	Number Collected	Hours Fished	CPUE (Fish/Hour)	CPUE (Fish/Day)
Gill Nets	Rainbow Trout	24	284.68	0.08	2.02
	Kokanee	13	284.68	0.05	1.10
	Smallmouth Bass	12	284.68	0.04	1.01
	Sacramento Sucker	2	284.68	0.01	0.17
	Carp	1	284.68	0.00	0.08
	All Species	**52**	**284.68**	**0.18**	**4.38**
Trap Nets	Smallmouth Bass	6	147.07	0.04	0.98
	Bluegill	4	147.07	0.03	0.65
	Crappie	3	147.07	0.02	0.49
	Unidentified Centrarchid	2	147.07	0.01	0.33
	All Species	**15**	**147.07**	**0.10**	**2.45**

Table CAWG 7-34. Vertical Distribution of Fish Densities Detected During Shaver Lake Hydroacoustic Survey for All Areas, July 2002.

STRATA	TOP	BOTTOM	Density of Fish
	Depth (m)	Depth (m)	(fish per cu. m)
1*	2	3.9	1.05E-03
2	3.9	5.9	1.48E-03
3	5.9	7.9	3.41E-04
4	7.9	9.8	6.02E-04
5	9.8	11.8	6.30E-04
6	11.8	13.7	7.53E-04
7	13.7	15.7	6.74E-04
8	15.7	17.7	3.79E-04
9	17.7	19.6	3.67E-04
10	19.6	21.6	1.29E-04
11	21.6	23.5	3.65E-05
12	23.5	25.5	1.77E-05
13	25.5	27.5	3.37E-05
14	27.5	29.4	3.71E-05
15	29.4	31.4	1.82E-05
16	31.4	33.4	7.18E-06
17	33.4	35.3	2.38E-05
18	35.3	37.3	1.23E-05
19	37.3	39.2	0.00E+00
20	39.2	41.2	0.00E+00

* Fish density is potentially underestimated near the surface of the reservoir due to small sample volumes.

FIGURES

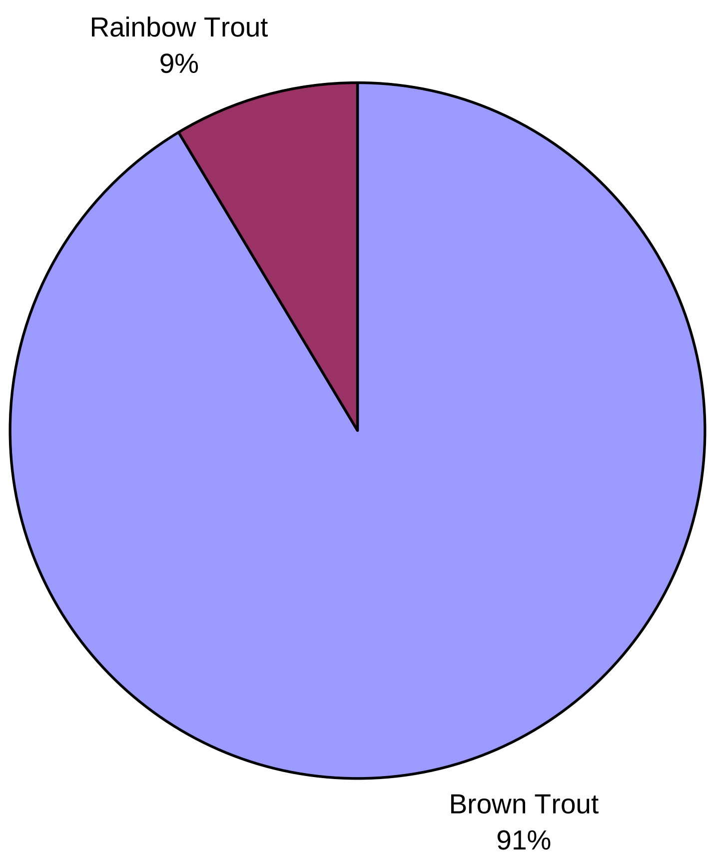


Figure CAWG 7-1. Composition of Fish Species Collected in South Fork San Joaquin River, Florence Lake to Bear Creek, Rosgen Level I Type C/B Channel Site, September 2002 (Number of Fish = 23).

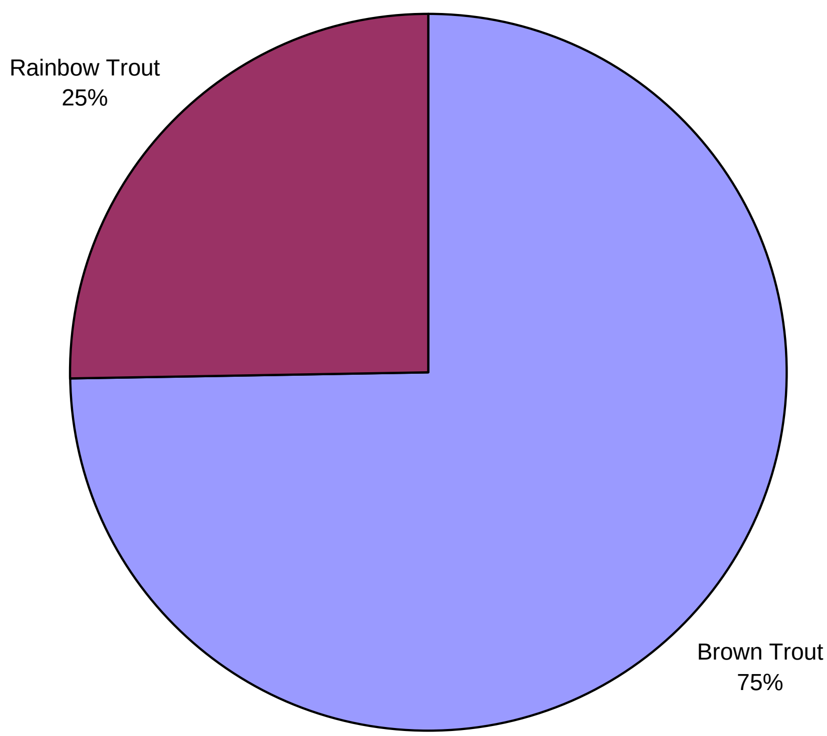


Figure CAWG 7-2. Composition of Fish Species Collected in South Fork San Joaquin River, Florence Lake to Bear Creek, Rosgen Level I Type B Channel Site, September 2002 (Number of Fish = 71).

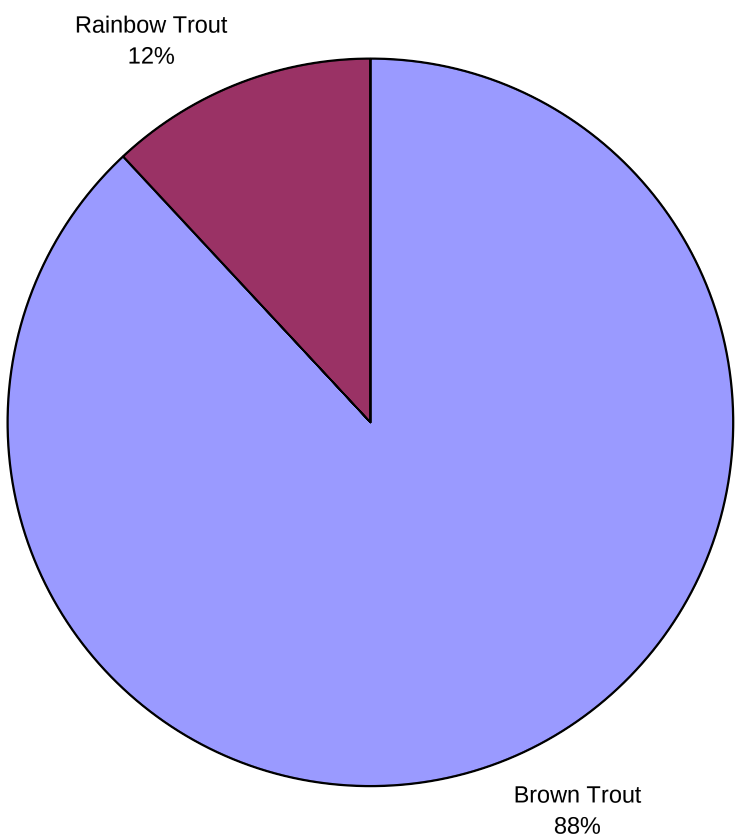


Figure CAWG 7-3. Composition of Fish Species Collected in South Fork San Joaquin River, Bear Creek to Mono Crossing, Rosgen Level I Type G Channel Site, September 2002 (Number of Fish = 25).

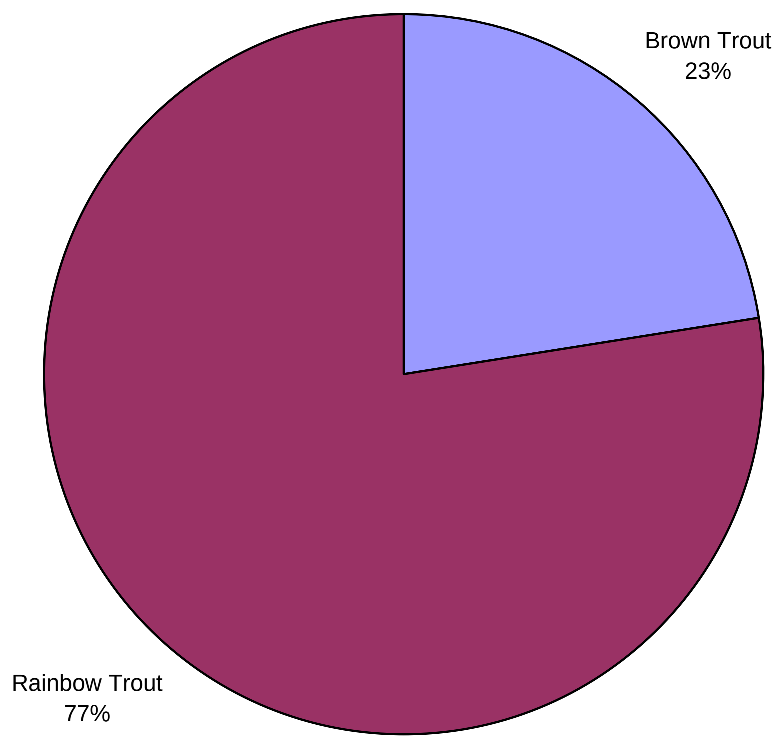


Figure CAWG 7-4. Composition of Fish Species Collected in South Fork San Joaquin River, Bear Creek to Mono Crossing, Rosgen Level I Type C Channel Site, September 2002 (Number of Fish = 80).

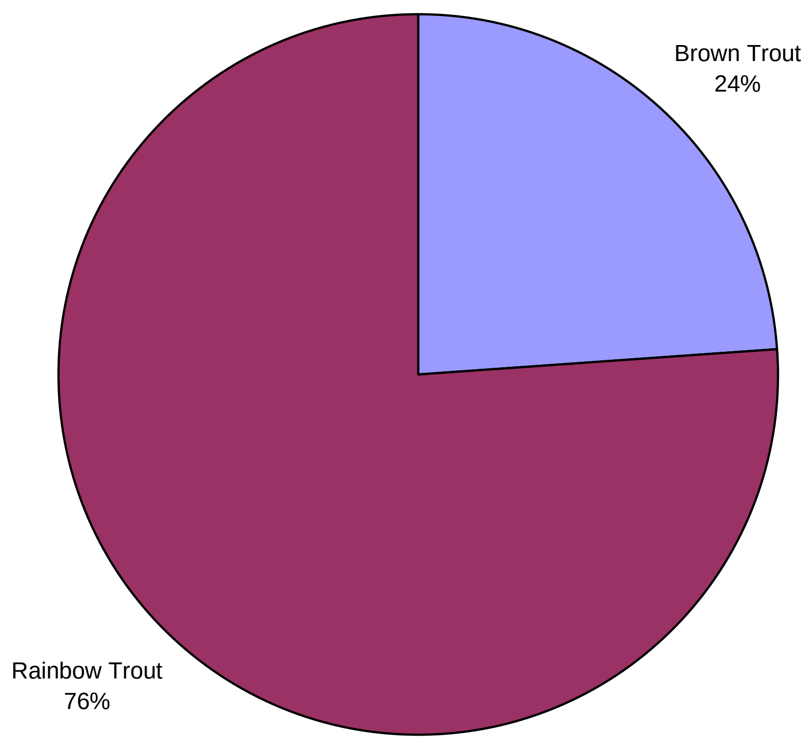


Figure CAWG 7-5. Composition of Fish Species Collected in South Fork San Joaquin River, Bear Creek to Mono Crossing, Rosgen Level I Type B Channel Site, September 2002 (Number of Fish = 92).

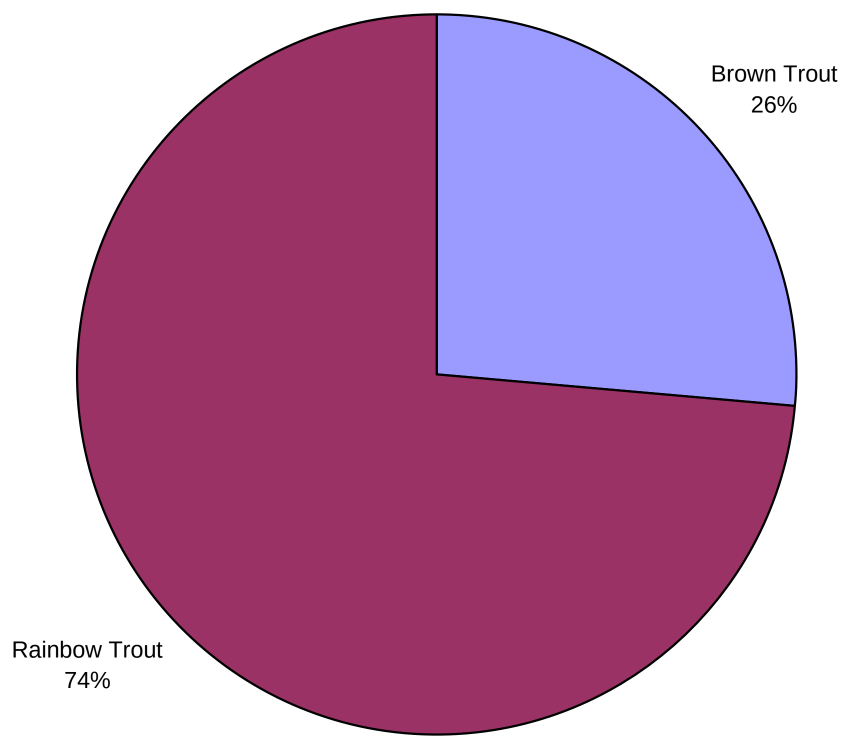


Figure CAWG 7-6. Composition of Fish Species Collected in South Fork San Joaquin River, Mono Crossing to Rattlesnake Crossing, Rosgen Level I Type B Channel Site, October 2002 (Number of Fish = 117).

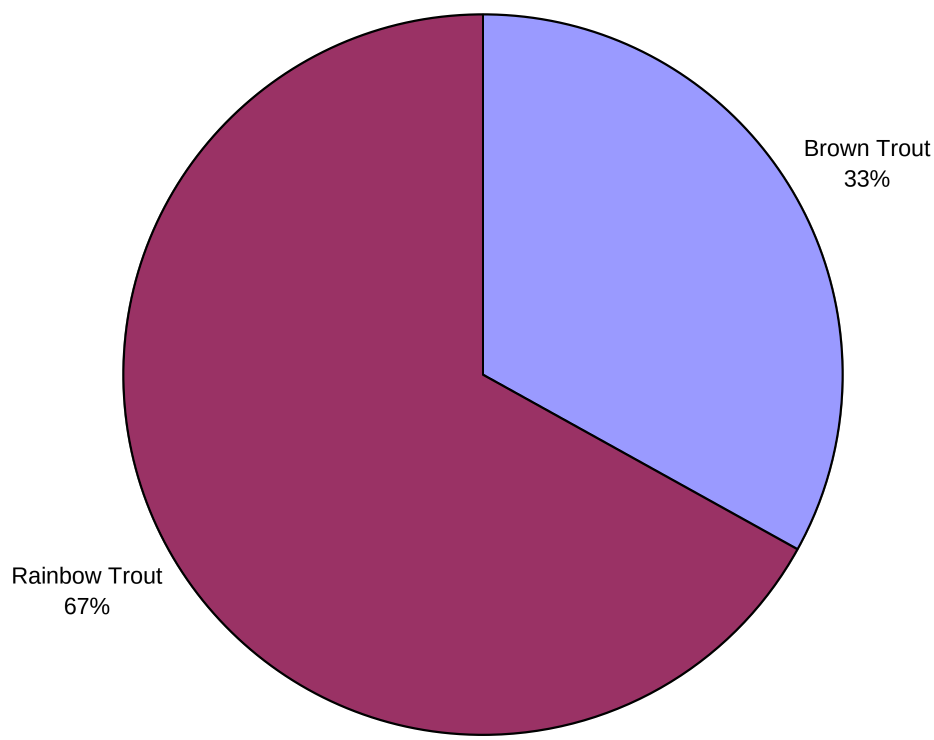


Figure CAWG 7-7. Composition of Fish Species Collected in South Fork San Joaquin River, Rattlesnake Crossing to San Joaquin Confluence, Rosgen Level I Type G Channel Site, October 2002 (Number of Fish = 97).

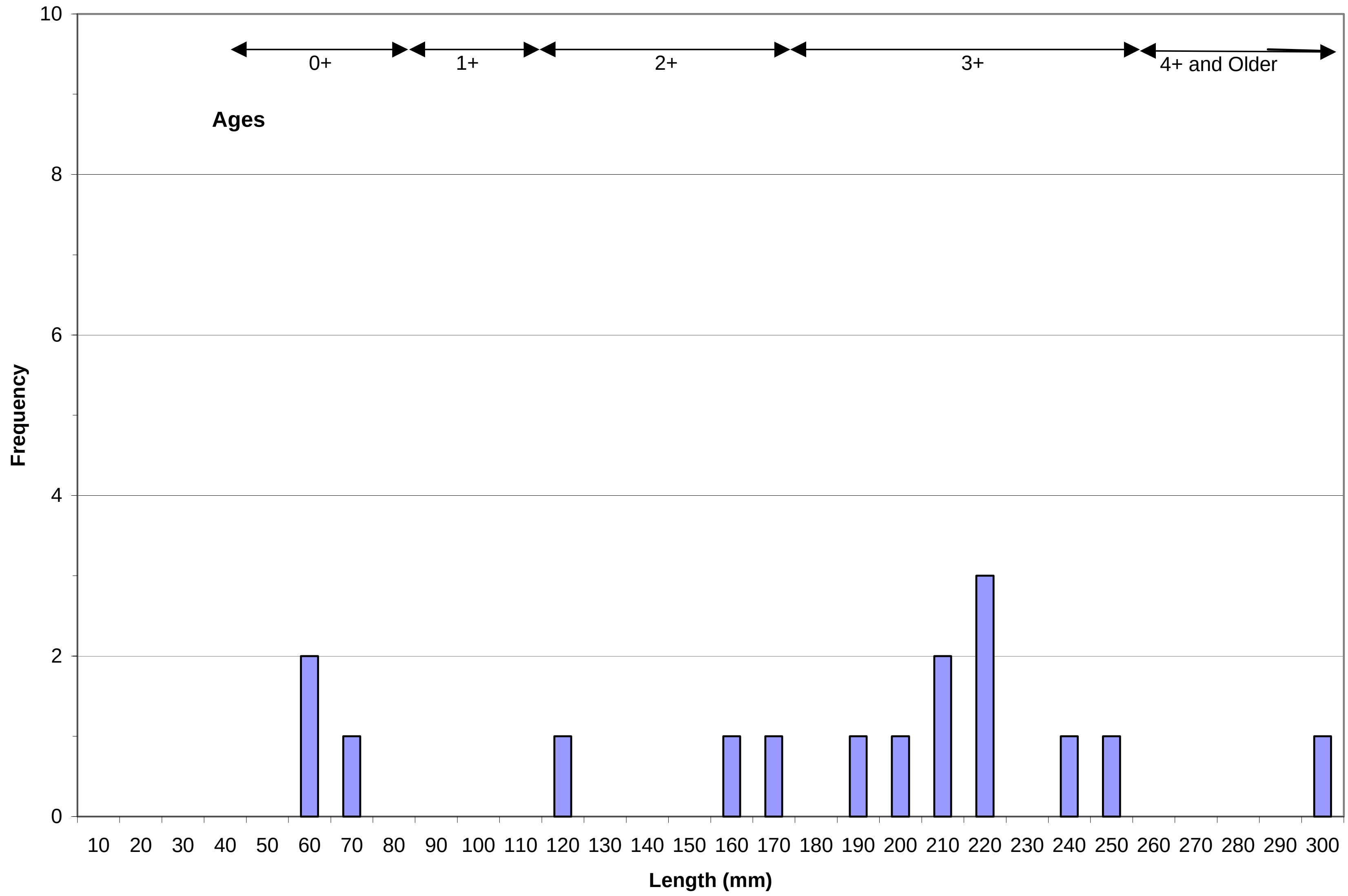


Figure CAWG 7-8. Length Frequency and Age of Brown Trout Collected in the South Fork San Joaquin River, Upstream of Florence Lake, Rosgen Level I Type B Channel Site, August 2002 (Number of Fish = 16).

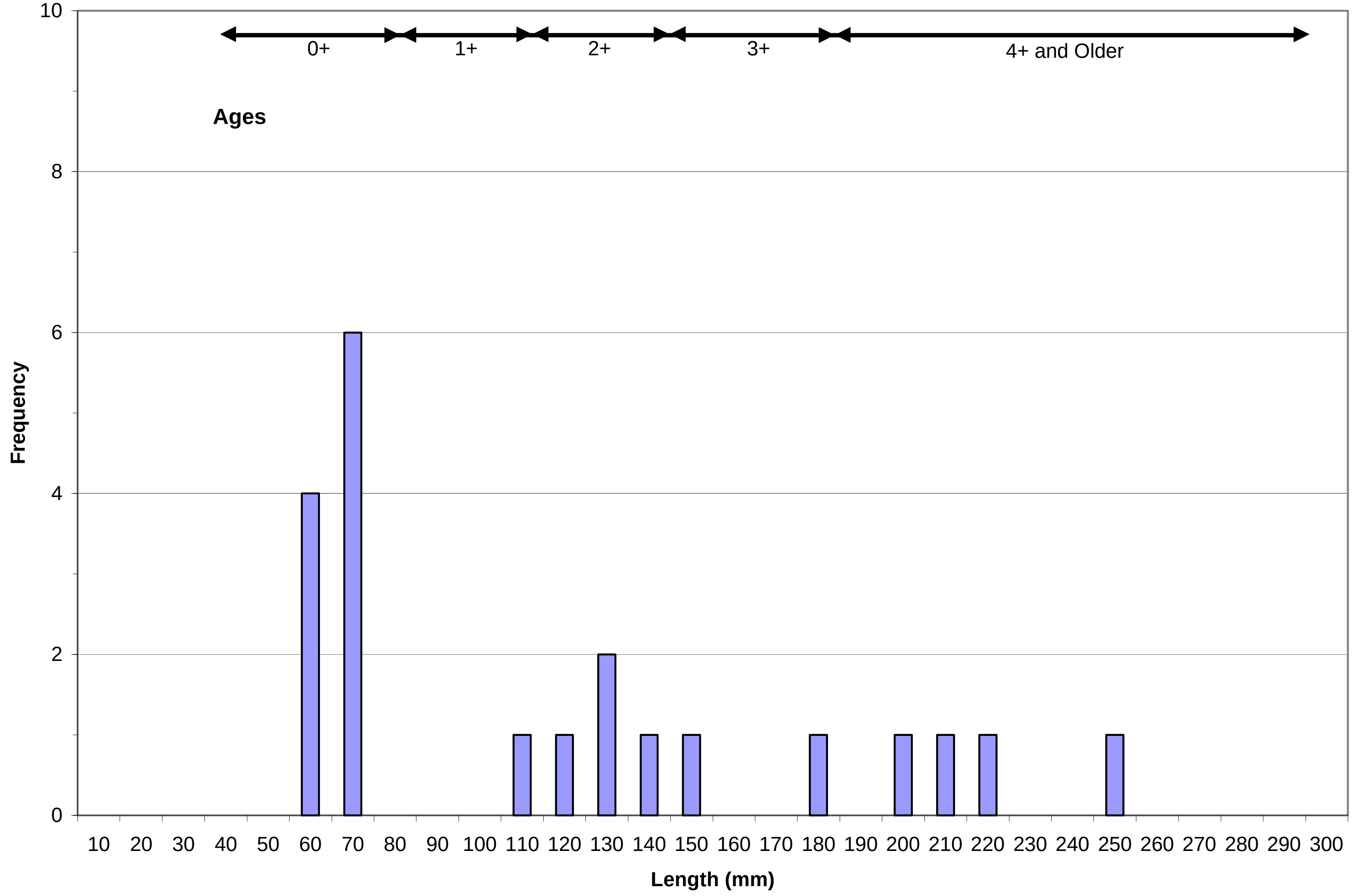


Figure CAWG 7-9. Length Frequency and Age of Brown Trout Collected in the South Fork San Joaquin River, Florence Lake to Bear Creek, Rosgen Level I Type C Channel Site, September 2002 (Number of Fish = 21).

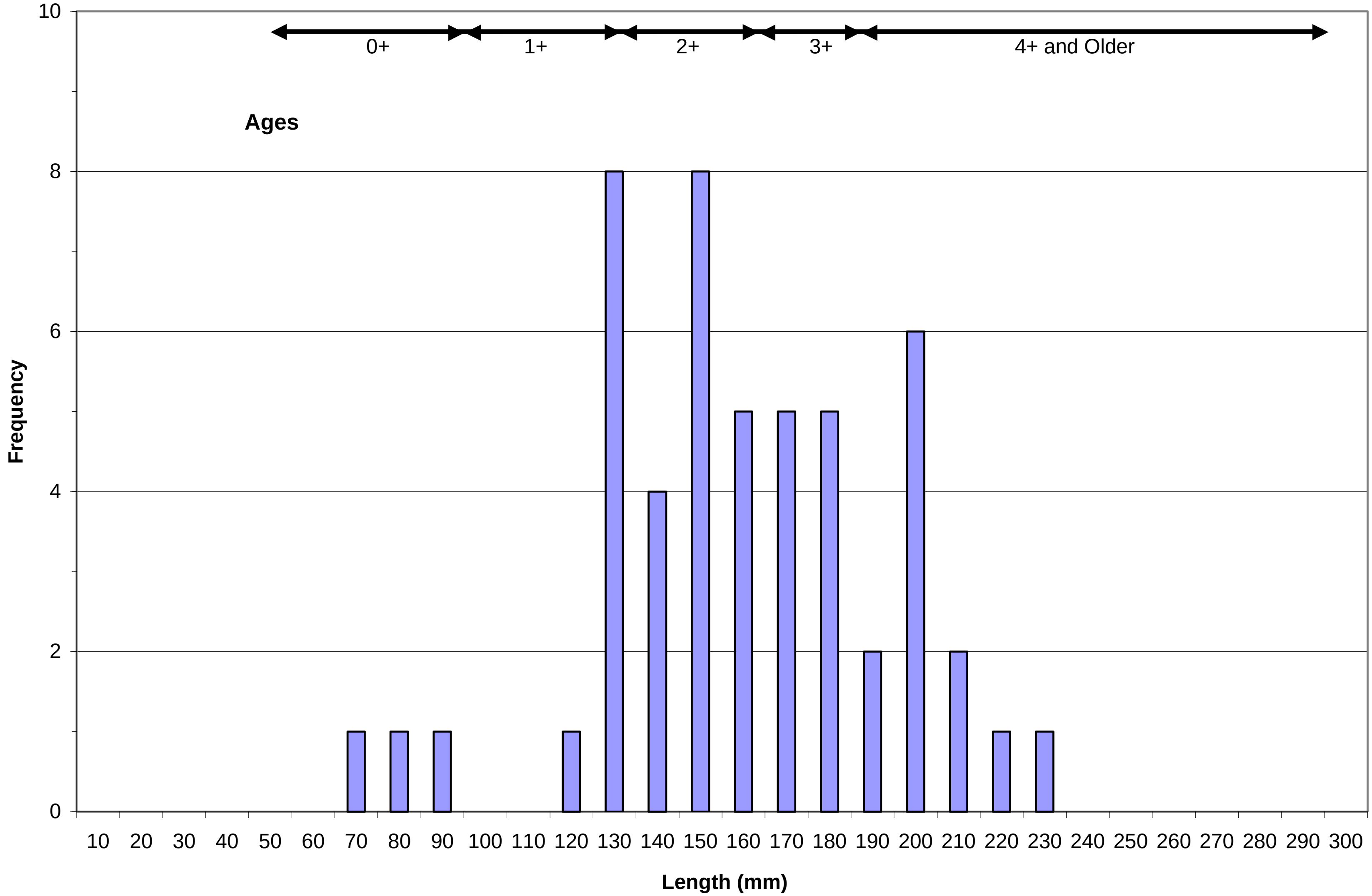


Figure CAWG 7-10. Length Frequency and Age of Brown Trout Collected in the South Fork San Joaquin River, Florence Lake to Bear Creek, Rosgen Level I Type B Channel Site, September 2002 (Number of Fish = 51).

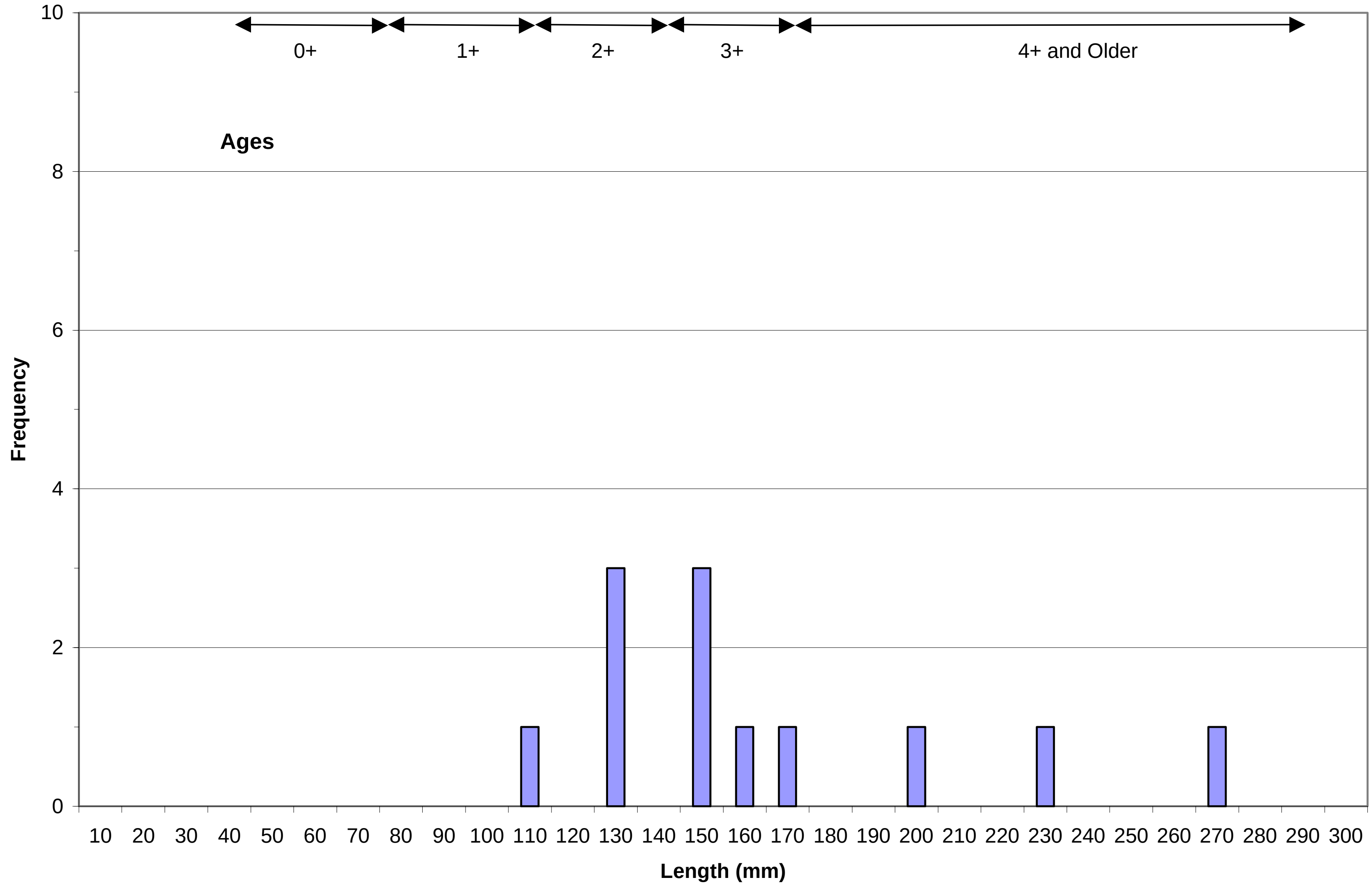


Figure CAWG 7-11. Length Frequency and Age of Rainbow Trout Collected in the South Fork San Joaquin River, Florence Lake to Bear Creek, Rosgen Level I Type B Channel Site, September 2002 (Number of Fish = 12).

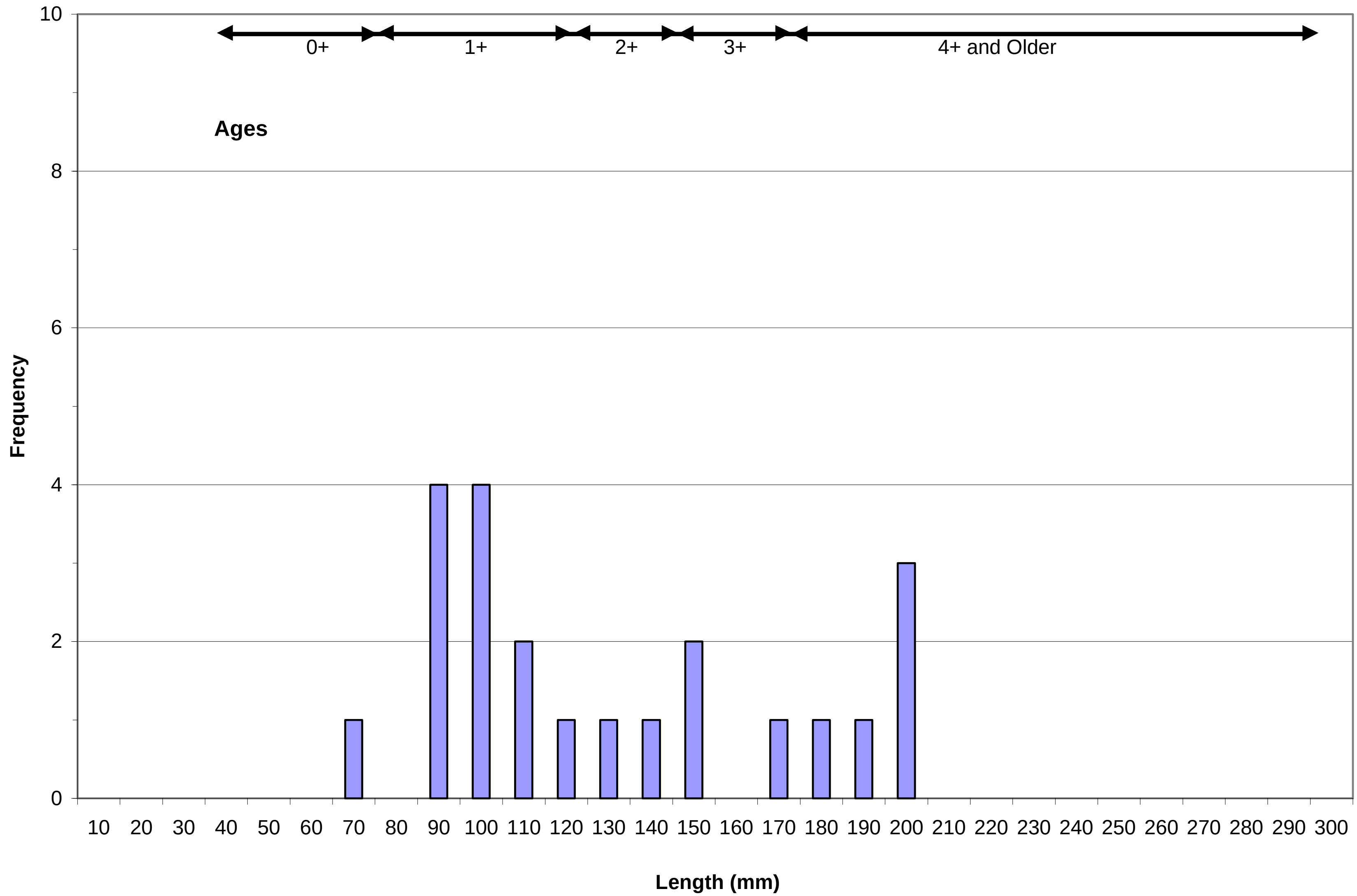


Figure CAWG 7-12. Length Frequency and Age of Brown Trout Collected in South Fork San Joaquin River, Bear Creek to Mono Crossing, Rosgen Level I Type G Channel Site, September 2002 (Number of Fish = 22).

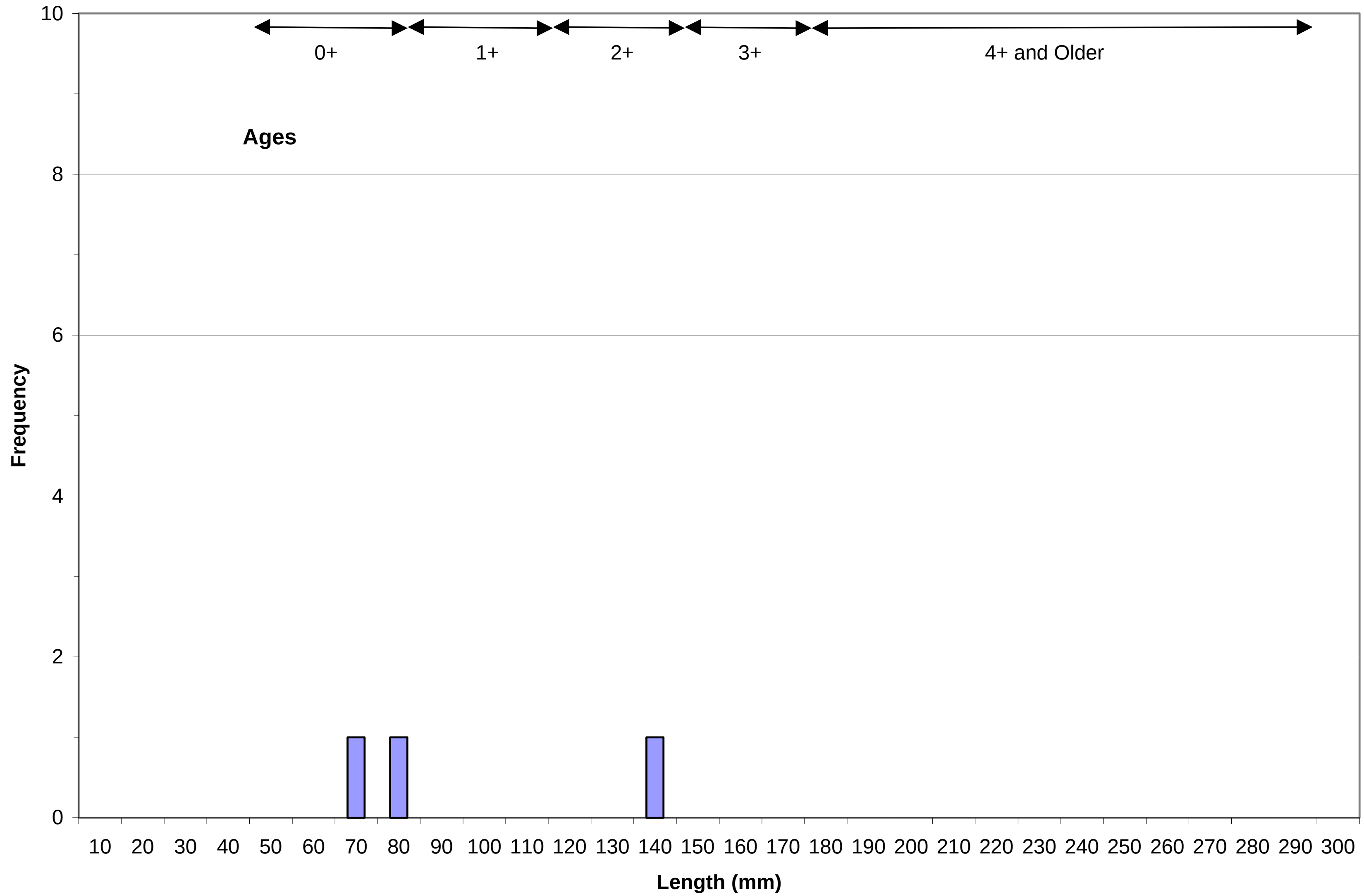


Figure CAWG 7-13. Length Frequency and Age of Rainbow Trout Collected in the South Fork San Joaquin River, Bear Creek to Mono Crossing, Rosgen Level I Type G Channel Site, September 2002 (Number of Fish = 3).

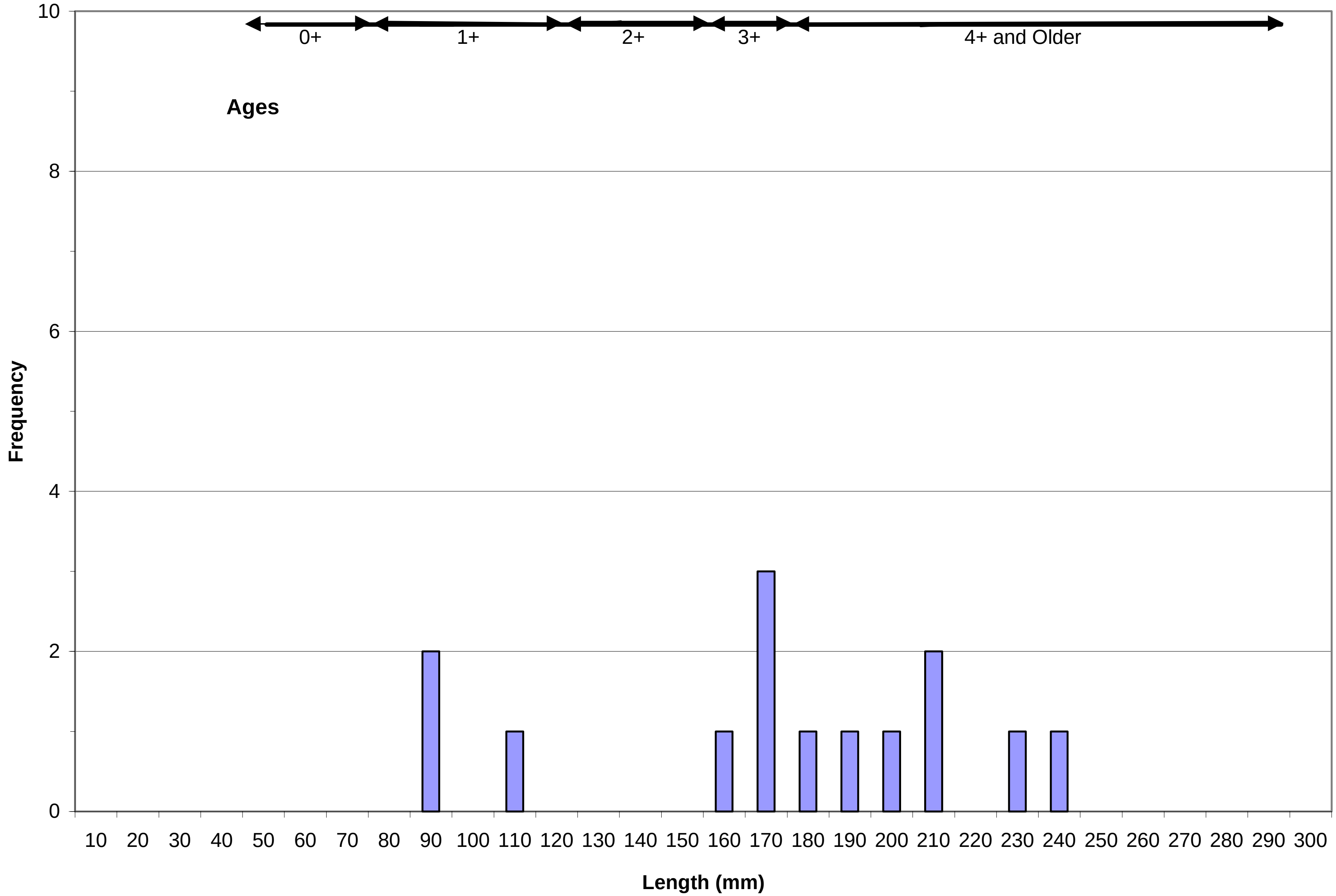


Figure CAWG 7-14. Length Frequency and Age of Brown Trout Collected in the South Fork San Joaquin River, Bear Creek to Mono Crossing, Rosgen Level I Type C Channel Site, September 2002 (Number of Fish = 14).

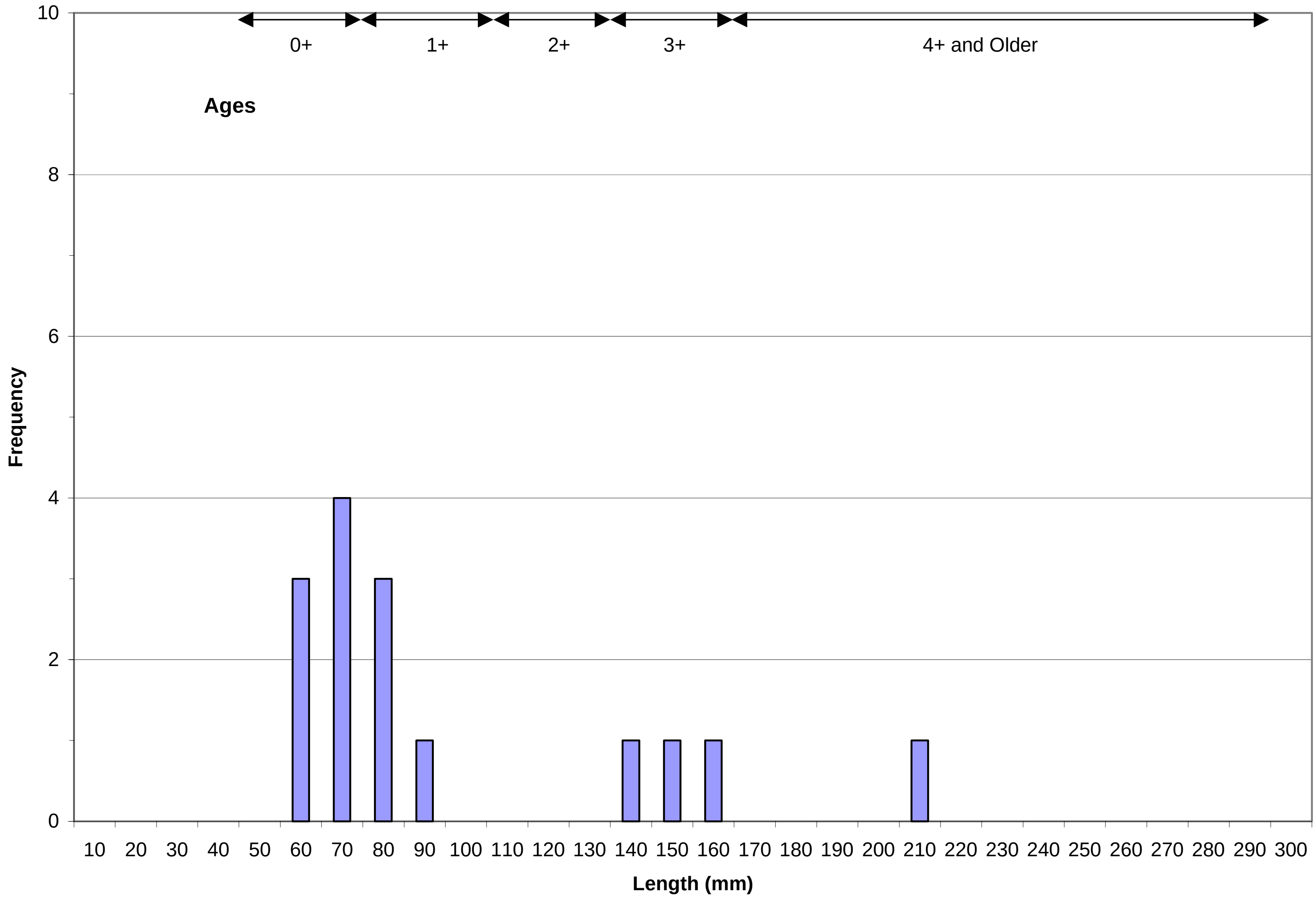


Figure CAWG 7-15. Length Frequency and Age of Rainbow Trout Collected in the South Fork San Joaquin River, Bear Creek to Mono Crossing, Rosgen Level I Type C Channel Site, September 2002 (Number of Fish = 15).

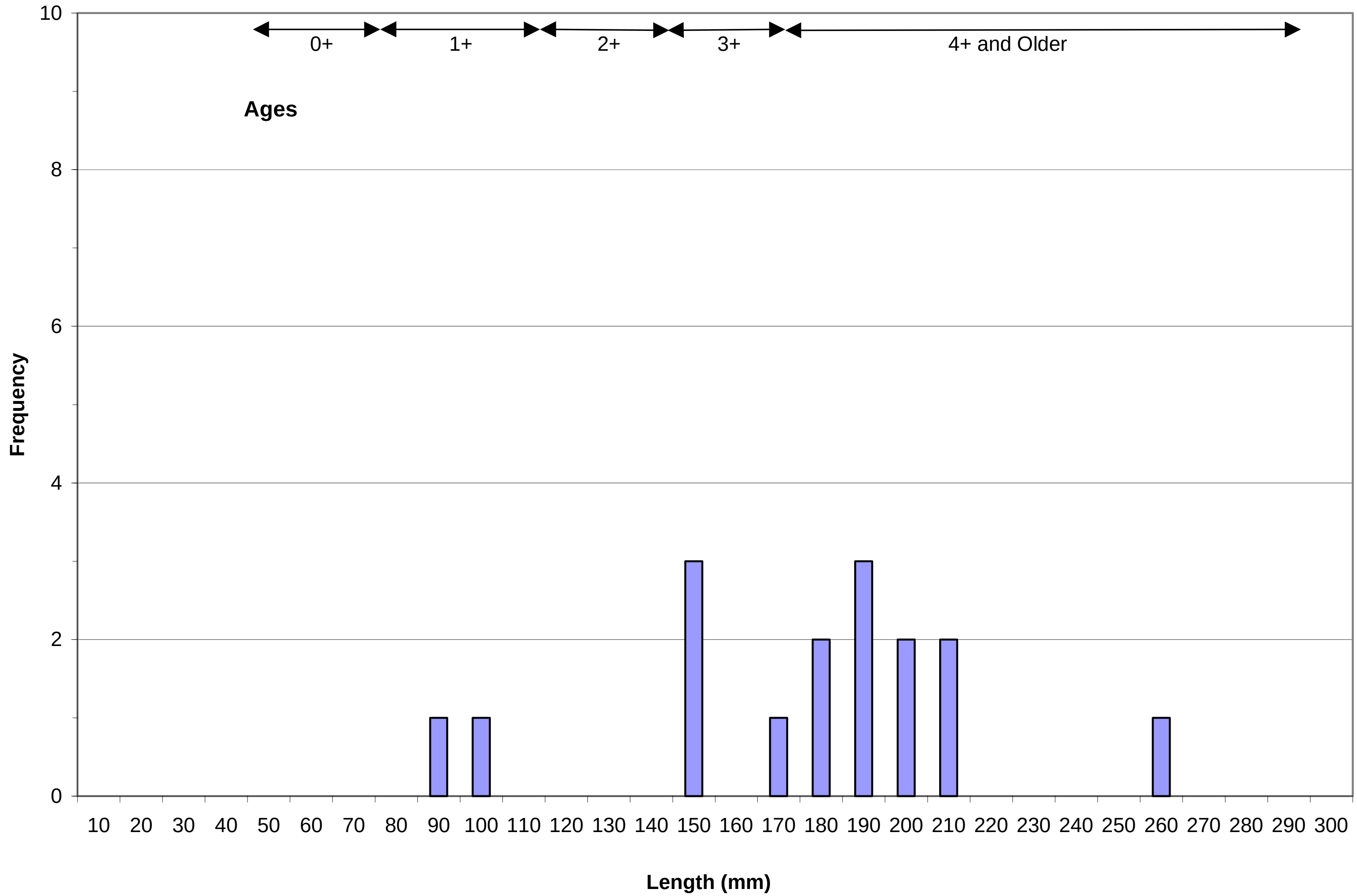


Figure CAWG 7-16. Length Frequency and Age of Brown Trout Collected in the South Fork San Joaquin River, Bear Creek to Mono Crossing, Rosgen Level I Type B Channel Site, September 2002 (Number of Fish = 16).

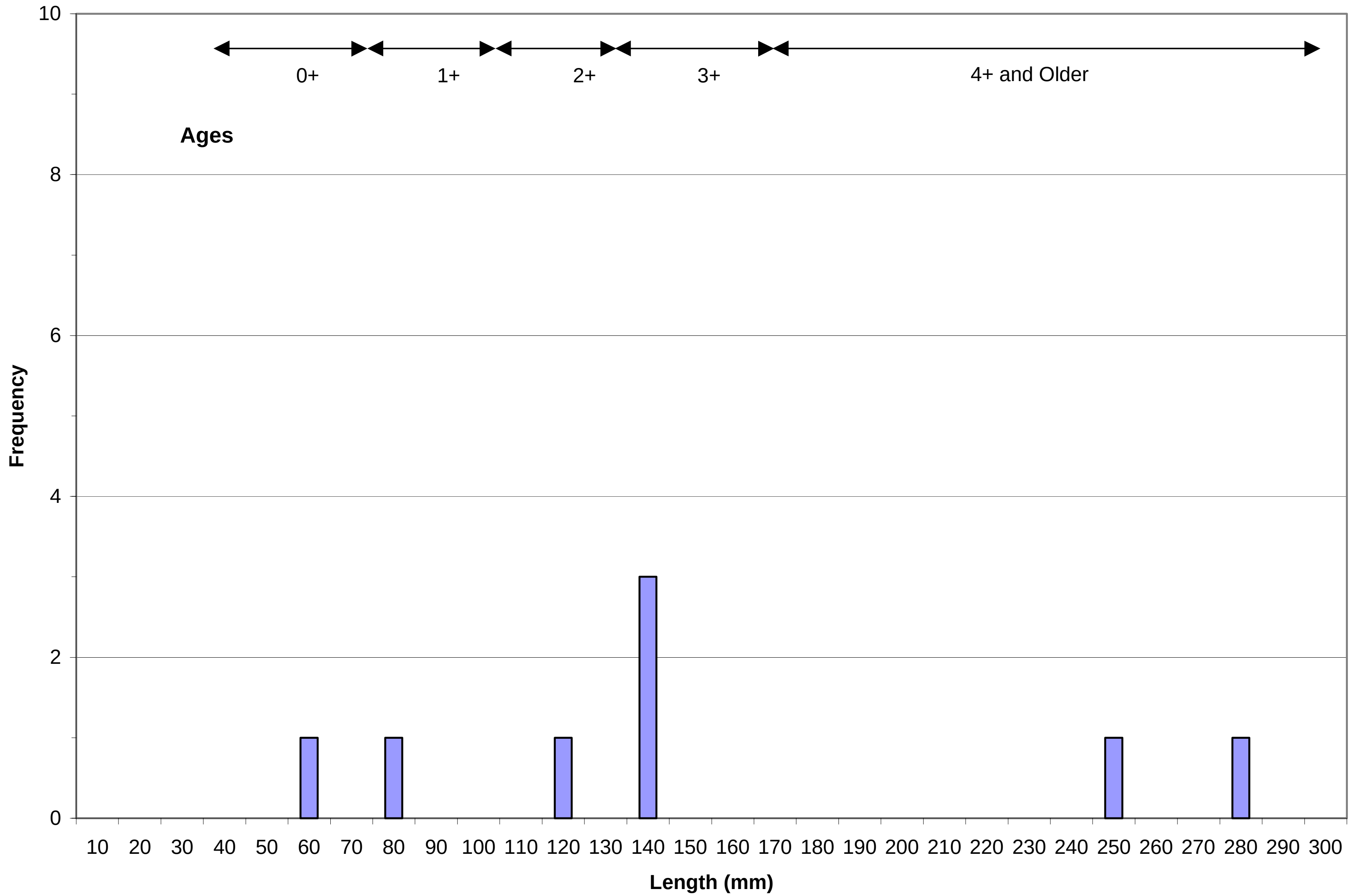


Figure CAWG 7-17. Length Frequency and Age of Rainbow Trout Collected in the South Fork San Joaquin River, Bear Creek to Mono Crossing, Rosgen Level I Type B Channel Site, September 2002 (Number of Fish = 8).

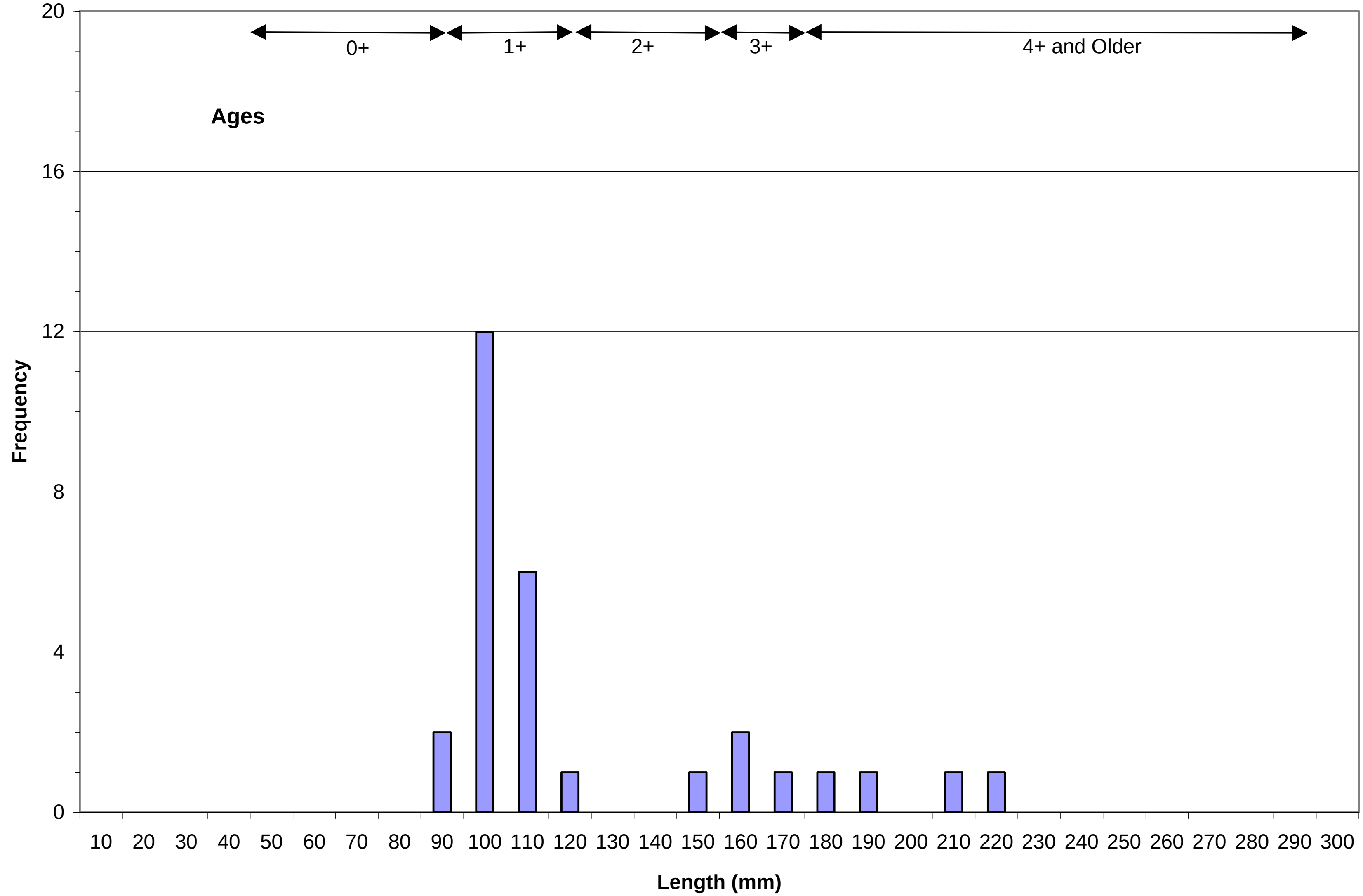


Figure CAWG 7-18. Length Frequency and Age of Brown Trout Collected in the South Fork San Joaquin River, Mono Crossing to Rattlesnake Crossing, Rosgen Level I Type B Channel Site, October 2002 (Number of Fish = 29).

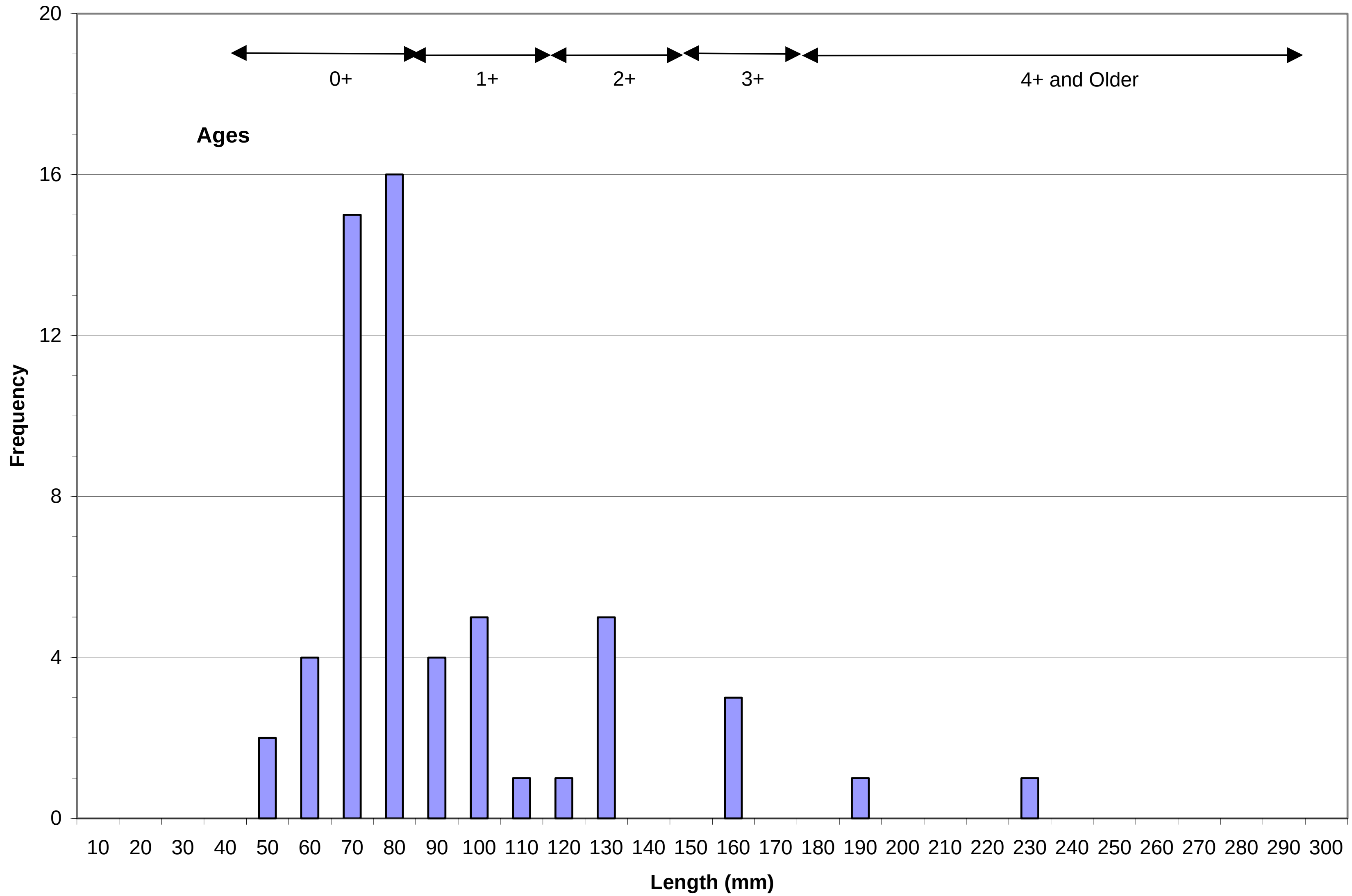


Figure CAWG 7-19. Length Frequency and Age of Rainbow Trout Collected in the South Fork San Joaquin River, Mono Crossing to Rattlesnake Crossing, Rosgen Level I Type B Channel Site, October 2002 (Number of Fish = 58).

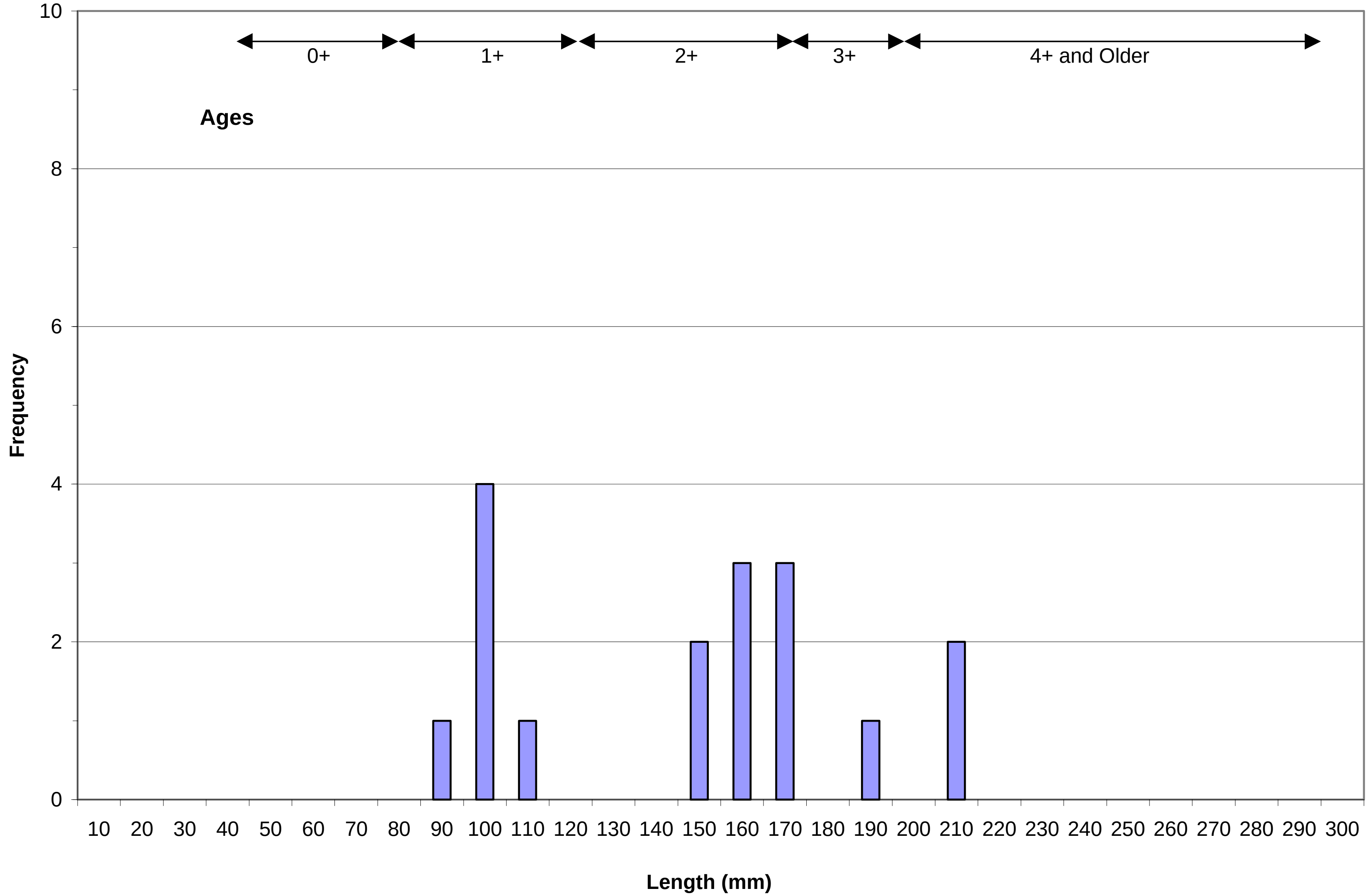


Figure CAWG 7-20. Length Frequency and Age of Brown Trout Collected in the South Fork San Joaquin River, Rattlesnake Crossing to Confluence with San Joaquin River, Rosgen Level I Type G Channel Site, October 2002 (Number of Fish = 17).

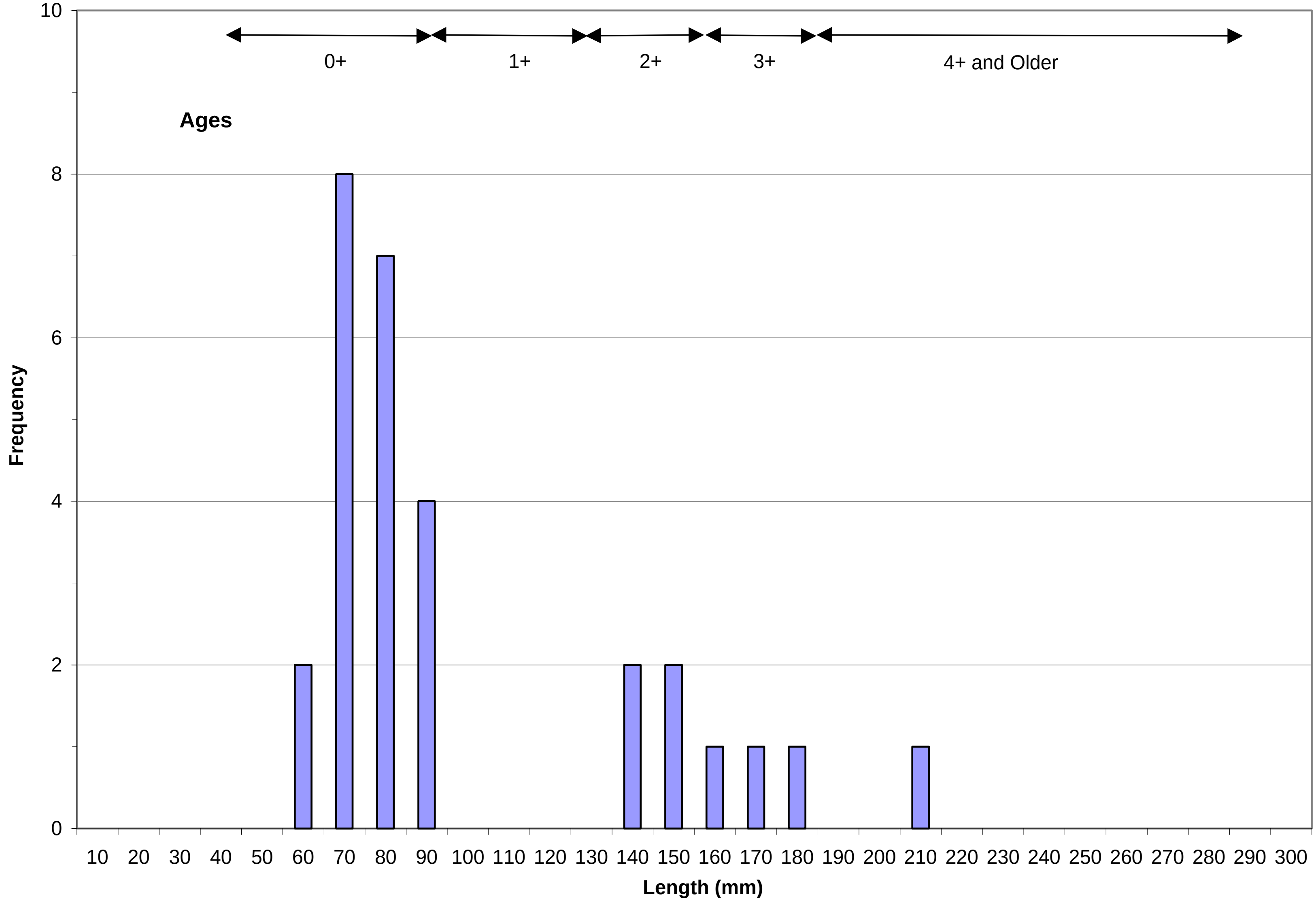
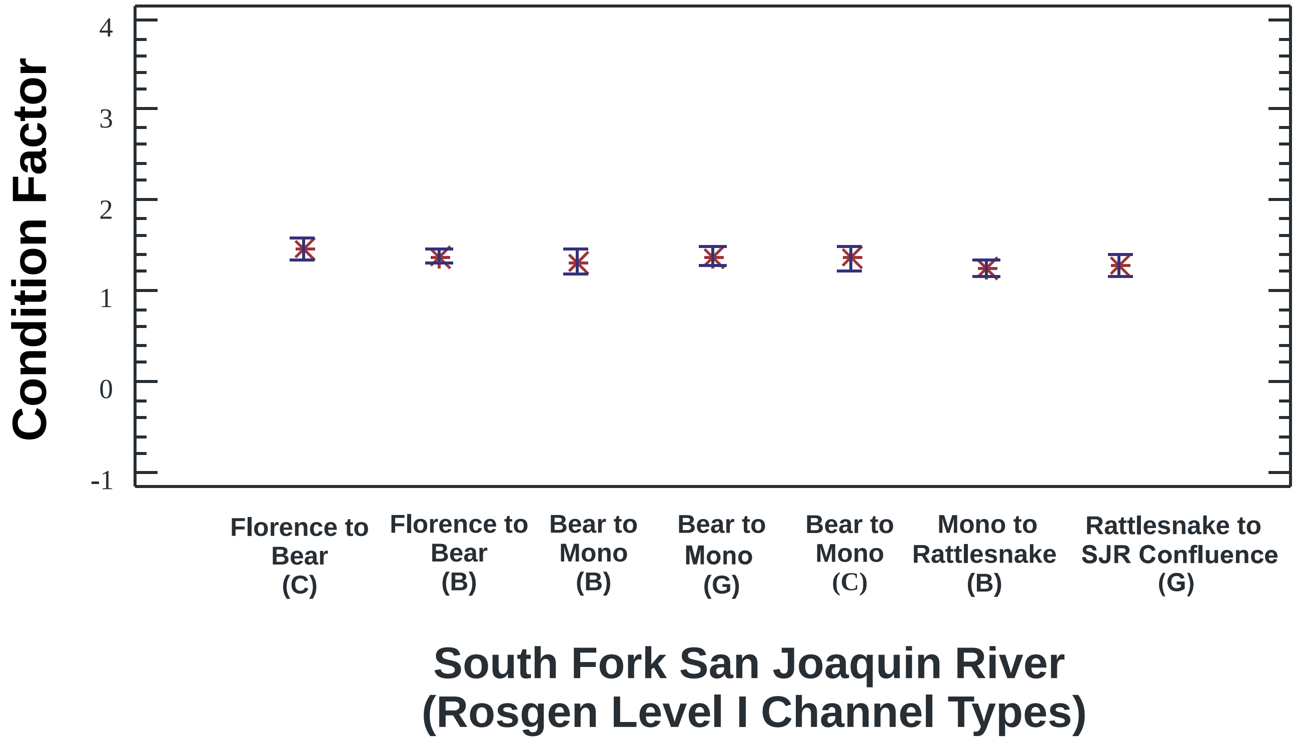


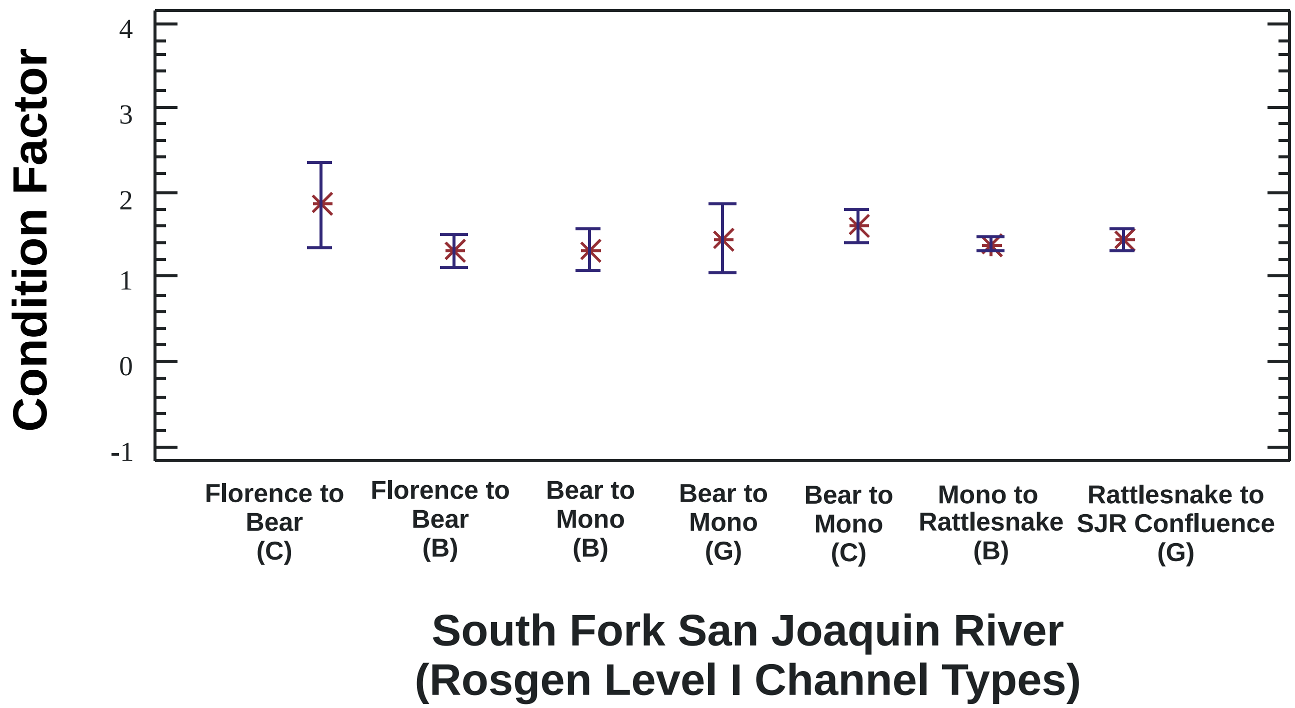
Figure CAWG 7-21. Length Frequency and Age of Rainbow Trout Collected in the South Fork San Joaquin River, Rattlesnake Crossing to Confluence with San Joaquin River, Rosgen Level I Type G Channel Site, October 2002 (Number of Fish = 29).



Site/Value	Florence to Bear (C)	Florence to Bear (B)	Bear to Mono (B)	Bear to Mono (G)	Bear to Mono (C)	Mono to Rattlesnake (B)	Rattlesnake to SJR Confluence (G)
Upper 95% Limit	1.57	1.44	1.45	1.49	1.50	1.34	1.40
Mean	1.45	1.37	1.32	1.38	1.35	1.24	1.27
Lower 95% Limit	1.33	1.29	1.18	1.26	1.21	1.14	1.14

Figure CAWG 7-22. Brown Trout[1] Condition Factor Means and 95.0 Percent Confidence Intervals (pooled variance) for South Fork San Joaquin River, 2002.

[1] Florence-Bear (C)=Florence Lake to Bear Creek Reach Rosgen Level I C Channel Site
Florence-Bear (B)=Florence Lake to Bear Creek Reach Rosgen Level I B Channel Site
Bear-Mono (B)=Bear Creek to Mono Crossing Reach Rosgen Level I B Channel Site
Bear-Mono (G)=Bear Creek to Mono Crossing Reach Rosgen Level I G Channel Site
Bear-Mono (C)=Bear Creek to Mono Crossing Reach Rosgen Level I C Channel Site
Mono-Rattlesnake (B)=Mono Crossing to Rattlesnake Creek Reach Rosgen Level I B Channel Site
Rattlesnake-Confluence (G)=Rattlesnake Crossing to Confluence Rosgen Level I G Channel Site



Site/Value	Florence to Bear (C)	Florence to Bear (B)	Bear to Mono (B)	Bear to Mono (G)	Bear to Mono (C)	Mono to Rattlesnake (B)	Rattlesnake to SJR Confluence (G)
Upper 95% Limit	2.34	1.51	1.56	1.84	1.78	1.47	1.56
Mean	1.84	1.31	1.31	1.44	1.60	1.38	1.43
Lower 95% Limit	1.35	1.11	1.07	1.04	1.42	1.29	1.30

Figure CAWG 7-23. Rainbow Trout[1] Condition Factor Means and 95.0 Percent Confidence Intervals (pooled variance) for South Fork San Joaquin River, 2002.

[1] Florence-Bear (C)=Florence Lake to Bear Creek Reach Rosgen Level I C Channel Site
Florence-Bear (B)=Florence Lake to Bear Creek Reach Rosgen Level I B Channel Site
Bear-Mono (B)=Bear Creek to Mono Crossing Reach Rosgen Level I B Channel Site
Bear-Mono (G)=Bear Creek to Mono Crossing Reach Rosgen Level I G Channel Site
Bear-Mono (C)=Bear Creek to Mono Crossing Reach Rosgen Level I C Channel Site
Mono-Rattlesnake (B)=Mono Crossing to Rattlesnake Creek Reach Rosgen Level I B Channel Site
Rattlesnake-Confluence (G)=Rattlesnake Crossing to Confluence Rosgen Level I G Channel Site

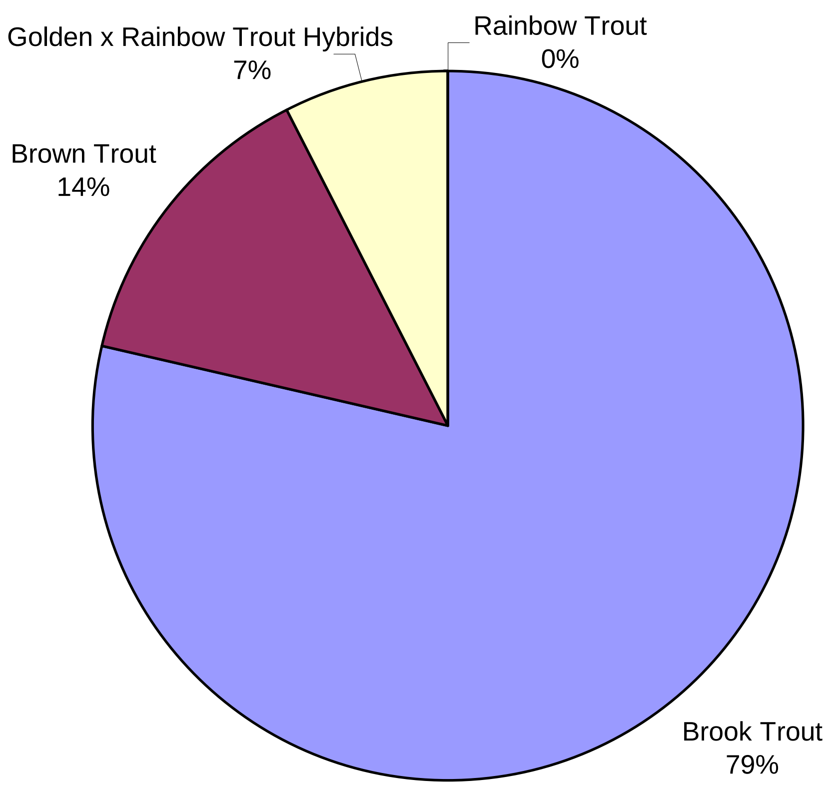


Figure CAWG 7-24. Composition of Fish Species Collected in the South Fork San Joaquin River Tributaries, All Sites, Summer 2002 (Number of Fish = 1,093).

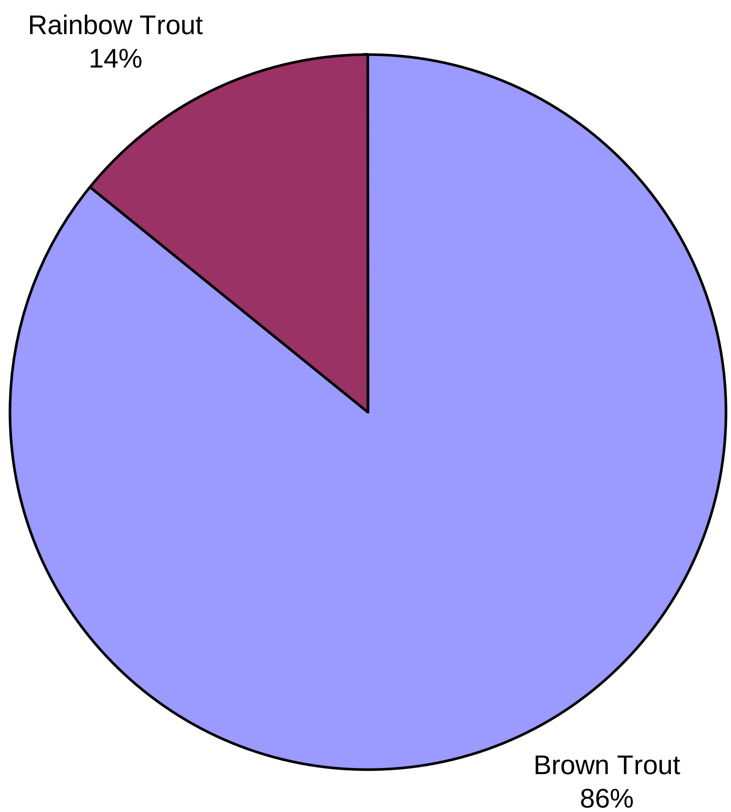


Figure CAWG 7-25. Composition of Fish Species Collected in Mono Creek, Below the Diversion, Rosgen Level I Type B Channel Site, September 2002 (Number of Fish = 7).

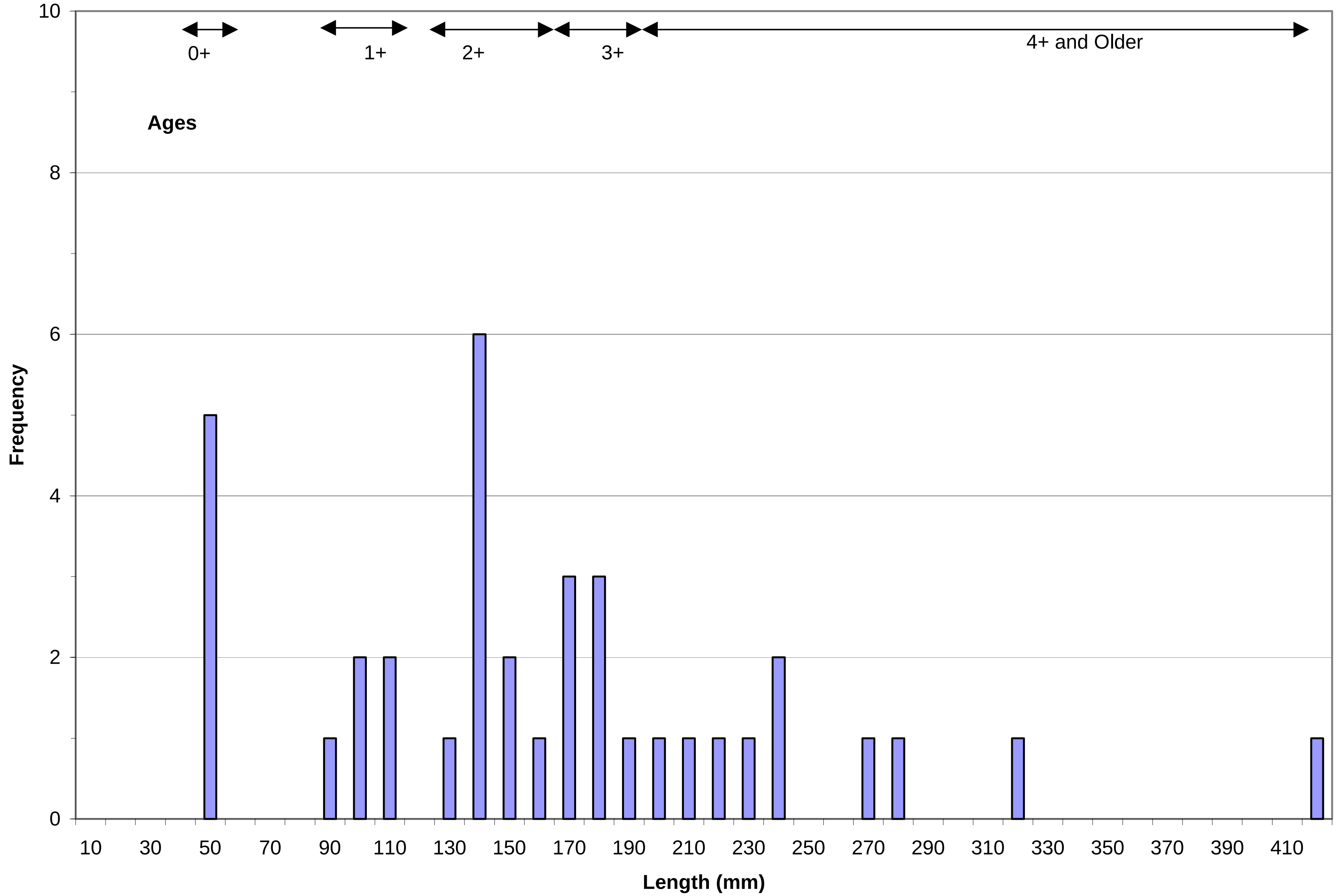


Figure CAWG 7-26. Length Frequency and Age of Brown Trout Collected in Tombstone Creek, Below the Diversion, Rosgen Level I Type Aa+ Channel Site, August 2002 (Number of Fish = 37).

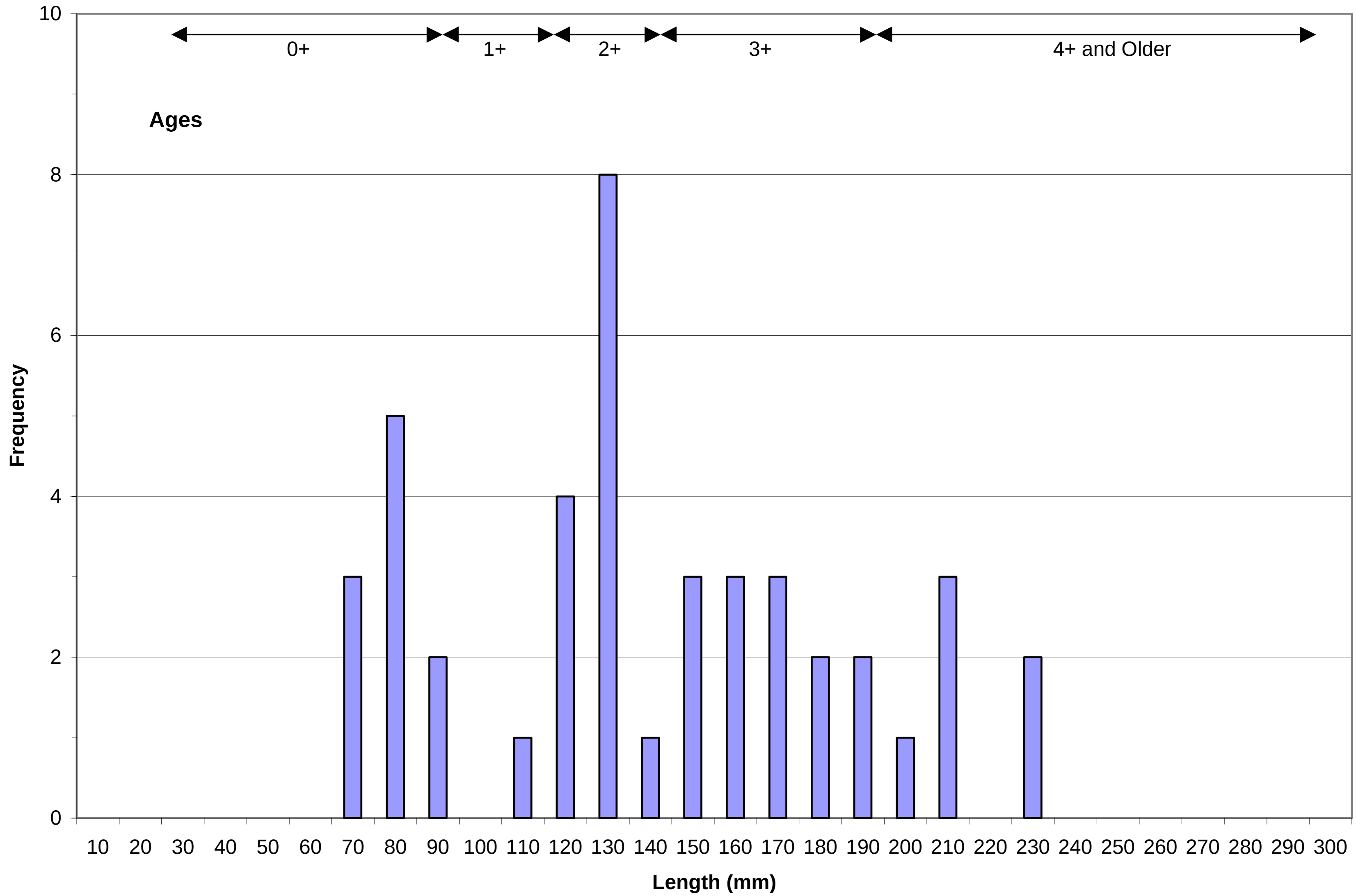


Figure CAWG 7-27. Length Frequency and Age of Brown Trout Collected in Bear Creek, Above the Diversion, Rosgen Level I Type B Channel Site, October 2002 (Number of Fish = 43).

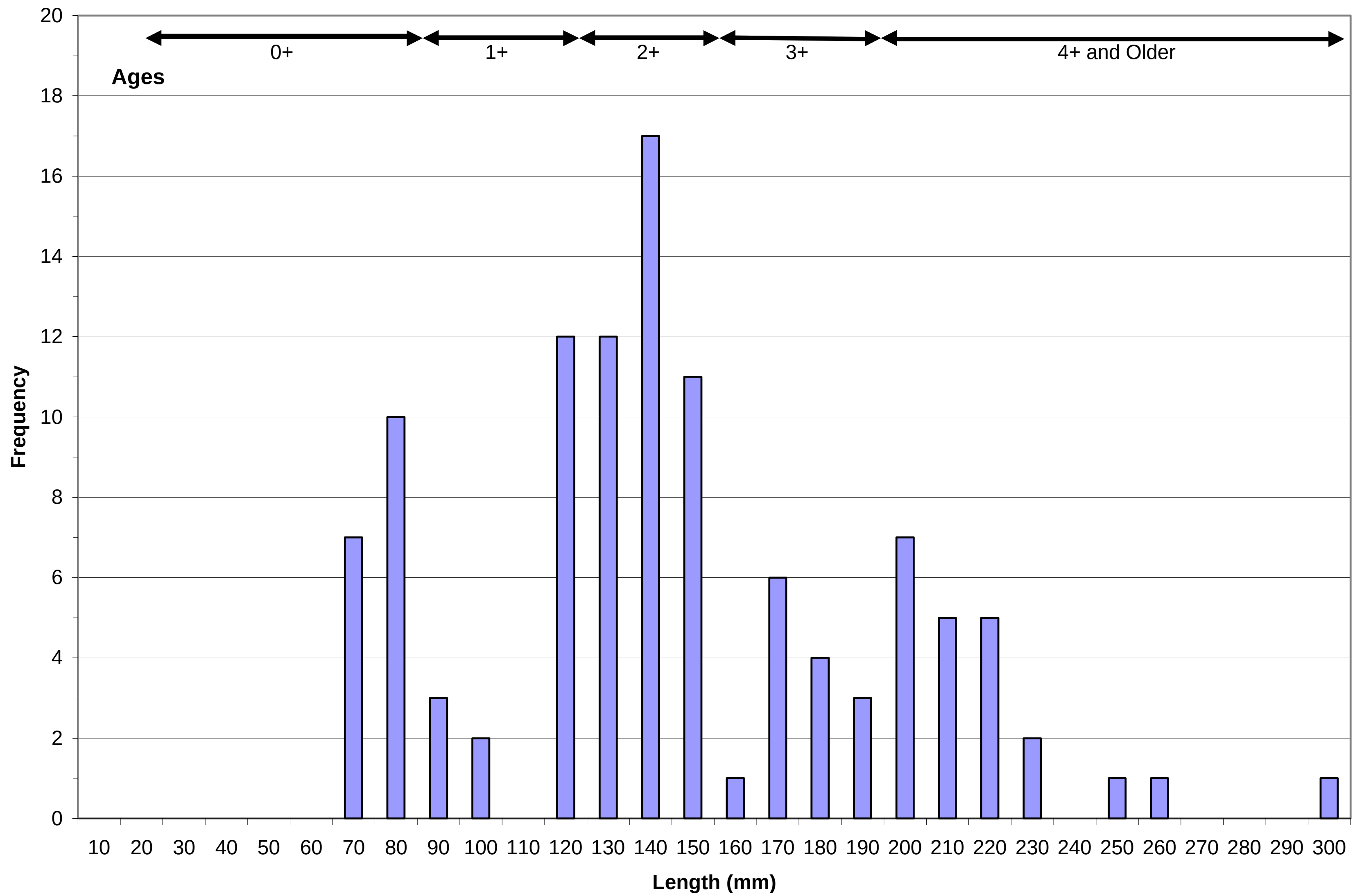


Figure CAWG 7-28. Length Frequency and Age of Brown Trout Collected in Bear Creek, Below the Diversion, Rosgen Level I Type A Channel Site, October 2002 (Number of Fish = 110).

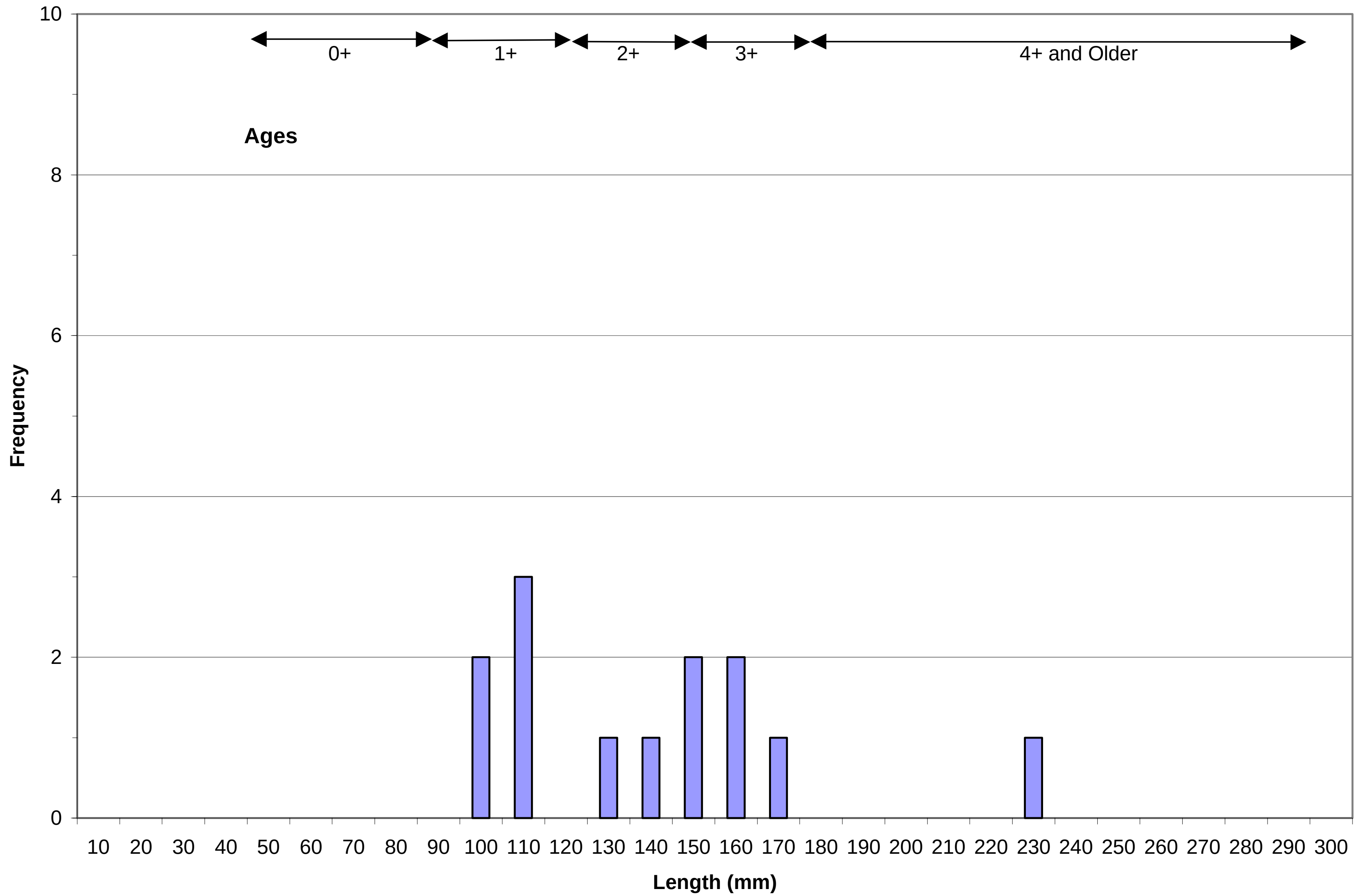


Figure CAWG 7-29. Length Frequency and Age of Golden x Rainbow Trout Hybrids Collected in Hooper Creek, Above the Diversion, Rosgen Level I Type Aa+ Channel Site, August 2002 (Number of Fish = 13).

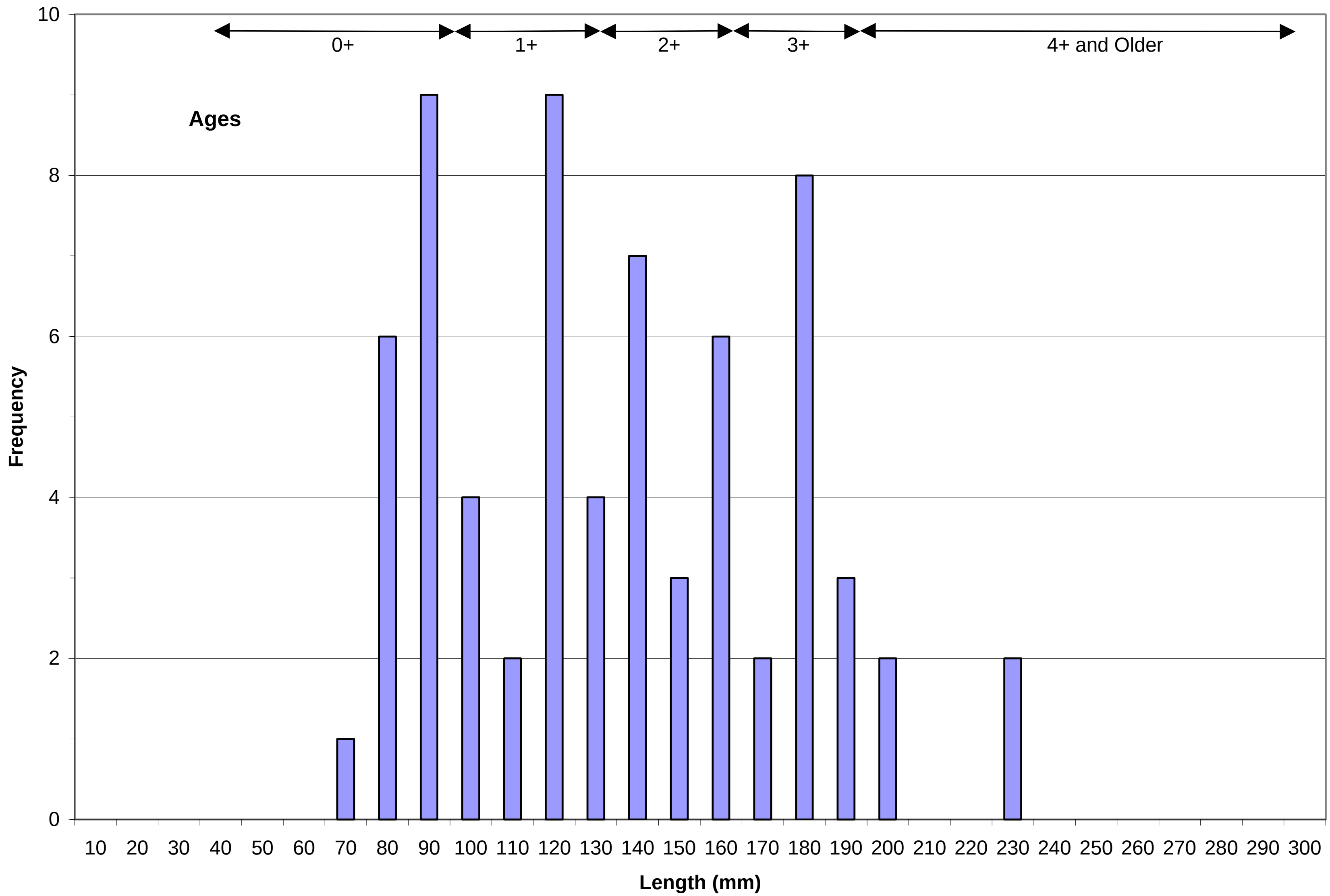


Figure CAWG 7-30. Length Frequency and Age of Golden x Rainbow Trout Hybrids Collected in Hooper Creek, Below the Diversion, Rosgen Level I Type Aa+ Channel Site, August 2002 (Number of Fish = 68).

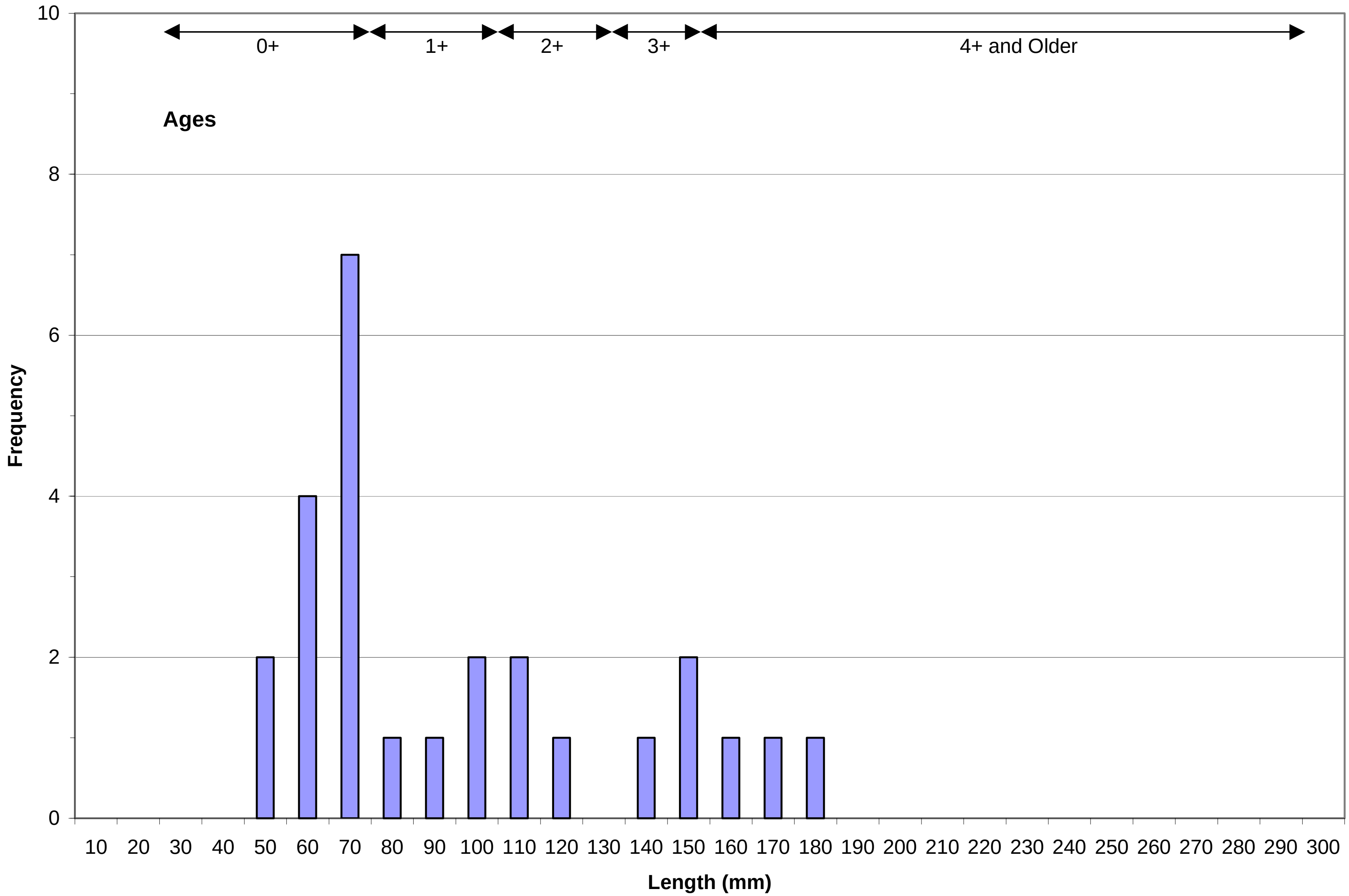


Figure CAWG 7-31. Length Frequency and Age of Brook Trout Collected in Crater Creek, Above the Diversion, Rosgen Level I Type Aa+ Channel Site, October 2002 (Number of Fish = 26).

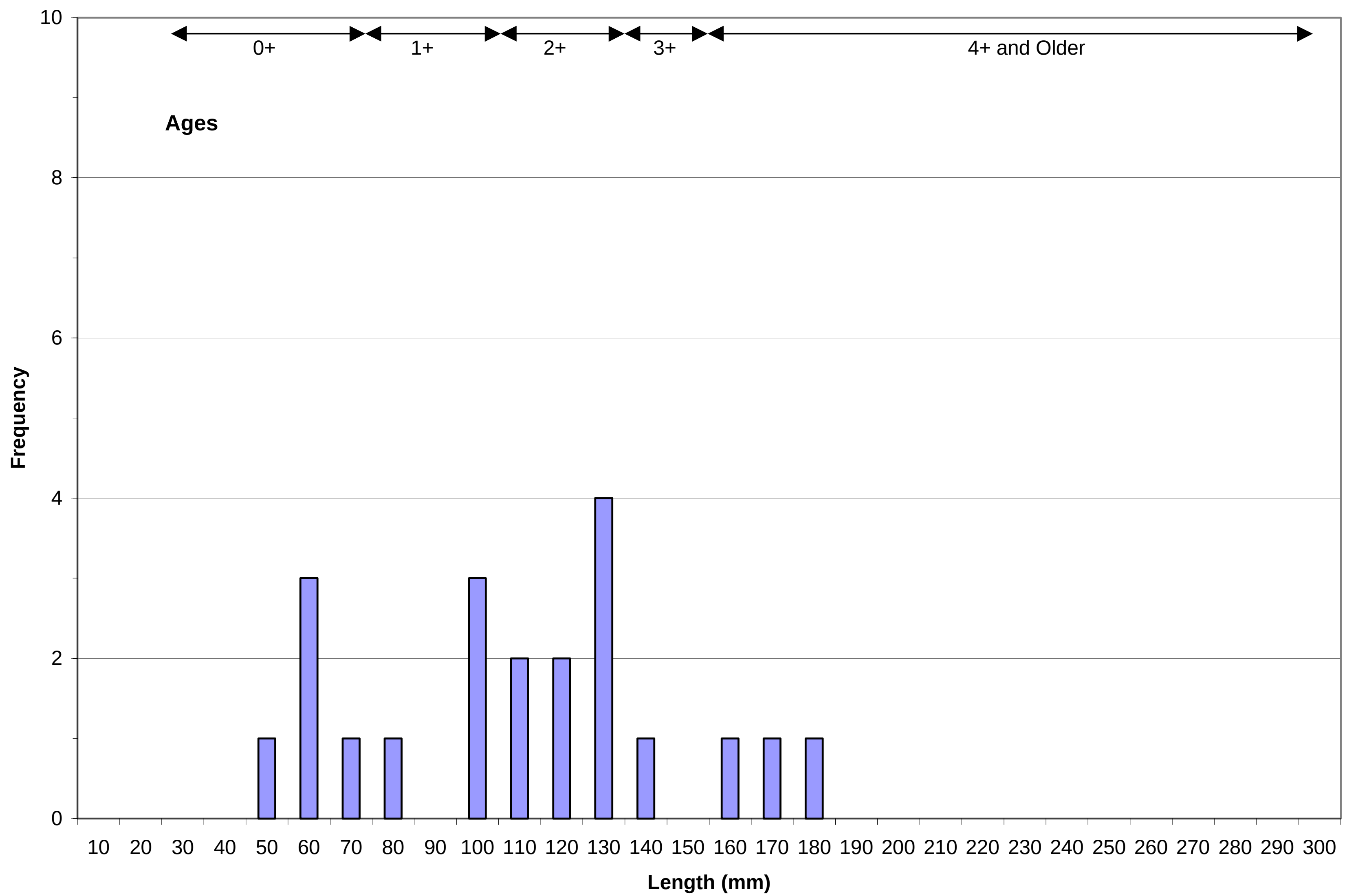


Figure CAWG 7-32. Length Frequency and Age of Brook Trout Collected in Crater Creek, Below the Diversion, Rosgen Level I Type Aa+ Channel Site, October 2002 (Number of Fish = 21).

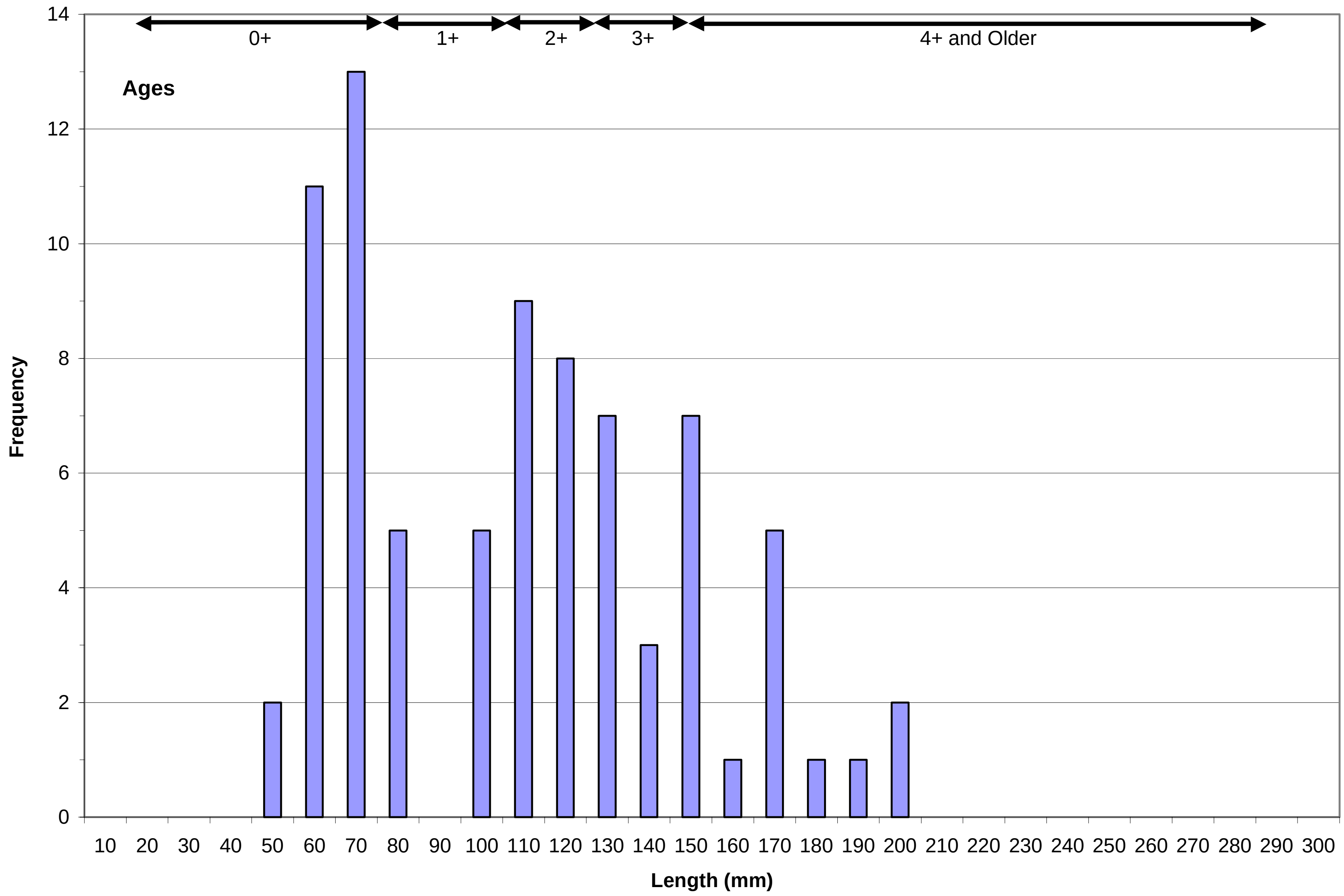


Figure CAWG 7-33. Length Frequency and Age of Brook Trout Collected in Crater Creek Diversion Channel, Rosgen Level I Type Aa+ Channel Site, October 2002 (Number of Fish = 80).

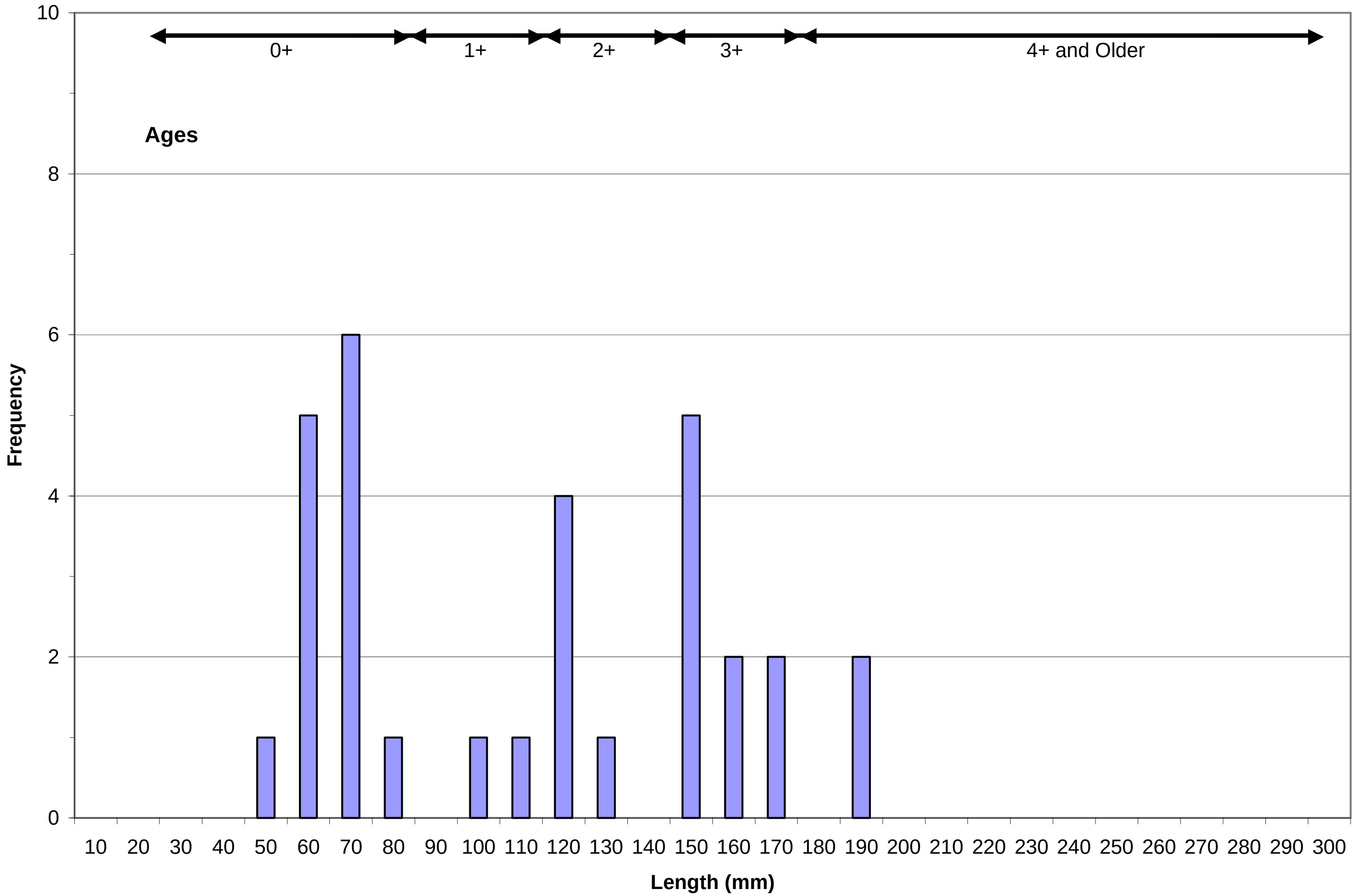


Figure CAWG 7-34. Length Frequency and Age of Brook Trout Collected in Chinquapin Creek, Above the Diversion, Rosgen Level I Type Aa+ Channel Site, September 2002 (Number of Fish = 31).

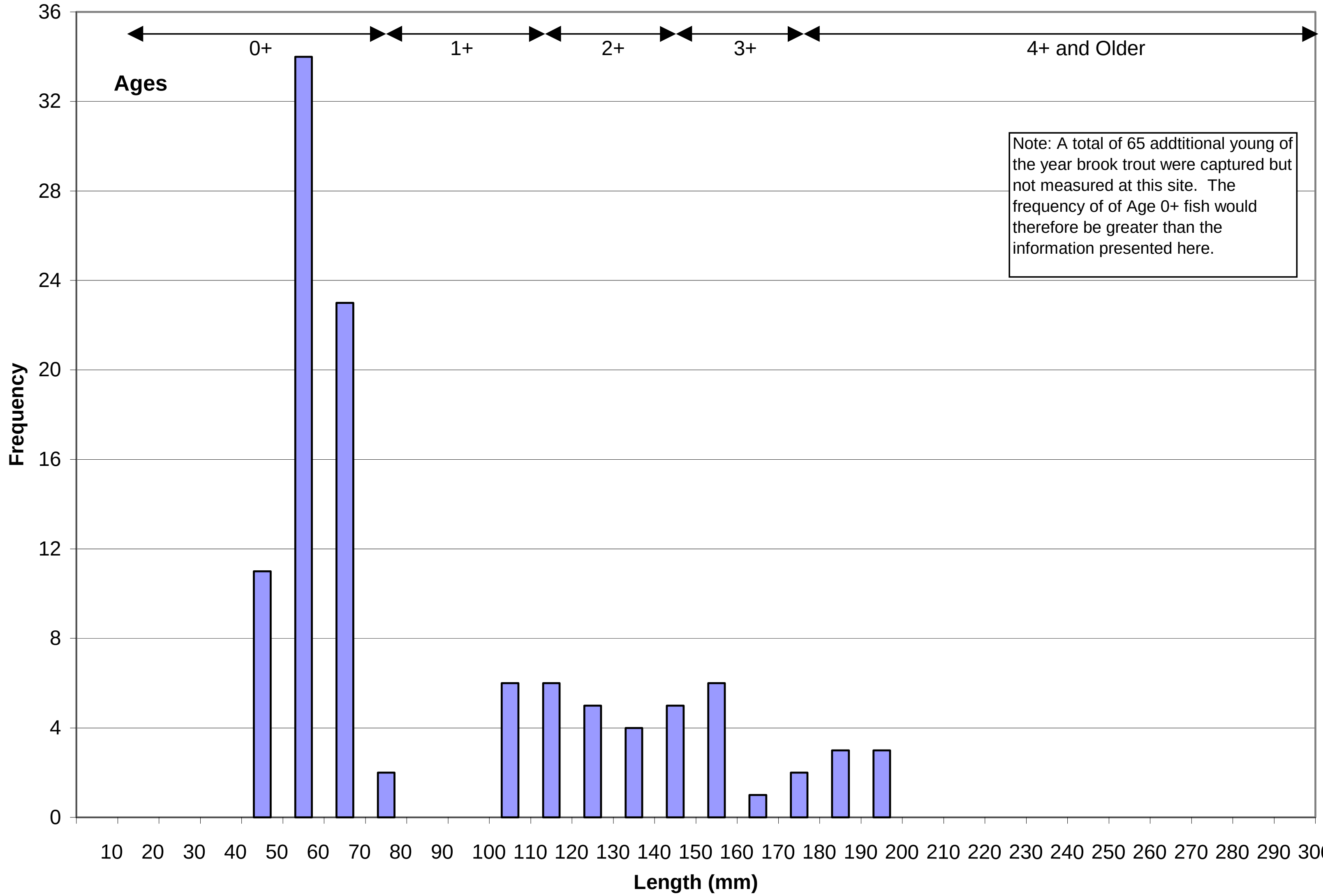


Figure CAWG 7-35. Length Frequency and Age of Brook Trout Collected in Chinquapin Creek, Below the Diversion, Rosgen Level I Type Aa+ Channel Site, August 2002 (Number of Fish = 111).

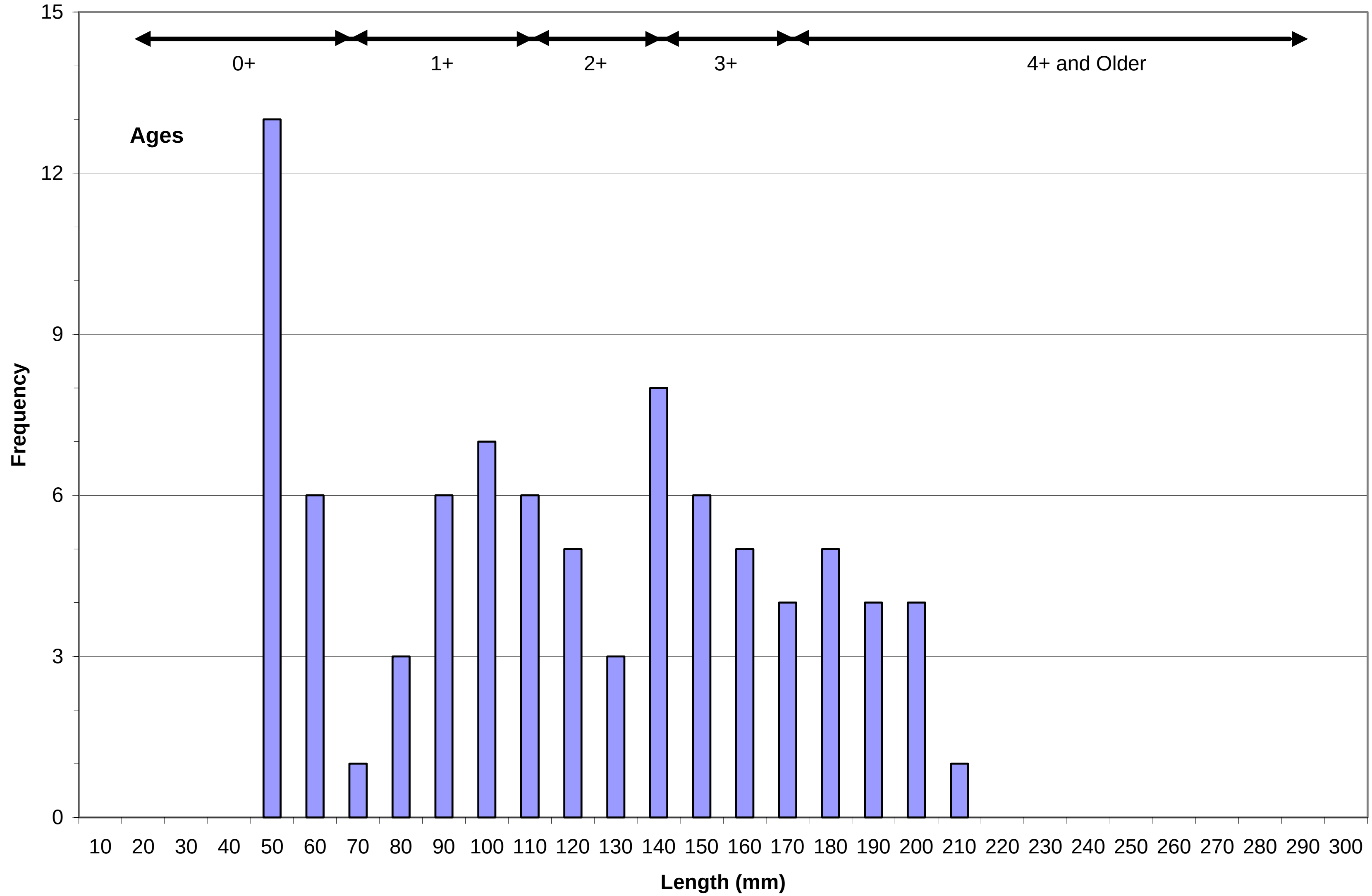


Figure CAWG 7-36. Length Frequency and Age of Brook Trout Collected in Camp 62 Creek, Above the Diversion, Rosgen Level I Type Aa+ Channel Site, August 2002 (Number of Fish = 87).

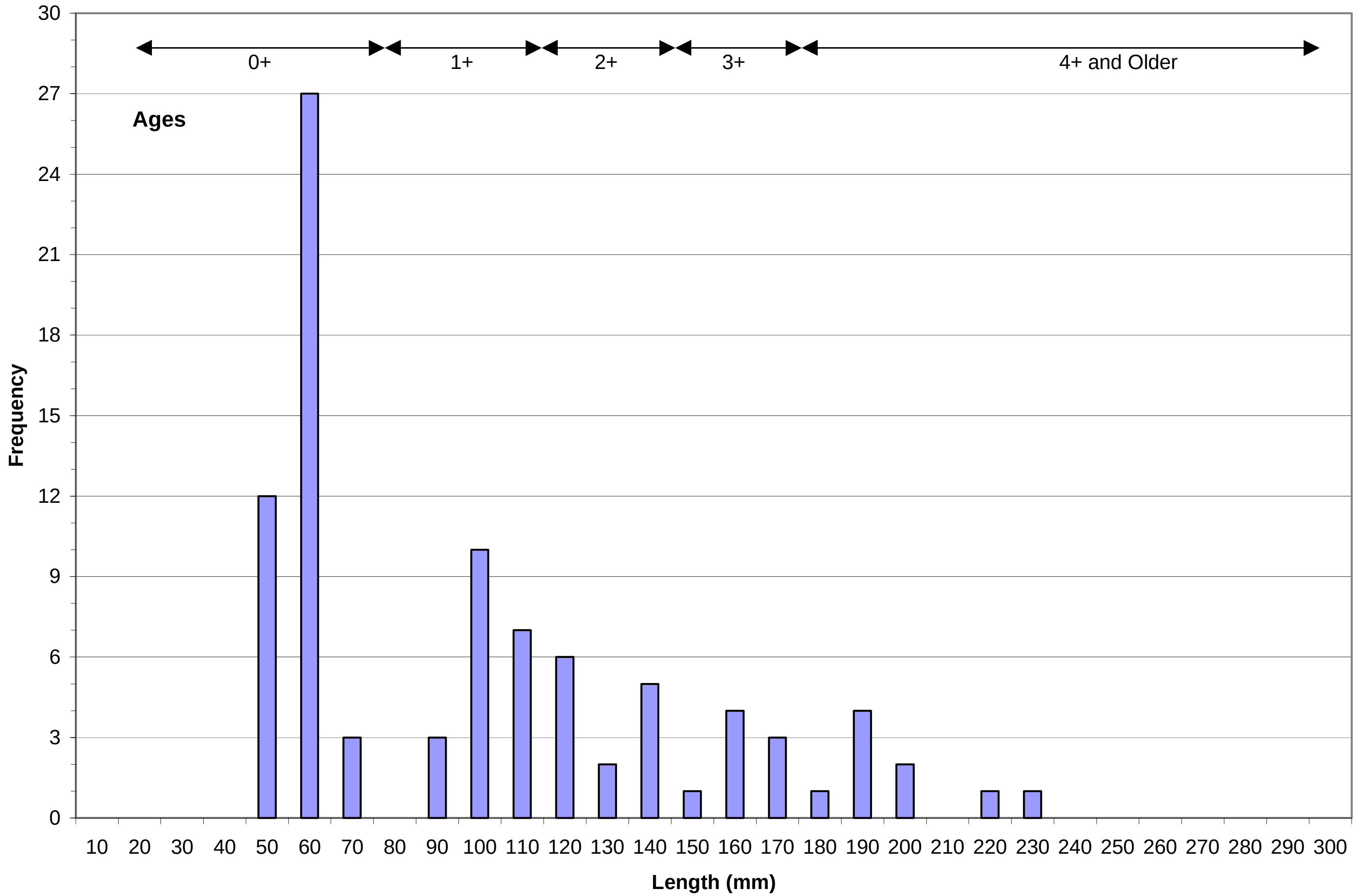


Figure CAWG 7-37. Length Frequency and Age of Brook Trout Collected in Camp 62 Creek, Below the Diversion, Rosgen Level I Type Aa+ Channel Site, August 2002 (Number of Fish = 92).

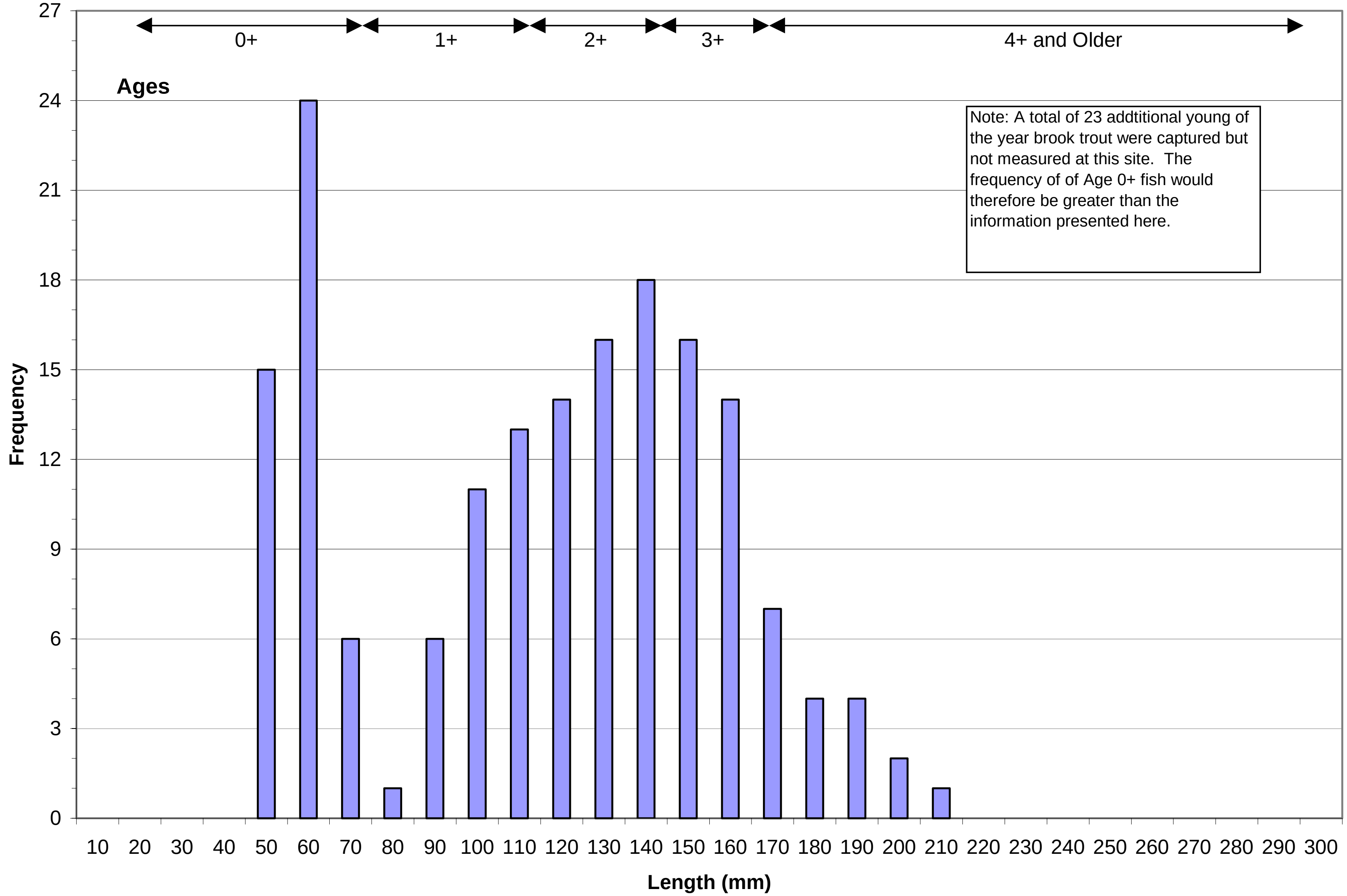


Figure CAWG 7-38. Length Frequency and Age of Brook Trout Collected in Bolsillo Creek, Above the Diversion, Rosgen Level I B Type Channel Site, September 2002 (Number of Fish = 172).

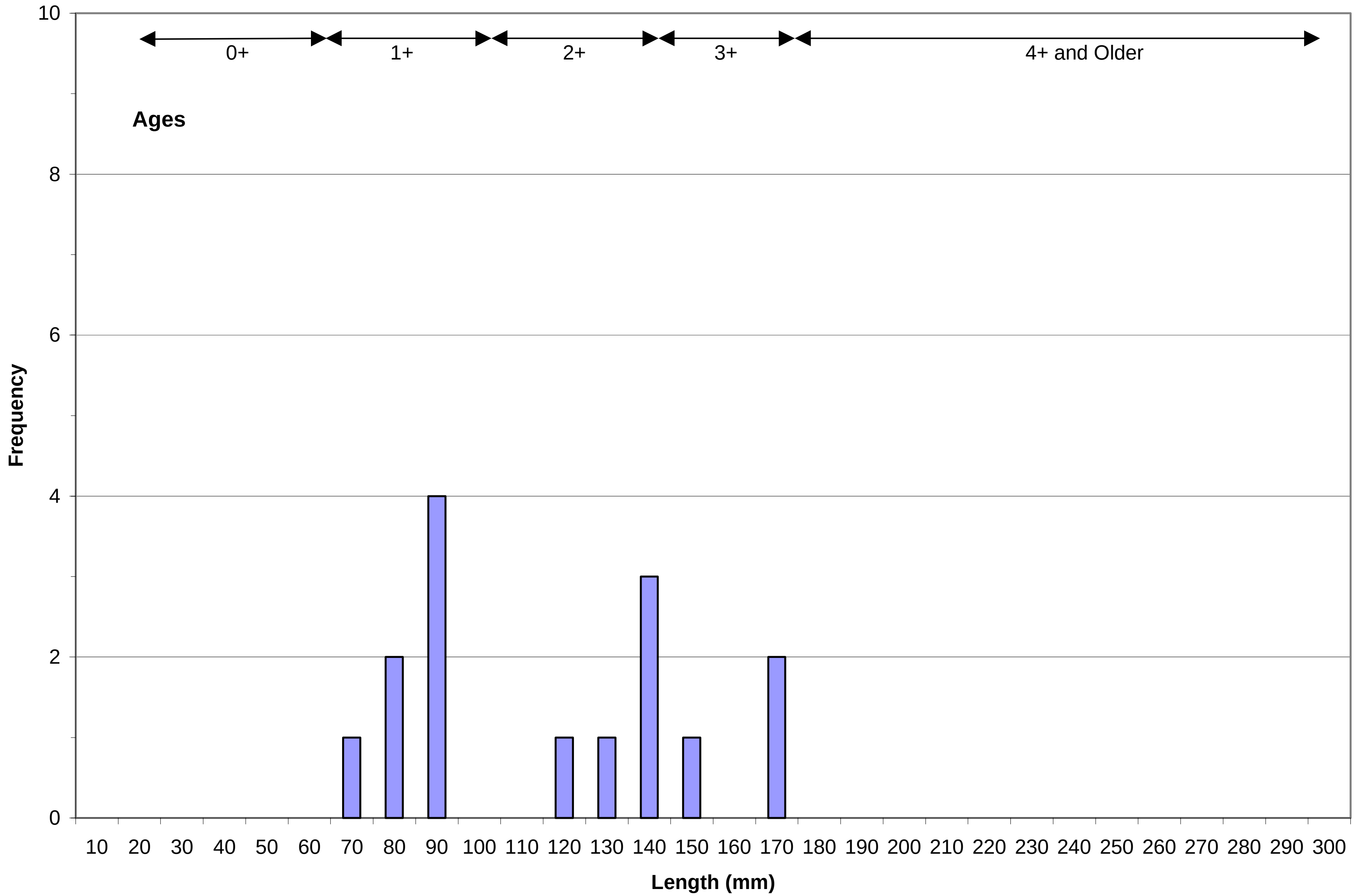


Figure CAWG 7-39. Length Frequency and Age of Brook Trout Collected in Bolsillo Creek, Below the Diversion, Rosgen Level I Type Aa+ Channel Site, October 2002 (Number of Fish = 15).

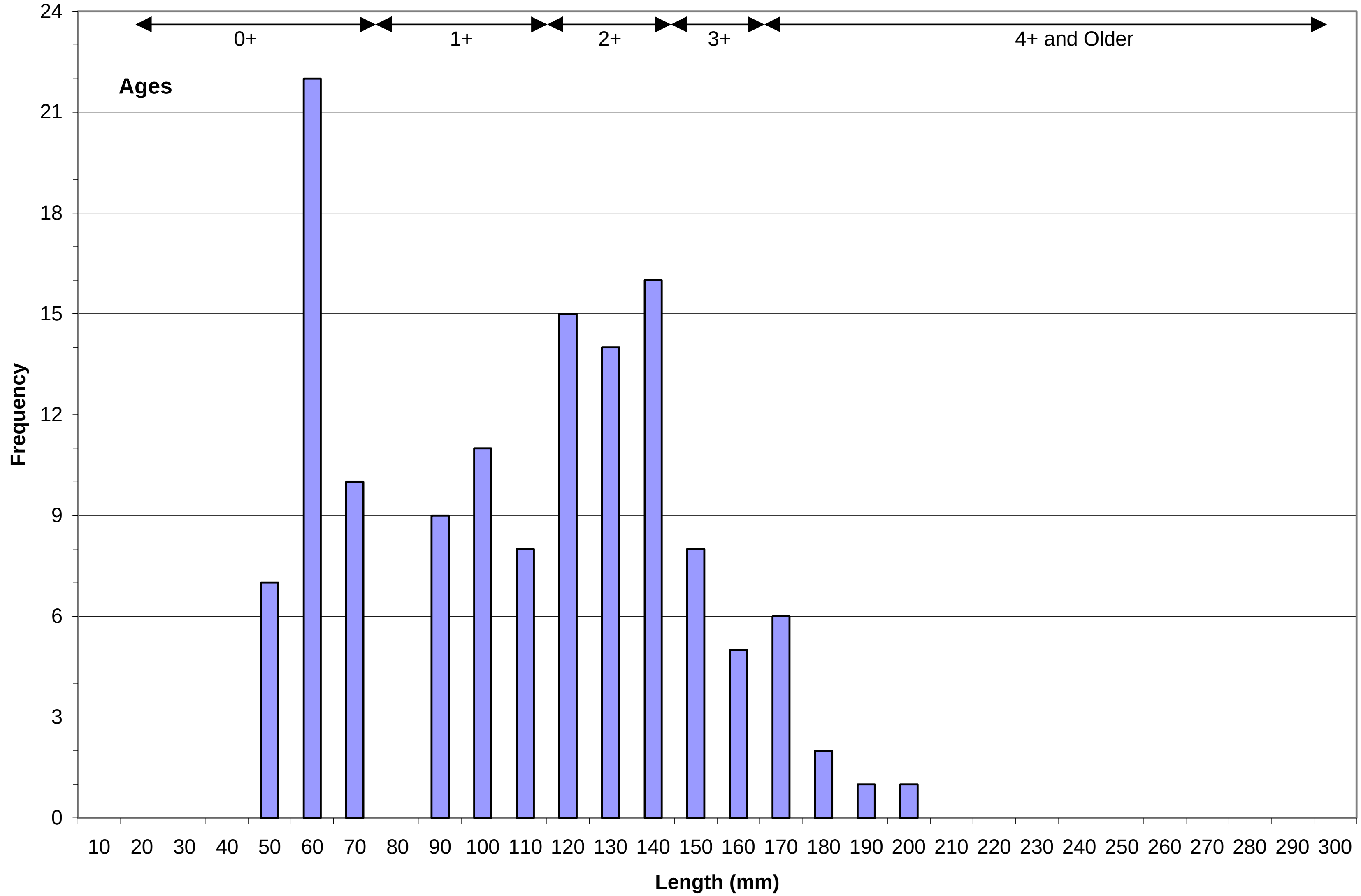


Figure CAWG 7-40. Length Frequency and Age of Brook Trout Collected in Bolsillo Creek, Below the Diversion, Rosgen Level I Type B Channel Site, October 2002 (Number of Fish = 135).

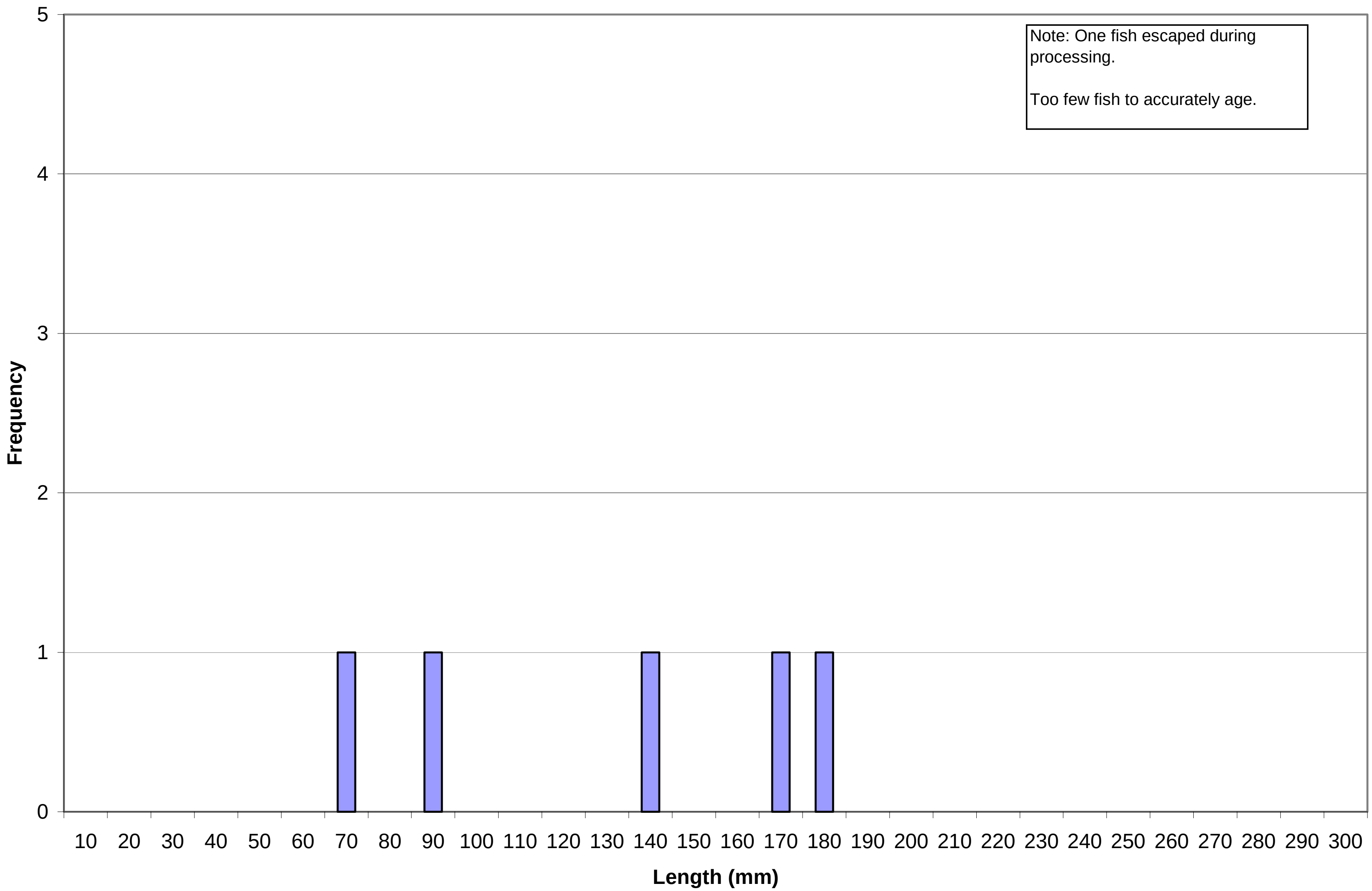
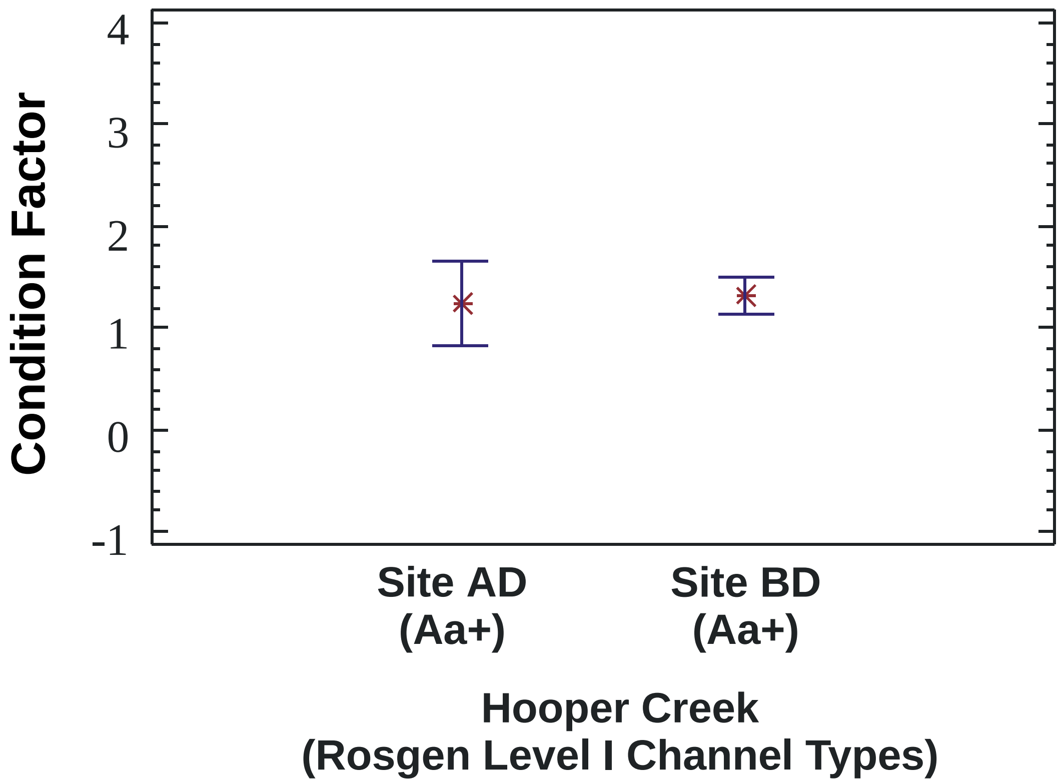
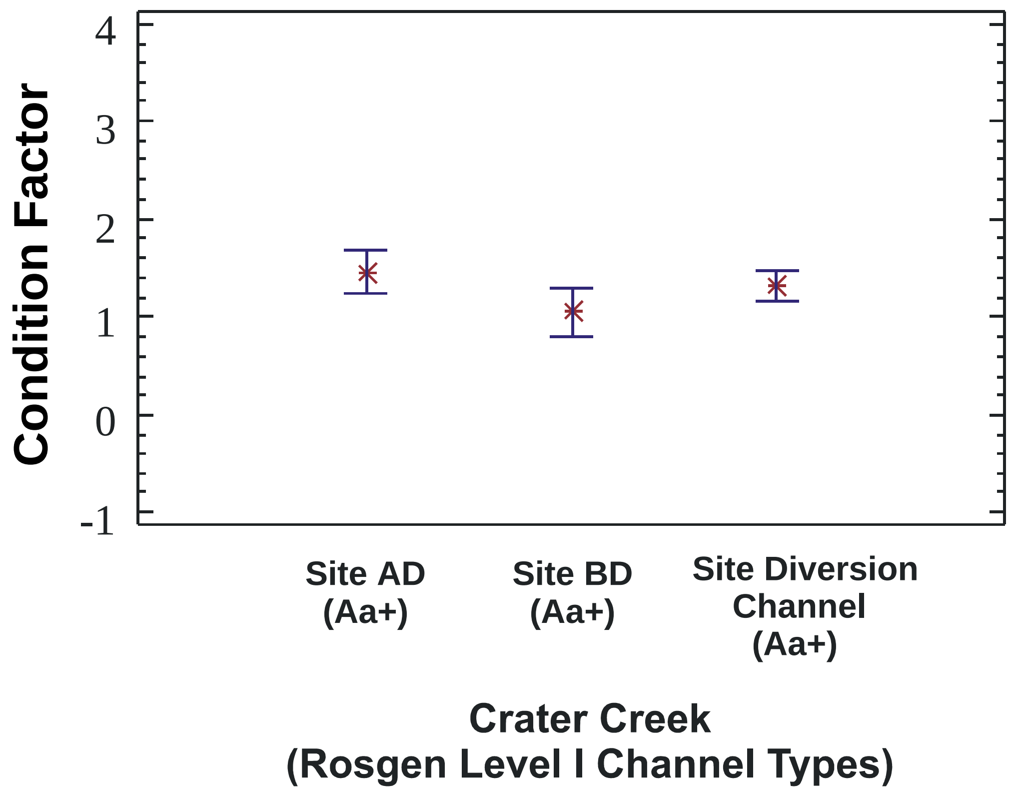


Figure CAWG 7-41. Length Frequency of Brown Trout Collected in Mono Creek, Below the Diversion, Rosgen Level I Type B Channel Site, September 2002 (Number of Fish = 5).



Site/Value	Site AD (Aa+)	Site BD (Aa+)
Upper 95% Limit	1.64	1.49
Mean	1.23	1.31
Lower 95% Limit	0.83	1.13

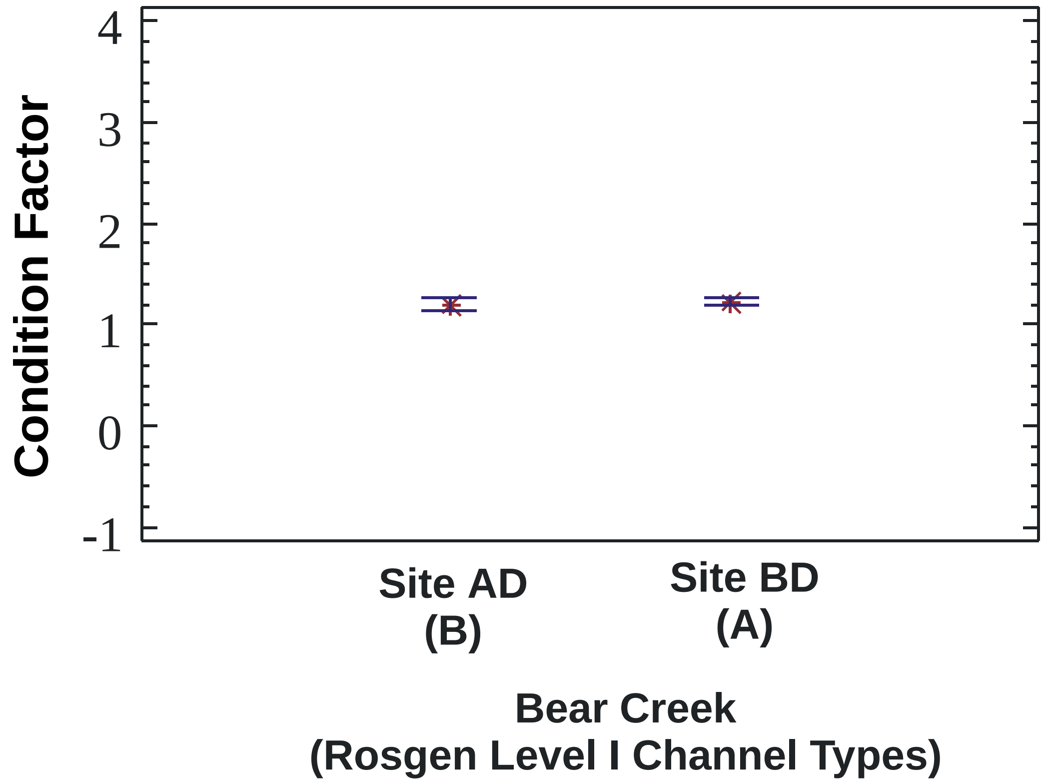
Figure CAWG 7-42. Golden x Rainbow Trout Condition Factor Means and 95.0 Percent Confidence Intervals (pooled variance) for Above Diversion (AD) Rosgen Level I Type Aa+ Channel Site and Below Diversion (BD) Rosgen Level I Type Aa+ Channel Site for Hooper Creek, 2002.



Site/Value	Site AD (Aa+)	Site BD (Aa+)	Site Diversion Channel (Aa+)
Upper 95% Limit	1.68	1.30	1.47
Mean	1.46	1.05	1.33
Lower 95% Limit	1.23	0.80	1.18

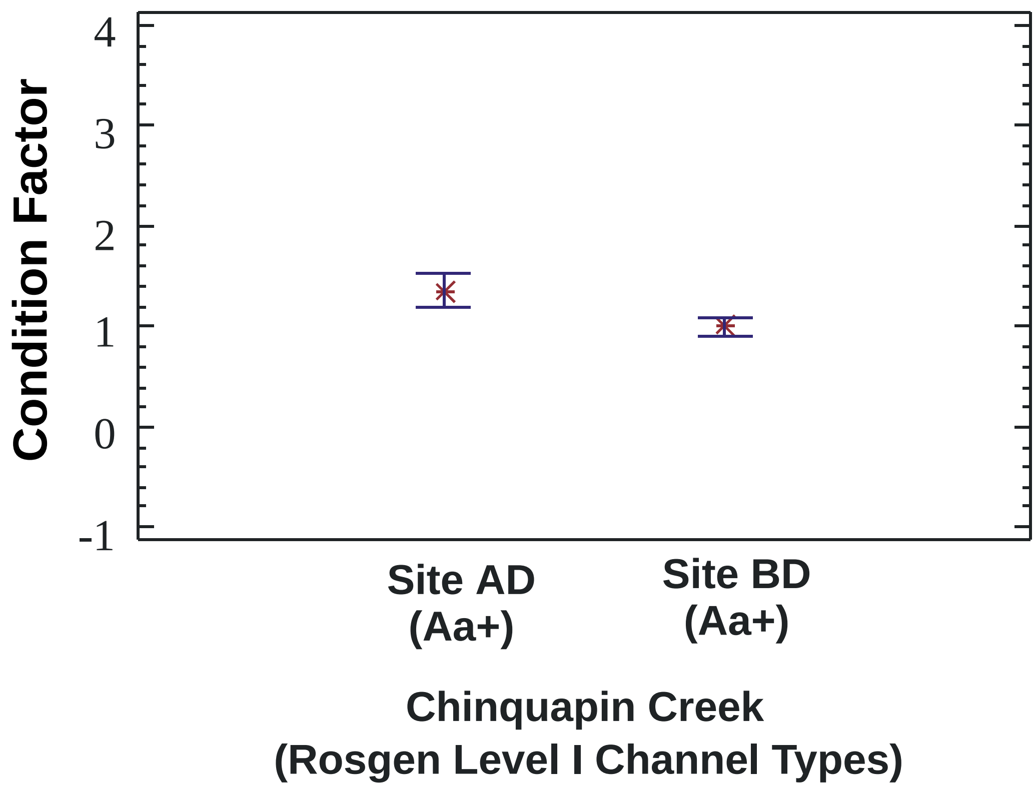
Figure CAWG 7-43. Brook Trout Condition Factor Means and 95.0 Percent Confidence Intervals (pooled variance) for Above Diversion (AD) Rosgen Level I Type Aa+ Channel Site and Below Diversion (BD)[1] Rosgen Level I Type Aa+ Channel Site for Crater Creek and Rosgen Level I Type Aa+ Channel Site for Crater Creek Diversion Channel (Div-CH), 2002.

[1] No fish found in Crater Creek C/E Channel Site.



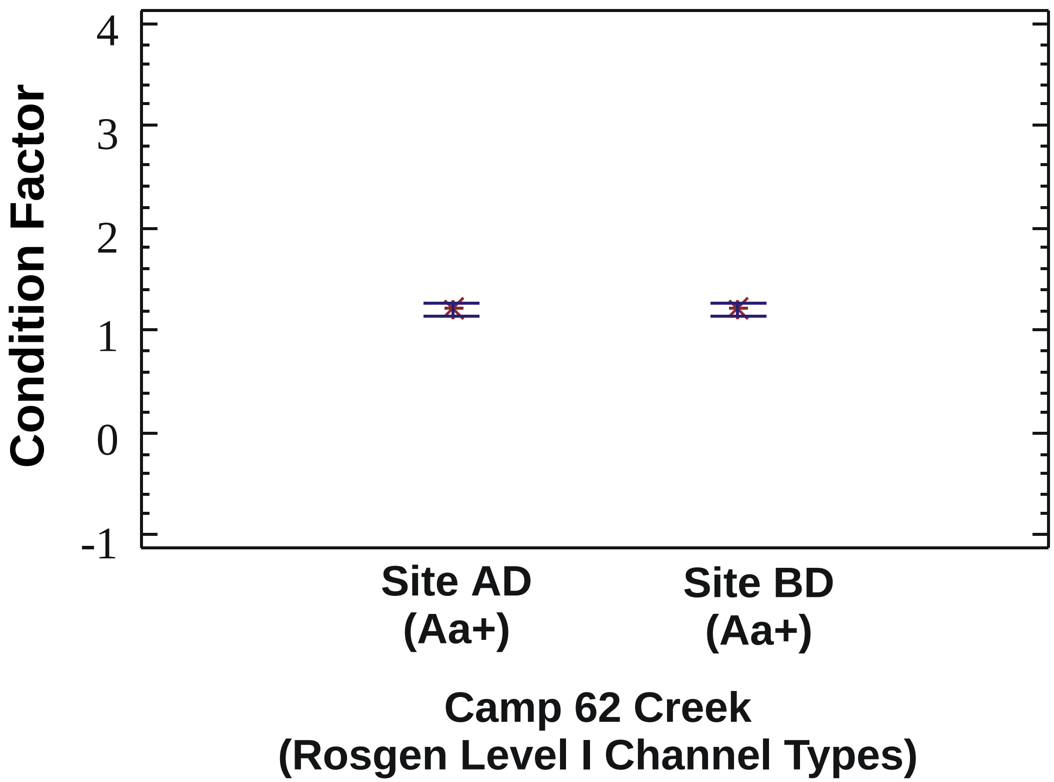
Site/Value	Site AD (B)	Site BD (A)
Upper 95% Limit	1.27	1.27
Mean	1.20	1.23
Lower 95% Limit	1.13	1.18

Figure CAWG 7-44. Brown Trout Condition Factor Means and 95.0 Percent Confidence Intervals (pooled variance) for Above Diversion (AD) Rosgen Level I Type B Channel Site and Below Diversion (BD) Rosgen Level I Type A Channel Site for Bear Creek, 2002.



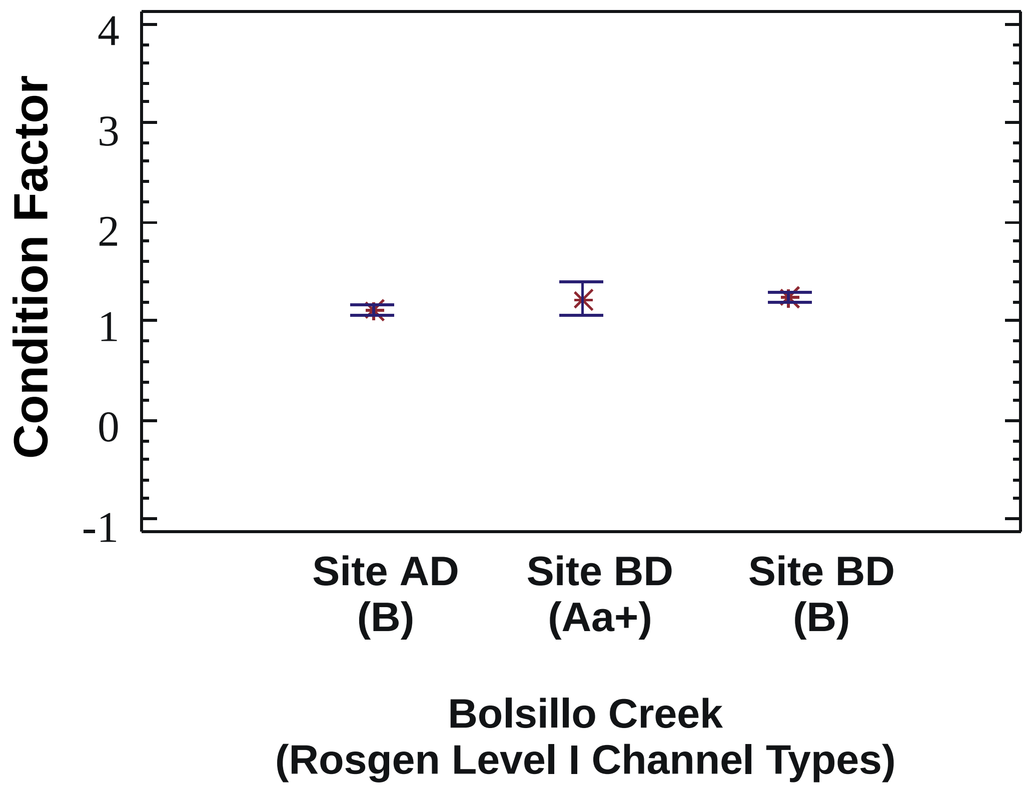
Site/Value	Site AD (Aa+)	Site BD (Aa+)
Upper 95% Limit	1.51	1.10
Mean	1.35	1.01
Lower 95% Limit	1.18	0.91

Figure CAWG 7-45. Brook Trout Condition Factor Means and 95.0 Percent Confidence Intervals (pooled variance) for Above Diversion (AD) Rosgen Level I Type Aa+ Channel Site and Below Diversion (BD) Rosgen Level I Type Aa+ Channel Site for Chinquapin Creek, 2002.



Site/Value	Site AD (Aa+)	Site BD (Aa+)
Upper 95% Limit	1.27	1.27
Mean	1.21	1.21
Lower 95% Limit	1.14	1.15

Figure CAWG 7-46. Brook Trout Condition Factor Means and 95.0 Percent Confidence Intervals (pooled variance) for Above Diversion (AD) Rosgen Level I Type Aa+ Channel Site and Below Diversion (BD) Rosgen Level I Type Aa+ Channel Site for Camp 62 Creek, 2002.



Site/Value	Site AD (B)	Site BD (Aa+)	Site BD (B)
Upper 95% Limit	1.16	1.39	1.29
Mean	1.11	1.22	1.24
Lower 95% Limit	1.06	1.05	1.18

Figure CAWG 7-47. Brook Trout Condition Factor Means and 95.0 Percent Confidence Intervals (pooled variance) for Above Diversion (AD) Rosgen Level I Type B Channel Site and Below Diversion (BD) Rosgen Level I Type Aa+ and B Channel Sites for Bolsillo Creek, 2002.

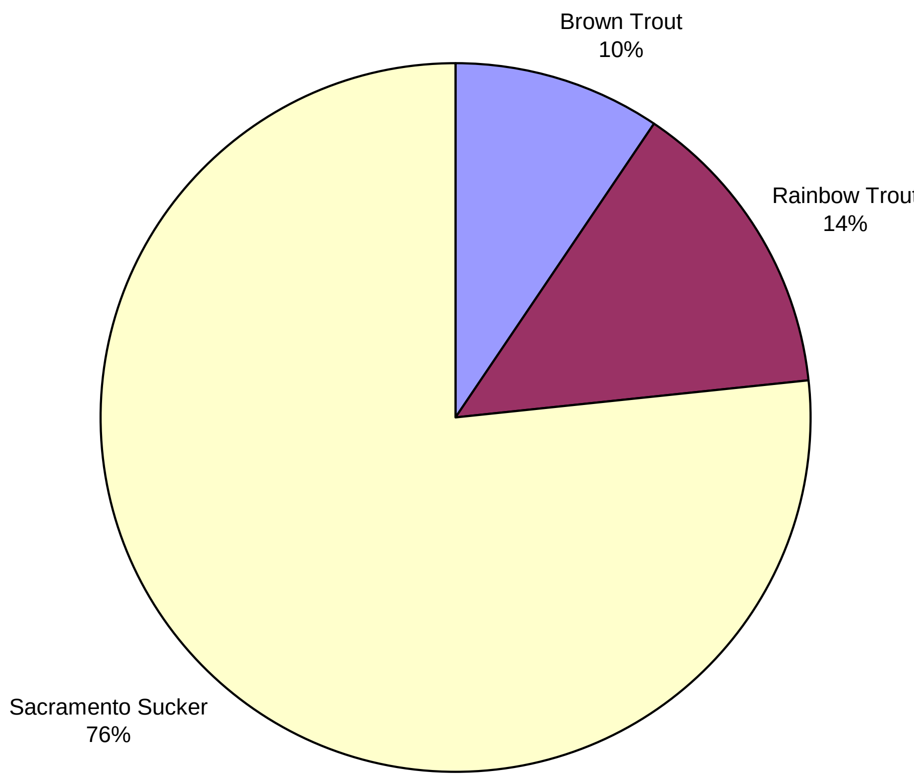


Figure CAWG 7-48. Composition of Fish Species Collected in the San Joaquin River Mammoth Reach, All Sites, All Methods, August 2002 (Number of Fish = 282).

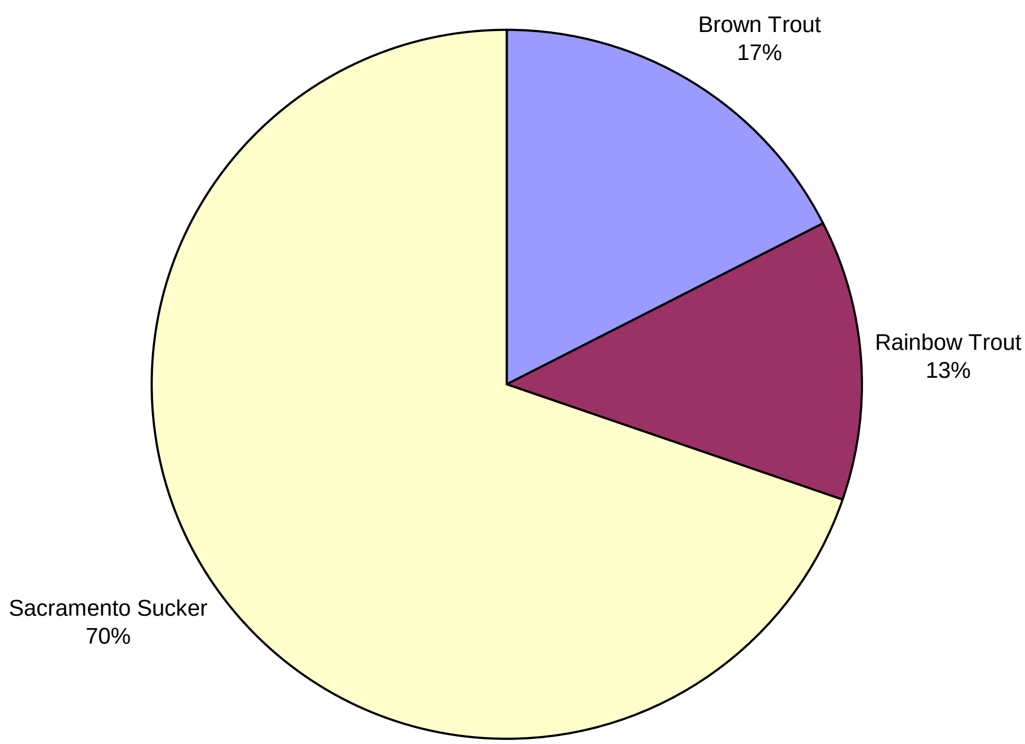


Figure CAWG 7-49. Composition of Fish Species Collected in the San Joaquin River Mammoth Reach, Upper Site, Rosgen Level I Type B Channel Site, August 2002 (Number of Fish = 86).

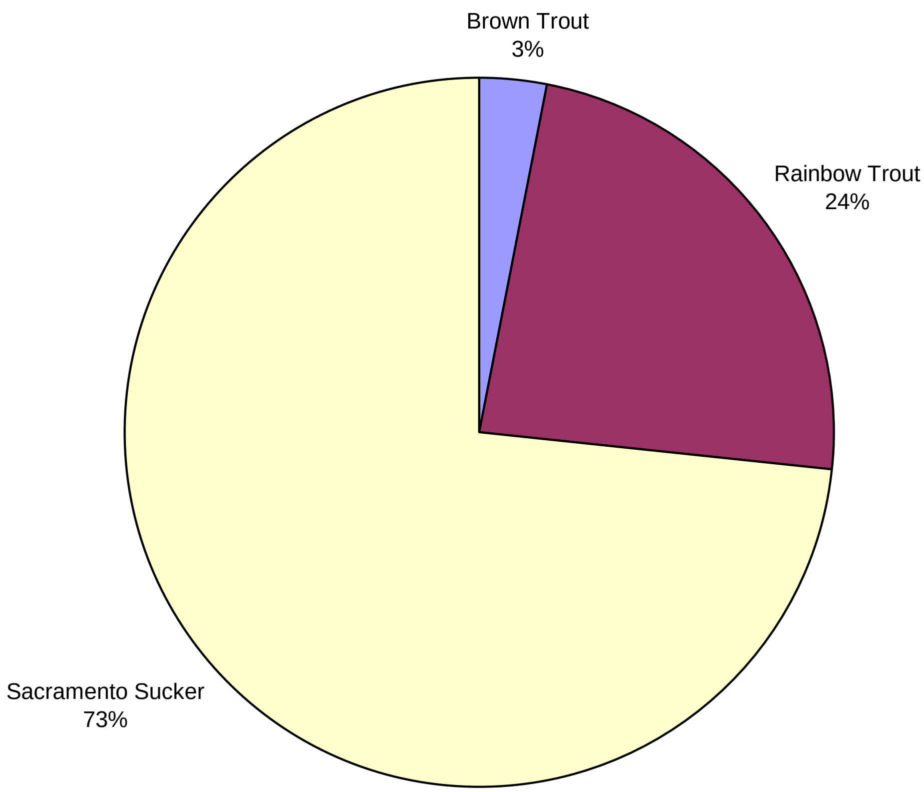


Figure CAWG 7-50. Composition of Fish Species Collected in the San Joaquin River Mammoth Reach, Rosgen Level I Type B Channel Site, August 2002 (Number of Fish = 442).

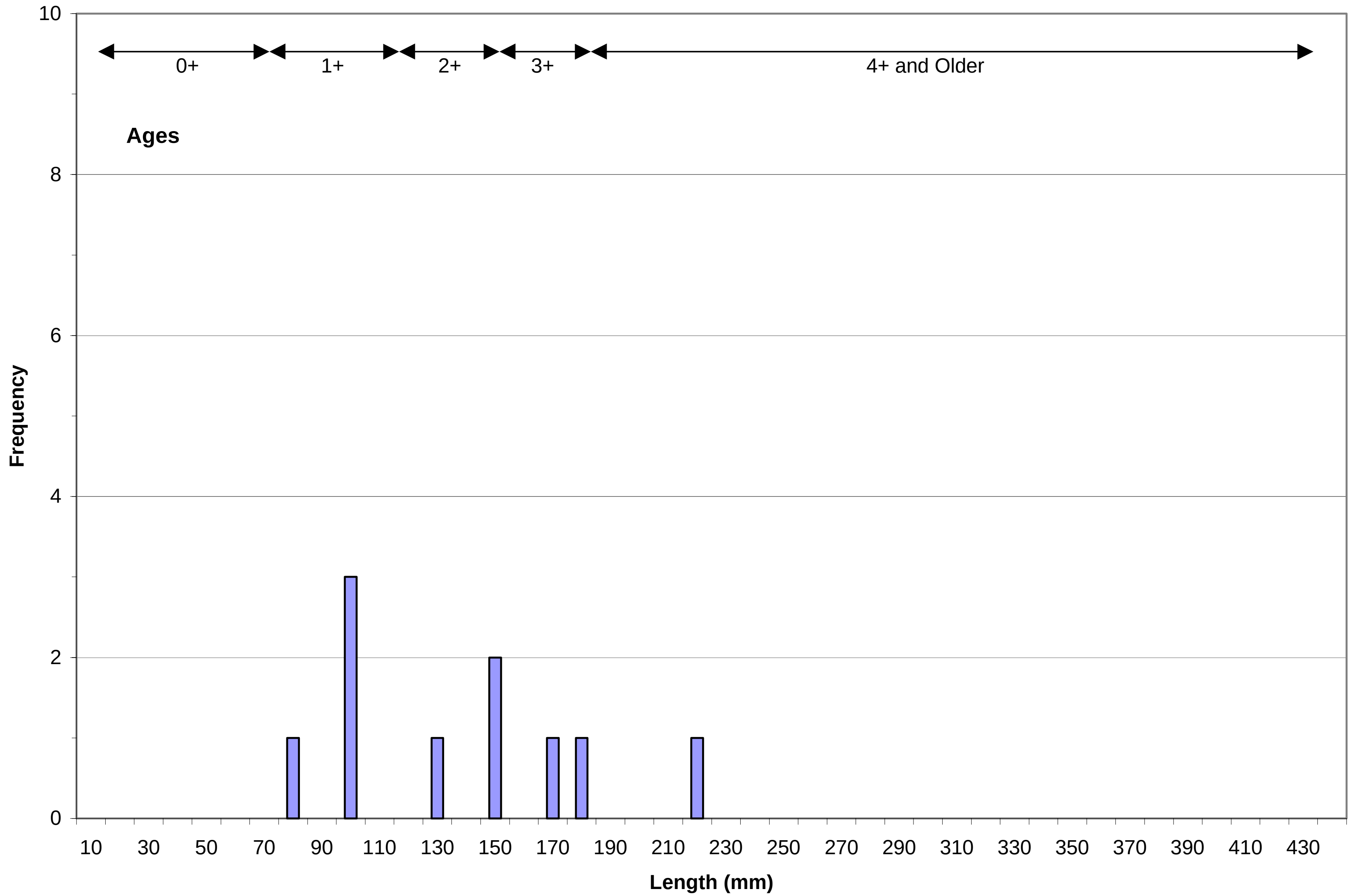


Figure CAWG 7-51. Length Frequency and Age of Brown Trout Collected in the San Joaquin River Mammoth Reach, Upper Site, Rosgen Level I Type B Channel Site, Electrofishing, August 2002 (Number of Fish = 10).

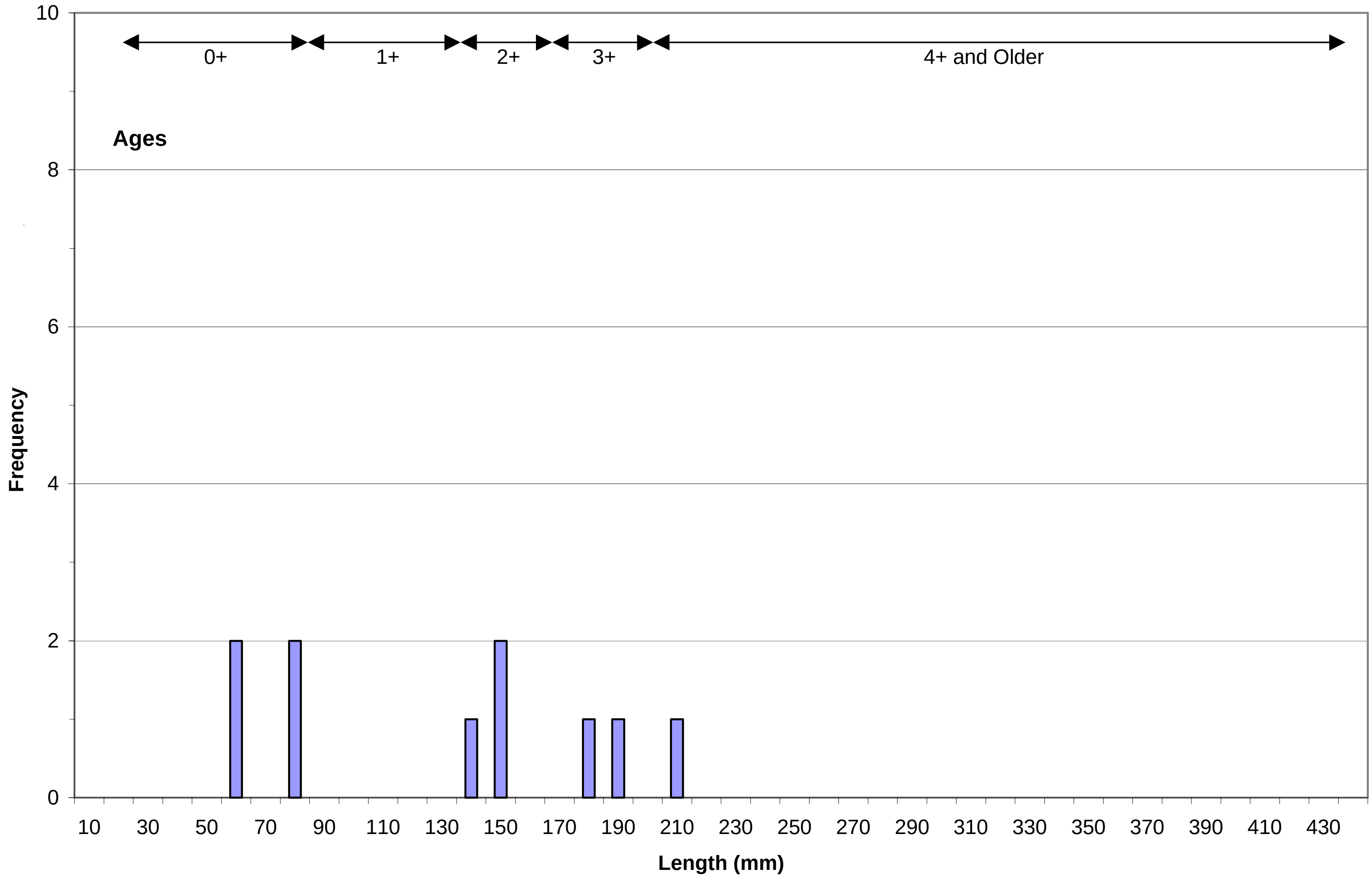


Figure CAWG 7-52. Length Frequency and Age of Rainbow Trout Collected in the San Joaquin River Mammoth Reach, Upper Site, Rosgen Level I Type B Channel Site, Electrofishing, August 2002 (Number of Fish = 10).

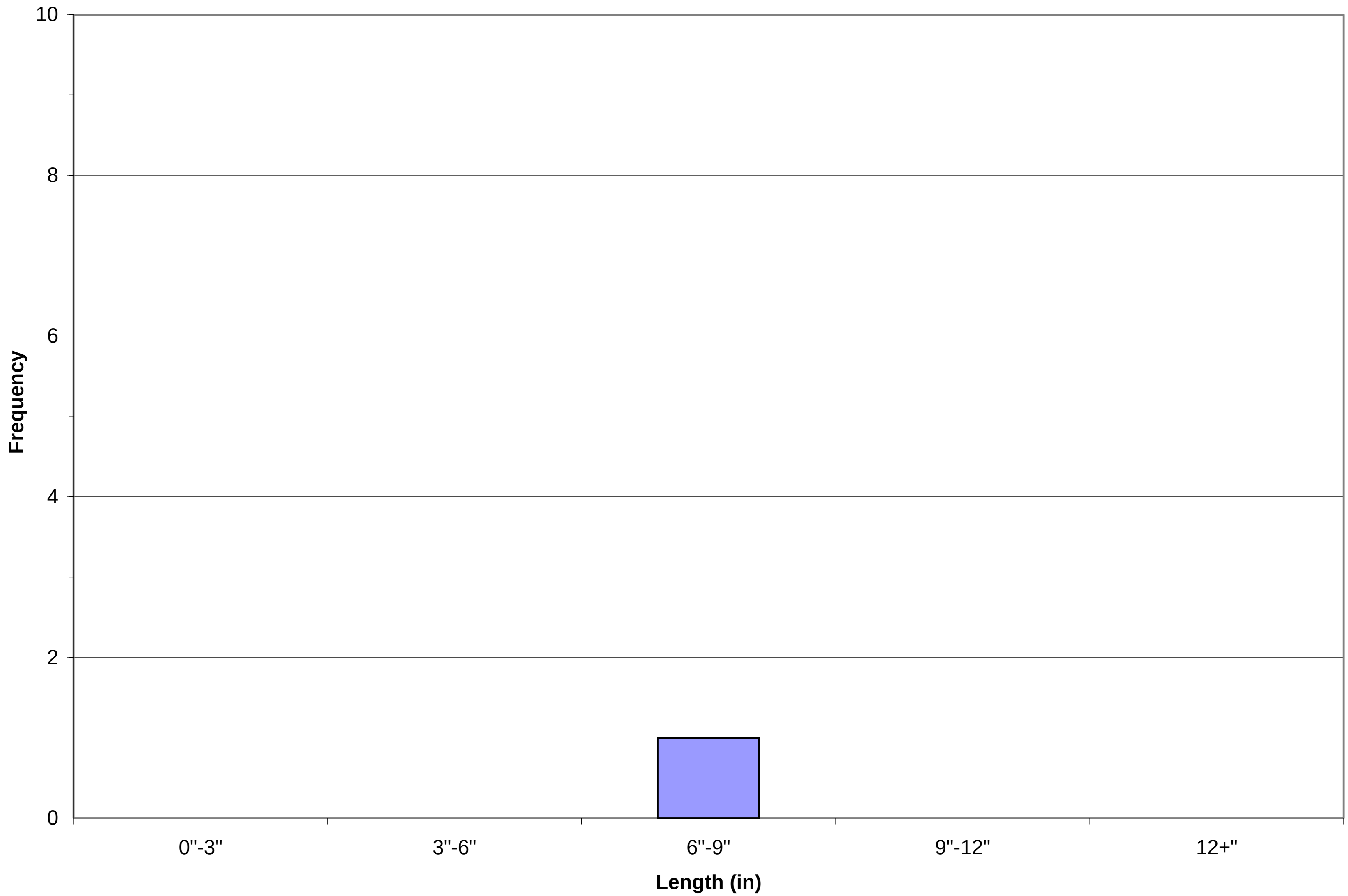


Figure CAWG 7-53. Length Frequency of Rainbow Trout Observed in the San Joaquin River Mammoth Reach, Upper Site, Rosgen Level I Type B Channel Site, Snorkel Survey, August 2002 (Number of Fish = 1).

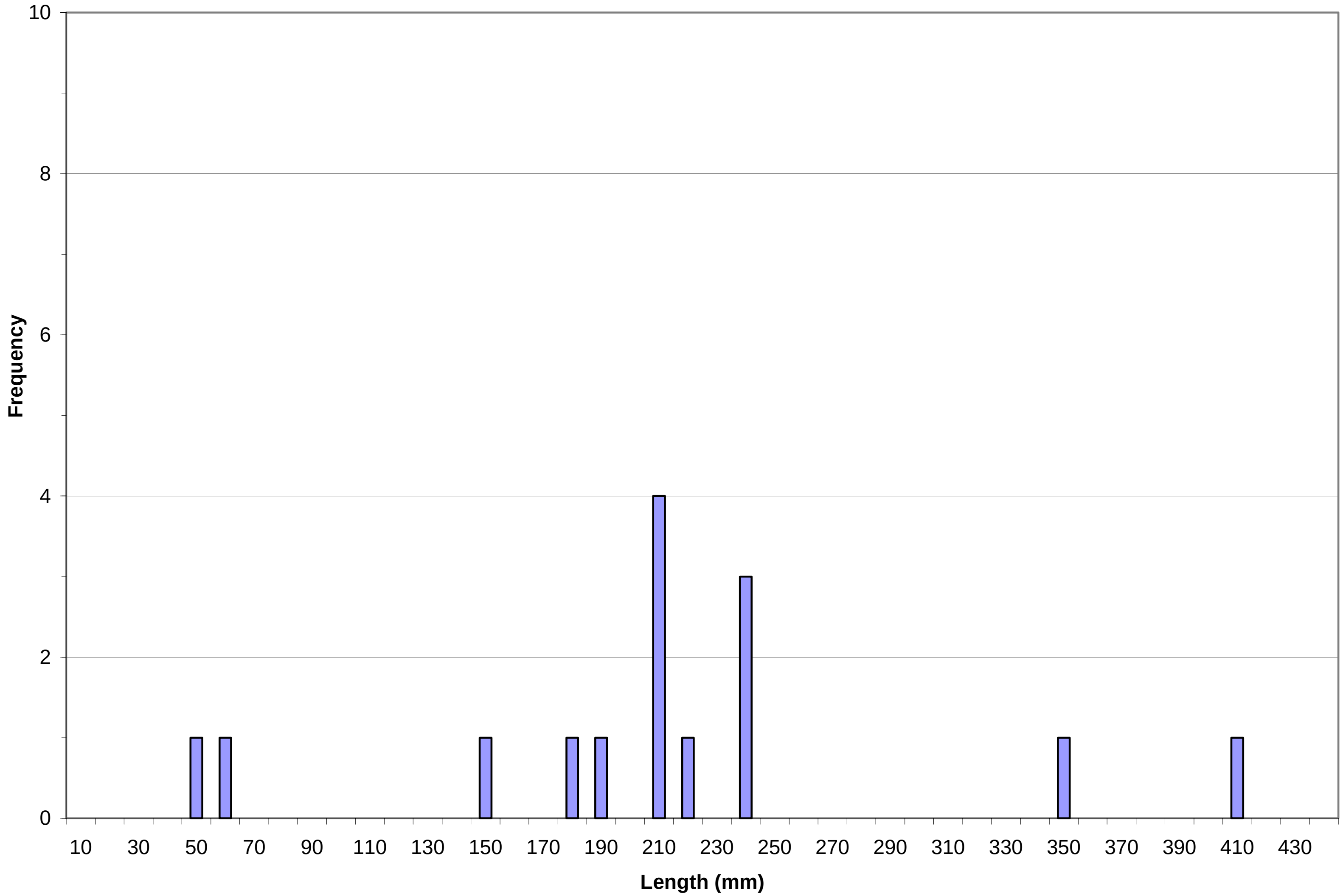


Figure CAWG 7-54. Length Frequency and Age of Sacramento Sucker Collected in the San Joaquin River Mammoth Reach, Upper Site, Rosgen Level I Type B Channel Site, Electrofishing, August 2002 (Number of Fish = 15).

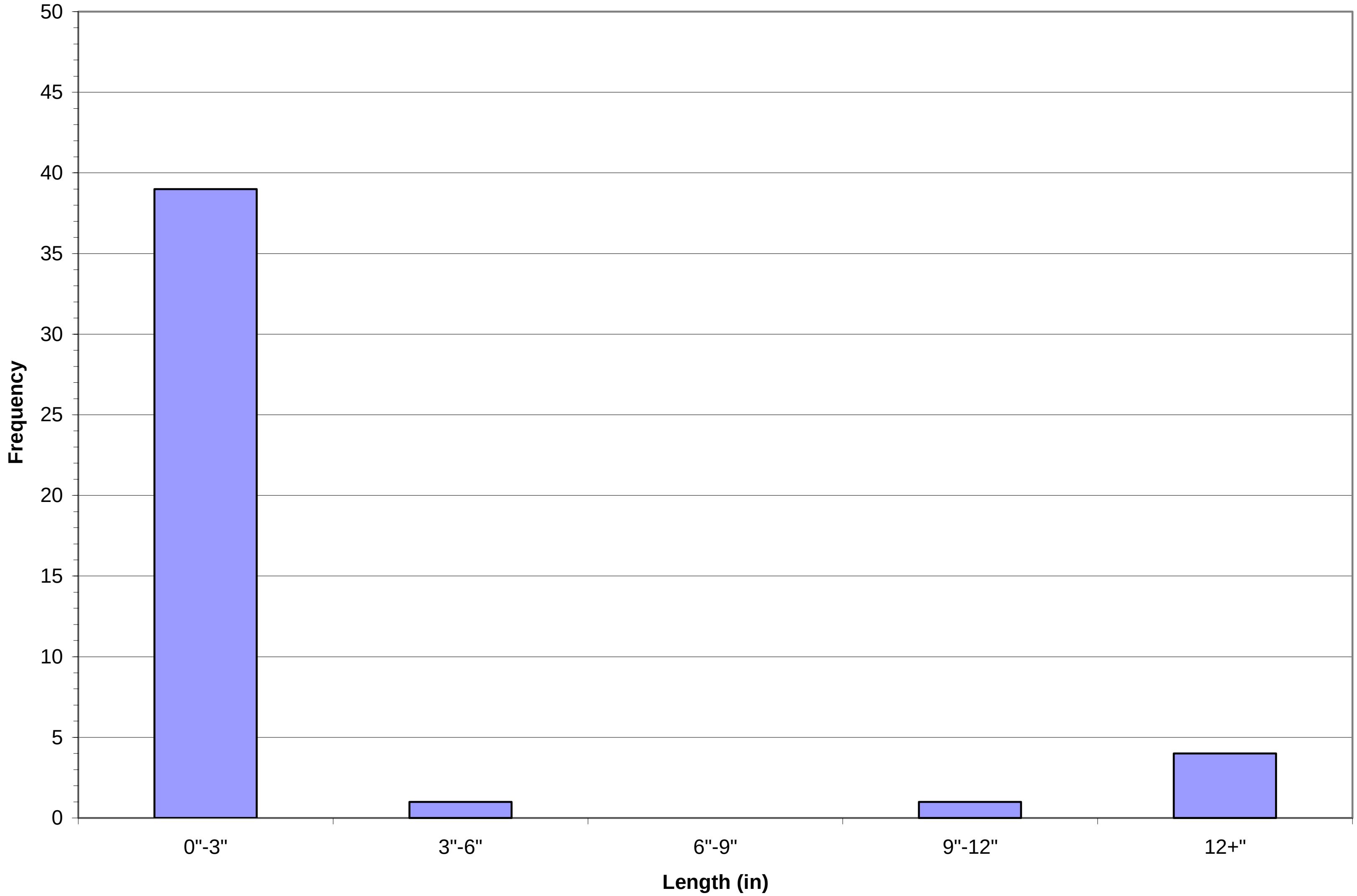


Figure CAWG 7-55. Length Frequency of Sacramento Sucker Observed in the San Joaquin River Mammoth Reach, Upper Site, Rosgen Level I Type B Channel Site, Snorkel Survey, August 2002 (Number of Fish = 45).

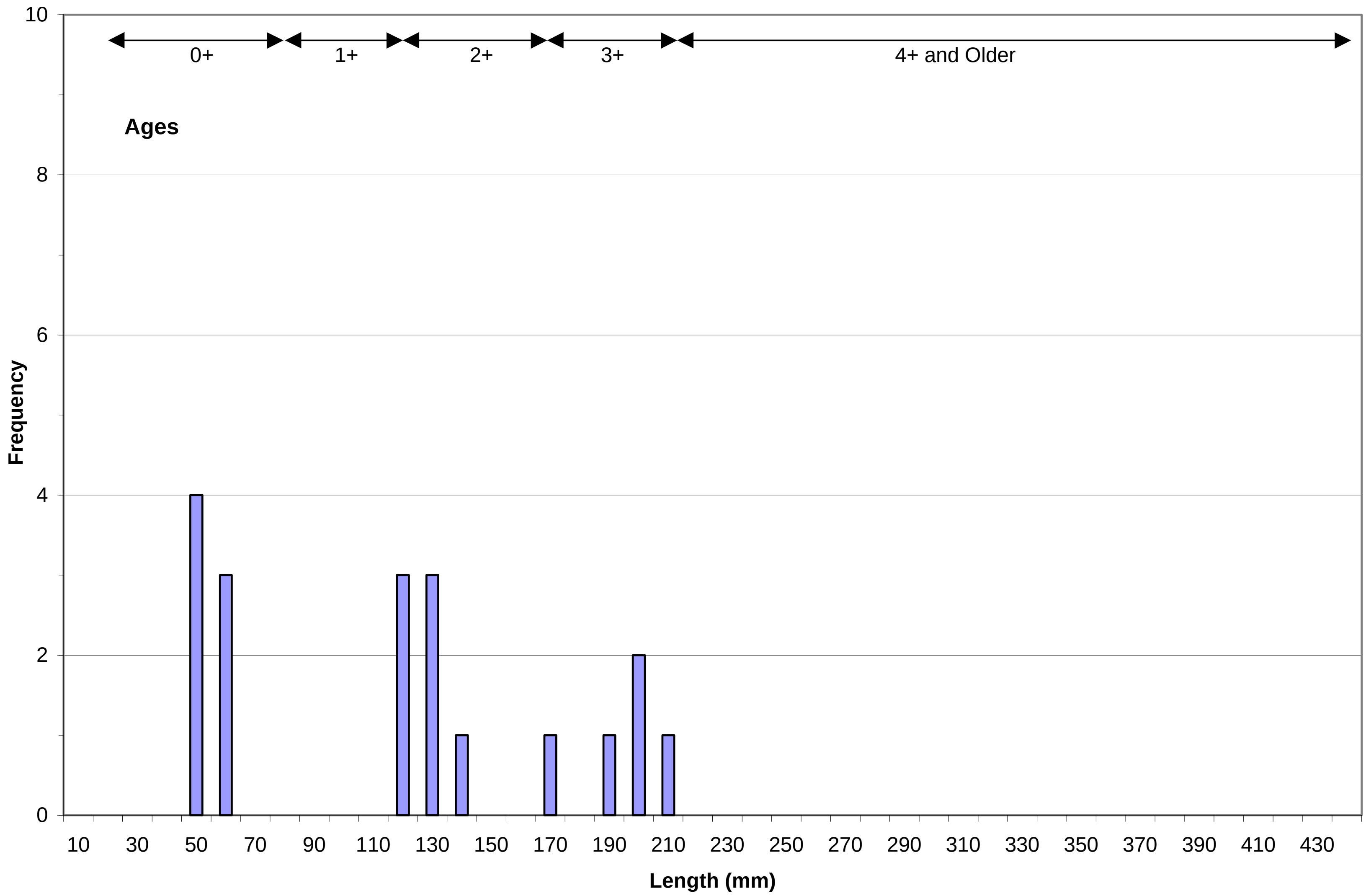


Figure CAWG 7-56. Length Frequency and Age of Rainbow Trout Collected in the San Joaquin River Mammoth Reach, Lower Site, Rosgen Level I Type B Channel Site, Electrofishing, August 2002 (Number of Fish = 19).

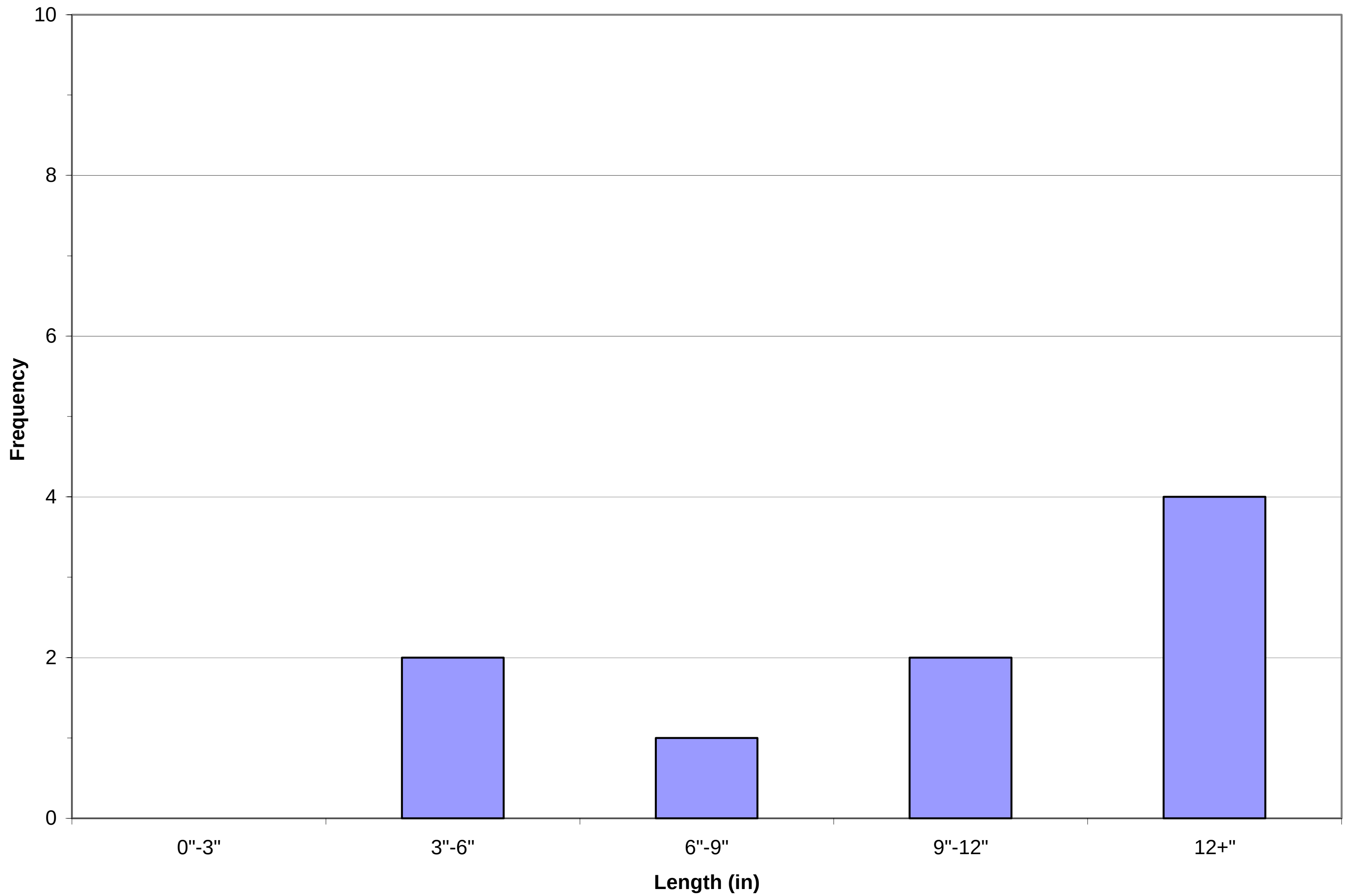


Figure CAWG 7-57. Length Frequency of Rainbow Trout Observed in the San Joaquin River Mammoth Reach, Lower Site, Rosgen Level I Type B Channel Site, Snorkel Survey, August 2002 (Number of Fish = 9).

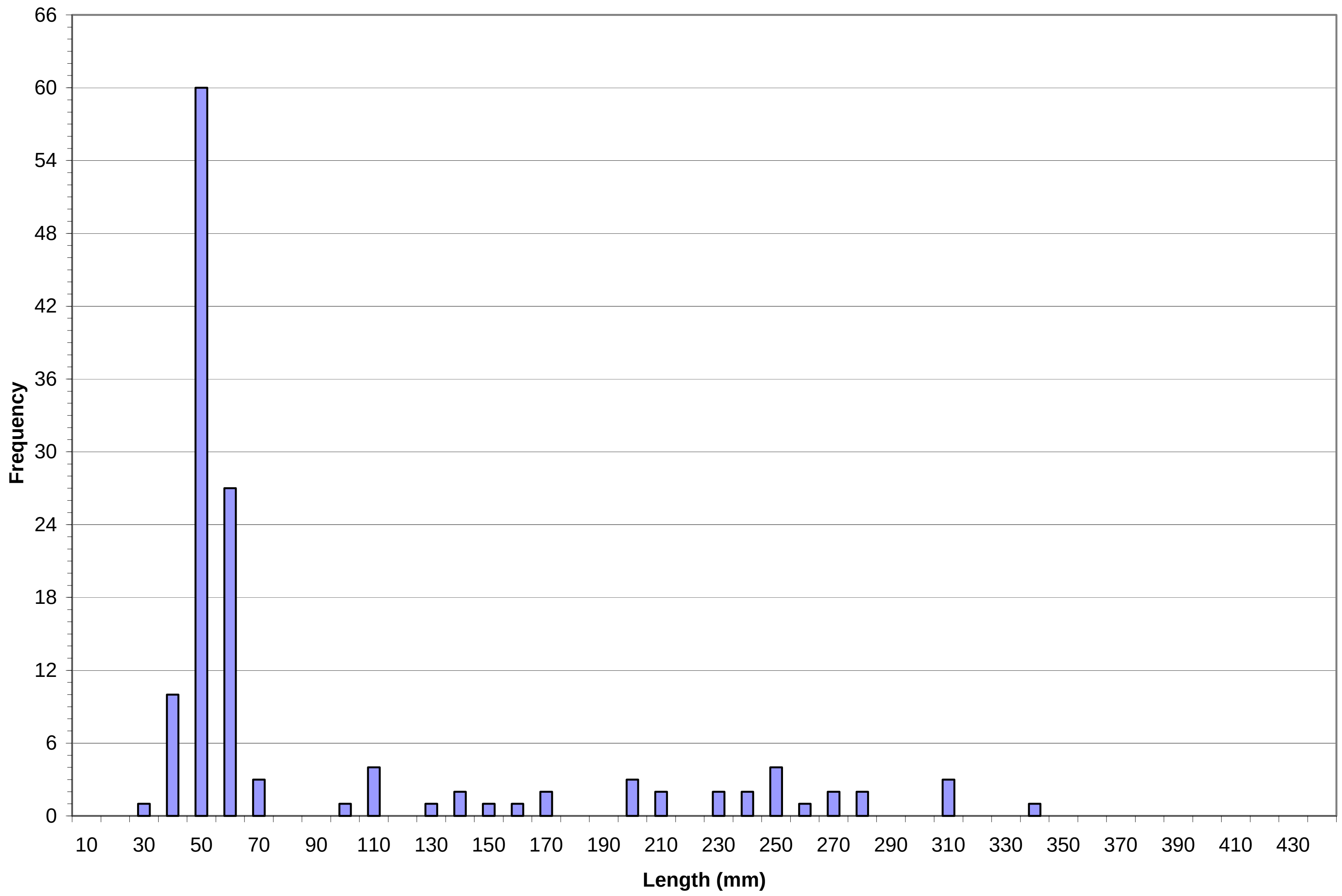


Figure CAWG 7-58. Length Frequency and Age of Sacramento Sucker Collected in the San Joaquin River Mammoth Reach, Lower Site, Rosgen Level I Type B Channel Site, Electrofishing, August 2002 (Number of Fish = 135).

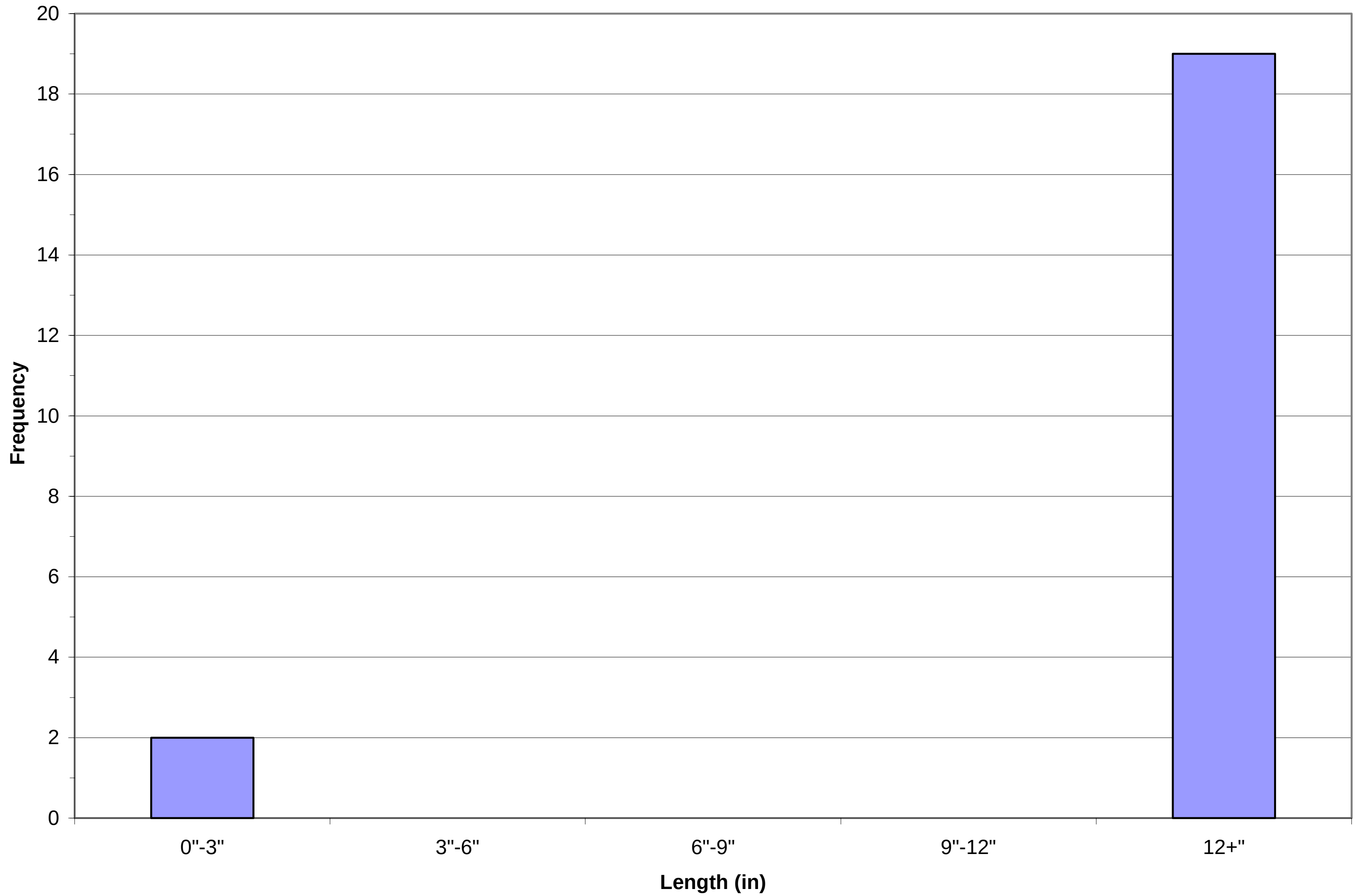


Figure CAWG 7-59. Length Frequency of Sacramento Sucker Observed in the San Joaquin River Mammoth Reach, Lower Site, Rosgen Level I Type B Channel Site, Snorkel Survey, August 2002 (Number of Fish = 21).

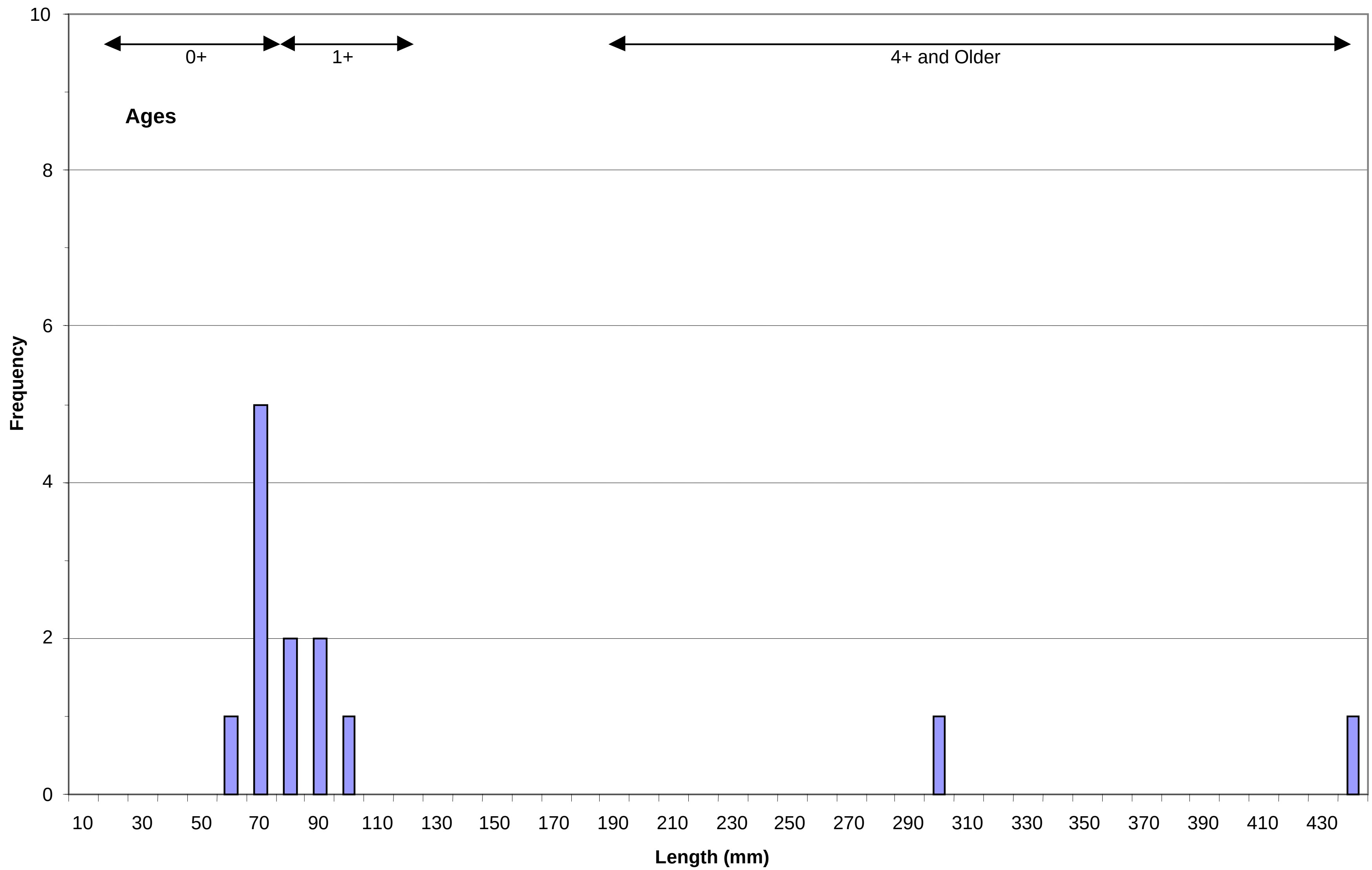
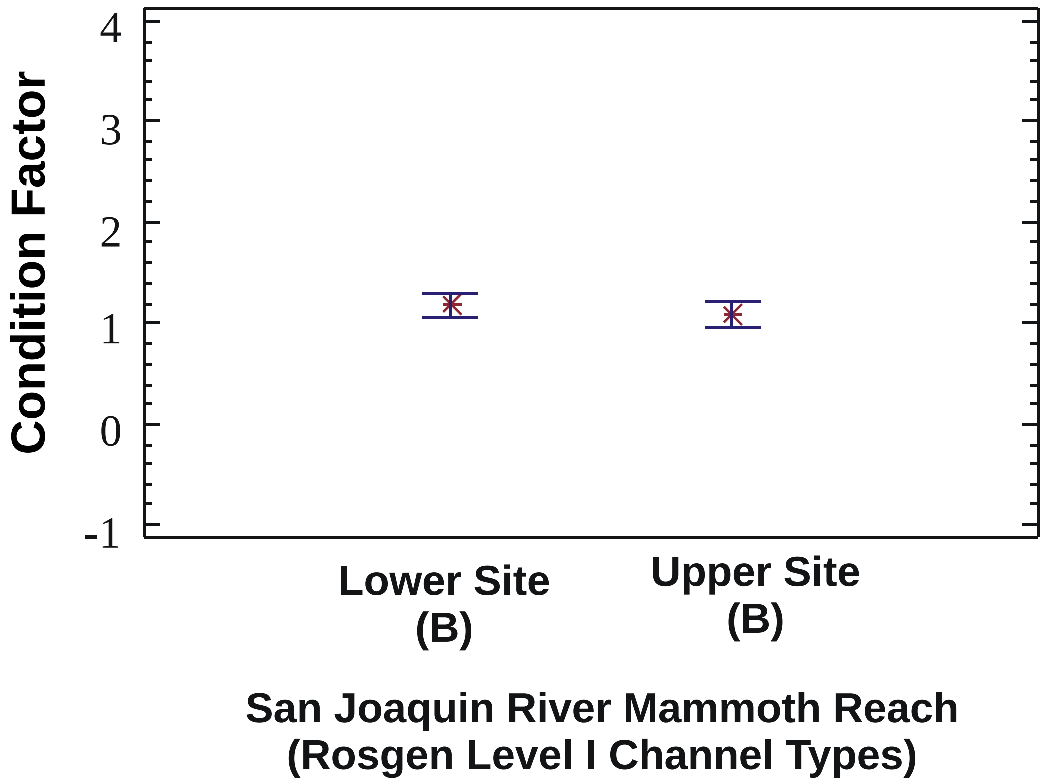
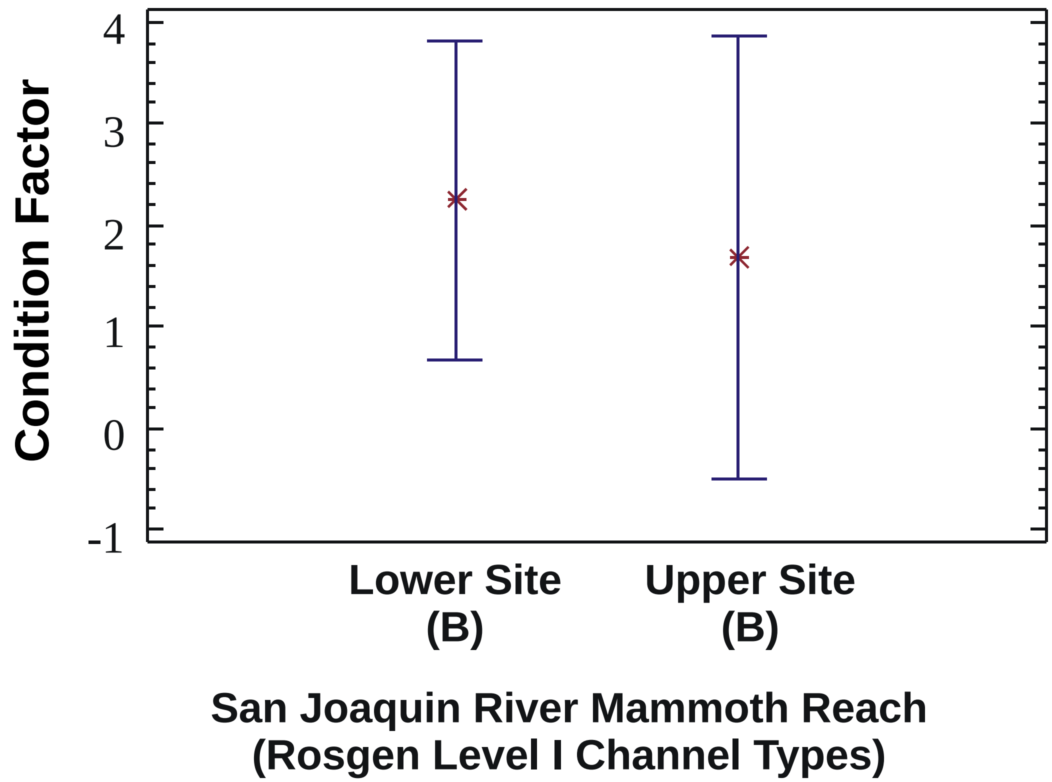


Figure CAWG 7-60. Length Frequency and Age of Brown Trout Collected in the San Joaquin River Mammoth Reach, Lower Site, Rosgen Level I Type B Channel Site, Electrofishing, August 2002 (Number of Fish = 13).



Site/Value	Lower Site (B)	Upper Site (B)
Upper 95% Limit	1.30	1.22
Mean	1.18	1.09
Lower 95% Limit	1.07	0.96

Figure CAWG 7-61. Brown Trout Condition Factor Means and 95.0 Percent Confidence Intervals (pooled variance) for Lower Site Rosgen Level I Type B Channel Site and Upper Site Rosgen Level I Type B Channel Site for San Joaquin River Mammoth Reach, 2002.



Site/Value	Lower Site (B)	Upper Site (B)
Upper 95% Limit	3.83	3.87
Mean	2.25	1.69
Lower 95% Limit	0.67	-0.49

Figure CAWG 7-62. Rainbow Trout Condition Factor Means and 95.0 Percent Confidence Intervals (pooled variance) for Lower Site Rosgen Level I Type B Channel Site and Upper Site Rosgen Level I Type B Channel Site for San Joaquin River Mammoth Reach, 2002.

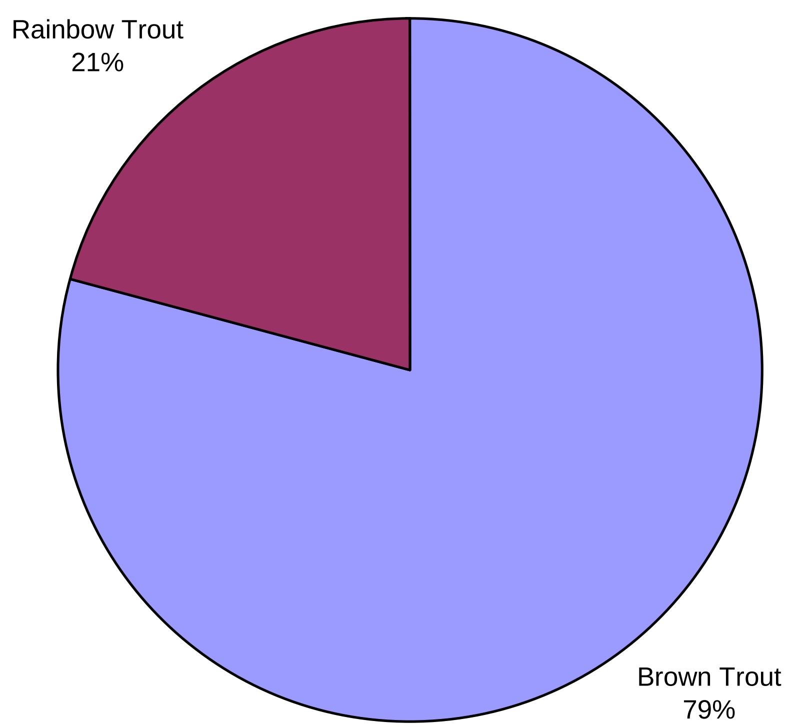


Figure CAWG 7-63. Composition of Fish Species Collected in Rock Creek, Above the Diversion, Rosgen Level I Type Aa+ Channel Site, August 2002 (Number of Fish = 106).

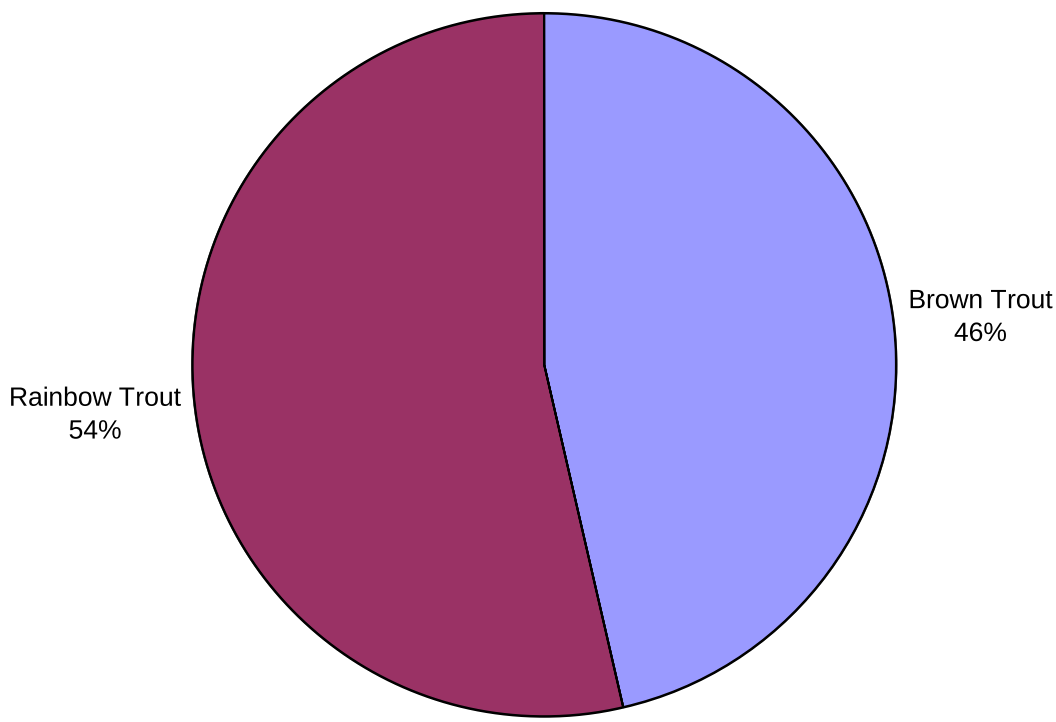


Figure CAWG 7-64. Composition of Fish Species Collected in Rock Creek, Below the Diversion, Rosgen Level I Type Aa+ Channel Site, October 2002 (Number of Fish = 84).

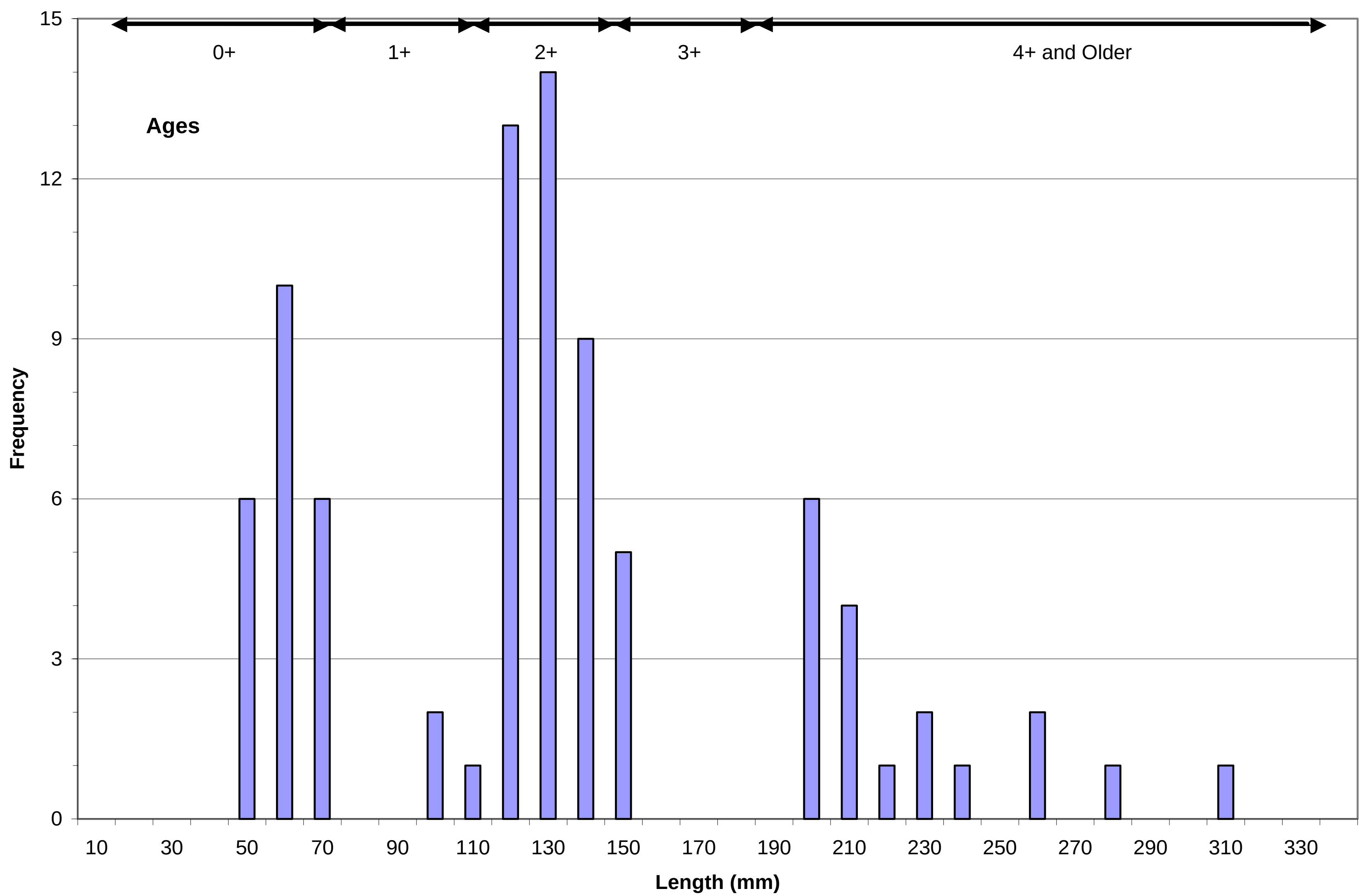


Figure CAWG 7-65. Length Frequency and Age of Brown Trout Collected in Rock Creek, Above the Diversion, Rosgen Level I Type Aa+ Channel Site, August 2002 (Number of Fish = 84).

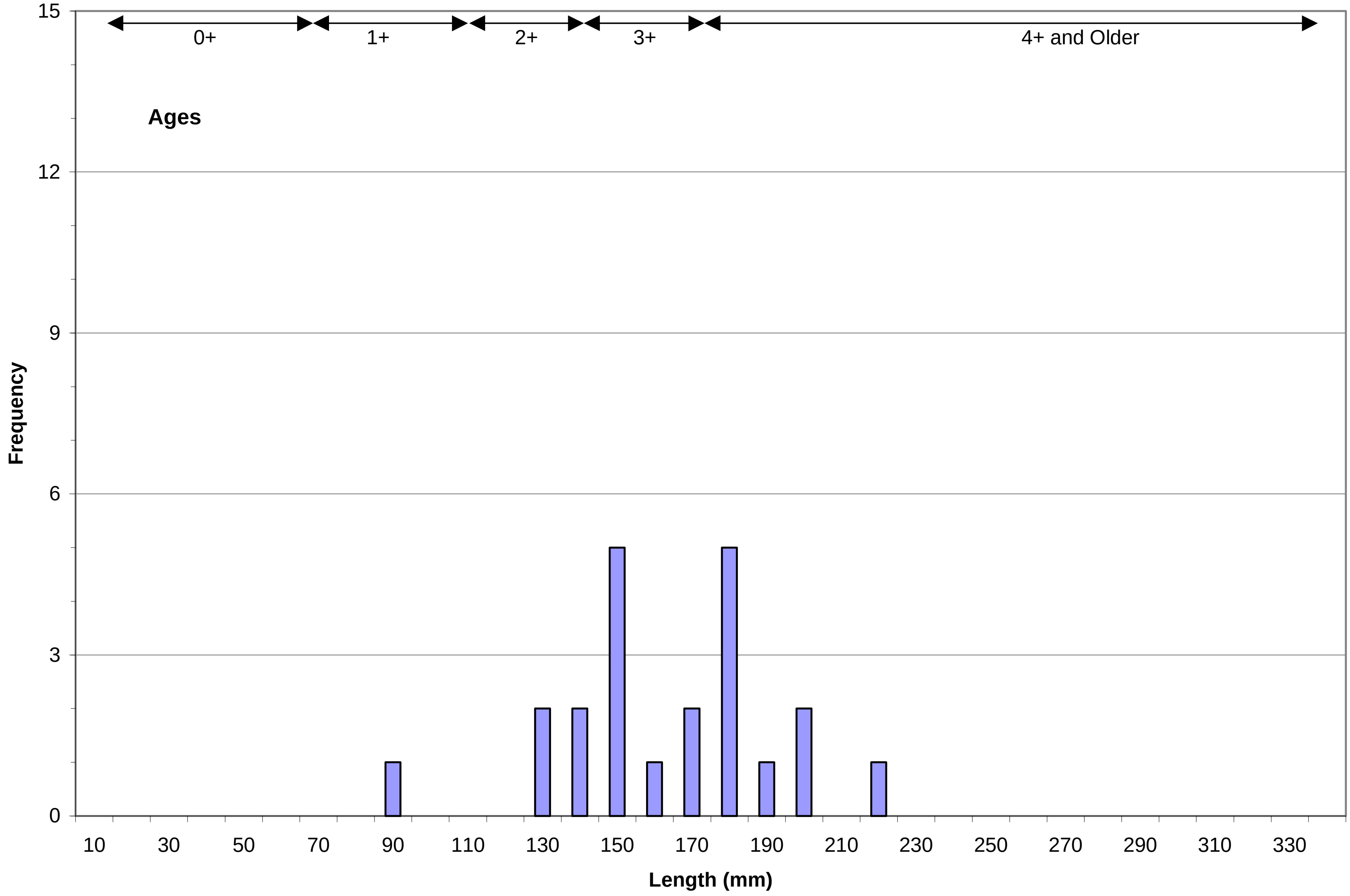


Figure CAWG 7-66. Length Frequency and Age of Rainbow Trout Collected in Rock Creek, Above the Diversion, Rosgen Level I Type Aa+ Channel Site, August 2002 (Number of Fish = 22).

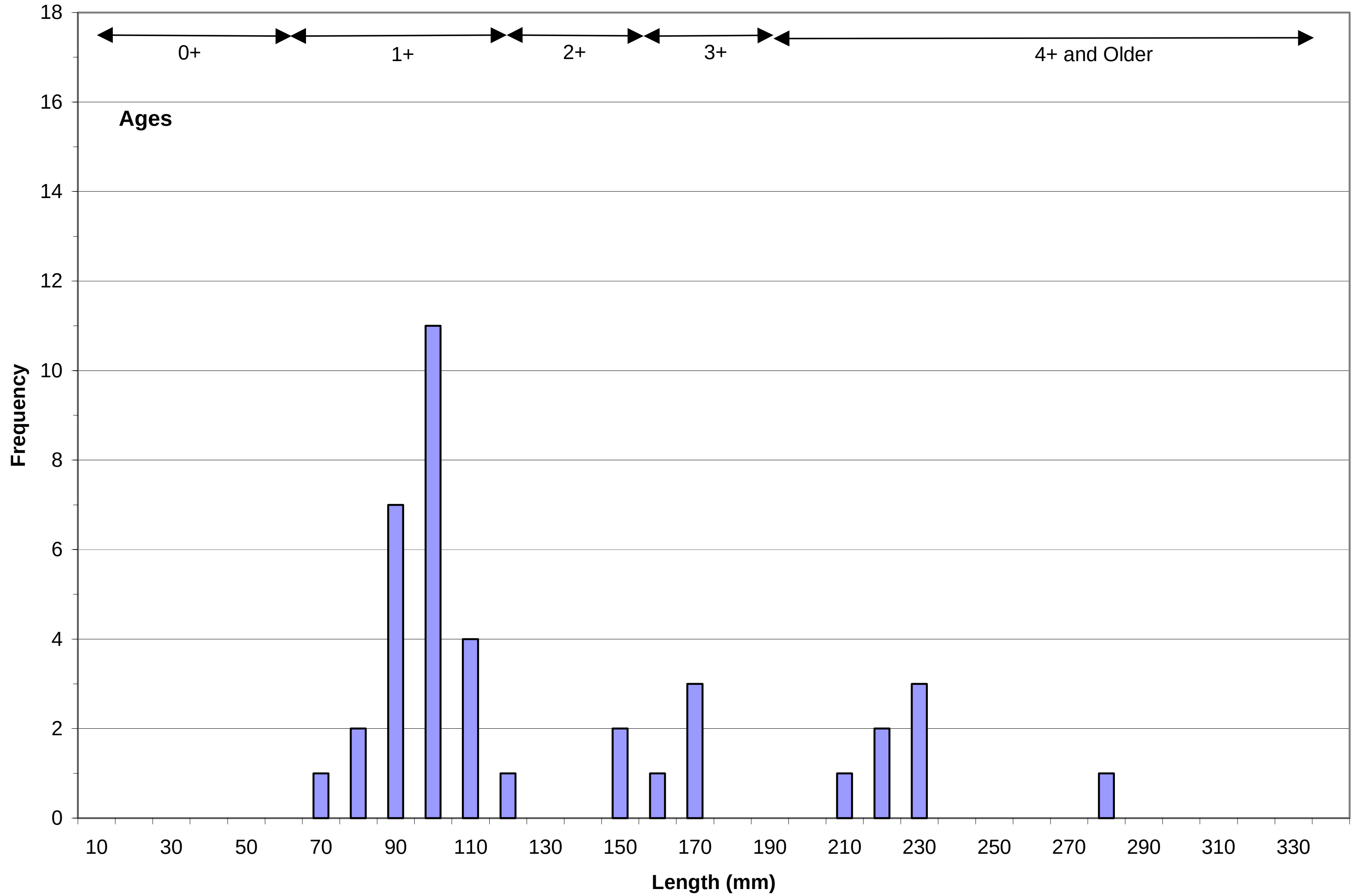


Figure CAWG 7-67. Length Frequency and Age of Brown Trout Collected in Rock Creek, Below the Diversion, Rosgen Level I Type Aa+ Channel Site, October 2002 (Number of Fish = 39).

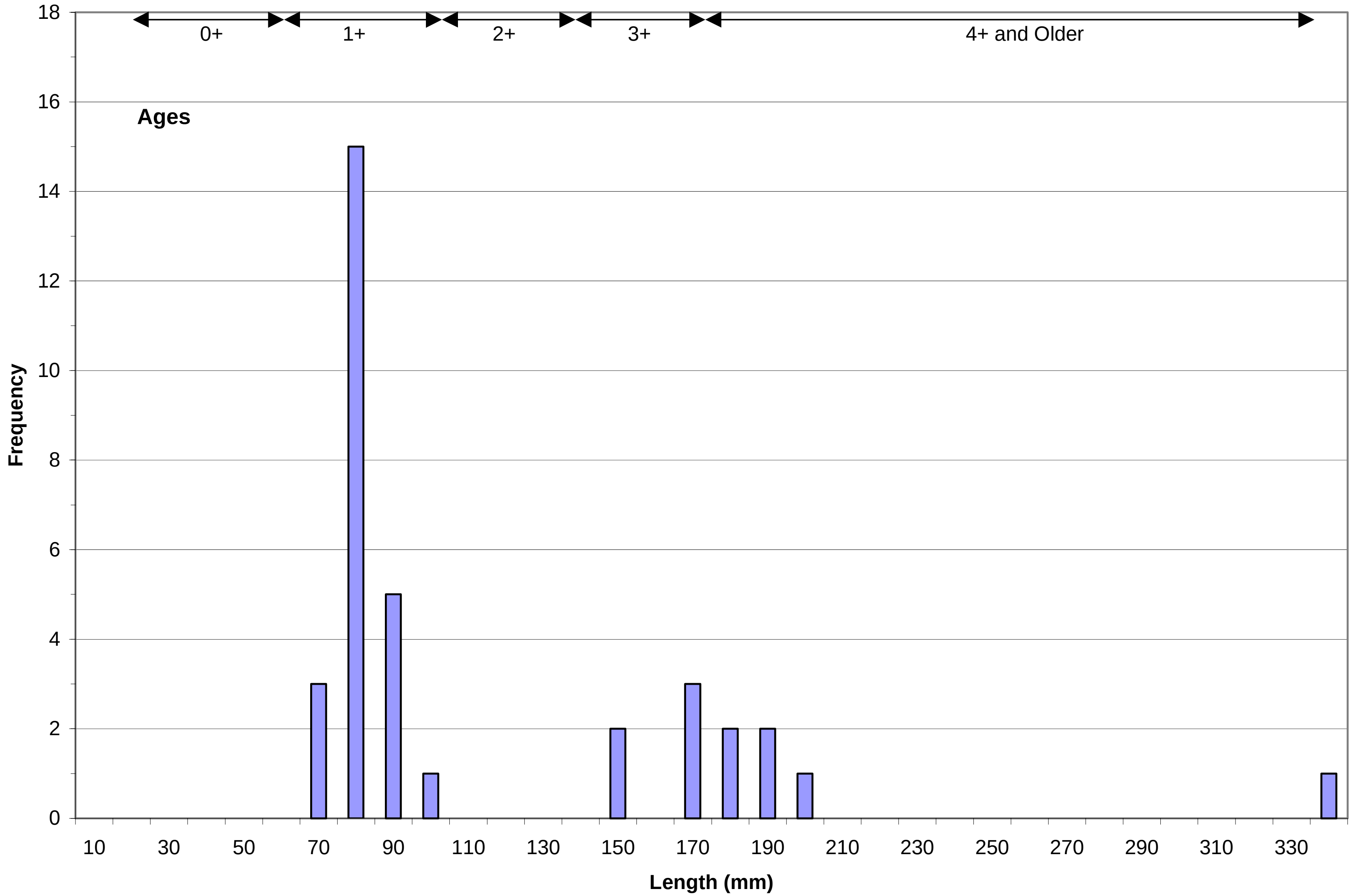
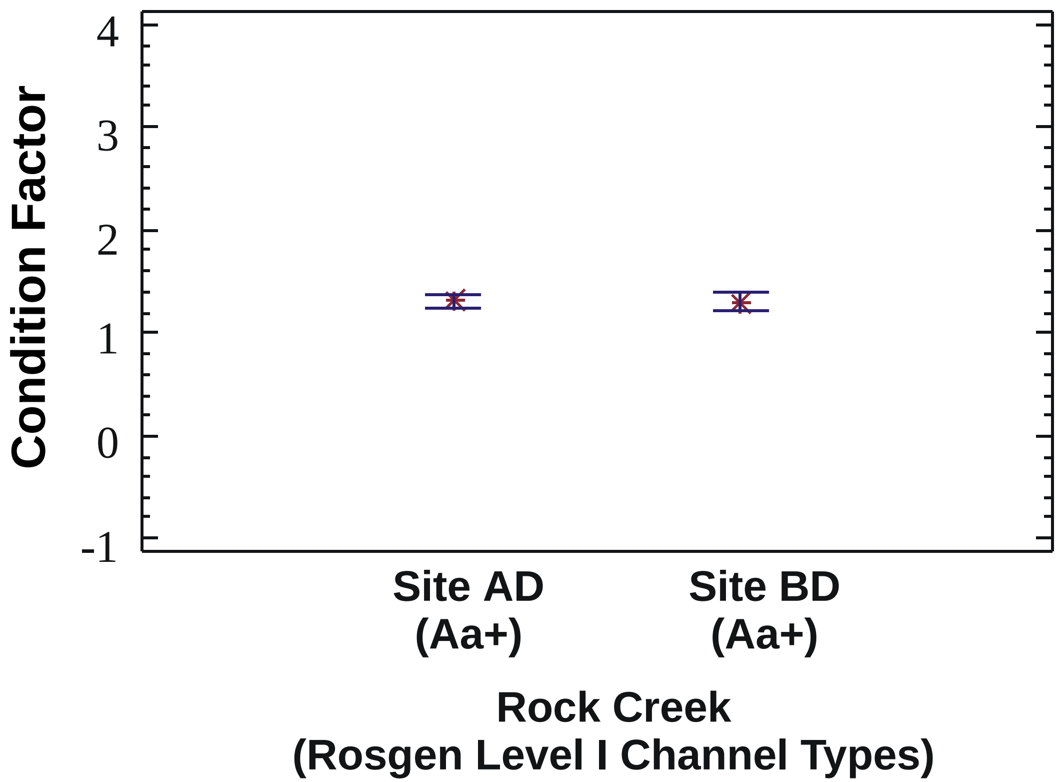
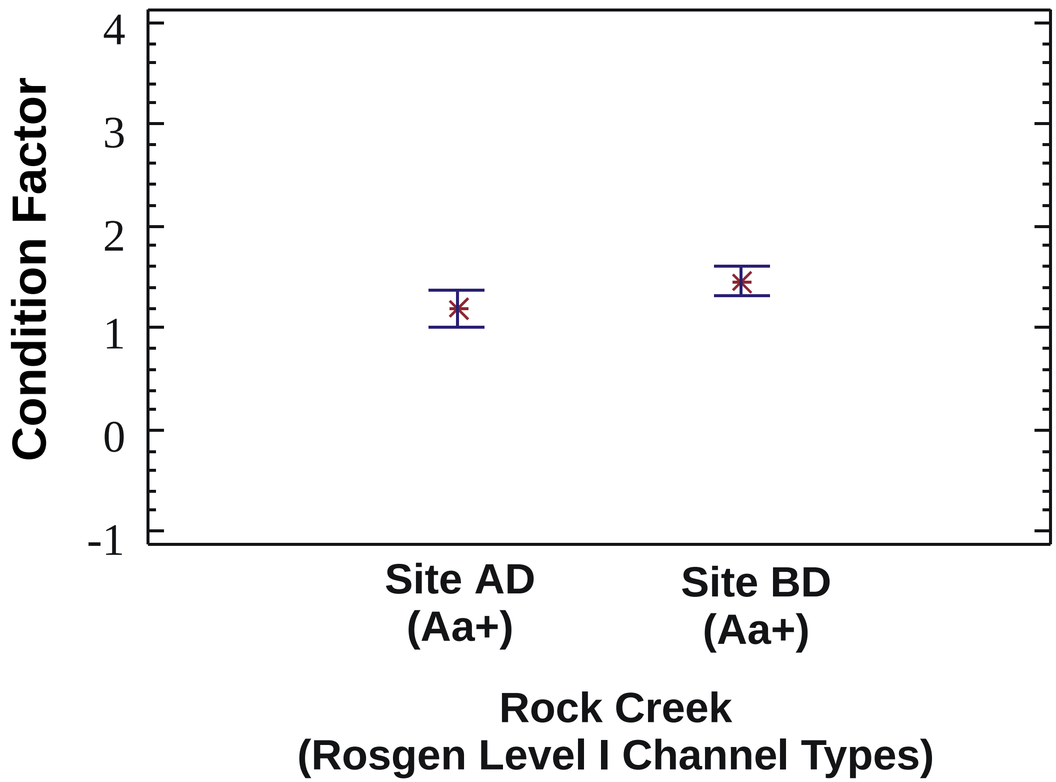


Figure CAWG 7-68. Length Frequency and Age of Rainbow Trout Collected in Rock Creek, Below the Diversion, Rosgen Level I Type Aa+ Channel Site, October 2002 (Number of Fish = 35).



Site/Value	Site AD (Aa+)	Site BD (Aa+)
Upper 95% Limit	1.38	1.39
Mean	1.31	1.30
Lower 95% Limit	1.25	1.20

Figure CAWG 7-69. Brown Trout Condition Factor Means and 95.0 Percent Confidence Intervals (pooled variance) for Above Diversion (AD) Rosgen Level I Type Aa+ Channel Site and Below Diversion (BD) Rosgen Level I Type Aa+ Channel Site for Rock Creek, 2002.



Site/Value	Site AD (Aa+)	Site BD (Aa+)
Upper 95% Limit	1.37	1.60
Mean	1.19	1.46
Lower 95% Limit	1.01	1.31

Figure CAWG 7-70. Rainbow Trout Condition Factor Means and 95.0 Percent Confidence Intervals (pooled variance) for Above Diversion (AD) Rosgen Level I Type Aa+ Channel Site and Below Diversion (BD) Rosgen Level I Type Aa+ Channel Site for Rock Creek, 2002.

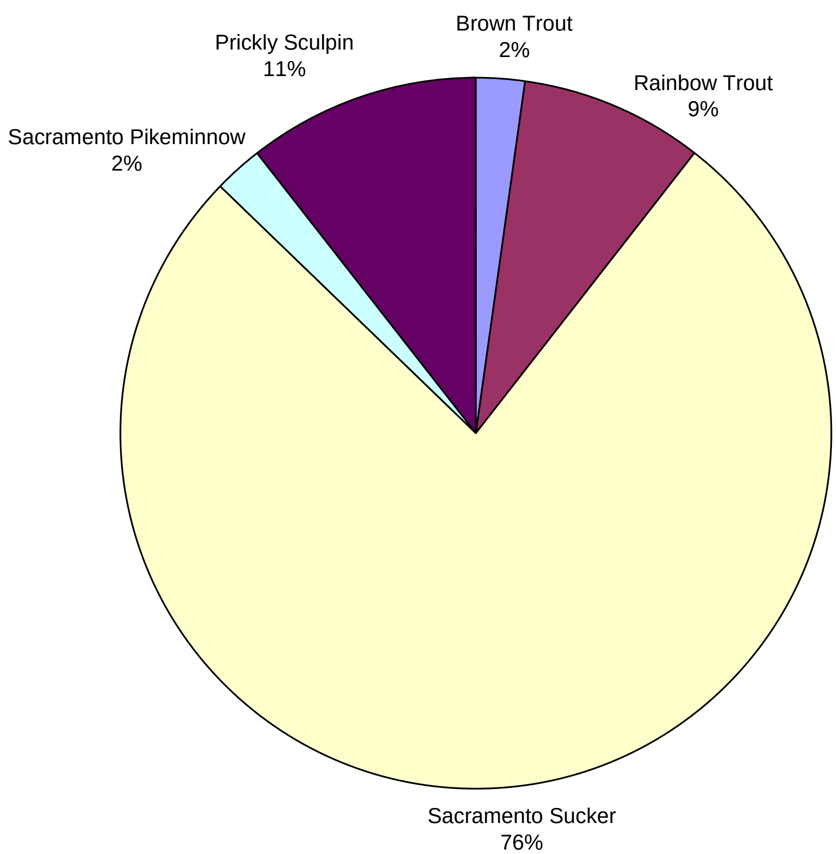


Figure CAWG-7-71. Composition of Fish Species Collected in the San Joaquin River Stevenson Reach, Upper Site, Rosgen Level I G Channel Site, August 2002 (Number of Fish = 93, does not include one unidentified cyprinid).

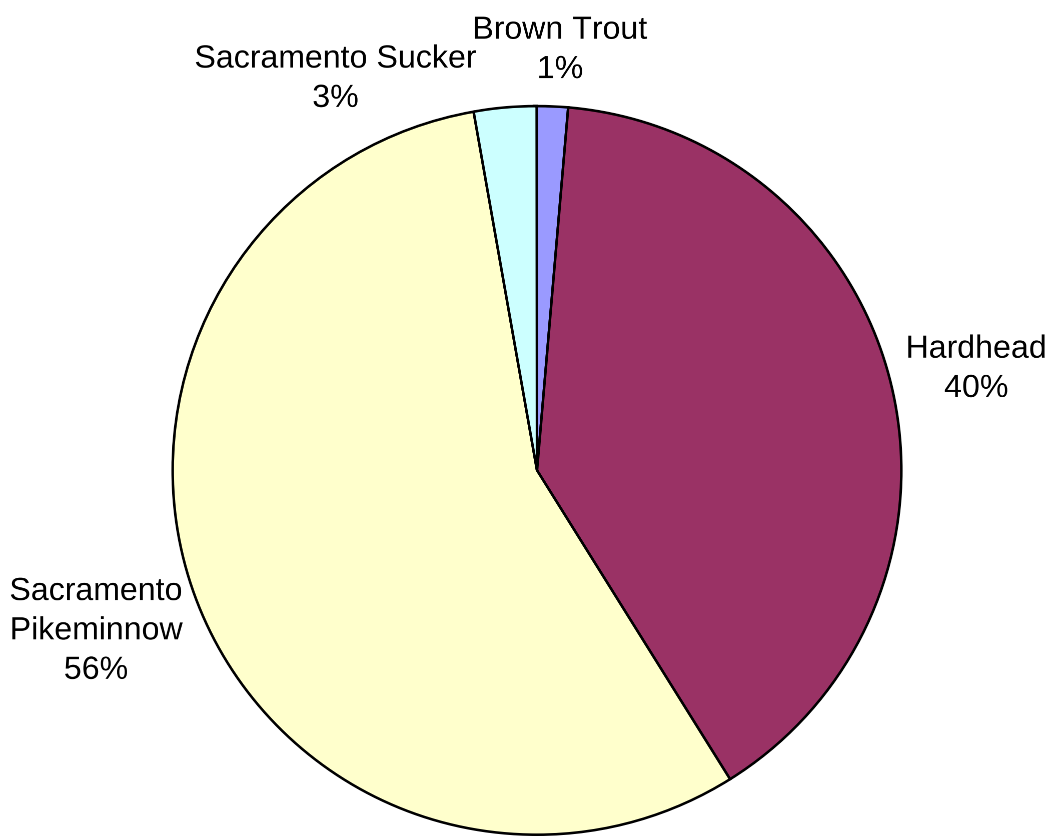


Figure CAWG 7-72. Composition of Fish Species Collected in the San Joaquin River Stevenson Reach, Lower Site, Rosgen Level I Type G Channel Site, August 2002 (Number of Fish = 123, does not include 71 unidentified cyprinids).

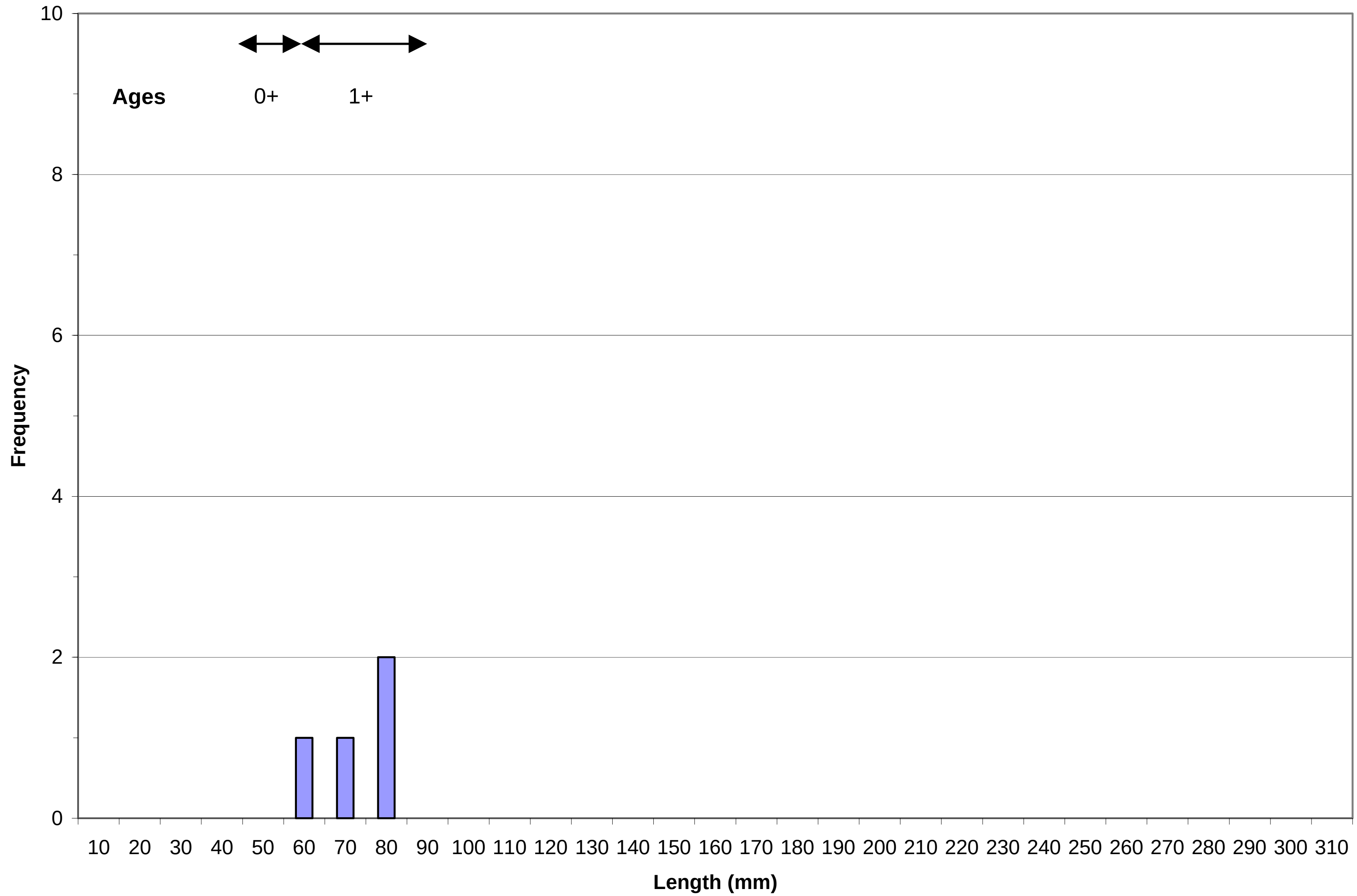


Figure CAWG 7-73. Length Frequency of Rainbow Trout Collected in the San Joaquin Stevenson Reach, Upper Site, Rosgen Level I Type G Channel Site, Electrofishing, August 2002 (Number of Fish = 4).

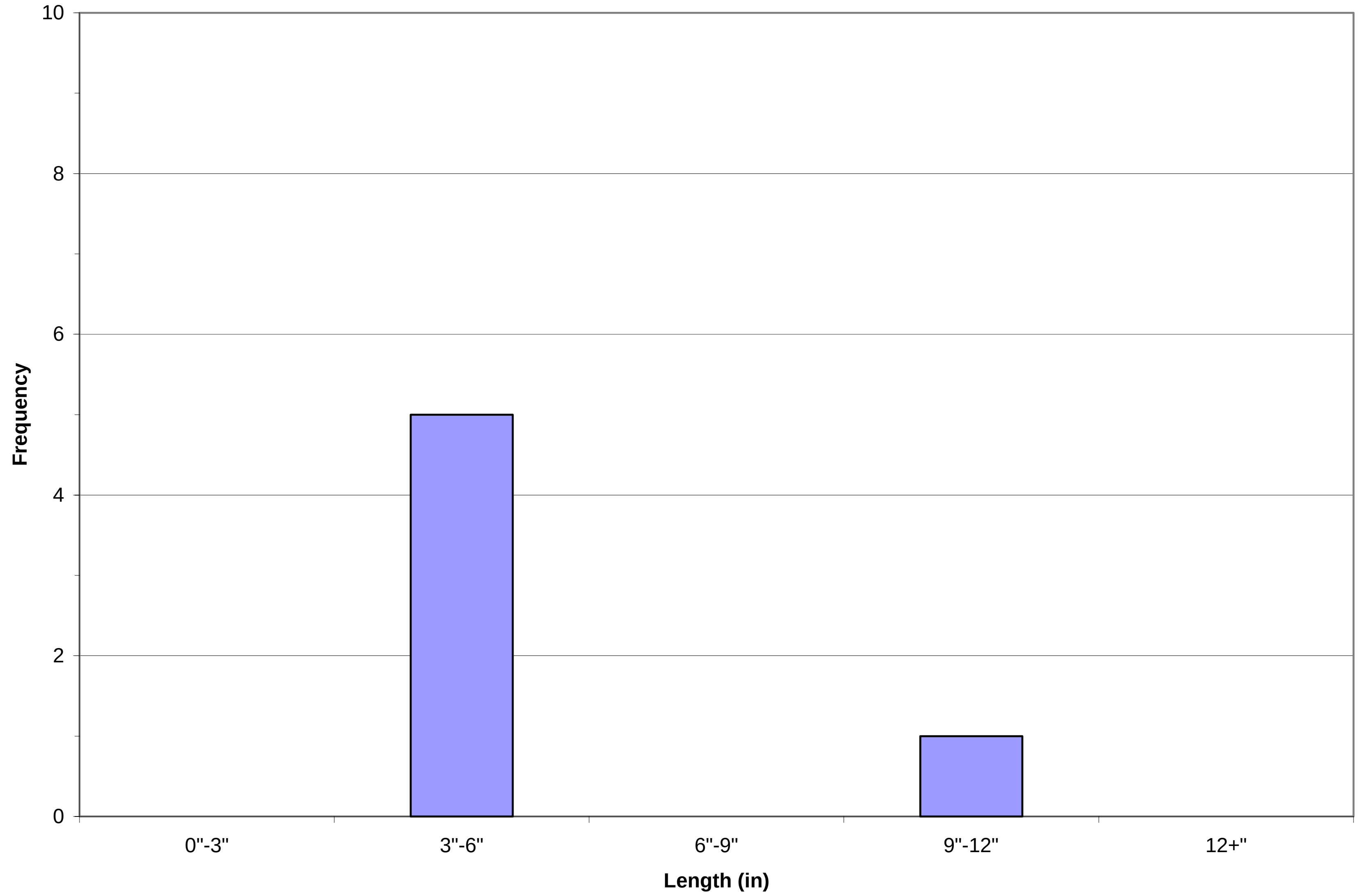


Figure CAWG 7-74. Length Frequency of Rainbow Trout Observed in the San Joaquin River Stevenson Reach, Upper Site, Rosgen Level I Type G Channel Site, Snorkel Survey, August 2002 (Number of Fish = 6).

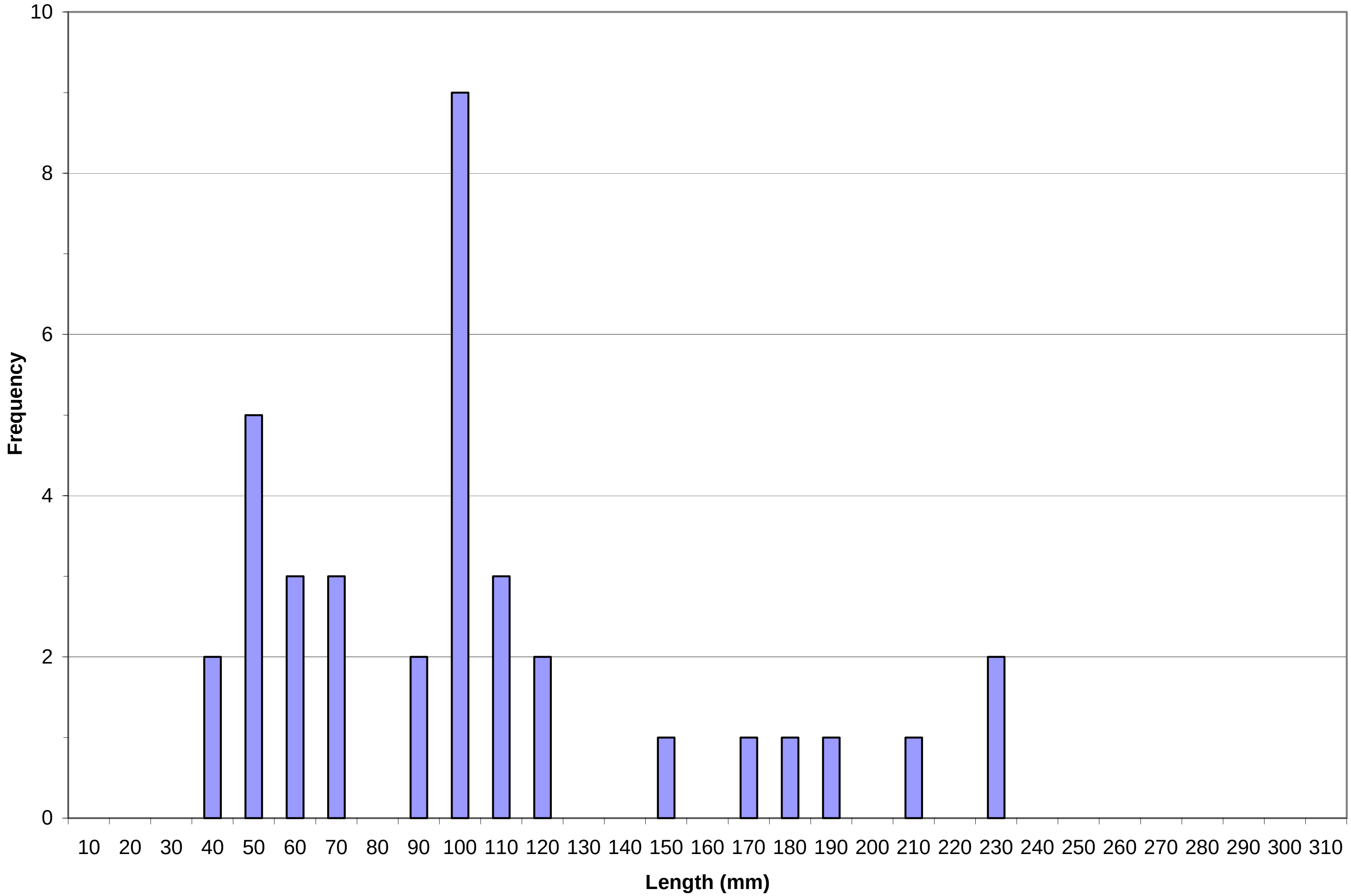


Figure CAWG 7-75. Length Frequency of Sacramento Sucker Collected in the San Joaquin River Stevenson Reach, Upper Site, Rosgen Level I Type G Channel Site, Electrofishing, August 2002 (Number of Fish = 36).

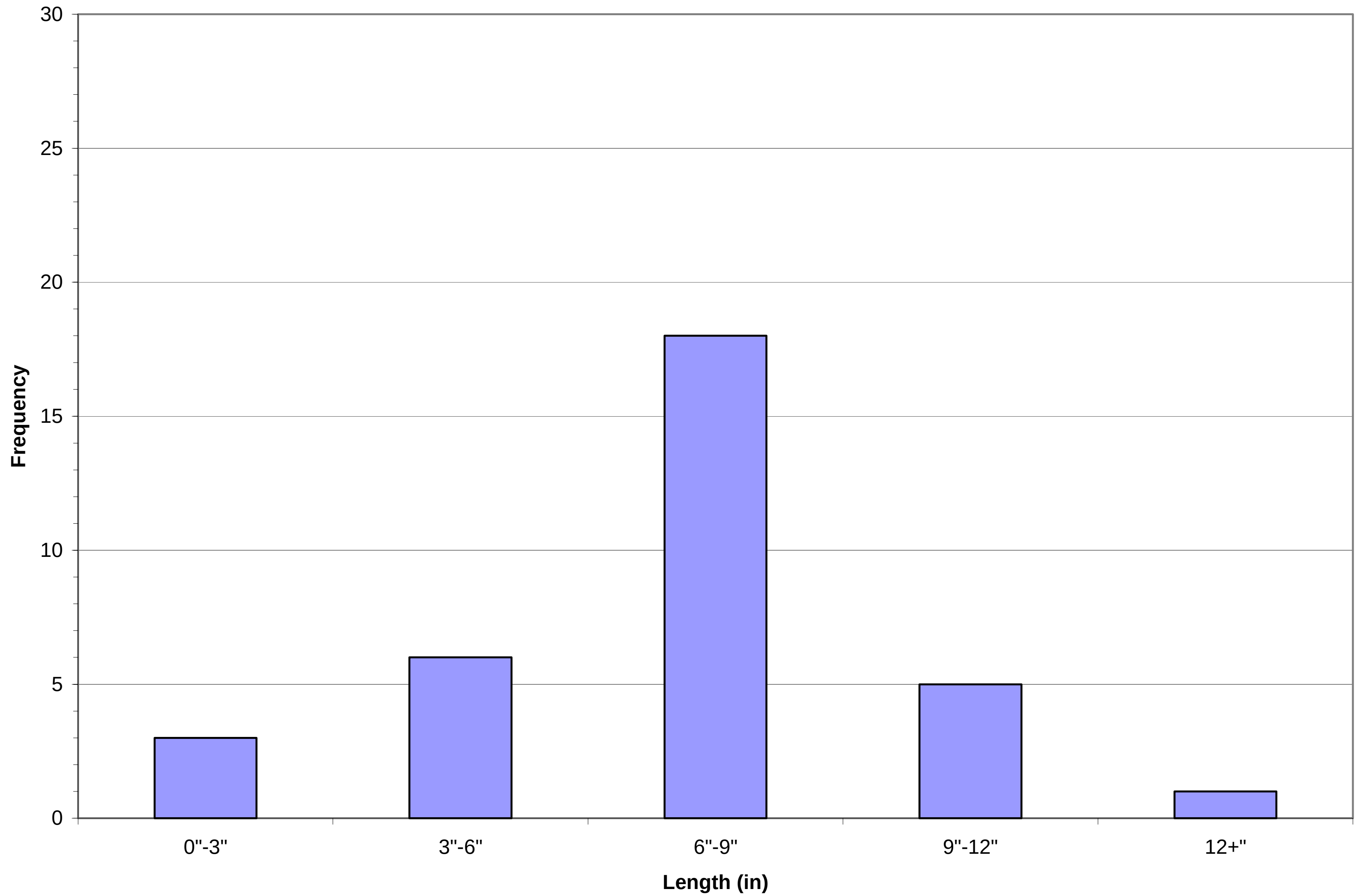


Figure CAWG 7-76. Length Frequency of Sacramento Sucker Observed in the San Joaquin River Stevenson Reach, Upper Site, Rosgen Level I Type G Channel Site, Snorkel Survey, August 2002 (Number of Fish = 33).

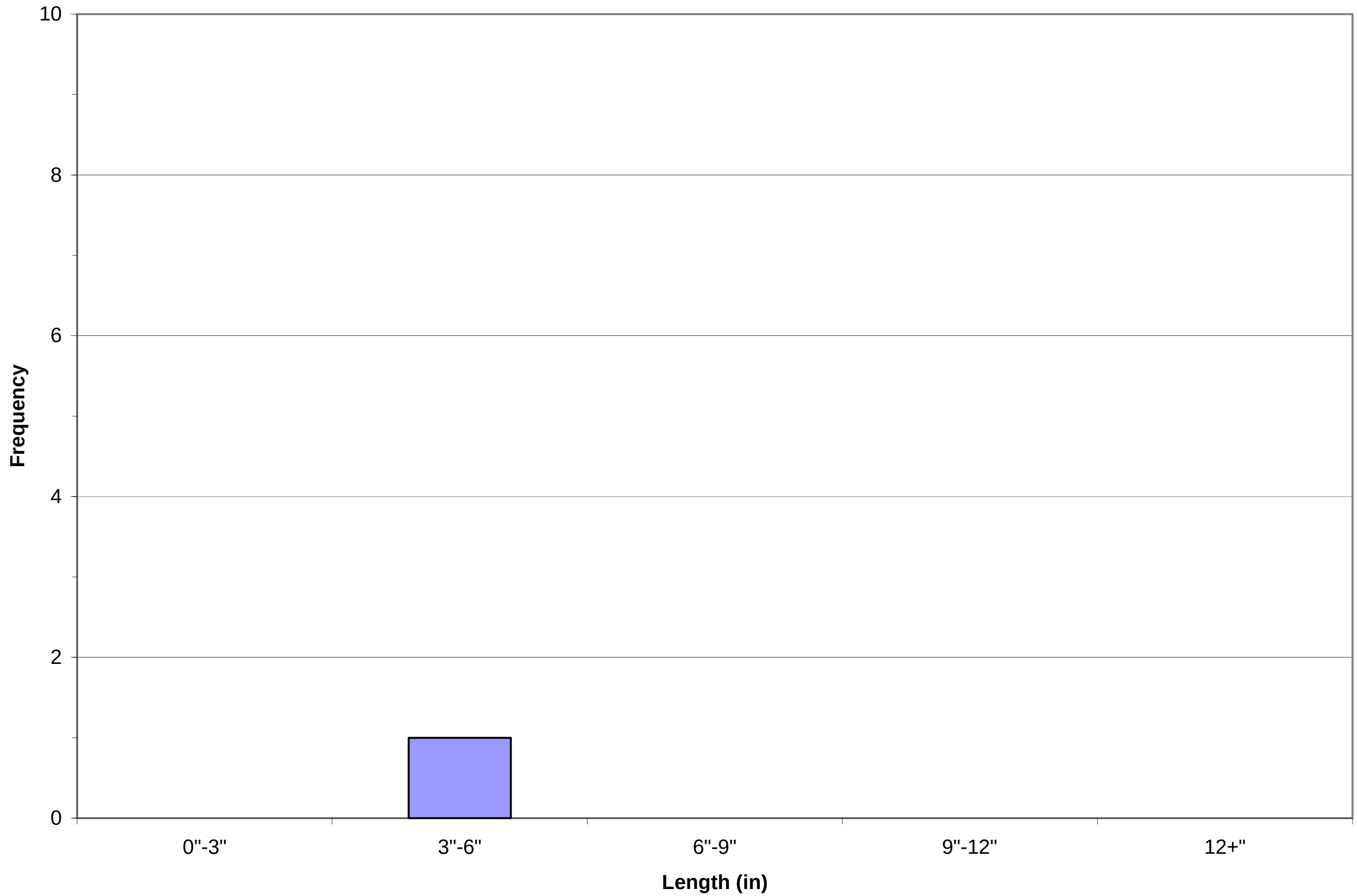


Figure CAWG 7-77. Length Frequency of Sacramento Pikeminnow Observed in the San Joaquin River Stevenson Reach, Upper Site, Rosgen Level I Type G Channel Site, Snorkel Survey, August 2002 (Number of Fish = 1).

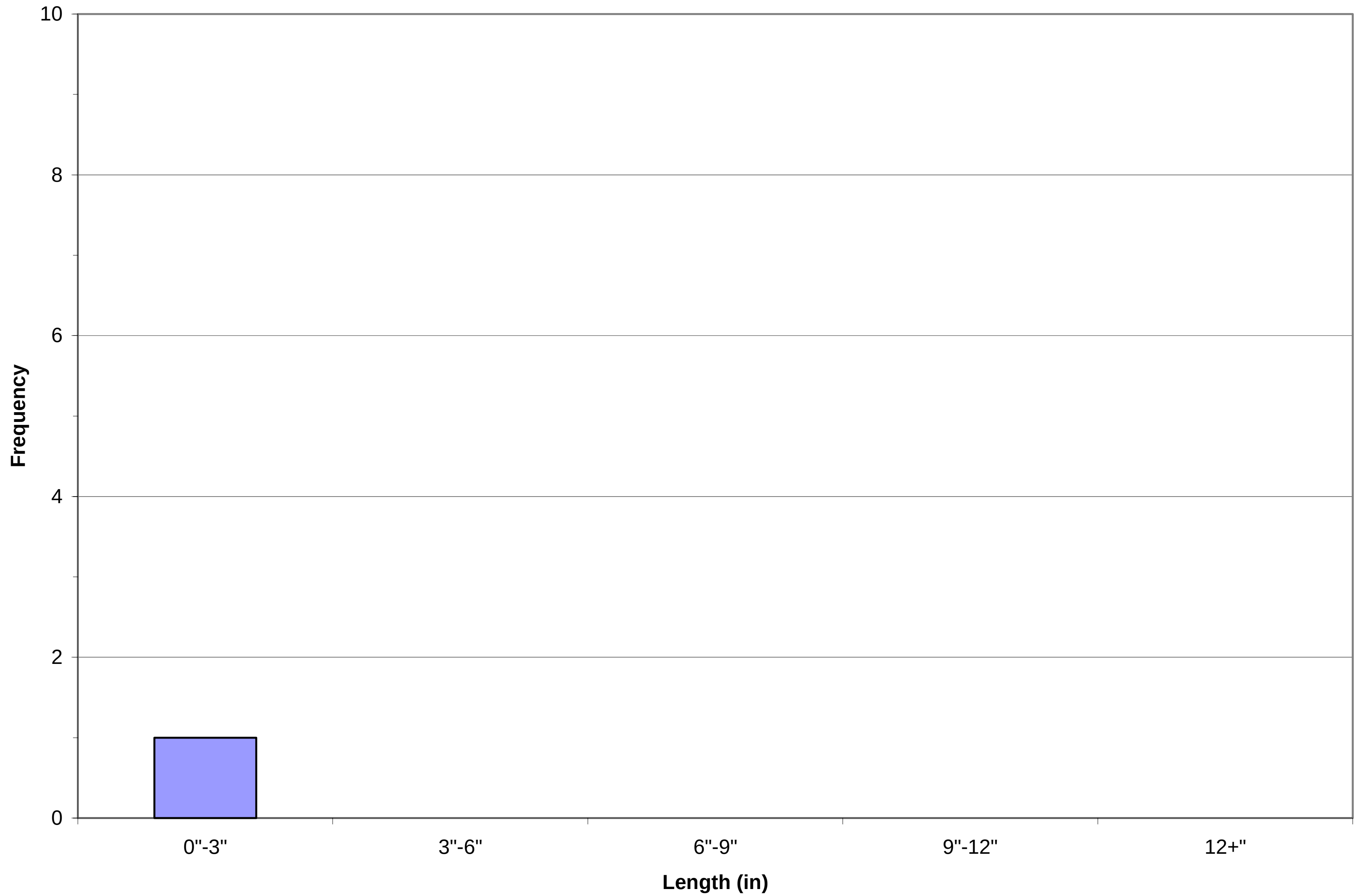


Figure CAWG 7-78. Length Frequency of Unidentified Cyprinid (see text) Observed in the San Joaquin River Stevenson Reach, Upper Site, Rosgen Level I Type G Channel Site, Snorkel Survey, August 2002 (Number of Fish = 1).

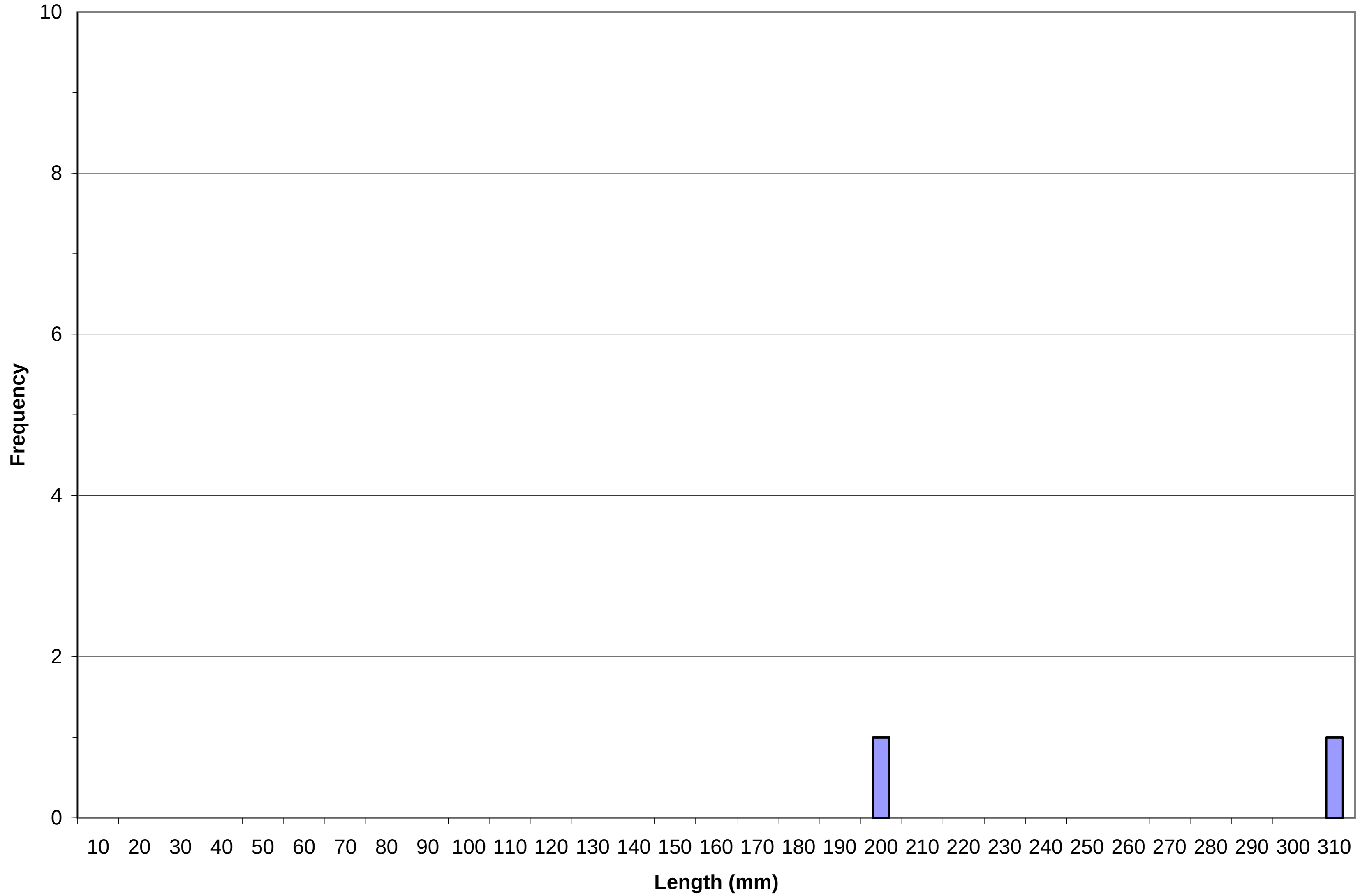


Figure CAWG 7-79. Length Frequency of Sacramento Sucker Collected in the San Joaquin River Stevenson Reach, Lower Site, Rosgen Level I Type G Channel Site, Electrofishing, August 2002 (Number of Fish = 2).

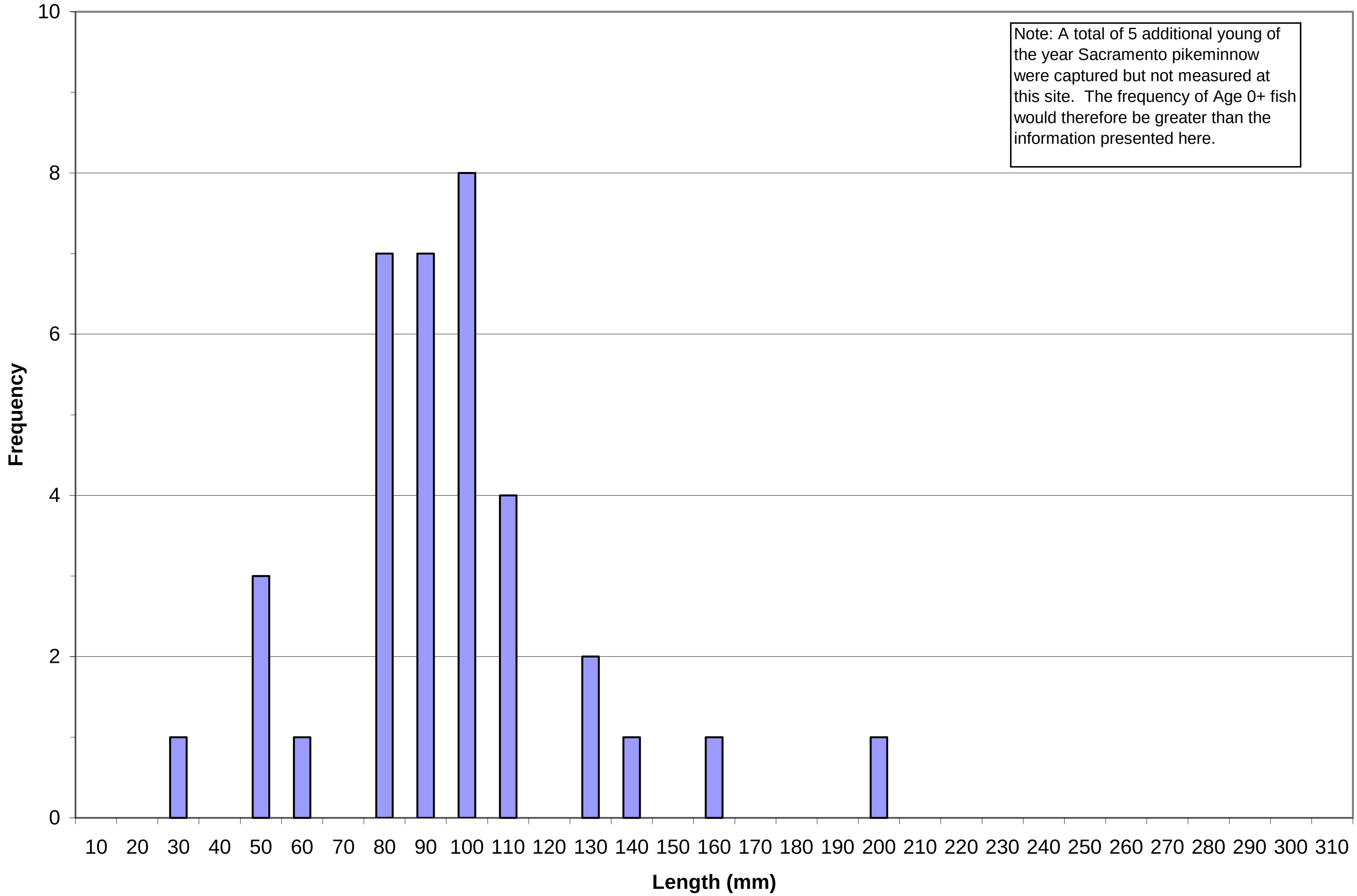


Figure CAWG 7-80. Length Frequency of Sacramento Pikeminnow Collected in the San Joaquin River Stevenson Reach, Lower Site, Rosgen Level I Type G Channel Site, Electrofishing, August 2002 (Number of fish = 36).

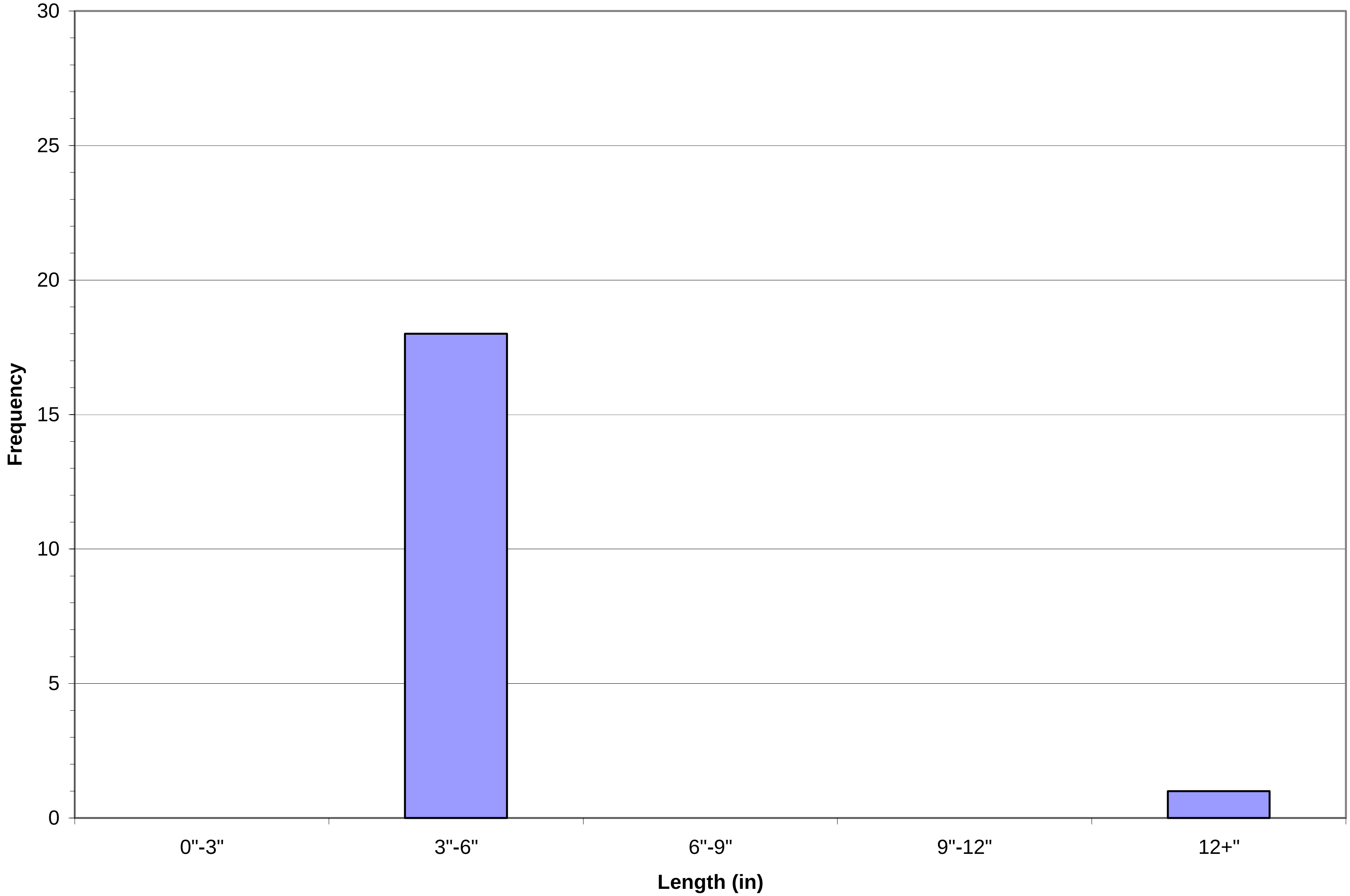


Figure CAWG 7-81. Length Frequency of Sacramento Pikeminnow Observed in the San Joaquin River Stevenson Reach, Lower Site, Rosgen Level I Type G Channel Site, Snorkel Survey, August 2002 (Number of Fish = 19).

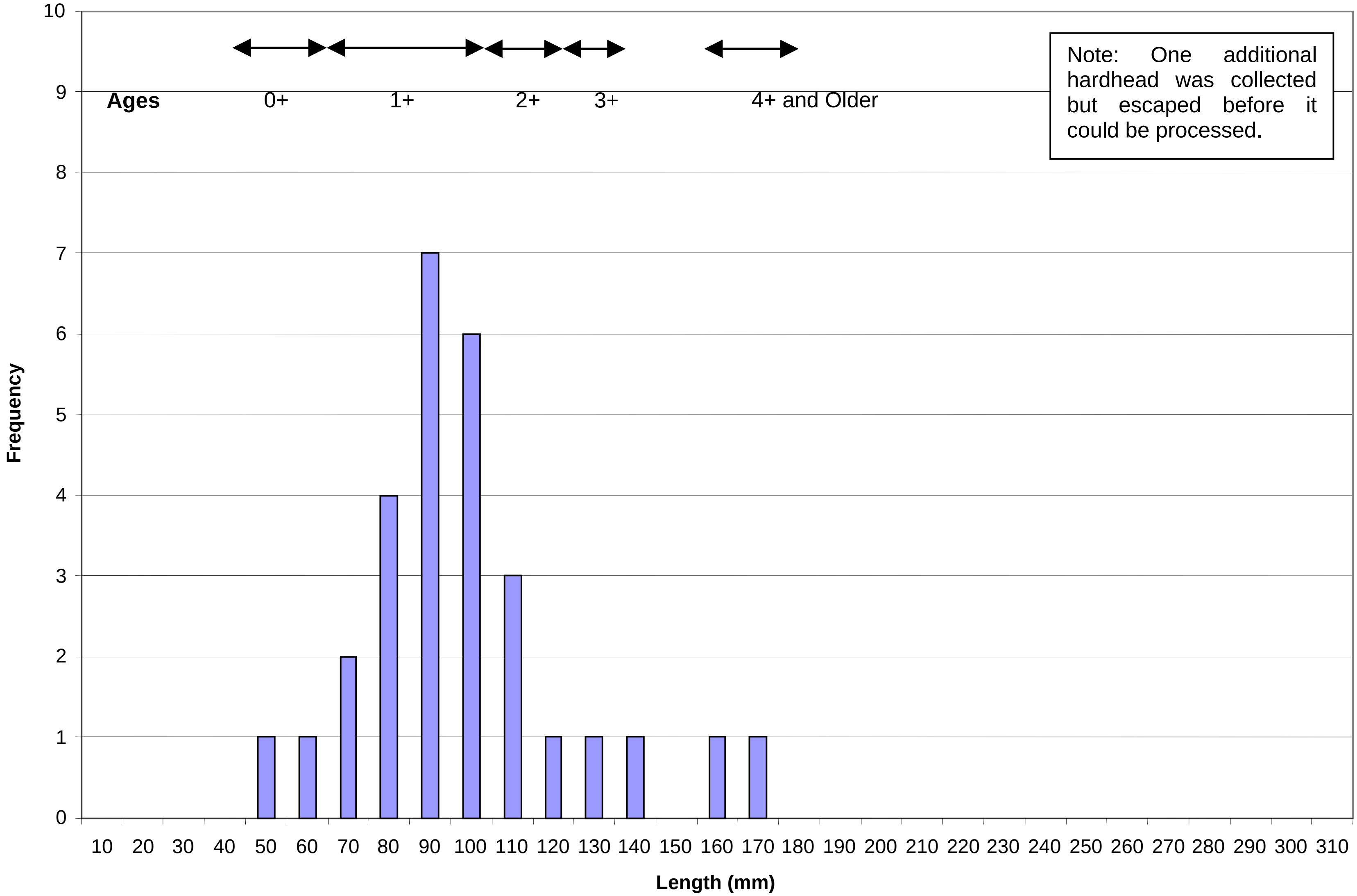


Figure CAWG 7-82. Length Frequency of Hardhead Observed in the San Joaquin River Stevenson Reach, Lower Site, Rosgen Level I Type G Channel Site, August 2002 (Number of Fish = 29).

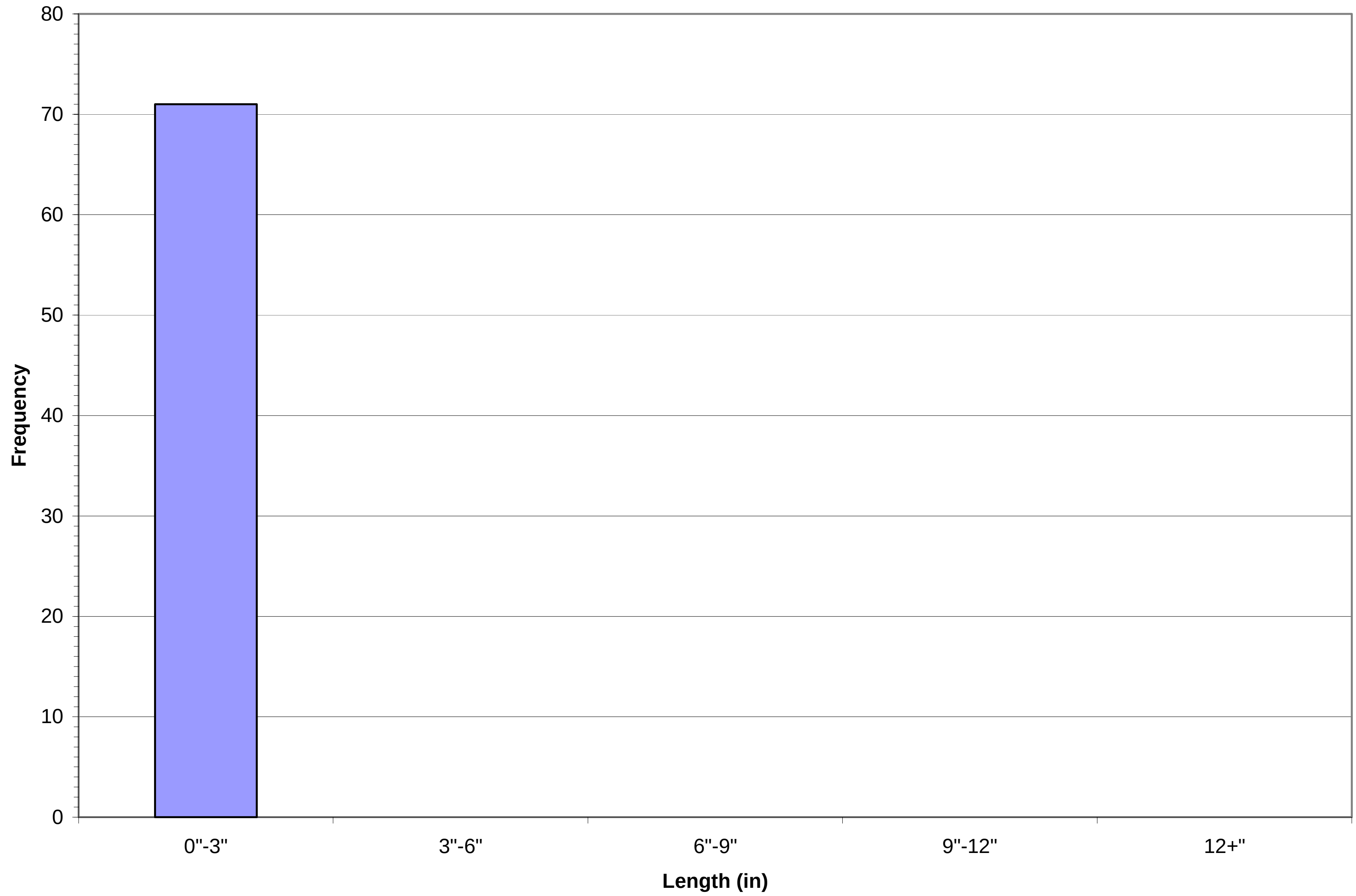


Figure CAWG 7-83. Length Frequency of Unidentified Cyprinids (see text) Observed in the San Joaquin River Stevenson Reach, Lower Site, Rosgen Level I Type G Channel Site, Snorkel Survey, August 2002 (Number of Fish = 71).

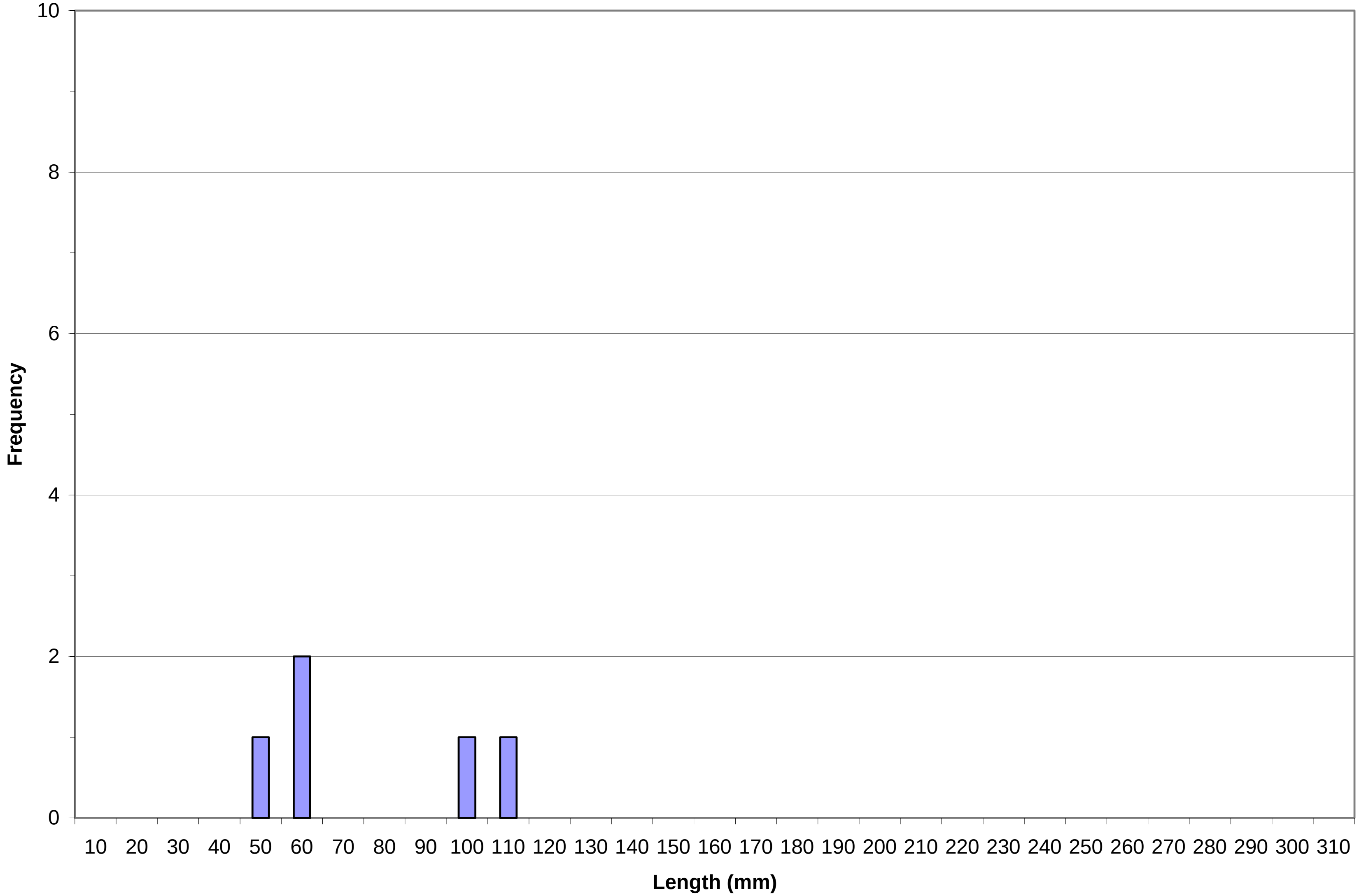


Figure CAWG 7-84. Length Frequency of Prickly Sculpin Collected in the San Joaquin River Stevenson Reach, Upper Site, Rosgen Level I Type G Channel Site, Electrofishing, August 2002 (Number of fish = 5).

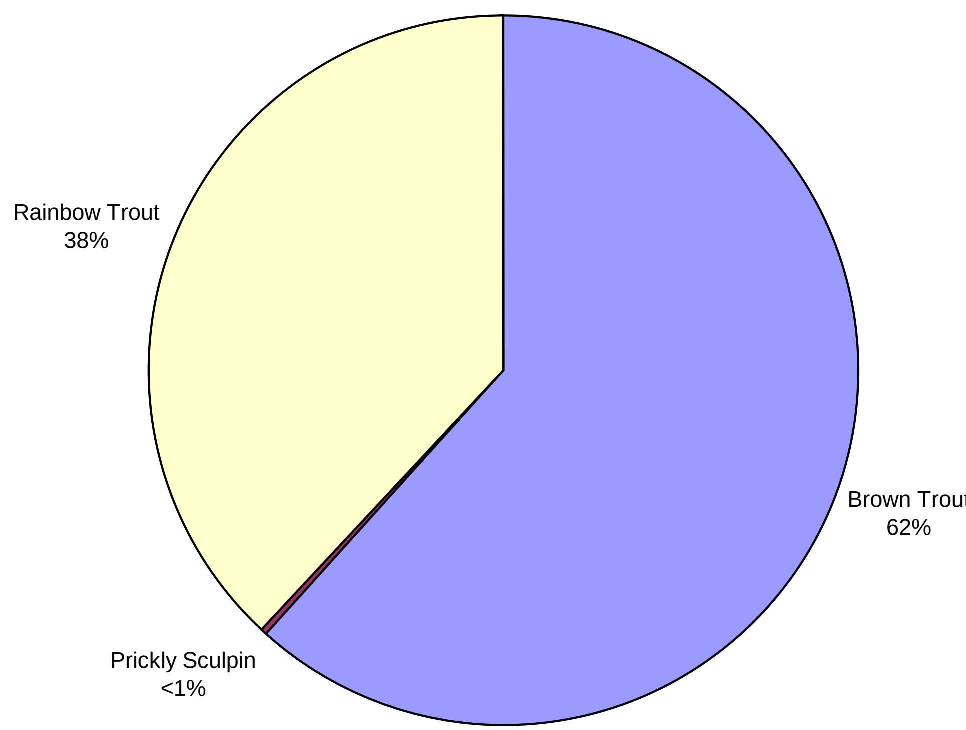


Figure CAWG 7-85. Composition of Fish Species Collected in Big Creek, All Sites, October 2002 (Number of Fish = 409).

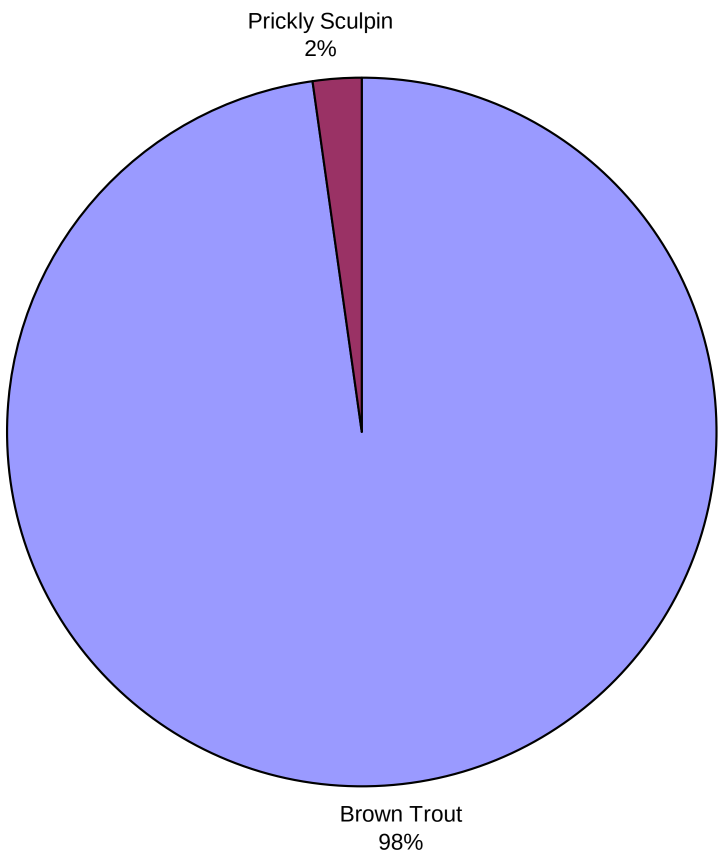


Figure CAWG 7-86. Composition of Fish Species Collected in Big Creek, Dam 1 to Powerhouse 1, Rosgen Level I Type G Channel Site, October 2002 (Number of Fish = 45).

Note: Only Brown Trout found in Rosgen Level I Type A, Aa+, and B Channel Sites

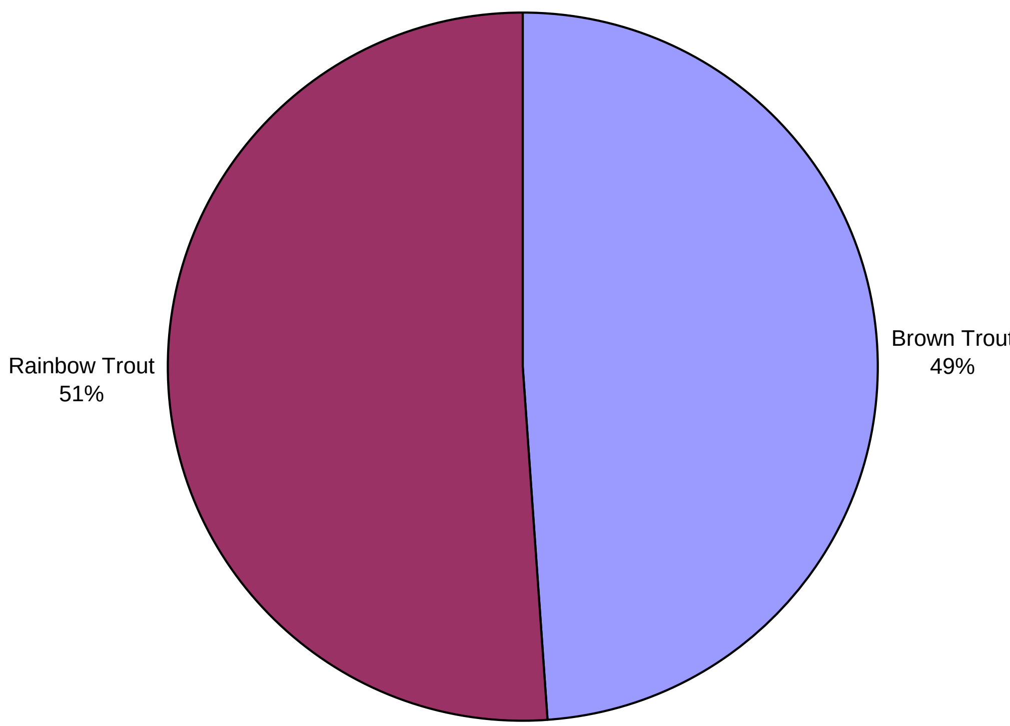


Figure CAWG 7-87. Composition of Fish Species Collected in Big Creek, Dam 4 to Powerhouse 2, Rosgen Level I Type A Channel Site, October 2002 (Number of Fish = 51).

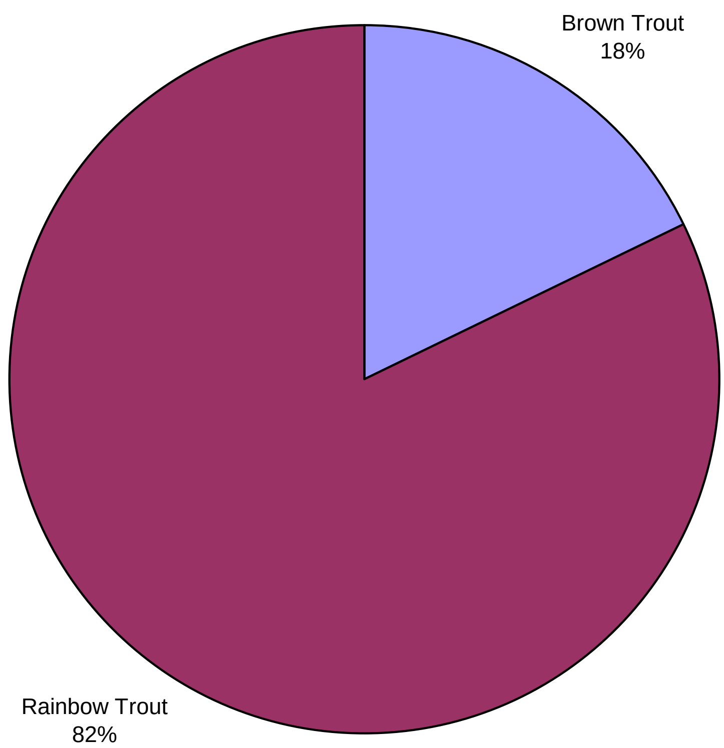


Figure CAWG 7-88. Composition of Fish Species Collected in Big Creek, Dam 5 to Powerhouse 8, Rosgen Level I Type Aa+ Channel Site, October 2002 (Number of Fish = 62).

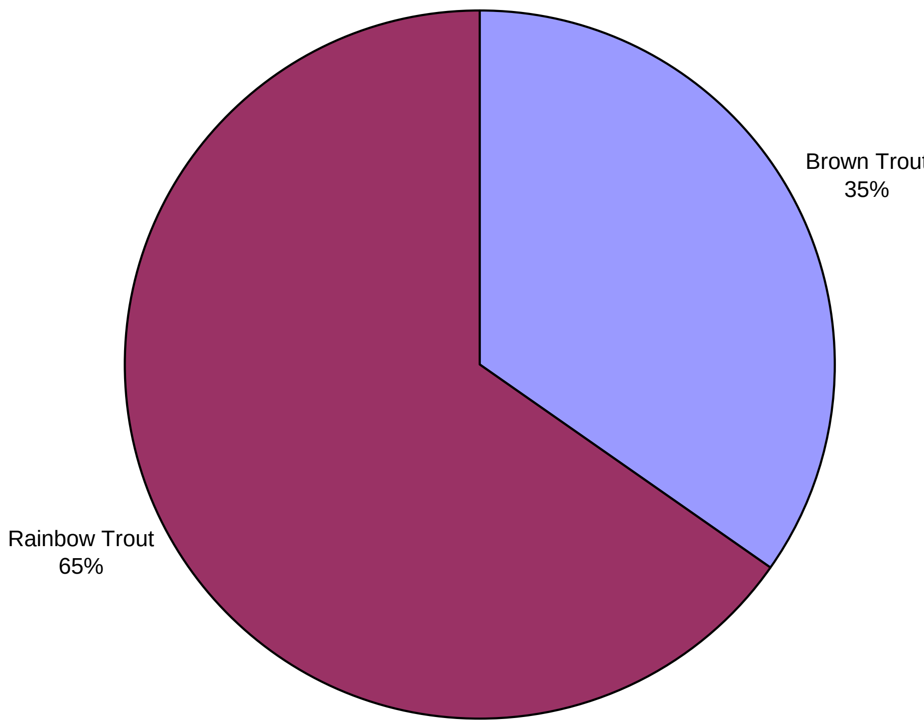


Figure CAWG 7-89. Composition of Fish Species Collected in Big Creek, Dam 5 to Powerhouse 8, Rosgen Level I Type A Channel Site, October 2002 (Number of Fish = 121).

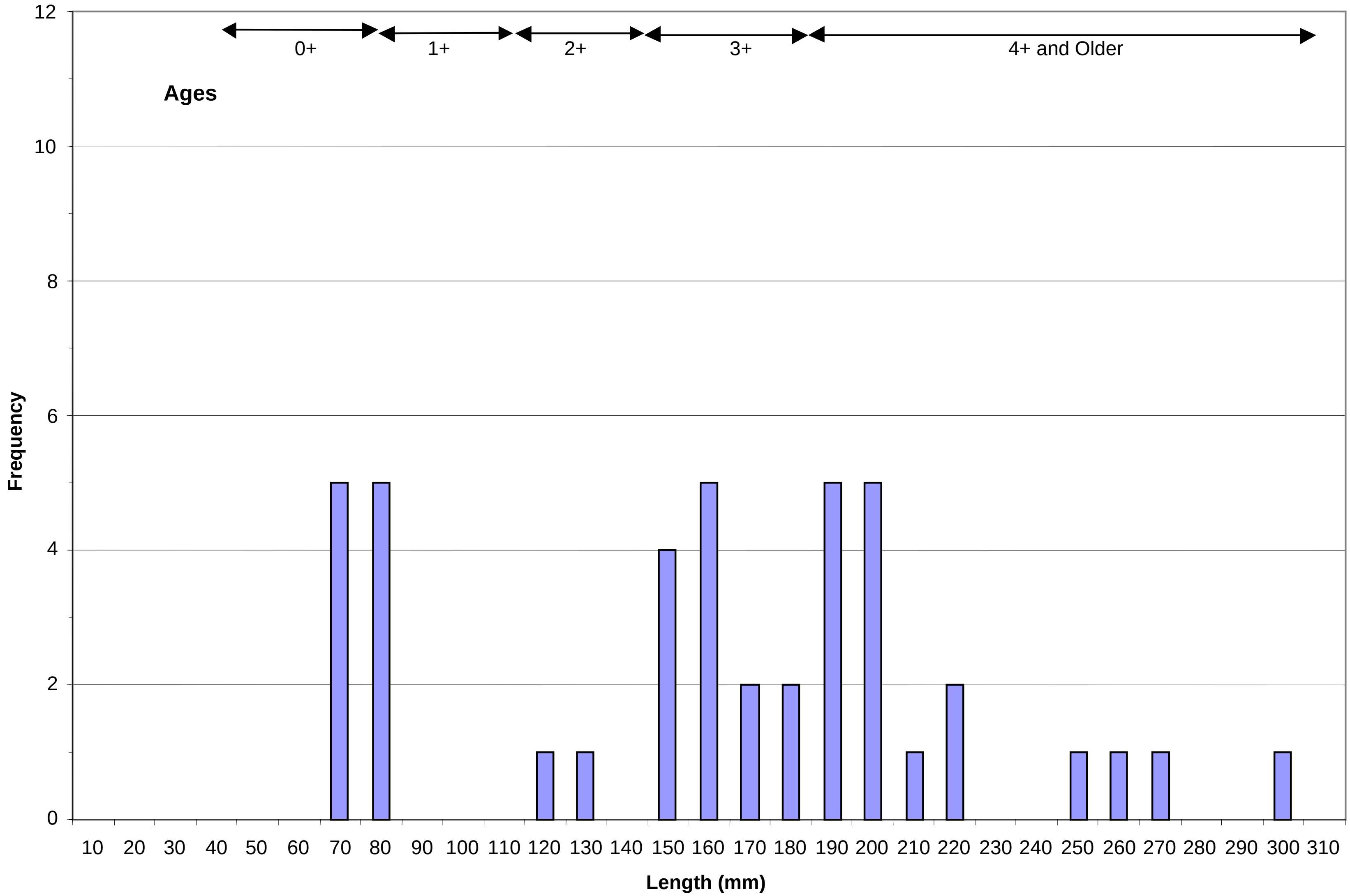


Figure CAWG 7-90. Length Frequency and Age of Brown Trout Collected in Big Creek, Dam 1 to Powerhouse 1, Rosgen Level I Type Aa+ Channel Site, October 2002 (Number of Fish = 42).

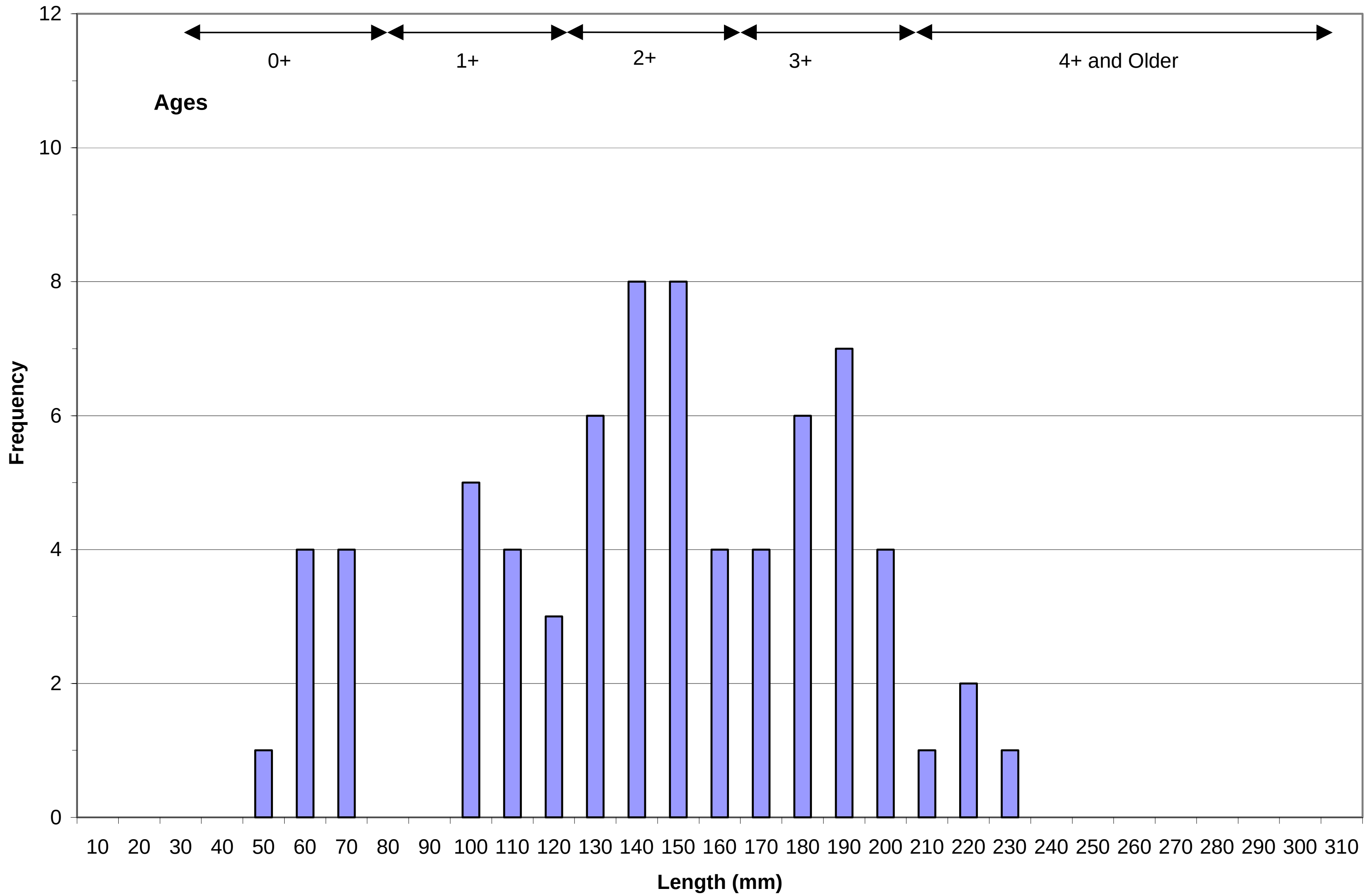


Figure CAWG 7-91. Length Frequency and Age of Brown Trout Collected in Big Creek, Dam 1 to Powerhouse 1, Rosgen Level I Type A Channel Site, October 2002 (Number of Fish = 72).

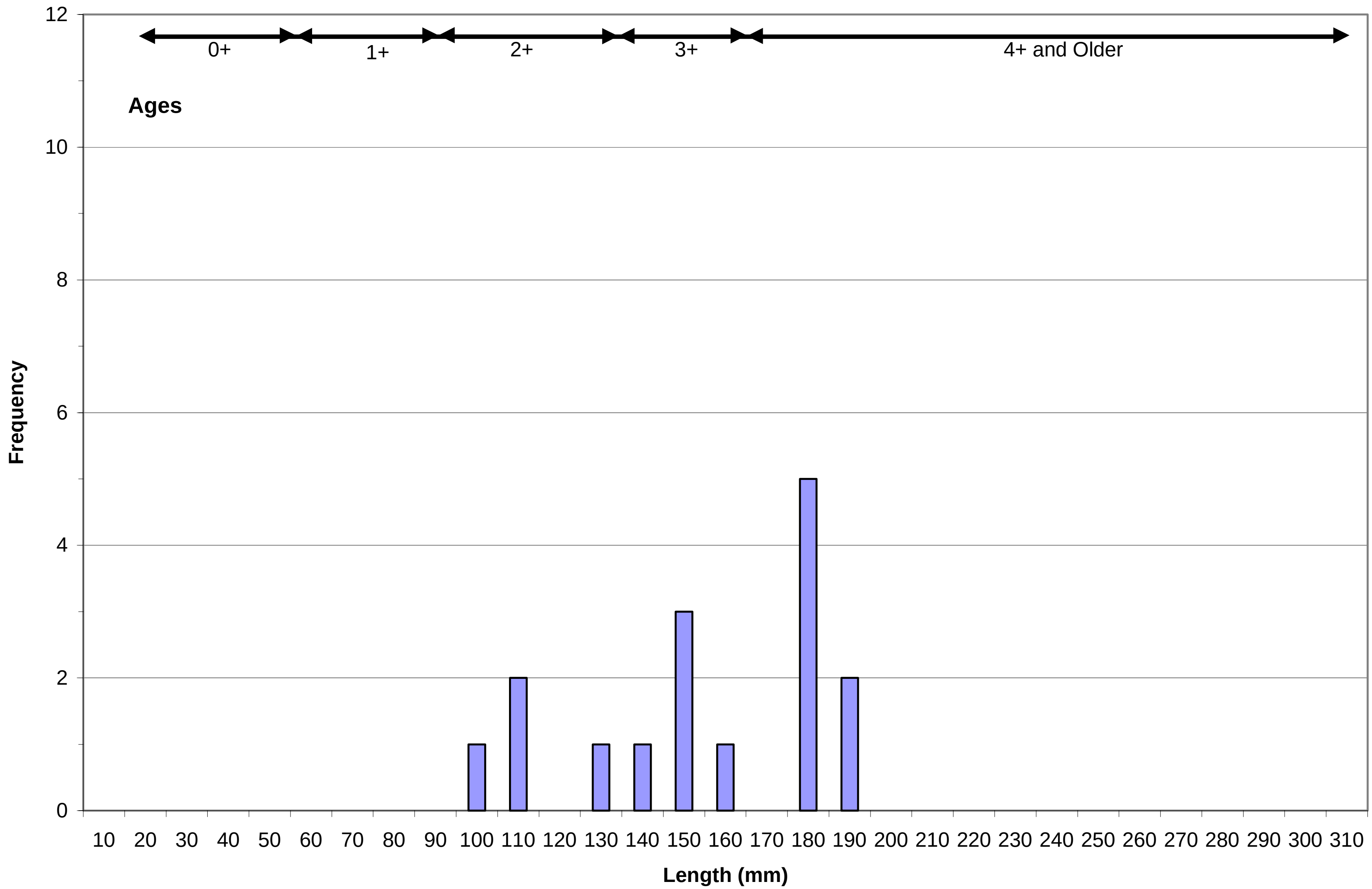


Figure CAWG 7-92. Length Frequency and Age of Brown Trout Collected in Big Creek, Dam 1 to Powerhouse 1, Rosgen Level I Type B Channel Site, October 2002 (Number of Fish = 16).

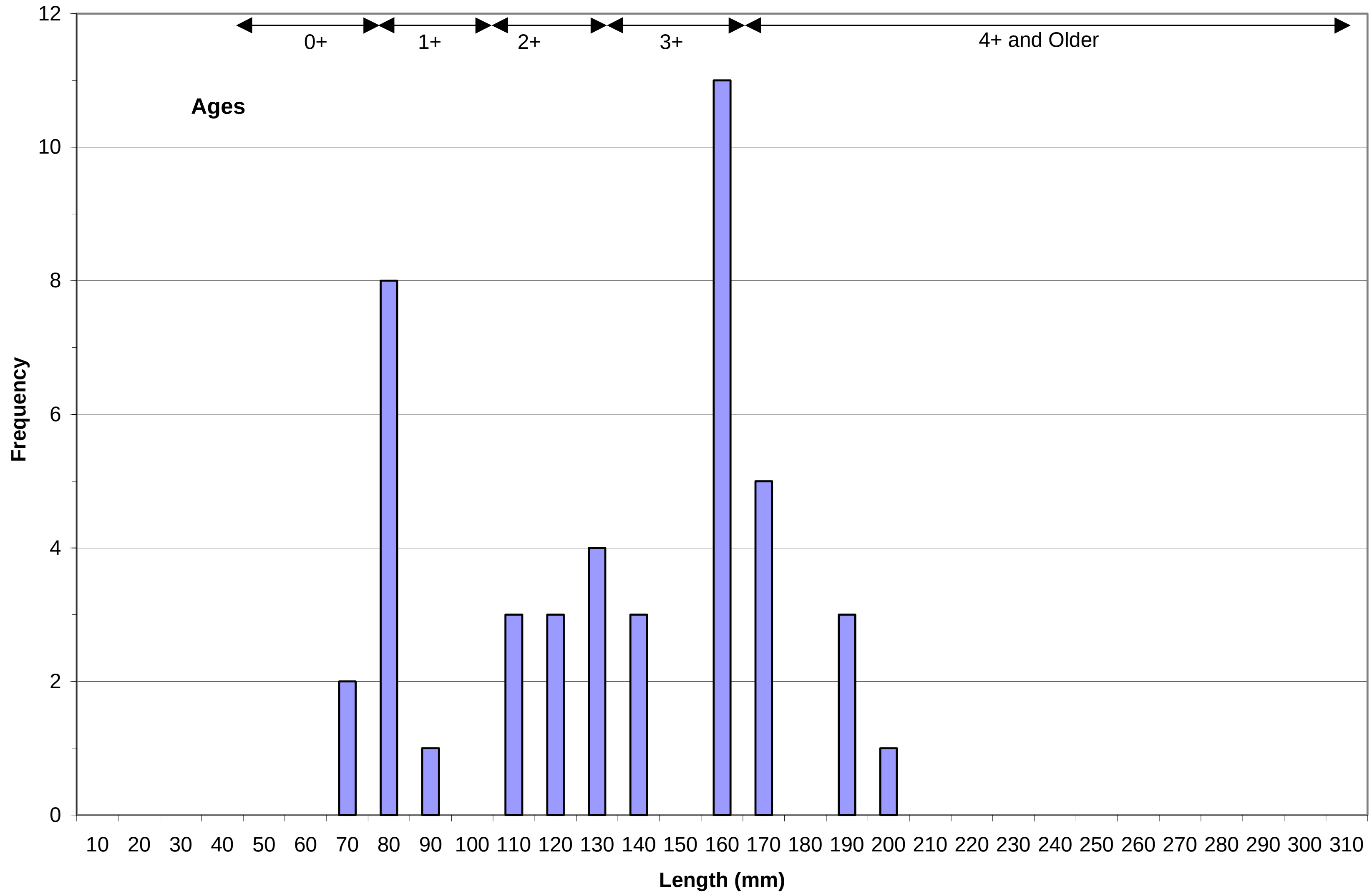


Figure CAWG 7-93. Length Frequency and Age of Brown Trout Collected in Big Creek, Dam 1 to Powerhouse 1, Rosgen Level I Type G Channel Site, October 2002 (Number of Fish = 44).

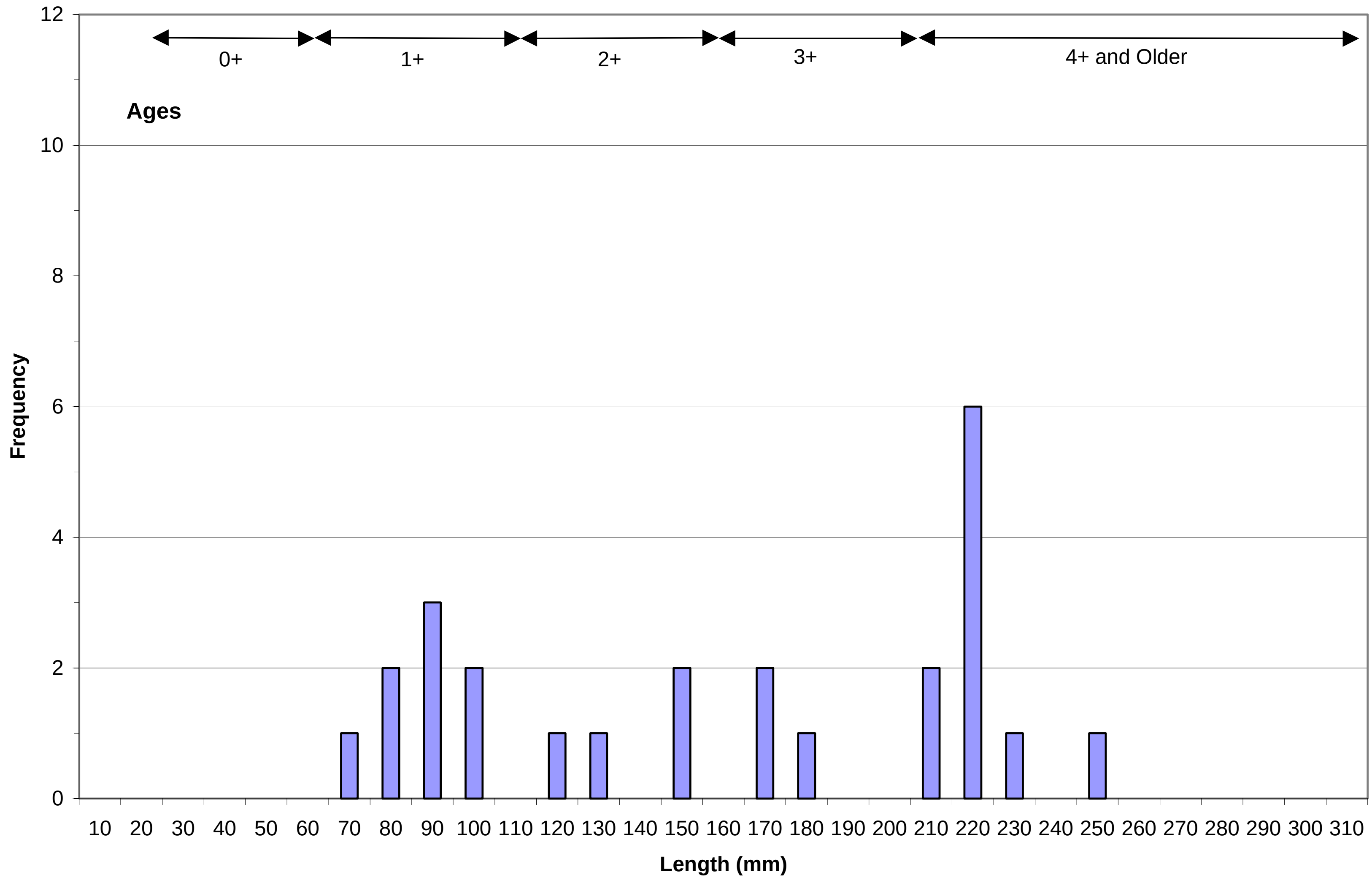


Figure CAWG 7-94. Length Frequency and Age of Brown Trout Collected in Big Creek, Dam 4 to Powerhouse 2, Rosgen Level I Type A Channel Site, October 2002 (Number of Fish = 25).

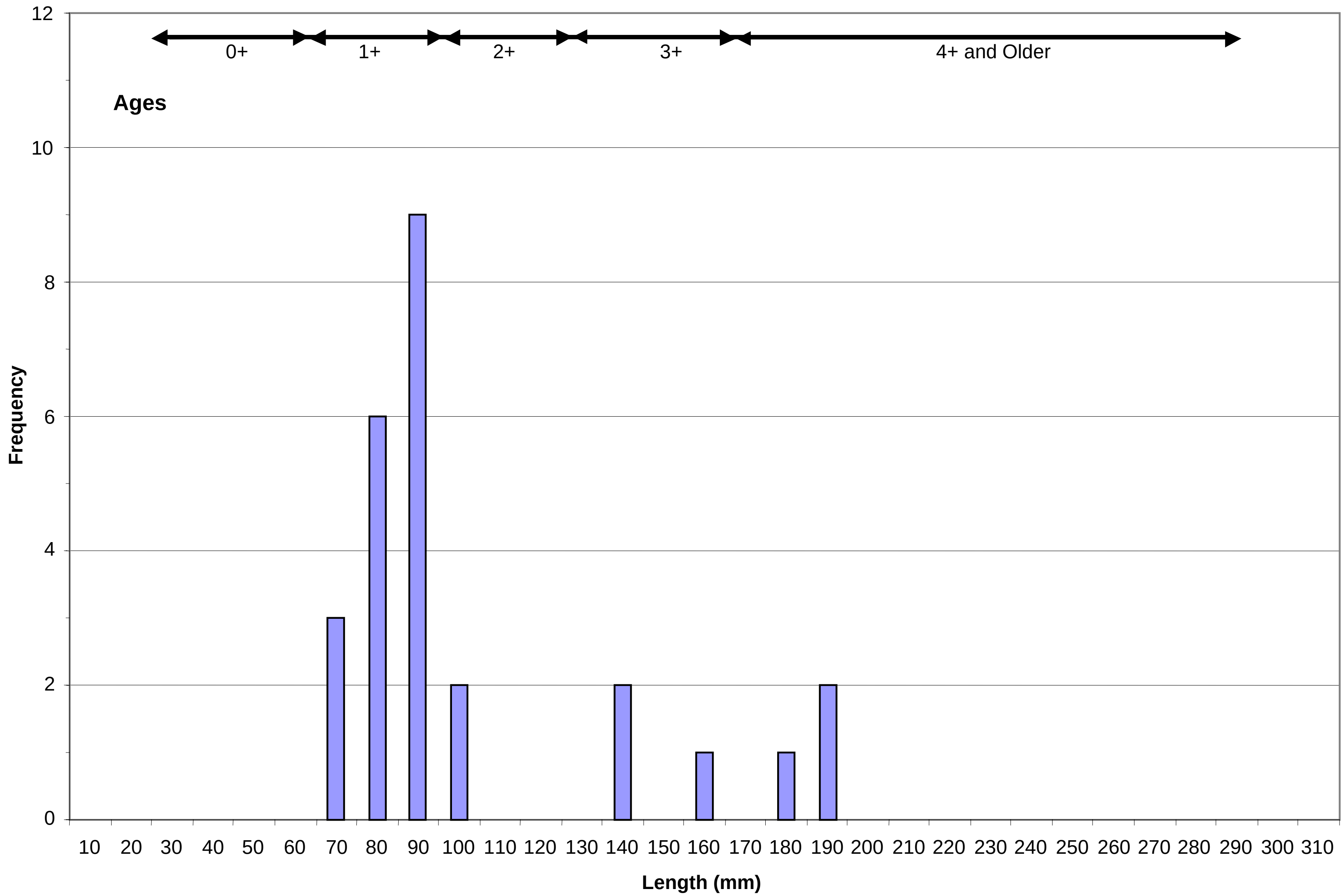


Figure CAWG 7-95. Length Frequency and Age of Rainbow Trout Collected in Big Creek, Dam 4 to Powerhouse 2, Rosgen Level I Type A Channel Site, October 2002 (Number of Fish = 26).

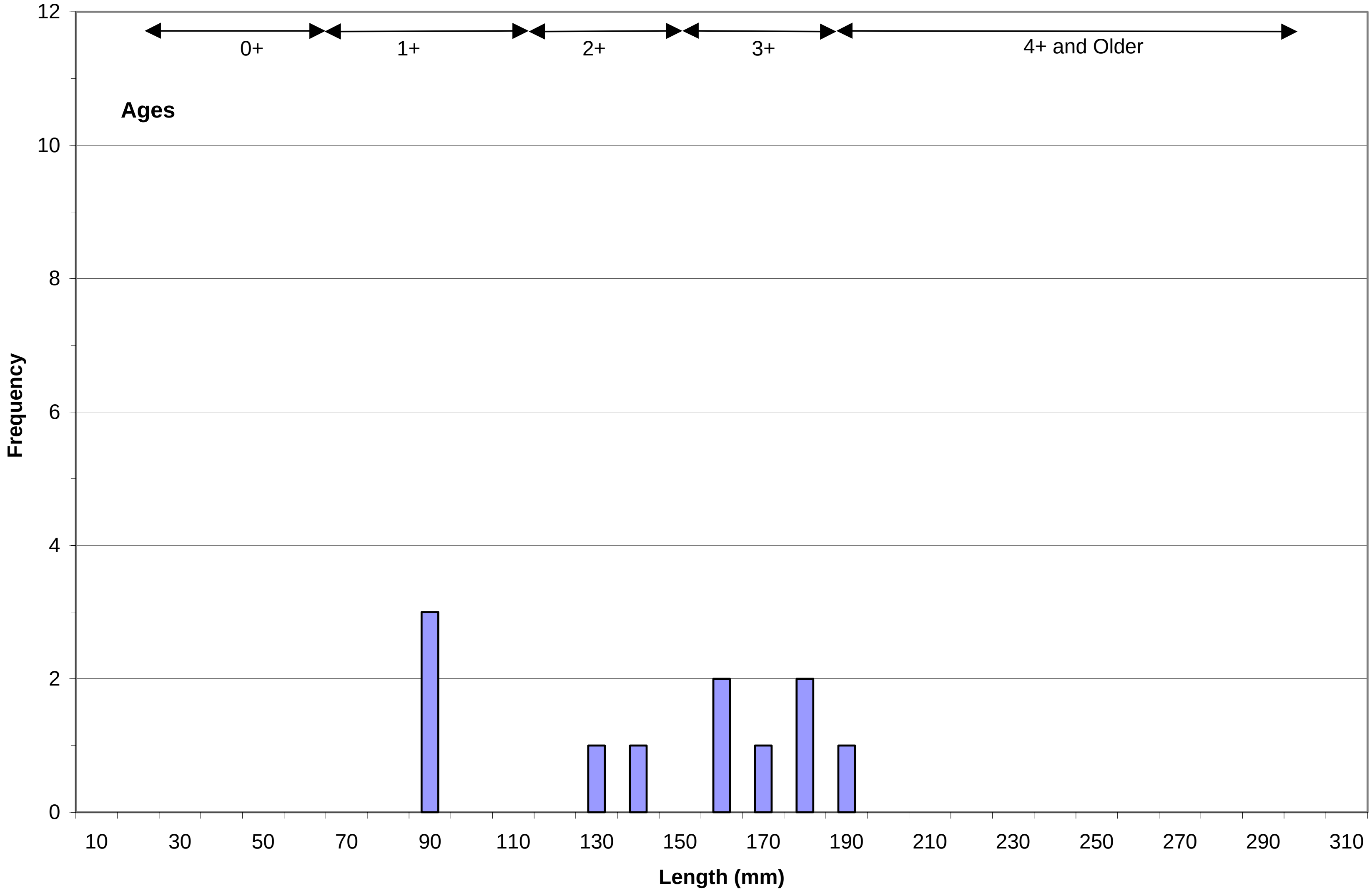


Figure CAWG 7-96. Length Frequency and Age of Brown Trout Collected in Big Creek, Dam 5 to Powerhouse 8, Rosgen Level I Type Aa+ Channel Site, October 2002 (Number of Fish = 11).

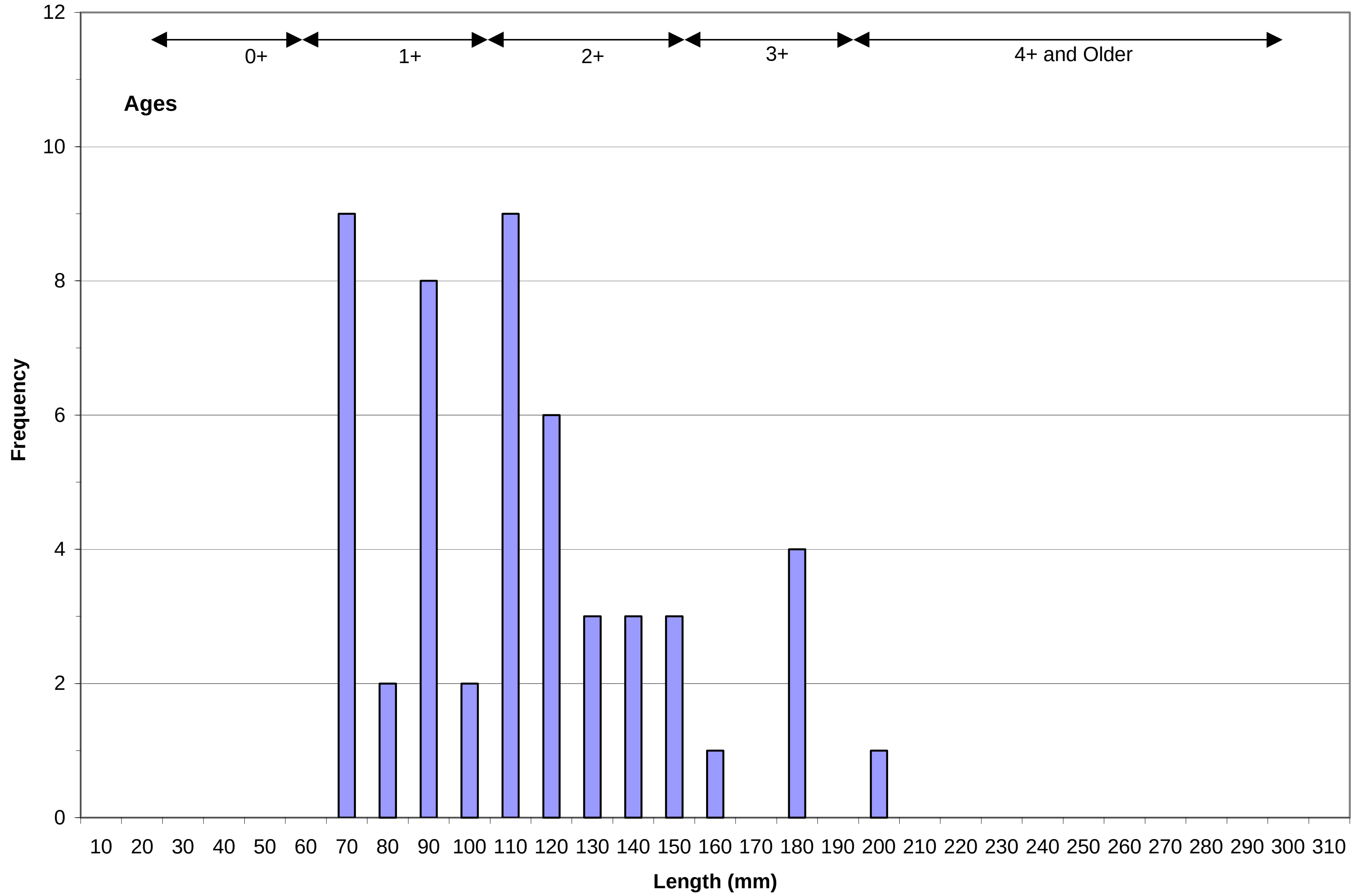


Figure CAWG 7-97. Length Frequency and Age of Rainbow Trout Collected in Big Creek, Dam 5 to Powerhouse 8, Rosgen Level I Type Aa+ Channel Site, October 2002 (Number of Fish = 51).

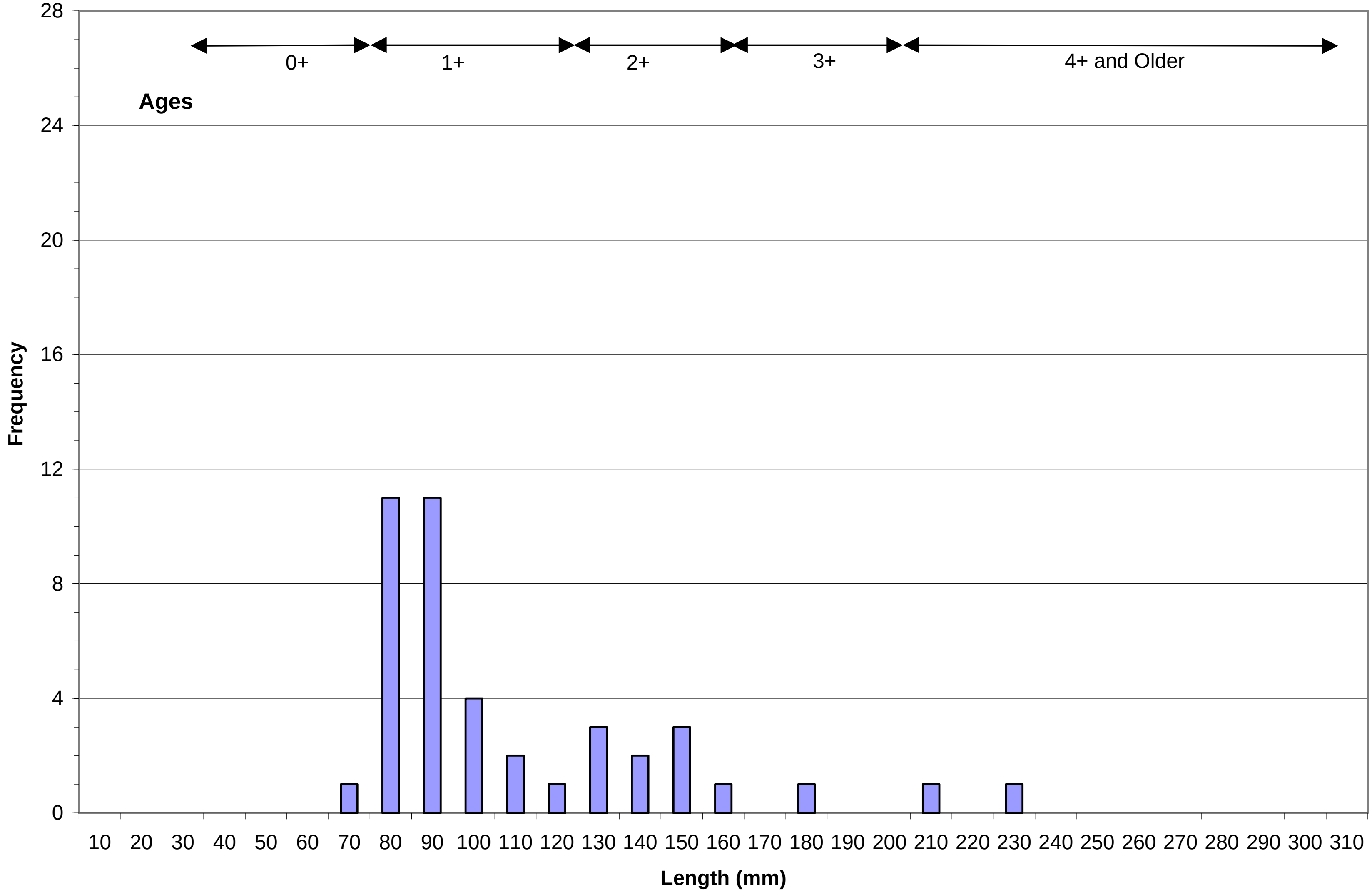


Figure CAWG 7-98. Length Frequency and Age of Brown Trout Collected in Big Creek, Dam 5 to Powerhouse 8, Rosgen Level I Type A Channel Site, October 2002 (Number of Fish = 42).

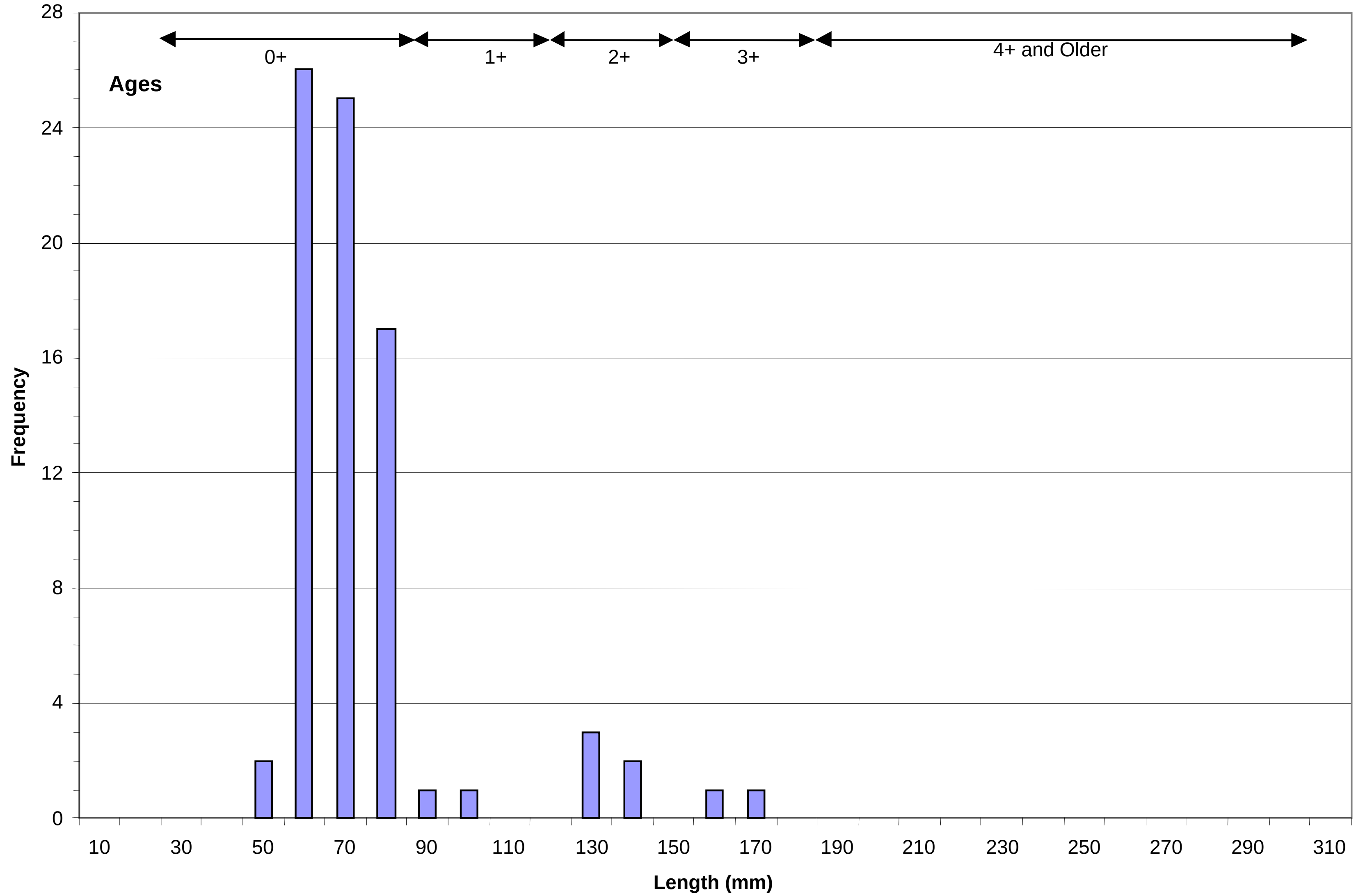
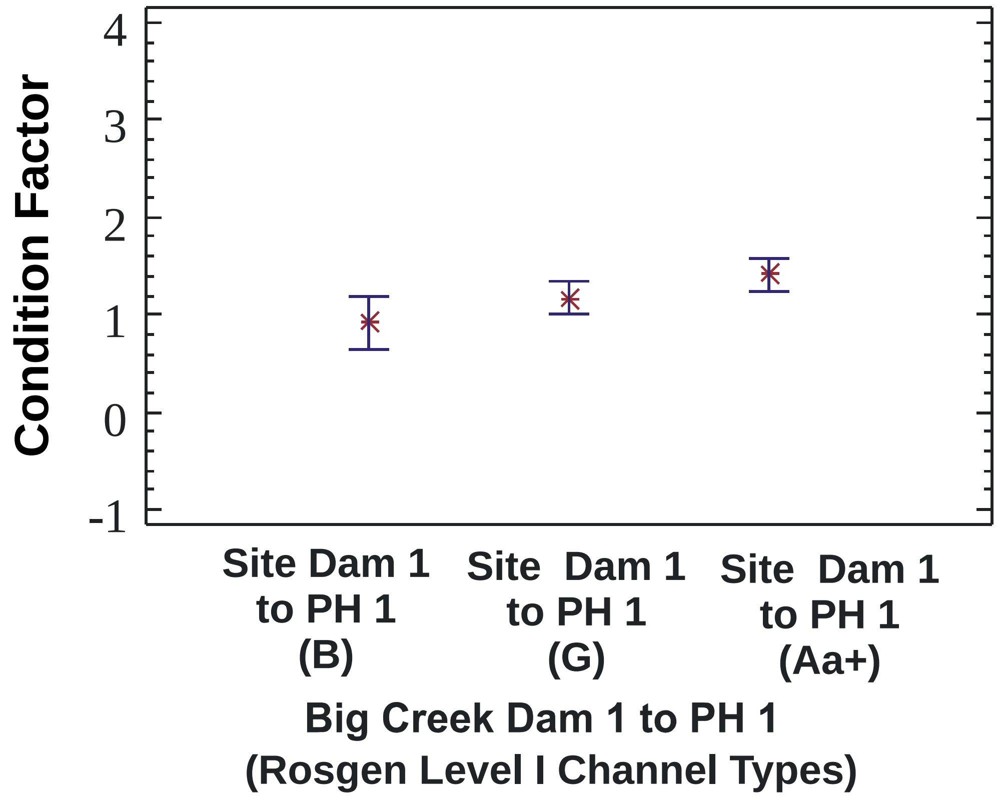


Figure CAWG 7-99. Length Frequency and Age of Rainbow Trout Collected in Big Creek, Dam 5 to Powerhouse 8, Rosgen Level I Type A Channel Site, October 2002 (Number of Fish = 79).



Site/Value	Site Dam 1 to PH 1 (B)	Site Dam 1 to PH 1 (G)	Site Dam 1 to PH 1 (Aa+)
Upper 95% Limit	1.19	1.34	1.58
Mean	0.92	1.17	1.42
Lower 95% Limit	0.65	1.01	1.25

Figure CAWG 7-100. Brown Trout Condition Factor Means and 95.0 Percent Confidence Intervals (pooled variance) for Downstream (DS) Rosgen Level I Type B and G Channel Sites and Upstream (US) Rosgen Level I Type Aa+ Channel Site[1] for Big Creek Dam 1 to Powerhouse 1, 2002.

[1] No condition factor available for Dam 1 to Powerhouse 1 Rosgen Level I A Channel Site due to scale malfunction.
No condition factor available for Dam 4 to Powerhouse 2 Rosgen Level I A Channel Site due to scale malfunction.
No condition factor available for Dam 5 to Powerhouse 8 Rosgen Level I A Channel Site due to scale malfunction.
No condition factor available for Dam 5 to Powerhouse 8 Rosgen Level I Aa+ Channel Site due to scale malfunction.

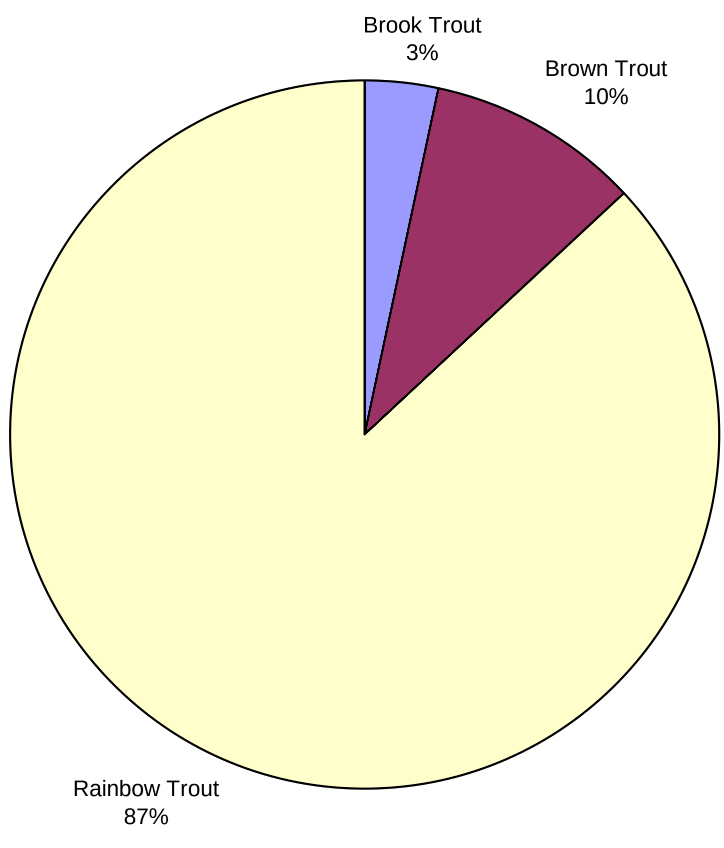


Figure CAWG 7-101. Composition of Fish Species Collected in Pitman Creek, All Sites, October 2002 (Number of Fish = 306).

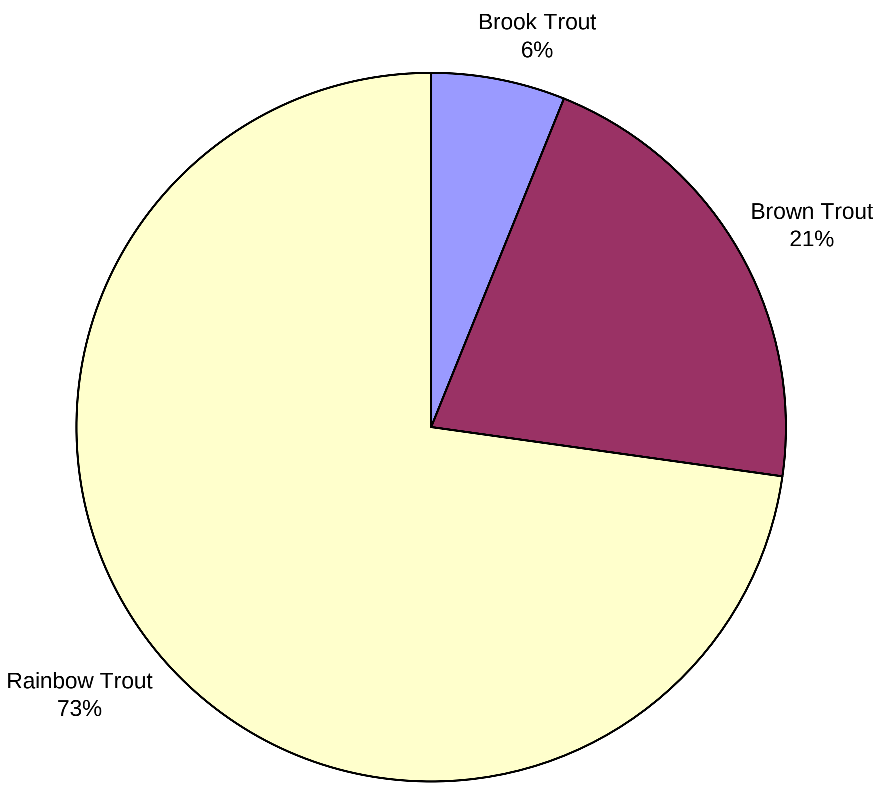


Figure CAWG 7-102. Composition of Fish Species Collected in Pitman Creek, Above the Diversion, Rosgen Level I Type B Channel Site, October 2002 (Number of Fish = 132).

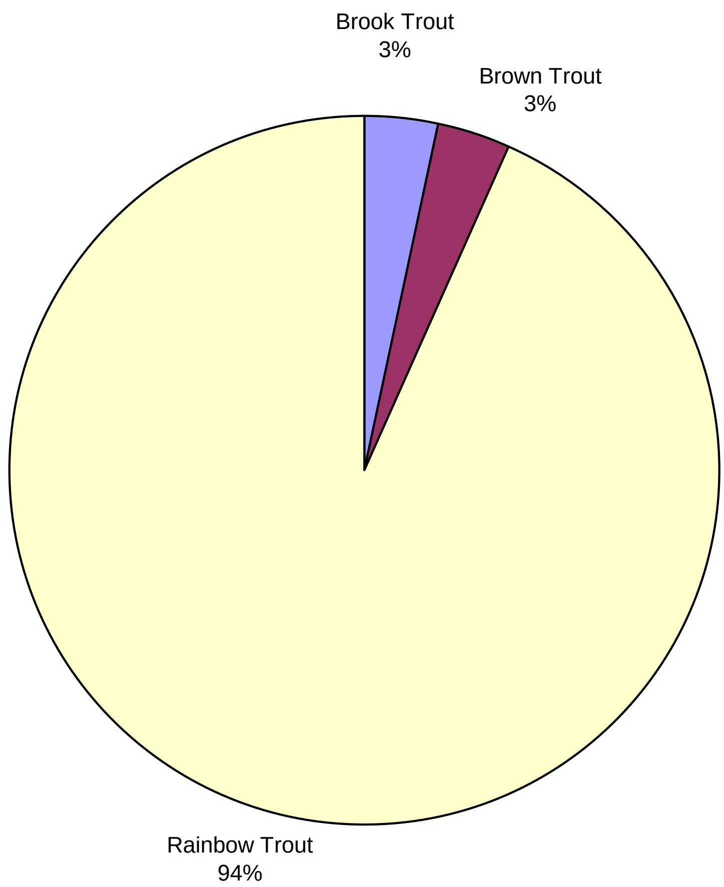


Figure CAWG 7-103. Composition of Fish Species Collected in Pitman Creek, Below the Diversion, Rosgen Level I Type B Channel Site, October 2002 (Number of Fish = 60).

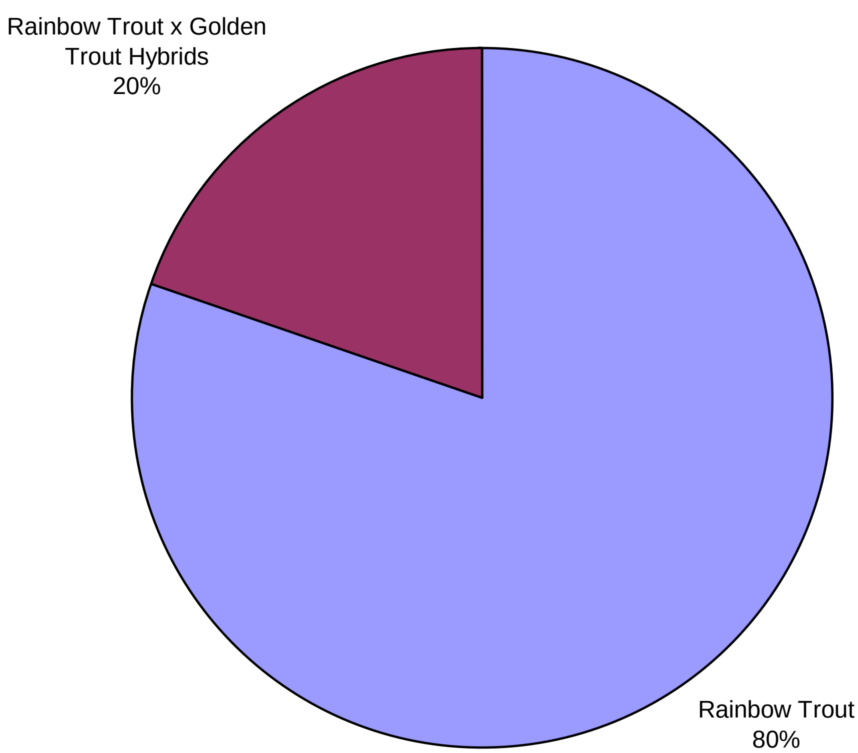


Figure CAWG 7-104. Composition of Fish Species Collected in Ely Creek, All Sites, July 2002 (Number of Fish = 51).

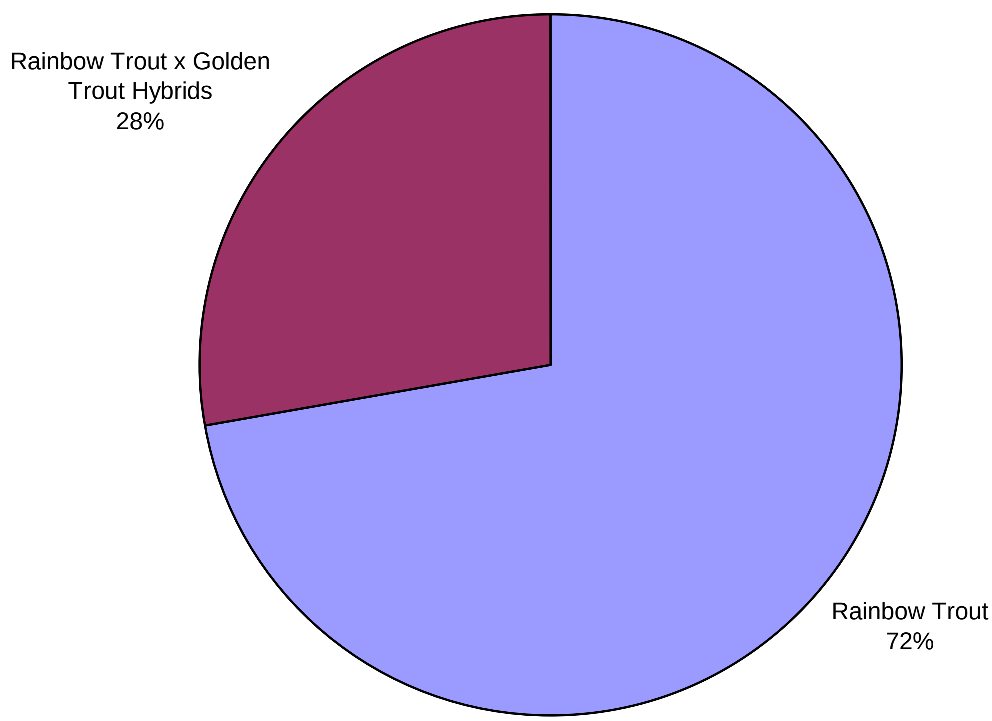


Figure CAWG 7-105. Composition of Fish Species Collected in Ely Creek, Below the Diversion, Rosgen Level I Type Aa+ Channel Site, July 2002 (Number of Fish = 36).

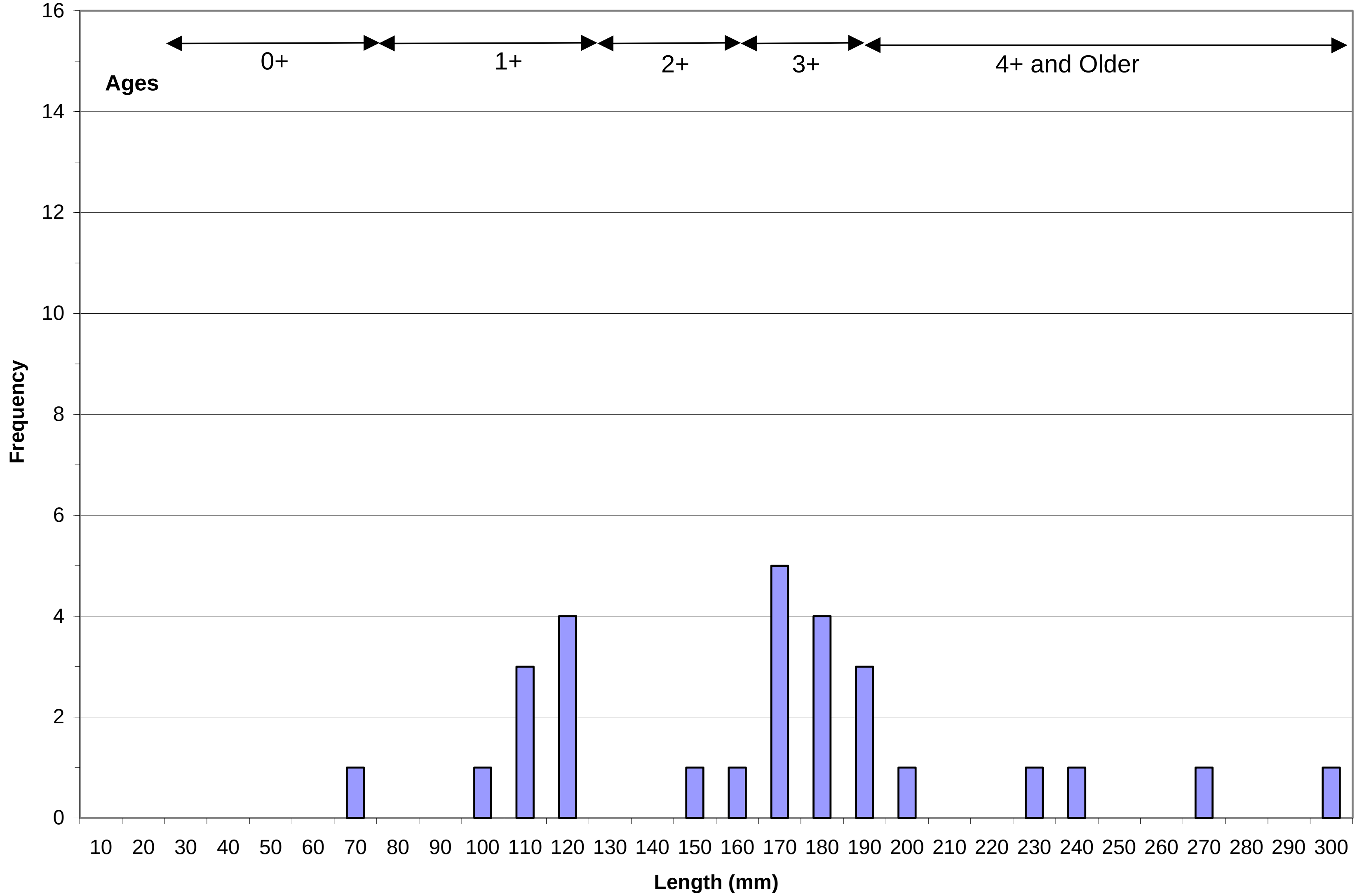


Figure CAWG 7-106. Length Frequency and Age of Brown Trout Collected in Pitman Creek, Above the Diversion, Rosgen Level I Type B Channel Site, October 2002 (Number of Fish = 28).

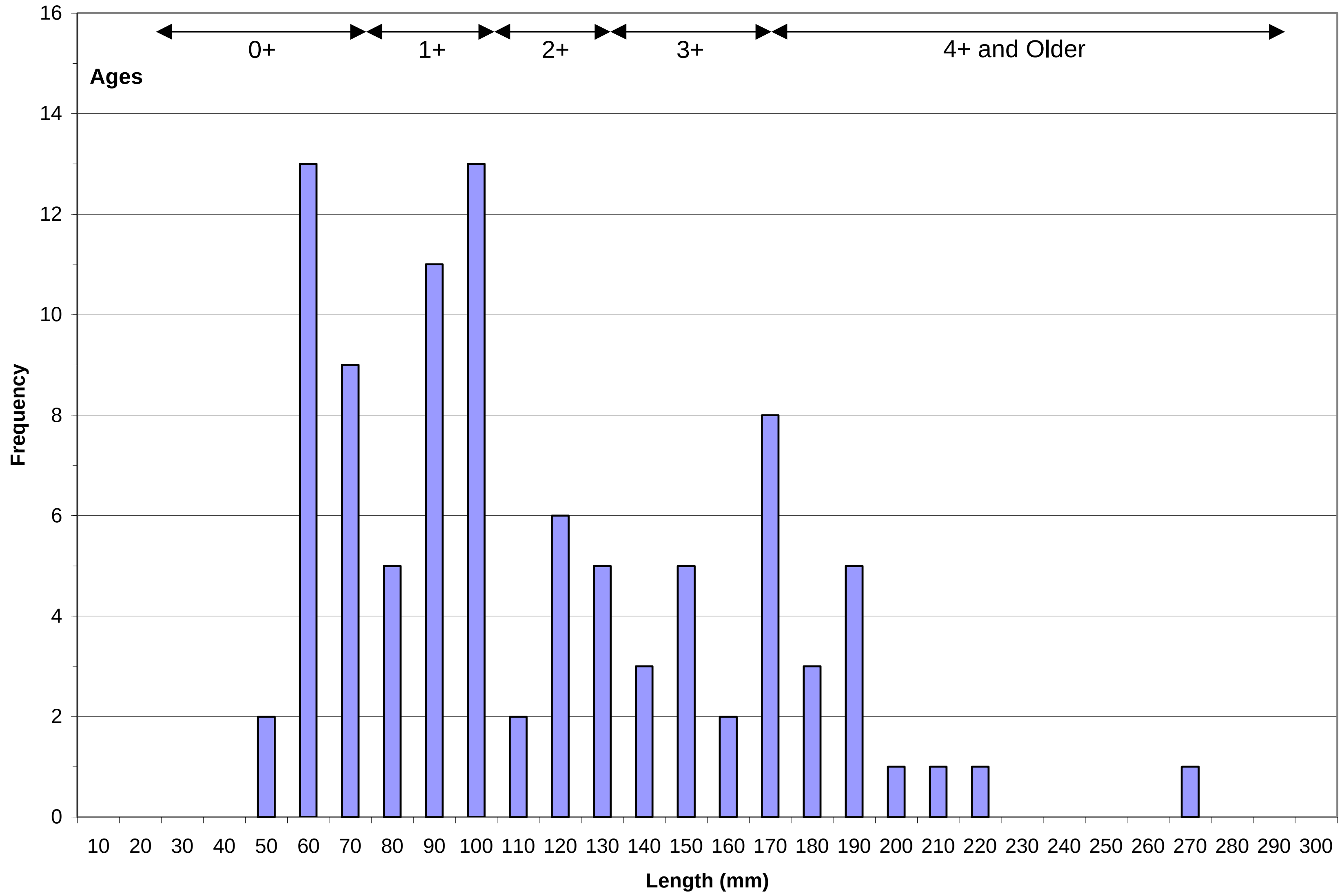
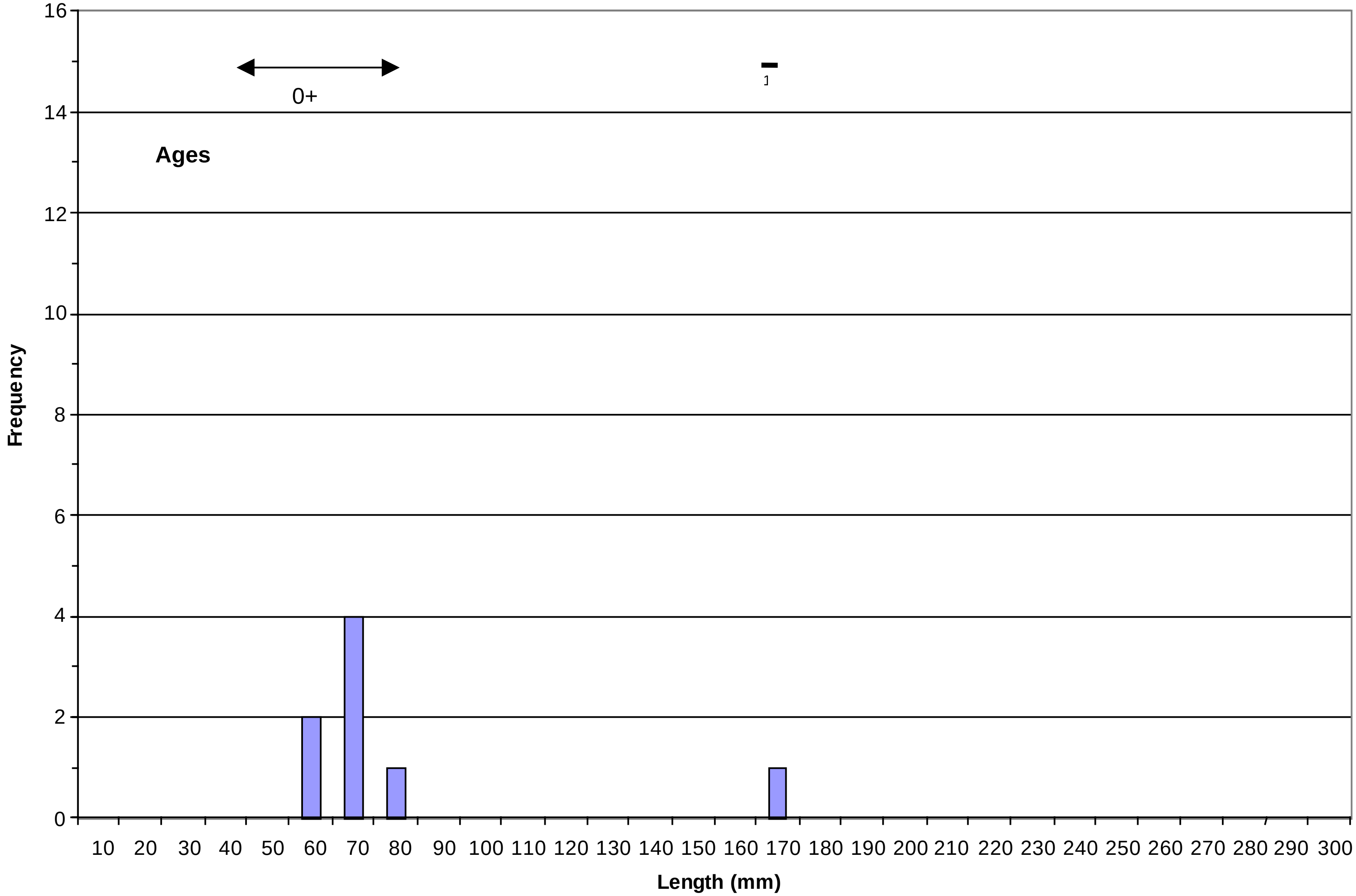


Figure CAWG 7-107. Length Frequency and Age of Rainbow Trout Collected in Pitman Creek, Above the Diversion, Rosgen Level I Type B Channel Site, October 2002 (Number of Fish = 96).



[1] Unable to determine the age of the fish.

Figure CAWG 7-108. Length Frequency of Brook Trout Collected in Pitman Creek, Above the Diversion, Rosgen Level I Type B Channel Site, October 2002 (Number of Fish = 8).

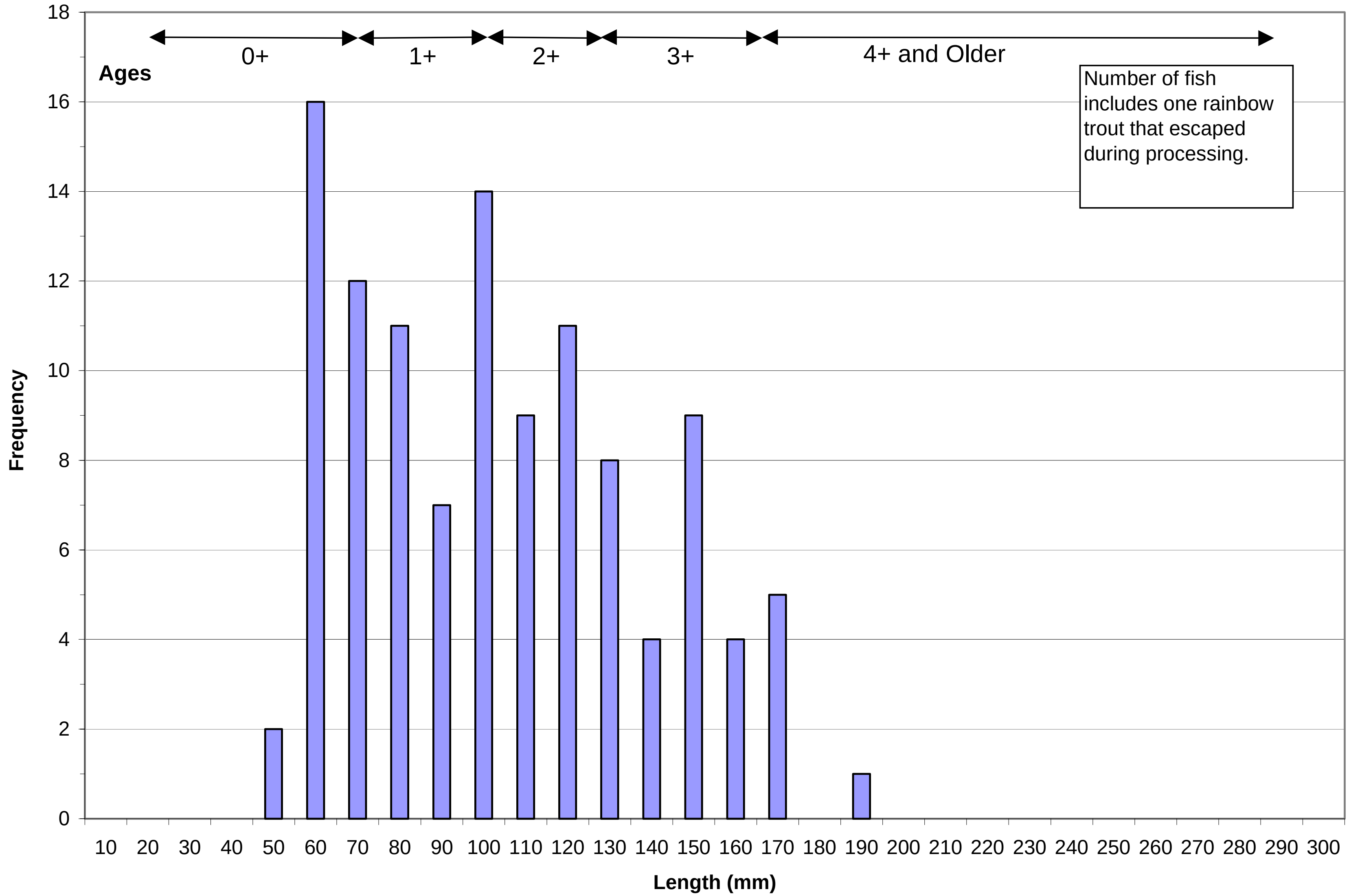


Figure CAWG 7-109. Length Frequency and Age of Rainbow Trout Collected in Pitman Creek, Below the Diversion, Rosgen Level I Type Aa+ Channel Site, July 2002 (Number of Fish = 114).

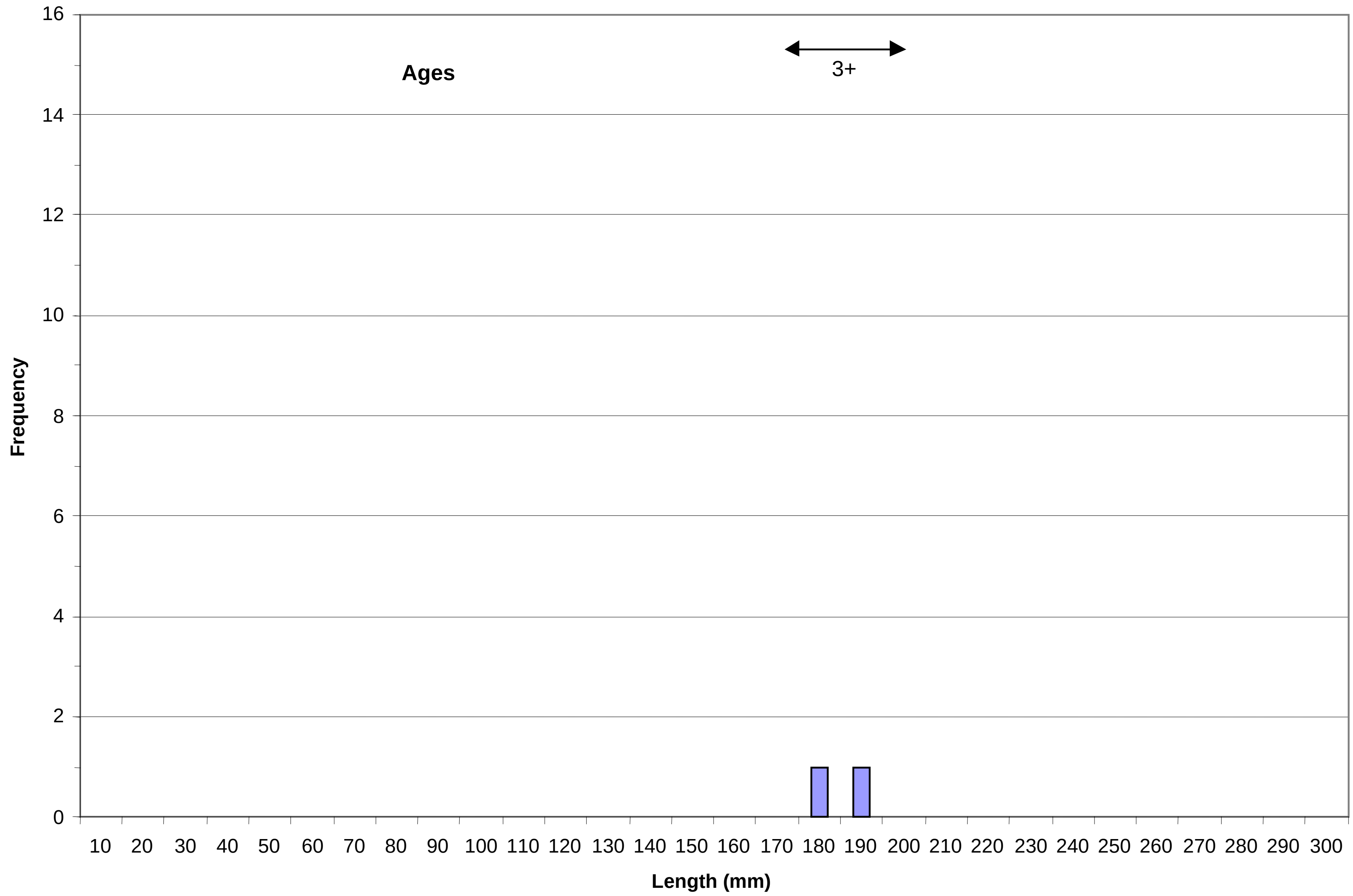


Figure CAWG 7-110. Length Frequency and Age of Brown Trout Collected in Pitman Creek, Below the Diversion, Rosgen Level I Type B Channel Site, July 2002 (Number of Fish = 2).

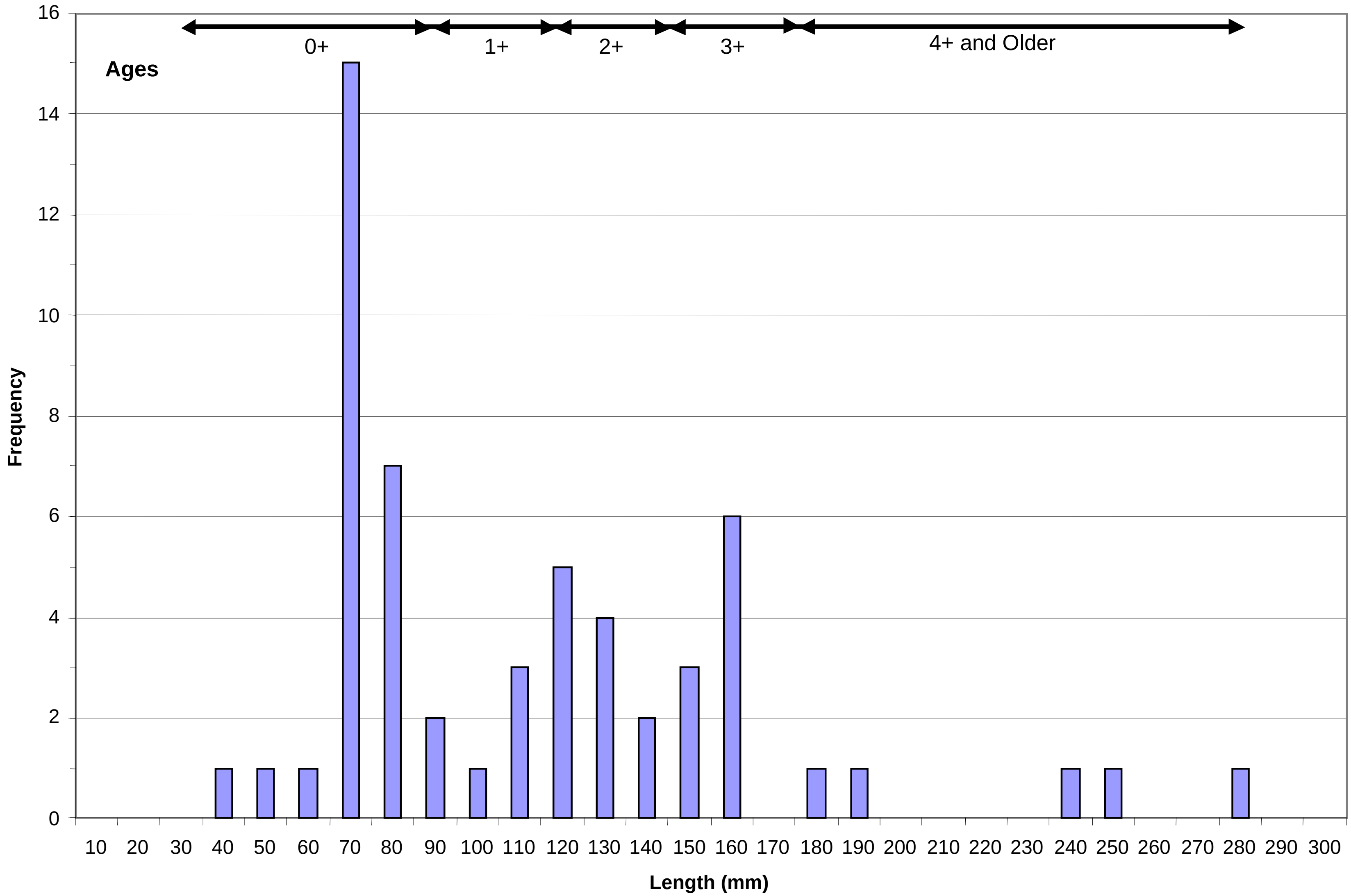


Figure CAWG 7-111. Length Frequency and Age of Rainbow Trout Collected in Pitman Creek, Below the Diversion, Rosgen Level I Type B Channel Site, July 2002 (Number of Fish = 56).

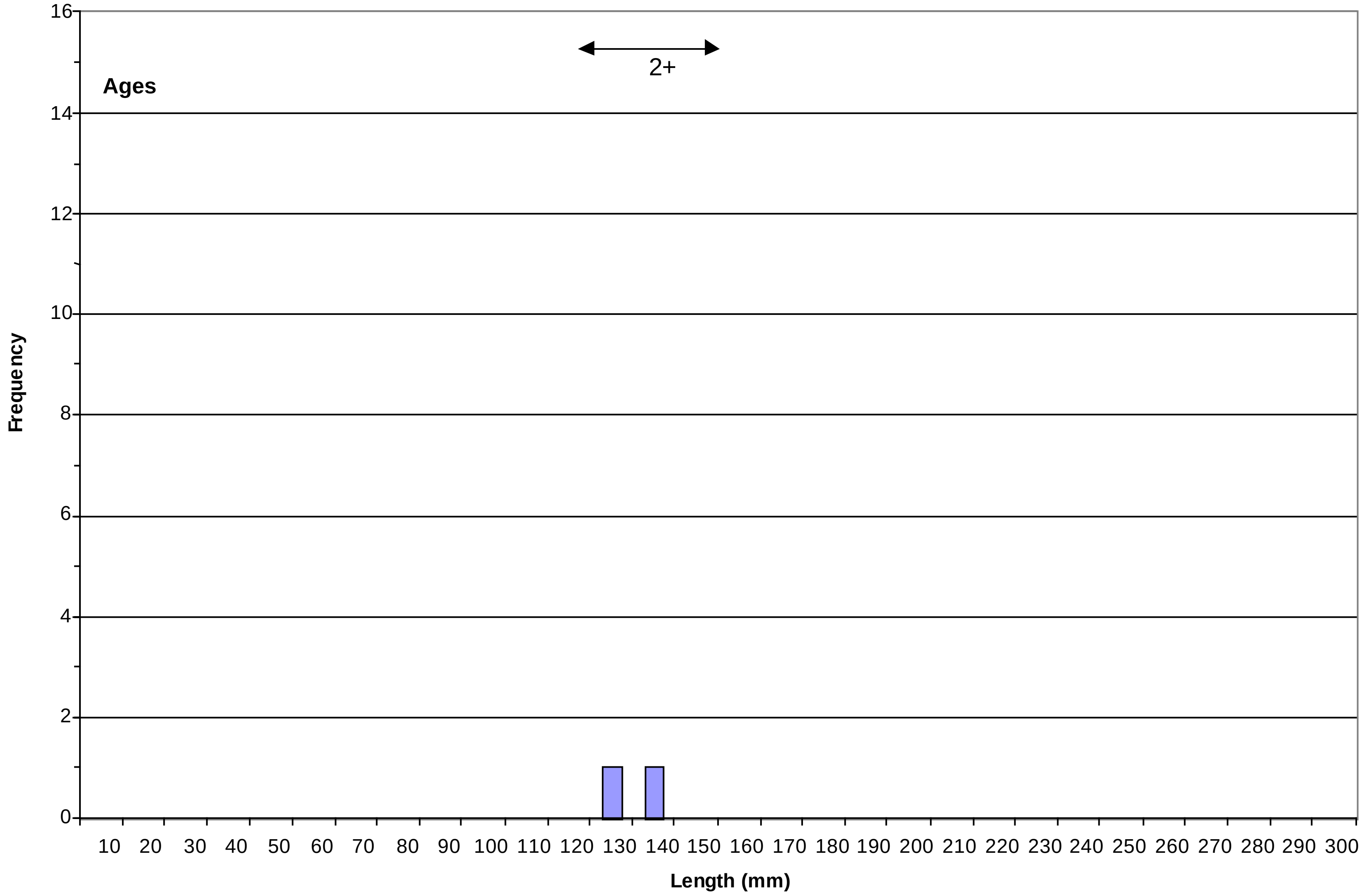


Figure CAWG 7-112. Length Frequency and Age of Brook Trout Collected in Pitman Creek, Below the Diversion, Rosgen Level I Type B Channel Site, July 2002 (Number of Fish = 2).

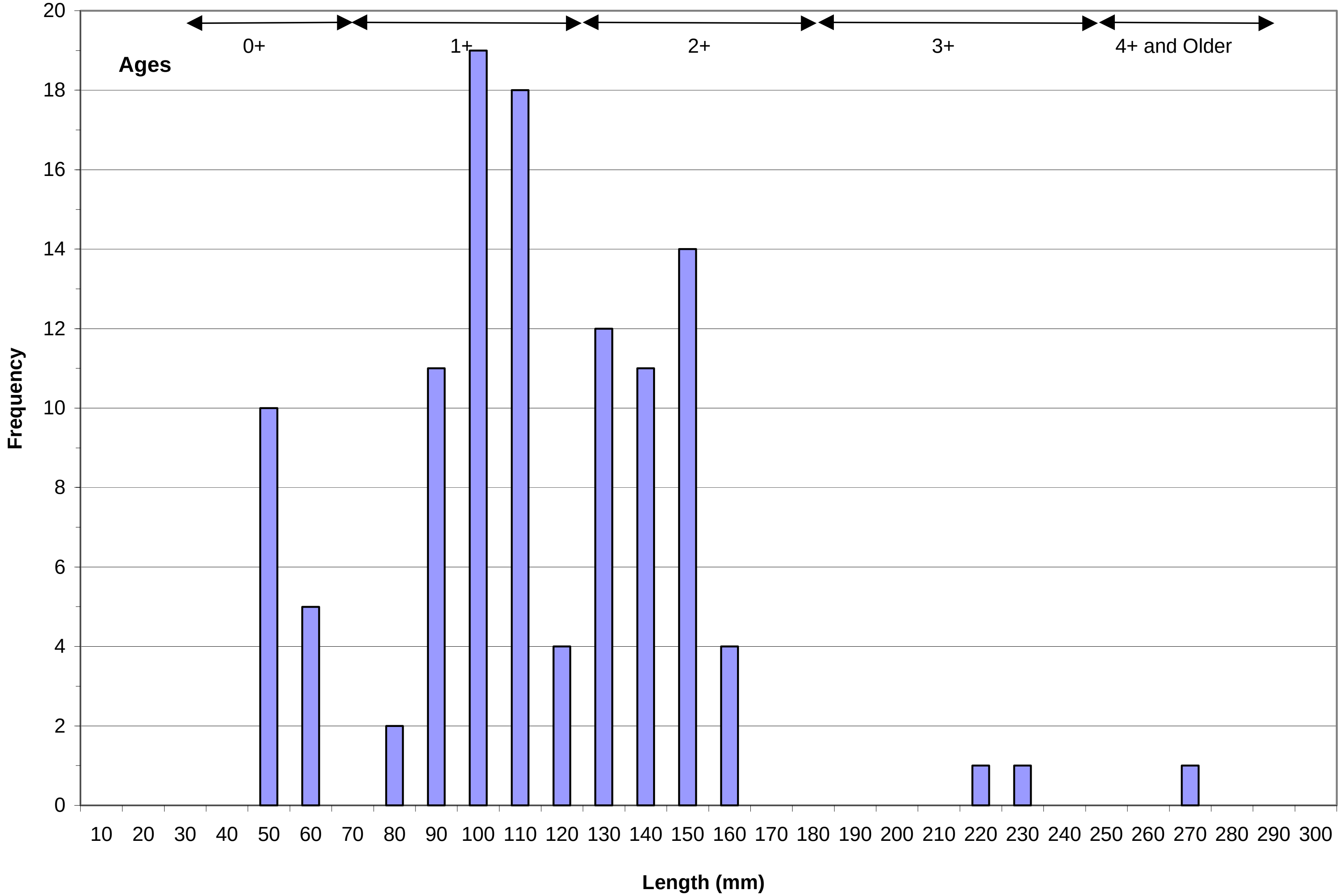


Figure CAWG 7-113. Length Frequency and Age of Rainbow Trout Collected in Balsam Creek, Above the Diversion, Rosgen Level I Type Aa+ Channel Site, July 2002 (Number of Fish = 113).

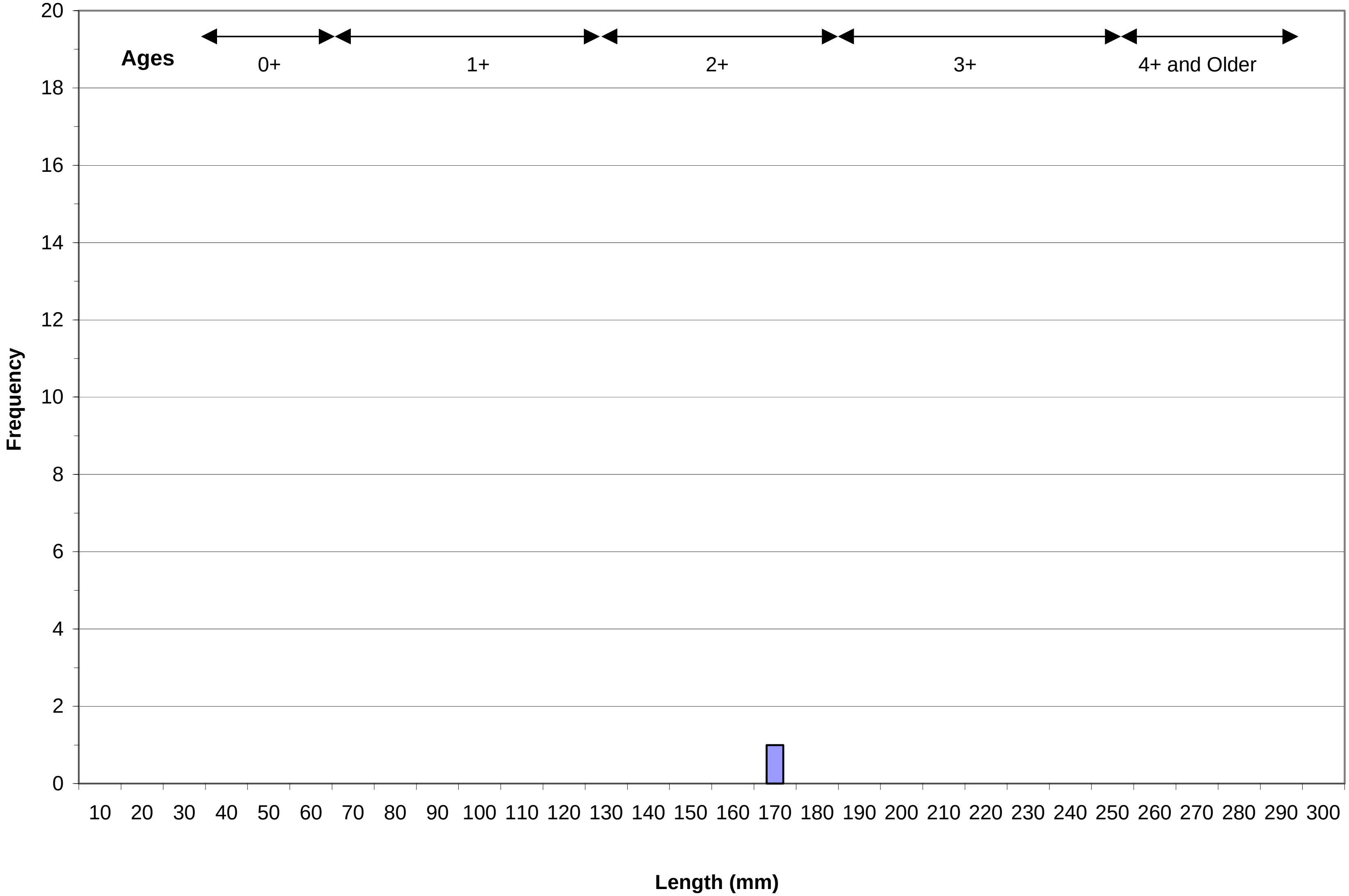


Figure CAWG 7-114. Length Frequency and Age of Rainbow Trout Collected in Balsam Creek, Below the Diversion, Rosgen Level I Type Aa+ Channel Site, July 2002 (Number of Fish = 1).

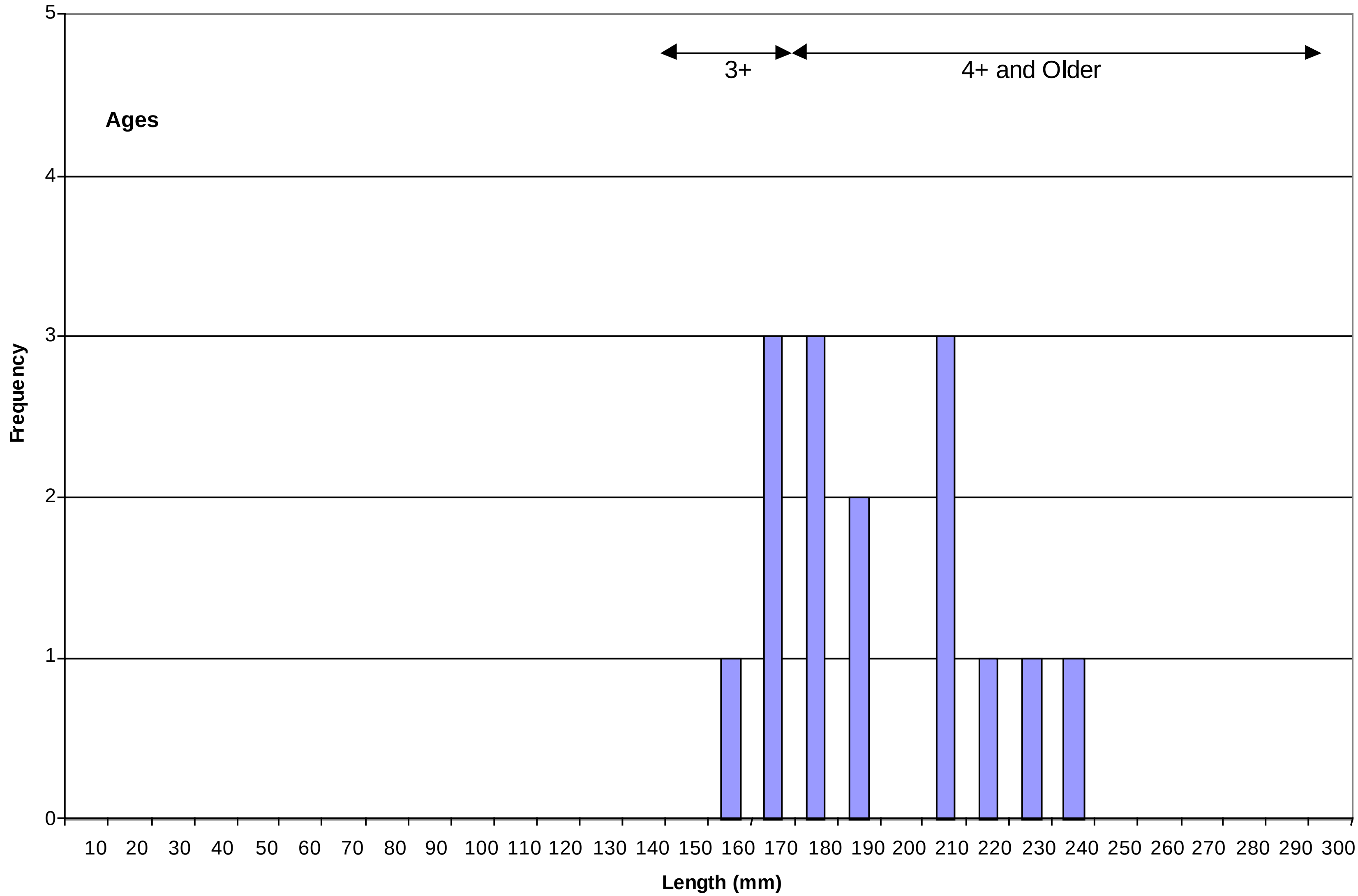


Figure CAWG 7-115. Length Frequency and Age of Rainbow Trout Collected in Ely Creek, Above the Diversion, Rosgen Level I Type Aa+ Channel Site, July 2002 (Number of Fish = 15).

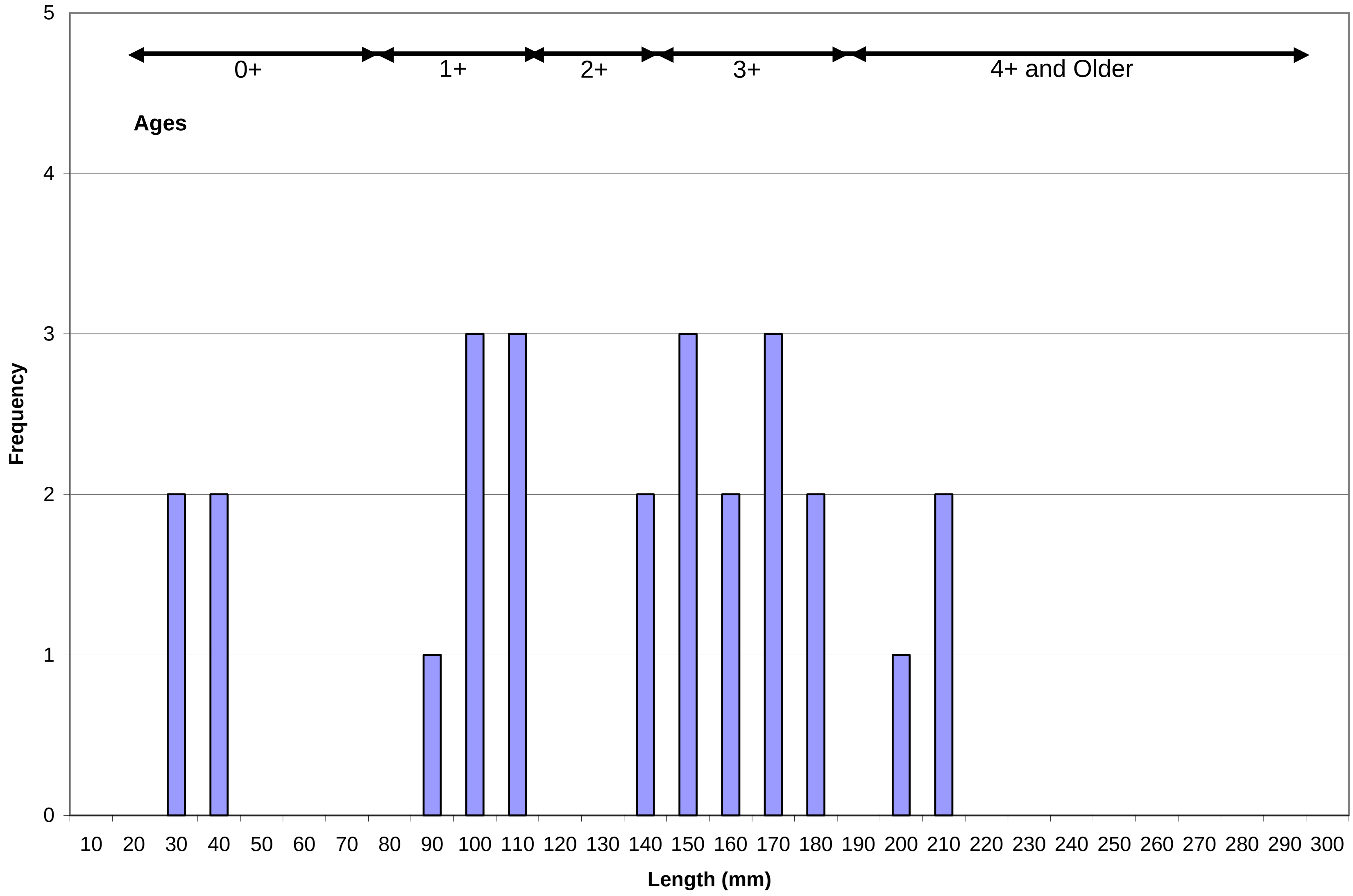


Figure CAWG 7-116. Length Frequency and Age of Rainbow Trout Collected in Ely Creek, Below the Diversion, Rosgen Level I Type Aa+ Channel Site, July 2002 (Number of Fish = 26).

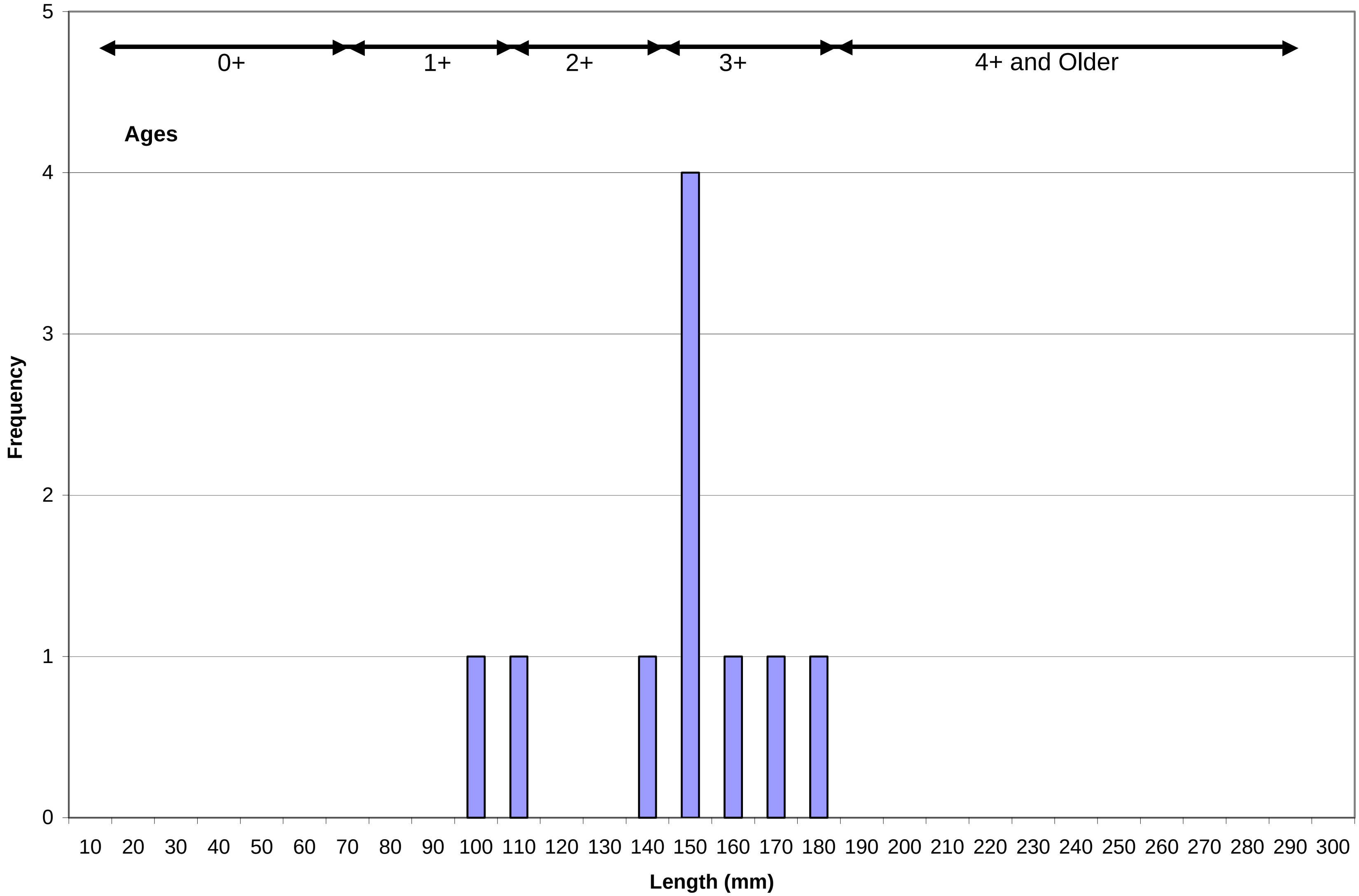
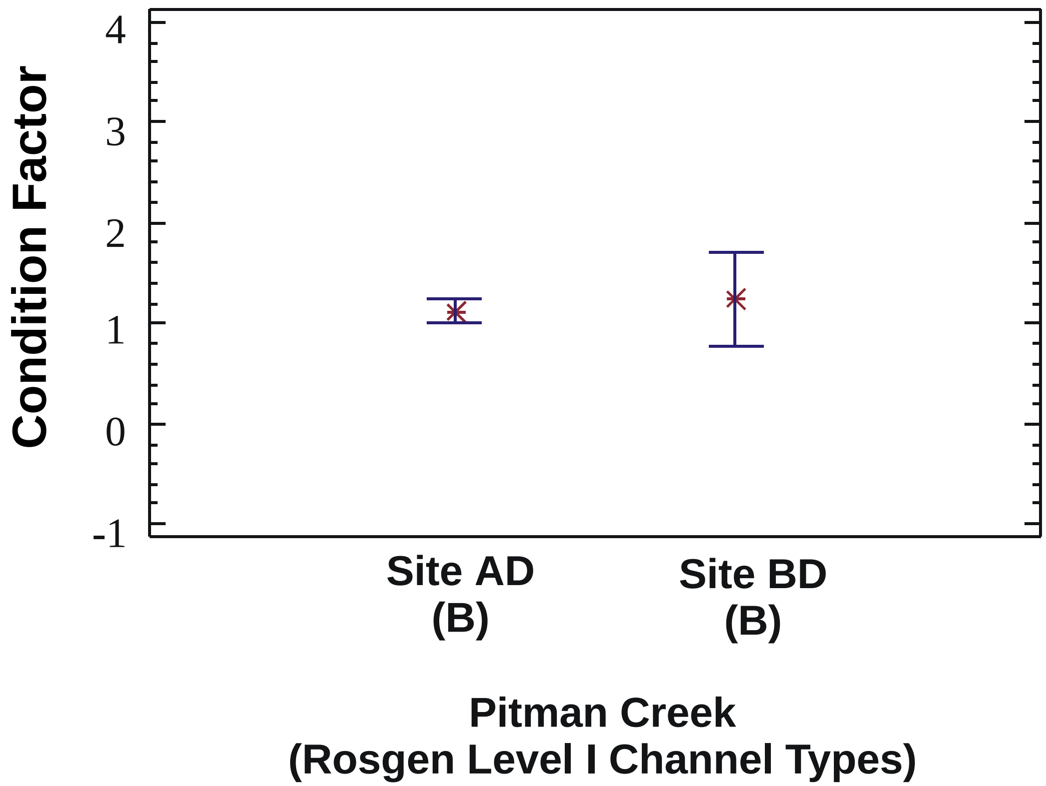


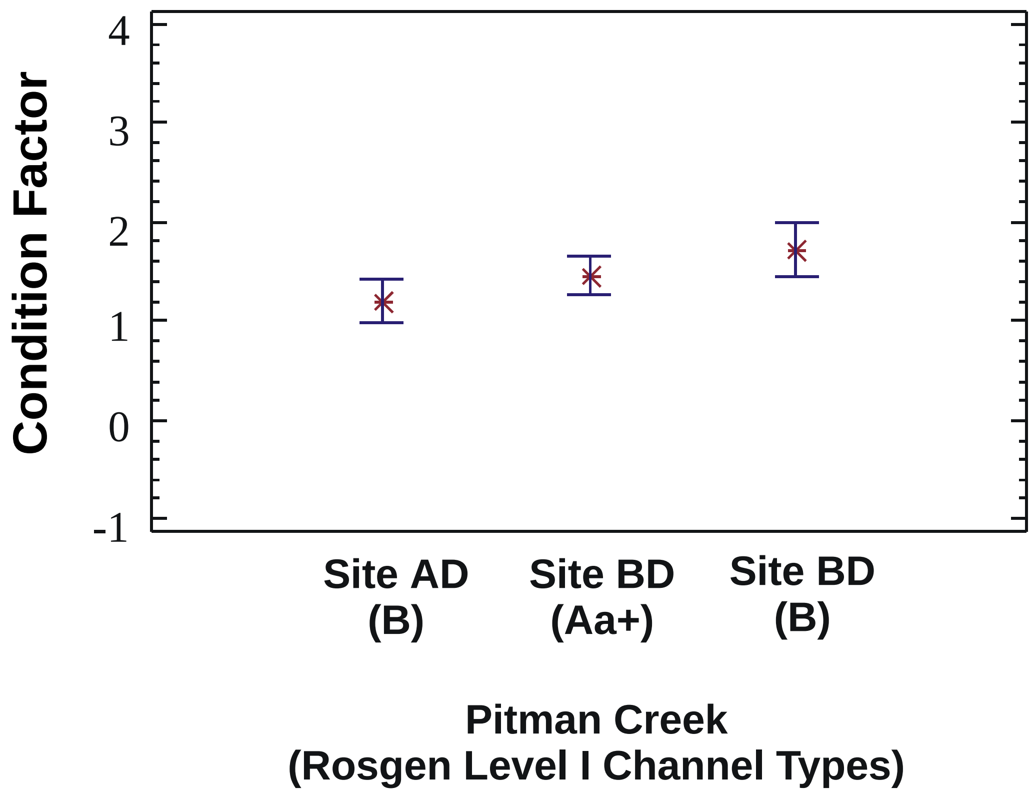
Figure CAWG 7-117. Length Frequency and Age of Golden x Rainbow Trout Hybrids Collected in Ely Creek, Below the Diversion, Rosgen Level I Type Aa+ Channel Site, July 2002 (Number of Fish = 10).



Site/Value	Site AD (B)	Site BD (B)
Upper 95% Limit	1.25	1.70
Mean	1.12	1.23
Lower 95% Limit	1.00	0.77

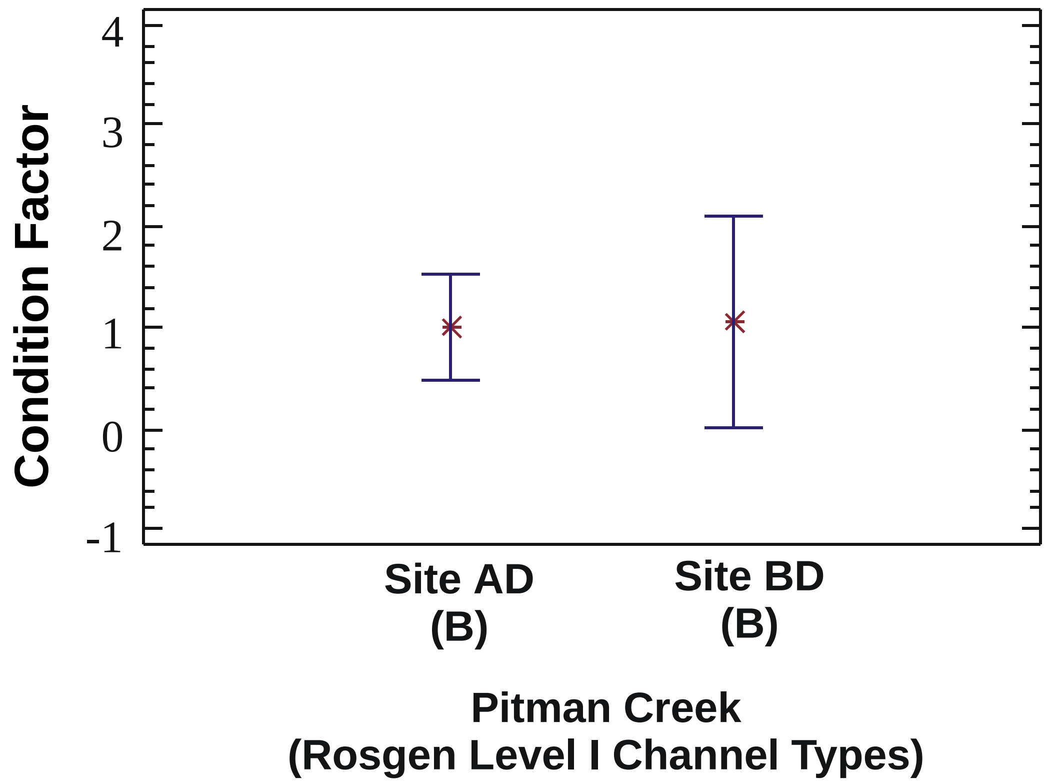
Figure CAWG 7-118. Brown Trout Condition Factor Means and 95.0 Percent Confidence Intervals (pooled variance) for Above Diversion (AD) Rosgen Level I Type B Channel Site and Below Diversion (BD)[1] Rosgen Level I Type B Channel Site for Pitman Creek, 2002.

[1] No Brown Trout found in Aa+ Channel Site



Site/Value	Site AD (B)	Site BD (Aa+)	Site BD (B)
Upper 95% Limit	1.41	1.64	1.98
Mean	1.20	1.45	1.71
Lower 95% Limit	0.99	1.26	1.44

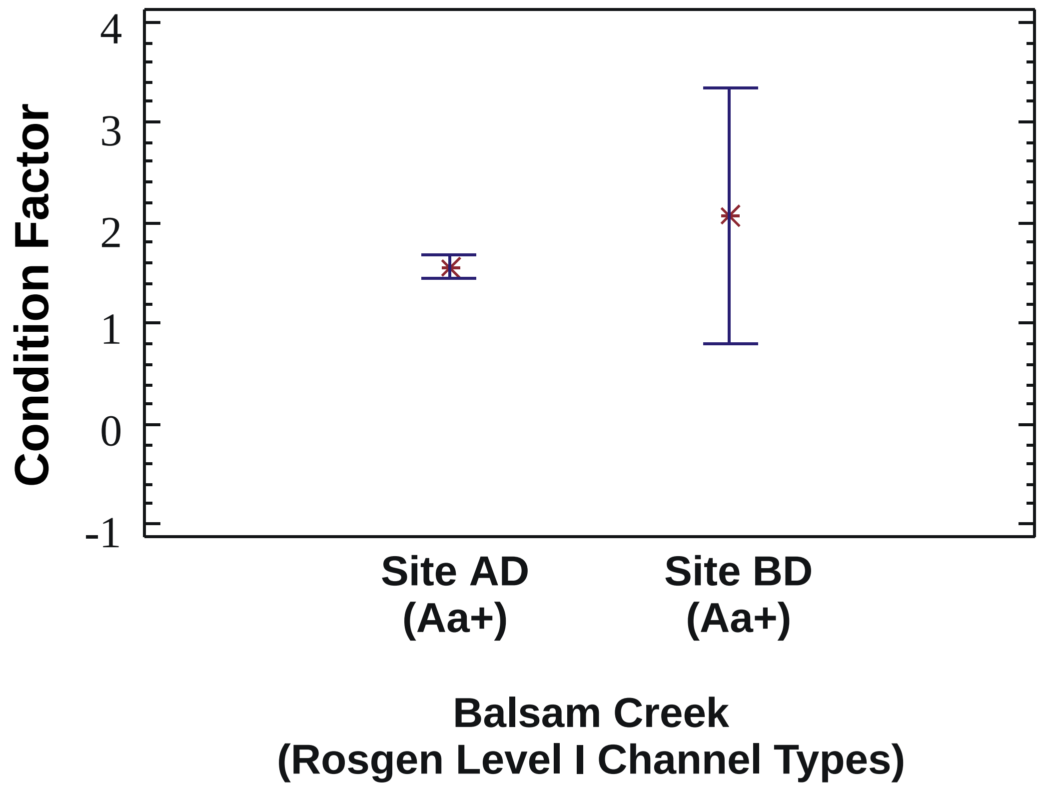
Figure CAWG 7-119. Rainbow Trout Condition Factor Means and 95.0 Percent Confidence Intervals (pooled variance) for Above Diversion (AD) Rosgen Level I Type B Channel Site and Below Diversion (BD) Rosgen Level I Type Aa+ and B Channel Sites for Pitman Creek, 2002.



Site/Value	Site AD (B)	Site BD (B)
Upper 95% Limit	1.52	2.11
Mean	1.00	1.06
Lower 95% Limit	0.47	0.01

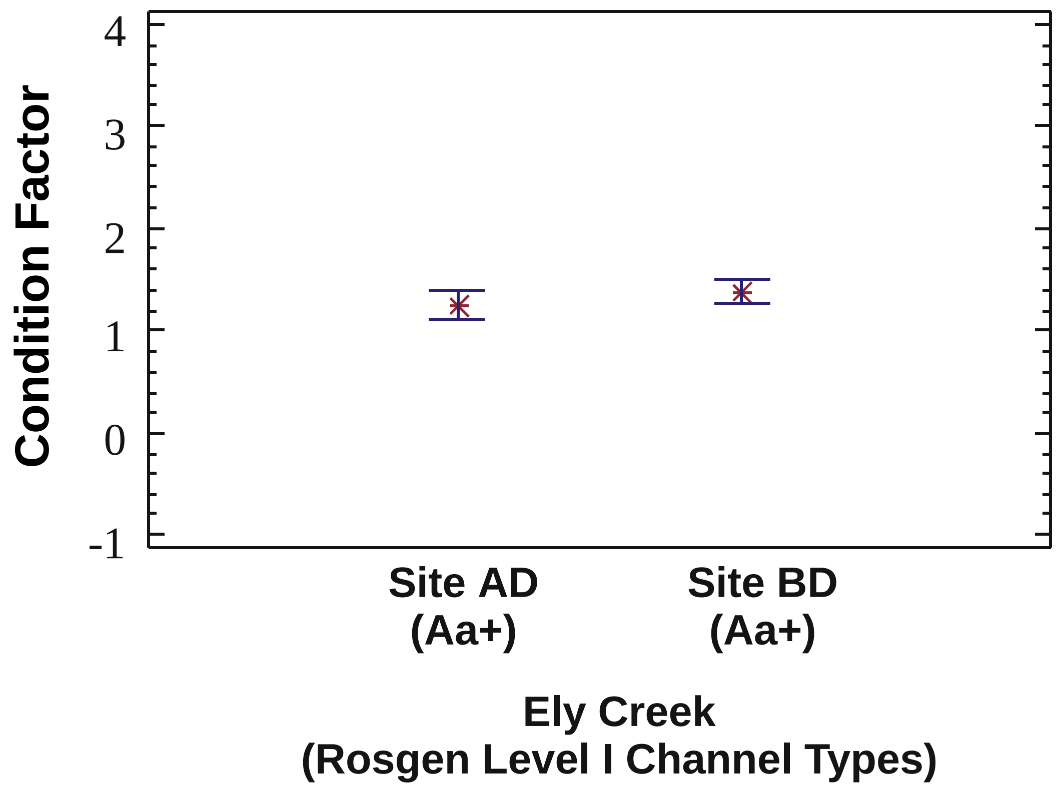
Figure CAWG 7-120. Brook Trout Condition Factor Means and 95.0 Percent Confidence Intervals (pooled variance) for Above Diversion (AD) Rosgen Level I Type B Channel Site and Below Diversion (BD)[1] Type B Channel Site for Pitman Creek, 2002.

[1] No Brook Trout found in Aa+ Channel Site



Site/Value	Site AD (Aa+)	Site BD (Aa+)
Upper 95% Limit	1.68	3.32
Mean	1.56	2.07
Lower 95% Limit	1.44	0.81

Figure CAWG 7-121. Rainbow Trout Condition Factor Means and 95.0 Percent Confidence Intervals (pooled variance) for Above Diversion (AD) Rosgen Level I Type Aa+ Channel Site and Below Diversion (BD) Type Aa+ Channel Site for Balsam Creek, 2002.



Site/Value	Site AD (Aa+)	Site BD (Aa+)
Upper 95% Limit	1.39	1.49
Mean	1.25	1.38
Lower 95% Limit	1.10	1.27

Figure CAWG 7-122. Rainbow Trout Condition Factor Means and 95.0 Percent Confidence Intervals (pooled variance) for Above Diversion (AD) Rosgen Level I Type Aa+ Channel Site and Below Diversion (BD) Type Aa+ Channel Site for Ely Creek, 2002.

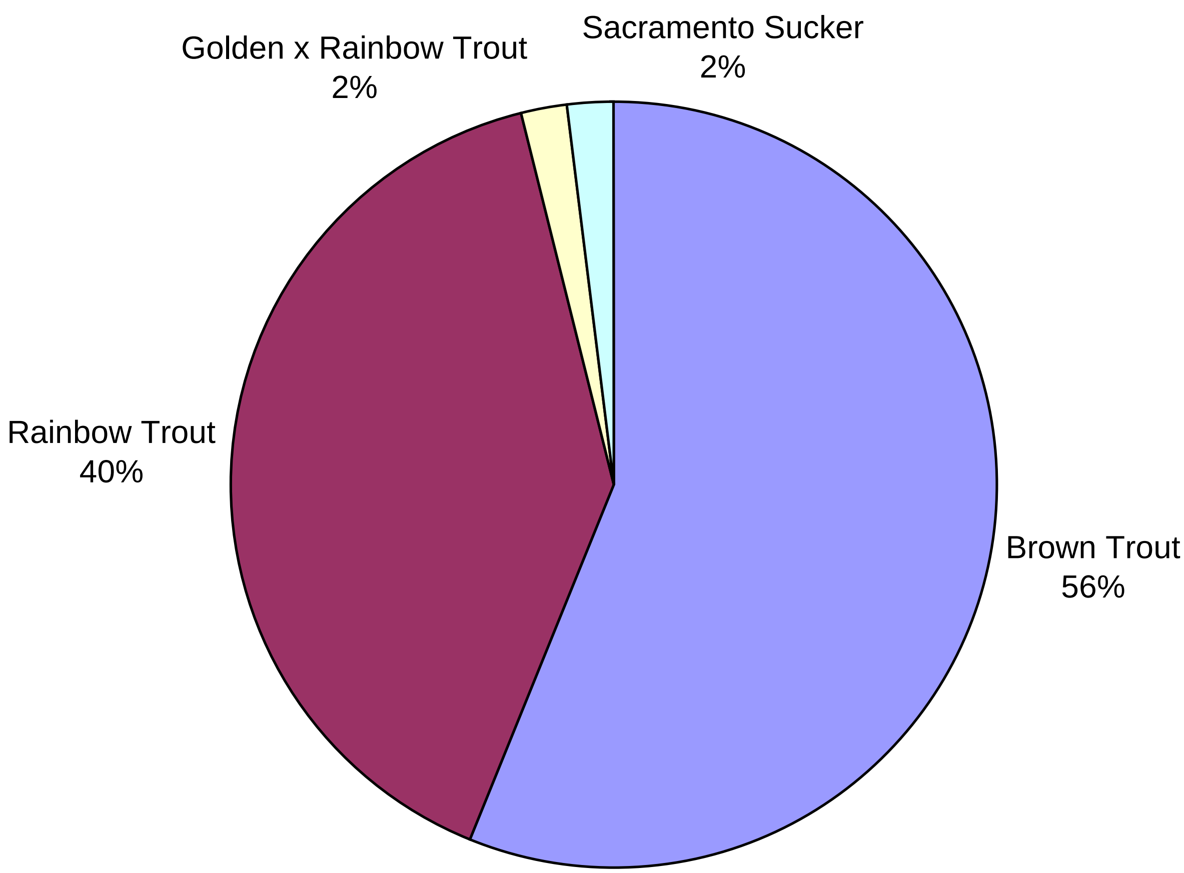


Figure CAWG 7-123. Composition of Fish Species Collected in North Fork Stevenson Creek, Rosgen Level I Type G Channel Site, July 2002 (Number of Fish = 49).

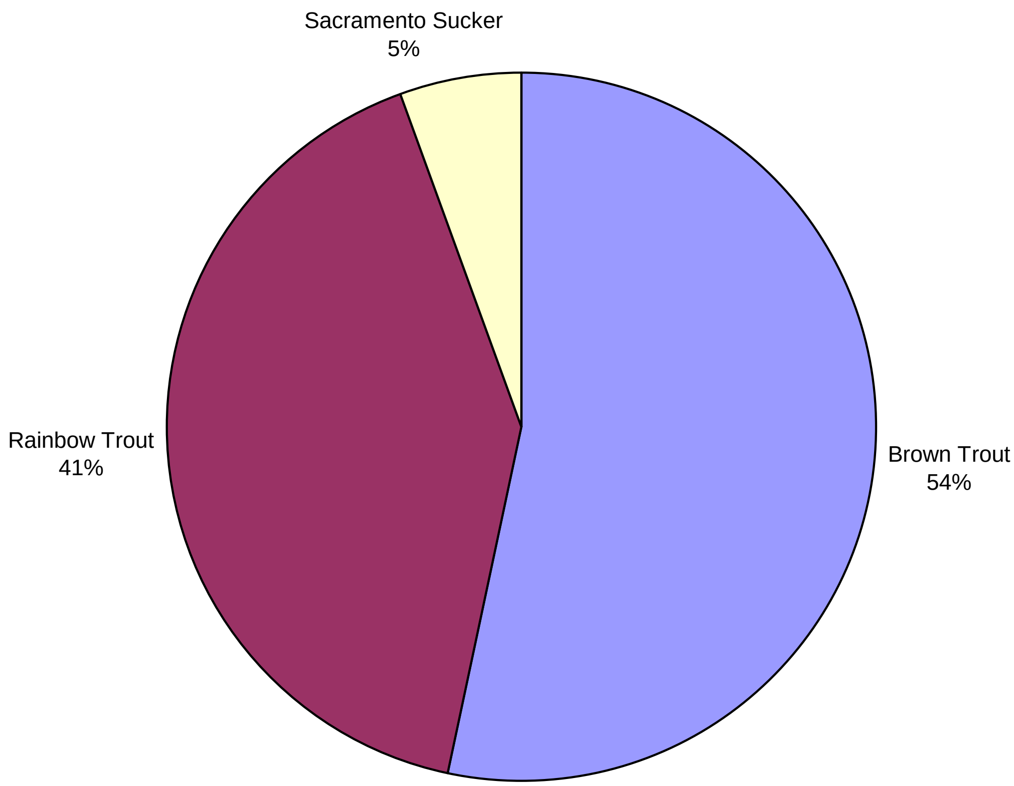


Figure CAWG 7-124. Composition of Fish Species Collected in North Fork Stevenson Creek, Rosgen Level I Type C Channel Site, July 2002 (Number of Fish = 73).

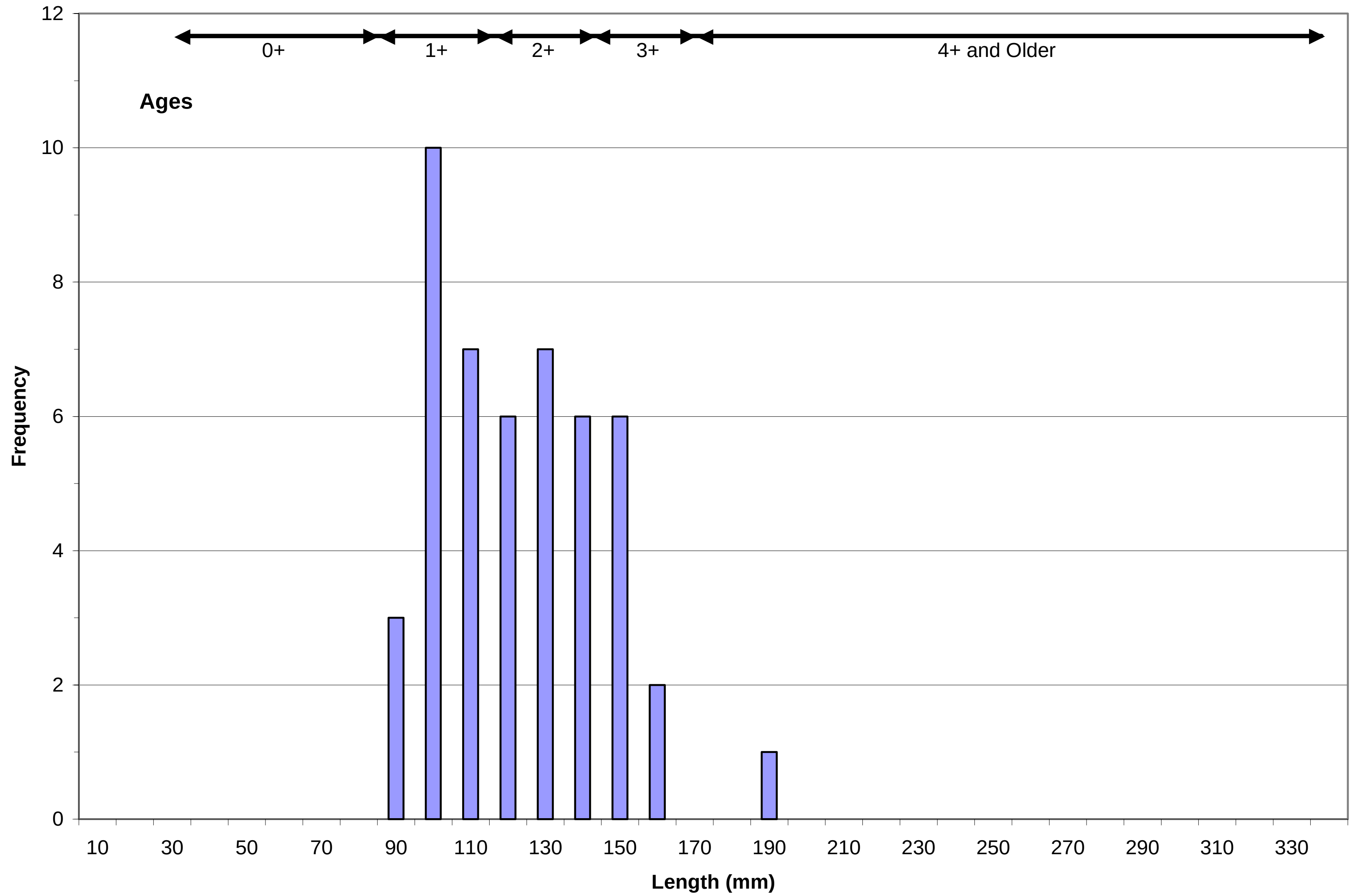


Figure CAWG 7-125. Length Frequency and Age of Golden x Rainbow Trout Hybrids Collected in North Fork Stevenson Creek, Below the Tunnel 7 Outlet, Rosgen Level I Type Aa+ Channel Site, August 2002 (Number of Fish = 48).

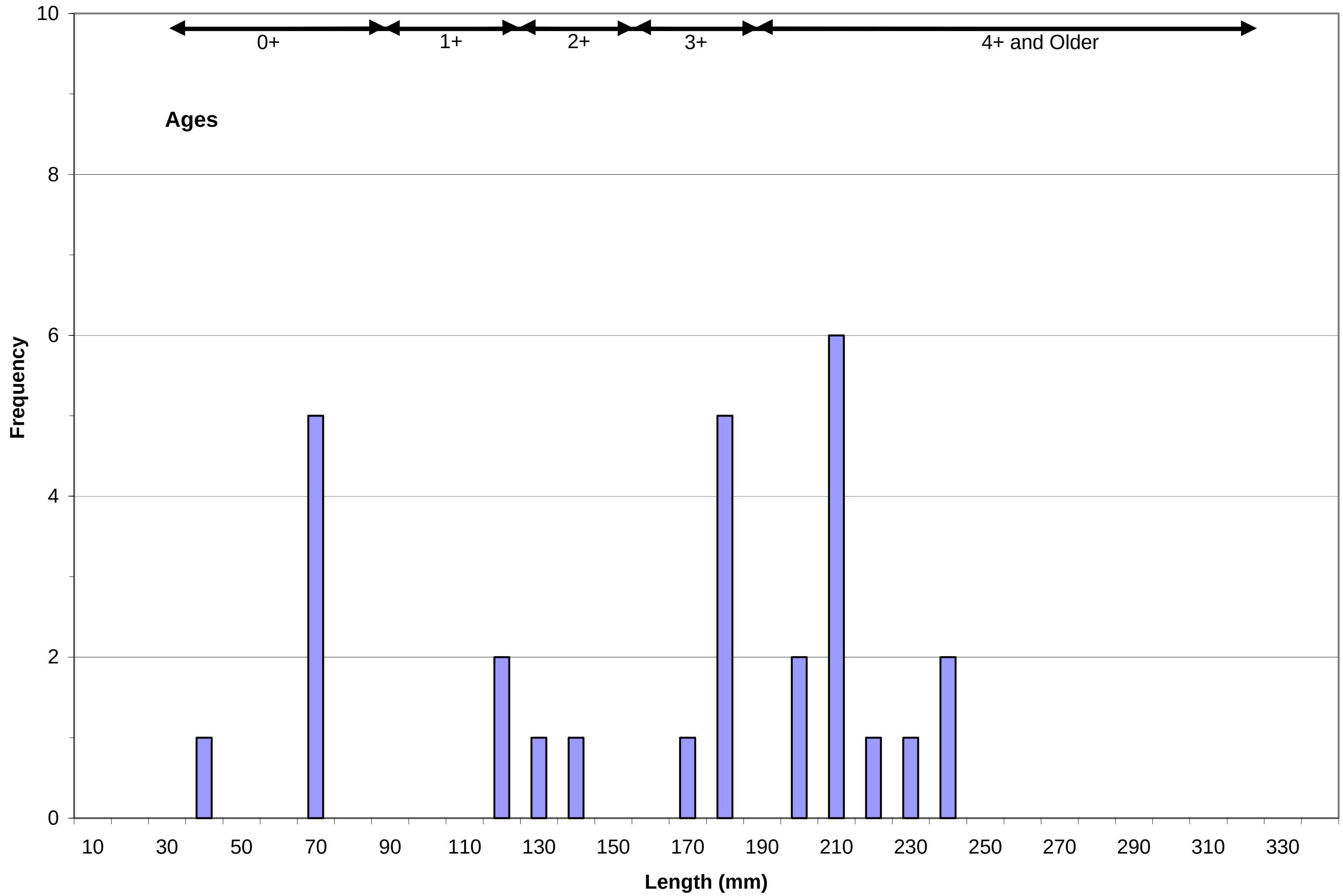


Figure CAWG 7-126. Length Frequency and Age of Brown Trout Collected in North Fork Stevenson Creek, Below the Tunnel 7 Outlet, Rosgen Level I Type G Channel Site, July 2002 (Number of Fish = 28).

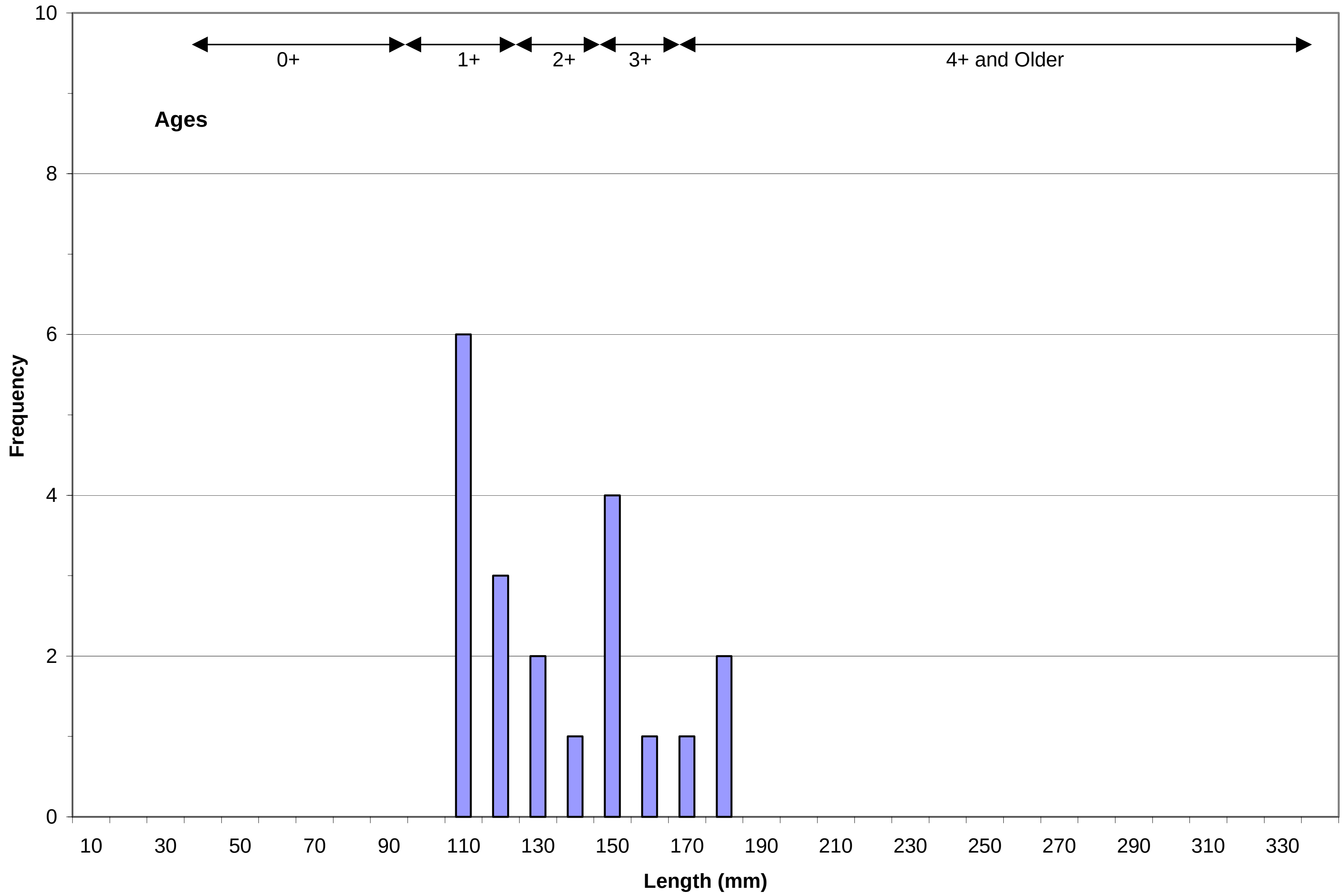


Figure CAWG 7-127. Length Frequency and Age of Rainbow Trout Collected in North Fork Stevenson Creek, Below the Tunnel 7 Outlet, Rosgen Level I Type G Channel Site, July 2002 (Number of Fish = 20).

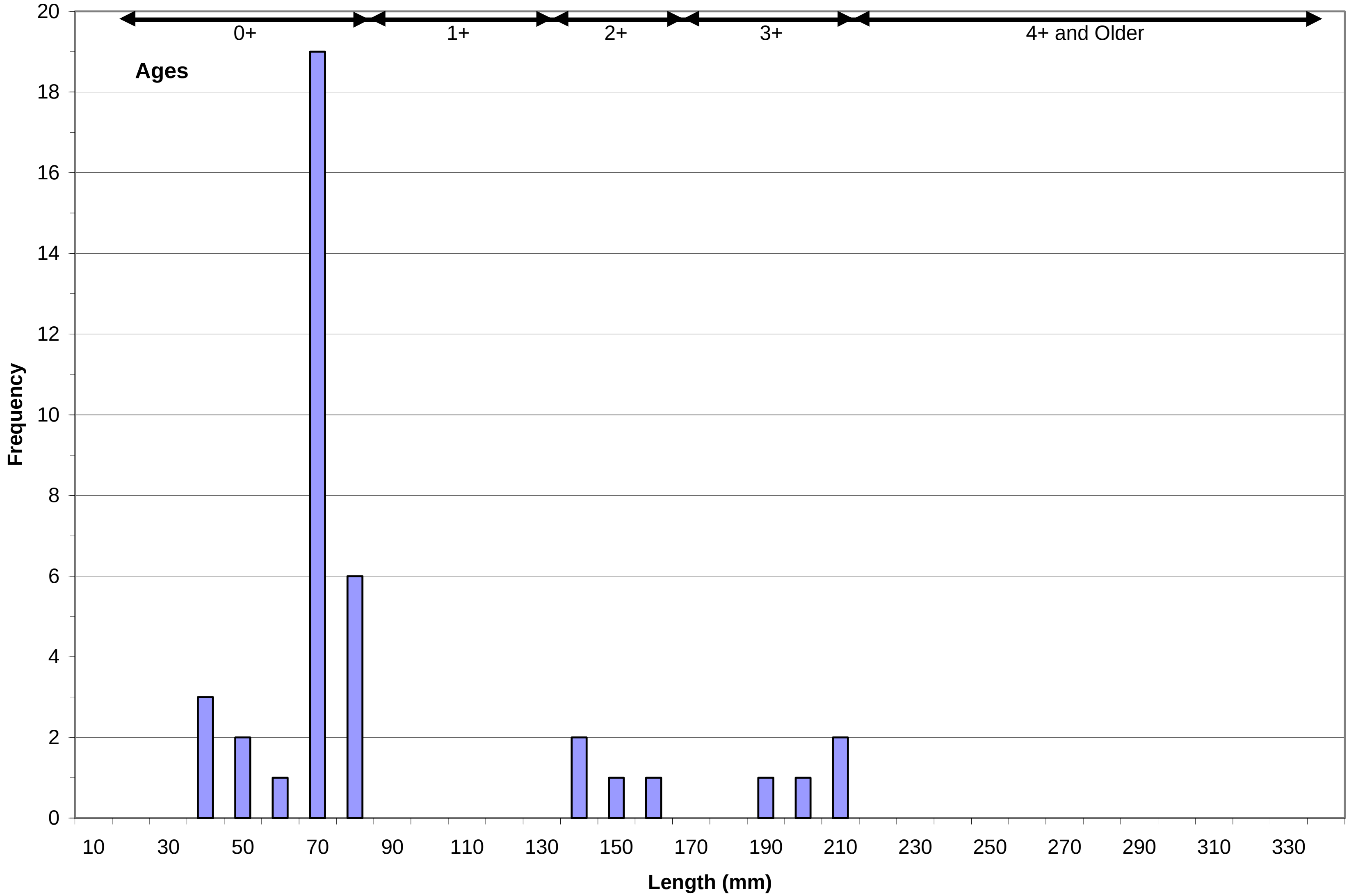


Figure CAWG 7-128. Length Frequency and Age of Brown Trout Collected in North Fork Stevenson Creek, Below the Tunnel 7 Outlet, Rosgen Level I Type C Channel Site, July 2002 (Number of Fish = 39).

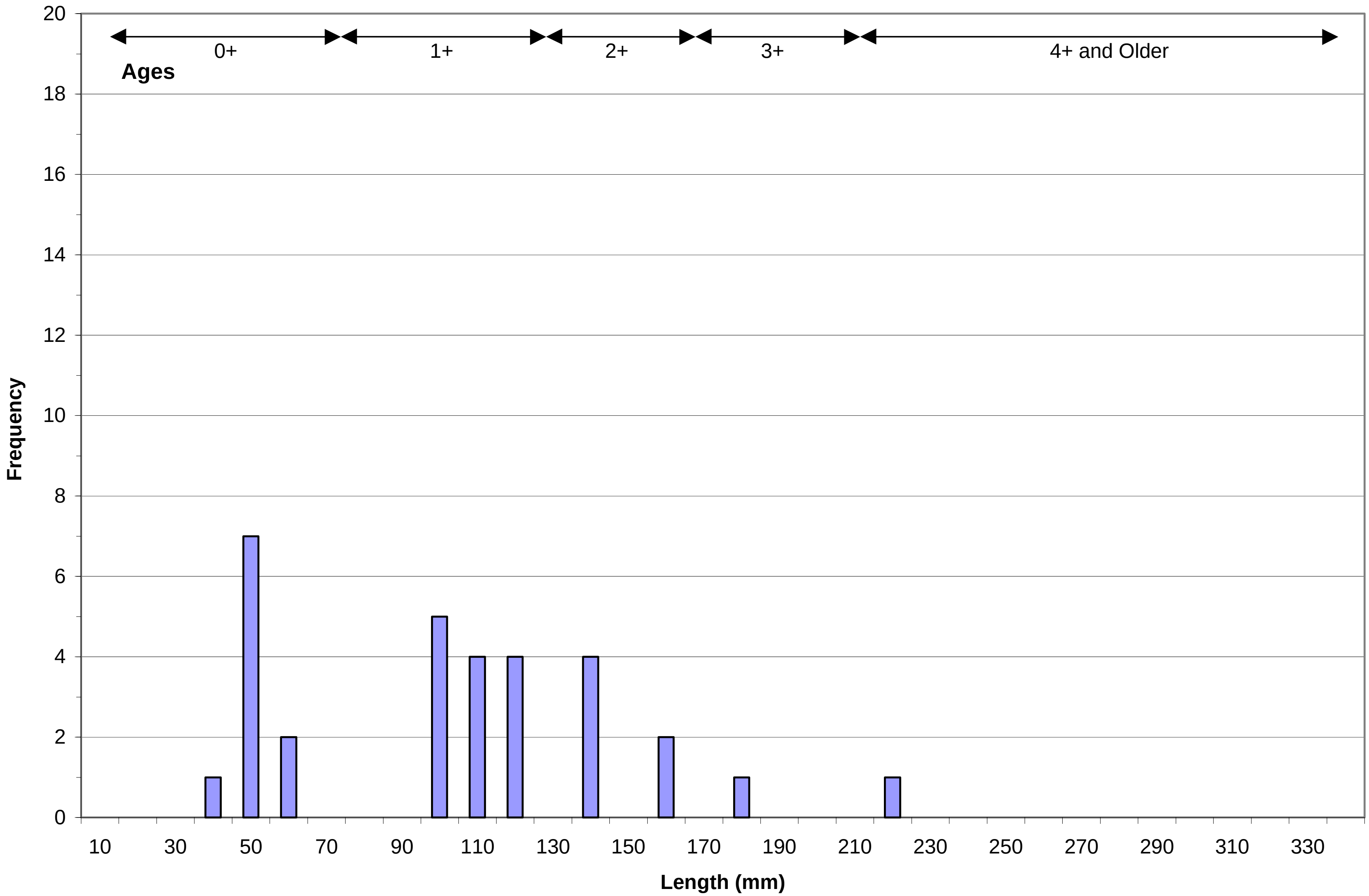


Figure CAWG 7-129. Length Frequency and Age of Rainbow Trout Collected in North Fork Stevenson Creek, Below the Tunnel 7 Outlet, Rosgen Level I Type C Channel Site, July 2002 (Number of Fish = 31).

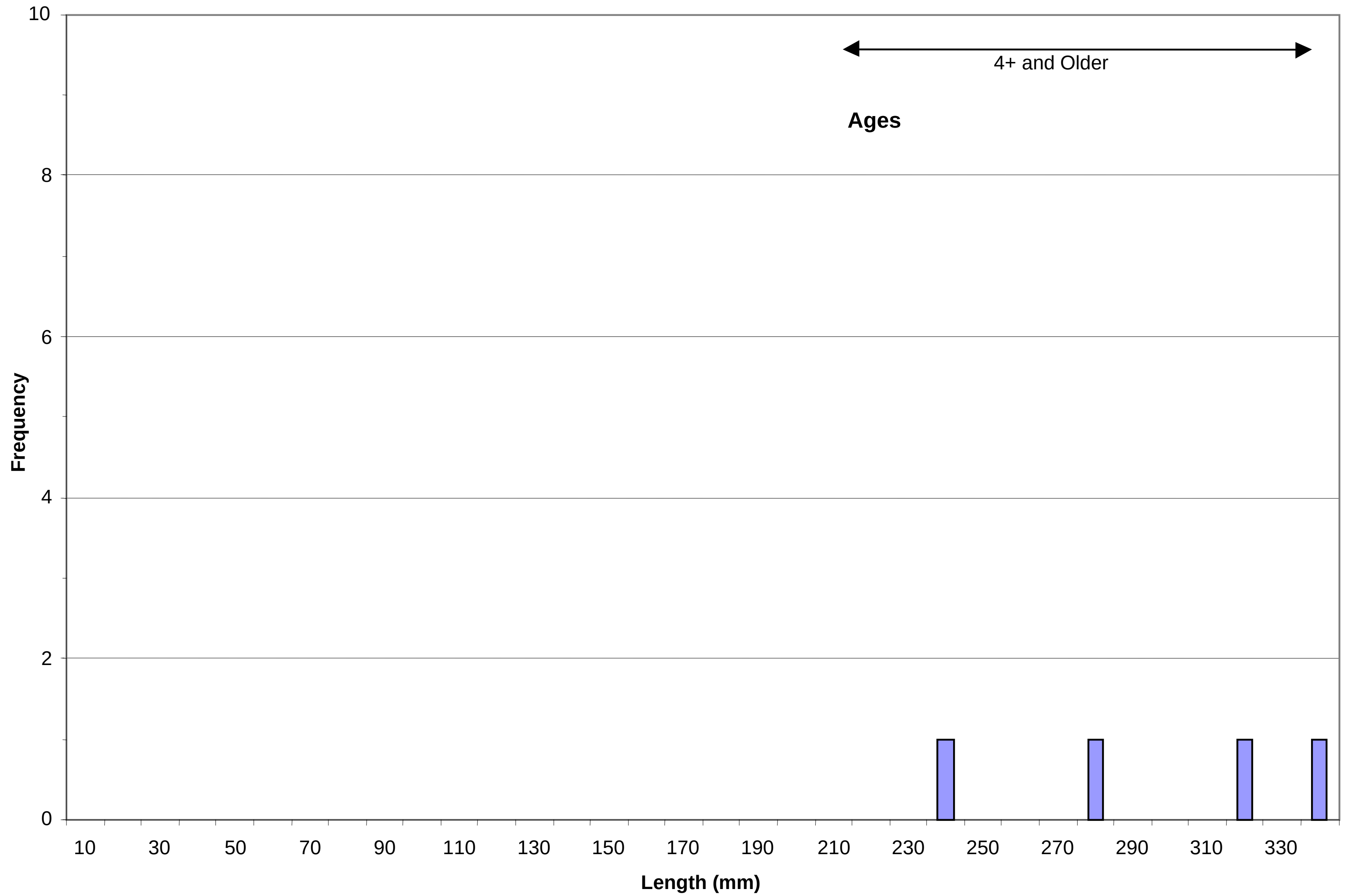
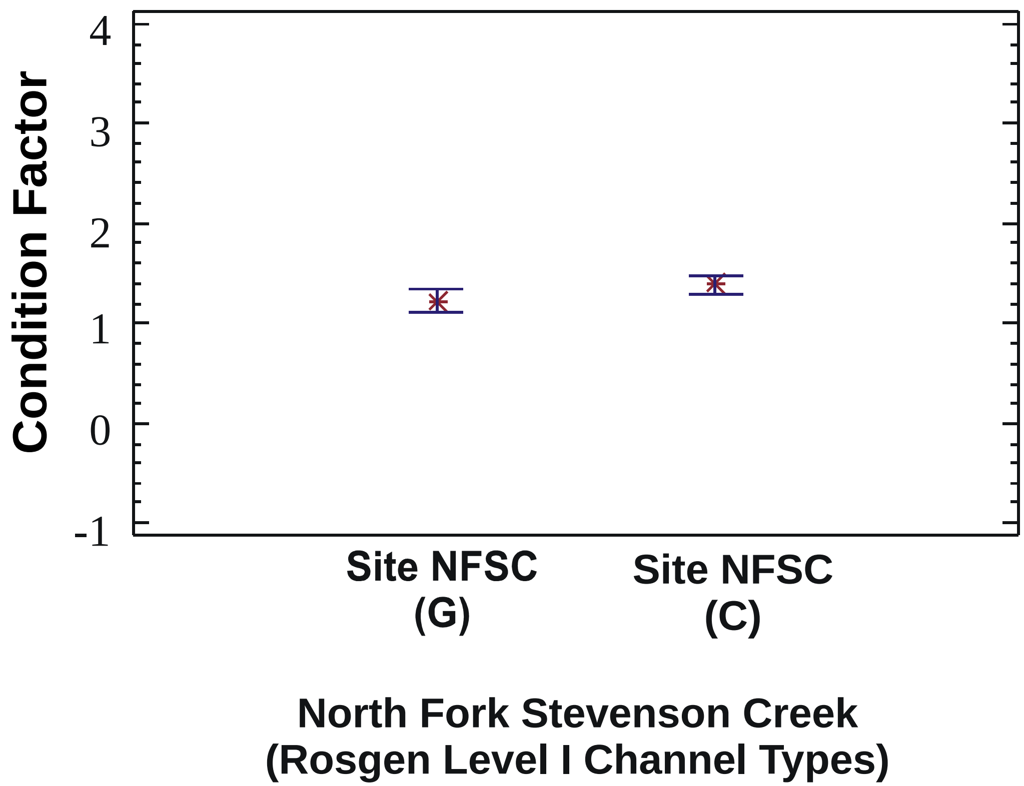
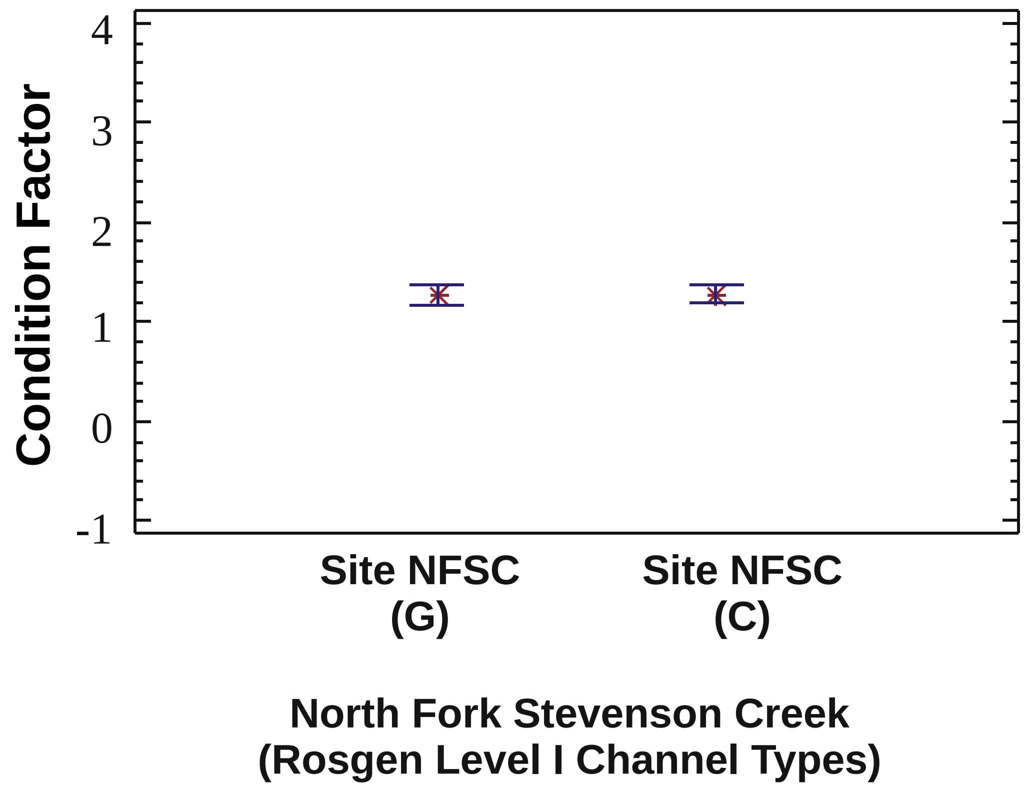


Figure CAWG 7-130. Length Frequency and Age of Sacramento Sucker Collected in North Fork Stevenson Creek, Below the Tunnel 7 Outlet, Rosgen Level I Type C Channel Site, July 2002 (Number of Fish = 4).



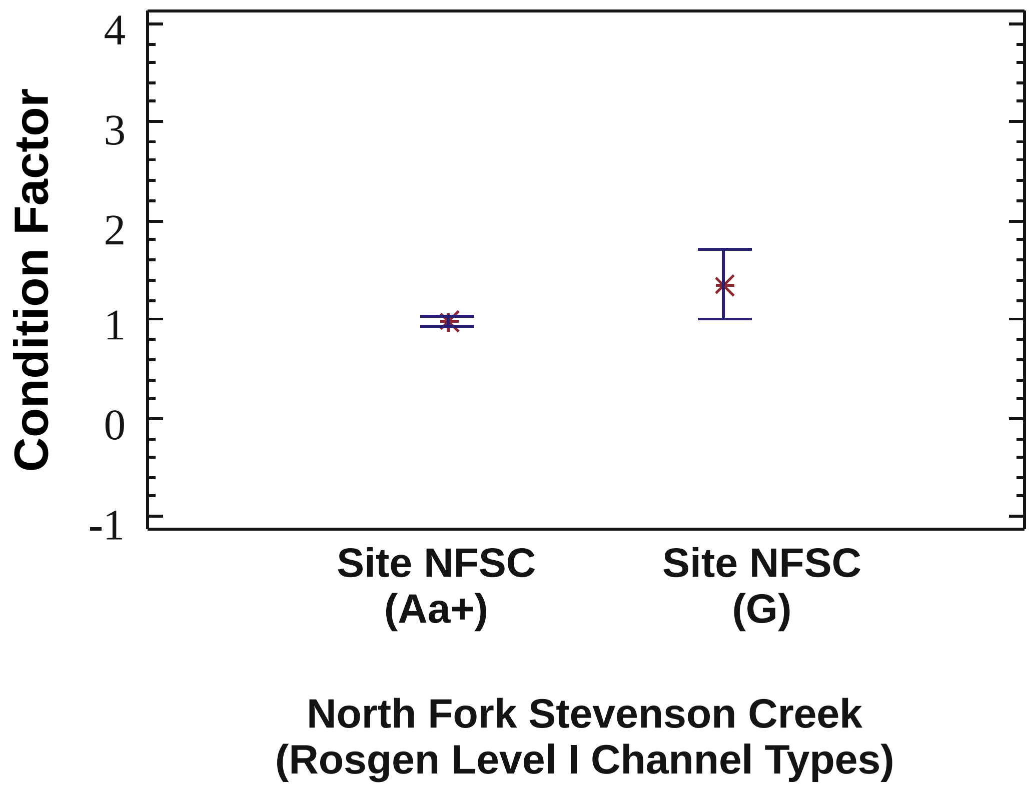
Site/Value	Site NFSC (G)	Site NFSC (C)
Upper 95% Limit	1.34	1.48
Mean	1.23	1.39
Lower 95% Limit	1.12	1.30

Figure CAWG 7-131. Brown Trout Condition Factor Means and 95.0 Percent Confidence Intervals (pooled variance) for Downstream of Tunnel 7 Rosgen Level I Type G and C Channel Sites for North Fork Stevenson Creek, 2002.



Site/Value	Site NFSC (G)	Site NFSC (C)
Upper 95% Limit	1.37	1.36
Mean	1.27	1.27
Lower 95% Limit	1.16	1.19

Figure CAWG 7-132. Rainbow Trout Condition Factor Means and 95.0 Percent Confidence Intervals (pooled variance) for Downstream of Tunnel 7 Rosgen Level I Type G and C Channel Sites for North Fork Stevenson Creek, 2002.



Site/Value	Site NFSC (Aa+)	Site NFSC (G)
Upper 95% Limit	1.03	1.70
Mean	0.98	1.35
Lower 95% Limit	0.93	1.00

Figure CAWG 7-133. Golden x Rainbow Trout Hybrid Condition Factor Means and 95.0 Percent Confidence Intervals (pooled variance) for Downstream of Tunnel 7 Rosgen Level I Type Aa+ and G Channel Sites for North Fork Stevenson Creek, 2002.

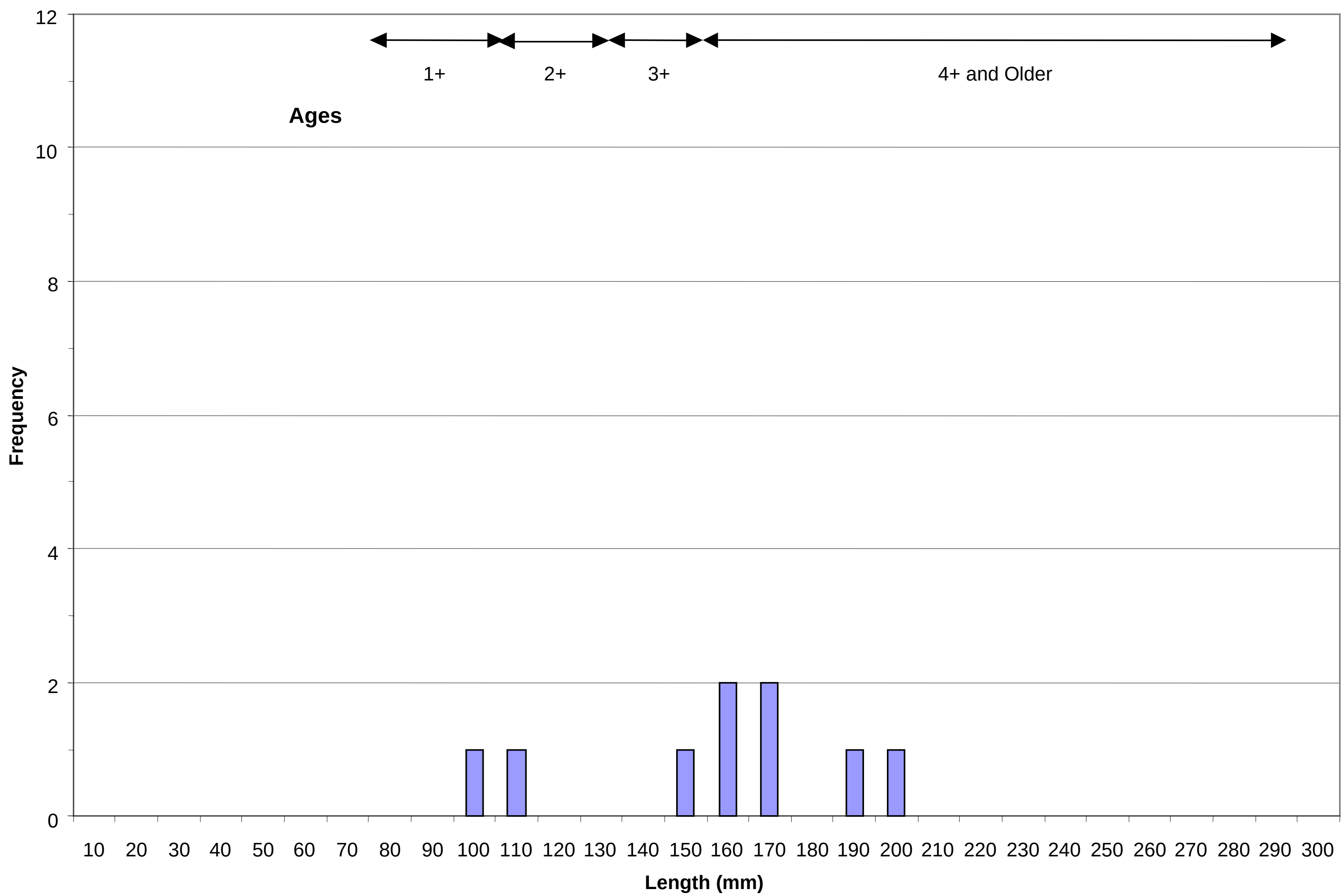


Figure CAWG 7-134. Length Frequency and Age of Rainbow Trout Collected in Stevenson Creek, Below Shaver Lake, Rosgen Level I Type A Channel Site, October 2002 (Number of Fish = 9).

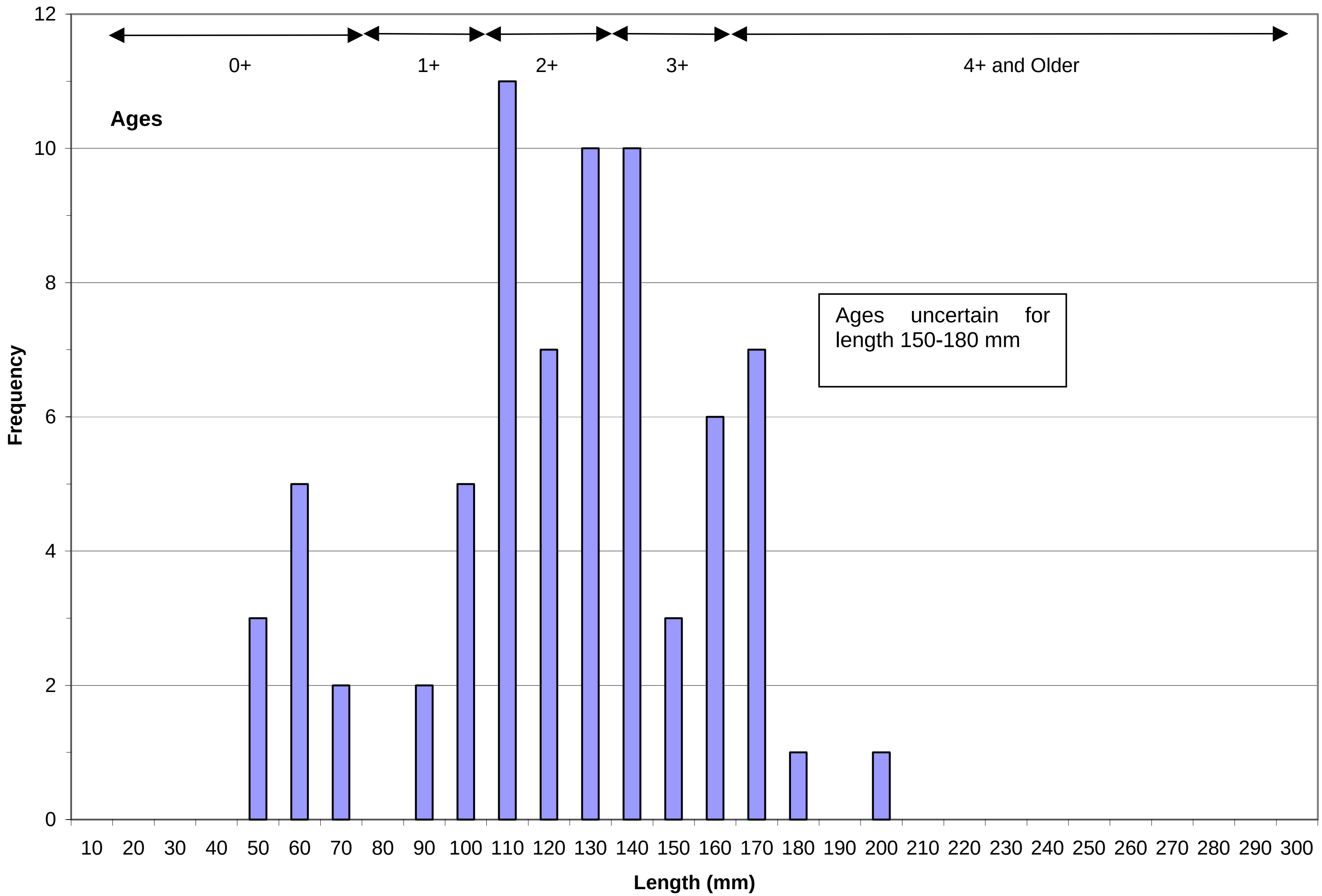


Figure CAWG 7-135. Length Frequency and Age of Rainbow Trout Collected in Stevenson Creek, Below Shaver Lake, Rosgen Level I Type Aa+ Channel Site, August 2002 (Number of Fish = 73).

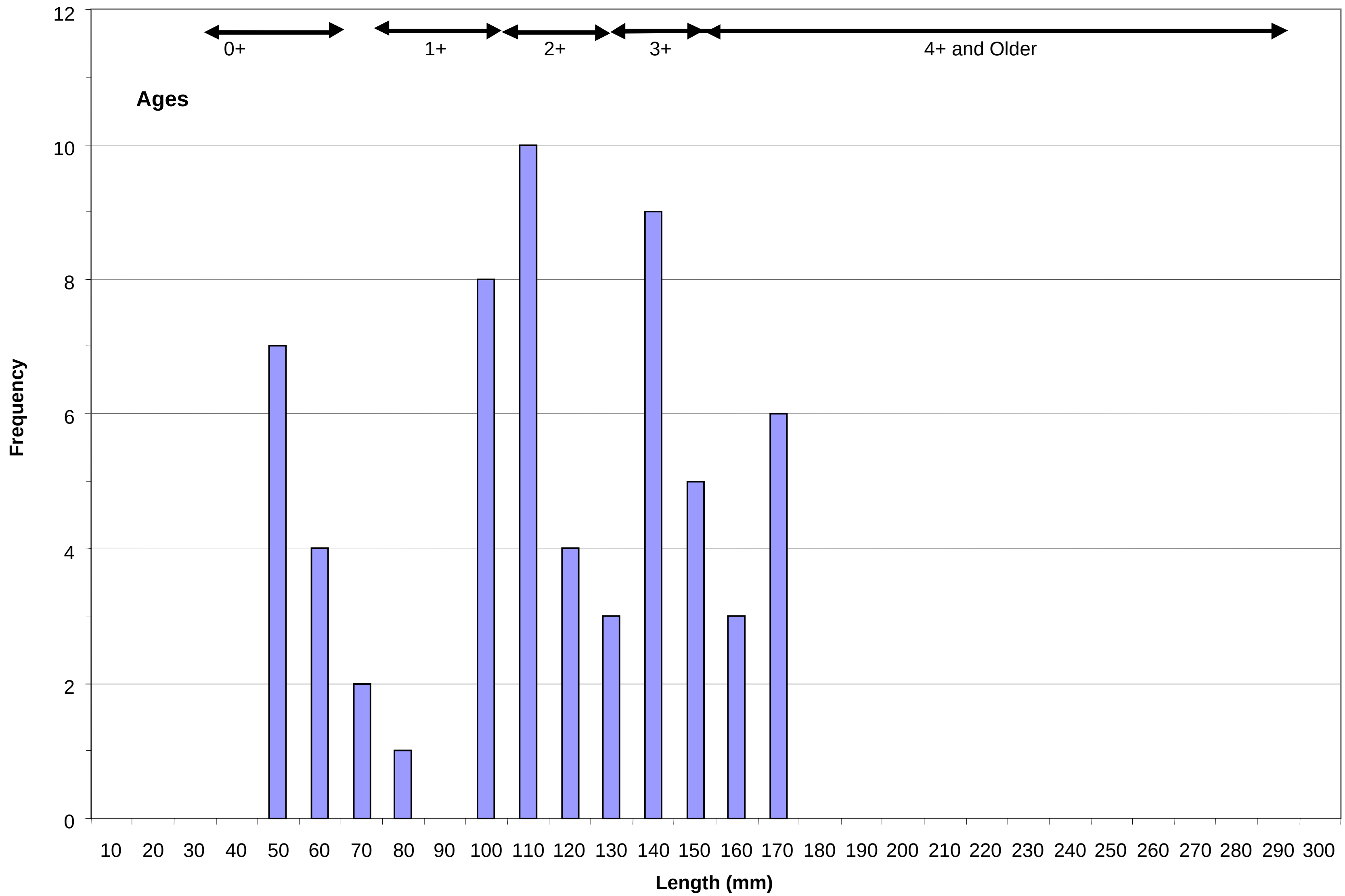
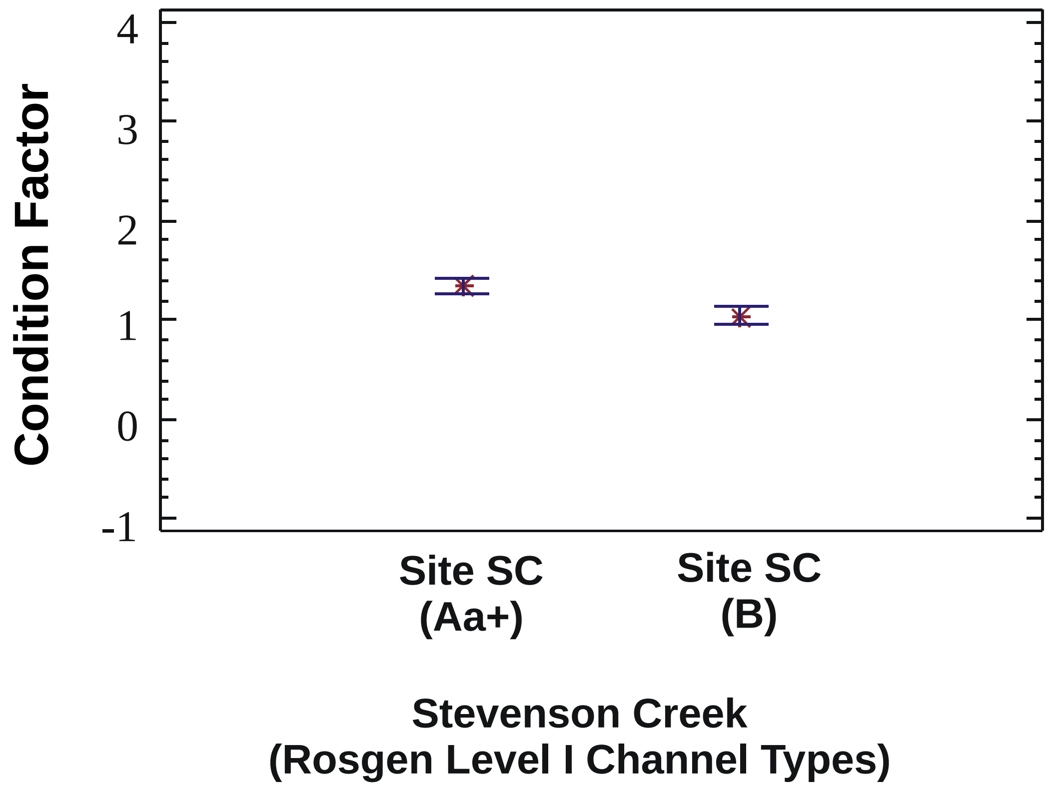


Figure CAWG 7-136. Length Frequency and Age of Rainbow Trout Collected in Stevenson Creek, Below Shaver Lake, Rosgen Level I Type B Channel Site, August 2002 (Number of Fish = 62).



Site/ Value	Site SC (Aa+)	Site SC (B)
Upper 95% Limit	1.42	1.13
Mean	1.34	1.04
Lower 95% Limit	1.26	0.96

Figure CAWG 7-137. Rainbow Trout Condition Factor Means and 95.0 Percent Confidence Intervals (pooled variance) for Rosgen Level I Type Aa+ and B Channel Sites[1] for Stevenson Creek, 2002.

[1] No condition factor available for Rosgen Level I A Channel Site due to scale malfunction.

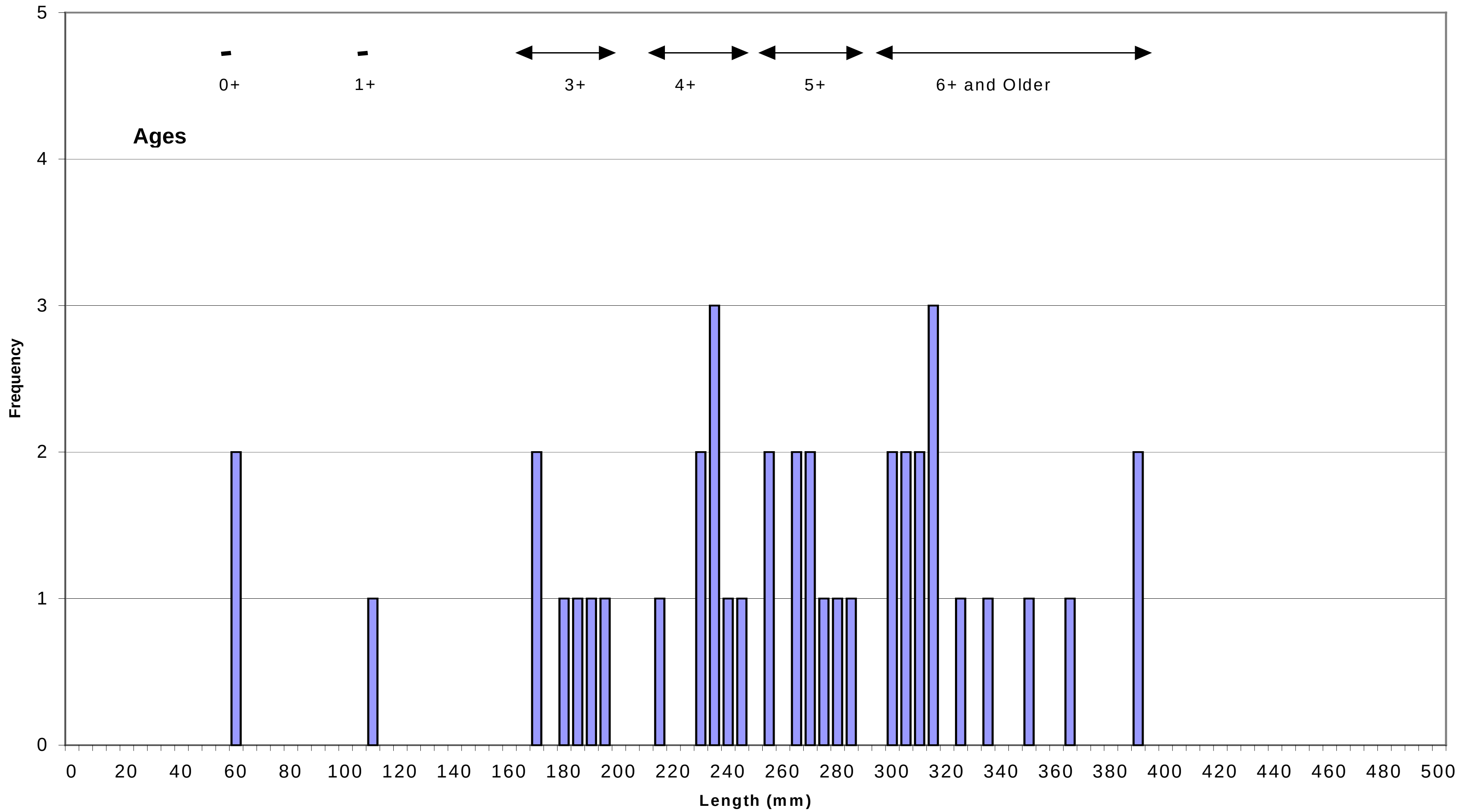


Figure CAWG 7-138. Length Frequency and Age of Brown Trout Collected in Florence Lake, August 2002 (Number of Fish = 41)

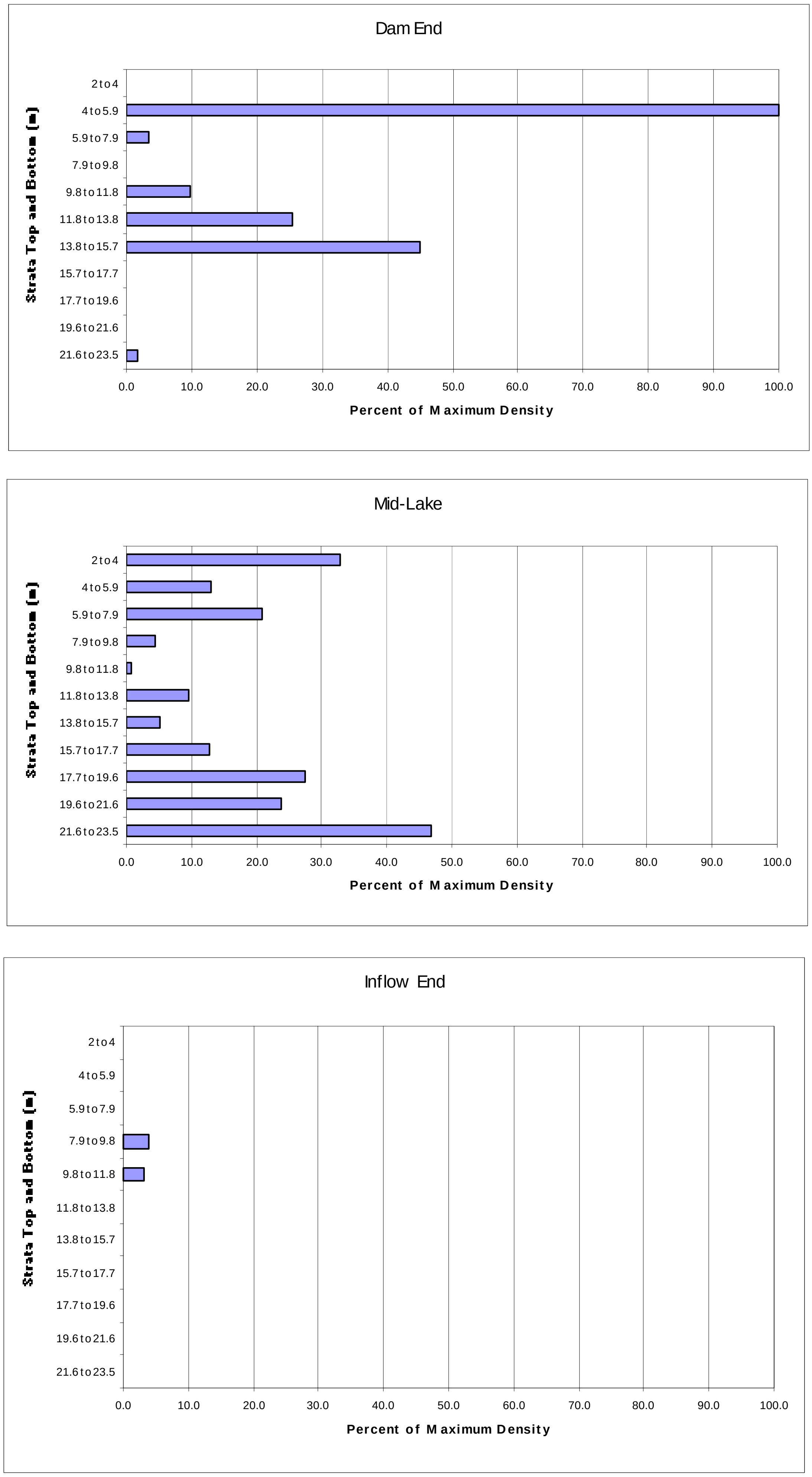


Figure CAWG 7-139. Percent of Maximum Fish Density Detected by Lake Area During Florence Lake Hydroacoustic Survey, August 2002 (Maximum Density Detected = 7.75 x 10^{-4} fish/m^3).

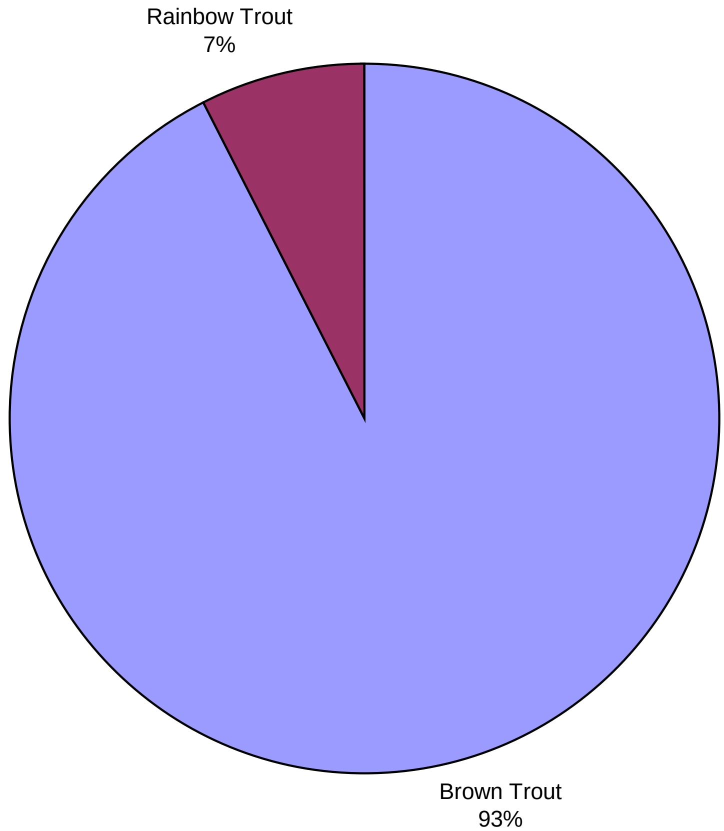


Figure CAWG 7-140. Composition of Fish Species Collected in Bear Diversion Forebay, June 2002 (Number of Fish = 54).

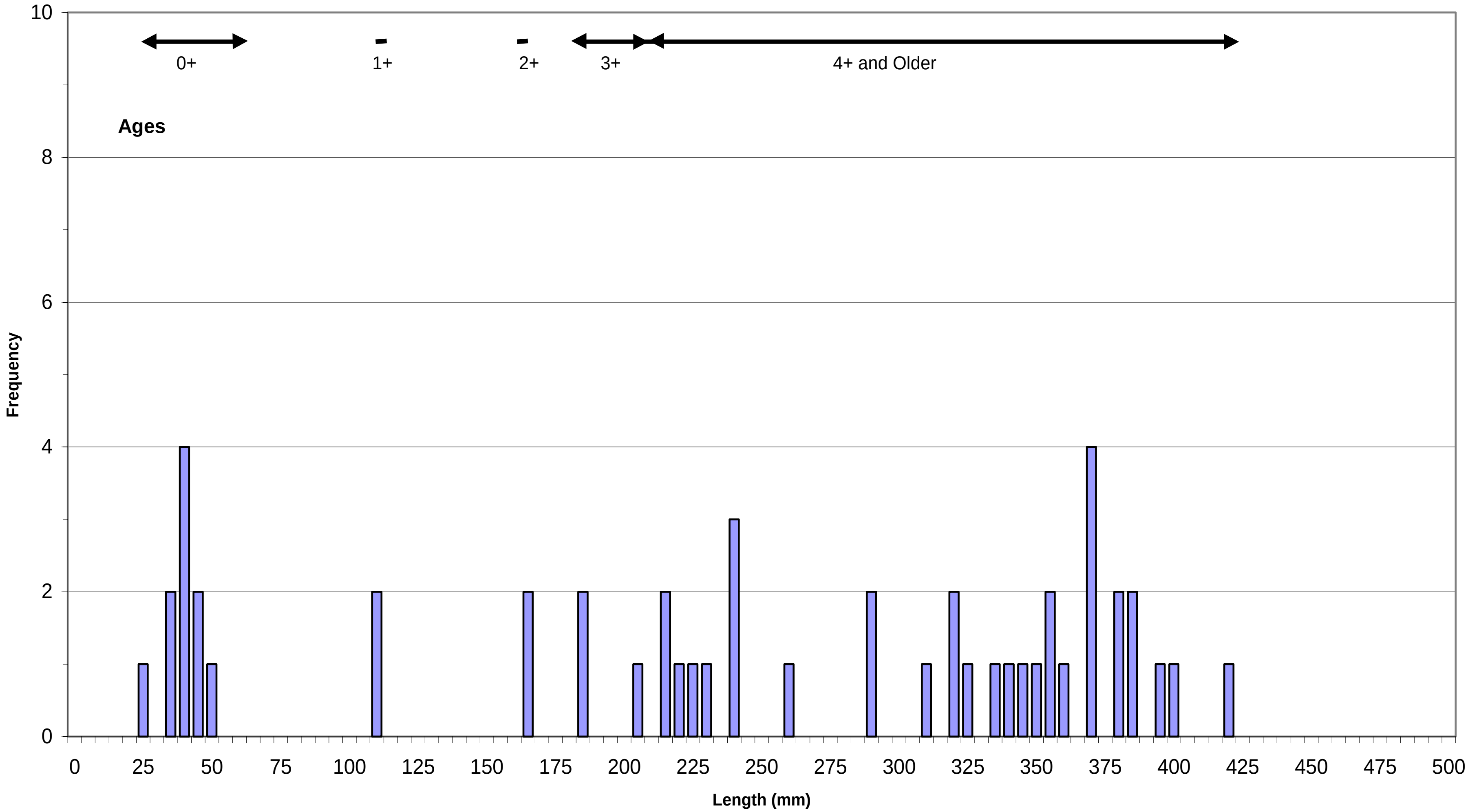
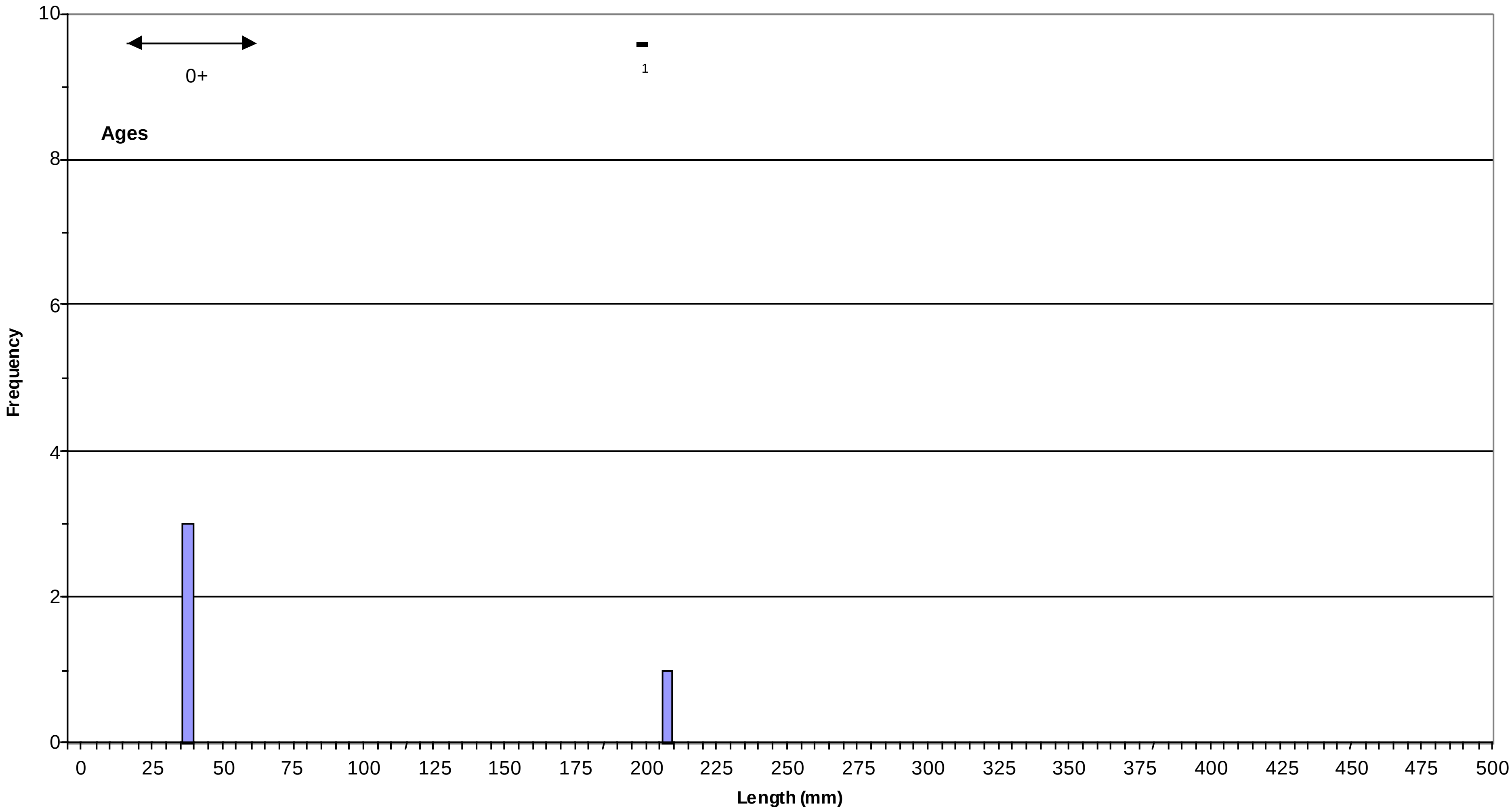


Figure CAWG 7-141. Length Frequency and Age of Brown Trout Collected in Bear Diversion Forebay June 2002 (Number of Fish = 50).



[1] Unable to determine the age of the fish.

Figure CAWG 7-142. Length Frequency and Age of Rainbow Trout Collected in Bear Diversion Forebay, June 2002 (Number of Fish = 4).

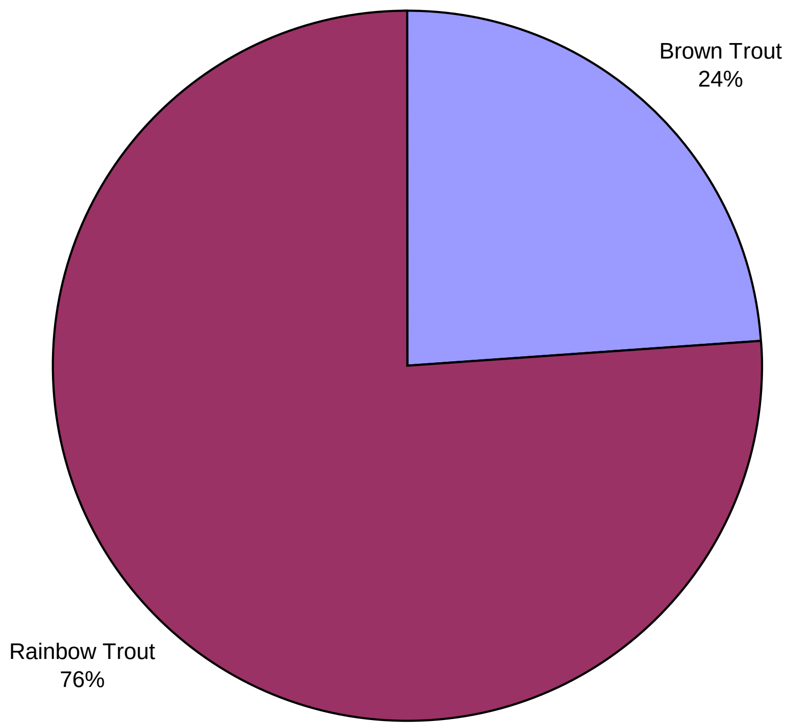


Figure CAWG 7-143. Composition of Fish Species Collected in Mono Diversion Forebay, June 2002 (Number of Fish = 50).

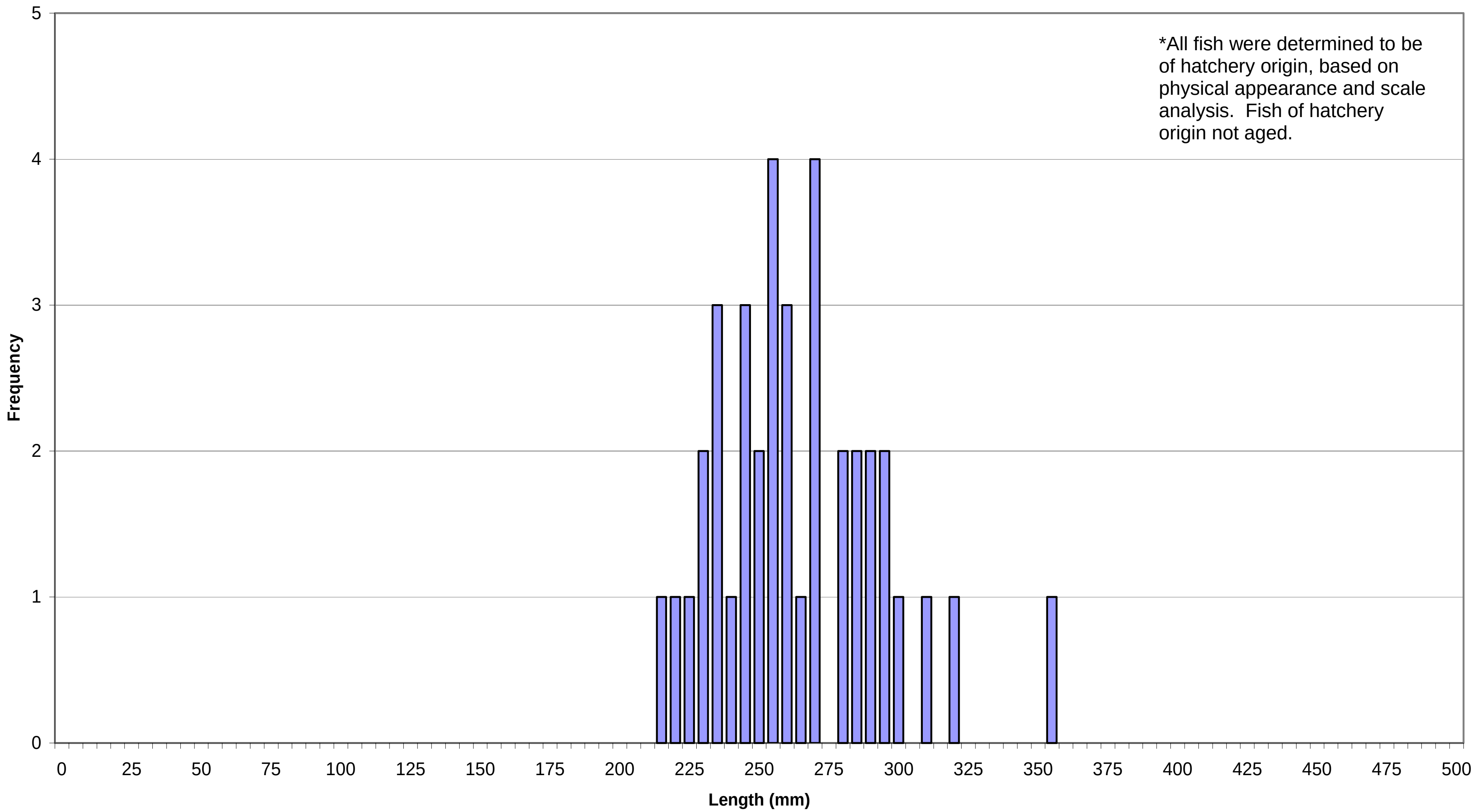


Figure CAWG 7-144. Length Frequency of Rainbow Trout Collected in Mono Diversion Forebay, June 2002 (Number of Fish = 38).

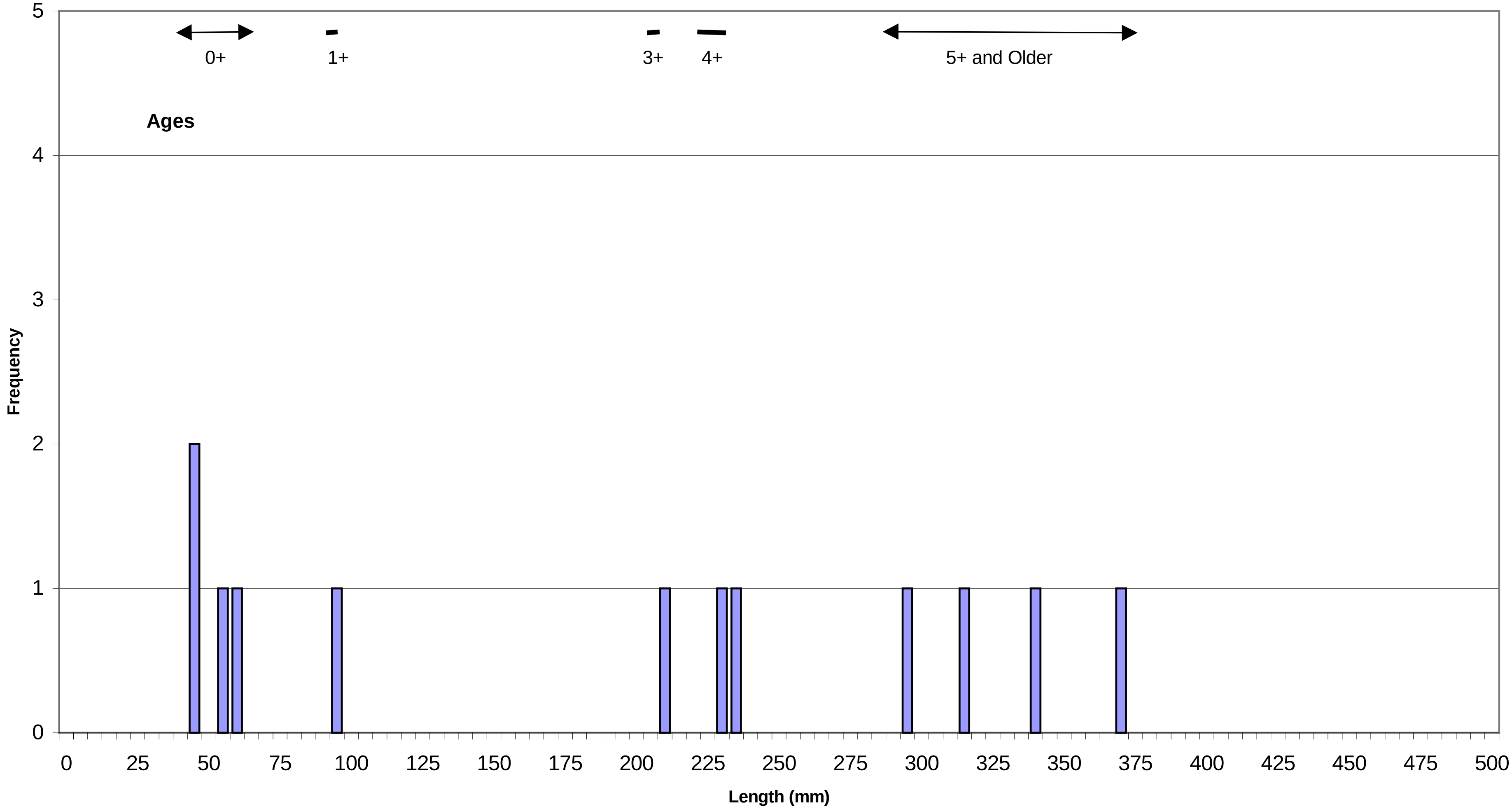


Figure CAWG 7-145. Length Frequency and Age of Brown Trout Collected in Mono Diversion Forebay, June 2002 (Number of Fish = 12).

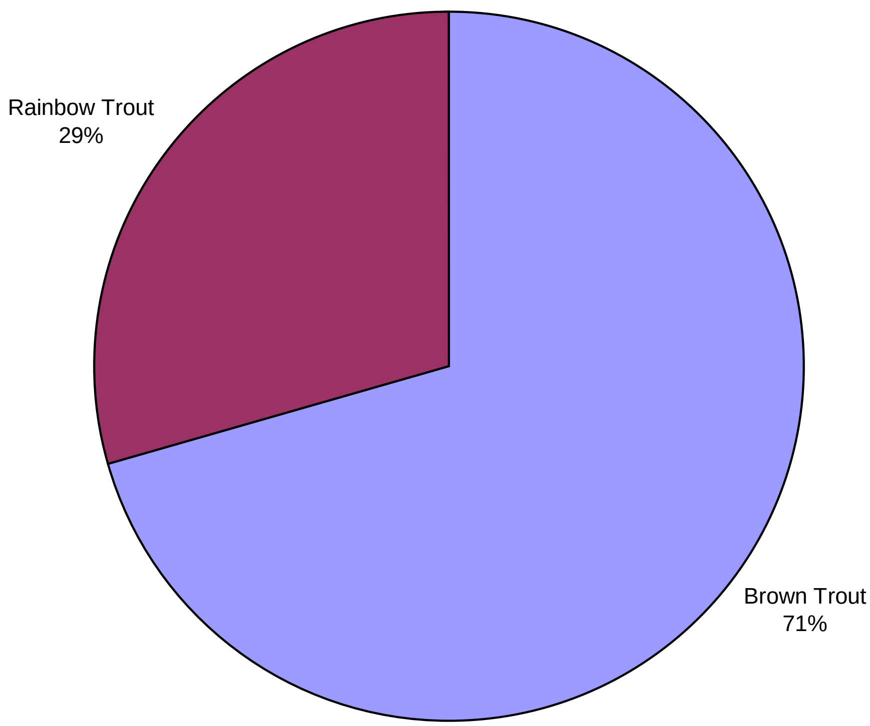
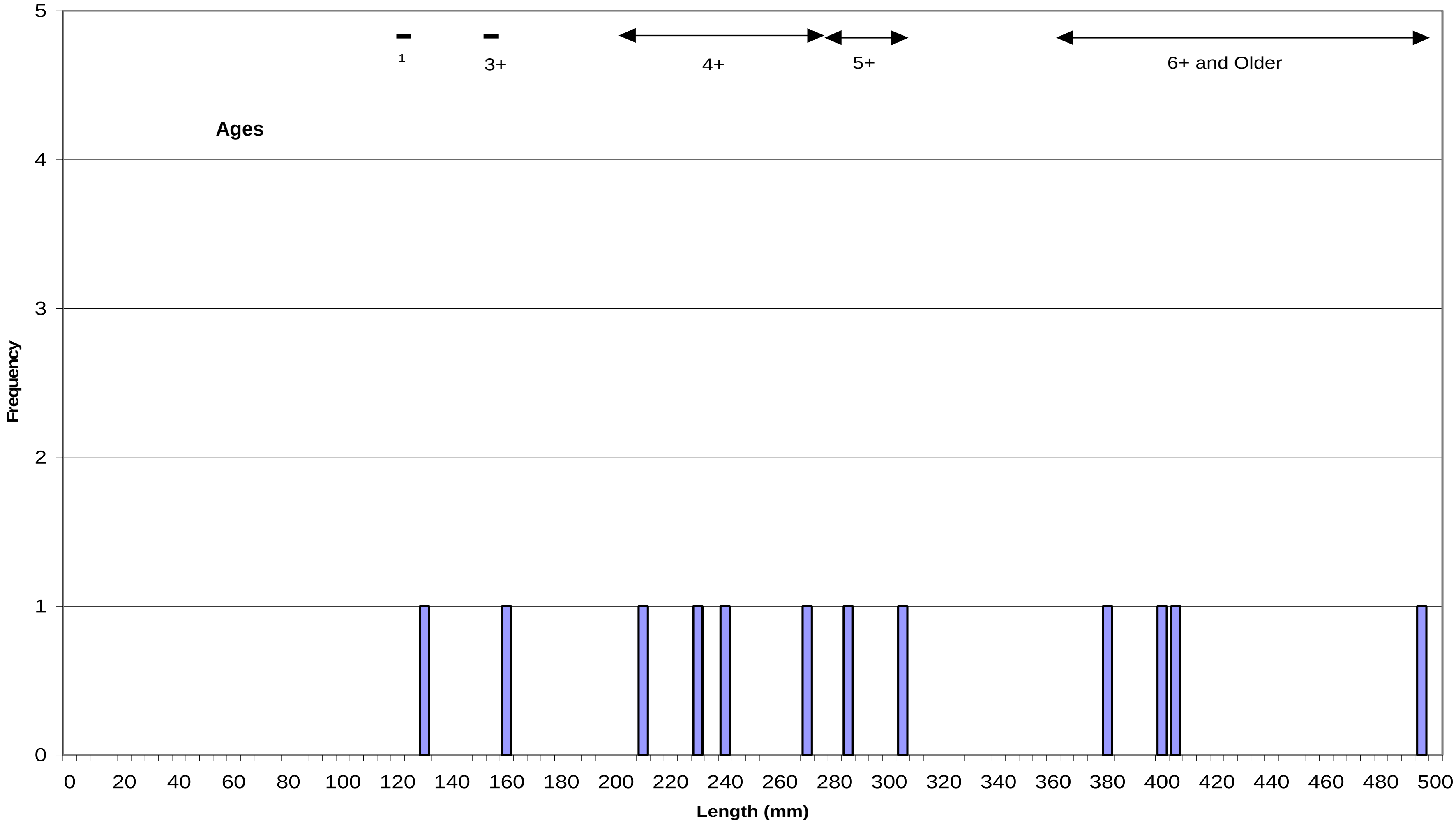


Figure CAWG 7-146. Composition of Fish Species Collected in Mammoth Pool Reservoir, September 2002 (Number of Fish = 17).



[1] Unable to determine the age of the fish.

Figure CAWG 7-147. Length Frequency and Age of Brown Trout Collected Mammoth Pool Reservoir, All Gill Nets, September 2002 (Number of Fish = 12).

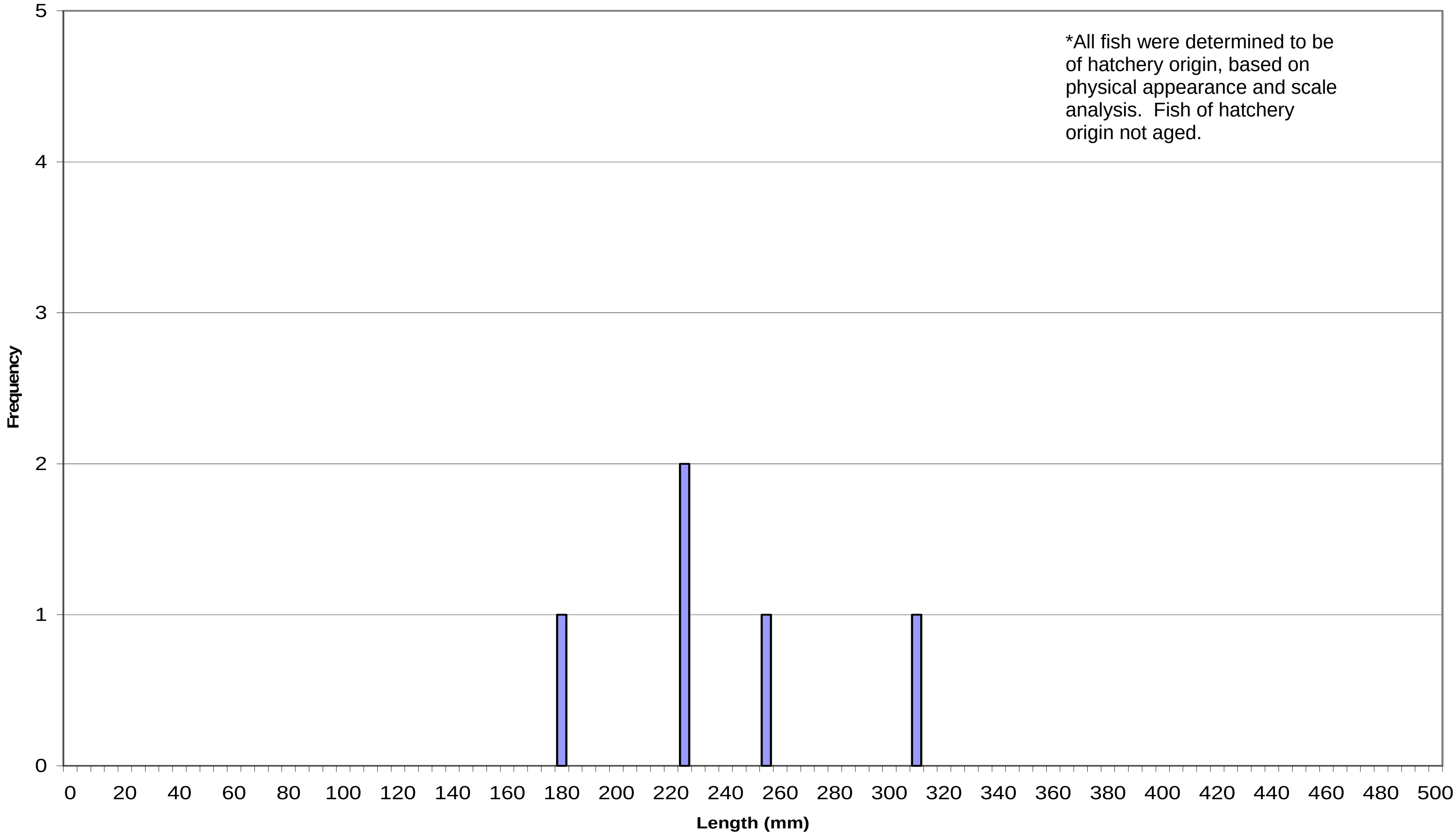


Figure CAWG 7-148. Length Frequency and of Rainbow Trout Collected in Mammoth Pool Reservoir, All Gill Nets, September 2002 (Number of Fish =5).

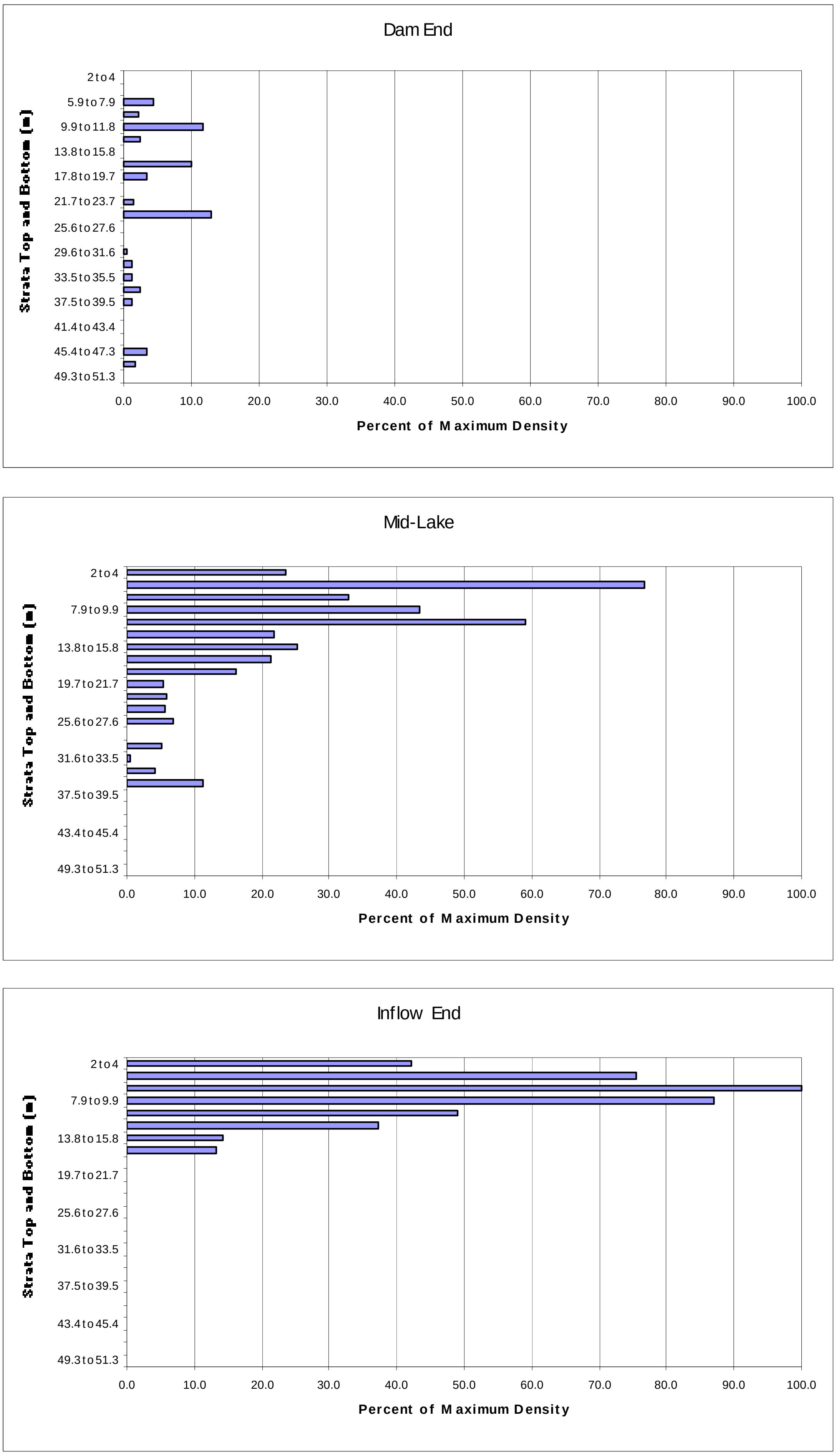


Figure CAWG 7-149. Percent of Maximum Fish Density Detected by Lake Area During Mammoth Pool Reservoir Hydroacoustic Survey, August 2002 (Maximum Density Detected = 2.18 x 10^{-3} fish/m^3).

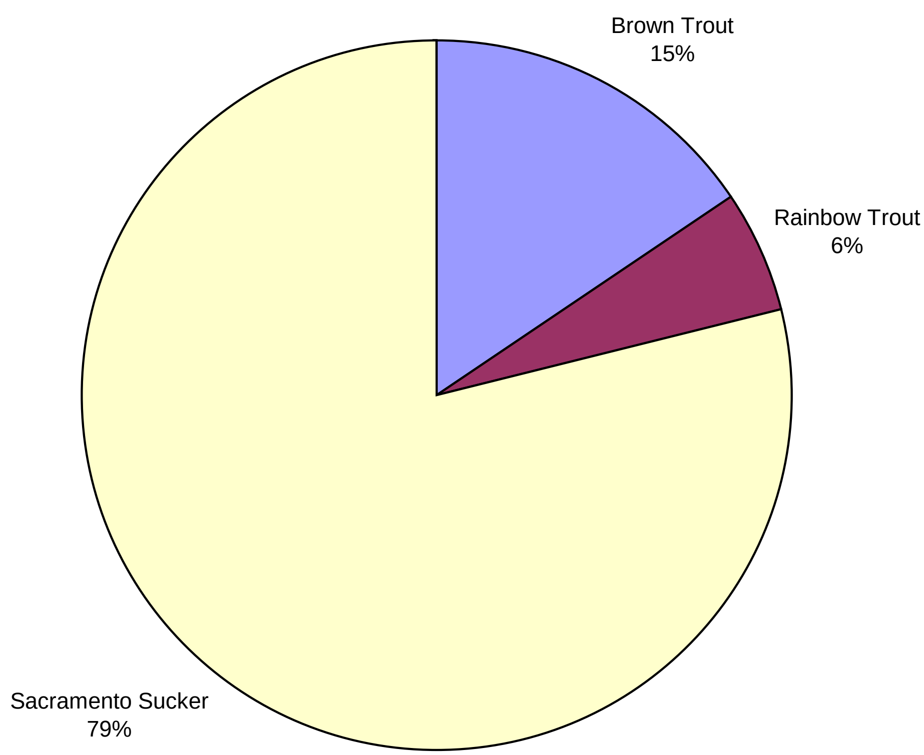


Figure CAWG 7-150. Composition of Fish Species Collected in Dam 6 Forebay, June 2002 (Number of Fish = 80).

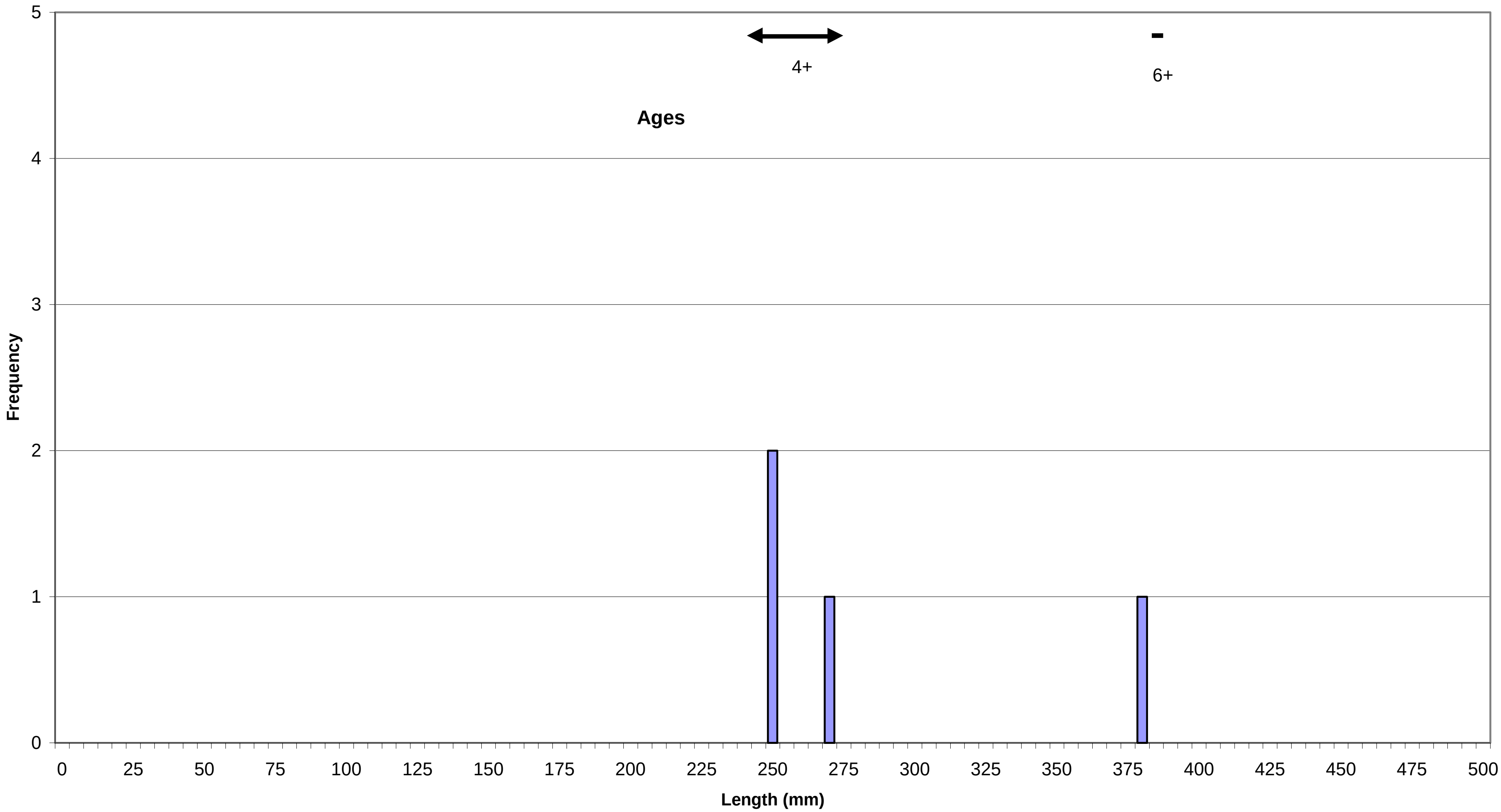


Figure CAWG 7-151. Length Frequency and Age of Rainbow Trout Collected in Dam 6 Forebay, All Gill Nets, June 2002 (Number of Fish = 4).

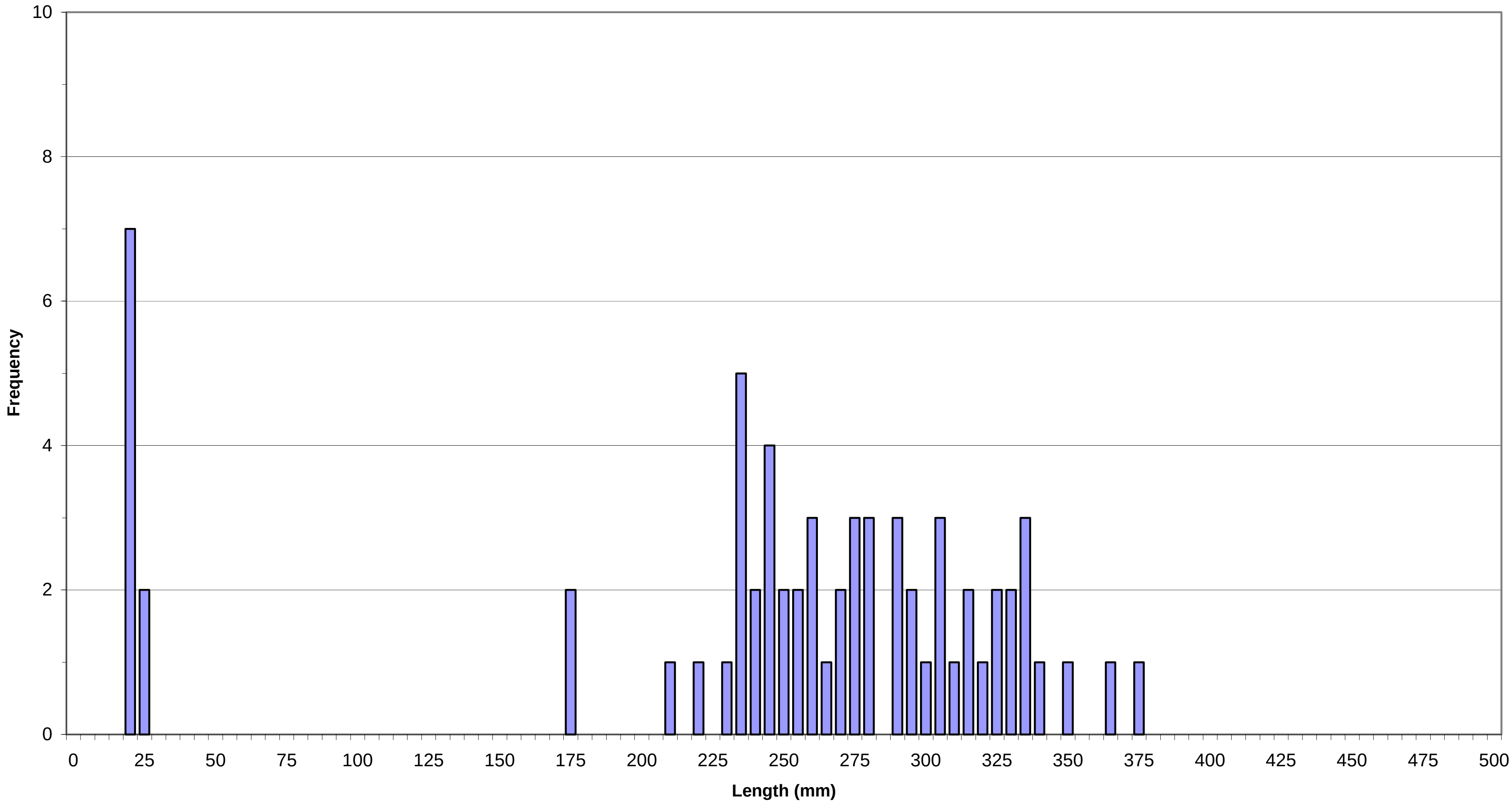


Figure CAWG 7-152. Length Frequency of All Sacramento Sucker Collected Dam 6 Forebay, June 2002 (Number of Fish = 65).

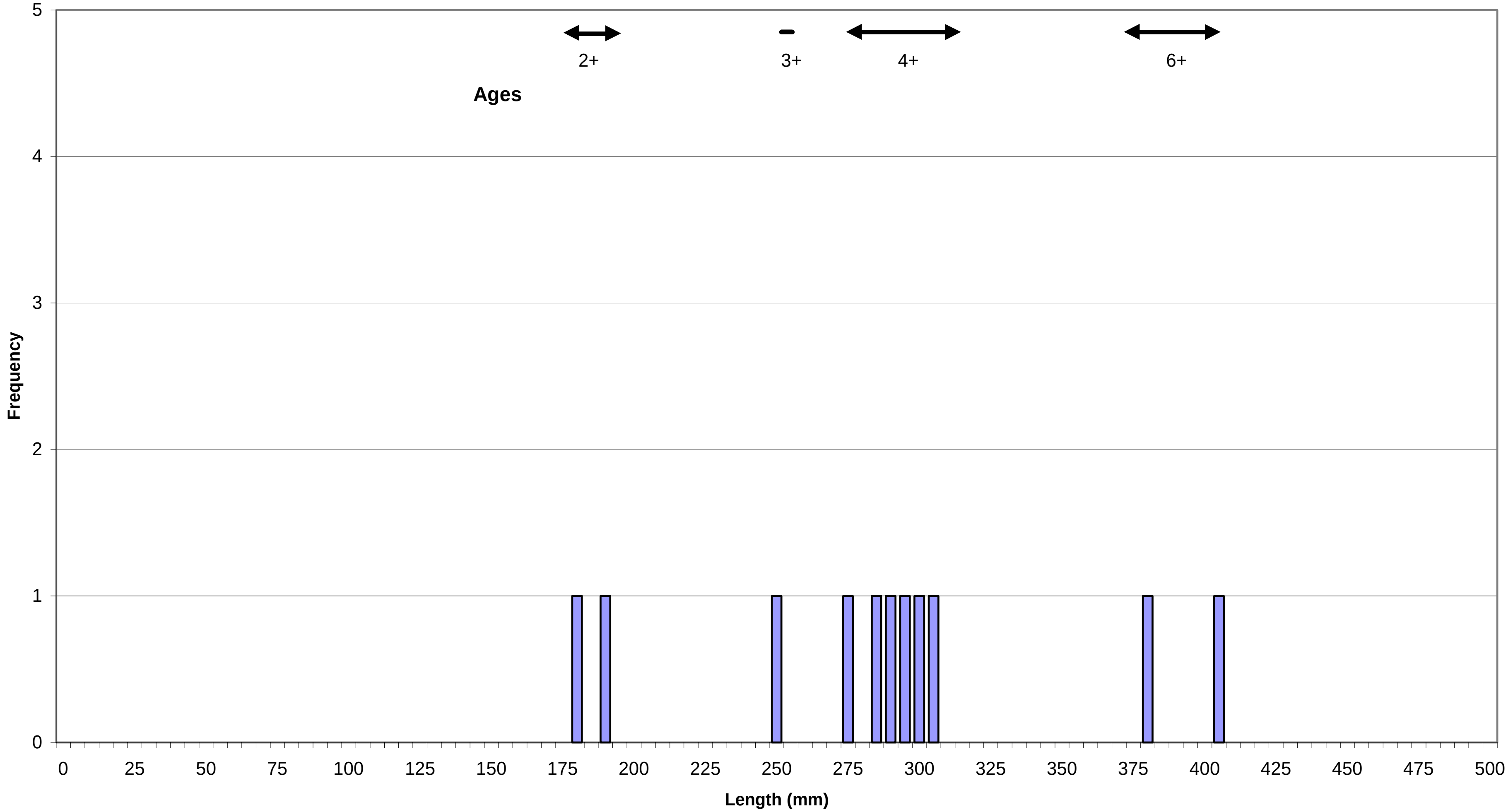


Figure CAWG 7-153. Length Frequency and Age of Brown Trout Collected in Dam 6 Forebay, All Gill Nets, June 2002 (Number of Fish = 11).

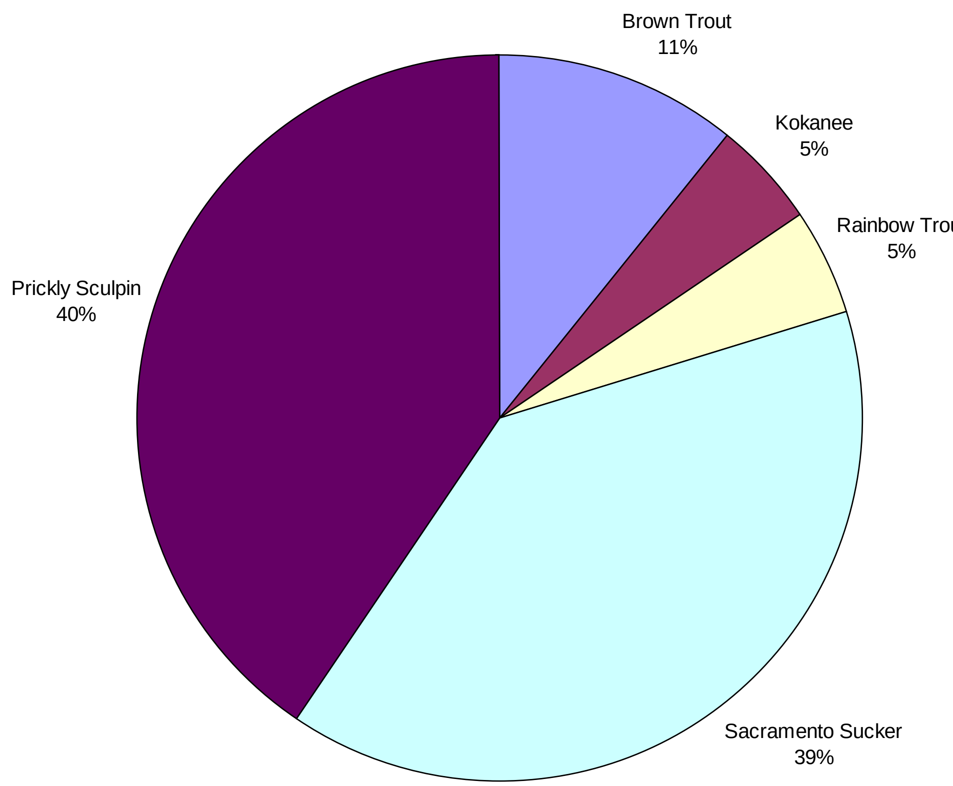


Figure CAWG 7-154. Composition of Fish Species Collected in Huntington Lake, June 2002 (Number of Fish = 64).

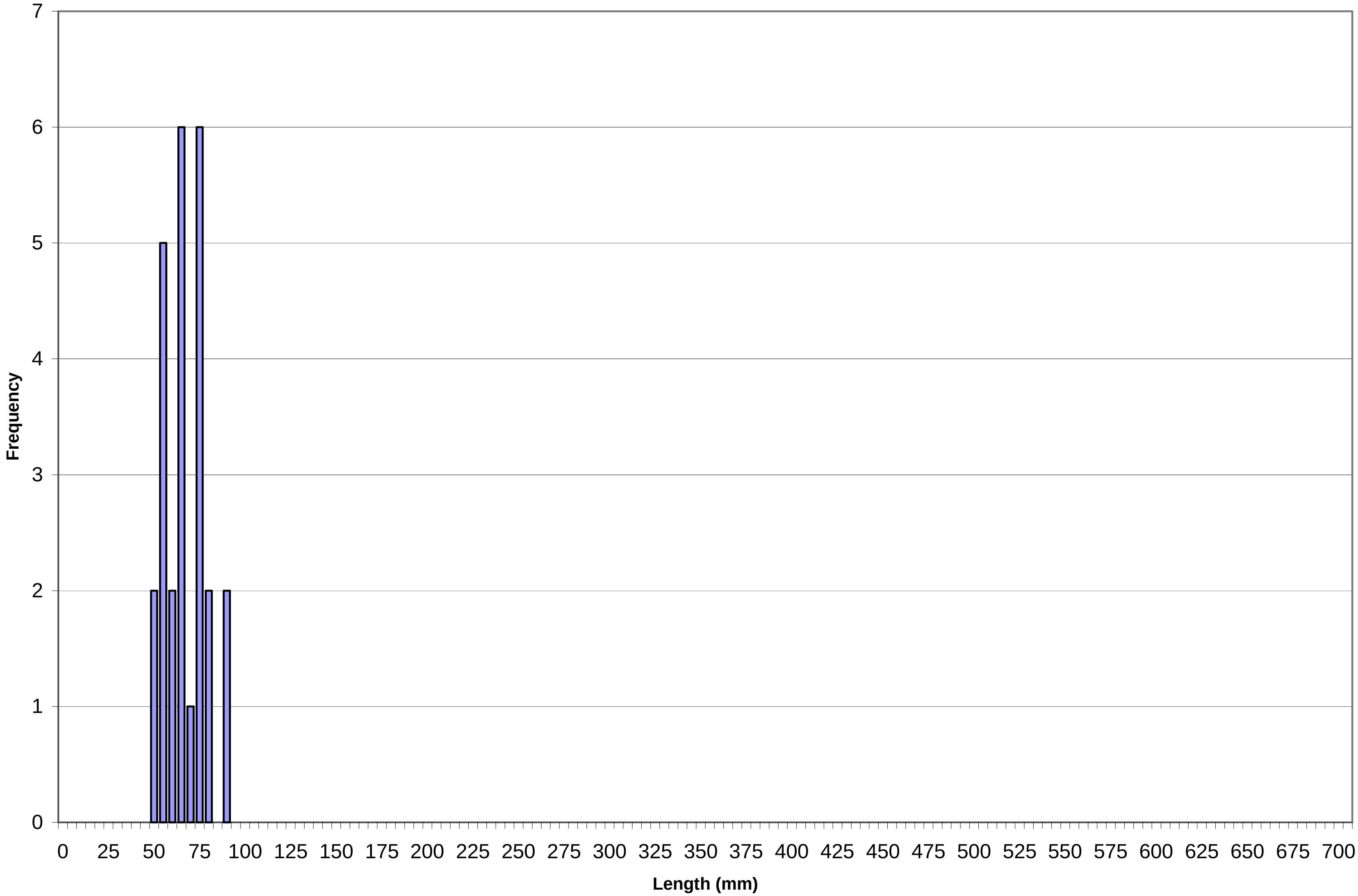


Figure CAWG 7-155. Length Frequency of Prickly Sculpin Collected in Huntington Lake, June 2002 (Number of Fish = 26).

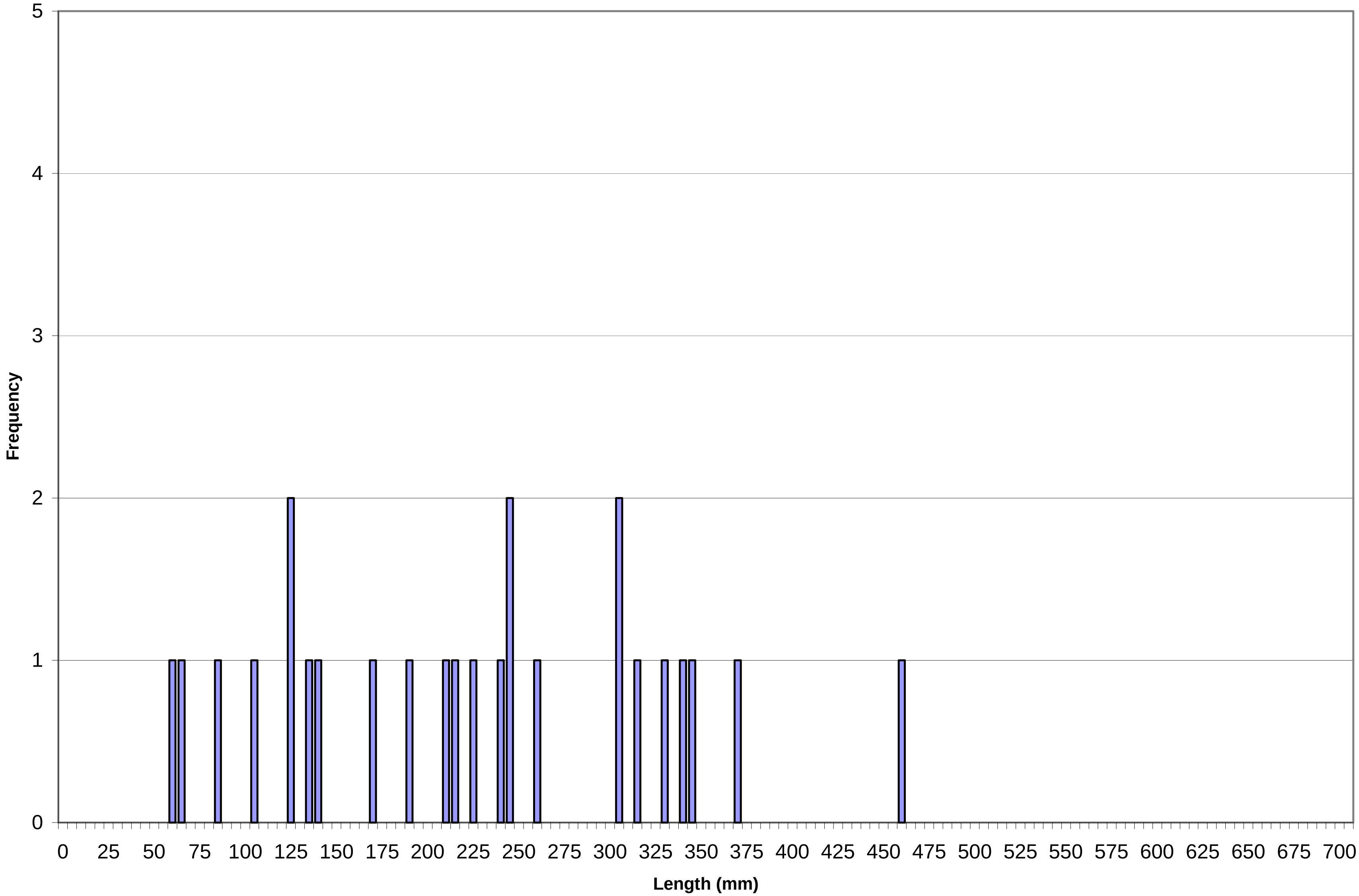


Figure CAWG 7-156. Length Frequency of Sacramento Sucker Collected in Huntington Lake, June 2002 (Number of Fish = 25).

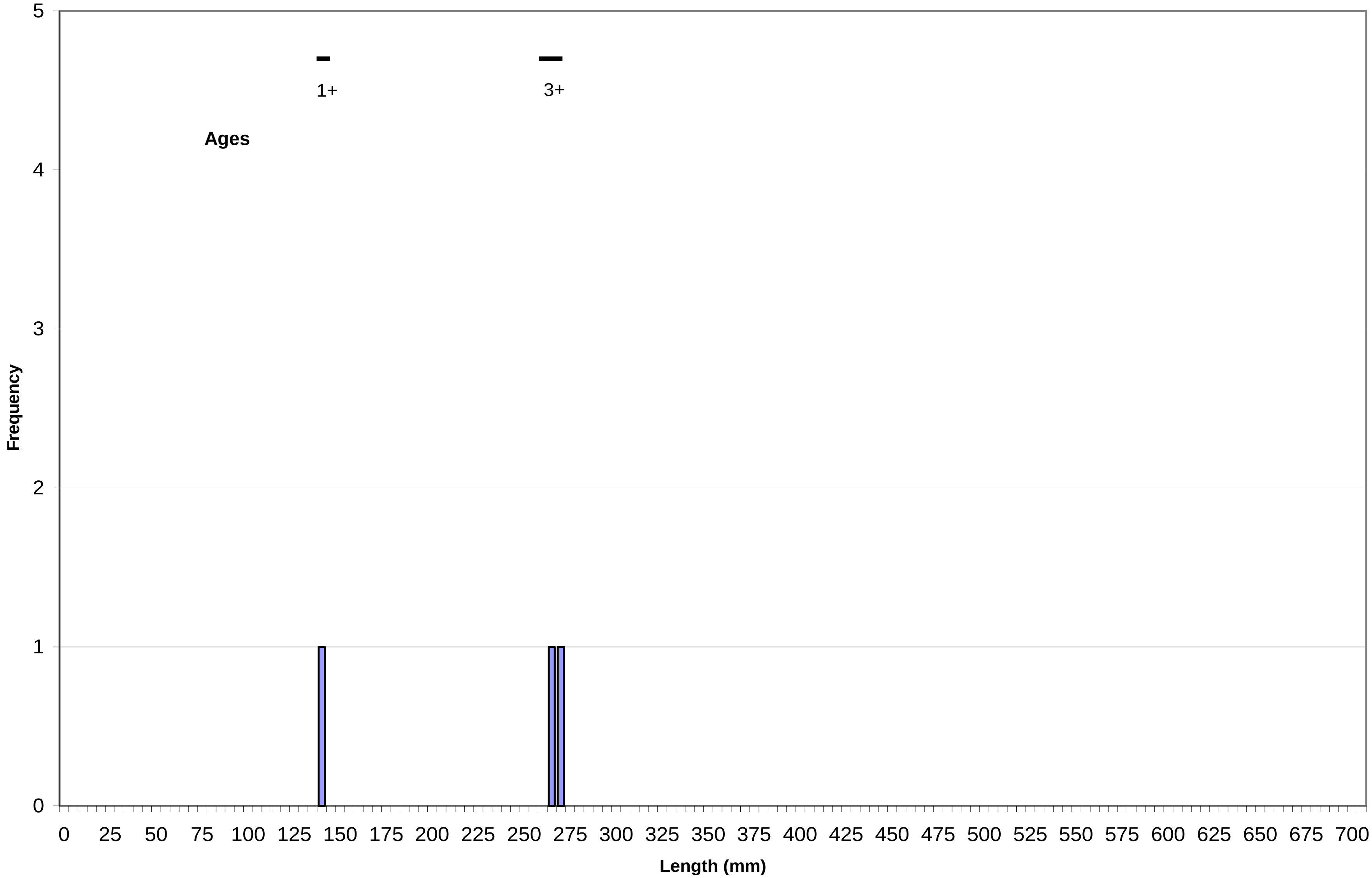


Figure CAWG 7-157. Length Frequency and Age of Rainbow Trout Collected in Huntington Lake, June 2002 (Number of Fish = 3).

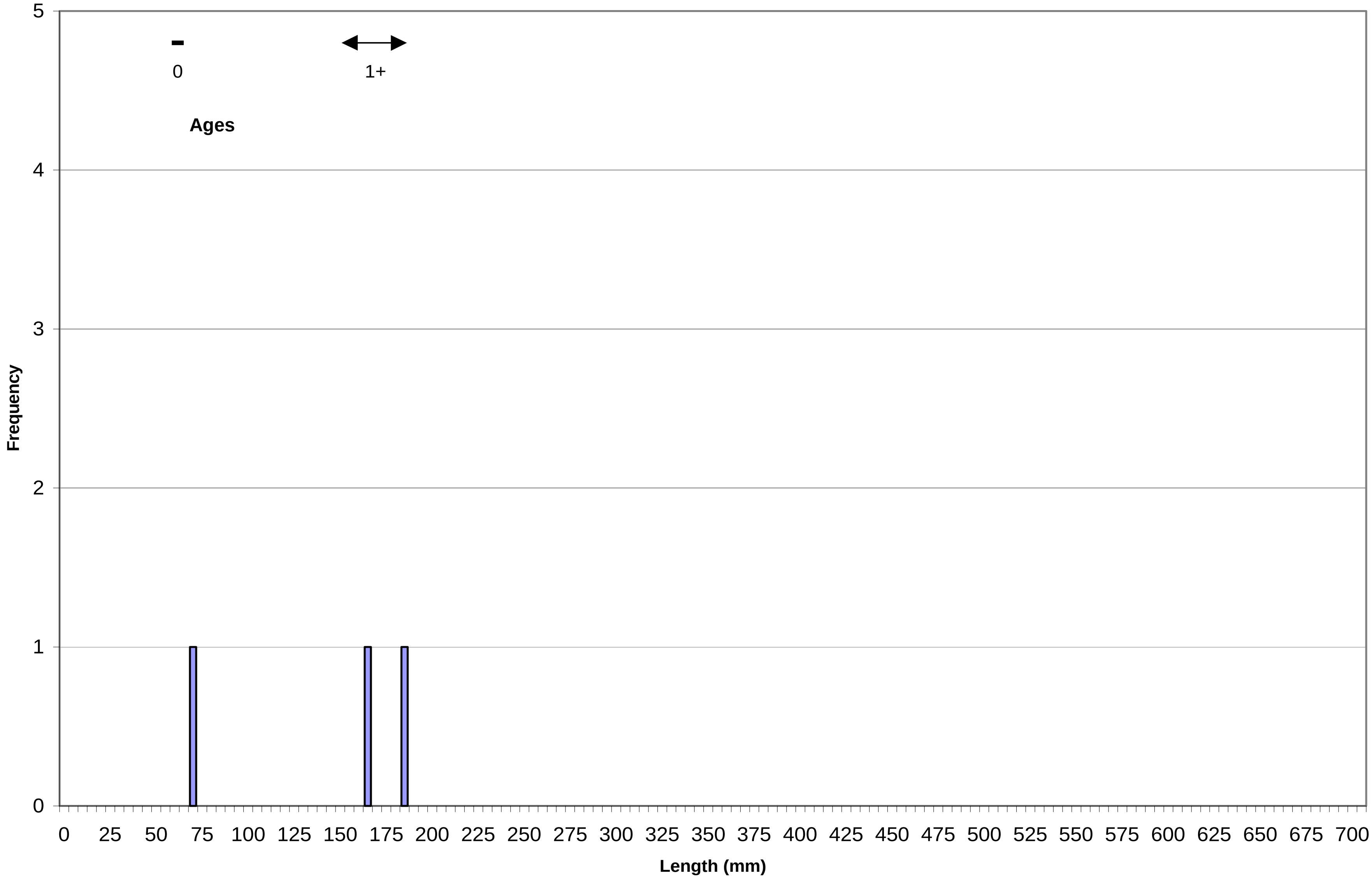


Figure CAWG 7-158. Length Frequency and Age of Kokanee Collected in Huntington Lake, June 2002 (Number of Fish = 3).

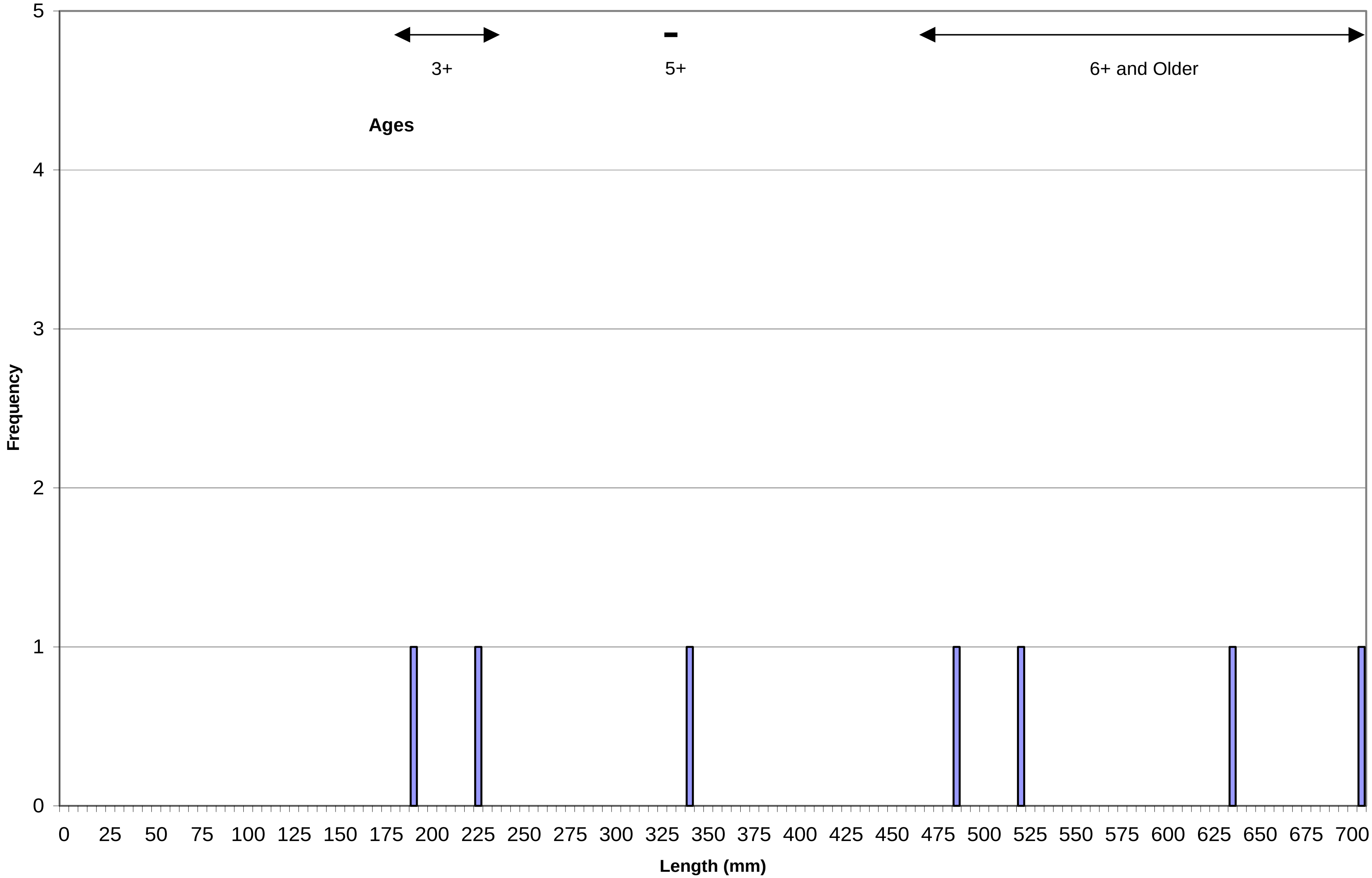
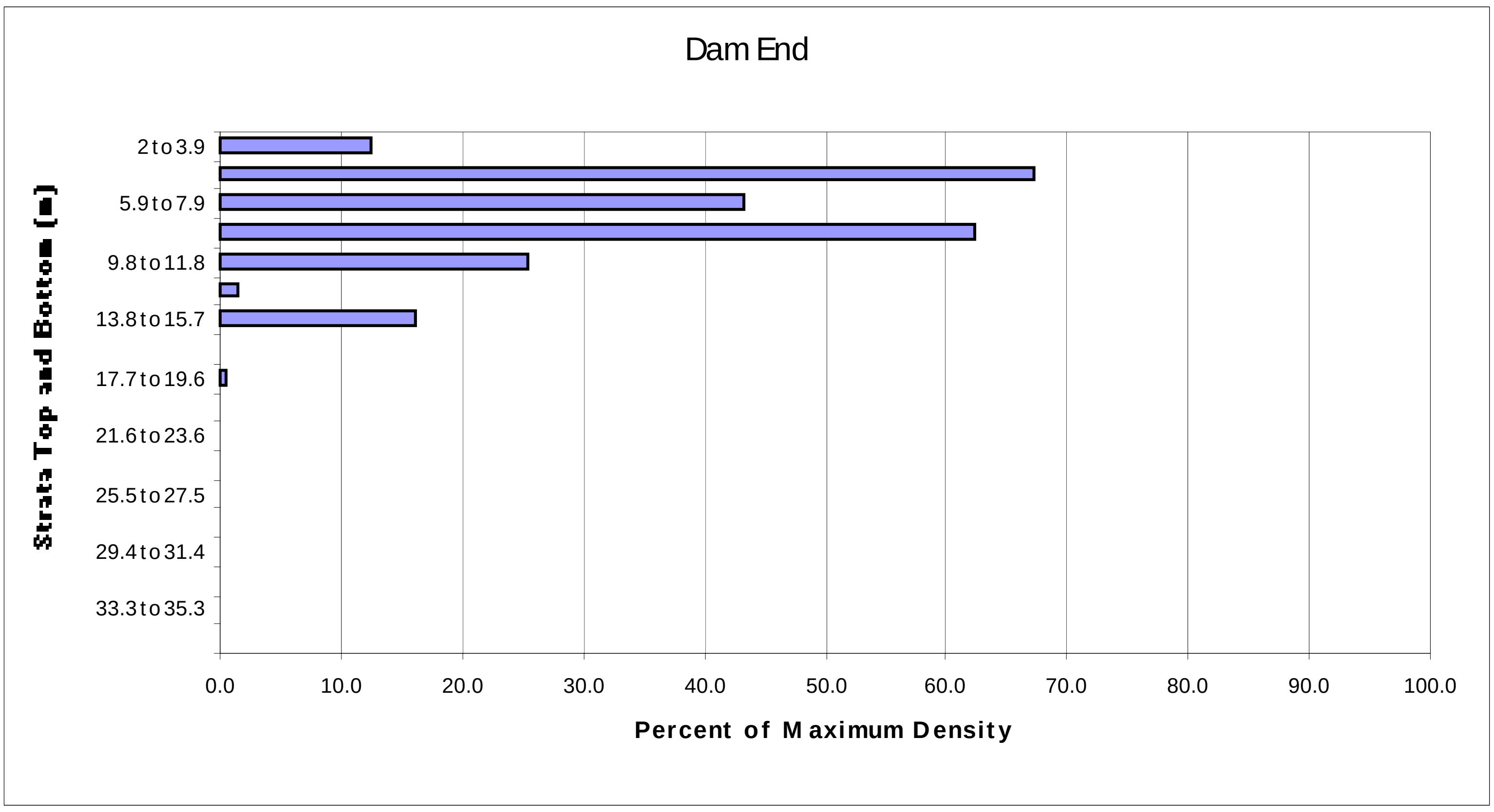
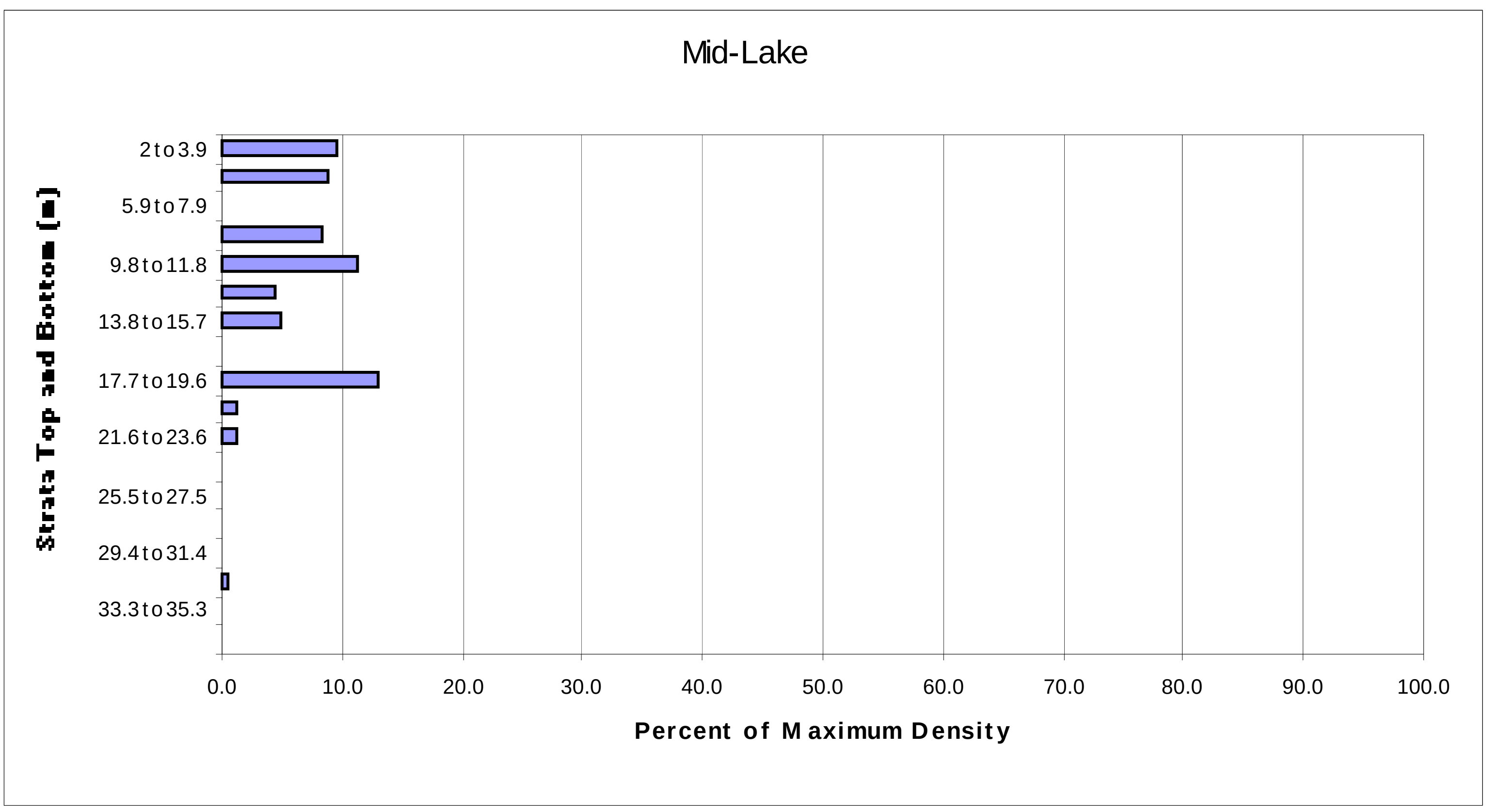


Figure CAWG 7-159. Length Frequency and Age of Brown Trout Collected in Huntington Lake, June 2002 (Number of Fish = 7).





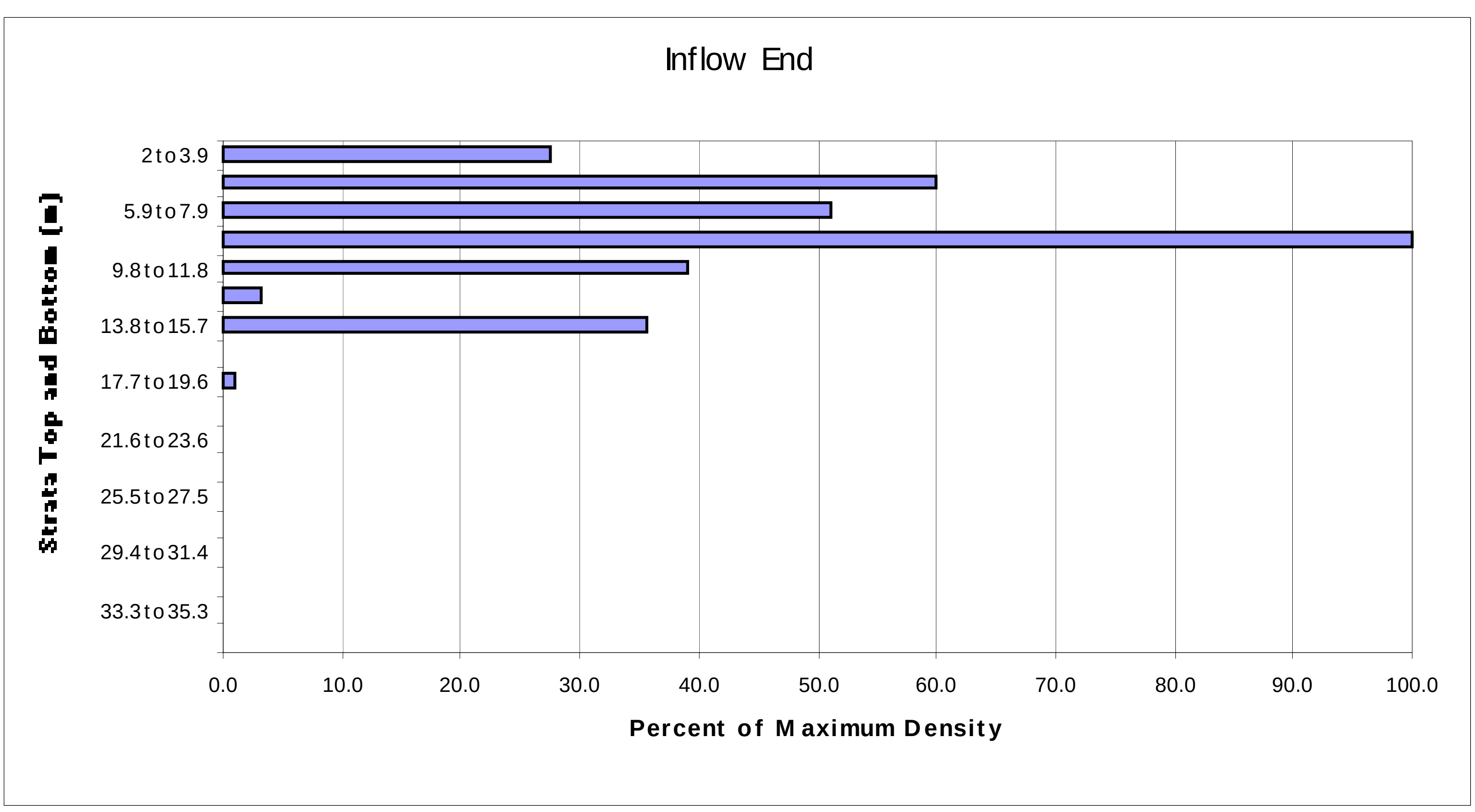


Figure CAWG 7-160. Percent of Maximum Fish Density Detected by Lake Area During Huntington Lake Hydroacoustic Survey, August 2002 (Maximum Density Detected = 1.32 x 10^{-3} fish/m^3).

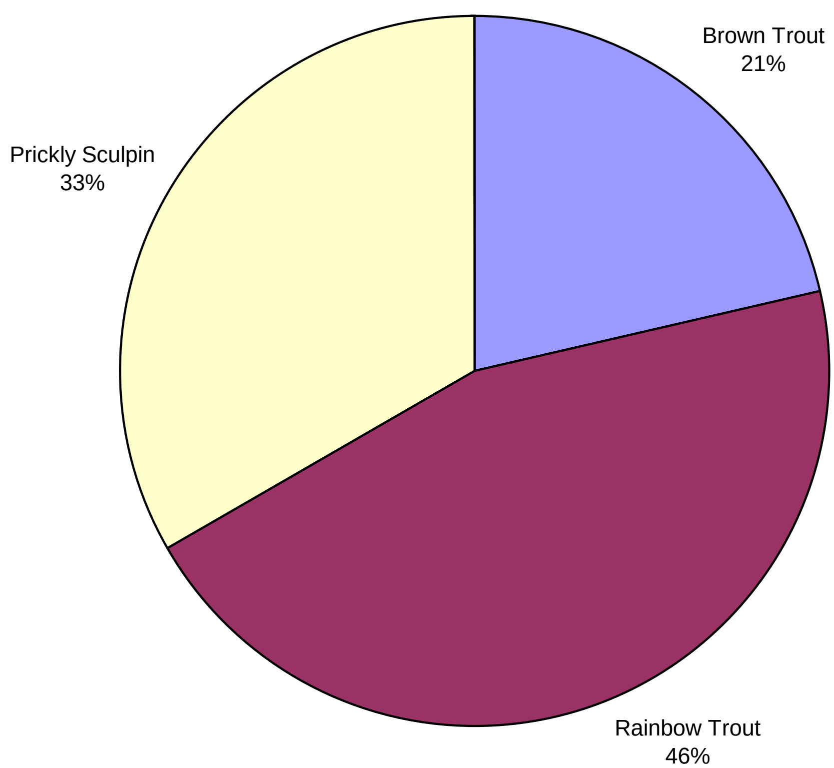


Figure CAWG 7-161. Composition of Fish Species Collected in Dam 4 Forebay, June 2002 (Number of Fish = 42).

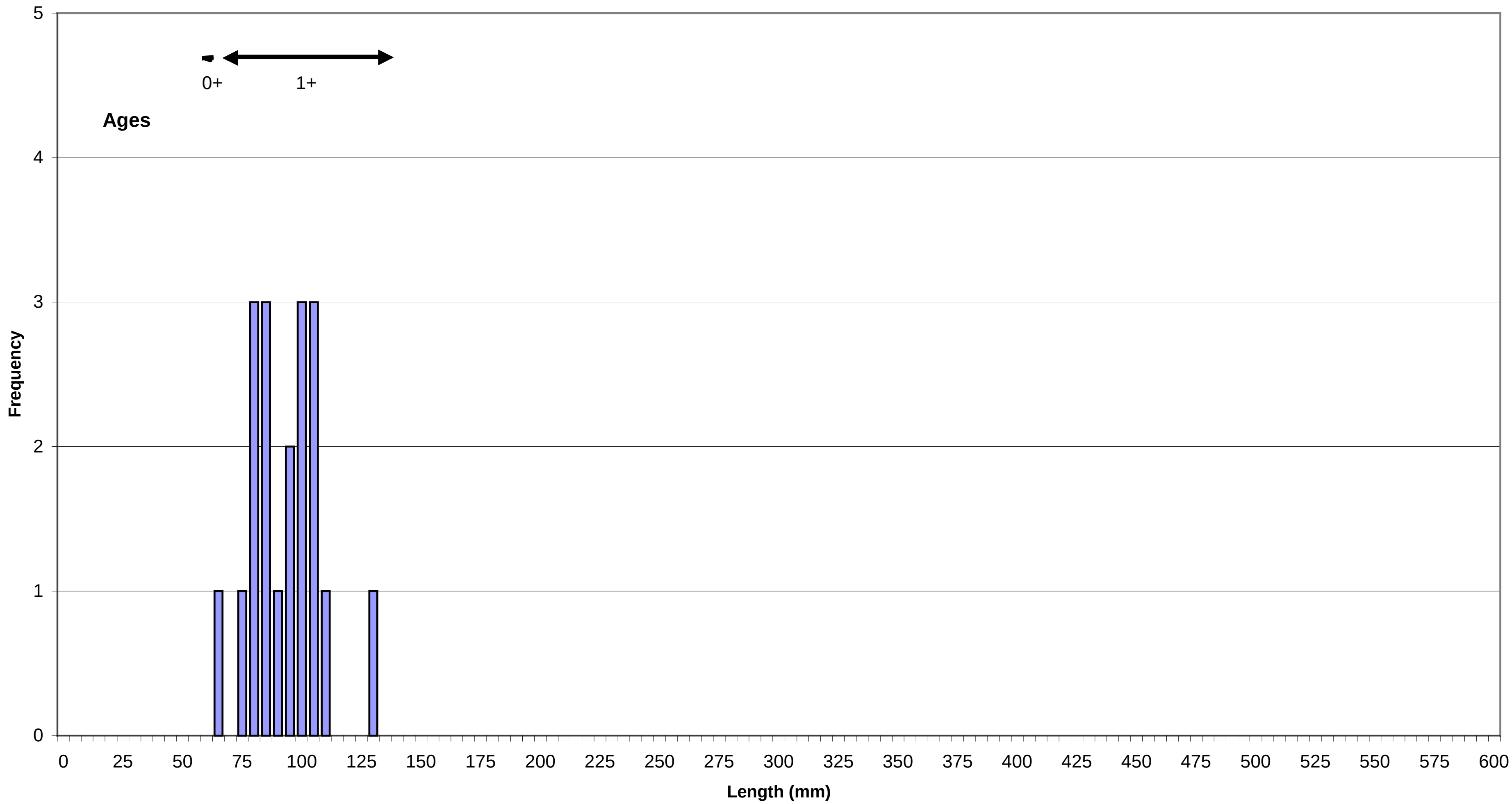


Figure CAWG 7-162. Length Frequency and Age of Rainbow Trout Collected in Dam 4 Forebay, June 2002 (Number of Fish = 19).

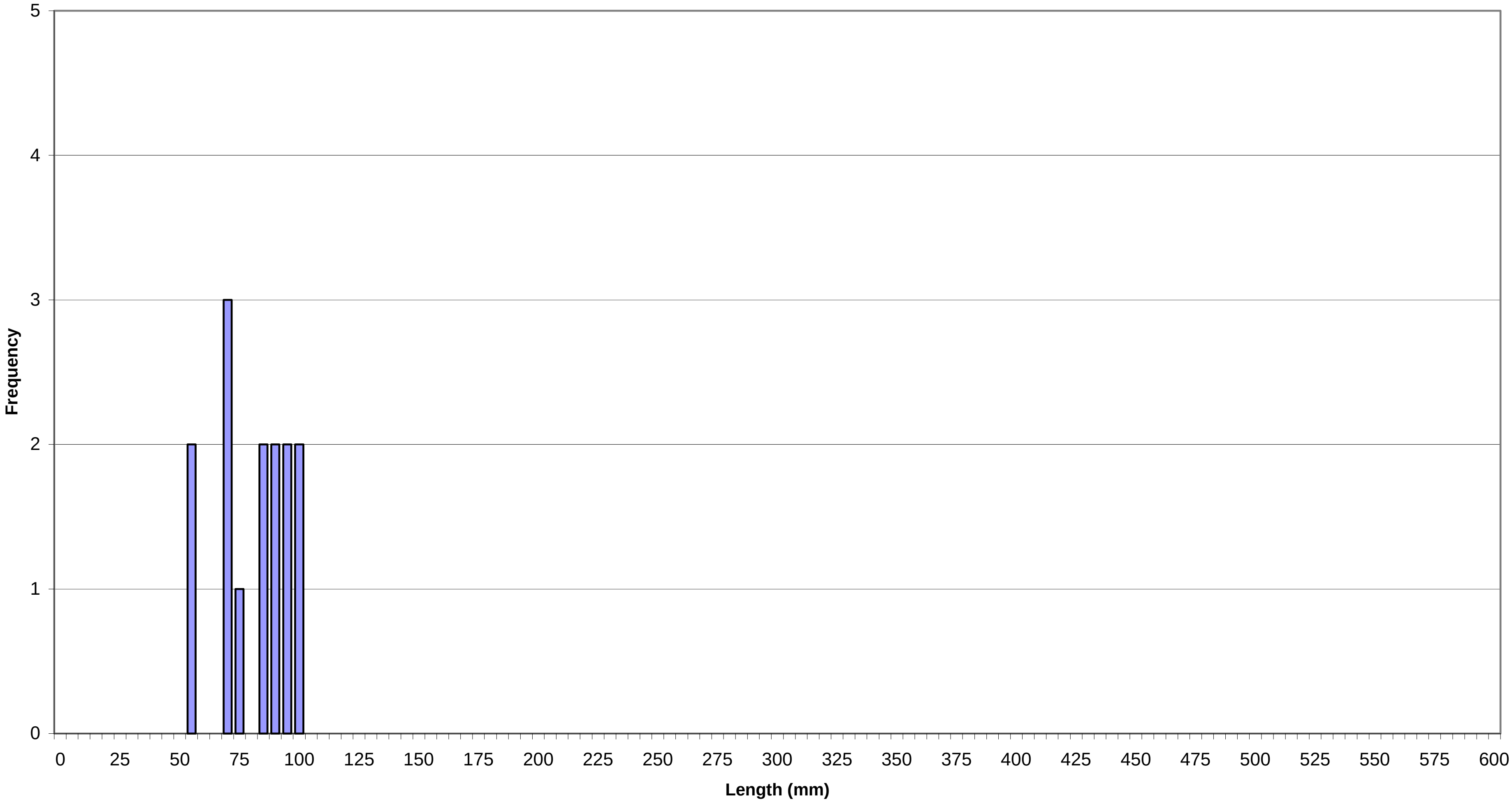


Figure CAWG 7-163. Length Frequency of Prickly Sculpin Collected Dam 4 Forebay, June 2002 (Number of Fish = 14).

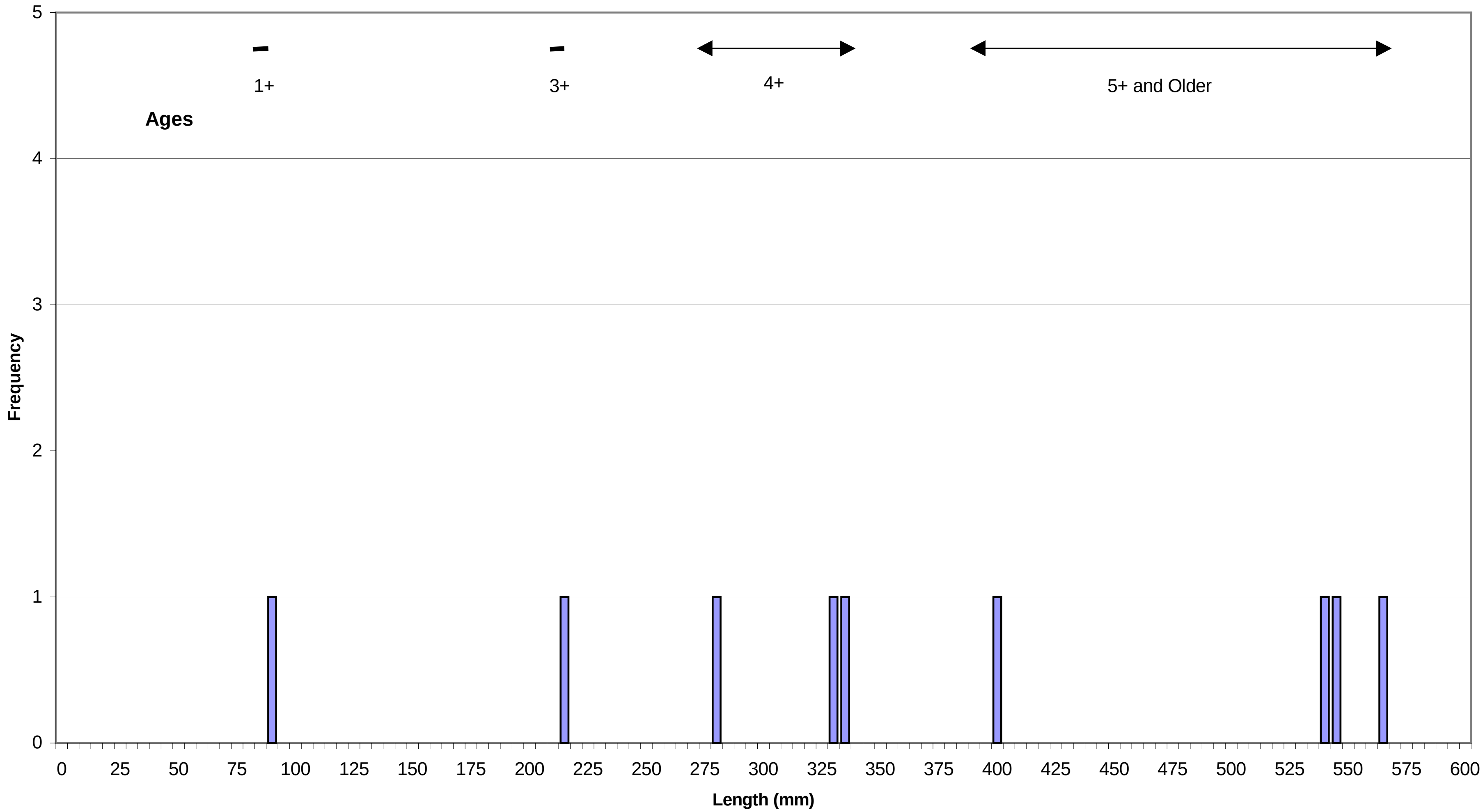


Figure CAWG 7-164. Length Frequency and Age of Brown Trout Collected in Dam 4 Forebay, June 2002 (Number of Fish = 9).

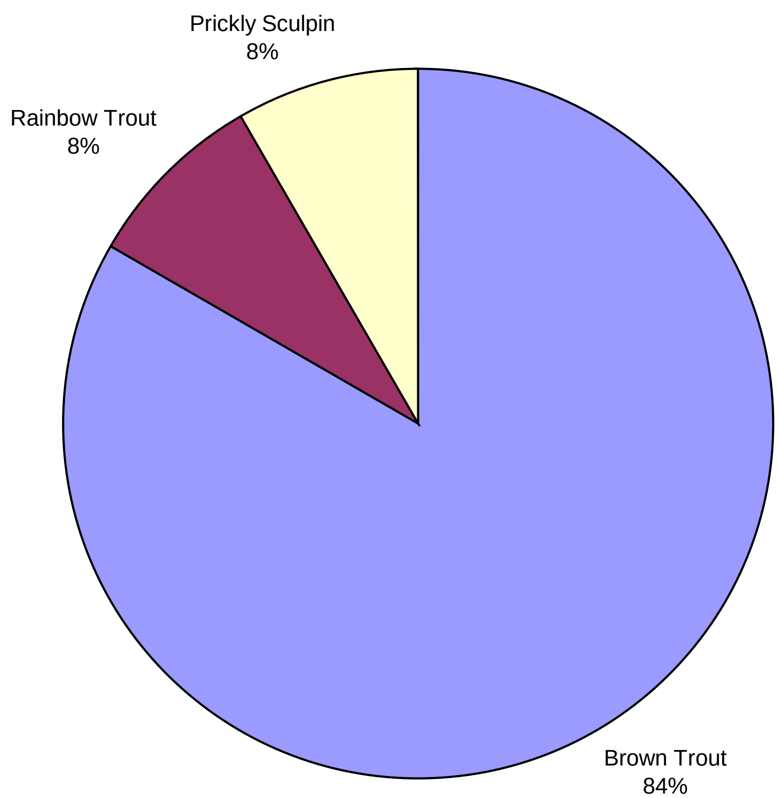


Figure CAWG 7-165. Composition of Fish Species Collected in Dam 5 Forebay, June 2002 (Number of Fish = 12).

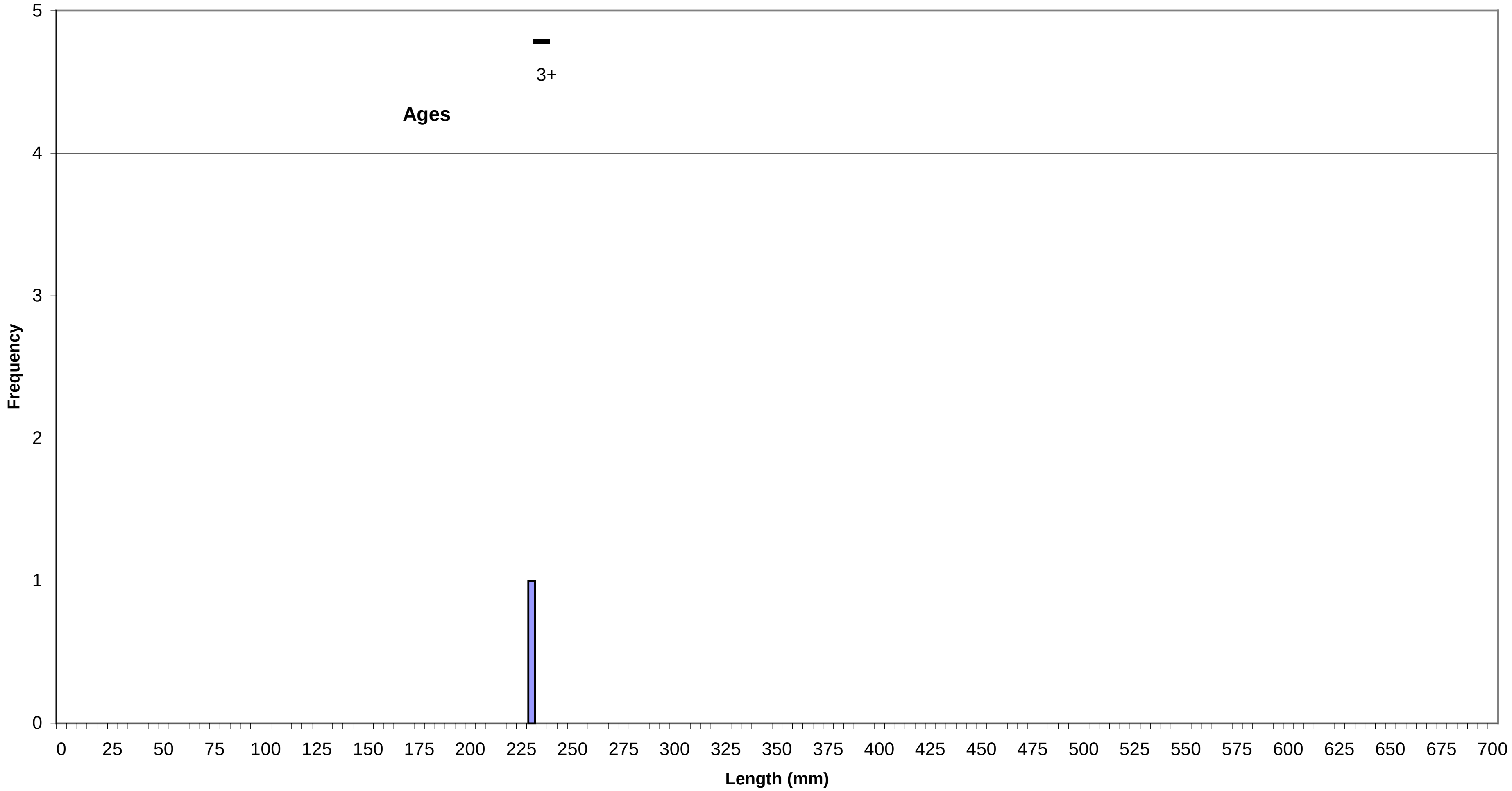


Figure CAWG 7-166. Length Frequency and Age of Rainbow Trout Collected in Dam 5 Forebay, All Gill Nets, June 2002 (Number of Fish = 1).

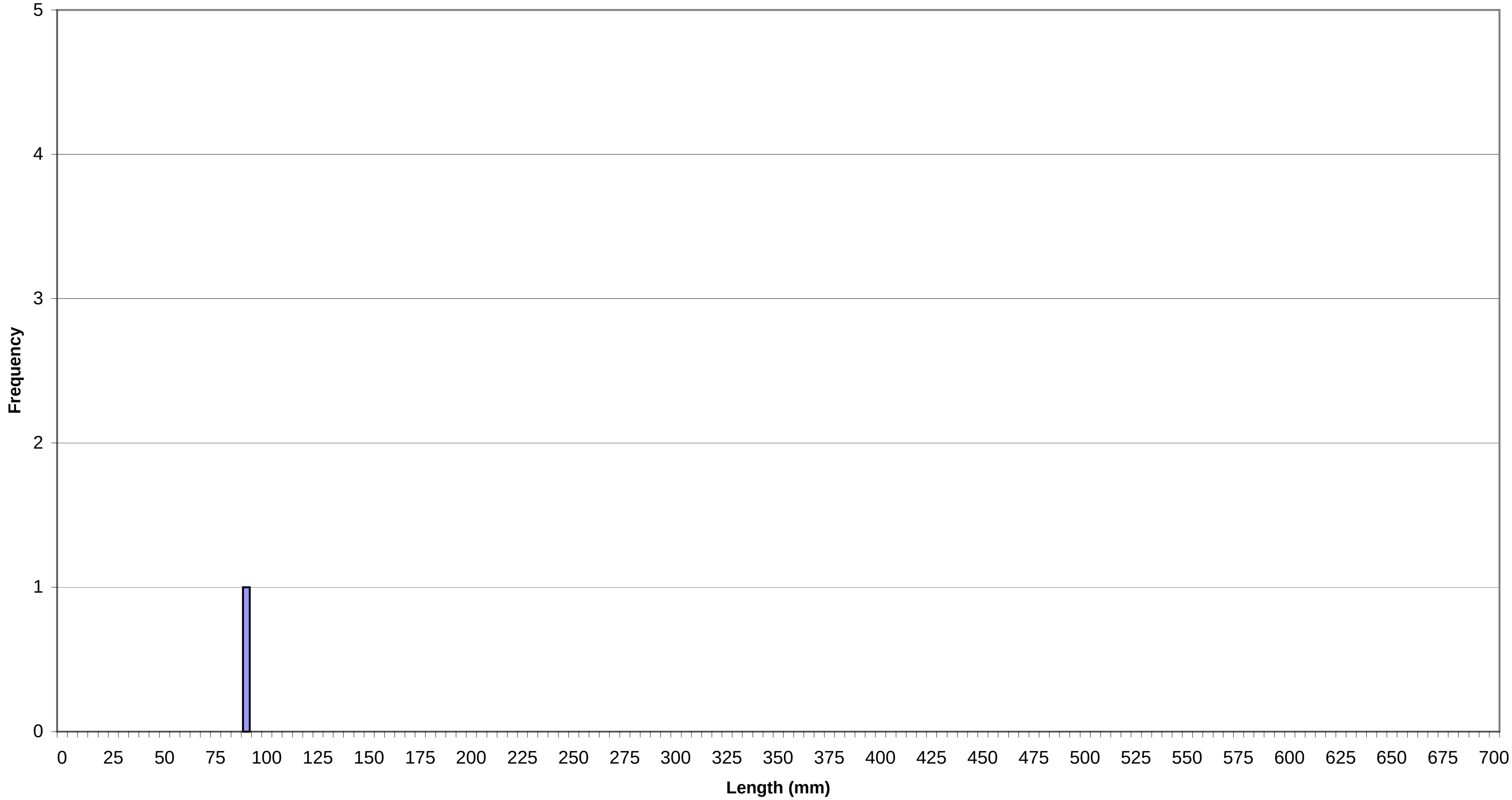


Figure CAWG 7-167. Length Frequency of Prickly Sculpin Collected in Dam 5 Forebay, June 2002 (Number of Fish = 1).

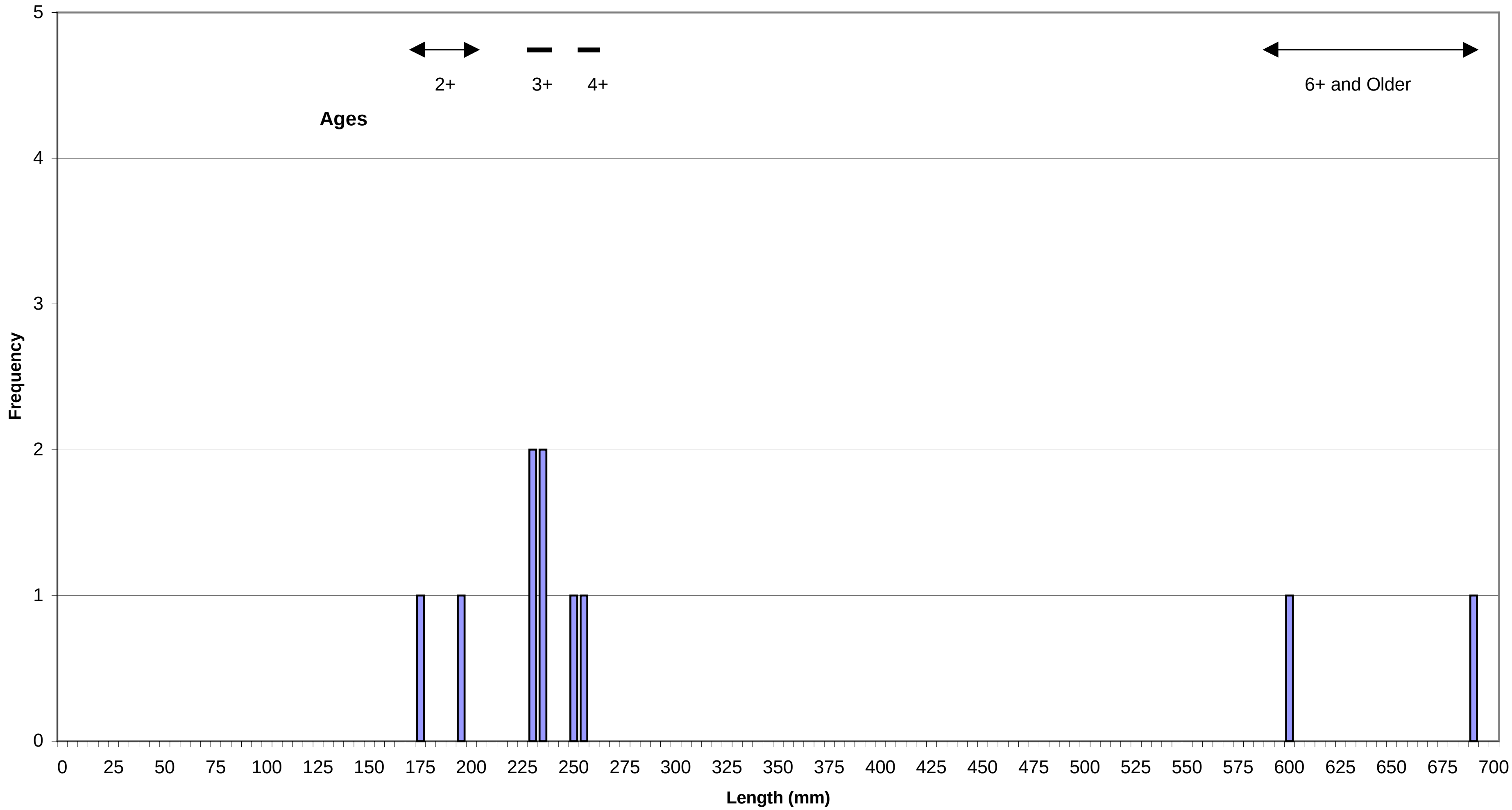


Figure CAWG 7-168. Length Frequency and Age of Brown Trout Collected in Dam 5 Forebay, All Gill Nets, June 2002 (Number of Fish = 10).

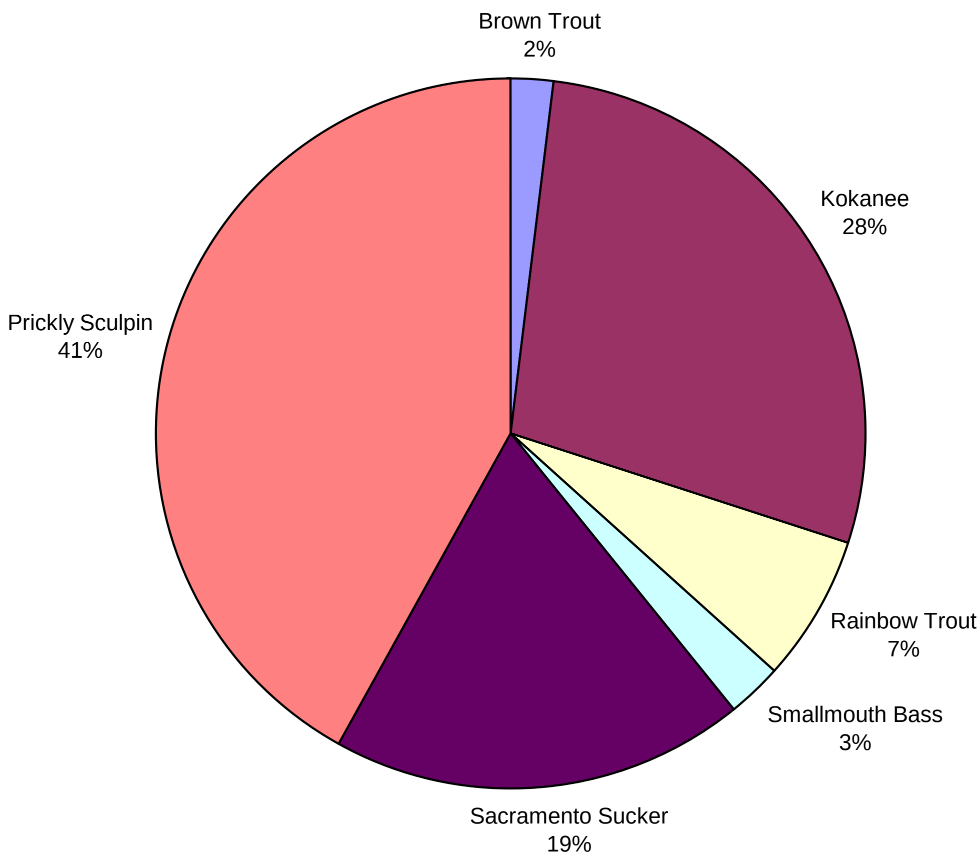


Figure CAWG 7-169. Composition of Fish Species Collected in Balsam Meadow Forebay, June 2002 (Number of Fish = 153).

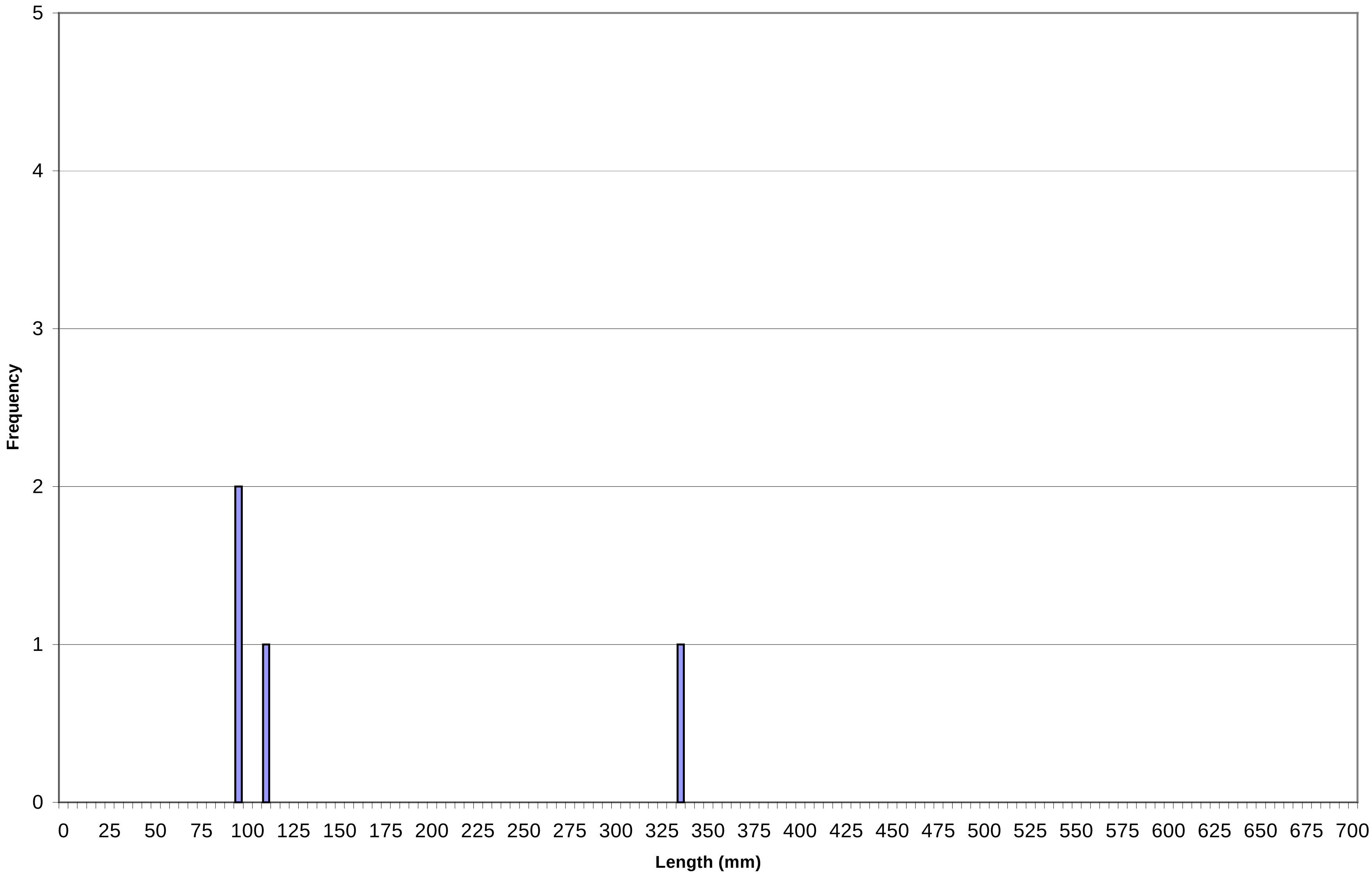


Figure CAWG 7-170. Length Frequency of Smallmouth Bass Collected in Balsam Meadow Forebay, All Nets, June 2002 (Number of Fish = 4).

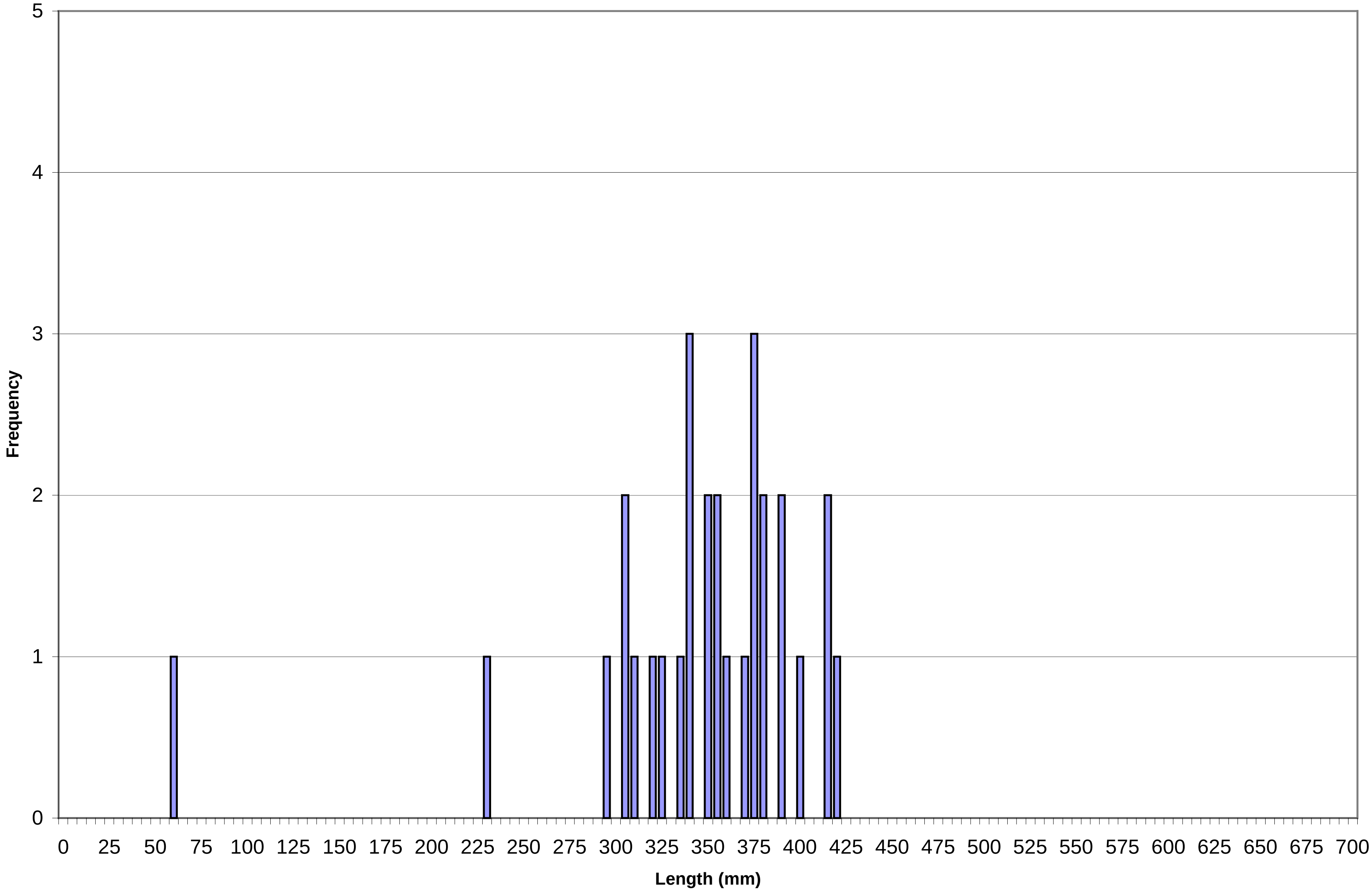


Figure CAWG 7-171. Length Frequency of Sacramento Sucker Collected in Balsam Meadow Forebay, All Nets, June 2002 (Number of Fish = 29).

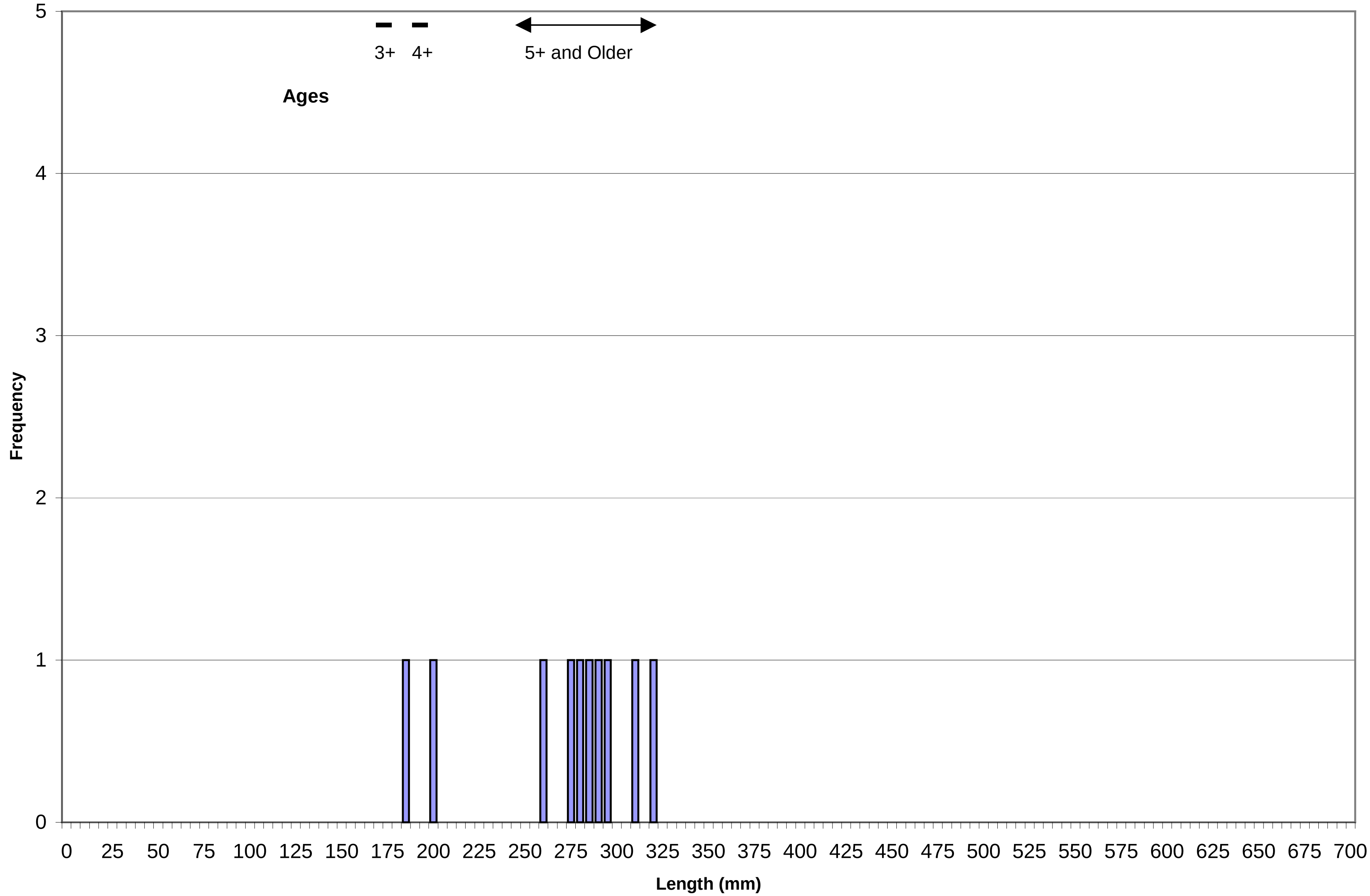


Figure CAWG 7-172. Length Frequency and Age of Rainbow Trout Collected in Balsam Meadow Forebay, All Nets, June 2002 (Number of Fish = 29).

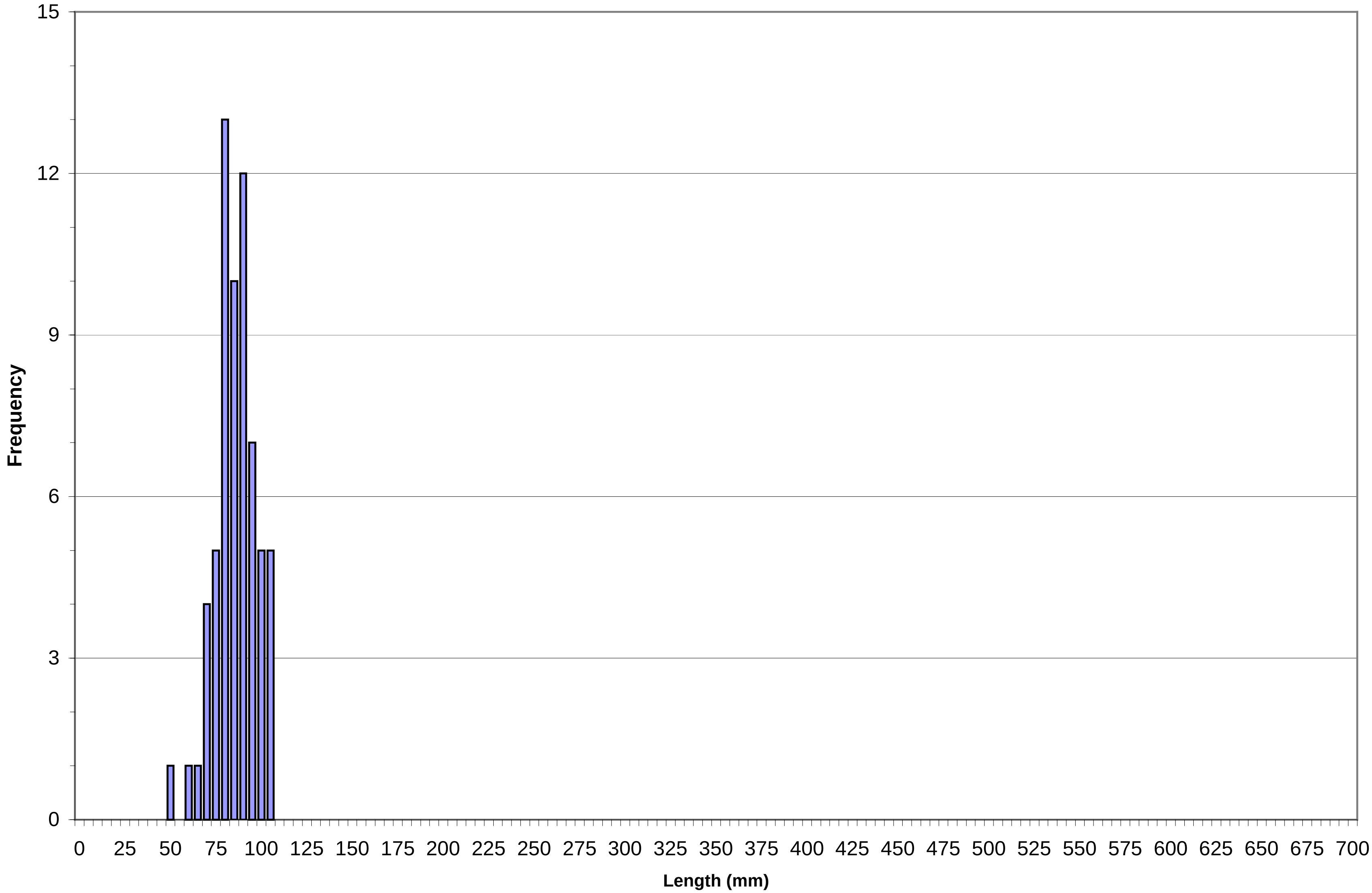


Figure CAWG 7-173. Length Frequency of Prickly Sculpin Collected in Balsam Meadow Forebay, All Nets, June 2002 (Number of Fish = 64).

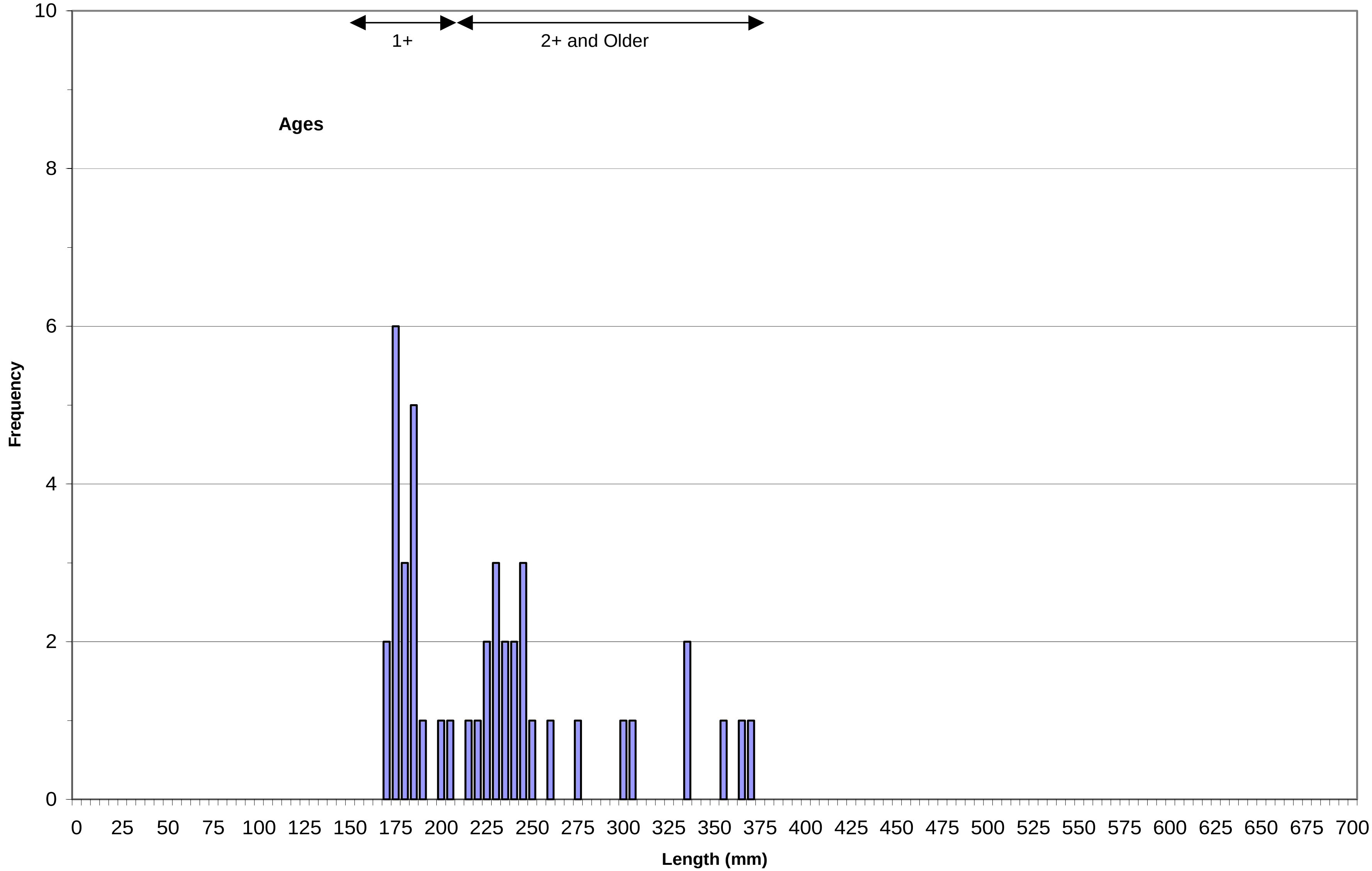


Figure CAWG 7-174. Length Frequency and Age of Kokanee Collected in Balsam Meadow Forebay, All Nets, June 2002 (Number of Fish =43).

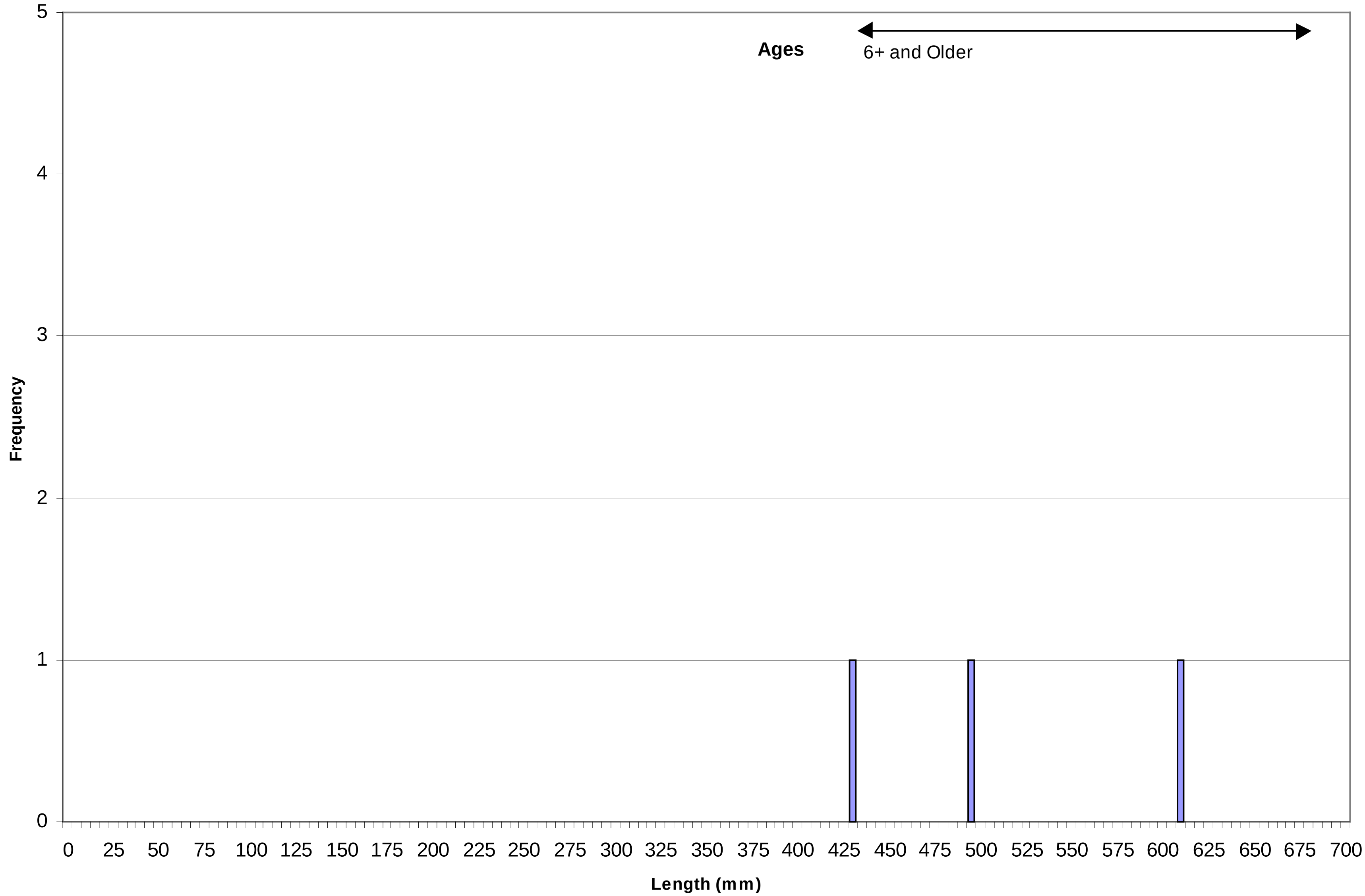


Figure CAWG 7-175. Length Frequency and Age of Brown Trout Collected in Balsam Meadow Forebay, All Nets, June 2002 (Number of Fish = 3).

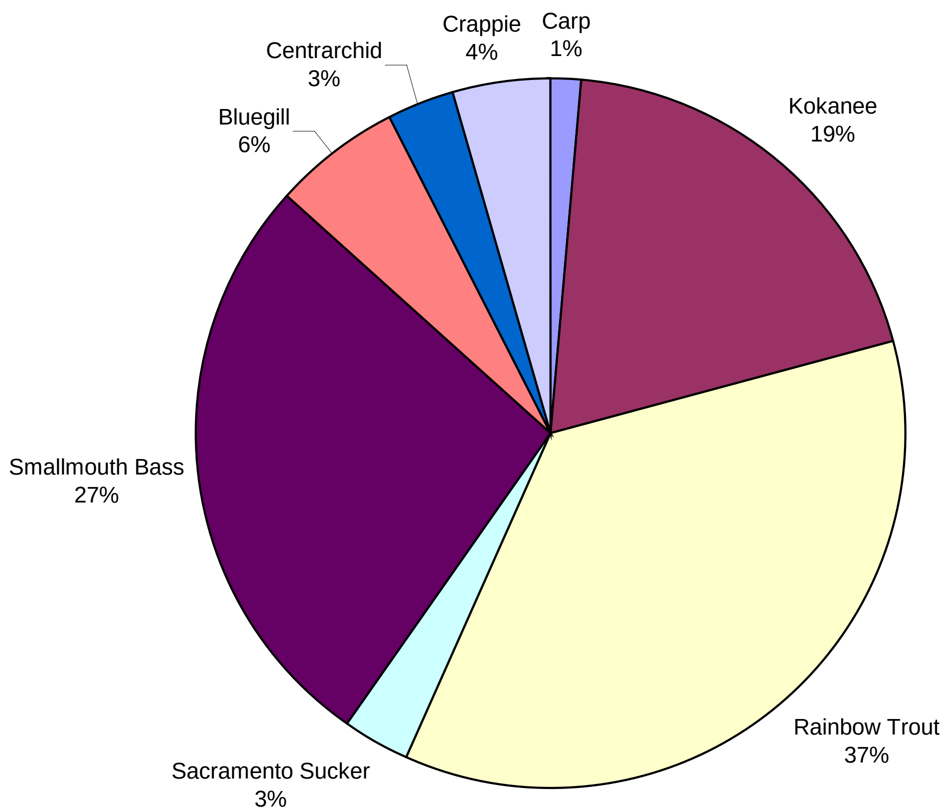


Figure CAWG 7-176. Composition of Fish Species Collected in Shaver Lake, July-August 2002 (Number of Fish = 67).

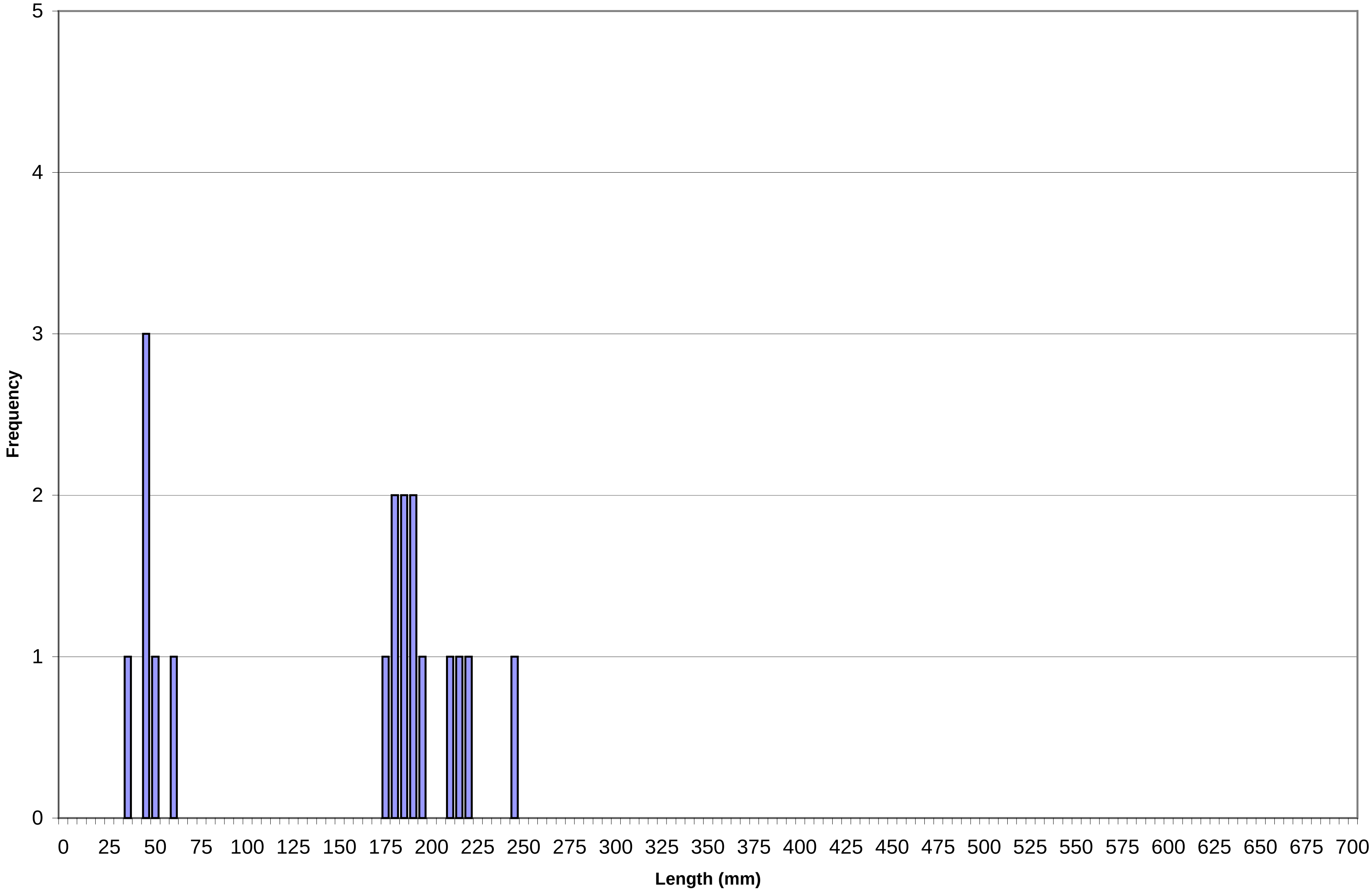


Figure CAWG 7-177. Length Frequency of Smallmouth Bass Collected in Shaver Lake, July-August 2002 (Number of Fish =18).

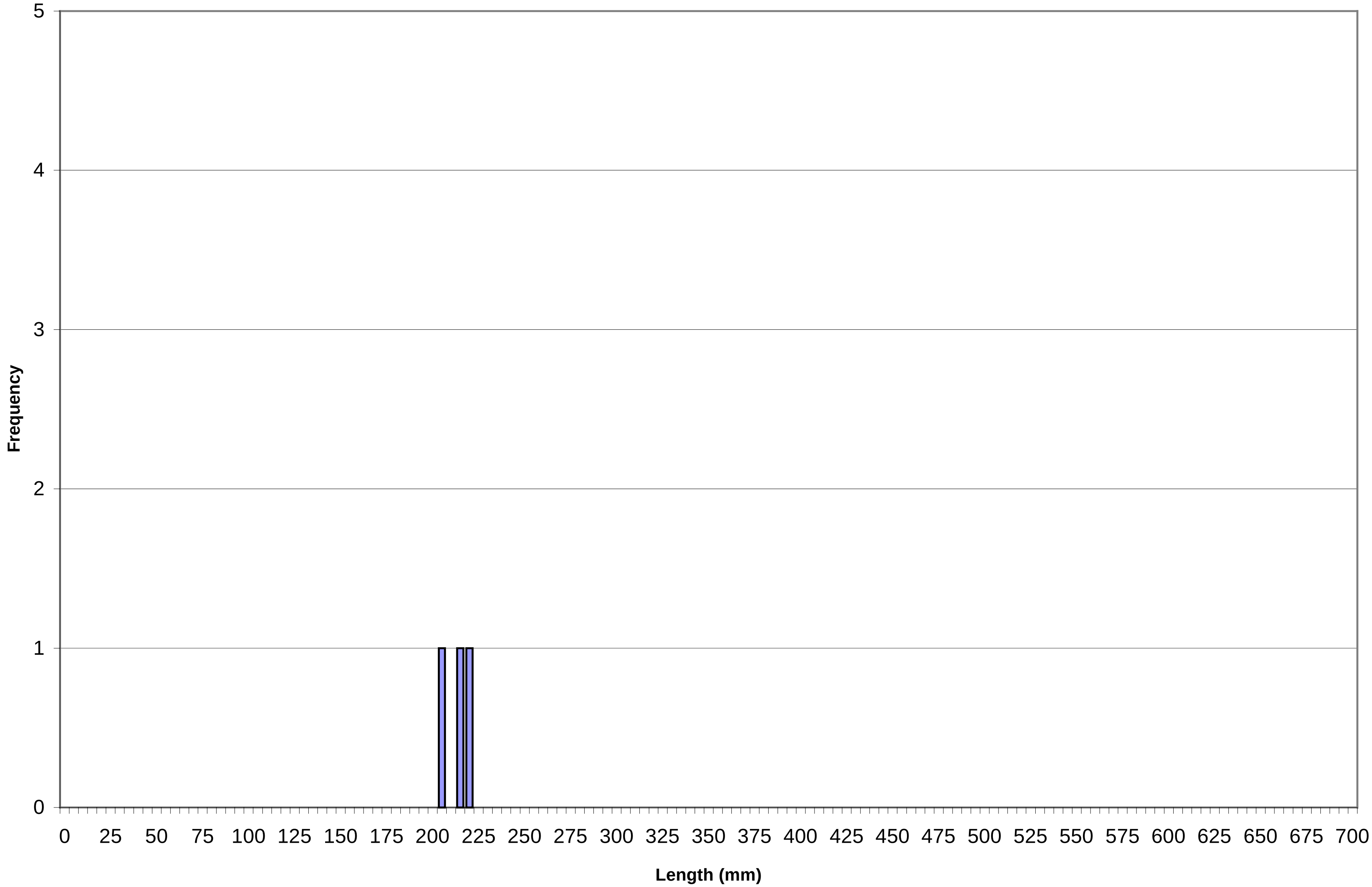


Figure CAWG 7-178. Length Frequency of Crappie Collected in Shaver Lake, July-August 2002 (Number of Fish =3).

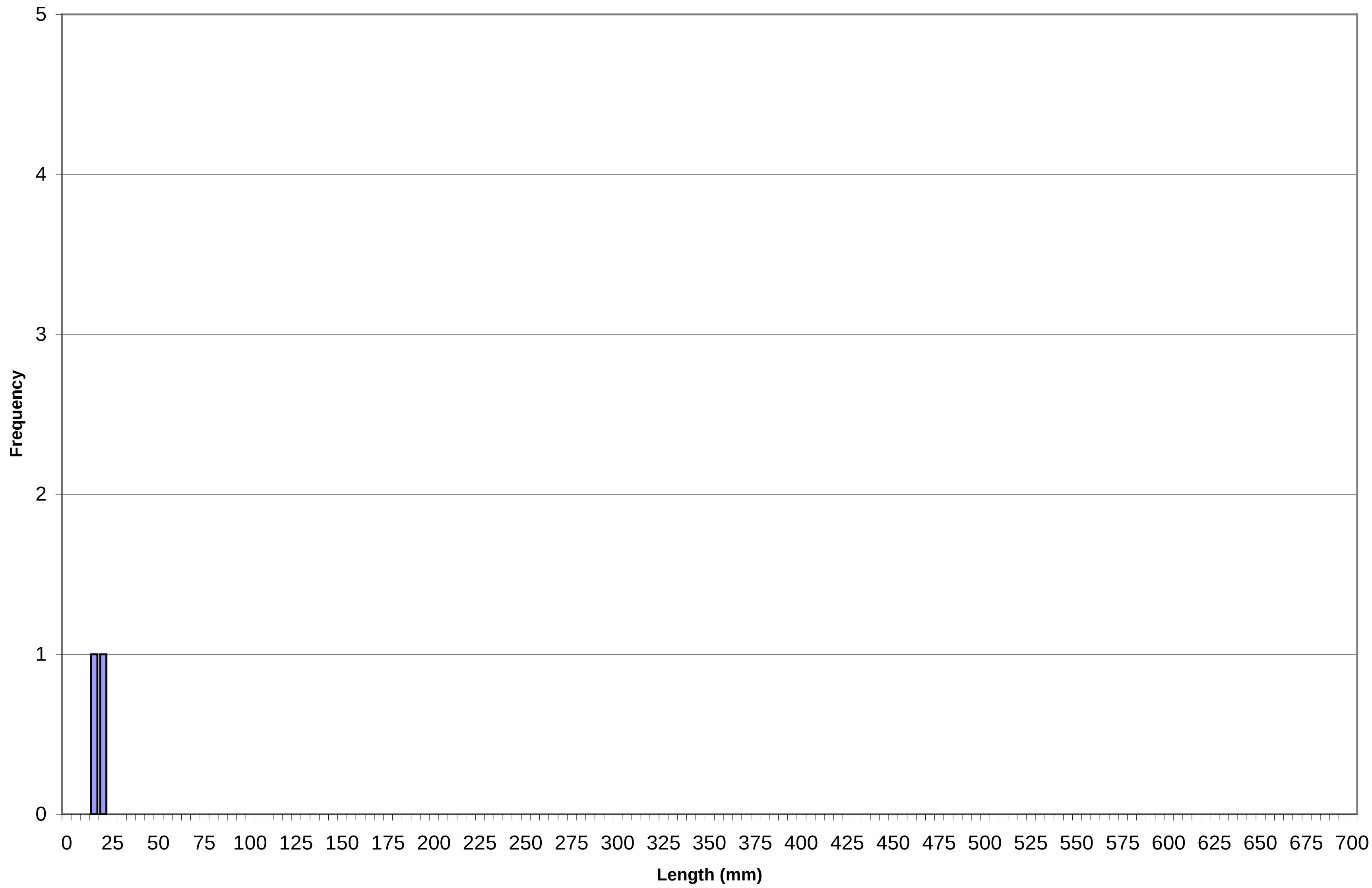


Figure CAWG 7-179. Length Frequency of Centrachid Species Collected in Shaver Lake, June-July 2002 (Number of Fish =2).

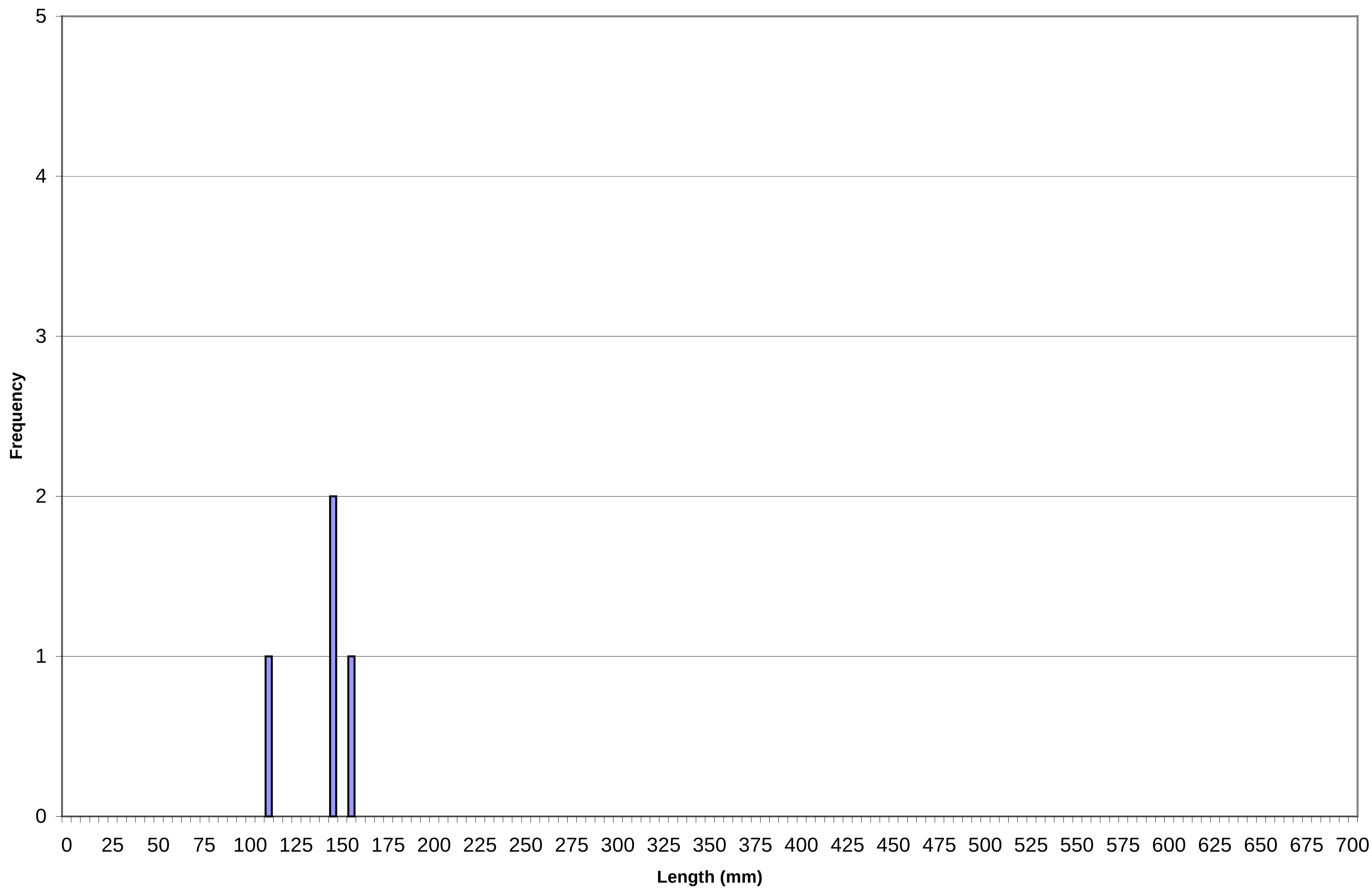


Figure CAWG 7-180. Length Frequency of Bluegill Collected in Shaver Lake, July-August 2002 (Number of Fish = 4).

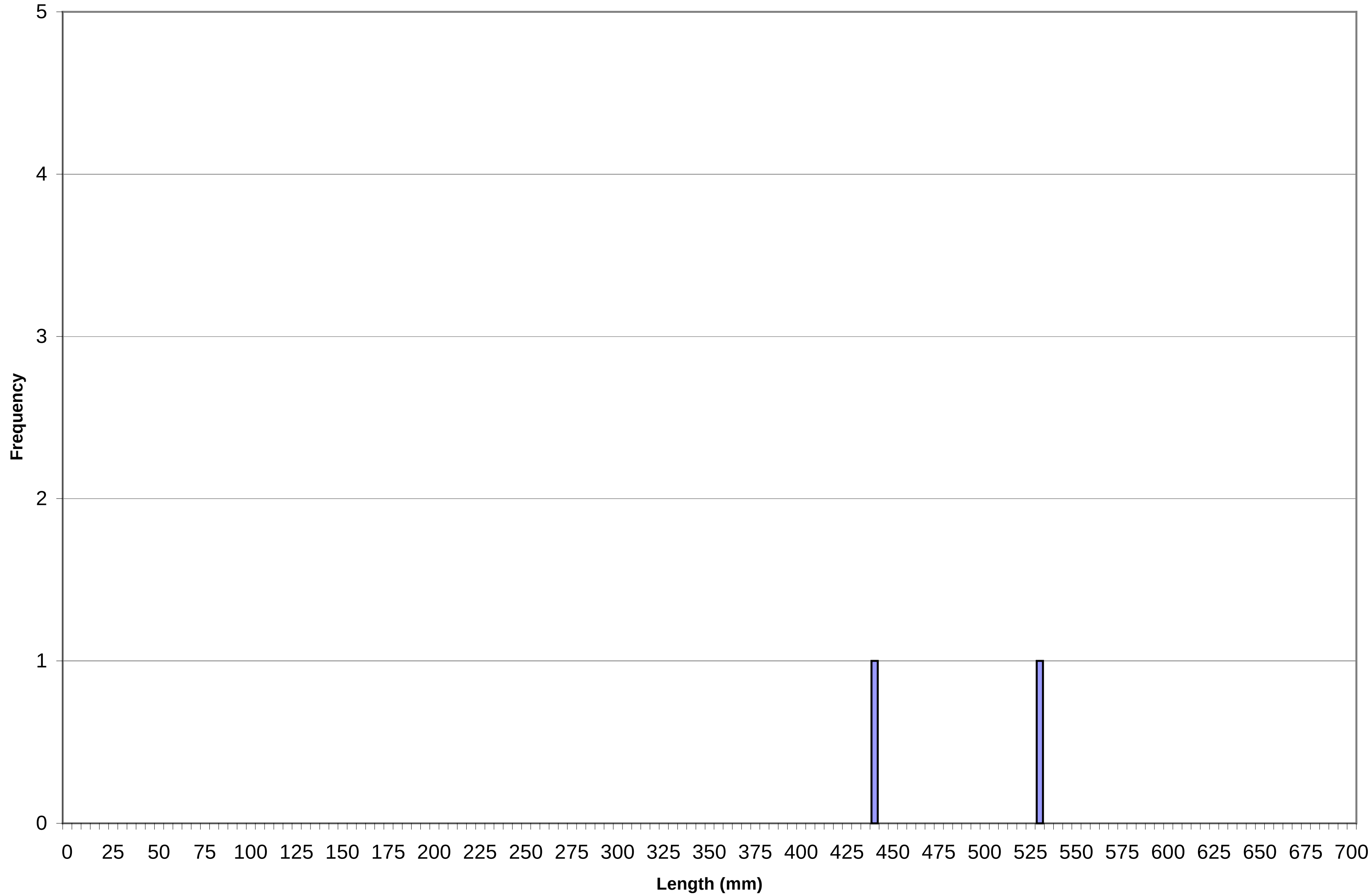


Figure CAWG 7-181. Length Frequency of Sacramento Sucker Collected in Shaver Lake, July-August 2002 (Number of Fish = 2).

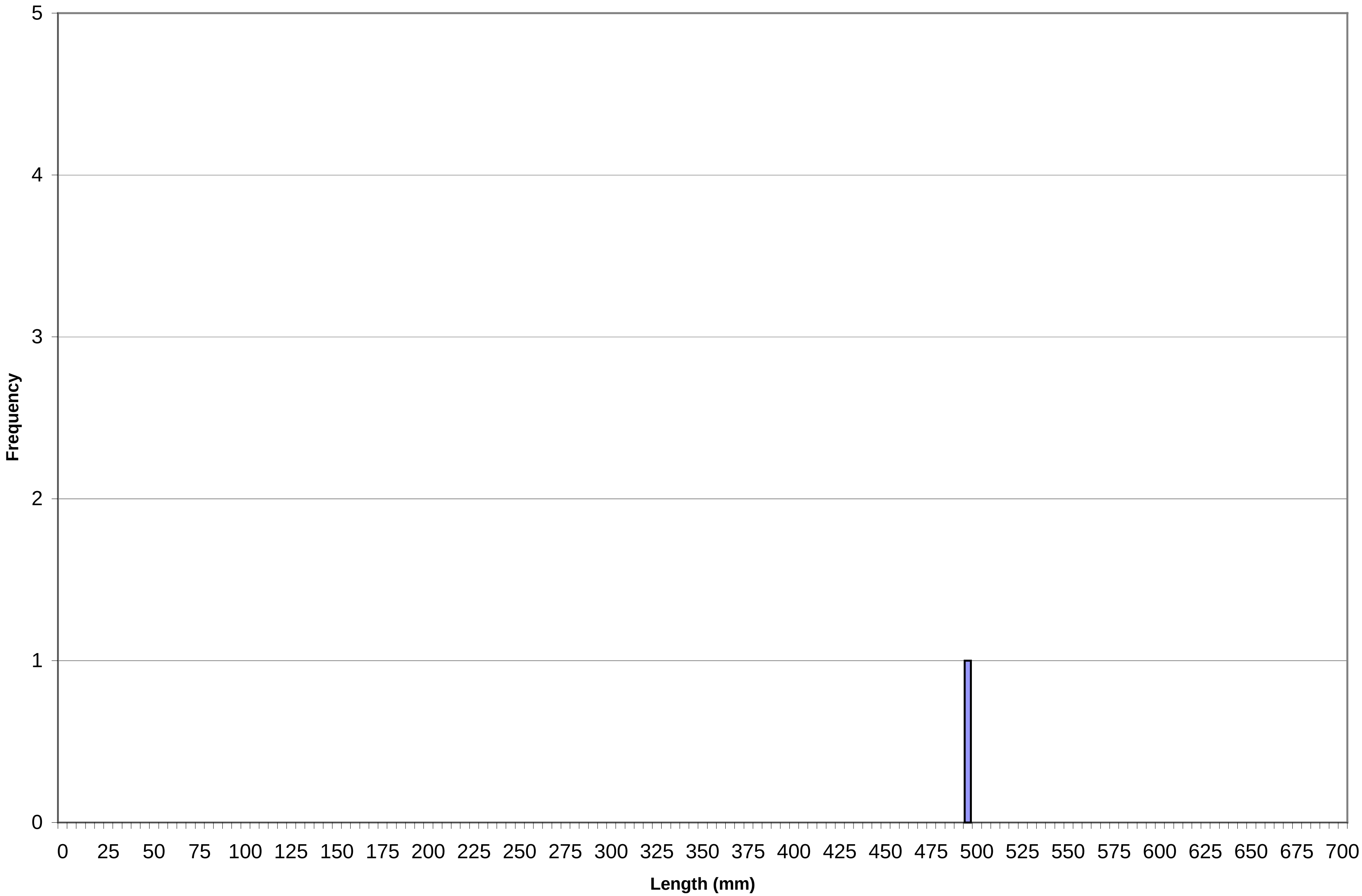


Figure CAWG 7-182. Length Frequency of Carp Collected in Shaver Lake, July-August 2002 (Number of Fish = 1).

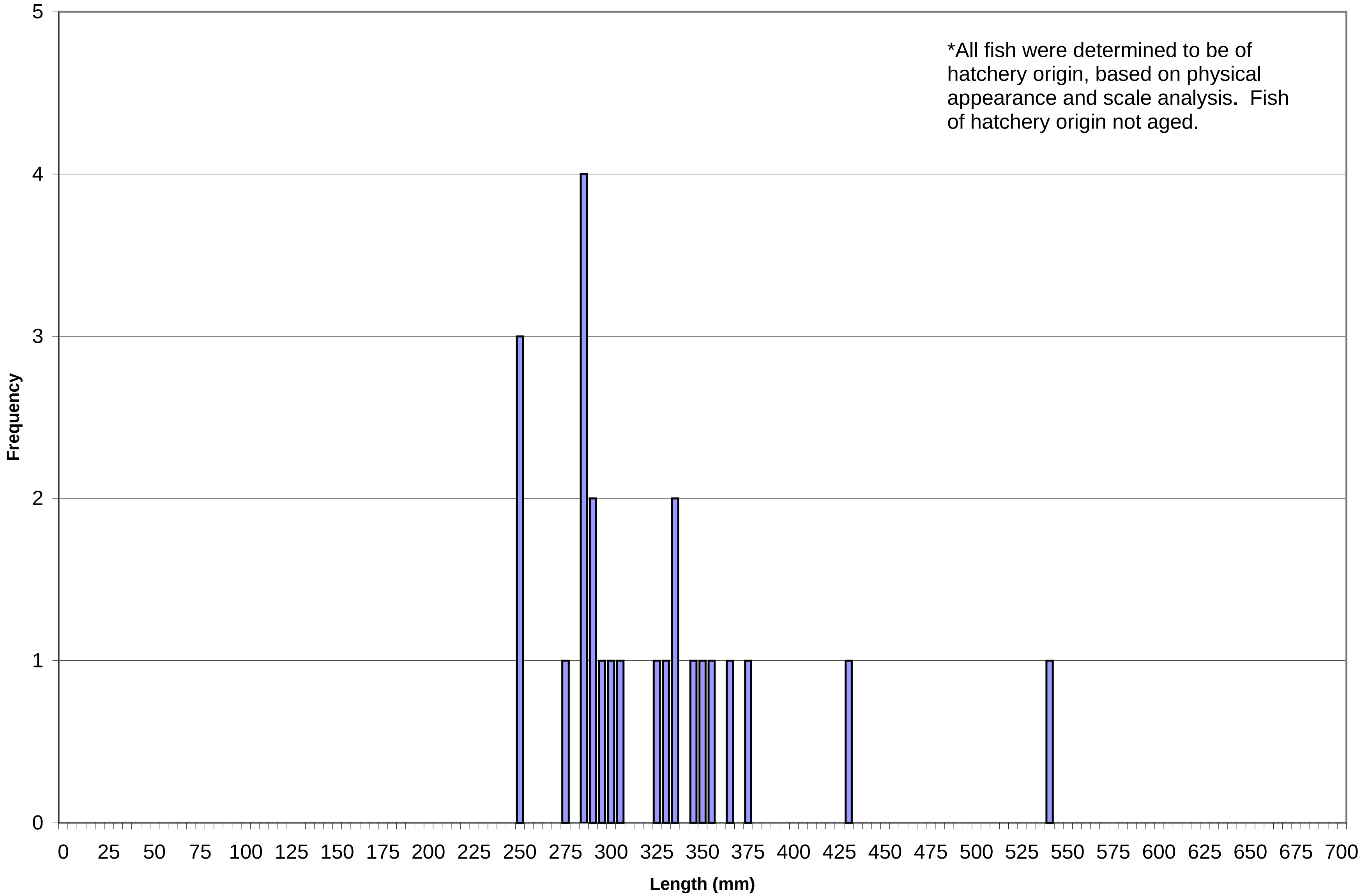


Figure CAWG 7-183. Length Frequency of Rainbow Trout Collected in Shaver Lake, July-August 2002 (Number of Fish = 24).

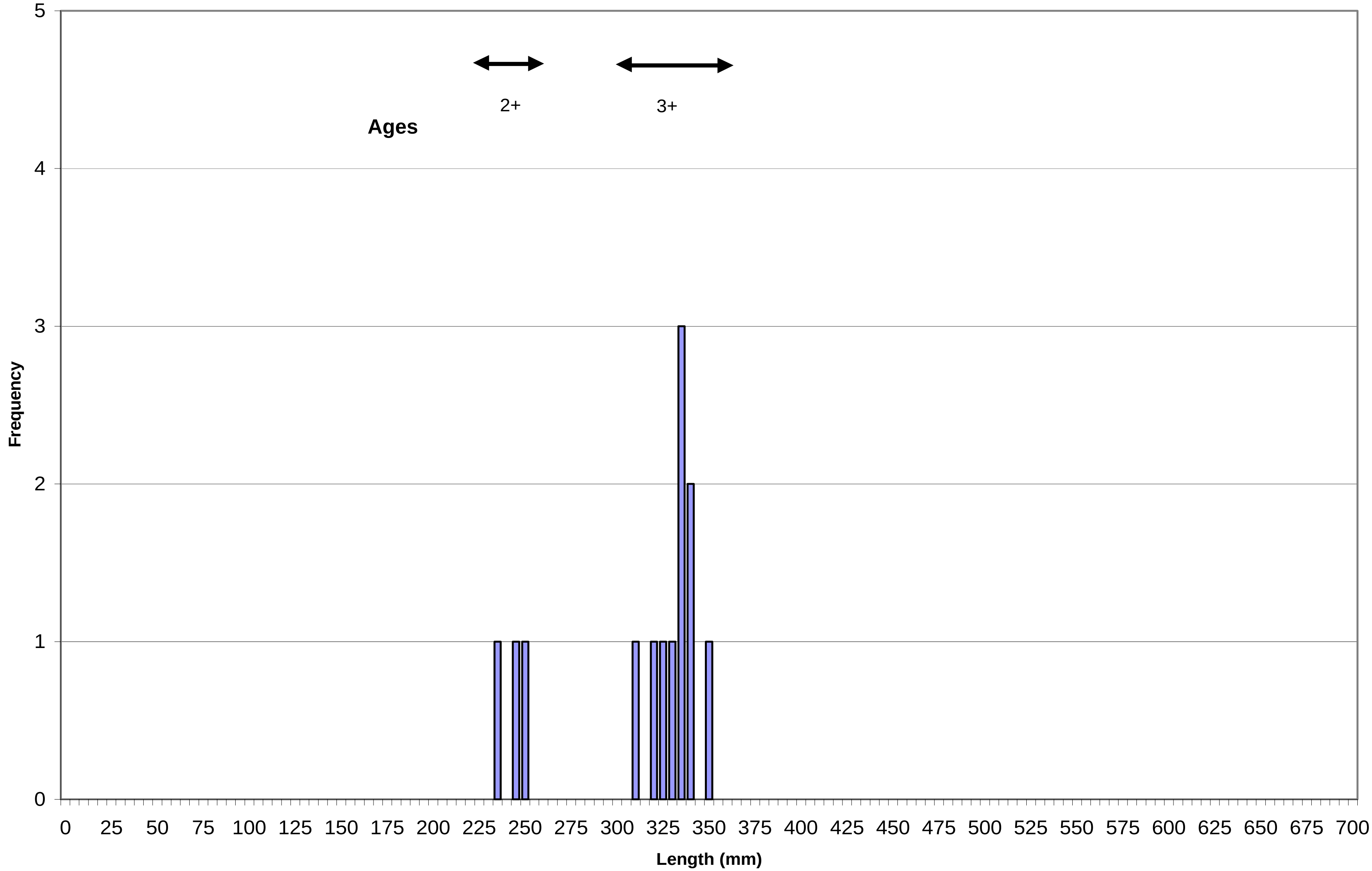
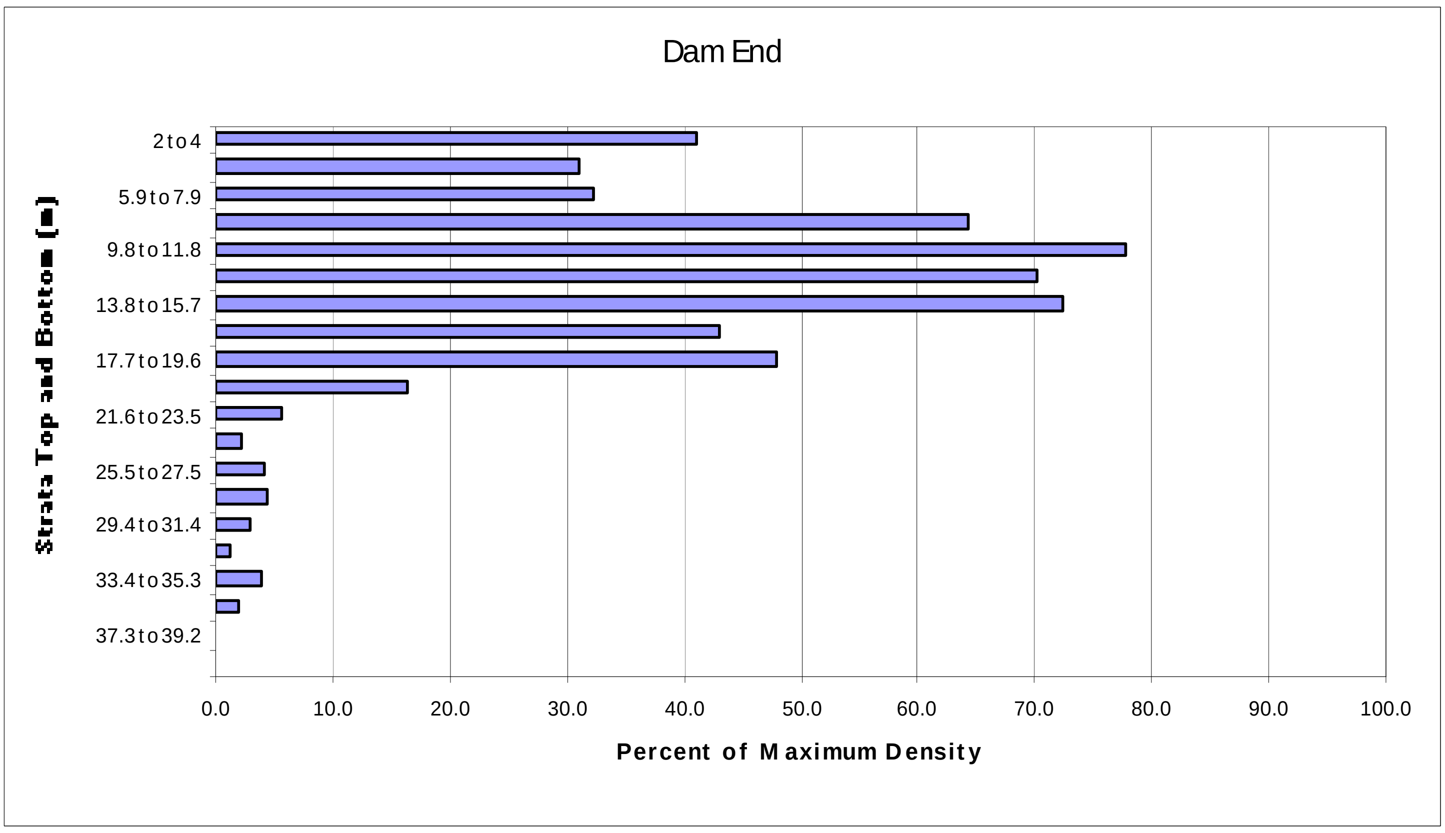
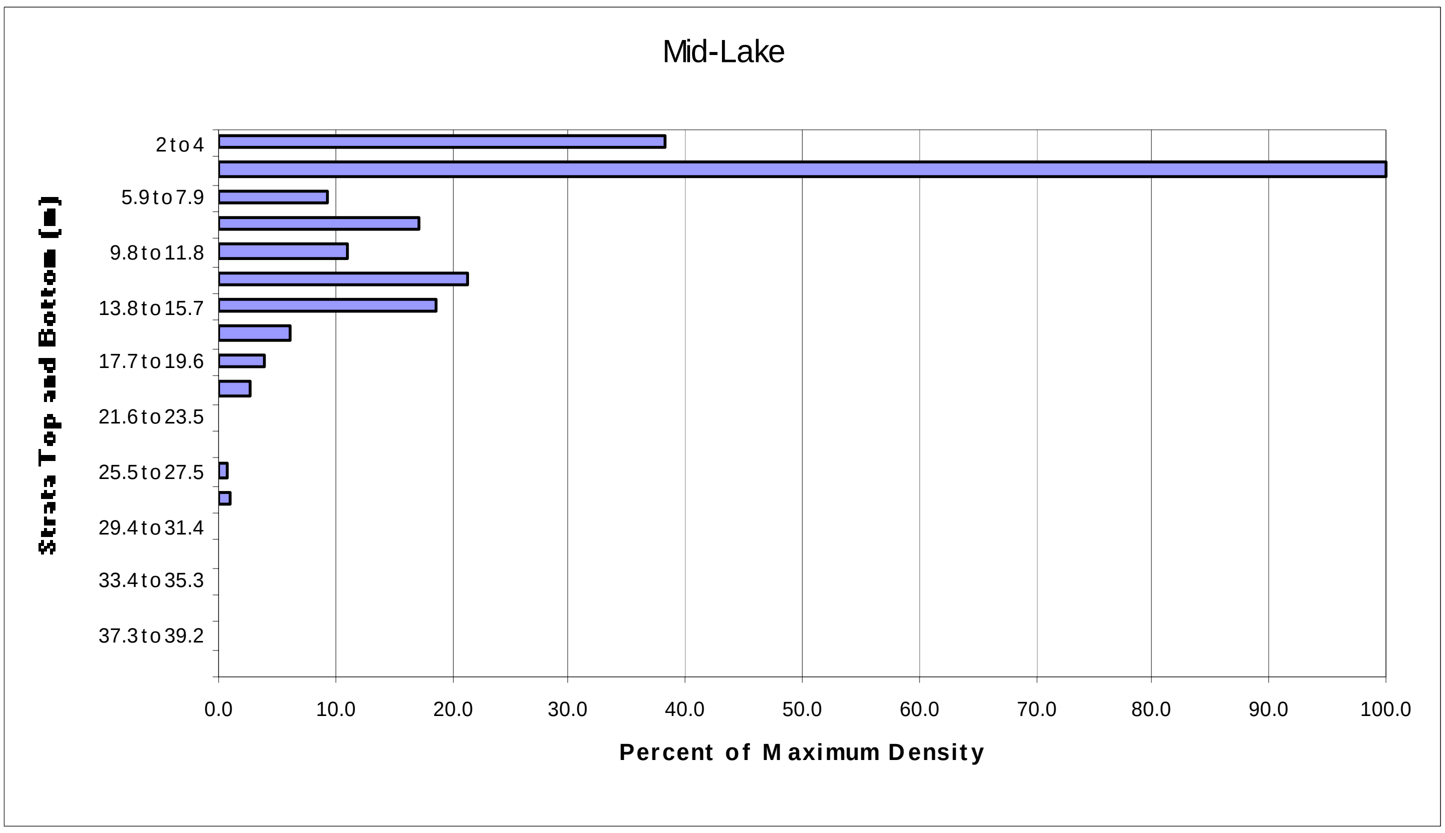


Figure CAWG 7-184. Length Frequency of Kokanee Collected in Shaver Lake, July-August 2002 (Number of Fish = 13).





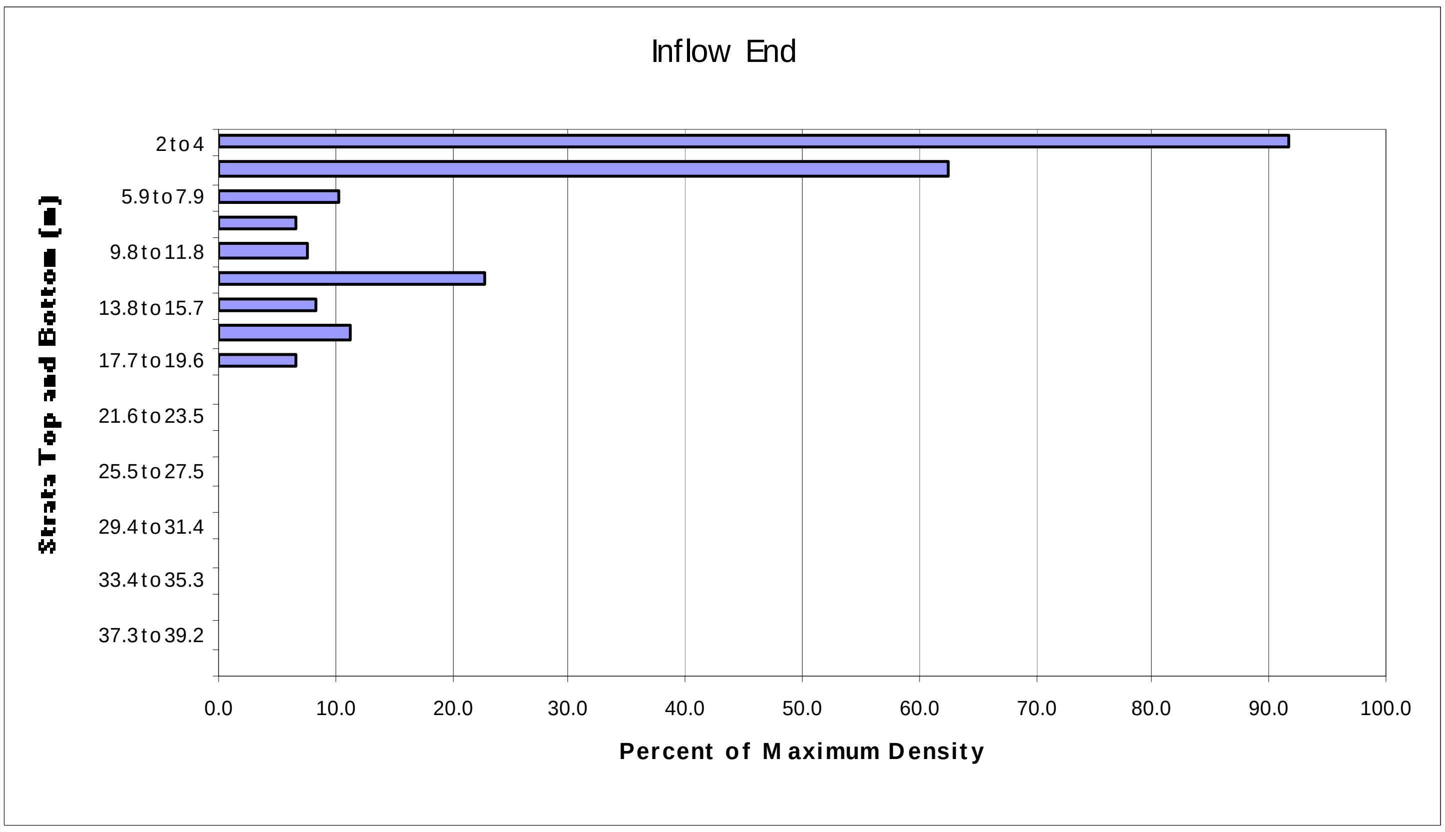


Figure CAWG 7-185. Percent of Maximum Fish Density Detected by Lake Area During Shaver Lake Hydroacoustic Survey, August 2002 (Maximum Density Detected = 2.08 x 10^{-3} fish/m^3).

MAP

Placeholder for Maps

Non-Internet Public Information

These Maps have been removed in accordance with the Commission regulations at 18 CFR Section 388.112.

These Maps are considered Non-Internet Public information and should not be posted on the Internet. This information is provided in Volume 4 of the Application for New License and is identified as "Non-Internet Public" information. This information may be accessed from the FERC's Public Reference Room, but is not expected to be posted on the Commission's electronic library, except as an indexed item.

APPENDIX A

Detailed Methods

CAWG 7-APPENDIX A DETAILED STUDY METHODOLOGY

Review Existing Data

Prior to initiating field data collection, existing data from SCE, CDFG and the Sierra National Forest were reviewed to identify information relevant to the study objectives and to assess its usefulness in understanding the fisheries of Project-affected streams and impoundments.

Historical fisheries information and stocking records were summarized by stream. Summary tables include the year the sampling was conducted, sampling locations, site characteristics, the species present, estimated abundance, and biomass. Information on fish stocking was reviewed and records of historic introductions were compiled.

Site Selection

Sampling sites were selected based on the results of habitat mapping summarized as part of the CAWG 1 Characterize Stream and Reservoir Habitats study. Stream segments in Project-affected streams were classified based on Rosgen Level 1 geomorphic channel-types. Candidate fish population sampling sites were selected within representative habitats within one reach of each dominant Rosgen Level I channel type within each Project bypass reach. In streams with small and medium-sized diversions, a potential reference site was selected in the dominant Rosgen Level 1 channel-type upstream of the Project diversion. Sampling sites were selected to include the major types of habitat present within a given channel type and reach. Habitat composition, proximity, site-specific characteristics and access were considered in selecting appropriate sampling sites. Approximately 100 meters of stream were included in each sampling site. Candidate sample sites were presented to the CAWG and sampling was conducted after CAWG approval was obtained.

Electrofishing Sampling

Stream electrofishing was conducted using Smith-Root Type 12B backpack electrofishing units. This method was used in habitats sufficiently shallow (under existing seasonal conditions at the time of sampling) to allow effective sampling. Prior to initial sampling activity, specific habitats units were evaluated to determine if the site could be effectively sampled, and to determine if any special status amphibian was present. Sampling gear was sterilized prior to use on a stream to avoid transport of pathogens. Project streams sampled by electrofishing methods are presented in Table CAWG 7-Appendix A-1. The locations of stream sampling sites are shown in Maps CAWG 7-1 through 7.

Sampling was conducted using multiple pass depletion in study streams in which fish are stunned and removed from the site in multiple sequential passes of similar effort. However, effort was adjusted between sites to provide effective removal for population estimation. Table CAWG 7-Appendix A-2 lists electrofishing effort by stream, reach, and Rosgen Level I channel types. Population estimates from these data were based on the maximum likelihood technique of Zippin (1958).

The upstream and downstream ends of the site were blocked using 0.25-inch mesh block nets. The block nets prevented fish passage into or out of the site during sampling. At most sites, electrofishing was conducted using one backpack electrofishing unit. At sites where the stream width was about 20 feet or more, two backpack electrofishing units were used. Sampling was performed in an upstream direction beginning at the downstream block net and finishing at the upstream block net. Settings on the electroshocker were adjusted to provide adequate strength for polarization and anesthesia of fish based on site-specific conditions. A typical electrofishing team consisted of one backpack electrofisher, one or two net persons, and one net/livecar person for streams smaller than 20 feet wide. Additional backpack electrofishers and net persons were required for streams greater than 20 feet wide. Electrofishing was generally conducted as described by Reynolds (1996).

Fish captured from each pass were transferred to separate holding pens outside of the sample site. Between passes, the fish captured during that pass were processed as described in the Fish Processing section below.

Snorkel Surveys

Project streams sampled by snorkeling are identified in Table CAWG 7-Appendix A-1. Snorkel surveys were conducted in habitat units that were too deep to be effectively sampled using electrofishing techniques (i.e., pool habitats). The habitat units were divided into one or more swimming lanes parallel to the direction of stream flow. Underwater visibility was measured to determine lane width (Hillman et al. 1992). If stream velocity or depth impeded the diver's ability to move upstream, pull ropes were used to assist the diver. A main rope was positioned at the uppermost boundary of the sample site, perpendicular to the flow. Pull ropes (one for each diver) were evenly spaced and attached to the main rope. The pull ropes extended to the lower most boundary of the sample site and were allowed to float at the water surface parallel with the stream flow. Lane markers and pull ropes, if used, were positioned in the site at least two hours prior to each direct underwater observation survey. This delay minimizes the influence of disturbance on the fish community (Hankin and Reeves 1988).

Table CAWG 7-Appendix A-1. Fish Sampling Techniques for Project Streams.

STREAM NAME	REACH NAME	ROSGEN LEVEL I TYPE CHANNEL SAMPLED	ELECTROFISHING	DIRECT OBSERVATION
South Fork San Joaquin River	Upstream of Florence Lake	B	C, 2002	C, 2002
	Florence Lake to Bear Creek	C	C, 2002	
	Florence Lake to Bear Creek	B	C, 2002	C, 2002
	Bear Creek to Mono Crossing	B	C, 2002	C, 2002
	Bear Creek to Mono Crossing	C	C, 2002	C, 2002
	Bear Creek to Mono Crossing	G	C, 2002	
	Mono Crossing to Rattlesnake Crossing	B	C, 2002	C, 2002
	Rattlesnake Crossing to SJR Confluence	G	C, 2002	C, 2002
Tombstone Creek	Above Diversion	Aa+	C, 2002	
	Below Diversion	Aa+	C, 2002	
	Below Diversion	C/E	NA	
South Slide Creek	Above Diversion	Aa+[1]		
	Below Diversion	Aa+	C, 2002	

Table CAWG 7-Appendix A-1. Fish Sampling Techniques for Project Streams (cont).

STREAM NAME	REACH NAME	ROSGEN LEVEL I TYPE CHANNEL SAMPLED	ELECTROFISHING	DIRECT OBSERVATION
North Slide Creek	Above Diversion	Aa+[1]		
	Below Diversion	Aa+	C, 2002	
Hooper Creek	Above Diversion	Aa+	C, 2002	
	Below Diversion	Aa+	C, 2002	
Crater Creek	Above Diversion	Aa+	C, 2002	
	Below Diversion	Aa+	C, 2002	
	Below Diversion	C	NA	
	Diversion Channel	Aa+	C, 2002	
Bear Creek	Above Diversion	B	C, 2002	
	Below Diversion	A	C, 2002	
Chinquapin Creek	Above Diversion	Aa+	C, 2002	
	Below Diversion	Aa+	C, 2002	
Camp 62 Creek	Above Diversion	Aa+	C, 2002	
	Below Diversion	Aa+	C, 2002	

Table CAWG 7-Appendix A-1. Fish Sampling Techniques for Project Streams (cont).

STREAM NAME	REACH NAME	ROSGEN LEVEL I TYPE CHANNEL SAMPLED	ELECTROFISHING	DIRECT OBSERVATION
Bolsillo Creek	Above Diversion	B	C, 2002	
	Below Diversion	B	C, 2002	
	Below Diversion	Aa+	C, 2002	
Mono Creek	Below Diversion	B	C, 2002	
San Joaquin River, Mammoth Reach	Upper Site	G	C, 2002	C, 2002
	Lower Site	B	C, 2002	C, 2002
Rock Creek	Above Diversion	Aa+	C, 2002	
	Below Diversion	Aa+	C, 2002	C, 2002
Ross Creek	Above Diversion	Aa+	NA	
	Below Diversion	Aa+	NA	
Big Creek	Dam 1 to PH 1 Reach	B	C, 2002	
	Dam 1 to PH 1 Reach	G	C, 2002	
	Dam 1 to PH 1 Reach	A	C, 2002	
	Dam 1 to PH 1 Reach	Aa+	C, 2002	

Table CAWG 7-Appendix A-1. Fish Sampling Techniques for Project Streams (cont).

STREAM NAME	REACH NAME	ROSGEN LEVEL I TYPE CHANNEL SAMPLED	ELECTROFISHING	DIRECT OBSERVATION
	Dam 4 to PH 2 Reach	A	C, 2002	
	Dam 5 to PH 8 Reach	A	C, 2002	
	Dam 5 to PH 8 Reach	Aa+	C, 2002	
Pitman Creek	Above Diversion	B	C, 2002	
	Below Diversion	B	C, 2002	
	Below Diversion	Aa+	C, 2002	
Balsam Creek	Above Diversion	Aa+	C, 2002	
	Below Diversion	Aa+	C, 2002	
Ely Creek	Above Diversion	Aa+	C, 2002	
	Below Diversion	Aa+	C, 2002	
Adit 8 Creek	Above Diversion	Aa+[1]		
	Below Diversion	Aa+	C, 2002	
San Joaquin River, Stevenson Reach	Upper Site	G	C, 2002	C, 2002
	Lower Site	G	C, 2002	C, 2002

Table CAWG 7-Appendix A-1. Fish Sampling Techniques for Project Streams (cont).

STREAM NAME	REACH NAME	ROSGEN LEVEL I TYPE CHANNEL SAMPLED	ELECTROFISHING	DIRECT OBSERVATION
North Fork Stevenson Creek	Above Tunnel 7 Outlet	Aa+	C, 2002	
	Below Tunnel 7 Outlet	Aa+	C, 2002	
	Below Tunnel 7 Outlet	G	C, 2002	
	Below Tunnel 7 Outlet	C	C, 2002	
Stevenson Creek	Below Shaver Lake	Aa+	C, 2002	
	Below Shaver Lake	B	C, 2002	
	Below Shaver Lake	A	C, 2002	

C - Completed
NA - Data not available because stream was dry at the time of sampling
[1] Sample site was inaccessible/ not amenable to safe sampling

Table CAWG 7-Appendix A-2. Electrofishing Effort by Stream, Reach, and Channel Type.

Stream	Reach	Rosgen Channel Type	Target Shocking Seconds (sec)
SFSJR	Upstream of Florence Lake	B	2716
SFSJR	Bear Creek to Florence Lake	C	3502
SFSJR	Bear Creek to Florence Lake	B	4534
SFSJR	Mono Xing to Bear Creek	B	2709
SFSJR	Mono Xing to Bear Creek	C	2872
SFSJR	Mono Xing to Bear Creek	G	4492
SFSJR	Rattlesnake Xing to Mono Xing	B	3894
SFSJR	SJR Confl. to Rattlesnake Xing	G	3079
Mono Creek	Below Diversion (BD)	B	4492
Bolsillo Creek	AD	B	3645
Bolsillo Creek	BD	B	2650
Bolsillo Creek	BD	Aa+	1699
SJR	Mammoth Reach, Upper Site	G	3618
SJR	Mammoth Reach, Lower Site	B	8355
SJR	Stevenson Reach, Upper Site	G	2926
SJR	Stevenson Reach, Lower Site	G	3503
Big Creek	PH 1 to Dam 1	A	1740
Big Creek	PH 1 to Dam 1	Aa+	3010
Big Creek	PH 1 to Dam 1	B	1430
Big Creek	PH 1 to Dam 1	G	1876
Big Creek	PH 2 to Dam 4	A	2808
Big Creek	PH 8 to Dam 5	A	4996
Big Creek	PH 8 to Dam 5	Aa+	2805
Pitman Creek	AD	B	4580
Pitman Creek	BD Site 1	B	1940
Pitman Creek	BD Site 2	Aa+	2683
Balsam Creek	AD	Aa+	2784
Balsam Creek	BD	Aa+	1027

Table CAWG 7-Appendix A-2. Electrofishing Effort by Stream, Reach, and Channel Type (cont).

Stream	Reach	Rosgen Channel Type	Target Shocking Seconds (sec)
Ely Creek	AD	Aa+	1346
Ely Creek	BD	Aa+	743
Rock Creek	AD	Aa+	3519
Rock Creek	BD	Aa+	2238
Ross Creek	AD	Aa+	Did not efish - Stream was dry
Ross Creek	BD	Aa+	Did not efish - Stream was dry
Adit 8 Creek	AD	Aa+	Did not attempt - unsafe
Adit 8 Creek	BD	Aa+	378
Bear Creek	AD	B	1759
Bear Creek	BD	A	3465
Chinquapin Creek	AD	Aa+	1115
Chinquapin Creek	BD	Aa+	2557
Camp 62 Creek	AD	Aa+	2299
Camp 62 Creek	BD	Aa+	1761
Crater Creek	AD	Aa+	1016
Crater Creek	BD	Aa+	1057
Crater Creek	BD	C/E	Did not efish - Stream was dry
Crater Creek	Diversion Channel	Aa+	2437
Hooper Creek	AD	Aa+	883
Hooper Creek	BD	Aa+	2323
North Slide Creek	AD	Aa+	793
North Slide Creek	BD	Aa+	840
South Slide Creek	AD	Aa+	861
South Slide Creek	BD	Aa+	815
Tombstone Creek	AD	Aa+	603
Tombstone Creek	BD	Aa+	1385
Tombstone Creek	BD	C/E	Did not efish - Stream was dry
Stevenson Creek	Below Shaver Lake, Site 1	Aa+	2244
Stevenson Creek	Below Shaver Lake, Site 2	B	3304
Stevenson Creek	Below Shaver Lake, Site 3	A	1319

Table CAWG 7-Appendix A-2. Electrofishing Effort by Stream, Reach, and Channel Type (cont).

Stream	Reach	Rosgen Channel Type	Target Shocking Seconds (sec)
North Fork Stevenson Creek	Above Tunnel 7 Outlet	Aa+	1722
North Fork Stevenson Creek	Below Tunnel 7 Outlet, Site 1	Aa+	3409
North Fork Stevenson Creek	Below Tunnel 7 Outlet, Site 2	B	3308
North Fork Stevenson Creek	Below Tunnel 7 Outlet, Site 3	C	2765

Methods were generally similar to those presented in Griffith (1972), Platts et al. (1983), Hicks and Watson (1985), Hankin and Reeves (1988), and Hillman et al. (1992). Surveys were performed between 0900 to 1600 hours (Hankin and

Reeves 1988) to maximize the likelihood that light intensity would be suitable for observing fish. Direct observation surveys were not conducted on overcast days (Platts et al. 1983).

Divers entered the water slightly below the downstream end of the sample unit (Hankin and Reeves 1988) and moved directly across and slightly below the lowermost boundary of the sample unit into their designated swimming lane. When in position, the divers moved upstream to the lowermost boundary of the sample unit. From a fixed position and prior to moving upstream, the divers looked upstream to locate fish on the fringe of vision (Platts et al. 1983). Divers then identified and counted fish species in their lane while moving slowly upstream at a uniform, even, pace with no abrupt movements. Fish were counted as they passed below or to the side of an observer. Cover for fish such as interstitial spaces between substrate particles, woody debris, bubble screens, crannies in bedrock and along stream margins were inspected closely for concealed fish to the best of the divers ability (Fausch and White 1981; Hicks and Watson 1985). A bank-side observer was stationed to monitor and verbally direct diver distribution and sampling rate.

Fish lengths were estimated by comparison with a fish length calibration cord. The calibration cord is a piece of small diameter rope with size length categories marked on it. In addition to the fish length calibration cord, all divers were trained in estimating fish lengths, so estimates of fish length would be consistent and accurate.

Snorkel Count Calibration

Hankin and Reeves (1988) recommend that visual fish counts be calibrated using electrofishing techniques. To perform the calibration, three run/pocketwater habitats in each of the following two stream categories were sampled using snorkel and electrofishing methods:

- Large stream bypass reach in the upper basin (upstream of Mammoth Pool)
- Large stream bypass reach in the lower basin (downstream of Mammoth Pool)

Each of the run/pocketwater habitats was snorkeled, then electrofished to calibrate the snorkel survey fish counts. The habitats selected were sufficiently deep to permit effective movement of divers and sufficiently shallow to allow effective electrofishing. However, these were not habitat types that were not those that were normally snorkeled. These habitats were shallower and more complex than the pools, which were the only habitats snorkeled to obtain population estimates. The run/pocketwater habitats used for calibration were selected from study sampling sites for each of the large stream bypass reaches. The upper basin large stream bypass reach consisted of the South Fork San Joaquin River, and the lower basin stream consisted of the San Joaquin River Mammoth and Stevenson Reaches. An average ratio of fish from the snorkel survey counts with the population estimates from the electrofishing sampling of the same habitats, ideally would provide a means of assessing the results of results from the two techniques at other sites.

To conduct the calibration survey, block nets were first placed at the upstream and downstream end of each habitat to prevent fish from leaving the site during the surveys. The snorkel survey was conducted using the methods previously described. After the snorkel survey, the site was allowed to rest for two hours before electrofishing. This time allowed fish to resume normal behavior and redistribute before electrofishing. Electrofishing was conducted using backpack electrofishing unit(s) and employed the same techniques described under Electrofishing Sampling (multiple-pass depletion method). The fish collected by electrofishing were processed as described in the Fish Processing section. The size class categories assigned to the fish captured by electrofishing were the same as those used during the snorkeling survey so that data from the two approaches would be comparable.

The ratios of fish counted in the snorkel survey and the population estimates for the run/pocketwater habitats in both the upper and lower basins were inconsistent. Therefore, the calibration information could not be reliably used to adjust population snorkel survey estimates for deep pool habitats. Thompson (2003) indicates that unless removal estimates (from the multiple-pass depletion method) exceed 85 percent of the true number of fish within the sampled habitat unit *and* unless the correlation between the snorkel count and removal estimate are at least 0.90, the Hankin and Reeves (1988) approach to estimating fish abundance from snorkel surveys may produce poor results. Substantial differences in data collected between the two methods was likely a result of the habitat complexity of the run/pocket-water habitats studied. Run and pocket-water habitats were, in part, composed of large substrate components that provided complex cover to fish. This cover allowed most fish to hide and avoid detection by snorkelers. The large complex substrate allowed even moderately large fish (approximately 300 mm FL) to find cover and avoid detection. On this basis, snorkel counts were considered minimum estimates of true abundance for the pool portions of sampling sites, where snorkeling was used. These are considered minimum estimates since they represent fish that were actually counted and do not account for additional fish, which may have been present, but uncounted.

Fish Processing

All fish captured through electrofishing and other sampling techniques (see methods for reservoir sampling) were identified to species, measured for length to the nearest millimeter total length or fork length, depending on the configuration of the caudal fin, and weighed to the nearest 0.1 g for fish up to two kg, or to the nearest one g for fish over two kg. If large numbers (>100) of a species were captured, the measurements were collected from a sub-sample of fish. The sub-samples were stratified by size class, with 10 measurements collected within each 25-mm size category.

Scale samples were collected from wild trout and hardhead for age determination. Scales were collected from the back of the fish above the lateral line and below and slightly behind the dorsal fin. Scales were stored in envelopes and the date, stream, site, species, length, weight and a data sheet reference code were recorded on the envelope.

Scale analysis was conducted to determine the age of sampled fish and to assess the age structure of sampled populations. In order to determine the age of the fish, scales were mounted on standard glass microscope slides and either directly viewed though a microscope or imaged with a microscope-mounted digital camera. Images of scales were digitally recorded for analysis using Motic® Images 2000 release 1.2 software. The electronic files allowed biologists to view and manipulate the scale images using simple imaging software (e.g. Motic® Images 2000 release 1.2, Jasc® Paintshop Pro version 7.02). The digital images of the scales were manipulated to make the annuli appear distinct from the rest of the circuli (scale rings). Due to their small size and the limitations of digital imaging, brook trout scales were not amenable to digital recording. The brook trout scales were aged using a microscope or standard microfiche viewer.

Downstream of Mammoth Pool and in tributaries that may have been accessible to anadromous fish prior to the construction of Kerckhoff and Friant dams, tissue samples were collected from representative non-hatchery rainbow trout for possible CDFG genetic analysis. Tissue samples were taken from small clips of the caudal fin. The samples were stored in envelopes and the date, stream, site, species, length, weight and a data sheet reference code were recorded on the envelope. The tissue samples were then allowed to air dry. These samples will be provided to CDFG for their use.

Physical Conditions

Routine observations were made of habitat and physical conditions in the specific areas sampled. These observations included physical measurements of water temperature, specific conductance, and dissolved oxygen. Water transparency is generally high in study streams. Discoloration or turbidity was noted, if observed. These measurements were made using either a Hydrolab Quanta or Horiba U-10 water quality meter. Water quality meters were calibrated at least once a day prior to use, to correct for altitude and dissolved oxygen saturation among sites.

Reservoir and Impoundment Sampling

Reservoirs (including the larger Project lakes) and impoundments (including the mid-sized diversion pools) were sampled through a variety of techniques including electrofishing, minnow traps and trap nets in shallow areas; gill and trap nets were set in deeper areas. Small diversions contain little or no impounded water during the summer and fall, when sampling took place. Sampling upstream of small diversions and medium diversions generally took place in stream reaches upstream of the boundary of the diversion pool (methods described above). All sample locations for each method were identified by GPS. Table CAWG 7-Appendix A-3 presents the sample methods for each reservoir. Maps CAWG 7-8 through 17 present the locations sampled by each gear type in each of the reservoirs. Set and retrieval times for each net collection method also were recorded to provide Catch-per-Unit Effort estimates.

Hydroacoustic surveys were conducted in the large reservoirs including Florence Lake, Huntington Lake, Shaver Lake, and Mammoth Pool. Hydroacoustic surveys were used to characterize overall fish density and evaluate depth distribution of fish abundance near Project intakes in large reservoirs.

Electrofishing was conducted using a boat or barge shocker. Representative coves and shallow margin habitats were sampled. The length of shoreline sampled was 100 meters for each representative habitat sampled. The electrofishing crew consisted of a boat/generator operator and two net persons. Fish were stunned and netted from the boat. All fish captured were processed as described above.

Minnow traps and trap nets were set in shallow water and baited with sardines. These traps were set for 48 hours and checked at approximately 24-hour intervals. More frequent checks were found to be unnecessary due to the low mortality level observed in trap nets and minnow traps. Minnow traps were set in at least ten locations around the Florence Lake, Huntington Lake, Shaver Lake and Mammoth Pool Reservoir, in five locations in Balsam Meadow Forebay, and in three locations in Dam 4, 5, and 6 Forebays and Bear Diversion Forebay. Each sample location consisted of a cluster of three minnow traps. Minnow traps were composed of two wire baskets (1/4 inch mesh) held together with a clip attached to a line with a float. The trap was 16 inches long, with a diameter of nine inches at the middle, and 7½ inches at the end. The opening to the trap was two inches.

Three trap nets were set in Florence Lake, Huntington Lake, Shaver Lake, Mammoth Pool Reservoir, and Balsam Meadow Forebay. The nets were baited with sardines/cat food and set for 48 hours and checked at approximately 24-hour intervals. The mouth of the trap nets measured three feet deep by six feet wide. Two wings, attached to the mouth of the net and measuring three feet by 25 feet, funneled fish into the net. Four hoops, measuring 2.5 feet in diameter formed the body of the net. The mesh on the trap net measured approximately 3/8 inch. All fish captured were processed as described above.

Table CAWG 7-Appendix A-3. Sampling Techniques for Project Impoundments.

	ELECTRO-FISHING	HYDRO-ACOUSTIC SURVEY	PASSIVE CAPTURE
LARGE DAMS WITH STORAGE			
Florence Lake Dam and Reservoir	C, 2002/U*	C, 2002	C, 2002
Huntington Lake Dams 1, 2, 3, 3a, and Reservoir	C, 2002/U	C, 2002	C, 2002
Shaver Lake Dam and Reservoir	C, 2002/U	C, 2002	C, 2002
Mammoth Pool Dam and Reservoir	C, 2002/U	C, 2002	C, 2002
MODERATE DIVERSION DAMS - SMALL IMPOUNDMENT			
Bear Creek Diversion Dam and Forebay	C+, 2002/U		C, 2002
Mono Creek Diversion Dam and Forebay	C, 2001		C, 2002
Balsam Dam and Forebay	C+, 2002		C, 2002
Big Creek Dam 4 and Forebay	C+, 2002		C, 2002
Big Creek Dam 5 and Forebay	C+, 2002		C, 2002
San Joaquin River Dam 6 and Forebay	C+, 2002		C, 2002
SMALL DIVERSIONS - MINIMAL OR NO IMPOUNDMENT Upstream Reaches Sampled			
Tombstone Creek Diversion	C+/U, 2002		
South Slide Creek Diversion	C+/**, 2002		
North Slide Creek Diversion	C+/**, 2002		
Hooper Creek Diversion	C+/U, 2002		
Crater Creek Diversion	C+/U, 2002		
Chinquapin Creek Diversion	C+/U, 2002		
Camp 62 Creek Diversion	C+/U, 2002		
Rock Creek Diversion	C+/U, 2002		
Ross Creek Diversion	C+/U, 2002		
Pitman Creek Diversion	C+/U, 2002		
Balsam Creek Diversion	C+/U, 2002		
Ely Creek Diversion	C+/U, 2002		
Bolsillo Creek Diversion	C+/U, 2002		

C – Sampling Completed
U – Stream upstream of the diversion to be sampled in 2002
* – Tributaries upstream of diversion to be sampled in 2002
** - Upstream area inaccessible/unsafe for sampling
+ – Stream upstream included on Table CAWG 7-Appendix A-1

Deep water habitats were sampled with gill nets in Project reservoirs. Each gill net consisted of four-panels (½, one, and 1½, and two inches mesh) measuring six feet deep and 25 feet in length (the total dimensions of each net were six ft x 100 ft). The gill nets were set overnight for two nights (two 24-hour periods) and checked in the morning of each day. In order to accurately describe the diversity of species, gill nets were, on occasion, relocated to different sampling locations on the second night of sampling. Six gill nets were set in Florence Lake, Huntington Lake, Shaver Lake and Mammoth Pool Reservoir. Three gill nets were set in Balsam Meadow Forebay, two were set in Dam 6 Forebay and Bear Creek Diversion Forebay, and one each was set in Dam 4 and Dam 5 Forebay. All fish captured were processed as described above.

Hydroacoustic surveys were conducted to characterize reservoir fish populations in large reservoirs including Shaver Lake, Huntington Lake, Florence Lake, and Mammoth Pool Reservoir. The surveys were conducted using boat mounted hydroacoustic equipment. A BioSonics Model DT6000 digital splitbeam echosounder was used with a pulse rate determined by the depth of the waterbody being sampled. Gain was operated at 40logR with a –60 dB threshold. The transducer mounted on a sled designed to be towed beside the boat. The transducer was towed at a depth of approximately one meter to reduce the effect of surface turbulence. Towing took place at a target speed of 2.5 miles per hour. Speed was measured as velocity made good over ground as measured by GPS. GPS coordinates of sampling transects were recorded with fish density data using a differential GPS to allow spatial integration of fish counts to determine fish densities. The transducer was towed through the lake through the equivalent of 10 or more transects to provide sufficient coverage of the lake to obtain a reasonable estimate the number of fish present. Due to the configuration of the hydroacoustic equipment, surveys were conducted primarily in areas where water depth exceeded 10 feet. At depths less than 10 feet, the volume of the cone ensonified by the hydroacoustic transducer is generally too small to provide adequate sampling. Data were recorded to computer along with timing and location information. Maps CAWG 7-18 through 21 present the path monitored using hydroacoustics in each of the large reservoirs. Underwater video was used to verify targets, objects observed, and any apparently anomalous objects detected. Hydroacoustic data were analyzed BioSonics Visual Analyzer Version 4.02 and associated software.

APPENDIX B

Life Histories

APPENDIX B SPECIES ACCOUNTS

Fish Species Present in the Project Area

Rainbow Trout (*Oncorhynchus mykiss*)

Rainbow trout are found in many of the waters of the Project Area, and include trout of a variety of origins and strains. A hybrid of rainbow trout and golden trout (golden x rainbow trout) also is found in several streams. The close relationship between rainbow trout and golden trout allows the two species to crossbreed (an account of the life history of golden trout is discussed in the next section). An anadromous run of steelhead/rainbow trout was historically present in the San Joaquin River below Mammoth Pool prior to the construction of Kerchkoff and Friant dams, which blocked access upstream. However, rainbow trout were stocked into other reaches of the San Joaquin River drainage including those inaccessible to anadromous fish. The presence of rainbow trout in Project waters is the result of their popularity as a gamefish and past and present stocking efforts in this area.

As demonstrated by their flexible biology and life history behavior, growth in rainbow trout can be variable. In small streams and high mountain lakes, rainbow trout seldom live longer than six years of age or grow larger than 40 cm total length. Most wild rainbow trout reach sexual maturity in their second or third year and usually spawn between February and June, depending on water temperature and strain (McAfee, 1966). In colder waters at high altitudes, spawning may occur as late as July or early August (McAfee, 1966). Rainbow trout in other similar South Fork San Joaquin River (SFSJR) tributary streams have been found to spawn from April through June, according to CDFG (Loudermilk, 2001) (Figure CAWG 7-Appendix B-1).

Rainbow trout spawn in gravel, usually in riffles. The eggs hatch in 15 weeks at 3.5ºC and 11 weeks at 5ºC (Stickney, 1991). The fry emerge from the gravel beginning two to three weeks later, depending upon temperature. Juvenile and adult rainbow trout may migrate into a lake or other downstream areas or remain in the stream defending a small home range (Moyle, 2002).

For the first year or two of life rainbow trout inhabit clear, cool, fast flowing water. Rainbow trout prefer streams with ample aquatic cover such as riparian vegetation or undercut banks. As the fish grow in size, habitats generally shift from riffles for the smallest fish to runs for intermediate sized fish and pools for the largest fish (Moyle 2002). Stream dwelling fish feed mostly on drifting invertebrates, but will also take benthic invertebrates. In lakes feeding habits depend on the availability of prey. Rainbow trout in lakes may feed on zooplankton, benthic invertebrates, or small fish.

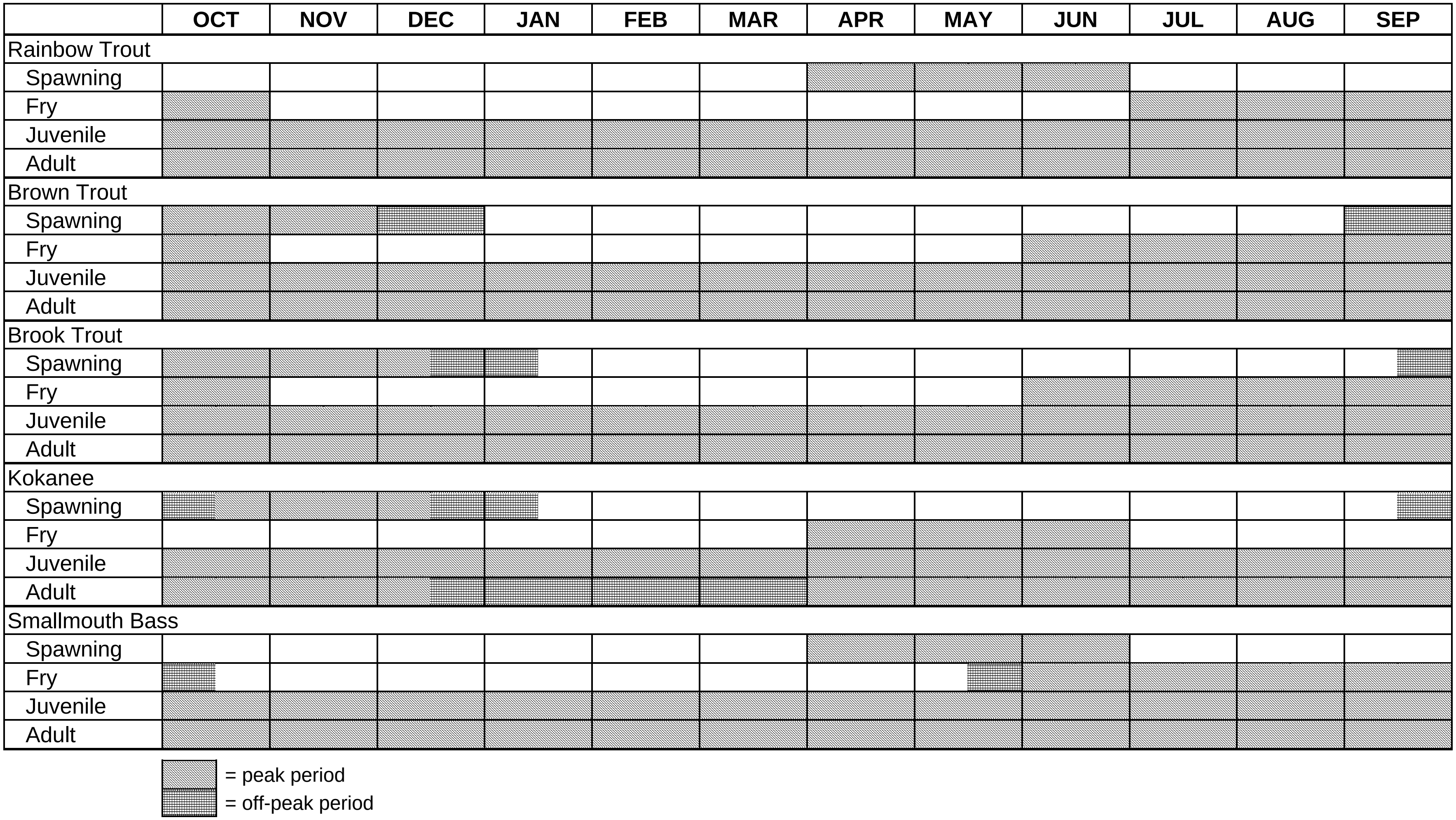


Figure CAWG 7-Appendix B-1. Phenology of Key Fish Species in Big Creek Project Waters.

Golden Trout (*Oncorhynchus mykiss aguabonita*)

Rainbow trout x golden trout hybrids were found in Hooper Creek, Ely Creek, and North Fork Stevenson Creek. They were collected and identified during backpack electrofishing surveys in the summer and fall of 2002. Golden trout are native only to the upper Kern River Basin, but fishermen, settlers, and government agencies began moving them to other Sierra Nevada drainages by the late nineteenth century (Moyle, 1996). Golden trout populations have been established in over 300 high altitude streams and lakes in the Sierra Nevada by planting both wild and hatchery stock (McAfee, 1966). During the 1950s, there was considerable additional planting of golden trout and other species in high mountain lakes and nearby streams in this area. CDFG records indicate that golden trout planted in Bear Creek, a tributary of the South Fork San Joaquin River, were the source of golden trout planted in other waters such as Hooper Creek. The interconnectiveness of Project water facilities provides a means for movement of fish species such as golden trout or their hybrids.

Growth in golden trout is generally slow due to the short growing season of high altitude waters and the low productivity of their native waters (Moyle, 2002). Golden trout can live for six to seven years and can grow to 35-43 cm fork length (FL) in high elevation lakes and streams (Moyle, 2002). Golden trout mature in their third or fourth year and spawn when water temperatures reach seven to 10ºC, which occurs in Project area waters as early as May (Moyle, 2002). However, it is not known whether the spawning period of hybrids is more similar to that of rainbow trout or golden trout. Golden trout eggs hatch in about 20 days at 14ºC (Moyle, 2002). Golden trout seem to do poorly in competition with other salmonids, especially eastern brook trout (McAfee, 1966).

Brown Trout (*Salmo trutta*)

Brown trout are a popular, nonnative gamefish introduced into Project area waters. Brown trout growth is variable and depends on habitat conditions. Usually brown trout grow faster in large lakes and reservoirs than in streams (Moyle, 2002). Surface water temperatures in large lakes may be warmer than smaller high altitude mountain lakes, and, therefore, contribute to a better and longer growing season. Brown trout mature in their second or third year and will spawn, depending on water levels and stream temperature, in the fall or winter. In the Project area, brown trout may begin their spawning migration as soon as early September (Figure CAWG 7-Appendix B-1). However, spawning sites are not chosen until stream temperatures begin to significantly cool (Moyle, 2002). Peak spawning activity generally does not occur until October and November and tapers off in December. Eggs hatch after between 11 to 16 weeks (Loudermilk, 2001). For a period, typically June though October, brown trout fry inhabit quiet water close to banks among large rocks or overhanging vegetation. Large brown trout are highly piscivorous and can prey on young of their own or of other trout species.

Brook Trout (*Salvelinus fontinalis*)

Brook trout have long been a popular gamefish for high altitude waters. In the Project area, brook trout, a nonnative, introduced species, was captured from many locations including tributaries of the SFSJR.

Growth in brook trout depends on a number of factors, including length of growing season, water temperature, population density, and food availability. Competition with other introduced salmonids, and the factors listed above, frequently prevent brook trout from growing larger than 30 cm total length. Brook trout rarely live longer than four to five years of age (Moyle, 2002).

Maturity in males can occur at the end of their first year of life, but is more common in their second year. Females may mature between their second and fourth year of life. Brook trout may begin their spawning migration in mid-September, but specific timing depends on water temperatures (Figure CAWG 7-Appendix B-1). Brook trout also are capable of spawning in lakes if suitable habitat exists. The peak spawning period lasts from October to December.

Eggs hatch after 12-16 weeks at water temperatures of two to 5°C. After hatching, the fish remain in the gravel for three to four days until the yolk sac is absorbed. In streams and lakes, the fry move to the shallow edges among vegetation or backwater areas for cover (Moyle, 2002). Fry will remain in the shallows from June to October. In streams, juvenile and adult fish will defend territories (often associated with areas of cover) against other trout. In lakes, juvenile and adult fish may move individually about in open water, schooling only when alarmed.

Kokanee (*Oncorhynchus nerka*)

Kokanee are the non-anadromous form of sockeye salmon and have been introduced in many of California's cold-water lakes. Kokanee are regularly stocked in Shaver and Huntington Lakes. Kokanee in Huntington Lake and associated waters primarily originate from CDFG stocking rather than natural reproduction (Wickwire pers. Comm. 2002).

Kokanee are pelagic zooplankton feeders that inhabit well-oxygenated waters of reservoirs between 10 and 15° Celsius. The diet of kokanee changes little as they grow larger; kokanee feed mainly on Daphnia, copepods, emerging insects and, on occasion, larval fish. Kokanee cease all feeding activity during the winter and prior to spawning. Kokanee grow quickly compared to other salmonids, but typically do not attain the large sizes observed in some of the other species.

Spawning kokanee are usually between two and four years of age, depending on growing conditions and genetic stock. Most spawning kokanee are at least 20 cm total length, but mature fish as small as 16 cm total length have been recorded. Depending on the genetic stock and the lake and stream temperatures, kokanee spawn between

September and February. Kokanee require water temperatures between six and 13°C to spawn. Kokanee may spawn in streams or lakes (usually in water less than eight meters in depth) with suitable gravel substrate. Just prior to spawning, kokanee congregate at the mouths of streams or in the vicinity of suitable lake spawning areas. Like other salmon, spawning kokanee attempt to return to the stream in which they were hatched. Spawning behavior is like that of other salmon; the females build redds while the males defend the area from other males. Spawning success is particularly low among kokanee, but is compensated by a high survival rate for the eggs that are laid, based on the literature. The fry emerge in April through June and immediately migrate downstream and generally do not start feeding until they reach the lake.

Sacramento Sucker (*Catostomus occidentalis*)

Sacramento suckers are found in a wide variety of streams, from cold mountain streams to valley floor rivers. They are most abundant in larger streams and rivers in the transitional areas between the cold and warm-water reaches. Sacramento suckers are part of the same transition zone community of fish as the hardhead and the Sacramento pikeminnow and are native to the Sacramento-San Joaquin River basin. In the Project area, Sacramento suckers were found in lower elevation streams and in tributaries to Huntington Lake, as well as Huntington Lake and Shaver Lake.

Habitat needs and use vary with lifestage (Moyle, 2002). Larval suckers (<14 mm SL) concentrate in the warm, quiet, protected stream margins. Moyle (2002) states that the post-larvae emerge and occupy warm shallows and flooded vegetation, where they often occur in large aggregations or schools. Swimming capability is limited for larvae, but increases with size and development.

Juvenile suckers were more commonly found in the tributary streams where they hatched, than in reservoirs and downstream areas. Juvenile suckers (< 50 mm SL) stay on or close to the bottom at depths of 20-60 cm, foraging in shallow, slow-flowing (<10 cm/sec) water along the stream margins.

Sub-adult and adult suckers are usually found in the deep water of pools, in runs, or beneath undercut banks near riffles during the day. Adult suckers appear to school, but are comprised of individuals orientating themselves to optimal foraging sites in a stream, usually at the head of pools. They prefer water greater than three feet deep where they are relatively safe from avian predators (e.g. herons, osprey, bald eagles).

Sacramento suckers first spawn at an age of about four or five. Spawning generally takes place in February through June (see Figure CAWG 7-Appendix B-2), depending on water temperatures, and may continue into July or August in some systems (Moyle 2002). The spawning migration is triggered when water temperatures warm to 5.6-10.6°C. Suckers are known to swim up to 20 km upstream to spawn. A sudden cooling also can stop the run until warmer temperatures return (Moyle 2002). Spawning occurs in groups, with an individual female being accompanied by several males. In

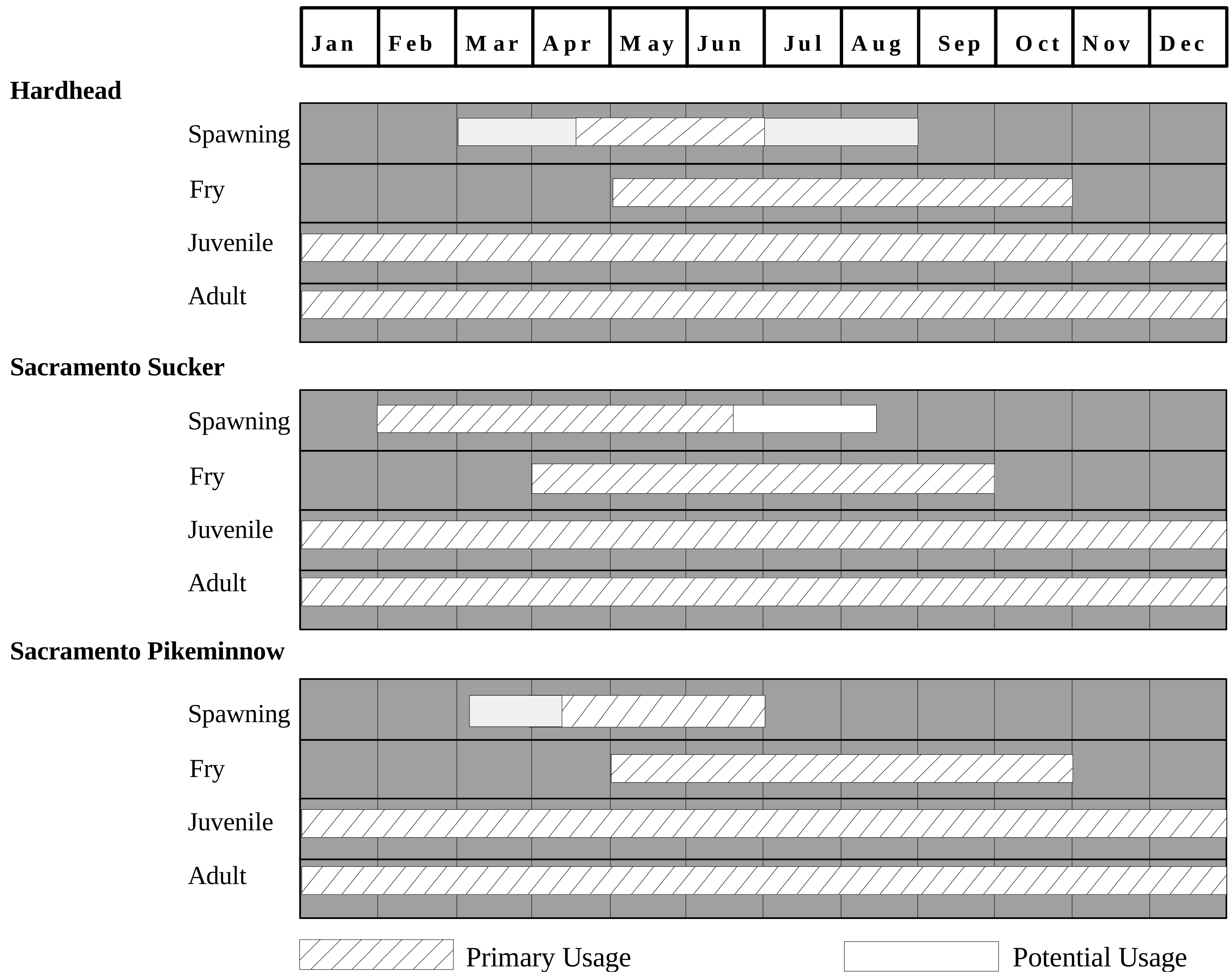


Figure CAWG 7-Appendix B-2. Phenology of Native Fish Species in Big Creek Project Waters.

tributaries, suckers will spawn over gravel riffles, whereas in lakes they may spawn along shorelines.

Suckers forage most actively at night, when they move up into riffles to feed. Their primary foods are algae, diatoms, and invertebrates. Invertebrates become increasingly important as the fish grow larger, although algae remain an important component of the diet throughout life. Suckers may grow 12-87 mm per year depending on local conditions and may exceed ten years of age and 50 cm in length in larger water bodies.

The diet of suckers is composed of algae, detritus, and invertebrates associated with the substrate. Postlarval suckers, with their short digestive tract and terminal mouths, feed primarily at the surface and in the midwater on early instars of insects. As they develop into juveniles and their mouths become subterminal and digestive tracts lengthen, their diet shifts toward diatoms, filamentous algae and protozoans. The diet of adult suckers is made up of filamentous algae, diatoms, and detritus. Invertebrates consumed by adult suckers make up less than 20 percent of their diet (Moyle 2002). At night, suckers are more active and move into the shallows to feed (Moyle 2002).

Hardhead (*Mylopharodon conocephalus*)

Hardhead are a member of the native transition zone fish community and are native to the San Joaquin River basin. Although hardhead are not listed as threatened or endangered by either the state or federal governments (CDFG Natural Heritage Division March 1998), they are identified as a species of special concern by CDFG and a sensitive species by the USFS (Moyle et al. 1995, USFS 1998).

Hardhead mature at the end of their third or fourth years and spawn mainly in April and May (Reeves 1964, Grant 1992). However, Wang (1986) reports spawning from May through August in the upper San Joaquin River. Fish from larger rivers or reservoirs may migrate 30-75 km or more upstream in April and May, usually into smaller tributary streams (Reeves 1964). In Pine Creek, Tehama Co., resident hardhead aggregate during the spawning season in nearby pools, while hardhead from the Sacramento River move up, presumably to spawn, into downstream reaches that dry up during the summer (Grant 1992). Figure CAWG 7-Appendix B-2 presents the phenology of spawning and the various life history stages of the hardhead.

Moyle (2002) states that knowing that hardhead are highly fecund (20,000 eggs, Burns 1966), it is assumed that mass spawning occurs, and that eggs are broadcast over gravel riffles, in streams or over gravel areas along the margins of lakes and reservoirs. However, lower estimates of fecundity (9,500-10,700) also have been made for fish from Weber Creek (Reeves 1964).

Hardhead juveniles feed on aquatic insect larvae. After reaching 20 cm SL, hardhead primarily feed on aquatic plants and invertebrates in quiet water. Every year, hardhead grow an average of 60-70 mm, eventually decreasing their growth rate as the fish get older. Usually hardhead live up to six years (460 mm FL).

Hardhead are typically found in undisturbed mid to low elevation streams, up to 1,450 m maximum elevation. Hardhead prefer well-oxygenated water with summer water temperatures in excess of 20°C. They prefer deep pools (> 1 m deep) with a sand-gravel-boulder substrate and a slow velocities. Adult hardhead tend to position themselves in the lower half of the water column in a stream and near the surface in a lake or reservoir (BioSystems and UC Davis 1985). The hardhead is a species of concern to many stakeholders in the Big Creek ALP and is addressed by a stakeholder objective from the CAWG 5 Study Plan:

5. Maintain favorable water temperatures and water quality for the native transition zone community.

The hardhead is a US Forest Service Region 5 sensitive species (USFS 1998) and a CDFG species of special concern. It is a member of a group of native fish species that are associated with warmer temperatures and different life histories than coldwater fish, such as trout.

Temperature preferences among fish depend upon a variety of factors including fish size, acclimation history, food availability, predators, disturbance, water velocity and cover availability. Moyle (2002) has characterized hardhead as occurring primarily in streams that have summer temperatures in excess of 20°C. Optimal temperatures for hardhead (as determined in laboratory experiments) are in the range of 24-28°C (Knight 1985, Cech et al. 1990). In a natural thermal plume in the Pit River, hardhead generally selected temperatures of 17-21°C, which were the warmest temperatures available (Grant 1992 as cited in Moyle 2002).

Hardhead usually occur in the same habitats as Sacramento suckers and Sacramento pikeminnow, and are almost never found in areas where pikeminnow are absent. In addition, hardhead are rarely found in an environment that has a well-established centrarchid populations (Moyle and Nichols 1973, Moyle 1995 and 2002) or in an environment that has been impacted by man (Baltz and Moyle 1993). They are rarely found in reservoirs, with the exception of Redinger and Kerckhoff reservoirs in Fresno County, and in reservoirs of the Pit River system in Shasta County (Moyle 2002).

Adult hardhead prefer water at least one meter deep with moderate velocities ranging from about 0.13 to .52 m/s (BioSystems and University of California at Davis [UC Davis] 1985). Juvenile hardhead prefer depths less than 1.2 m, and velocities of zero to 0.06 m/s. Generally areas with depths of greater than 1.2 m occur within pool habitats, although some runs may get this deep. Low velocities are usually associated with pools. The moderate velocities preferred by large hardheads would most commonly be found in runs or at the heads of pools. In studies conducted in the Pit River, hardhead were most frequently observed in runs and pools and rarely in riffles (BioSystems and UC Davis 1985). Adult fish were more commonly encountered in pools, while juveniles were more common in runs. During periods of high flow and cold temperatures hardhead may be even further restrictive in their use of habitat (Grant 1992). Field observations indicate that larvae and young juveniles of hardhead school in shallow, warm nearshore waters with very low velocities (<0.06 m/s) (Moyle 2002). Hardhead larvae have limited swimming ability and therefore avoid higher velocity areas

Sacramento Pikeminnow (*Ptychocheilus grandis*)

Sacramento pikeminnow (*Ptychocheilus grandis*) are not listed by either the federal or state governments as threatened or endangered (CDFG Natural Heritage Division March 1998), nor are they listed as a species of special concern (Moyle et al. 1995) or as a sensitive species by the USFS (1998). The Sacramento pikeminnow is a member of the native transition zone fish community and have become much less abundant in the lowland habitats where they were once the dominant predatory fish (Moyle 2002). Sacramento sucker are native to the San Joaquin River basin.

Sacramento pikeminnow reach sexual maturity at an age of three or four years. Movement to spawning areas generally occurs in April and May (see Figure CAWG 7-Appendix B-2), generally when water temperatures reach 14°C. Pikeminnows spawn in gravel riffles or in shallow flowing areas at the base of pools, when water temperatures rise to 15-20°C (Moyle 2002). The presence of small larvae found in some streams indicates that spawning may occur through June (Wang 1986, Mulligan 1975). Ripe pikeminnow migrate upstream to spawn in gravel riffles in streams or on gravel areas near shore, in lakes or reservoirs. The female dips down to release a small batch of eggs, while one to six males simultaneously release milt into the water, which fertilizes the eggs. The eggs drift down into the gravel, and adhere to the substrate. Sacramento pikeminnow are known to have a high fecundity, based on observations of a female carrying 17,730 eggs. Fecundity is high with estimates of 15,000-40,000 eggs/female and related to the size of the fish (Taft and Murphy 1950, Burns 1966, Grant 1992). In northern pikeminnow, a closely related species, eggs hatch in four to seven days at 18°C, and the fry begin schooling in another seven days (Burns 1966). Similar observations of large numbers of schooling Sacramento pikeminnow larvae in shallow edges and backwaters have been reported by Wang (1986). The larvae and young juveniles require low velocity habitats due to their limited swimming abilities.

Baltz and Moyle (1985) found that juvenile Sacramento pikeminnow preferred a habitat with 57.4 cm depth and a mean water column velocity of 19.4 cm/s.

Adults on the other hand preferred a total depth of 115.6 cm and a mean water column velocity of 36.4 cm/s. Unlike juveniles, adult pikeminnow are considered to be solitary and do not school. Optimal water temperature for Sacramento pikeminnow, in laboratory studies, was 26.3°C.

Juvenile pikeminnow prey on surface and bottom-dwelling aquatic insects. Once they reach 18 cm SL, pikeminnow become piscivorous and start feeding on smaller fish and crayfish. Pikeminnow tend to occupy one area in a stream, but are also known to migrate upstream (when water level is high) or downstream (when water level is low) for food. Sacramento pikeminnow tend to have a faster growth rate in permanent rather than in intermittent streams, but are considered to have a slow growth rate compared to other fish in the cyprinid family. Pikeminnow have been known to grow well past 100 cm SL.

Sacramento pikeminnow have a high abundance in intermittent and permanent streams (elevation of 100-650 m). Older pikeminnow prefer pool habitats that are deep, have adequate amount of shade, and that have a sandy/boulder substrate. Adults tend to hide underneath rock ledges and logs during the day, and come out of hiding at night, to actively seek out prey. After hatching, young Sacramento pikeminnow school in shallow pool edges (Moyle 2002).

Adult pikeminnow prefer water deeper than 1.0 m and velocities between 0.12 and 0.34 m. Juvenile pikeminnow prefer depths ranging from 0.67-1.43 m and velocities less than 0.23 m. Based on this, one would expect to find juvenile pikeminnow in run habitats and adult pikeminnow in deep runs or at the head of pools. In the Pit River, pikeminnow were most commonly observed in pool habitats, followed by runs (BioSystems and UC Davis 1985). They were often absent in riffles.

Pikeminnow have a preference for warm water temperatures ranging up to 27.8°C. The final preferred temperature for pikeminnow was 26.0°C (Knight 1985). Moyle (2002) states that they generally live in waters with summer temperatures of 18-28ºC. Further, within this range, pikeminnows often seek out the warmer temperatures, if other aspects of the habitat are appropriate. The CTM for pikeminnow increased with acclimation temperature from 28.3°C at an acclimation temperature of 10-38.0°C at an acclimation temperature of 30°C (Knight 1985).

Smallmouth Bass (*Micropterus dolomieu*)

Smallmouth bass were introduced into California in 1874 and have since spread to most of the suitable waters. Smallmouth bass are normally found in water approximately 20-27°C, preferring pools and areas with abundant cover. In California, smallmouth bass tend to be most abundant at elevations between 100 and 1,000 m. In rivers and streams, they are usually found in the same habitats as pikeminnow, sucker, and hardhead, members of the native transition zone fish community (Moyle 2002). In the Project Area, they generally are found in Shaver Lake.

Spawning occurs during their third or fourth year. When water temperatures reach 13-16°C (usually in April) (Figure CAWG 7-Appendix B-1) males begin to build nests in rocky bottoms at a depth of three feet in reservoirs or quiet areas of streams. Males will guard the nest until the eggs hatch in three to 10 days. After hatching, the sac fry spend three to four days in the nest. The male herds and guards the fry for an additional one to three weeks; they then disperse into shallow water. Young fry would be expected to be present during early summer (Moyle 2002).

For the first month or two, fry feed mainly on rotifers and small crustaceans. By the time they are two to three inches long, they feed primarily on aquatic insects and fish fry. Once smallmouth bass exceed four inches, they feed primarily on fish and large invertebrates, especially crayfish. In addition, smallmouth bass also feed on amphibians. Moyle (2002) notes that smallmouth bass are frequently cannibalistic. Growth of smallmouth bass depends upon food availability and habitat conditions.

APPENDIX C

Historical and Stocking Information

APPENDIX C HISTORICAL INFORMATION

An extensive search of historical fish information and stocking records was conducted for all Project-affected streams and river segments. Fish stocking and population information was reported where available. In some cases, no information was found, and is indicated as such. The results of the review are presented by river basin within the Project area, including:

- Mainstem of the South Fork San Joaquin River (SFSJR) and Project-affected tributaries to the SFSJR,
- Mammoth Reach of the San Joaquin River and Project-affected tributaries,
- Stevenson Reach of the San Joaquin River,
- Big Creek and Project-affected tributaries, and
- Stevenson Creek / North Fork Stevenson Creek.

South Fork San Joaquin River Basin

South Fork San Joaquin River Mainstem

Five segments of the mainstem South Fork San Joaquin River (SFSJR) were sampled for the ALP sampling effort. Therefore, historical fish information and stocking records were gathered for each of the five SFSJR segments. These five river segments include:

- SFSJR upstream of Florence Lake,
- Downstream of Florence Lake Dam (SFSJR RM 27.85) to Bear Creek confluence (SFSJR RM 22.3),
- Bear Creek (SFSJR RM 22.3) to Mono Creek crossing (SFSJR RM 17.93),
- Mono Creek crossing (SFSJR RM 17.93) to Rattlesnake Creek crossing (SFSJR RM 14.5), and
- Rattlesnake Creek crossing (SFSJR RM 14.5) to the confluence with San Joaquin River (SFSJR RM 0.0).

The California Department of Fish and Game (CDFG) and other entities have stocked or introduced several species of fish to the SFSJR in the past. Based on CDFG fish stocking and fish sampling records, attempts have been made to introduce the following species (at a minimum) to the SFSJR drainage: brown trout (*Salmo trutta*), brook trout (*Salvelinus fontinalis*), rainbow trout/steelhead

(*Oncorhynchus mykiss*), cutthroat trout (*Oncorhynchus clarki*) and golden trout (*Oncorhynchus mykiss aguabonita*). In the case of many of these species, numerous varieties of diverse origins were introduced to these waters.

Fish stocking in the SFSJR has been extensive and has occurred over a long period of time. Several salmonid species have been stocked including brown trout, rainbow trout, brook trout, and cutthroat trout. Extensive fish stocking records are available for the SFSJR (CDFG 1939; CDFG 1952a; CDFG 1968a; CDFG 1998; CDFG 2002). Planting locations were not identified for all entries, therefore the exact locations for some plantings are not known. Additionally, settlers, soldiers, fishermen, and government agencies have historically been important in the introduction of fish to streams and lakes in the Sierra Nevada (State Fish and Game Commission Biennial Reports 1913-14, 1915-16, 1919-20).

Available stocking information for the SFSJR is provided in Table CAWG 7-Appendix C-1.

The primary species stocked by CDFG has been the rainbow trout. Eighty-two percent of the fish stocked by the CDFG into the SFSJR (1931 to present) have been rainbow trout. After 1941, the SFSJR was almost exclusively stocked with rainbow trout (brook trout was planted in 1966 and 1979). Based on available information, it appears that most of the fish have been planted between Mono Hot Springs and Florence Lake Dam and upstream of Florence Lake. All of the fish stocked after 1956 have been documented as catchable-sized fish, except for one record of sub-catchable sized fish in 1966. The average number of catchable rainbow trout planted in the SFSJR is 10,150 fish per year. Catchable-sized fish measured approximately 200 mm TL. Prior to 1956, all fish were planted as fingerling-sized fish.

Fish stocking and population information from available references are discussed for each of the five sampled reaches of the SFSJR.

<u>SFSJR – Upstream of Florence Lake</u>

CDFG fish stocking records (CDFG 1939; CDFG 1952a), CDFG stream surveys (CDFG 1934a; CDFG 1945a; CDFG 1945b), and fish sampling (Bartholomew and Loudermilk 1986) indicate that brown trout, brook trout, golden trout and rainbow trout have been introduced and subsequently found upstream of Florence Lake. Rainbow trout was the primary fish planted (Table CAWG 7-Appendix C-1). Although brown trout, golden trout and rainbow trout were caught and observed, population estimates were not available for earlier sampling efforts (Table CAWG 7-Appendix C-2). The locations of earlier sampling were not indicated in the information available.

SFSJR – Bear Creek to Florence Lake

Based on fish stocking records (CDFG 1952a; CDFG 1968a; CDFG 1998), routine CDFG stream surveys (CDFG 1945a), and other fish sampling (Bartholomew and Loudermilk 1986), brown and rainbow trout were the only fish species found in the SFSJR between Bear Creek and Florence Lake. Rainbow trout was the primary species planted in the Bear Creek to Florence Lake segment of the SFSJR (Table CAWG 7-Appendix C-1). Although brown trout and rainbow trout observations have been made since 1945, population estimates were only available for rainbow trout in 1968, and rainbow and brown trout in 1985 (Table CAWG 7-Appendix C-3).

SFSJR – Mono Crossing to Bear Creek

Based on fish stocking records (CDFG 1939; CDFG 1952a; CDFG 1998), routine CDFG stream surveys (CDFG 1934a; CDFG 1945a), and other fish sampling (Strickland 1963; Bartholomew and Loudermilk 1986), brown trout and rainbow trout were the only fish species found in the Mono Crossing to Bear Creek segment of the SFSJR. Rainbow trout was the primary fish planted in the SFSJR from Mono Crossing to Bear Creek (Table CAWG 7-Appendix C-1). Although brown trout and rainbow trout observations have been made since 1945, population estimates were only available for rainbow trout in 1968, and rainbow and brown trout in 1985 (Table CAWG 7-Appendix C-4).

SFSJR – Rattlesnake Crossing to Mono Crossing

CDFG fish stocking records (CDFG 1939), CDFG stream surveys (CDFG 1945b), and fish sampling (Bartholomew and Loudermilk 1986), have indicated that brown trout and rainbow trout were historically introduced and subsequently present in the SFSJR between Rattlesnake Crossing and Mono Crossing. Brown trout was the primary species planted between Rattlesnake Crossing and Mono Crossing (Table CAWG 7-Appendix C-1). Although brown trout and rainbow trout were caught and observed, population estimates were not provided as part of the earlier surveys (Table CAWG 7-Appendix C-5).

SFSJR – Rattlesnake Crossing to San Joaquin River Confluence

Based on available fish sampling information (Bartholomew and Loudermilk 1986), brown trout and rainbow trout have historically resided (post-introduction) in the SFSJR from Rattlesnake Crossing to the San Joaquin River confluence. Although brown trout and rainbow trout were caught and observed, population estimates were not provided in earlier reports (Table CAWG 7-Appendix C-6).

Project-affected Tributaries of the South Fork San Joaquin River

Historical fish records were collected for Project-affected tributaries of the SFSJR. These tributaries, from an upstream to downstream perspective, include: Tombstone, South Slide, North Slide, Hooper, and Crater Creeks, Crater Creek Diversion Channel, and Bear, Chinquapin, Camp 62, Bolsillo and Mono Creeks. Fish stocking and population information are discussed for each Project-affected tributary of the SFSJR, including all sampled reaches of each tributary.

Tombstone Creek

After conducting an extensive search of historical fish records, only one record was found indicating any presence of fish in either reach of Tombstone Creek. Golden trout was the only species reported above the diversion (CDFG 1970a). No historical fish records were found for the reach below the diversion. Additionally, no fish stocking records were found for Tombstone Creek.

North and South Slide Creeks

No fish species were reported historically in North Slide Creek for either reach. In the past, North Slide Creek was not recognized as an important fishing stream (Dill 1945a), and fish water releases were not recommended (CDFG 1970a).

Based on a fish stocking record and field observations, rainbow trout was the only species reported, and only in the reach below the diversion in South Slide Creek.

In the past, South Slide Creek was not recognized as an important fishing stream (Dill 1945a). In 1950, however, CDFG Madera Hatchery planted 500 fingerling rainbow trout in South Slide Creek (CDFG 1950). The site of the planting was not specified in the fish stocking record. Additionally, rainbow trout were observed in 1954 below the diversion, but habitat quality was assessed as poor (CDFG 1954). A population estimate was not provided. More recently, CDFG recommended that fish water releases were not necessary for the bypass reach (CDFG 1970a). No historical records were found for the reach above the diversion.

Hooper Creek

Historical fish information was found for both reaches of Hooper Creek. For the most part, fish were stocked above the diversion in Hooper Creek. The majority of fish stocking records were from 1949, when “wild” golden trout (introduced from other drainages) were caught in the Bear Creek drainage and transplanted to locations in Hooper Creek (Table CAWG 7-Appendix C-7; CDFG 1949). Planting locations are provided where information was available (Table CAWG 7-

Appendix C-7).

Hooper Creek: Above the Diversion Reach

Based on fish stocking records (CDFG 1949; CDFG 1951a; CDFG 1951b; Dunham 1952; SCE 1963), CDFG stream surveys (CDFG 1952b), and reports by anglers (Hoss 1964), brown trout, golden trout, and rainbow trout were all historically introduced and subsequently above the Hooper Creek diversion (Table CAWG 7-Appendix C-8). Golden trout were observed in 1950, 1951, 1952, and 1964 on CDFG stream and fish surveys (CDFG 1951a; CDFG 1952b), as well as on fishing trips (Hoss 1964) in various sections of the creek and lakes. However, population estimates were not provided.

Hooper Creek: Below the Diversion Reach

Rainbow trout was reported in 1945 below the diversion, near the mouth of Hooper Creek (CDFG 1952b). However, a population estimate was not provided in the CDFG stream survey.

Crater Creek

Based on one historical record for Crater Creek, brook trout was the only fish species reported for both above and below the diversion (CDFG 1970a). No other fish presence or stocking records was found for any of the other reaches of Crater Creek.

Bear Creek

Brook trout, brown trout, golden trout, rainbow trout, and golden x rainbow trout hybrids were all historically introduced and subsequently found in Bear Creek. Bear Creek was initially planted with wild golden trout. These fish were later used to stock other tributaries of the SFSJR.

Above the Diversion Reach

Brook trout, brown trout, golden trout, rainbow trout, and golden x rainbow trout hybrids were all historically introduced and subsequently found above the Bear Creek diversion. Several fish species were stocked by CDFG or other sources.

A vast amount of information is available regarding historical fish stocking records in the Bear Creek drainage (CDFG 1934b; CDFG 1934c; Dill 1943a; CDFG 1948a; CDFG 1948b; CDFG 1951c). Wild golden trout were first planted in upper Bear Creek in 1914 (Dill 1943a). Less than 200 fish were taken from Golden Trout Creek at Little Whitney and main Whitney meadows in Tulare County and planted in Marie Lake and the headwaters of Bear Creek (Dill 1943a). From these wild fish, fish were planted in Hilgard Reach, East Fork Bear

Creek Reach, South Fork Bear Creek Reach, and the Rose and Marie Lakes Drainage in 1928 (Dill 1943a). Another transplant of wild golden trout from the Bear Creek drainage occurred in 1942 and were planted in various locations throughout the Bear Creek drainage (Table CAWG 7-Appendix C-9) (CDFG 1948b). Bear Creek was first stocked with rainbow trout in 1934 (CDFG 1934b; CDFG 1934c). Historical stocking information is summarized in Table CAWG 7-Appendix C-9.

In addition to stocking information, a number of sightings have historically been documented, primarily from CDFG in the form of stream surveys or fishing trips (CDFG 1934c; CDFG 1948a; Douglas 1950; Vestal 1958; CDFG 1959; CDFG 1960; Lewis 1962; SCE 1971; CDFG 1978). Golden trout was most often documented above the diversion in Bear Creek (Table CAWG 7-Appendix C-10).

Below the Diversion Reach

Based on the information available, Bear Creek was not stocked with fish below its diversion. Brook trout, brown trout, and rainbow trout have been reported in the literature below the Bear diversion dam (CDFG 1941a; CDFG 1941b; USFS 1979; Bartholomew and Loudermilk 1986). These fish most likely originated from stocked fish above the diversion. Bartholomew and Loudermilk (1986) was the only source that provided population estimates (Table CAWG 7-Appendix C-11).

Chinquapin Creek

Both brook trout and rainbow trout were historically introduced and subsequently found in Chinquapin Creek. Limited information was available for both reaches of Chinquapin Creek.

Above the Diversion Reach

Based on fish studies (ESA 1985), brook trout was found above the Chinquapin Creek diversion in the past. Fish stocking information was not available, although brook trout were introduced, as this fish is not native to California. The only reported occurrence of any fish was through ESA (1985). Brook trout was reported as the dominant species at the headwaters. Other fish species were probably present, but were not named nor reported. No population estimate or density was provided.

Below the Diversion Reach

Based on streamflow studies (CDFG 1970a), rainbow trout was historically introduced and subsequently found below the Chinquapin Creek diversion. Fish stocking information was not available. The only reported occurrence of any fish was through the CDFG (1970a). They observed rainbow trout (length range: 102-254 mm) in “good numbers” at the lower 0.5 miles of Chinquapin Creek.

Camp 62 Creek

After an extensive historical fish records search, no fish stocking or fish observations were discovered for any of the reaches in Camp 62 Creek.

Bolsillo Creek

Brook trout and rainbow trout were historically reported in Bolsillo Creek. Although no historical records were found for above the diversion reach, a few records were found for below the diversion reach.

Below the Diversion Reach

Based on fish stocking records (CDFG 1945c), stream surveys (CDFG 1940), and other reports (CDFG 1970a), brook trout and rainbow trout were both found below the diversion in Bolsillo Creek. Although CDFG fish stocking records were only found for rainbow trout (Table CAWG 7-Appendix C-12) (CDFG 1945c), brook trout was also apparently stocked, as indicated by its numerous presence in 1940 and 1970 (Table CAWG 7-Appendix C-13) (CDFG 1940; CDFG 1970a). Rainbow trout was reported as "numerous" in 1970 (Table CAWG 7-Appendix C-13) (CDFG 1970a). However, a population estimate was not provided in either reference for both species.

Mono Creek

Historical information on fisheries for Mono Creek downstream of the Mono Creek Diversion was reviewed for the Big Creek ALP. Based on fish studies and sampling (SCE 1968; SCE 1971; Bartholomew and Loudermilk 1986), brown trout and rainbow trout were historically reported below the Mono Creek Diversion. Stocking records indicated that rainbow trout was only stocked above the diversion in Mono Creek, which is outside the scope of this study. Although no stocking records were found for brown trout, it was likely introduced in the past. Brown trout was observed in 1968, 1971, and 1985 on fish surveys (SCE 1968; SCE 1971; Bartholomew and Loudermilk 1986), while rainbow trout was observed in 1968 and 1971 (SCE 1968; SCE 1971) (Table CAWG 7-Appendix C-14). Population estimates were generally not provided.

San Joaquin River

Historical fish information and stocking records for two segments of the San Joaquin River (SJR) and Project-affected tributaries of the SJR were collected. The Mammoth Reach of the SJR extends from Mammoth Pool Dam (SJR RM 25.55) to Mammoth Pool Powerhouse (SJR RM 18.2). Project-affected tributaries of the SJR Mammoth Reach include Rock and Ross Creeks, which are located downstream of the Mammoth Pool Reservoir. The Stevenson Reach of the SJR extends from Dam 6 (SJR RM 17.0) to Powerhouse 3 (SJR RM 11.2) at Redinger Lake. Historical fish information for each reach and Project-affected tributary of the SJR is discussed.

Mammoth Reach of the San Joaquin River Basin

San Joaquin River Mainstem

The first known fish population surveys of the Mammoth Reach of the SJR were conducted in 1969 and collected only rainbow trout and brown trout (Table CAWG 7-Appendix C-15) (Bartholomew and Loudermilk 1986). Subsequent surveys conducted during the mid-1980s collected and observed both rainbow and brown trout, as well as a large number of Sacramento sucker (*Catostomus occidentalis*) by means of electrofishing, gill netting, and faceplate observations (Table CAWG 7-Appendix C-15) (Bartholomew and Loudermilk 1986). Abundance, density, and biomass estimates were generally available and are reported where available (Table CAWG 7-Appendix C-15).

No historical fish stocking records for the Mammoth Reach were found.

Study Stream Tributaries of the San Joaquin River Basin

Project-affected tributaries of the Mammoth Reach of the San Joaquin River include Rock (San Joaquin RM 22.56) and Ross (San Joaquin RM 18.7) Creeks.

Rock Creek

Based on CDFG fish stocking and fish sampling records, attempts have been made to introduce the following species (at a minimum) to Rock Creek: rainbow trout/steelhead, brown trout and brook trout (Table CAWG 7-Appendix C-16). The primary species stocked by CDFG has been the rainbow trout. Rainbow trout from the CDFG Madera Hatchery were planted in the early 1950s, and rainbow trout from the CDFG San Joaquin Fish Hatchery were planted every year from 1956 to the present (CDFG 1999a; CDFG 2002). Brown trout from the Madera Hatchery were planted in 1953 (CDFG 1999a). Brook trout raised at the San Joaquin Fish Hatchery were planted in 1966 (CDFG 1999a). Prior to 1956, all fish were planted as fingerling-sized fish. Catchable-sized fish (approximately 200 mm TL) were planted in subsequent years.

Fish population surveys in Rock Creek conducted in 1976 collected brown trout, while surveys in 1984 collected both rainbow trout and brown trout (Table CAWG 7-Appendix C-17) (ESA 1985). Density estimates were 105.6 fish/mile in August of 1976 and 316.8 fish/mile in the March of 1984. A notation was made regarding environmental changes from past hydro operation activities that “aquatic habitat was reduced to warm, stagnant, algae-matted plunge pools…lacked good capability for fish production" (ESA 1985).

Ross Creek

Very little historical fish information was found for Ross Creek. "Trout" were first stocked in Ross Creek as early as 1870 (Ellis 1915).

Stevenson Reach of the San Joaquin River Basin

No historical fish stocking records for Stevenson Reach were found.

Fish population surveys of the Stevenson Reach of the San Joaquin River conducted in 1985 and 1986 collected Sacramento pikeminnow (*Ptychocheilus grandis*), hardhead (*Mylopharodon conocephalus*), Sacramento sucker, rainbow trout, brown trout, and sculpin (*Cottus* spp.) by means of electrofishing (Table CAWG 7-Appendix C-18) (BSAI 1987a). Sacramento pikeminnow and hardhead were the most abundant species in this reach of the San Joaquin River, suggesting that a native transition zone fish community dominated portions of this reach. Rainbow trout were found throughout the reach, but brown trout were rarely found (ESA 1985; SCE 2000a). Hardhead were collected upstream of Redinger Lake (SCE 2000a).

Big Creek Drainage Basin

Big Creek

Historical fish information and stocking records were collected for the mainstem of Big Creek. Big Creek extends from Big Creek Dam 1 at Huntington Lake (Big Creek RM 9.9) to Big Creek Powerhouse 8 (Big Creek RM 0.0). Historical fish information is discussed for three segments of Big Creek.

CDFG and other entities have stocked or moved several species of fish in Big Creek during the past. Based on fish stocking records, rainbow trout, brook trout, and brown trout have been planted in Big Creek. However, determining exactly where fish were planted along Big Creek between Dam 1 and Big Creek Powerhouse 8 from the available historical fish stocking information was problematic. As noted in Dill (1944), "plants made in 'Big Creek, Fresno County' may have been made in three entirely different localities". Therefore, stocking information was not divided into separate reaches; it was compiled for all of Big Creek between Dam 1 and Big Creek Powerhouse 8. The available stocking information was incorporated into Table CAWG 7-Appendix C-19 (ESA 1985; Dill 1944; and CDFG 2002).

Big Creek (Dam 1 to Big Creek PH 1)

In 1944 rainbow trout, brown trout, and brook trout were all reported to be present in the reach of Big Creek between Dam 1 and Big Creek Powerhouse 1 (Dill 1944). Rainbow and brown trout have been noted subsequently, as well as a fourth species, riffle sculpin (*Cottus gulosus*) (Table CAWG 7-Appendix C-20) (SCE 2000b).

Big Creek (Dam 4 to Big Creek PH 2)

The species that have been found in the past in Big Creek between Dam 4 and Big Creek Powerhouse 2 are rainbow trout, brown trout, and an unspecified sculpin species (Table CAWG 7-Appendix C-21) (ESA 1985; SCE 2000b).

Big Creek (Dam 5 to Big Creek PH 8)

The sole fish population survey conducted on Big Creek between Dam 5 and Big Creek Powerhouse 8 found rainbow trout, brown trout, and an unspecified sculpin species (Table CAWG 7-Appendix C-22) (BSAI 1987a).

Project-affected Tributaries of Big Creek

Historical fish information and stocking records were collected for the Project-affected tributaries of Big Creek and are discussed below. Project-affected tributaries of Big Creek include Pitman (Big Creek RM 6.3), Balsam (Big Creek RM 4.8), and Ely (Big Creek RM 3.3) Creeks.

Pitman Creek

Based on CDFG fish stocking records (CDFG 1983; CDFG 2002), other fish stocking documents (Ellis 1915; Shebley 1911) and available fisheries reports (ESA 1985), rainbow trout, brook trout, cutthroat trout and brown trout have been found in Pitman Creek in the past. Stocking of rainbow trout dates back to 1956, with “trout” stocked as early as 1897 (Ellis 1915) (Table CAWG 7-Appendix C-23). Brook trout was stocked only in 1966 and 1979 (CDFG 2002). Cutthroat trout and brown trout were stocked in 1910 (Shebley 1911). Rainbow trout was reported by ESA (1985) as having a large hatchery population, which extended from the Hwy 168 crossing to downstream of the diversion dam. Information from previous studies regarding population estimates and densities were not found.

Balsam Creek

There was very little information located for Balsam Creek. There was, though, one survey that noted that anglers had reported rainbow trout both above and below the Balsam Creek diversion, which indicates that the species had been introduced in the past (Table CAWG 7-Appendix C-24) (Dill1945b).

Ely Creek

There was no historical fish information located for Ely Creek.

North Fork Stevenson Creek

Historical fish information was collected for North Fork Stevenson Creek, which is tributary to Stevenson Creek. Natural flow in North Fork Stevenson Creek is augmented by releases made from Tunnel 7. Water is conveyed through the tunnel from Huntington Lake to Shaver Lake via North Fork Stevenson Creek.

Historically, no fish were thought to be present in North Fork Stevenson Creek above the Tunnel 7 outlet (ESA 1985). There were also no records of fish stocking into North Fork Stevenson Creek either above the Tunnel 7 outlet or below it.

Historical fish population surveys of North Fork Stevenson Creek below the Tunnel 7 outlet have found rainbow trout, brown trout, brook trout, Sacramento sucker, prickly sculpin (*Cottus asper*), and riffle sculpin (BSAI 1993; ESA 1985) (Table CAWG 7-Appendix C-25).

The most recent results previous to the sampling conducted as part of the Big Creek ALP are from a monitoring study begun in October 2000. The study was designed to monitor the fish populations of North Fork Stevenson Creek downstream of the Tunnel 7 outlet after a high flow event resulted in streamflows occurring outside the currently active creek channel (ENTRIX 2001; ENTRIX 2002). The results of these sampling efforts have found brown trout, rainbow trout, Sacramento sucker, and riffle sculpin to inhabit the stream. Overall, rainbow trout made up the greatest proportion of collected fish, followed by brown trout (Table CAWG 7-Appendix C-26).

Stevenson Creek

Historical fish information and stocking records were collected for Stevenson Creek, which is a Project-affected tributary of the SJR (SJR RM 13.6).

Rainbow trout was the only fish species historically introduced and subsequently present in Stevenson Creek below Shaver Lake, according to numerous sources (BSAI 1987a; BSAI 1988; CDFG 1970a; ESA 1985) (Table CAWG 7-Appendix C-27). Limited stocking information was available for Stevenson Creek, consisting of five annual plantings of rainbow trout during the 1950's (CDFG

2002) (Table CAWG 7-Appendix C-28). Additional records were found that indicated rainbow trout and brown trout were both stocked in 1906 (Shebley 1911) and cutthroat trout may have been stocked in 1884 (Ellis 1910).

Reservoirs

This section presents historical fish information and stocking records in Project reservoirs and medium-sized impoundments. Reservoirs and impoundments are classified based on storage capacity. Large Project reservoirs include Florence Lake, Mammoth Pool Reservoir, Huntington Lake, and Shaver Lake. Medium-sized Project impoundments include Bear Creek Diversion Dam Forebay, Mono Creek Diversion Dam Forebay, Big Creek Powerhouse 3 Forebay (Dam 6), Big Creek Powerhouse 2 Forebay (Dam 4), Big Creek Powerhouse 8 Forebay (Dam 5), and Balsam Meadow Forebay. The discussion starts with Florence Lake and proceeds to discuss impoundments from upstream to downstream.

Florence Lake

Florence Lake is impounded by Florence Dam at SFSJR RM 28. Historical stocking records and fish population information were gathered for Florence Lake. Based on fish stocking records (CDFG 1952c; CDFG 1998), CDFG lake/stream surveys (CDFG 1934d; CDFG 1941c), gill net sampling/fish data (BSAI 1987b; CDFG 1964; CDFG 1965; CDFG 1967; CDFG 1968b; CDFG 1969; CDFG 1970b; CDFG 1971; CDFG 1973; CDFG 1975), and field correspondence (CDFG 1952d), brown trout, rainbow trout/steelhead, brook trout, kokanee, and golden shiner were all historically introduced to Florence Lake. Fish (rainbow trout) were last stocked in Florence Lake in 1998.

Rainbow trout was the primary fish that was planted in Florence Lake (Table CAWG 7-Appendix C-29). Several strains of rainbow trout were planted, including the Coleman, Whitney, and Whitney x Kamloops strains (Table CAWG 7-Appendix C-29). Additionally, rainbow trout from Eagle Lake (both hatchery and wild) were planted in 1985 and 1989 (CDFG 1998). The Whitney x Kamloops strain has been most recently planted (Table CAWG 7-Appendix C-29).

Other fish that have been stocked in Florence Lake include brown trout, brook trout, kokanee and steelhead (the anadromous form of rainbow trout) (Table CAWG 7-Appendix C-29). Records for brown trout indicate that the species was stocked from 1933 through 1969. Apparently, brook trout was only stocked in 1980. Kokanee was stocked in 1959 and steelhead was planted in 1931.

Although brown trout, brook trout, rainbow trout, and golden shiner were caught and observed, population estimates were not provided (Table CAWG 7-Appendix C-30). Gill netting was the primary method used to catch fish in the past, as indicated by numerous memorandums from the CDFG (CDFG 1964; CDFG 1965; CDFG 1967; CDFG 1968b; CDFG 1969; CDFG 1970b; CDFG 1971; CDFG 1973; CDFG 1975). Rainbow trout was observed in Florence Lake as early as 1934, although it was not as numerous as brown trout, which was the dominant species present in 1937 (CDFG 1934d; CDFG 1937a).

Bear Creek Diversion Dam Forebay

Bear Creek Diversion creates a medium-sized Project impoundment located approximately 1.57 miles upstream of the confluence of Bear Creek with the SFSJR. Brown trout, rainbow trout, brook trout, golden trout, and golden x rainbow trout hybrids were all historically introduced and subsequently found in the Bear Creek Diversion Dam Forebay. These fish species were documented through stream and lake surveys (CDFG 1934c; CDFG 1948a), fish studies (SCE 1971) and stocking records (CDFG 1948b).

The only fish stocking record found was in 1948, when 4,050 rainbow trout were stocked in the Bear Creek Diversion Dam Forebay (CDFG 1948b) (Table CAWG 7-Appendix C-31).

The presence of several fish species within the Bear Creek Diversion Dam Forebay was reported in 1934 and 1971 (Table CAWG 7-Appendix C-32). Brook trout and brown trout were documented as “doing real well” at the Bear Creek Diversion Dam in 1934 (CDFG 1934c). Golden x rainbow trout hybrids were present in sizeable numbers in the forebay during 1971 (SCE 1971). Additionally, an excellent population of brown trout existed in the lower reaches of the forebay in 1971 (SCE 1971). Rainbow trout were present in “good numbers” in the middle area of the forebay in 1971 (SCE 1971). Golden trout were documented in the upper reaches of the forebay in 1971 (SCE 1971).

Mono Creek Diversion Dam Forebay

Mono Creek Diversion is located on Mono Creek approximately 5.8 miles upstream of the confluence with the SFSJR. Brown and rainbow trout were historically introduced and subsequently present in the impoundment, and both species were found upstream in Mono Creek below Vermilion Valley Dam.

Very few historical records were found for the Mono Creek Diversion Dam Forebay. In fact, only one record was found that reported the presence of any fish species within the forebay. However, comprehensive stocking records were available since 1950 for the area between Vermilion Valley Dam and the Mono Creek Diversion Dam (Table CAWG 7-Appendix C-33). Rainbow, brown, and brook trout, as well as several strains of rainbow trout hybrids, have historically been stocked in Lake Edison by CDFG. Rainbow trout and brook trout also have been stocked in Mono Creek downstream of Vermilion Valley Dam. Rainbow trout have been regularly stocked in Mono Creek above the diversion dam for many years. Catchable-sized rainbow trout is the only species currently stocked in Mono Creek upstream of the diversion.

Based on a fish study (SCE 1971), brown trout and rainbow trout were found in the Mono Creek Diversion Dam Forebay (Table CAWG 7-Appendix C-34). Both species were commonly found in the forebay, as of 1971 (SCE 1971). No biological information was taken from these species, nor were population estimates provided.

Mammoth Pool Reservoir

Mammoth Pool Dam, located on the SJR (SJR RM 26), impounds water in Mammoth Pool Reservoir. Brown trout, rainbow trout, brook trout, coho salmon, Sacramento sucker, and golden shiner were all historically introduced and subsequently found in Mammoth Pool Reservoir, based on a number of historical fish records (BSAI 1987b; CDFG 1999b; CDFG 2002).

Comprehensive historical fish stocking records exist for Mammoth Pool Reservoir since 1960 (Table CAWG 7-Appendix C-35). Rainbow trout was the primary fish species that was stocked. Various strains of rainbow trout were stocked, including the Coleman, Kamloops, Whitney, Shasta, Hot Creek x Virginia, and Whitney x Kamloops strains. Additionally, rainbow trout from Eagle Lake have also been stocked. Coho salmon and brook trout have been occasionally stocked in the past. Rainbow trout is the only species currently stocked in Mammoth Pool Reservoir.

The majority of historical fish population information for Mammoth Pool Reservoir comes from several creel censuses and gill netting surveys conducted in the 1970s (Table CAWG 7-Appendix C-36). Rainbow trout, brown trout, brook trout, coho salmon, golden shiner, and Sacramento sucker were all collected in those surveys (BSAI 1987b). The presence of coho salmon has not been documented since 1977, the last year they were stocked. More recent sampling reported the presence of rainbow trout, brown trout, brook trout, golden shiner, and Sacramento sucker (SCE 2000b). Golden shiner presence was documented as recently as 1998 and may represent escaped baitfish.

Other available data concerning fish populations in Mammoth Pool Reservoir are from the 1940’s and pre-dates the construction of Mammoth Pool Dam, which was completed in 1960 (Table CAWG 7-Appendix C-36). Rainbow trout and brown trout were both collected before the construction of Mammoth Pool Dam (CDFG 1943; CDFG 1946a; CDFG 1946b; Fresno Bee 1945).

San Joaquin River Big Creek Powerhouse 3 Forebay (Dam 6)

The Big Creek Powerhouse 3 forebay (Dam 6 Forebay) is located behind Dam 6 at San Joaquin RM 17.0 (upstream of the confluence with Big Creek). This medium-sized Project impoundment is approximately one mile long and less than 91 meters wide.

Limited historical fisheries information was available for the Dam 6 Forebay. Seventeen hundred (1700) rainbow trout from the SCE fish hatchery were released into Dam 6 Forebay in 1979 (Table CAWG 7-Appendix C-37). Subsequent plantings have been made for which records are not available (BSAI 1987b).

No historical fish population surveys were found for the Dam 6 Forebay. However, brown trout, rainbow trout, and Sacramento sucker are all known to be present in the forebay, and brook trout is thought to be present (Table CAWG 7-Appendix C-38) (BSAI 1987b). Sacramento suckers spawn above the forebay in the SJR (Table CAWG 7-Appendix C-38).

Huntington Lake

Dam 1 on Big Creek impounds Huntington Lake at Big Creek RM 9.9. Brown trout, rainbow trout, brook trout, Sacramento sucker, and kokanee were all found in Huntington Lake in the past.

Rainbow trout was the primary fish that was planted in Huntington Lake, and was first stocked in 1940 (Table CAWG 7-Appendix C-39). Various strains of rainbow trout were stocked, including Shasta and Whitney strains.

Brown trout, brook trout, and kokanee were also stocked in Huntington Lake (Table CAWG 7-Appendix C-39). The only recorded planting of brown trout occurred in 1984. Brook trout was stocked intermittently from 1950 through 1997. Additionally, various strains of kokanee salmon were stocked from 1959 through 2002. Rainbow trout and kokanee are the only species that are currently stocked in Huntington Lake.

Although brown trout, brook trout, rainbow trout, Sacramento sucker and kokanee were caught and observed, population estimates were not provided (Table CAWG 7-Appendix C-40). The majority of historical information came from gill net surveys and creel census data or angler records (CDFG 1937b; Dill 1943b; Fresno Bee 1949; CDFG 1957-1978; CDFG 1957-1982; CDFG 1964-1978; CDFG 1969 & 1974). Brown trout, rainbow trout, and brook trout were first observed and reported in 1934 from a lake survey (CDFG 1934e). Rainbow trout was the most abundant species observed (average of 267 fish per observation), followed by brook trout (average of 54 fish per observation) and Sacramento sucker (average of 40 fish per observation) (Table CAWG 7-Appendix C-40). Kokanee was not reported until 1964, when a “large number” of kokanee were captured in a gill net sample (CDFG 1964-1978).

Big Creek Powerhouse 2 Forebay (Dam 4)

Dam 4, located at Big Creek RM 6.0, creates a medium-size pool (60 acre-feet) in Big Creek, which is the Powerhouse 2 Forebay.

Only one "historical" document was found for the Powerhouse 2 Forebay, and is in fact a fairly recent document, from 1987. Powerhouse 2 Forebay is home to large rainbow trout that occasionally escape from the nearby SCE fish hatchery (Table CAWG 7-Appendix C-41) (BSAI 1987b). Brown trout and brook trout may also be present, but have not been collected in the forebay (Table CAWG 7-Appendix C-41).

No records of historical fish stocking in Powerhouse 2 Forebay were found.

Big Creek Powerhouse 8 (Dam 5)

Big Creek Powerhouse 8 Forebay is impounded by Dam 5 at Big Creek RM 1.65 It is a medium-sized Project impoundment.

The sole source of historical fisheries information came from BSAI (1987b). In 1979, rainbow trout (1,600) were planted into the forebay (Table CAWG 7-Appendix C-42) (BSAI 1987b). No other records of historical fish stocking in the Powerhouse 8 Forebay were discovered.

No historical fish population surveys were found for the forebay. However, brown trout and brook trout likely inhabited the forebay (Table CAWG 7-Appendix C-43) (BSAI 1987b).

Balsam Meadow Forebay

Balsam Meadow Forebay is located on Balsam Creek, approximately 2.7 miles upstream of the confluence with Big Creek. Water moves from Huntington Lake to Balsam Meadow Forebay, and water also is pumped from Shaver Lake to Balsam Meadow Forebay for pump-storage operation. Fish may be moved between the Balsam Meadow Forebay and Shaver Lake in either direction by operation of the Eastwood Powerhouse and pumpback.

Historical records indicate that fish were not actually stocked in the Balsam Meadow Forebay before the late 1990's. In 1982, fish plantings were not recommended to discourage angler use in order to protect wildlife (FERC 1982a). In 1999, 170 pounds of rainbow trout from the SCE Hatchery in Big Creek were stocked into Balsam Meadow Forebay (CDFG 2002) (Table CAWG 7-Appendix C-44). No additional historical fish stocking information was available.

The primary source of fish population information for Balsam Meadow Forebay is from entrainment sampling of the pumpback from Shaver Lake conducted in the early 1990's. Entrainment sampling in Balsam Meadow Forebay reported brown trout, rainbow trout, brook trout, prickly sculpin, kokanee, smallmouth bass, green sunfish, black crappie, carp, golden shiner, brown bullhead, and an unidentifiable catfish species (ENTRIX 1991a; ENTRIX 1991b; ENTRIX 1991c; ENTRIX 1991d; ENTRIX 1991e; ENTRIX 1992a; ENTRIX 1992b; ENTRIX 1992c). Most of these species were entrained from Shaver Lake and did not originally occur in the forebay.

The dominant fish captured during the entrainment sampling appeared to be smallmouth bass, prickly sculpin, and green sunfish (Table CAWG 7-Appendix C-45). Entrainment sampling data was the only information found for any indication of historical fish presence.

Shaver Lake

Shaver Lake is impounded by Shaver Lake Dam on Stevenson Creek at RM 4.25. Brown trout, rainbow trout, brook trout, Sacramento sucker, prickly sculpin, kokanee, largemouth bass, smallmouth bass, carp, bluegill, black and brown bullhead, black crappie, goldfish, threadfin shad, green sunfish have all been collected in Shaver Lake (BSAI 1987c; CDFG 1999a; CDFG 2002; ENTRIX 1992c; ESA 1985).

Historical fish stocking records for Shaver Lake date back to 1908, before the dam was built, and are complete from 1950 forward. Species historically stocked include brown trout, rainbow trout, brook trout, kokanee, threadfin shad, smallmouth bass, and largemouth bass (Table CAWG 7-Appendix C-46). Rainbow trout was the primary species that was stocked, since stocking first began for this species in 1950. The Coleman x Shasta strain of rainbow trout was stocked once in 1970. In addition, rainbow trout from Eagle Lake were once planted in Shaver Lake. Brown trout was planted from 1908 through 1911, then again in 1975 and 1983. Brook trout was stocked from 1970 through 1996, while kokanee was stocked from 1982 through 2002. The Taylor strain of kokanee was stocked once in 1995. Threadfin shad and smallmouth bass were only stocked once, in 1963 and 1912, respectively.

Historical sampling methods utilized for Shaver Lake included electrofishing, gill netting, visual surveying, and creel census of anglers. Relatively few historical records were found for each species present in Shaver Lake (Table CAWG 7-Appendix C-47). No population estimates were provided, nor were biological measurements generally taken. In 1969, rainbow trout was the most abundant species captured (Table CAWG 7-Appendix C-47). However, in 1976, Sacrament sucker was the most abundant species captured (Table CAWG 7-Appendix C-47). Various records were found for 1986, when a creel survey was conducted (Table CAWG 7-Appendix C-47). However, creel survey data are not necessarily representative of the fish assemblage in Shaver Lake, as some fish species are more difficult to catch than others (BSAI 1987c).

Literature Cited

Bartholomew, P. and W. Loudermilk. 1986. San Joaquin River 1984 to 1985 Fisheries Data collection reports below Mammoth Pool Dam.

BioSystems Analysis Inc. (BSAI). 1987a. A Technical Report on Riverine Fishery Studies Conducted in Support of the Big Creek Expansion Project.

_____. 1987b. A Technical Report on Existing Reservoir Fishery Information Conducted in Support of the Big Creek Expansion Project.

_____. 1987c. A Technical Report on Shaver Lake Fishery Studies Conducted in Support of the Big Creek Expansion Project.

_____. 1988. Comparison of Fish Populations in Stevenson Creek in 1986 and 1988.

_____. 1989. Fisheries Studies of Shaver Lake: 1988 Annual Report. 44 pp. + Appendices.

_____. 1993. Fish Populations in North Fork Stevenson Creek 1988-1992. Final Report.

California Department of Fish and Game. 1934a. Stream Survey, South Fork San Joaquin River. California Dept. of Fish and Game, Fresno, California.

_____. 1934b. Fish stocking record for Bear Creek to Huntington Lake.

_____. 1934c. Stream Survey, Bear Creek. California Department of Fish and Game, Fresno County, California.

_____. 1934d. Lake Survey, Florence Lake. California Department of Fish and Game, Fresno County, California.

_____. 1934e. CDFG Lake Survey, Huntington Lake. California Department of Fish and Game, Fresno County, California.

_____. 1937a. Reservoir Project Scouting Data, Florence Lake.

_____. 1937b. Trout from Fresno County Reservoirs. California Department of Fish and Game, Fresno County, California.

_____. 1939. Stocking Records from 1930-1939 for South Fork San Joaquin River. California Dept. of Fish and Game, Fresno, California.

_____. 1940. Stream Survey, Bolsillo Creek.

_____. 1941a. Stream Survey, Bear Creek.

_____. 1941b. Supplementary sheet for Bear Creek to Huntington Lake, San Joaquin River system.

_____. 1941c. Lake Survey, Florence Lake.

_____. 1943. Supplementary sheet. Trip of Aug. 21-22, 1943 by W. A. Dill.

_____. 1945a. Stream Survey, South Fork San Joaquin River. California Dept. of Fish and Game, Fresno, California.

_____. 1945b. Stream Survey Supplementary Sheet, South Fork San Joaquin River. California Dept. of Fish and Game, Fresno, California.

_____. 1945c. Stocking Record, Bolsillo Creek, 1940-1945.

_____. 1946a. Supplementary sheet. Trip of Aug. 24-25, 1946 by C. K. Fisher, Jr.

_____. 1946b. Supplementary sheet. Trip of Aug 31 to Sept. 2, 1946 by C. K. Fisher, Jr.

_____. 1948a. Lake Survey, Bear Creek Reservoir.

_____. 1948b. Stocking Record, Bear Creek.

_____. 1948c. Stream Survey Supplementary Sheet, East Fork Bear Creek.

_____. 1949. Field Correspondence, Hooper Creek Drainage: Planting with Golden Trout.

_____. 1950. Fish stocking record for Slide Creek, Madera County.

_____. 1951a. Field Correspondence, Hooper Creek Drainage: Success of Golden Trout Plant.

_____. 1951b. Field Correspondence, Hooper Creek: Unauthorized Plant of Rainbow.

_____. 1951c. Fish planting receipt, Bear Creek.

_____. 1952a. Stocking Records from 1940-1952 for South Fork San Joaquin River. California Dept. of Fish and Game, Fresno, California.

_____. 1952b. Stream Survey, Hooper Creek (1945-1952).

_____. 1952c. Stocking Record, Florence Lake (1930-1952).

_____. 1952d. Field Correspondence, Florence Lake.

_____. 1952e. Stocking record for Huntington Lake Reservoir from 1940 through 1952, Fresno County.

_____. 1954. Stream survey for Slide Creek.

_____. 1957-1982. Memoranda regarding Huntington Lake gill net sampling, 1957, 1964, 1969, 1970, 1972, 1974, 1980, 1981, 1982. California Department of Fish and Game, Fresno County, California.

_____. 1957-1978. Memoranda on Creel Census from Huntington Lake, 1957, 1964, 1965, 1968, 1972, 1973, 1978. California Department of Fish and Game, Fresno County, California.

_____. 1959. Correspondence to Mr. Schmidtmann regarding fishing in Bear Creek area.

_____. 1960. Report of the 19th annual cooperative lake and stream survey of the Fresno County Sportsmen's Club and California Department of Fish and Game - 1960.

_____. 1964. Memorandum, Florence Lake, Fresno County, Gill Net Sampling.

_____. 1964-1978. Memoranda regarding fish sampling in Huntington Lake, 1964, 1974, 1978. California Department of Fish and Game, Fresno County, California.

_____. 1965. Memorandum, Florence Lake, Fresno County, Gill Net Sampling.

_____. 1967. Memorandum, Florence Lake, Fresno County, Gill Net Sampling.

_____. 1968a. Fish Planting Receipt, South Fork San Joaquin River. California Dept. of Fish and Game, Fresno, California.

_____. 1968b. Memorandum, Florence Lake, Fresno County, Gill Net Sampling.

_____. 1969. Memorandum, Florence Lake, Fresno County, Gill Net Sampling.

_____. 1969 & 1974. Memoranda regarding electrofishing & gill net surveys in Huntington Lake, 1969 & 1974. California Department of Fish and Game, Fresno County, California.

_____. 1970a. Preliminary Evaluation Report on Southern California Edison Company Big Creek Project (FPC No. 67) in Respect to Streamflow.

_____. 1970b. Memorandum, Florence Lake, Fresno County, Gill Net Sampling.

_____. 1971. Memorandum, Florence Lake, Fresno County, Gill Net Sampling.

_____. 1973. Memorandum, Florence Lake, Fresno County, Gill Net Sampling.

_____. 1975. Memorandum, Florence Lake, Fresno County, Gill Net Sampling.

_____. 1978. East Fork Bear Creek Stream Survey. California Department of Fish and Game.

_____. 1983. Stream survey, agency file data, or personal communication. As cited in: ESA Planning and Environmental Services. 1985. Draft Upper San Joaquin Basin Cumulative Impact Study for Hydroelectric Developments. Prepared for: State Water Resources Control Board, Division of Water Rights. December.

_____. 1998. Historical Stocking Records, Fresno County. California Dept. of Fish and Game, Fresno, California.

_____. 1999a. Fish Stocking Records for Big Creek through 1999.

_____. 1999b. Stocking Records for Mammoth Pool from 1960 through 1999. California Dept. of Fish and Game, Fresno, California.

_____. 2002. CDFG Fish Stocking Records. California Dept. of Fish and Game, Fresno, California.

Dill, W. A. 1943a. CDFG Administrative Reports 1943, A Fisheries Survey of the Upper Bear Creek Drainage, Fresno County, California.

_____. 1943b. Memorandum regarding results of 1943 planting in Huntington Lake, Fresno County. California Department of Fish and Game, Fresno County, California.

_____. 1944. A Preliminary Survey of Big Creek below Huntington Lake, Fresno Co, CA.

_____. 1945a. Correspondence and reports for 1945 application of SCE to divert water from South Fork San Joaquin River Drainage.

_____. 1945b. Stream Survey Balsam Creek. CDFG.

Douglas, P.A. 1950. Field Notes for Bear Creek, tributary to South Fork San Joaquin. CDFG.

Dunham, L. R. 1952. Report on the Success of the Golden Trout Transplant to Hooper Creek, Fresno County, California.

Ellis, S. L. N. 1915. A record of fish plants made in the waters of the Fresno Division Fish and Game Commission, comprising the counties of Kern, Tulare, Kings, Fresno, Madera, Merced, Mariposa, Tuolumne, and Stanislaus, 1870-1915. Manuscript. Calif. Dept. of Fish and Game, Fresno, CA 34 pp.

Ellis, S. L. N. 1910. Partial List of fish plants made in the waters of Kings, Fresno, and San Joaquin rivers covering the period 1884 and 1909. Mimeograph report. 7 pp. Calif. Dept. of Fish and Game. Fresno, California.

ENTRIX, Inc. 1991a. Balsam Meadow Pumped Storage Project. FERC Project no. 67 Fish Entrainment Study July 1991 Progress Report.

_____. 1991b. Balsam Meadow Pumped Storage Project. FERC Project no. 67 Fish Entrainment Study August 1991 Progress Report.

_____. 1991c. Balsam Meadow Pumped Storage Project. FERC Project no. 67 Fish Entrainment Study September 1991 Progress Report.

_____. 1991d. Balsam Meadow Pumped Storage Project. FERC Project no. 67 Fish Entrainment Study October 1991 Progress Report.

_____. 1991e. Balsam Meadow Pumped Storage Project. FERC Project no. 67 Fish Entrainment Study December 1991 Progress Report.

_____. 1992a. Balsam Meadow Pumped Storage Project. FERC Project no. 67 Fish Entrainment Study May 1992 Progress Report.

_____. 1992b. Balsam Meadow Pumped Storage Project. FERC Project no. 67 Fish Entrainment Study June 1992 Progress Report.

_____. 1992c. Balsam Meadow Pumped Storage Project. FERC Project no. 67 Fish Entrainment Study Final Report. November 20, 1992.

_____. 2001. Fisheries reconnaissance of North Fork Stevenson Creek, October 2000. ENTRIX, Inc. Walnut Creek, CA.

_____. 2002. North Fork Stevenson Creek fish population monitoring. ENTRIX, Inc. Walnut Creek, CA.

ESA Planning and Environmental Services (ESA). 1985. Draft Upper San Joaquin Basin Cumulative Impact Study for Hydroelectric Developments. Prepared for: State Water Resources Control Board, Division of Water Rights. December.

FERC. 1982a. Balsam Meadow Misc. Documents Vol. One. Project No. 67.

_____. 1982b. Balsam Meadow Development of Big Creek Project No. 67 Final Environmental Impact Statement.

Fresno Bee. 1945. Bee Sports photo caption and note on photo copy. August 8, 1945.

_____. 1949. Slower Downer - record brown trout caught in Huntington Lake. May 23, 1949.

Hoss, V. 1964. Letter to S. M. Soule (CDFG) regarding fishing trip to Hooper Creek lakes.

Lewis, R.C. 1962. Letter to C. Miller RE: Fisherman's Log from the Sierra Club Back-Country Camp.

Shebley. 1911. Citation from CDFG not available at this time.

Southern California Edison Company (SCE). 1963. Letter to R.C. Lewis regarding stocking of rainbow trout in pond at Hooper Cr. diversion dam.

_____. 1968. Preliminary data, Big Creek-San Joaquin River F.P.C. Projects 67 and 120, cooperative field study on fisheries and recreation. Southern California Edison Company, Rosemead, CA. As cited in: ESA Planning and Environmental Services. 1985. Draft Upper San Joaquin Basin Cumulative Impact Study for Hydroelectric Developments. Prepared for: State Water Resources Control Board, Division of Water Rights. December.

_____. 1971. Exhibit S. Fish and Wildlife Resources, Big Creek No. 2A and 8 Project.

_____. 1990. Letter to CDFG Regarding Southern California Edison Trout Plants for 1990. Submitted by E. Martinez (Manager), Northern Hydro Division, SCE. November 7, 1990.

_____. 2000a. Technical Resources Document concerning environmental baseline conditions.

_____. 2000b. Technical Resources Document for Valuation of SCE's Hydroelectric Facilities.

State Fish and Game Commission Biennial Reports 1913-14, 1915-16, 1919-20.

United States Forest Service (USFS). 1979. Stream Survey for Bear Creek.

Vestal, E. 1958. Pers. comm. Bear Creek fishing conditions (above Edison C. diversion dam).

Table CAWG 7-Appendix C-1. Historical Fish Stocking Information for South Fork San Joaquin River (All Reaches).

Species	County	Year	Size	Pounds	Number of Fish	Hatchery	Comment	Reference
Rainbow Trout	Fresno	2002	C[1]		5560	San Joaquin River		CDFG.2002
Rainbow Trout	Fresno	2001	C[1]	2900	5695	San Joaquin River		CDFG.2002
Rainbow Trout	Fresno	2000	C[1]	2900	5810	San Joaquin River		CDFG.2002
Rainbow Trout	Fresno	1999	C[1]		4,300	San Joaquin River		CDFG.1998
Rainbow Trout	Fresno	1998	C[1]		2,625	San Joaquin River		CDFG.1998
Rainbow Trout	Fresno	1997	C[1]		4,376	San Joaquin River		CDFG.1998
Rainbow Trout	Fresno	1996	C[1]		4,525	San Joaquin River		CDFG.1998
Rainbow Trout	Fresno	1995	C[1]		1,030	San Joaquin River		CDFG.1998
Rainbow Trout	Fresno	1994	C[1]		7,015	San Joaquin River		CDFG.1998
Rainbow Trout	Fresno	1993	C[1]		4,430	San Joaquin River		CDFG.1998

Table CAWG 7-Appendix C-1. Historical Fish Stocking Information for South Fork San Joaquin River (All Reaches) (Continued).

Species	County	Year	Size	Pounds	Number of Fish	Hatchery	Comment	Reference
Rainbow Trout	Fresno	1992	C[1]		8,635	San Joaquin River		CDFG.1998
Rainbow Trout	Fresno	1991	C[1]		10,135	San Joaquin River		CDFG.1998
Rainbow Trout	Fresno	1990	C[1]		18,935	San Joaquin River		CDFG.1998
Rainbow Trout	Fresno	1989	C[1]		18,250	San Joaquin River		CDFG.1998
Rainbow Trout	Fresno	1988	C[1]		16,250	San Joaquin River		CDFG.1998
Rainbow Trout	Fresno	1987	C[1]		17,010	San Joaquin River		CDFG.1998
Rainbow Trout	Fresno	1986	C[1]		9,772	San Joaquin River		CDFG.1998
Rainbow Trout	Fresno	1985	C[1]		12,855	San Joaquin River		CDFG.1998
Rainbow Trout	Fresno	1984	C[1]		12,225	San Joaquin River		CDFG.1998
Rainbow Trout	Fresno	1983	C[1]		12,020	San Joaquin River		CDFG.1998

Table CAWG 7-Appendix C-1. Historical Fish Stocking Information for South Fork San Joaquin River (All Reaches) (Continued).

Species	County	Year	Size	Pounds	Number of Fish	Hatchery	Comment	Reference
Rainbow Trout	Fresno	1982	C[1]		11,520	San Joaquin River		CDFG.1998
Rainbow Trout	Fresno	1981	C[1]		11,350	San Joaquin River		CDFG.1998
Rainbow Trout	Fresno	1980	C[1]		12,450	San Joaquin River		CDFG.1998
Brook Trout	Fresno	1979	C[1]		510	San Joaquin River		CDFG.1998
Rainbow Trout	Fresno	1979	C[1]		11,693	San Joaquin River		CDFG.1998
Rainbow Trout	Fresno	1978	C[1]		11,600	San Joaquin River		CDFG.1998
Rainbow Trout	Fresno	1977	C[1]		12,055	San Joaquin River		CDFG.1998
Rainbow Trout	Fresno	1976	C[1]		14,545	San Joaquin River		CDFG.1998
Rainbow Trout	Fresno	1975	C[1]		16,395	San Joaquin River		CDFG.1998
Rainbow Trout	Fresno	1974	C[1]		22,733	San Joaquin River		CDFG.1998

Table CAWG 7-Appendix C-1. Historical Fish Stocking Information for South Fork San Joaquin River (All Reaches) (Continued).

Species	County	Year	Size	Pounds	Number of Fish	Hatchery	Comment	Reference
Rainbow Trout	Fresno	1973	C[1]		17,800	San Joaquin River		CDFG.1998
Rainbow Trout	Fresno	1972	C[1]		24,525	San Joaquin River		CDFG.1998
Rainbow Trout	Fresno	1971	C[1]		17,622	San Joaquin River		CDFG.1998
Rainbow Trout	Fresno	1971	C[1]		1,600	Big Creek		CDFG.1998
Rainbow Trout	Fresno	1970	C[1]		13,188	San Joaquin River		CDFG.1998
Rainbow Trout	Fresno	1969	C[1]		5,562	San Joaquin River	Dorsal	CDFG.1998
Rainbow Trout	Fresno	1968	C[1]		13,208	San Joaquin River	Tags	CDFG.1998
Rainbow Trout	Fresno	1968	5 per lb.	200	999	San Joaquin River	Planted in Jackass Mdw.	CDFG.-Fish Planting Receipt
Rainbow Trout	Fresno	1967	C[1]		6,758	San Joaquin River	Ad & Lv	CDFG.1998
Rainbow Trout	Fresno	1966	S		200	Big Creek		CDFG.1998

Table CAWG 7-Appendix C-1. Historical Fish Stocking Information for South Fork San Joaquin River (All Reaches) (Continued).

Species	County	Year	Size	Pounds	Number of Fish	Hatchery	Comment	Reference
RT&BK	Fresno	1966	C[1]		14,113	San Joaquin River		CDFG.1998
Rainbow Trout	Fresno	1965	C[1]		11,434	San Joaquin River		CDFG.1998
Rainbow Trout	Fresno	1964	C[1]		11,187	San Joaquin River		CDFG.1998
Rainbow Trout	Fresno	1963	C[1]		9,809	San Joaquin River		CDFG.1998
Rainbow Trout	Fresno	1963	C[1]		1,000	Big Creek		CDFG.1998
Rainbow Trout	Fresno	1962	C[1]		12,545	San Joaquin River		CDFG.1998
Rainbow Trout	Fresno	1962	C[1]		1,600	Big Creek		CDFG.1998
Rainbow Trout	Fresno	1961	C[1]		14,960	San Joaquin River		CDFG.1998
Rainbow Trout	Fresno	1960	C[1]		4,000	Fern Creek		CDFG.1998
Rainbow Trout	Fresno	1960	C[1]		12,460	San Joaquin River		CDFG.1998

Table CAWG 7-Appendix C-1. Historical Fish Stocking Information for South Fork San Joaquin River (All Reaches) (Continued).

Species	County	Year	Size	Pounds	Number of Fish	Hatchery	Comment	Reference
Rainbow Trout	Fresno	1959	C[1]		9,720	San Joaquin River		CDFG.1998
Rainbow Trout	Fresno	1958	C[1]		8,543	San Joaquin River		CDFG.1998
Rainbow Trout	Fresno	1957	C[1]		9,660	San Joaquin River		CDFG.1998
Rainbow Trout	Fresno	1956	C[1]		4,499	San Joaquin River		CDFG.1998
Rainbow Trout	Fresno	1954	F[2]		10,175	Kings River		CDFG.1998
Rainbow Trout	Fresno	1953	F[2]		9,800	Kings River		CDFG.1998
Rainbow Trout	Fresno	1952	F[2]		10,080	Kings River	Planted 3,240 at Mono Hot Spr & 6,840 at Jackass Mdw.	CDFG.1998 CDFG.1952
Rainbow Trout	Fresno	1952	F[2]		15,050	Kings River	Planted 2.5 mi. below FL to 1.5 mi. above Dude Ranch	CDFG.1952
Rainbow Trout	Fresno	1951	F[2]		35,120	Kings River	Planted at Jackass Mdw. And Mono Hot Spr.6/14-15/51	CDFG.1998 CDFG.1952
Rainbow Trout	Fresno	1950	F[2]	30.6	10,800	Huntington Lake	Planted at Jackass Mdw.; total wt.= 490 oz.; 7/17/1950	CDFG.1998 CDFG.1952

Table CAWG 7-Appendix C-1. Historical Fish Stocking Information for South Fork San Joaquin River (All Reaches) (Continued).

Species	County	Year	Size	Pounds	Number of Fish	Hatchery	Comment	Reference
Rainbow Trout	Fresno	1950	F[2]		14,295	Kings River	Planted at Mono Hot Spr.; 6/21-7/20/50	CDFG.1998
Rainbow Trout	Fresno	1950	15 per oz.	61	14,700	Huntington Lake	Planted below Dude Ranch; 8/18-19/50; total wt.= 980 oz.	CDFG.1952
Rainbow Trout	Fresno-Madera	1949	20 per oz.	7.8	25,000	Kings River	Planted 20,000 at Jackass Mdw. & 5,000 at gauging sta. Near Hooper Cr.; total wt.= 125 oz.; 6/4/49	CDFG.1952
Rainbow Trout	Fresno-Madera	1949	20.5 per oz.	30.6	10,045	Kings River	Planted at Mono Hot Spr.; total wt.= 490 oz.; 6/6/49	CDFG.1952
Rainbow Trout	Fresno-Madera	1948	18-22 per oz.	115	34,950	Kings River	Planted at Mono Hot Spr. & Jackass Mdw.; total wt. = 1845 oz.; 6/9-11/48	CDFG.1952
Rainbow Trout	Fresno	1947	9.5-8 per oz.	92	12,885	Huntington Lake	Planted Blaney Mdw. & 3 mi. above FL; 7/30/47 & 8/12/47; total wt.= 1,470 oz.	CDFG.1952
Rainbow Trout	Fresno-Madera	1947	38 per oz.	26	15,960	Kings River	Planted at gauging sta. below Hooper Cr.; total wt. = 420 oz.; 5/13/47	CDFG.1952
Rainbow Trout	Fresno-Madera	1947	38 per oz.	33	19,950	Kings River	Planted at Mono Hot Spr.; total wt. = 525 oz.; 5/13/47	CDFG.1952
Rainbow Trout	Fresno-Madera	1946	32-33 per oz.	68	25,120	Kings River	Planted at Mono Hot Spr.; total wt. = 1,080 oz.; 5/30/46 & 6/5/46	CDFG.1952
Rainbow Trout	Fresno-Madera	1946	8 per oz.	33	4,160	Huntington Lake	Planted at Jackass Mdw.; total wt. = 520 oz.; 8/8/46	CDFG.1952

Table CAWG 7-Appendix C-1. Historical Fish Stocking Information for South Fork San Joaquin River (All Reaches) (Continued).

Species	County	Year	Size	Pounds	Number of Fish	Hatchery	Comment	Reference
Rainbow Trout	Fresno	1945	11 per oz.	50	8,800	Huntington Lake	Planted Blaney Mdw. & 2 mi. above FL; 7/26/45; total wt.= 800 oz.	CDFG.1952
Rainbow Trout	Fresno-Madera	1945	19-18 per oz.	126	37,280	Kings River	Planted at Mono Hot Spr.; total wt. = 2,010 oz.; 6/21-22/45	CDFG.1952
Rainbow Trout	Fresno-Madera	1944	24 & 25 per oz.	83	32,520	Kings River	Planted at Mono Hot Spr.; total wt. = 1,320 oz.; 6/5, 7, 10/44	CDFG.1952
Rainbow Trout	Fresno-Madera	1943	22 per oz.	60	21,120	Kings River	Planted at Mono Hot Spr.; total wt. = 960 oz.; 6/17/43	CDFG.1952
Rainbow Trout	Fresno	1942	21.5 & 22 per oz.	61	21,315	Huntington Lake	Planted Blaney Mdw. & 2 mi. above; 7/22-23/42; total wt.= 980 oz.	CDFG.1952
Rainbow Trout	Fresno-Madera	1942	27 per oz.	13	5,400	Kings River	Planted at Jackass Mdw.; total wt. = 200 oz.; 6/27/42	CDFG.1952
Rainbow Trout	Fresno-Madera	1942	27 per oz.	30	12,960	Kings River	Planted at Mono Hot Spr.; total wt. = 480 oz.; 6/29/42	CDFG.1952
Rainbow Trout	Fresno-Madera	1942	17 per oz.	28	7,465	Huntington Lake	Planted at Mono Hot Spr.; total wt. = 445 oz.; 8/13/42	CDFG.1952
Brown Trout	Fresno-Madera	1941	21 per oz.	26	8,820	Kings River	Planted at Jackass Mdw.; total wt. = 420 oz.; 6/25/41	CDFG.1952
Brown Trout	Fresno-Madera	1941	21 per oz.	47	15,750	Kings River	Planted at Mono Hot Spr.; total wt. = 750 oz.; 6/26/41	CDFG.1952

Table CAWG 7-Appendix C-1. Historical Fish Stocking Information for South Fork San Joaquin River (All Reaches) (Continued).

Species	County	Year	Size	Pounds	Number of Fish	Hatchery	Comment	Reference
Rainbow Trout	Fresno	1941	18 per oz.	39	11,340	Huntington Lake	Planted 1 mi. above falls at Blaney Mdws.; 8/21/41; total wt.= 630 oz.	CDFG.1952
Rainbow Trout	Fresno-Madera	1941	15.5 per oz.	30	7,440	Huntington Lake	Planted at Jackass Mdw.; total wt. = 480 oz.; 8/29/41	CDFG.1952
Rainbow Trout	Fresno-Madera	1941	17.5 & 15.5 per oz.	69	18,465	Huntington Lake	Planted at Mono Hot Spr. & Mono Xing; total wt. = 1,110 oz.; 8/23&29/41	CDFG.1952
Brown Trout	Fresno-Madera	1940	29 per oz.	44	20,300	Kings River	Planted at Mono Hot Springs, 5/23/40; total wt. = 700 oz.	CDFG.1952
Rainbow Trout	Fresno	1940	28 per oz.	38	16,800	Huntington Lake	Planted 2 mi. above Blaney Mdws.; 7/14/40; total wt.= 600 oz.	CDFG.1952
Rainbow Trout	Fresno-Madera	1940	20 per oz.	83	26,600	Huntington Lake	Planted at Mono Xing; total wt. = 1,330 oz.	CDFG.1952
Brown Trout	Fresno	1939	53 per oz.		40,068	Kings River	Planted at Mono Hot Springs, 5/30/39	CDFG.1939
Rainbow Trout	Fresno	1939	80 per oz.		40,000	Huntington Lake	08/17/1939	CDFG.1939
Brook Trout	Fresno	1937	14 per oz.		11,200	Huntington Lake	8/2/37 - planted above Florence (Pack).	CDFG.1939
Brown Trout	Fresno	1937	47 per oz.		50,000	Fern Creek	Planted b/n Mono Cr. And Florence Lake, 7/23/37.	CDFG.1939

Table CAWG 7-Appendix C-1. Historical Fish Stocking Information for South Fork San Joaquin River (All Reaches) (Continued).

Species	County	Year	Size	Pounds	Number of Fish	Hatchery	Comment	Reference
Brook Trout	Fresno	1936	18 per oz.		16,416	Huntington Lake	8/3/36 - planted above Florence Lake	CDFG.1939
Brown Trout	Fresno	1936	46 per oz.		19,320	Huntington Lake	Planted b/n Mono Cr. And Florence Lake, 7/13/36.	CDFG.1939
Brown Trout	Fresno	1936	46 per oz.		6,210	Huntington Lake	Planted b/n Mono Cr. And Florence Lake, 7/15/36.	CDFG.1939
Cutthroat Trout	Fresno	1936	55 per oz.		20,000	Fern Creek	8/12/36 - planted in SF San Joaquin River, Madera Co.	CDFG.1939
Brook Trout	Fresno	1935			7,864	Huntington Lake	06/22/1935	CDFG.1939
Brook Trout	Fresno	1935	19.6 per oz.		9,408	Huntington Lake	07/11/1935	CDFG.1939
Rainbow Trout	Fresno	1934	75 per oz.		600	Huntington Lake	07/31/1934	CDFG.1939
Rainbow Trout	Fresno	1934	29 per oz.		14,268	Huntington Lake	07/31/1934	CDFG.1939
Rainbow Trout	Fresno	1931			7,400	Madera Hatchery	7/23/1931 - planted in SF San Joaquin River, Madera Co.	CDFG.1939

[1] Catchable

[2] Fingerling

Table CAWG 7-Appendix C-2. Historical Fisheries Information for Upstream of Florence Lake.

Species	Date	Population Estimate	Biomass (kg)	Density				Number Collected	Fork Length (mm)	Comments	References
				kg/ha	lb/ac	Fish/km	Fish/Mile				
Brown Trout	1934	Present								From Blaney Meadows to Florence Lake.	CDFG.1934a
Brown Trout	08/27/1945	Present								Predominant fish spp. 1 mi. above Florence Lake.	CDFG.1945a
Brown Trout	08/27/1945	Present						11	152-279	Caught from Florence Lake upstream about 2 mi.; fished for 5.5 hours.	CDFG.1945b
Brown Trout	09/25/1968	Present						21	155-357	See detail	Bartholomew and Loudermilk.1986
Golden Trout	08/29/1945	Present								Abundant and predominant just below Piute Creek (elevation 7900 ft. at mouth of Piute Creek).	CDFG.1945a
Golden Trout	08/29/1945	Present						13	178	Caught just below mouth of Piute Creek; avg. length given; fished for 1/3 hours.	CDFG.1945b
Rainbow Trout	1934	Present								From Blaney Meadows to Florence Lake.	CDFG.1934a
Rainbow Trout	08/27/1945	Present						1	229	Caught from Florence Lake upstream about 2 mi.; fished for 5.5 hours.	CDFG.1945b
Rainbow Trout	8/27-29/45	Present								Present at 1 mi. above Florence Lake, Blaney Meadows and just below Piute Creek.	CDFG.1945a

Table CAWG 7-Appendix-C-3. Historical Fisheries Information from Florence Lake to Bear Creek.

Species	Date	Population Estimate	Biomass* (kg)	Density				Number collected	Length (mm)	Comments	References
				kg/ha	lb/ac	Fish/km	Fish/Mile				
Brown Trout	7/29/85	101 (+8)	3.64	31.4	28	1227	1975	95	50-324	Sampled immediately DS from Hooper gauging station, T7S R28E S19 sw1/4.	Bartholomew & Loudermilk. 1986
Rainbow Trout	7/29/85	113 (+8)	1.7	14.6	13	1373	2210	107	75-174	Sampled immediately DS from Hooper gauging station, T7S R28E S19 sw1/4.	Bartholomew & Loudermilk. 1986
Brown Trout	9/17/68							11	86-271	Below Hooper Gauge	Bartholomew & Loudermilk. 1986
Brown Trout	9/17/68							27	82-248	Poison Meadow	Bartholomew & Loudermilk. 1986
Rainbow Trout	9/17/68			35.93	32.15	1455	2341	12	74-193	Below Hooper Gauge	Bartholomew & Loudermilk. 1986
Rainbow Trout	9/17/68			87.41	78.21	2088.8	3360.9	23	118-190	Poison Meadow	Bartholomew & Loudermilk. 1986
Brown Trout	8/31/45							14	152-241	Caught from Poison Mdw. to Hooper Cr., fished for 3.5 hours.	CDFG. 1945a
Rainbow Trout	8/31/45							12	152-203	Caught from Poison Mdw. to Hooper Cr., fished for 3.5 hours.	CDFG. 1945a

Table CAWG 7-Appendix-C-3. Historical Fisheries Information from Florence Lake to Bear Creek (Continued).

Species	Date	Population Estimate	Biomass* (kg)	Density				Number collected	Length (mm)	Comments	References
				kg/ha	lb/ac	Fish/km	Fish/Mile				
Brown Trout	8/30/45							4	203-279	Caught at Jackass Mdw., fished 1.5 hours.	CDFG. 1945a
Rainbow Trout	8/30/45							1	229	Caught at Jackass Mdw., fished 1.5 hours.	CDFG. 1945a

*Based on total amount of fish (not each age class)

Table CAWG 7-Appendix C-4. Historical Fisheries Information from Bear Creek to Mono Crossing.

Species	Date	Population Estimate	Biomass* (kg)	Density				Number collected	Length (mm)	Comments	References
				kg/ha	lb/ac	Fish/km	Fish/Mile				
Brown Trout	07/31/1985	90 (+4)	3.15	34.1	30.4	1176	1893	88	50-274	Approx. 250 yds upstream from bridge crossing, S of Mono Hot Spring turnoff	Bartholomew & Loudermilk. 1986
Rainbow Trout	07/31/1985	40 (+3)	1.6	17.4	15.5	523	841	39	75-249	Approx. 250 yds US from bridge crossing, S of Mono Hot Springs turnoff	Bartholomew & Loudermilk. 1986
Brown Trout	07/30/1985	147 (+7)	3.68	33.2	29.6	1608	2587	141	50-274	Near Mono Spring campground; T7S R27E S10 se1/4 of se1/4	Bartholomew & Loudermilk. 1986
Rainbow Trout	07/30/1985	44 (+5)	2.55	23.1	20.6	481	774	42	75-274	Near Mono Spring campground; T7S R27E S10 se1/4 of se1/4	Bartholomew & Loudermilk. 1986
Brown Trout	09/27/1968							6	135-219	1.5 mi. below Mono Hot Spring	Bartholomew & Loudermilk. 1986
Rainbow Trout	09/27/1968							3	115-188	1.5 mi. below Mono Hot Spring	Bartholomew & Loudermilk. 1986
Brown Trout	09/18/1968							25	123-206	Mono Hot Spring	Bartholomew & Loudermilk. 1986
Rainbow Trout	09/18/1968			26.49	23.7	863.95	1390.1	6	123-194	Mono Hot Spring	Bartholomew & Loudermilk. 1986

Table CAWG 7-Appendix C- 4. Historical Fisheries Information from Bear Creek to Mono Crossing (Continued).

Species	Date	Population Estimate	Biomass* (kg)	Density				Number collected	Length (mm)	Comments	References
				kg/ha	lb/ac	Fish/km	Fish/Mile				
Brown Trout	09/17/1968							8	130-233	Below Bear Creek	Bartholomew & Loudermilk. 1986
Rainbow Trout	09/17/1968							4	130-182	Below Bear Creek	Bartholomew & Loudermilk. 1986
Rainbow Trout	09/12/63									Catchables observed	CDFG. 1934a
Rainbow Trout	1963							2	203	Two female spawners caught	Strickland. 1963
Brown Trout	09/01/1945									Present at Mono Hot Spring	CDFG. 1945a
Rainbow Trout	09/01/1945									Present at Mono Hot Spring	CDFG. 1945a

*Based on total amount of fish (not each age class)

Table CAWG 7-Appendix C-5. Historical Fisheries Information for South Fork San Joaquin River Mono Crossing to Rattlesnake Crossing.

Species	Date	Density				Number collected	Length (mm)	Comments	References
		kg/ha	lb/ac	Fish/km	Fish/Mile				
Brown Trout	09/24/1968					4	91-111	Below confluence of Mono Creek	Bartholomew & Loudermilk.1986
Brown Trout	09/24/1968					2	138-150	Below confluence of Mono Creek	Bartholomew & Loudermilk.1986
Brown Trout	09/24/1968					5	140-209	Below confluence of Mono Creek	Bartholomew & Loudermilk.1986
Brown Trout	09/24/1968					1	240	Below confluence of Mono Creek	Bartholomew & Loudermilk.1986
Brown Trout	09/24/1968					1	458	Below confluence of Mono Creek	Bartholomew & Loudermilk.1986
Rainbow Trout	09/24/1968	59.51	53.25	918.63	1478.08	8	124-149	Below confluence of Mono Creek	Bartholomew & Loudermilk.1986
Rainbow Trout	09/24/1968	59.51	53.25	918.63	1478.08	11	149-199	Below confluence of Mono Creek	Bartholomew & Loudermilk.1986
Rainbow Trout	09/24/1968	59.51	53.25	918.63	1478.08	1	182	Below confluence of Mono Creek	Bartholomew & Loudermilk.1986
Brown Trout	9/21/1945					5	152-279	Caught between Mono Xing and mouth of Mono Cr.; fished for 2 hrs.	CDFG. 1945b
Rainbow Trout	9/21/1945					8	127-229	Caught between Mono Xing and mouth of Mono Cr.; fished for 2 hrs.	CDFG. 1945b

Table CAWG 7-Appendix C-6. Historical Fisheries Information of the South Fork San Joaquin River San Joaquin River Confluence to Rattlesnake Crossing.

Species	Date	Population Estimate	Biomass (kg)	Density				Number collected	Length (mm)	Comments	References
				kg/ha	lb/ac	Fish/km	Fish/Mile				
Brown Trout	09/25/1968	Present						5	92-117	Hoffman gage	Bartholomew & Loudermilk.1986
Brown Trout	09/25/1968	Present						5	170-220	Hoffman gage	Bartholomew & Loudermilk.1986
Brown Trout	09/25/1968	Present						4	222-250	Hoffman gage	Bartholomew & Loudermilk.1986
Brown Trout	09/25/1968	Present						2	273-178	Hoffman gage	Bartholomew & Loudermilk.1986
Rainbow Trout	09/25/1968	Present		44.11	39.47	1651.35	2657	2	77-80	Hoffman gage	Bartholomew & Loudermilk.1986
Rainbow Trout	09/25/1968	Present		44.11	39.47	1651.35	2657	3	130-135	Hoffman gage	Bartholomew & Loudermilk.1986
Rainbow Trout	09/25/1968	Present		44.11	39.47	1651.35	2657	5	160-184	Hoffman gage	Bartholomew & Loudermilk.1986
Rainbow Trout	09/25/1968	Present		44.11	39.47	1651.35	2657	3	211-232	Hoffman gage	Bartholomew & Loudermilk.1986

Table-CAWG 7-Appendix C-7. Historical Fish Stocking for Hooper Creek (All Reaches).

Species	County	Year	Size (Length [mm])	Pounds	Number of Fish	Hatchery	Comment	Reference
Rainbow Trout	Fresno	1963			300	Big Creek		CDFG. 2002, SCE. 1963
Brown Trout	Fresno	1949			Few	Florence Lake	Rescued fish and planted in reservoir behind Hooper Creek diversion dam	CDFG.1951b
Golden Trout	Fresno	1949	127-152		64	Bear Creek	Planted in Hooper Creek*	Dunham.1952 & CDFG.1949
Golden Trout	Fresno	1949	127-152		67	Bear Creek	Planted in Chamberlain Lake*	Dunham.1952 & CDFG.1949
Golden Trout	Fresno	1949	127-152		67	Bear Creek	Planted in Gordon Lake*	Dunham.1952 & CDFG.1949
Golden Trout	Fresno	1949	127-152		47	Bear Creek	Planted in Harvey Lake*	Dunham.1952 & CDFG.1949
Golden Trout	Fresno	1949	127-152		80	Bear Creek	Planted in Hooper Lake*	Dunham.1952 & CDFG.1949
Golden Trout	Fresno	1949	127-152		55	Bear Creek	Planted in Neil Lake*	Dunham.1952 & CDFG.1949
Rainbow Trout	Fresno	1949	Fingerling		Several hundred	Florence Lake	Rescued fish and planted in reservoir behind Hooper Creek diversion dam	CDFG.1951b

*Original planting

Table CAWG 7-Appendix C-8. Historical Fisheries Information for Hopper Creek.

Species	Date	Population Estimate	Biomass (kg)	Density				Number collected	Length (mm)	Comments	References
				kg/ha	lb/ac	Fish/km	Fish/Mile				
Golden Trout	10/10-11/64	Present						21	254-457	Fishing trip at Chamberlain Lake, a number of smaller trout caught - no quantity or lengths given.	Hoss.1964
Golden Trout	10/23-24/64	Present							Big	Fishing trip at Gorden Lake, qualitative - big GT observed, but not caught	Hoss.1964
Golden Trout	10/23-24/64	Present						2	406-508	Fishing trip at Harvey Lake, did not observe any smaller fish.	Hoss.1964
Golden Trout	8/7/52	Present							305-356	Four GT observed from shore, 1 found dead.	CDFG.1952b
Golden Trout	8/6/52	Present						Not specified	89-305	GT various sizes abundant in Hooper Cr. At lower meadow (1 mile below Hooper Lake) and upper meadow (located above lower meadow).	CDFG.1952b
Golden Trout	07/51	Present						8	343	Average length, fish in excellent condition, caught in Hooper Lake by anglers.	CDFG.1952b
Golden Trout	10/50	Present							305	Observed in Chamberlain, Harvey and Gordon Lakes by G. Bartholomew.	CDFG.1952b
Golden Trout	10/50	Present							< 25	A few small fingerlings observed.	CDFG.1951a

Table CAWG 7-Appendix C-9. Historical Information for Bear Creek Above the Diversion.

Species	Date	Population Estimate	Biomass (kg)	Density				Number collected	Length (mm)	Comments	References
				kg/ha	lb/ac	Fish/km	Fish/Mile				
Rainbow Trout	8/7/78	Present							127	Located East Fork Bear Creek (T11S, R27E, Sec. 7, 6, 5)	CDFG.1978
Brown Trout	6/1/71	Present								"Excellent population…in lower reaches", in Bear Creek Diversion Dam Lake	SCE. 1971
Golden Trout	6/1/71	Present								Population of Golden Trout in upper reaches, in Bear Creek Diversion Dam Lake	SCE. 1971
Golden Trout/Rainbow Trout Hybrids	6/1/71	Present								"Present in good numbers…in middle area", in Bear Creek Diversion Dam Lake	SCE. 1971
Rainbow Trout	6/1/71	Present								"Present in good numbers…in middle area", in Bear Creek Diversion Dam Lake	SCE. 1971
Golden Trout	7/8-21/62	Present						4	229, Max. 381	Medley Lakes (South Fork Bear Cr.) - Fishing trip by Sierra Club, average size given	Lewis.1962
Golden Trout	7/8-21/62	Present						18	229, Max. 330	Sandpiper Lake (South Fork Bear Cr.) - Fishing trip by Sierra Club, average size given	Lewis.1962
Rainbow Trout	7/8-21/62	Present						5	203	Fishing trip by Sierra Club, average size given	Lewis.1962
Rainbow Trout	7/8-21/62	Present						1	216	Rose Lake (West Fork Bear Creek.) - Fishing trip by Sierra Club, average size given	Lewis.1962

Table CAWG 7-Appendix C-9. Historical Information for Bear Creek Above the Diversion (Continued).

Species	Date	Population Estimate	Biomass (kg)	Density				Number collected	Length (mm)	Comments	References
				kg/ha	lb/ac	Fish/km	Fish/Mile				
Rainbow Trout	7/8-21/62	Present						3	229	Medley Lakes (South Fork Bear Creek.) - Fishing trip by Sierra Club, average size given	Lewis.1962
Golden Trout	8/8/60	Present							Max. 381	Seven Gables Lake Nos. 1-4 - GT Numerous	CDFG.1960
Golden Trout	8/9/60	Present							152-356	Claw Lake - GT present in "fair" numbers, in excellent condition, maintained by aerial plants	CDFG.1960
Golden Trout	8/9/60	Present							203-254	Den Lake - numerous as result of 1958 initial plant.	CDFG.1960
Golden Trout	8/9/60	Present								Vee Lake - GT present in limited numbers, some fish over 406 mm present, pop. dwindling	CDFG.1960
Golden Trout	8/10/60	Present							small	East Fork Bear Cr. - no quantification given, small, abundant - mouth to upper lakes	CDFG.1960
Golden Trout	8/10/60	Present								Big Bear Lake - GT pop. Low	CDFG.1960
Golden Trout	8/10/60	Present							small	Bearpaw Lake - tributary to Ursa Lake, very small pop. of small GT	CDFG.1960
Golden Trout	8/10/60	Present								Black Bear Lake - GT from plant in 1958 are present in low numbers.	CDFG.1960
Golden Trout	8/10/60	Present								Little Bear Lake - present in limited numbers	CDFG.1960
Golden Trout	8/10/60	Present								Ursa Lake - 1952 GT plant unsuccessful, fingerlings of 1960 plant observed	CDFG.1960
Golden Trout	8/11/60	Present								Coronet Lake - initial plant in 1958 taking hold , w/ fish averaging 8", in good condition	CDFG.1960

Table CAWG 7-Appendix C-9. Historical Information for Bear Creek Above the Diversion (Continued).

Species	Date	Population Estimate	Biomass (kg)	Density				Number collected	Length (mm)	Comments	References
				kg/ha	lb/ac	Fish/km	Fish/Mile				
Brook Trout	1958	Present						15	330-356	Lake Marie (West Fork Bear Cr) - fish in excellent condition	CDFG.1959
Golden Trout	1958	Present						2	small	Rose Lake (West Fork Bear Cr.)	CDFG.1959
Golden Trout	8/15/58	Present							small	Good fishing conditions, "lots" present, no quantification given	Vestal. 1958
Golden Trout/Rainbow Trout Hybrids	9/30/52	Present								Present in Rose Lake and Cirque Creek sub-basin	Lewis.1962
Rainbow Trout	9/19/50	Present							76-305	Abundant - approx. 2.5 miles above Diversion Dam	Douglas.1950
Golden Trout	8/16/48	Present						55	Max. 178	Fished just above Jct. w/ Hilgard Cr. for 1 hr. and caught 55 Golden Trout, fish were not fat	CDFG.1948c
Brown Trout	8/31/47	Present						12	203-375	Brown Trout are "abundant" w/ all size classes present, maximum size reported as 406 mm	CDFG.1948a
Rainbow Trout	7/30/34	12,000								Hatchery release	CDFG.1934c
Golden Trout	8/21/34	Present							102-305	Several fingerlings seen, Golden Trout abundant, source of data: U.S. Sierra Survey 8/21/34, recommended stocking only in lakes at headwaters	CDFG.1934c

Table CAWG 7-Appendix C-9. Historical Information for Bear Creek Above the Diversion (Continued).

Species	Date	Population Estimate	Biomass (kg)	Density				Number collected	Length (mm)	Comments	References
				kg/ha	lb/ac	Fish/km	Fish/Mile				
Brook Trout	1934	Present								Brook Trout "did real well" at the dam, no quantification given	CDFG.1934c
Golden Trout	1934	Present							small	No quantification given	CDFG.1934c
Brown Trout	1934	Present								Brown Trout "did real well" at the dam, no quantification given for all spp. (RT, BT, GT)	CDFG.1934c

Table CAWG 7-Appendix C-10. Historical Fish Stocking Information for Bear Creek (All Reaches).

Species	County	Year	Size	Pounds	Number of Fish	Hatchery	Comment	Reference
Rainbow Trout	Fresno	1962			600	Big Creek		CDFG. 2002
Rainbow Trout, Whitney strain	Fresno	1951		15	3,120	Madera	Planted 0.5 to 2 miles above dam	CDFG.1951c
Rainbow Trout	Fresno	1948		28	4,050	Huntington Lake	8/9/1948 - Stocked in Bear Creek Reservoir (Bear Dam)	CDFG.1948a
Rainbow Trout	Fresno	1948		39	5,040	Huntington Lake	Planted 0.5 to 2 miles above dam on 8/23/48 [7S 27E Sec. 15]	CDFG.1948b
Golden Trout	Fresno	1942			19	Bear Creek Drainage	Planted in Seven Gables Lake 6, fish from East Fork Bear Creek	CDFG.1948c
Golden Trout	Fresno	1942			48	Bear Creek	Planted in Seven Gables Lake 7, fish from East Fork Bear Creek	CDFG.1948c
Golden Trout	Fresno	1942			184	Bear Creek	Planted in Vee Lake, fish from East Fork Bear Creek	CDFG.1948c
Golden Trout	Fresno	1942			20	Bear Creek	Planted in Northeast Branch Lake 2, fish from East Fork Bear Creek	CDFG.1948c
Golden Trout	Fresno	1942			86	Bear Creek	Planted in Northeast Branch Lake 3, fish from East Fork Bear Creek	CDFG.1948c
Golden Trout	Fresno	1942			20	Bear Creek	Planted in Northeast Branch Lake 4, fish from East Fork Bear Cr.	CDFG.1948c

Table CAWG 7-Appendix C-10. Historical Fish Stocking Information for Bear Creek (All Reaches) (Continued).

Species	County	Year	Size	Pounds	Number of Fish	Hatchery	Comment	Reference
Golden Trout	Fresno	1942			45	Bear Creek	Planted in Northeast Branch Lake 5, fish from East Fork Bear Cr.	CDFG.1948c
Golden Trout	Fresno	1936		6*	15,470	Mount Whitney	*per pound; planted in unspecified "lakes at head of Bear Creek	CDFG.1948b
Rainbow Trout	Fresno	1934		9*	15,000	Kings River	*per pound	CDFG.1934b
Rainbow Trout	Fresno	1934			30,000	Huntington Lake	30-Jul-34	CDFG.1934c
Golden Trout	Fresno	1928			432	Bear Creek	Planted in Hilgard Reach	Dill.1943a
Golden Trout	Fresno	1928			504	Bear Creek	Planted in East Fork Bear Creek Reach	Dill.1943a
Golden Trout	Fresno	1928			395	Bear Creek	Planted in South Fork Bear Cr. Reach	Dill.1943a
Golden Trout	Fresno	1928			532	Bear Creek	Planted in Rose and Marie Lakes Drainage	Dill.1943a
Golden Trout	Fresno	1914			< 200	Golden Trout Creek	Wild Golden Trout planted in Marie Lake and headwaters of Bear Creek	Dill.1943a

Table CAWG 7-Appendix C-11. Historical Information for Bear Creek Below the Diversion.

Species	Date	Population Estimate	Biomass* (kg)	Density				Number collected	Fork Length (mm)	Comments	References
				kg/ha	lb/ac	Fish/km	Fish/Mile				
Brook Trout	8/1/85	6 (+1)	0.15	3	2.7	66	106	6	50-199		Bartholomew & Loudermilk.1986
Brown Trout	8/1/85	53 (+3)	4.24	86	76.7	580	933	52	25-299		Bartholomew & Loudermilk.1986
Brown Trout	6/1/71	Present								Population estimated as low	SCE.1971
Brown Trout	9/18/68			60	54	264	422	11	123-255	Two transects: 1) Located 0.25 miles below dam and 2) located below (denoted as lower transect), no pop. est., biomass or density provided, original density = 24 fish/300 ft. - density is conservative - not 100% of fish were collected in sample section	Bartholomew & Loudermilk.1986
Brown Trout	7/4/68							3	166-226	No pop. est., biomass or density provided	Bartholomew & Loudermilk.1986
Rainbow Trout	8/30/41	Present							Max. 152	No pop. est., biomass or density provided	CDFG.1941a
Brook Trout	6/26-27/79	Few				1.65	2.64		178	Original density 0.5 fish/100 feet, average fork length only, reproduction poor - few small fish observed	USFS. 1979
Rainbow Trout	6/26-27/79					1.65	2.64		152	Original density 0.5 fish/100 feet, average fork length only, reproduction poor - few small fish observed	USFS. 1979
Rainbow Trout	1941									Spawning observed, no quantification given	CDFG.1941b

*Based on total amount of fish (not each age category)

Table CAWG 7-Appendix C-12. Historical Fish Stocking Information for Bolsillo Creek (Below the Diversion Reach).

Species	County	Year	Size (Length [mm])	Pounds	Number of Fish	Hatchery	Comment	Reference
Rainbow Trout	Fresno	1945	18 per oz.	8	2,160	Kings River	Planted at High Sierra Ranger Station?	CDFG.1945c
Rainbow Trout	Fresno	1944	25 per oz.	8	3,000	Kings River	Planted at High Sierra Ranger Station?	CDFG.1945c
Rainbow Trout	Fresno	1941	15.5 per oz.	15	3,720	Huntington Lake	Planted at High Sierra Ranger Station?	CDFG.1945c
Rainbow Trout	Fresno	1940	68 per oz.	3.75	4,080	Huntington Lake	Planted at High Sierra Ranger Station?	CDFG.1945c

Table CAWG 7-Appendix C-13. Historical Information for Bolsillo Creek Below the Diversion.

Species	Date	Population Estimate	Biomass (kg)	Density				Number collected	Fork Length (mm)	Comments	References
				kg/ha	lb/ac	Fish/km	Fish/Mile				
Rainbow Trout	as of 1970	Present							102-152	Numerous RT - no quantitative measurement given	CDFG.1970a
Brook Trout	as of 1970	Present							51-203	Numerous BT - no quantitative measurement given	CDFG.1970a
Brook Trout	8/13/40	Present							127	Elevation 7200 ft., BT seen to 5" (T7S 27E Sec. 8)	CDFG.1940

Table-CAWG 7-Appendix C-14. Historical Information for Mono Creek Below the Diversion.

Species	Date	Population Estimate	Biomass* (kg)	Density				Number collected	Fork Length (mm)	Comments	References
				kg/ha	lb/ac	Fish/km	Fish/Mile				
Brown Trout	7/26/85	30 (+2)	1.95	40.6	36.2	469	754	30	50-349	T7S R27E S3 ne 1/4, approx. 600 yds. DS of diversion dam near Mono Creek campground.	Bartholomew & Loudermilk.1986
Brown Trout	7/25/85	73 (+4)	4.82	90	80.3	798	1284	71	50-299	T7S R27E S3 ne 1/4, approx. 200 yds. DS of diversion dam near Mono Creek campground.	Bartholomew & Loudermilk.1986
Brown Trout	as of 1971	Present								"Present in good numbers from Mono Meadow on DS."	SCE.1971
Rainbow Trout	as of 1971	Present								"Present in good numbers from Mono Meadow on DS."	SCE.1971
Brown Trout	9/19/68	Present						45	70-236	0.5 miles below diversion and "lower" transect	Bartholomew & Loudermilk.1986
Rainbow Trout	9/19/68	Present						11	56-184	"Lower" transect	Bartholomew & Loudermilk.1986
Brown Trout	9/18/68	Present						11	69-224	Mono Meadow	Bartholomew & Loudermilk.1986
Rainbow Trout	9/18/68	Present						1	49	Mono Meadow	Bartholomew & Loudermilk.1986
Brown Trout	09/68	Present				1139	1832			No weight given or lengths.	SCE.1968
Rainbow Trout	09/68	Present				249	401			No weight given or lengths.	SCE.1968
Rainbow Trout and Brown Trout	09/68	Present		65	57.91	1575	2534			Density grouped together for entire stream with both fish species. Conservative densities, as not 100% of fish w/n sample section collected.	Bartholomew & Loudermilk.1986
Brown Trout	07/68	Present				535	861		36-254	No weight given.	SCE.1968
Rainbow Trout	07/68	Present				105	169		104-226	No weight given.	SCE.1968

*Based on total amount of fish (not sample size).

Table CAWG 7-Appendix C-15. Historical Information in the Mainstem of San Joaquin River (Mammoth Reach).

Species	Date	Population Estimate	Biomass* (kg)	Density				Number collected	Fork Length (mm)	Comments	References
				kg/ha	lb/ac	Fish/km	Fish/Mile				
Brown Trout	08/14/1986	5+2	0.23	1.3	1.2	72	115	5	125-199	Approximately. 0.5 mi upstream Mammoth Pool Powerhouse	Bartholomew & Loudermilk.1986
Rainbow Trout	08/14/1986	45+9	1.58	9.2	8.2	645	1038	40	50-249	Approximately. 0.5 mi upstream Mammoth Pool Powerhouse	Bartholomew & Loudermilk.1986
Sacramento Sucker	08/14/1986	26+2	1.82	10.6	9.5	373	599	26	25-374	Approximately. 0.5 mi upstream Mammoth Pool Powerhouse	Bartholomew & Loudermilk.1986
Brown Trout	09/05/1985	38+19	1.48	8.6	7.7	544	876	29	75-349	Immediately downstream Ross Creek confluence	Bartholomew & Loudermilk.1986
Rainbow Trout	09/05/1985	58+5	2.09	12.2	10.9	831	1337	56	50-224	Immediately downstream Ross Creek confluence	Bartholomew & Loudermilk.1986
Sacramento Sucker	09/05/1985	162+18				2321	3735	142	25-374	Immediately downstream Ross Creek confluence	Bartholomew and Loudermilk.1986
Brown Trout	09/04/1985	36+39	0.25	2.5	2.2	486	782	22	50-124	Approximately 0.5 mi upstream Mammoth Pool Powerhouse	Bartholomew & Loudermilk.1986
Rainbow Trout	09/04/1985	17+2	0.07	0.7	0.6	230	369	17	50-99	Approximately 0.5 mi upstream Mammoth Pool Powerhouse	Bartholomew & Loudermilk.1986

Table CAWG 7-Appendix C-15. Historical Information in the Mainstem of San Joaquin River (Mammoth Reach) (Continued).

Species	Date	Population Estimate	Biomass* (kg)	Density				Number collected	Fork Length (mm)	Comments	References
				kg/ha	lb/ac	Fish/km	Fish/Mile				
Sacramento Sucker	09/04/1985	24+4	4.39	42.6	38	324	521	23	50-374	Approximately 0.5 mi upstream Mammoth Pool Powerhouse	Bartholomew & Loudermilk.1986
Brown Trout	1985	present								"Brown trout occur in San Joaquin River above and below Mammoth Pool Dam."	ESA.1985
Sacramento Sucker	1985	present								"Suckers remain common in the San Joaquin River below Mammoth Pool Dam."	ESA.1985
Brown Trout	08/02/1984	41+46	1.23	5.3	4.7	448	722	24	75-299	Immediately. downstream Ross Creek confluence	Bartholomew & Loudermilk.1986
Rainbow Trout	08/02/1984	91+193	1.46	6.3	5.6	995	1601	34	25-249	Immediately. downstream Ross Creek confluence	Bartholomew & Loudermilk.1986
Sacramento Sucker	08/02/1984	79+18	77	37.4	33.4	864	1390	66	25-349	Immediately. downstream Ross Creek confluence	Bartholomew & Loudermilk.1986
Rainbow Trout	7/84-8/84	26		0.52	0.58	309	507	18		Immediately downstream Shakeflat Creek confluence	Bartholomew & Loudermilk.1986
Brown Trout	7/84-8/84	90		0.61	0.69	209	343	23		Immediately downstream Shakeflat Creek confluence	Bartholomew & Loudermilk.1986

Table CAWG 7-Appendix C-15. Historical Information in the Mainstem of San Joaquin River (Mammoth Reach) (Continued).

Species	Date	Population Estimate	Biomass* (kg)	Density				Number collected	Fork Length (mm)	Comments	References
				kg/ha	lb/ac	Fish/km	Fish/Mile				
Sacramento Sucker	7/84-8/84	32		7.03	7.9	73	119	8		Immediately downstream Shakeflat Creek confluence	Bartholomew and Loudermilk.1986
Brown Trout	7/84-8/84	11+0	0.23	1.16	1.3	161	264	11		Immediately downstream Horsethief Creek confluence	Bartholomew & Loudermilk.1986
Sacramento Sucker	7/84-8/84	52+54	7.59	48.79	54.8	981	1608	30		Immediately downstream Horsethief Creek confluence	Bartholomew & Loudermilk.1986
Rainbow Trout	08/01/1984	33+5		12.29	13.8	354	581	31		Immediately downstream Fish Creek confluence	Bartholomew and Loudermilk.1986
Brown Trout	08/01/1984	7+0		9.88	11.1	75	123	7		Immediately downstream Fish Creek confluence	Bartholomew & Loudermilk.1986
Sacramento Sucker	08/01/1984	51+5		34.63	38.9	548	898	49		Immediately downstream Fish Creek confluence	Bartholomew & Loudermilk.1986
Rainbow Trout	7/84-8/84	91		4.89	5.5	977	1604	34		Immediately downstream Ross Creek confluence	Bartholomew & Loudermilk.1986
Brown Trout	7/84-8/84	41		4.17	4.69	440	723	24		Immediately downstream Ross Creek confluence	Bartholomew & Loudermilk.1986
Sacramento Sucker	7/84-8/84	79		30.52	34.3	886	1426	66		Immediately downstream Ross Creek confluence	Bartholomew & Loudermilk.1986

Table CAWG 7-Appendix C-15. Historical Information in the Mainstem of San Joaquin River (Mammoth Reach) (Continued).

Species	Date	Population Estimate	Biomass* (kg)	Density				Number collected	Fork Length (mm)	Comments	References
				kg/ha	lb/ac	Fish/km	Fish/Mile				
Rainbow Trout	08/01/1984	33+5	1.93	15.5	13.8	361	581	31	50-299	Immediately downstream Fish Creek confluence	BSAI.1987a
Brown Trout	08/01/1984	7+0	1.55	12.4	11.1	76	123	7	75->400	Immediately downstream Fish Creek confluence	BSAI.1987a
Sacramento Sucker	08/01/1984	51+4	5.42	43.6	38.9	558	898	49	25-324	Immediately downstream Fish Creek confluence	BSAI.1987a
Brown Trout	07/31/1984	11+0	0.23	1.5	1.3	164	264	11	50-199	Immediately downstream Horsethief Creek confluence	Bartholomew & Loudermilk.1986
Rainbow Trout	07/31/1984	23+1	0.25	1.6	1.4	343	552	23	50-224	Immediately downstream Horsethief Creek confluence	Bartholomew & Loudermilk.1986
Sacramento Sucker	07/31/1984	52+54	7.59	47.5	42.4	776	1248	30	75-299	Immediately downstream Horsethief Creek confluence	Bartholomew & Loudermilk.1986
Rainbow Trout	07/31/1984	23+1	0.25	1.34	1.5	337	552	23		Immediately downstream Horsethief Creek confluence	Bartholomew Loudermilk.1986
Rainbow Trout	07/30/1984	18+0	0.04	0.2	0.2		268	18	25-74	Immediately downstream Shakeflat Creek confluence	BSAI.1987a

Table CAWG 7-Appendix C-15. Historical Information in the Mainstem of San Joaquin River (Mammoth Reach) (Continued).

Species	Date	Population Estimate	Biomass* (kg)	Density				Number collected	Fork Length (mm)	Comments	References
				kg/ha	lb/ac	Fish/km	Fish/Mile				
Brown Trout	07/30/1984							18		Immediately downstream Shakeflat Creek confluence	BSAI.1987a
Sacramento Sucker	07/30/1984	8+0	1.28	8.9	7.9		119	8	50-324	Immediately downstream Shakeflat Creek confluence	BSAI.1987a

*Based on total amount of fish (not sample size).

Table CAWG 7-Appendix C-16. Historical Fish Stocking for Rock Creek.

Species	County	Year	Size (Length [mm])	Pounds	No. of Fish	Hatchery	Comment	Reference
Rainbow Trout	Madera	2002	C*		2,708	San Joaquin Fish Hatchery		CDFG.2002
Rainbow Trout	Madera	2001	C*		2,830	San Joaquin Fish Hatchery		CDFG.2002
Rainbow Trout	Madera	2000	C*		2,900	San Joaquin Fish Hatchery		CDFG.2002
Rainbow Trout	Madera	1999	C*		2,370	San Joaquin Fish Hatchery		CDFG.1999a
Rainbow Trout	Madera	1998	C*		2,630	San Joaquin Fish Hatchery		CDFG.1999a
Rainbow Trout	Madera	1997	C*		2,735	San Joaquin Fish Hatchery		CDFG.1999a
Rainbow Trout	Madera	1996	C*		3,040	San Joaquin Fish Hatchery		CDFG.1999a
Rainbow Trout	Madera	1995	C*		3,040	San Joaquin Fish Hatchery		CDFG.1999a
Rainbow Trout	Madera	1994	C*		3,415	San Joaquin Fish Hatchery		CDFG.1999a
Rainbow Trout	Madera	1993	C*		3,550	San Joaquin Fish Hatchery		CDFG.1999a
Rainbow Trout	Madera	1992	C*		4,365	San Joaquin Fish Hatchery		CDFG.1999a
Rainbow Trout	Madera	1991	C*		3,160	San Joaquin Fish Hatchery		CDFG.1999a
Rainbow Trout	Madera	1990	C*		4,285	San Joaquin Fish Hatchery		CDFG.1999a
Rainbow Trout	Madera	1989	C*		4,965	San Joaquin Fish Hatchery		CDFG.1999a
Rainbow Trout	Madera	1988	C*		4,805	San Joaquin Fish Hatchery		CDFG.1999a
Rainbow Trout	Madera	1987	C*		950	San Joaquin Fish Hatchery		CDFG.1999a
Rainbow Trout	Madera	1986	C*		6,070	San Joaquin Fish Hatchery		CDFG.1999a
Rainbow Trout	Madera	1985	C*		5,910	San Joaquin Fish Hatchery		CDFG.1999a
Rainbow Trout	Madera	1984	C*		5,180	San Joaquin Fish Hatchery		CDFG.1999a

Table CAWG 7-Appendix C-16. Historical Fish Stocking for Rock Creek (Continued).

Species	County	Year	Size (Length [mm])	Pounds	No. of Fish	Hatchery	Comment	Reference
Rainbow Trout	Madera	1983	C*		5,800	San Joaquin Fish Hatchery		CDFG.1999a
Rainbow Trout	Madera	1982	C*		5,625	San Joaquin Fish Hatchery		CDFG.1999a
Rainbow Trout	Madera	1981	C*		5,100	San Joaquin Fish Hatchery		CDFG.1999a
Rainbow Trout	Madera	1980	C*		6,020	San Joaquin Fish Hatchery		CDFG.1999a
Rainbow Trout	Madera	1979	C*		5,691	San Joaquin Fish Hatchery		CDFG.1999a
Rainbow Trout	Madera	1978	C*		4,544	San Joaquin Fish Hatchery		CDFG.1999a
Rainbow Trout	Madera	1977	C*		4,235	San Joaquin Fish Hatchery		CDFG.1999a
Rainbow Trout	Madera	1976	C*		4,680	San Joaquin Fish Hatchery		CDFG.1999a
Rainbow Trout	Madera	1975	C*		4,583	San Joaquin Fish Hatchery		CDFG.1999a
Rainbow Trout	Madera	1974	C*		5,240	San Joaquin Fish Hatchery		CDFG.1999a
Rainbow Trout	Madera	1973	C*		6,905	San Joaquin Fish Hatchery		CDFG.1999a
Rainbow Trout	Madera	1972	C*		7,797	San Joaquin Fish Hatchery		CDFG.1999a
Rainbow Trout	Madera	1971	C*		6,089	San Joaquin Fish Hatchery		CDFG.1999a
Rainbow Trout	Madera	1970	C*		5,518	San Joaquin Fish Hatchery		CDFG.1999a
Rainbow Trout	Madera	1969	C*		11,036	San Joaquin Fish Hatchery		CDFG.1999a
Rainbow Trout	Madera	1968	C*		4,989	San Joaquin Fish Hatchery		CDFG.1999a
Rainbow Trout	Madera	1967	C*		8,339	San Joaquin Fish Hatchery		CDFG.1999a
Rainbow Trout and Brook Trout	Madera	1966	C*		5,130	San Joaquin Fish Hatchery		CDFG.1999a
Rainbow Trout	Madera	1965	C*		5,360	San Joaquin Fish Hatchery		CDFG.1999a

Table CAWG 7-Appendix C-16. Historical Fish Stocking for Rock Creek (Continued).

Species	County	Year	Size (Length [mm])	Pounds	No. of Fish	Hatchery	Comment	Reference
Rainbow Trout	Madera	1964	C*		5,468	San Joaquin Fish Hatchery		CDFG.1999a
Rainbow Trout	Madera	1963	C*		4,730	San Joaquin Fish Hatchery		CDFG.1999a
Rainbow Trout	Madera	1962	C*		3,880	San Joaquin Fish Hatchery		CDFG.1999a
Rainbow Trout	Madera	1961	C*		3,595	San Joaquin Fish Hatchery		CDFG.1999a
Rainbow Trout	Madera	1960	C*		3440	San Joaquin Fish Hatchery		CDFG.1999a
Rainbow Trout	Madera	1959	C*		2,415	San Joaquin Fish Hatchery		CDFG.1999a
Rainbow Trout	Madera	1958	C*		3,555	San Joaquin Fish Hatchery		CDFG.1999a
Rainbow Trout	Madera	1957	C*		4546	San Joaquin Fish Hatchery		CDFG.1999a
Rainbow Trout	Madera	1956	C*		3,889	San Joaquin Fish Hatchery		CDFG.1999a
Brown Trout	Madera	1953	F**		6,360	Madera		CDFG.1999a
Rainbow Trout	Madera	1952	F**		12,060	Madera		CDFG.1999a
Rainbow Trout	Madera	1951	F**		14,840	Madera		CDFG.1999a
Rainbow Trout	Madera	1950	F**		14984	Madera		CDFG.1999a
*Catchables								
**Fingerlings								

Table CAWG 7-Appendix C-17. Historical Information for Rock Creek.

Species	Date	Population Estimate	Biomass (kg)	Density				Number collected	Fork Length (mm)	Comments	References
				kg/ha	lb/ac	Fish/km	Fish/Mile				
Brown Trout	Aug-76	Present					105.6		152.4-203.2	Table 7-3	ESA 1985
Rainbow Trout & Brown Trout	Mar-84	Present					316.8		86.4-259.1	Table 7-3	ESA 1985

Table CAWG 7-Appendix C-18. Historical Estimates for the Stevenson Reach of the San Joaquin River.

Species	Date	Population Estimate	Density		Comments	References
			lb/ac	Fish/Mile		
Rainbow Trout	1986	21	76.08	1458.95	Collected at the stairway, run habitat.	BSAI.1987
Rainbow Trout	1986	2	24.57	1173.33	Collected at the stairway, riffle habitat.	BSAI.1987
Rainbow Trout	1986	38	26.26	1866.42	Collected at the stairway, boulder strewn type II habitat.	BSAI.1987
Rainbow Trout	1986	17	11.68	839.66	Collected at the stairway, boulder strewn type I habitat.	BSAI.1987
Rainbow Trout	1986	8	12.46	545.74	Collected at the stairway, A2 pool habitat.	BSAI.1987
Sacramento Sucker	1986	17	1.55	1181.05	Collected at the stairway, run habitat.	BSAI.1987
Sacramento Sucker	1986	34	39.85	1669.95	Collected at the stairway, boulder strewn type II habitat.	BSAI.1987
Sacramento Sucker	1986	9	1.76	444.53	Collected at the stairway, boulder strewn type I habitat.	BSAI.1987
Sacramento Sucker	1986	5	7.8	668.35	Collected at the stairway, A1 pool habitat.	BSAI.1987
Sacramento Sucker	1986	100	22.48	6821.71	Collected at the stairway, A2 pool habitat.	BSAI.1987
Brown Trout	1986	2	0.49	98.23	Collected at the stairway, boulder strewn type II habitat.	BSAI.1987
Rainbow Trout	1986	2	28.6	222.78	Collected between the stairway and Stevenson Ck, boulder strewn type II habitat.	BSAI.1987
Rainbow Trout	1986	6	51.72	623.62	Collected between the stairway and Stevenson Ck, boulder strewn type I habitat.	BSAI.1987
Rainbow Trout	1986	2	0.45	168.96	Collected between the stairway and Stevenson Ck, A1 pool habitat.	BSAI.1987

Table CAWG 7-Appendix C-18. Historical Estimates for the Stevenson Reach of the San Joaquin River (Continued).

Species	Date	Population Estimate	Density		Comments	References
			lb/ac	Fish/Mile		
Sacramento Sucker	1986	13	218.5	1448.1	Collected between the stairway and Stevenson Ck, boulder strewn type II habitat.	BSAI.1987
Sacramento Sucker	1986	6	35.85	623.62	Collected between the stairway and Stevenson Ck, boulder strewn type I habitat.	BSAI.1987
Sacramento Sucker	1986	42	39.56	3548.16	Collected between the stairway and Stevenson Ck, A1 pool habitat.	BSAI.1987
Prickly Sculpin	1986	1	1.36	111.39	Collected between the stairway and Stevenson Ck, boulder strewn type II habitat.	BSAI.1987
Rainbow Trout	1986	2	22.63	302.58	Collected below Stevenson Ck, run habitat.	BSAI.1987
Rainbow Trout	1986	1	42.53	262.69	Collected below Stevenson Ck, riffle habitat.	BSAI.1987
Rainbow Trout	1986	7	14.45	1188.42	Collected below Stevenson Ck, boulder strewn type I habitat.	BSAI.1987
Rainbow Trout	1986	41			Collected below Stevenson Ck, A2 pool habitat.	BSAI.1987
Sacramento Pikeminnow	1986	2	0.08	302.58	Collected below Stevenson Ck, run habitat.	BSAI.1987
Sacramento Pikeminnow	1986	21	0.58	3565.27	Collected below Stevenson Ck, boulder strewn type I habitat.	BSAI.1987
Sacramento Pikeminnow	1986	98	2.38	12682.35	Collected below Stevenson Ck, A1 pool habitat.	BSAI.1987
Sacramento Pikeminnow	1986	11	0.39	1187.73	Collected below Stevenson Ck, A2 pool habitat.	BSAI.1987
Sacramento Sucker	1986	2	0.14	302.58	Collected below Stevenson Ck, run habitat.	BSAI.1987

Table CAWG 7-Appendix C-18. Historical Estimates for the Stevenson Reach of the San Joaquin River (Continued).

Species	Date	Population Estimate	Density		Comments	References
			lb/ac	Fish/Mile		
Sacramento Sucker	1986	3	0.14	509.32	Collected below Stevenson Ck, boulder strewn type I habitat.	BSAI.1987
Sacramento Sucker	1986	55	2.24	7117.65	Collected below Stevenson Ck, A1 pool habitat.	BSAI.1987
Sacramento Sucker	1986	7	0.42	755.83	Collected below Stevenson Ck, A2 pool habitat.	BSAI.1987
Brown Trout	1986	1	1.66	151.29	Collected below Stevenson Ck, run habitat.	BSAI.1987
Hardhead	1986	1148	5.71	66463.16	Collected below Redinger Lk, A1 pool habitat.	BSAI.1987
Hardhead	1986	205	0.66	8673.08	Collected below Redinger Lk, A2 pool habitat.	BSAI.1987
Hardhead	1986	62	1.57	10628.57	Collected below Redinger Lk, run habitat.	BSAI.1987
Hardhead	1986	8	0.39	1973.83	Collected below Redinger Lk, riffle habitat.	BSAI.1987
Hardhead	1986	1	2.08	83.41	Collected below Redinger Lk, boulder strewn type 1 habitat.	BSAI.1987
Rainbow Trout	1986	2	1.21	342.86	Collected below Redinger Lk, run habitat.	BSAI.1987
Rainbow Trout	1986	4	1.98	986.92	Collected below Redinger Lk, riffle habitat.	BSAI.1987
Rainbow Trout	1986	12	6.5	1000.95	Collected below Redinger Lk, boulder strewn type 1 habitat.	BSAI.1987
Prickly Sculpin	1986	18	0.73	1042.11	Collected below Redinger Lk, A1 pool habitat.	BSAI.1987
Prickly Sculpin	1986	20	0.71	846.15	Collected below Redinger Lk, A2 pool habitat.	BSAI.1987
Prickly Sculpin	1986	8	2.26	1371.43	Collected below Redinger Lk, run habitat.	BSAI.1987

Table CAWG 7-Appendix C-18. Historical Estimates for the Stevenson Reach of the San Joaquin River (Continued).

Species	Date	Population Estimate	Density		Comments	References
			lb/ac	Fish/Mile		
Prickly Sculpin	1986	38	10.47	9375.7	Collected below Redinger Lk, riffle habitat.	BSAI.1987
Prickly Sculpin	1986	4	4.14	333.65	Collected below Redinger Lk, boulder strewn type 1 habitat.	BSAI.1987
Sacramento Sucker	1986	73	2.34	4226.32	Collected below Redinger Lk, A1 pool habitat.	BSAI.1987
Sacramento Sucker	1986	43	0.86	1819.23	Collected below Redinger Lk, A2 pool habitat.	BSAI.1987
Sacramento Sucker	1986	6	1.23	1028.57	Collected below Redinger Lk, run habitat.	BSAI.1987
Sacramento Sucker	1986	7	0.59	583.89	Collected below Redinger Lk, boulder strewn type 1 habitat.	BSAI.1987
Sacramento Pikeminnow	1986	842	6.03	48747.37	Collected below Redinger Lk, A1 pool habitat.	BSAI.1987
Sacramento Pikeminnow	1986	902	2.78	38161.54	Collected below Redinger Lk, A2 pool habitat.	BSAI.1987
Sacramento Pikeminnow	1986	192	6.71	32914.29	Collected below Redinger Lk, run habitat.	BSAI.1987
Sacramento Pikeminnow	1986	34	2.38	8388.79	Collected below Redinger Lk, riffle habitat.	BSAI.1987
Sacramento Pikeminnow	1986	376	14.05	31363.03	Collected below Redinger Lk, boulder strewn type 1 habitat.	BSAI.1987

Table CAWG 7-Appendix C-19. Historical Fish Stocking Information for Big Creek (All Reaches).

Species	County	Year	Size	Pounds	Number of Fish	Hatchery	Comments	References
Rainbow Trout	Fresno	1979			1600	Big Creek	planted behind Dam 5	ESA.1985 & CDFG.2002
Rainbow Trout	Fresno	1979			1,700	Big Creek		CDFG.2002
Rainbow Trout	Fresno	1957			1,586	Big Creek		CDFG.2002
Brown Trout	Fresno	1937		63/oz	50,000		Big Creek Below Huntington Lake	Dill.1944
Brown Trout	Fresno	1936		80/oz	50,000		Big Creek Below Huntington Lake	Dill.1944
Brown Trout	Fresno	1935			10,000		Big Creek Below Huntington Lake	Dill.1944
Brook Trout	Fresno	1934		10/oz	5,000		Powerhouse 2	Dill.1944
Brook Trout	Fresno	1934		10/oz	5,000		Powerhouse 2	Dill.1944
Brook Trout	Fresno	1933			15,000		Powerhouse 2	Dill.1944
Brook Trout	Fresno	1933			15,000		Powerhouse 2	Dill.1944

Table CAWG 7-Appendix C-19. Historical Fish Stocking Information for Big Creek (All Reaches) (Continued).

Species	County	Year	Size	Pounds	Number of Fish	Hatchery	Comments	References
Brook Trout	Fresno	1932			2,000		Powerhouse 2	Dill.1944
Brook Trout	Fresno	1932			6,000		Powerhouse 2	Dill.1944
Brook Trout	Fresno	1931			2,000		Powerhouse 2	Dill.1944
Steelhead Trout	Fresno	1931			2,000		Powerhouse 2	Dill.1944
Rainbow Trout	Fresno	1963			1,800	Big Creek		CDFG.2002
Rainbow Trout	Fresno	1962			1,600	Big Creek		CDFG.2002

Table CAWG 7-Appendix C-20. Historical Information for Big Creek - Dam 1 to Powerhouse 1.

Species	Date	Population Estimate	Biomass (kg)	Density				Number collected	Fork Length (mm)	Comments	References
				kg/ha	lb/ac	Fish/km	Fish/Mile				
Rainbow Trout	February-2000	Present									SCE.2000b
Riffle sculpin	February-2000	Present									SCE.2000b
Brown Trout	1985	Present								"this portion of Big Creek contains wild brown trout densities as high as any other stream surveyed."	ESA. 1985
Brown Trout	December 1985	Present								Brown trout occupy much of mainstem Big Creek above and below Huntington Lake	ESA. 1985
Rainbow Trout	12/08/1944	Present								Rainbow have been reported. Warden Paul Kehrer tells me that one can catch some nice medium-sized Rainbow in "Scott Lake"	Dill.1944
Brown Trout	12/08/1944	Present								Loch Leven have been reported	Dill.1944
Brook Trout	12/08/1944	Present								Eastern brook, have been reported	Dill.1944

Table CAWG 7-Appendix C-21. Historical Information for Big Creek from Dam 4 to Powerhouse 2.

Species	Date	Population Estimate	Biomass (kg)	Density				Number. collected	Fork Length (mm)	Comments	References
				kg/ha	lb/ac	Fish/km	Fish/Mile				
Brown Trout	1987	Present									BSAI.1987a
Rainbow Trout	1987	Present									BSAI.1987a
Sculpin	1987	Present									BSAI.1987a
Rainbow Trout	Jul-68	Present					21.1		177.8	Table 7-3 elev 4800	ESA.1985
Brown Trout	Jul-68	Present					316.8		63.5-330.2	Table 7-3 elev 4800	ESA.1985
Rainbow Trout	Jul-68	Present					31.7		203.2	Table 7-3 elev 4000	ESA.1985
Brown Trout	Jul-68	Present					596.6		63.5-264.2	Table 7-3 elev 4000	ESA.1985
Rainbow Trout	Jul-68	Present					913.44		35.6-228.6	Table 7-3 elev 3000	ESA.1985
Brown Trout	Jul-68	Present					374.9		55.9-165.1	Table 7-3 elev 3000	ESA.1985

Table CAWG 7-Appendix C-22. Historical Information for Big Creek - Dam 5 to Powerhouse 8.

Species	Date	Total Number in Reach*	Biomass (kg)	Density				Number collected	Fork Length (mm)	Comments	References
				kg/ha	lb/ac	Fish/1000 ft^2	Fish/Mile				
Brown Trout	1986		2.14					33	60-309	Electrofishing results	BSAI.1987a
Brown Trout	1986	69	3.89			11.51				Riffle habitat.	BSAI.1987a
Brown Trout	1986	921	42.2			17.98				Run habitat.	BSAI.1987a
Brown Trout	1986	85	4.00			11.34				Boulder strewn habitat.	BSAI.1987a
Brown Trout	1986	73	6.63			3.71				A1 pool habitat.	BSAI.1987a
Brown Trout	1986	181	8.76			4.76				A2 pool habitat.	BSAI.1987a
Brown Trout	1986	113	22.76			5.05				A3 pool habitat.	BSAI.1987a
Rainbow Trout	1986	42	1.40			3.89				Plunge pool habitat.	BSAI.1987a
Rainbow Trout	1986	438	4.30			73.1				Riffle habitat.	BSAI.1987a

Table CAWG 7-Appendix C-22. Historical Information for Big Creek - Dam 5 to Powerhouse 8 (Continued).

Species	Date	Total Number in Reach*	Biomass (kg)	Density				Number collected	Fork Length (mm)	Comments	References
				kg/ha	lb/ac	Fish/1000 ft^2	Fish/Mile				
Rainbow Trout	1986	4839	49.65			94.48				Run habitat.	BSAI.1987a
Rainbow Trout	1986	458	4.67			61.20				Boulder strewn habitat.	BSAI.1987a
Rainbow Trout	1986	359	6.82			18.14				A1 pool habitat.	BSAI.1987a
Rainbow Trout	1986	271	13.55			7.14				A2 pool habitat.	BSAI.1987a
Rainbow Trout	1986	453	63.82			20.21				A3 pool habitat.	BSAI.1987a
Rainbow Trout	1986		2.79					148	50-219	Electrofishing results	BSAI.1987a
Prickly Sculpin	1986		0.05					1		Electrofishing results	BSAI.1987a

*Total fish calculated to reside in reach

Table CAWG 7-Appendix C-23. Historical Fish Stocking Information for Pitman Creek.

Species	County	Year	Size (Length [mm])	Pounds	Number of Fish	Hatchery	Comment	Reference
Rainbow Trout	Fresno	2001	C*	850	1,630	San Joaquin Fish Hatchery		CDFG. 2002.
Rainbow Trout	Fresno	2000	C*	800	1,675	San Joaquin Fish Hatchery		CDFG. 2002.
Rainbow Trout	Fresno	1999	C*		2,020	San Joaquin Fish Hatchery		CDFG. 2002.
Rainbow Trout	Fresno	1998	C*		1,398	San Joaquin Fish Hatchery		CDFG. 2002.
Rainbow Trout	Fresno	1997	C*		1,455	San Joaquin Fish Hatchery		CDFG. 2002.
Rainbow Trout	Fresno	1996	C*		2,183	San Joaquin Fish Hatchery		CDFG. 2002.
Rainbow Trout	Fresno	1995	C*		1,400	San Joaquin Fish Hatchery		CDFG. 2002.
Rainbow Trout	Fresno	1994	C*		1,700	San Joaquin Fish Hatchery		CDFG. 2002.
Rainbow Trout	Fresno	1993	C*		3,095	San Joaquin Fish Hatchery		CDFG. 2002.
Rainbow Trout	Fresno	1992	C*		4,395	San Joaquin Fish Hatchery		CDFG. 2002.
Rainbow Trout	Fresno	1991	C*		3,085	San Joaquin Fish Hatchery		CDFG. 2002.
Rainbow Trout	Fresno	1990	C*		2,440	San Joaquin Fish Hatchery		CDFG. 2002.
Rainbow Trout	Fresno	1989	C*		3,150	San Joaquin Fish Hatchery		CDFG. 2002.
Rainbow Trout	Fresno	1988	C*		4,245	San Joaquin Fish Hatchery		CDFG. 2002.

Table CAWG 7-Appendix C-23. Historical Fish Stocking Information for Pitman Creek (Continued).

Species	County	Year	Size (Length [mm])	Pounds	Number of Fish	Hatchery	Comment	Reference
Rainbow Trout	Fresno	1987	C*		2,390	San Joaquin Fish Hatchery		CDFG. 2002.
Rainbow Trout	Fresno	1986	C*		4,403	San Joaquin Fish Hatchery		CDFG. 2002.
Rainbow Trout	Fresno	1985	C*		3,675	San Joaquin Fish Hatchery		CDFG. 2002.
Rainbow Trout	Fresno	1984	C*		4,730	San Joaquin Fish Hatchery		CDFG. 2002.
Rainbow Trout	Fresno	1983	C*		5,030	San Joaquin Fish Hatchery		CDFG. 2002.
Rainbow Trout	Fresno	1982	C*		3,635	San Joaquin Fish Hatchery		CDFG. 2002.
Rainbow Trout	Fresno	1981	C*		3,121	San Joaquin Fish Hatchery		CDFG. 2002.
Rainbow Trout	Fresno	1980	C*		3,660	San Joaquin Fish Hatchery		CDFG. 2002.
Rainbow Trout	Fresno	1979	C*		3,236	San Joaquin Fish Hatchery		CDFG. 2002.
Rainbow Trout	Fresno	1979	C*		340	San Joaquin Fish Hatchery		CDFG. 2002.
Rainbow Trout	Fresno	1978	C*		4,100	San Joaquin Fish Hatchery		CDFG. 2002.
Rainbow Trout	Fresno	1977	C*		3,335	San Joaquin Fish Hatchery		CDFG. 2002.
Rainbow Trout	Fresno	1976	C*		3,680	San Joaquin Fish Hatchery		CDFG. 2002.
Rainbow Trout	Fresno	1975	C*		3,623	San Joaquin Fish Hatchery		CDFG. 2002.

Table CAWG 7-Appendix C-23. Historical Fish Stocking Information for Pitman Creek (Continued).

Species	County	Year	Size (Length [mm])	Pounds	Number of Fish	Hatchery	Comment	Reference
Rainbow Trout	Fresno	1974	C*		2,960	San Joaquin Fish Hatchery		CDFG. 2002.
Rainbow Trout	Fresno	1973	C*		3,530	San Joaquin Fish Hatchery		CDFG. 2002.
Rainbow Trout	Fresno	1972	C*		3,989	San Joaquin Fish Hatchery		CDFG. 2002.
Rainbow Trout	Fresno	1971	C*		4,896	San Joaquin Fish Hatchery		CDFG. 2002.
Rainbow Trout	Fresno	1970	C*		3,870	San Joaquin Fish Hatchery		CDFG. 2002.
Rainbow Trout	Fresno	1969	C*		4,281	San Joaquin Fish Hatchery		CDFG. 2002.
Rainbow Trout	Fresno	1968	C*		2,363	San Joaquin Fish Hatchery		CDFG. 2002.
Rainbow Trout	Fresno	1967	C*		3,890	San Joaquin Fish Hatchery		CDFG. 2002.
Rainbow Trout & Brook Trout	Fresno	1966	C*		6,066	San Joaquin Fish Hatchery		CDFG. 2002.
Rainbow Trout	Fresno	1965	C*		7,890	San Joaquin Fish Hatchery		CDFG. 2002.
Rainbow Trout	Fresno	1964	C*		1,960	San Joaquin Fish Hatchery		CDFG. 2002.
Rainbow Trout	Fresno	1963	C*		4,184	San Joaquin Fish Hatchery		CDFG. 2002.
Rainbow Trout	Fresno	1962	C*		2,950	San Joaquin Fish Hatchery		CDFG. 2002.
Rainbow Trout	Fresno	1961	C*		3,320	San Joaquin Fish Hatchery		CDFG. 2002.

Table CAWG 7-Appendix C-23. Historical Fish Stocking Information for Pitman Creek (Continued).

Species	County	Year	Size (Length [mm])	Pounds	Number of Fish	Hatchery	Comment	Reference
Rainbow Trout	Fresno	1960	C*		3,100	San Joaquin Fish Hatchery		CDFG. 2002.
Rainbow Trout	Fresno	1959	C*		1,100	San Joaquin Fish Hatchery		CDFG. 2002.
Rainbow Trout	Fresno	1958	C*		1,995	San Joaquin Fish Hatchery		CDFG. 2002.
Rainbow Trout	Fresno	1957	C*		2,100	San Joaquin Fish Hatchery		CDFG. 2002.
Rainbow Trout	Fresno	1956	C*		1,496	San Joaquin Fish Hatchery		CDFG. 2002.
Cutthroat Trout and Brown Trout	Fresno	1910						Shebley. 1911.
Trout	Fresno	1897						Ellis. 1915.

* Catchables

Table CAWG 7-Appendix C-24. Historical Information for Balsam Creek.

Species	Date	Population Estimate	Biomass (kg)	Density				Number collected	Fork Length (mm)	Comments	References
				kg/ha	lb/ac	Fish/km	Fish/Mile				
--	1982	--								"Balsam Creek does not now sustain a permanent fishery."	FERC.1982a
--	1982	--								"Fish plantings are not recommended for Balsam Meadow forebay."	FERC.1982a
--	Sep-82	--								"No fish were collected in Balsam Creek near the forebay site."	ESA.1985
Rainbow Trout	09/20/1945	None given								"Residents say that stream is OK for fish and report them below the Highway No. 168 road crossing. Also say they exist above the dam. Fish not seen by me. They are probably Rainbow and probably small."	Dill.1945b

Table CAWG 7-Appendix C-25. Historical Information for North Fork Stevenson Creek Downstream of Tunnel 7 Outlet.

Species	Date	Population Estimate	Biomass (kg)	Density				Number collected	Length (mm)	References
				kg/ha	lb/ac	Fish/km	Fish/Mile			
Brown Trout	1992							208	61-249	BSAI.1993
Rainbow Trout	1992							147	46-243	BSAI.1993
Brown Trout	1991							282	62-415	BSAI.1993
Rainbow Trout	1991							135	46-294	BSAI.1993
Brown Trout	1990							263	63-409	BSAI.1993
Rainbow Trout	1990							124	53-275	BSAI.1993
Brown Trout	1989							213	67-568	BSAI.1993
Rainbow Trout	1989							157	45-242	BSAI.1993
Brown Trout	1988							227	50-395	BSAI.1993
Rainbow Trout	1988							154	41-293	BSAI.1993
Rainbow Trout	1981						892			ESA.1985
Brown Trout	1981						106			ESA.1985

Table CAWG 7-Appendix C-25. Historical Information for North Fork Stevenson Creek Downstream of Tunnel 7 Outlet (Continued)

.

Species	Date	Population Estimate	Biomass (kg)	Density				Number collected	Length (mm)	References
				kg/ha	lb/ac	Fish/km	Fish/Mile			
Brook Trout	1981						16			ESA.1985
Rainbow Trout	1980						528		51-229	ESA.1985
Brown Trout	1980						53		229-543	ESA.1985

Table CAWG 7-Appendix C-26. Comparison of Collected Fish by Rosgen Levels of 2000 and 2001 in North Fork Stevenson Creek.

Site	Total Collected (2000)	Population Estimate (2000)	Estimated Abundance (#/km)	Total Collected (2001)	Population Estimate (2001)	Estimated Abundance (#/km)
Rosgen Level I Aa+ Channel Type Site (Upper Cascade)[1]						
Rainbow Trout	-	-	-	39	39	427
Riffle Sculpin	-	-	-	8	8	87
Rosgen Level I G Channel Type Site (Upper Plateau Site 2)						
Brown Trout	18	18	189	19	20	210
Rainbow Trout	25	36	379	65	100	1052
Sacramento Sucker	-	-	-	6	6	63
Rosgen Level I G Channel Type Site (Upper Plateau Site 1)[2]						
Brown Trout	31	40	505	53	57	719
Rainbow Trout	33	34	429	34	45	568
Sacramento Sucker	4	4	50	-	-	-
Riffle Sculpin	1	1	13	-	-	-
Rosgen Level I C Channel Type Site (Lower Plateau)[1]						
Brown Trout	-	-	-	40	44	722
Rainbow Trout	-	-	-	62	70	1148
Sacramento Sucker	-	-	-	1	1	16

[1] Site not sampled in 2000

[2] Site not sampled in 2001

Table CAWG 7-Appendix C-27. Historical Information for Stevenson Creek Downstream of Shaver Lake.

Species	Date	Population Estimate	Density				Biomass (lbs/acre)	Fork Length (mm)	Comments	References
			kg/ha	lb/ac	Fish/km	Fish/Mile				
Rainbow Trout	Jul-68					740		25.4-165.1		ESA 1985
Rainbow Trout	Feb-70								From Stevenson Creek I.G.	CDFG 1970a
Rainbow Trout	1986	24				2317	77	20-199	Site 1A	BSAI 1988
Rainbow Trout	1988	8				772	29	59-179	Site 1A	BSAI 1988
Rainbow Trout	1986	15				2095	69	20-199	Site 1B	BSAI 1988
Rainbow Trout	1986	22				1809	123	20-199	Site 2A	BSAI 1988
Rainbow Trout	1988	11				905	61	59-179	Site 2A	BSAI 1988
Rainbow Trout	1986	12				5369	156	20-199	Site 2B	BSAI 1988
Rainbow Trout	1988	11				4922	231	59-179	Site 2B	BSAI 1988
Rainbow Trout	1986	68				4025	205	20-199	Site 3A	BSAI 1988
Rainbow Trout	1988	39				2309	91	59-179	Site 3A	BSAI 1988

Table CAWG 7-Appendix C-28. Historical Stocking for Stevenson Creek.

Species	County	Year	Size (Length [mm])	Pounds	No. of Fish	Hatchery	Comment	Reference
Rainbow Trout	Fresno	1954			11,970	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1953			12,045	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1952			9,990	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1951			12,240	CDFG San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1950			11,500	San Joaquin		CDFG. 2002
Rainbow Trout and Brown Trout	Fresno	1906						Shebley. 1911
Cutthroat Trout	Fresno	1884					Possibly stocked.	Ellis. 1910

Table CAWG 7-Appendix C-29. Historical Fish Stocking Information for Florence Lake.

Species	County	Year	Size	Pounds	Number of Fish	Hatchery	Comment	Reference
Rainbow Trout	Fresno	1998	F[1]		60,880	San Joaquin		CDFG. 1998
Rainbow trout, Whitney X Kamloops strain	Fresno	1997	F[1]		25,200	San Joaquin		CDFG. 1998
Rainbow trout, Whitney X Kamloops strain	Fresno	1996	F[1]		20,246	San Joaquin		CDFG. 1998
Rainbow trout, Whitney strain	Fresno	1995	F[1]		18,000	San Joaquin		CDFG. 1998
Rainbow trout, Whitney X Kamloops strain	Fresno	1994	F[1]		18,000	San Joaquin		CDFG. 1998
Rainbow trout. Whitney X Kamloops strain	Fresno	1993	F[1]		21,000	San Joaquin		CDFG. 1998
Rainbow trout, Whitney strain	Fresno	1992	F[1]		19,950	San Joaquin		CDFG. 1998
Rainbow trout, Whitney strain	Fresno	1991	F[1]		18,000	San Joaquin		CDFG. 1998
Rainbow trout, Whitney strain	Fresno	1990	F[1]		19,500	San Joaquin		CDFG. 1998
Eagle Lake-wild trout	Fresno	1989	F[1]		19,000	San Joaquin		CDFG. 1998
Rainbow Trout	Fresno	1988	F[1]		20,000	San Joaquin		CDFG. 1998
Rainbow trout, Whitney strain	Fresno	1987	F[1]		10,000	San Joaquin		CDFG. 1998
Rainbow trout-Kamloops junction	Fresno	1986	F[1]		4,500	San Joaquin		CDFG. 1998

Table CAWG 7-Appendix C-29. Historical Fish Stocking Information for Florence Lake (Continued).

Species	County	Year	Size	Pounds	Number of Fish	Hatchery	Comment	Reference
Rainbow trout, Whitney strain	Fresno	1986	F[1]		18,150	San Joaquin		CDFG. 1998
Eagle Lake trout	Fresno	1985	F[1]		96,900	Moccasin Fish		CDFG. 1998
Rainbow trout, Whitney strain	Fresno	1983	F[1]		52,500	San Joaquin		CDFG. 1998
Rainbow Trout	Fresno	1982	F[1]		20,000	San Joaquin		CDFG. 1998
Rainbow trout, Whitney strain	Fresno	1981	F[1]		50,400	San Joaquin		CDFG. 1998
Rainbow Trout	Fresno	1981	C[2]		500	San Joaquin		CDFG. 1998
Brook trout	Fresno	1980	F[1]		50,410	San Joaquin		CDFG. 1998
Rainbow Trout-coleman strain	Fresno	1980	F[1]		35,280	San Joaquin		CDFG. 1998
Rainbow Trout	Fresno	1979	F[1]		53,200	San Joaquin		CDFG. 1998
Rainbow Trout	Fresno	1972	C[2]		29,760	San Joaquin		CDFG. 1998
Rainbow Trout	Fresno	1971	C[2]		23,276	San Joaquin		CDFG. 1998
Rainbow Trout	Fresno	1970	C[2]		12,962	DJ Marshall		CDFG. 1998
Brown trout	Fresno	1969	F[1]		44,200	DJ Marshall		CDFG. 1998
Rainbow Trout	Fresno	1969	C[2]		14,712	DJ Marshall		CDFG. 1998
Kokanee slamon	Fresno	1959	F[1]		75,000	San Joaquin		CDFG. 1998
Rainbow Trout	Fresno	1954	F[1]		25,300	Kings River		CDFG. 1998
Rainbow Trout	Fresno	1953	F[1]		24,960	Kings River		CDFG. 1998
Rainbow Trout	Fresno	1952	F[1]	49	25,110	Kings River	Total wt.= 785 oz.	CDFG. 1998, CDFG. 1952c

Table CAWG 7-Appendix C-29. Historical Fish Stocking Information for Florence Lake (Continued).

Species	County	Year	Size	Pounds	Number of Fish	Hatchery	Comment	Reference
Rainbow Trout	Fresno	1951	F[1]	63	30,000	Kings River	Total wt.= 1000 oz.	CDFG. 1998, CDFG. 1952c
Rainbow Trout	Fresno	1950	F[1]	148	21,375	Huntington Lake	Total wt.= 2375 oz.	CDFG. 1998, CDFG. 1952c
Rainbow Trout	Fresno	1949	20 per oz.	84	27,000	Kings River	6/5/49; total wt.= 1350 oz.	CDFG. 1952c
Rainbow Trout	Fresno	1948	19 per oz.	84.4	25,650	Kings River	6/8/48; total wt.= 1350 oz.	CDFG. 1952c
Rainbow Trout	Fresno	1948	7 per oz.	83	9,240	Kings River	8/24-27/48; total wt.= 1320 oz.	CDFG. 1952c
Rainbow Trout	Fresno	1947	40 per oz.	53	33,600	Kings River	5/14/47; total wt.= 840 oz.	CDFG. 1952c
Rainbow Trout	Fresno	1946	30 per oz.	63	30,000	Kings River	6/1/46; total wt.= 1000 oz.	CDFG. 1952c
Rainbow Trout	Fresno	1945	18 per oz.	163	46,800	Kings River	6/19/45; total wt.= 2600 oz.	CDFG. 1952c
Rainbow Trout	Fresno	1944	32 per oz.	87	44,480	Kings River	5/27&31/44; total wt.= 1390 oz.	CDFG. 1952c
Rainbow Trout	Fresno	1944	25 per oz.	30	12,000	Kings River	6/7/44; total wt.= 480 oz.	CDFG. 1952c
Rainbow Trout	Fresno	1943	25 per oz.	105	42,000	Kings River	6/15-16/43; total wt.= 1680 oz.	CDFG. 1952c
Rainbow Trout	Fresno	1942	27 per oz.	93	40,365	Kings River	6/27/42; total wt.=1495 oz.	CDFG. 1952c
Brown trout	Fresno	1941	21 per oz.	83	28,035	Kings River	6/25/41; total wt.= 1335 oz.	CDFG. 1952c
Brown trout	Fresno	1940	29 per oz.	54	25,056	Kings River	5/22/1940; total wt.= 864 oz.	CDFG. 1952c
Brown trout	Fresno	1937	47 per oz.		60,000	Kings River	06/22/1937	CDFG. 1952c

Table CAWG 7-Appendix C-29. Historical Fish Stocking Information for Florence Lake (Continued).

Species	County	Year	Size	Pounds	Number of Fish	Hatchery	Comment	Reference
Brown trout	Fresno	1936	46 per oz.		41,400	Huntington Lake	07/11/1936	CDFG. 1952c
Brown trout	Fresno	1936	46 per oz.		10,940	Huntington Lake	07/14/1936	CDFG. 1952c
Brown trout	Fresno	1935	26 per oz.		33,280	Huntington Lake	07/09/1935	CDFG. 1952c
Brown trout	Fresno	1934	17 per oz.		26,010	Huntington Lake	07/25/1934	CDFG. 1952c
Brown trout	Fresno	1934	see comment		16,734	Huntington Lake	17 per oz. for 9,894 & 22 per oz. for 6,840; 7/26/34	CDFG. 1952c
Brown trout	Fresno	1934	16 per oz.		28,060	Kings River	07/14/1934	CDFG. 1952c
Brown trout	Fresno	1934	see comment		19,205	Kings River	21 per oz. For 8,525 & 15 per oz. For 10,680; 7/18/34	CDFG. 1952c
Brown trout	Fresno	1933			50,000	Huntington Lake	08/24/1933	CDFG. 1952c
Brown trout	Fresno	1933			90,000	Huntington Lake	9/2-3/33	CDFG. 1952c
Rainbow Trout	Fresno	1933			20,000	Huntington Lake	08/25/1933	CDFG. 1952c
Rainbow Trout	Fresno	1932			30,000	Huntington Lake	08/14/1932	CDFG. 1952c
Steelhead trout	Fresno	1931			30,000	Kings River	07/05/1931	CDFG. 1952c

1 Fingerling
2 Catchable

Table CAWG 7-Appendix C-30. Historical Fish Population Information for Florence Lake.

Species	Date	Population Estimate	Biomass (kg)	Density				Number Collected	Fork Length (mm)	Comments	References
				kg/ha	lb/ac	Fish/km	Fish/Mile				
Brown Trout	6/6/74	Present						33	178-429	Caught in Florence Lake by 4 gillnets.	CDFG. 1975
Rainbow Trout	6/6/74	Present						2	282-310	Caught in Florence Lake by 4 gillnets.	CDFG. 1970b
Brown Trout	7/25/73	Present						9	203-279	Caught in Florence Lake by 2 gillnets; trout in good condition.	CDFG. 1973
Brown Trout	6/2/71	Present						14	241-330	Caught in Florence Lake by 3 gillnets; trout in poor condition.	CDFG. 1971
Rainbow Trout	6/2/71	Present						2	259-267	Caught in Florence Lake by 3 gillnets; trout in poor condition.	CDFG. 1971
Brown Trout	6/24/70	Present						4	292-333	Caught in Florence Lake by 1 gillnet.	CDFG. 1970b
Rainbow Trout	6/24/70	Present						2	175-234	Caught in Florence Lake by 1 gillnet.	CDFG. 1970b
Brown Trout	5/12/70	Present						12	286-400	Caught in Florence Lake by anglers; slightly thin in appearance.	CDFG. 1970b
Rainbow Trout	5/12/70	Present						10	232-260	Caught in Florence Lake by anglers; fish in good condition.	CDFG. 1970b

Table CAWG 7-Appendix C-30. Historical Fish Population Information for Florence Lake (Continued).

Species	Date	Population Estimate	Biomass (kg)	Density				Number Collected	Fork Length (mm)	Comments	References
				kg/ha	lb/ac	Fish/km	Fish/Mile				
Brook Trout	7/12/69	Present						2	140-175	Caught in Florence Lake; 3 sampling gillnets set overnight.	CDFG. 1969
Brown Trout	7/12/69	Present						9	180-328	Caught in Florence Lake; 3 sampling gillnets set overnight.	CDFG. 1967
Brook Trout	5/7/68	Present						1	188	Caught in Florence Lake by 3 gillnets.	CDFG. 1968b
Brown Trout	5/7/68	Present						21	165-610	Caught in Florence Lake by 3 gillnets; trout in fair to poor condition.	CDFG. 1986b
Brown Trout	7/20/67	Present						52	155-356	Caught in Florence Lake by 3 gillnets.	CDFG. 1967
Brown Trout	8/2/65	Present						20	292	Caught in Florence Lake by 3 gillnets; only average length given.	CDFG. 1965
Brook Trout	9/3/64	Present						1	170	Caught in Florence Lake by 3 gillnets.	CDFG. 1974
Brown Trout	9/3/64	Present						26	158-351	Caught in Florence Lake by 3 gillnets.	CDFG. 1964
Brook Trout	7/23/64	Present						1	183	Caught in Florence Lake by 3 gillnets.	CDFG. 1964
Brown Trout	7/23/64	Present						17	180-325	Caught in Florence Lake by 3 gillnets.	CDFG. 1964

Table CAWG 7-Appendix C-30. Historical Fish Population Information for Florence Lake (Continued).

Species	Date	Population Estimate	Biomass (kg)	Density				Number Collected	Fork Length (mm)	Comments	References
				kg/ha	lb/ac	Fish/km	Fish/Mile				
Brown Trout and Rainbow Trout	6/22/52	Present						75	305-381 of 25 fish	Caught in Florence Lake; 50:50 BWT: RT; 25 fish had lengths and weighed a lb. or more.	CDFG. 1952c
Brook Trout	9/17/37	Present								Rare in Florence Lake	CDFG. 1937a
Brown Trout	9/17/37	Present								Dominate fish in Florence Lake; fish look thin.	CDFG. 1937a
Rainbow Trout	9/17/37	Present								Rare in Florence Lake	CSFG. 1937a
Brown Trout	9/2/34	Present								BWT abundant in Florence Lake; many small 2 in. BWT seen near shore.	CDFG. 1937a
Brown Trout	7/26/34	Present								BWT have saturated Florence Lake - fish taken to 3 lbs.	CDFG. 1937a
Rainbow Trout	7/26/34	Present								Present in Florence Lake	CDFG. 1934d
Golden Shiner	as of 1987	Present								Present in Florence Lake	BSAI. 1987b

Table CAWG 7-Appendix C-31. Historical Fish Stocking Information for Bear Diversion Forebay.

Species	County	Year	Size	Pounds	Number of Fish	Hatchery	Comment	Reference
Rainbow Trout	Fresno	1948		28	4,050	Huntington Lake	8/9/1948 - Stocked in Bear Creek Reservoir (Bear Dam)	CDFG. 1948a

Table CAWG 7-Appendix C-32. Historical Fish Population Information for Bear Diversion Forebay.

Species	Date	Population Estimate	Biomass (kg)	Density				Number Collected	Average Fork Length (mm)	Comments	References
				kg/ha	lb/ac	Fish/km	Fish/Mile				
Brook Trout	1934	Present								Brook Trout "did real well" at the dam, no quantification given	CDFG. 1934c
Brown Trout	1934	Present								Brown Trout "did real well" at the dam, no quantification given for all spp. (RT, BT, GT)	CDFG. 1934c
Brown Trout	6/1/71	Present								"Excellent population…in lower reaches", in Bear Creek Diversion Dam Lake	SCE. 1971
Golden Trout	6/1/71	Present								Population of Golden Trout in upper reaches, in Bear Creek Diversion Dam Lake	SCE. 1971
Golden Trout/Rainbow Trout Hybrids	6/1/71	Present								"Present in good numbers…in middle area", in Bear Creek Diversion Dam Lake	SCE. 1971
Rainbow Trout	6/1/71	Present								"Present in good numbers…in middle area", in Bear Creek Diversion Dam Lake	SCE. 1971

Table CAWG 7-Appendix C-33. Historical Fish Stocking by CDFG (or SCE) in Mono Creek between Vermilion Dam and Mono Diversion Forebay (1950-2000).

Date	Species	Size	Number	Hatchery
1950	RT	F	19,980	Huntington Lake
1950	RT	F	19,320	Kings River
1952	RT	F	15,120	Kings River
1956	RT	C	4,176	San Joaquin
1957	RT	C	4,685	San Joaquin
1958	RT	C	4,052	San Joaquin
1959	RT	C	4,380	San Joaquin
1960	RT	C	8,000	San Joaquin
1961	RT	C	6,725	San Joaquin
1962	RT	C	8,850	San Joaquin
1962	RT	C	1,000	SCE
1963	RT	C	8,866	San Joaquin
1963	RT	C	1,200	SCE
1964	RT	C	5,880	San Joaquin
1965	RT	C	5,712	San Joaquin
1966	RT and BK	C	14,114	San Joaquin
1966	RT	S	1,500	SCE
1967	RT	C	4,953	San Joaquin
1968	RT	C	11,612	San Joaquin
1969	RT	C	5,558	San Joaquin
1969	RT	C	800	SCE
1970	RT	C	6,500	San Joaquin
1971	RT	C	6,410	San Joaquin
1972	RT	C	10,220	San Joaquin
1973	RT	C	9,890	San Joaquin
1974	RT	C	5,550	San Joaquin
1975	RT	C	4,045	San Joaquin
1976	RT	C	9,680	San Joaquin
1977	RT	C	3,910	San Joaquin
1978	RT	C	4,020	San Joaquin
1979	RT	C	3,985	San Joaquin
1980	RT	C	5,330	San Joaquin
1981	RT	C	5,045	San Joaquin
1982	RT	C	4,530	San Joaquin
1983	RT	C	4,690	San Joaquin
1984	RT	C	5,040	San Joaquin
1985	RT	C	4,900	San Joaquin

Table CAWG-7-Appendix C-33. Historical Fish Stocking by CDFG (or SCE) in Mono Creek between Vermilion Dam and Mono Diversion Forebay (1950-2000) (Continued).

Date	Species	Size	Number	Hatchery
1986	RT	C	3,171	San Joaquin
1987	RT	C	5,440	San Joaquin
1988	RT	C	6,260	San Joaquin
1989	RT	C	6,285	San Joaquin
1990	RT	C	5,445	San Joaquin
1991	RT	C	4,725	San Joaquin
1992	RT	C	4,880	San Joaquin
1993	RT	C	3,460	San Joaquin
1994	RT	C	3,380	San Joaquin
1995	RT	C	2,755	San Joaquin
1996	RT	C	3,200	San Joaquin
1997	RT	C	3,510	San Joaquin
1998	RT	C	1,540	San Joaquin
1999	RT	C	4,100	San Joaquin
2000	RT	C	3,455	San Joaquin

Legend:
Species Codes
RT: rainbow trout
RT-C: rainbow trout, Coleman strain
RT-H: rainbow trout, Hot Creek strain
RT-K: rainbow trout, Kootney strain
RT-KJ: rainbow trout, Kamloops Junction strain
RT-S: rainbow trout, Shasta strain
RT-W: rainbow trout, Mt. Whitney strain
RT-KJxCT-L: rainbow trout, Kamloops Junction strain x Lahontan cutthroat trout hybrid
RT-KJxRT-S: rainbow trout, Kamloops Junction strain x rainbow trout, Shasta strain hybrid
RT-SxRT-C: rainbow trout, Shasta strain x rainbow trout, Coleman strain hybrid
RT-VxRT-H: hybrid
RT-WxRT-KJ: rainbow trout, Mt. Whitney strain rainbow trout x Kamloops Junction strain hybrid
BN: brown trout
BK: brook trout
Size: B: Broodstock, F: Fingerling, S: Sub-catchable, C: Catchable

Table CAWG 7-Appendix C-34. Historical Fish Population Information for Mono Diversion Forebay.

Species	Date	Population Estimate	Biomass (kg)	Density				Number Collected	Fork Length (mm)	Comments	References
				kg/ha	lb/ac	Fish/km	Fish/Mile				
Brown Trout	as of 1971	Present								Commonly found in Mono Creek Diversion Dam Lake.	SCE. 1971
Rainbow Trout	as of 1971	Present								Commonly found in Mono Creek Diversion Dam Lake.	SCE. 1971

Table CAWG 7-Appendix C-35. Historical Fish Stocking Information for Mammoth Pool.

Species	County	Year	Size	Pounds	Number of Fish	Hatchery	Comment	Reference
Rainbow Trout	Madera	2002	C[1]		3,800	San Joaquin		CDFG. 2002
Eagle Lake Trout	Madera	2002	F[2]		20085	San Joaquin		CDFG. 2002
Rainbow Trout	Madera	2001	C[1]	2000	3,800	San Joaquin		CDFG. 2002
Rainbow Trout	Madera	2001	S[3]	2175	20,010	San Joaquin		CDFG. 2002
Rainbow Trout	Madera	2000	C[1]	5650	24,275	San Joaquin		CDFG. 2002
Rainbow Trout	Madera	1999	C[1]	2000	4200	San Joaquin		CDFG. 1999b & CDFG. 2002
Rainbow Trout	Madera	1999	S[3]	2600	20,166	San Joaquin		CDFG. 1999b & CDFG. 2002
Rainbow Trout	Madera	1998	C[1]	2000	3,800	San Joaquin		CDFG. 1999b & CDFG. 2002
Rainbow Trout	Madera	1998	S[3]	3000	20,100	San Joaquin		CDFG. 1999b & CDFG. 2002
Rainbow Trout	Madera	1997	C[1]	2000	3,600	San Joaquin		CDFG. 1999b & CDFG. 2002
Rainbow Trout-Coleman Strain	Madera	1997	S[3]	2120	20,146	San Joaquin		CDFG. 1999b & CDFG. 2002
Rainbow Trout	Madera	1996	C[1]		4,000	San Joaquin		CDFG. 1999b
Rainbow Trout, Whitney X Kamloops Strain	Madera	1996	F[2]	482	38,078	San Joaquin		CDFG. 1999b & CDFG. 2002
Rainbow Trout-Coleman Strain	Madera	1996	S[3]	3700	27,480	San Joaquin		CDFG. 1999b & CDFG. 2002
Rainbow Trout	Madera	1995	C[1]		3,400	San Joaquin		CDFG. 1999b

Table CAWG 7-Appendix C-35. Historical Fish Stocking Information for Mammoth Pool (Continued).

Species	County	Year	Size	Pounds	Number of Fish	Hatchery	Comment	Reference
Rainbow Trout	Madera	1995	S[3]		22,680	San Joaquin		CDFG. 1999b
Rainbow Trout	Madera	1994	C[1]		4,400	San Joaquin		CDFG. 1999b
Rainbow Trout	Madera	1994	F[2]		23,140	San Joaquin		CDFG. 1999b
Rainbow Trout	Madera	1994	S[3]		20,250	San Joaquin		CDFG. 1999b
Rainbow Trout	Madera	1993	C[1]		10,200	San Joaquin		CDFG. 1999b
Rainbow Trout	Madera	1993	S[3]		42,800	San Joaquin		CDFG. 1999b
Rainbow Trout	Madera	1992	C[1]		11,900	San Joaquin		CDFG. 1999b
Rainbow Trout	Madera	1991	C[1]		5,680	San Joaquin		CDFG. 1999b
Rainbow Trout	Madera	1990	C[1]		23,800	San Joaquin		CDFG. 1999b
Rainbow Trout	Madera	1990	S[3]		10,000	San Joaquin		CDFG. 1999b
Rainbow Trout	Madera	1989	C[1]		21,940	San Joaquin		CDFG. 1999b
Rainbow Trout	Madera	1988	C[1]		10,275	San Joaquin		CDFG. 1999b
Rainbow Trout	Madera	1988	S[3]		10,004	San Joaquin		CDFG. 1999b
Rainbow Trout	Madera	1987	C[1]		5,400	San Joaquin		CDFG. 1999b
Rainbow Trout	Madera	1987	C[1]		2,925	Moccasin		CDFG. 1999b
Rainbow Trout	Madera	1987	S[3]		10,000	San Joaquin		CDFG. 1999b
Rainbow Trout	Madera	1987	S[3]		10,000	Moccasin		CDFG. 1999b
Rainbow Trout	Madera	1986	C[1]		9,300	San Joaquin		CDFG. 1999b
Rainbow Trout	Madera	1985	C[1]		12,600	San Joaquin		CDFG. 1999b

Table CAWG 7-Appendix C-35. Historical Fish Stocking Information for Mammoth Pool (Continued).

Species	County	Year	Size	Pounds	Number of Fish	Hatchery	Comment	Reference
Rainbow Trout	Madera	1984	C[1]		13,480	San Joaquin		CDFG. 1999b
Rainbow Trout	Madera	1983	C[1]		13,060	San Joaquin		CDFG. 1999b
Brook Trout	Madera	1983	F[2]		30,778	San Joaquin		CDFG. 1999b
Rainbow Trout	Madera	1983	F[2]		9,500	San Joaquin		CDFG. 1999b
Rainbow Trout	Madera	1982	C[1]		12,800	San Joaquin		CDFG. 1999b
Rainbow Trout	Madera	1981	C[1]		12,000	San Joaquin		CDFG. 1999b
Rainbow Trout	Madera	1980	C[1]		12,031	San Joaquin		CDFG. 1999b
Brook Trout	Madera	1980	F[2]		108,724	San Joaquin		CDFG. 1999b
Brook Trout	Madera	1979	C[1]		33,900	San Joaquin		CDFG. 1999b
Brook Trout	Madera	1979	F[2]		55,575	San Joaquin		CDFG. 1999b
Brook Trout	Madera	1977	C[1]		27,200	San Joaquin		CDFG. 1999b
Coho Salmon	Madera	1977	F[2]		50,250	San Joaquin		CDFG. 1999b
Brook Trout	Madera	1977	S[3]		42,000	Moccasin		CDFG. 1999b
Eagle Lake Trout	Madera	1976	C[1]		37000	Moccasin		CDFG. 1999b
Rainbow Trout	Madera	1976	C[1]		47575	San Joaquin		CDFG. 1999b
Rainbow Trout	Madera	1976	F[2]		146952	San Joaquin		CDFG. 1999b
Rainbow Trout	Madera	1975	C[1]		52910	San Joaquin		CDFG. 1999b
Rainbow Trout	Madera	1974	C[1]		33030	San Joaquin		CDFG. 1999b
Coho Salmon	Madera	1974	F[2]		35000	Moccasin		CDFG. 1999b

Table CAWG 7-Appendix C-35. Historical Fish Stocking Information for Mammoth Pool (Continued).

Species	County	Year	Size	Pounds	Number of Fish	Hatchery	Comment	Reference
Rainbow Trout	Madera	1974	F[2]		100000	San Joaquin		CDFG. 1999b
Rainbow Trout	Madera	1973	C[1]		39455	San Joaquin		CDFG. 1999b
Rainbow Trout	Madera	1972	C[1]		51456	San Joaquin		CDFG. 1999b
Coho Salmon	Madera	1972	F[2]		40250	Moccasin		CDFG. 1999b
Rainbow Trout	Madera	1971	C[1]		42254	San Joaquin		CDFG. 1999b
Rainbow Trout	Madera	1970	C[1]		35622	San Joaquin		CDFG. 1999b
Rainbow Trout	Madera	1970	F[2]		39000	San Joaquin		CDFG. 1999b
Rainbow Trout	Madera	1969	C[1]		50640	San Joaquin		CDFG. 1999b
Rainbow Trout	Madera	1969	F[2]		140560	San Joaquin		CDFG. 1999b
Rainbow Trout	Madera	1969	S[3]		2525	San Joaquin		CDFG. 1999b
Rainbow Trout-Shasta Strain	Madera	1968	F[2]		79992	San Joaquin		CDFG. 1999b
Rainbow Trout Hot Creek x Virginia Strain	Madera	1968			769	San Joaquin		CDFG. 1999b
Rainbow Trout-Shasta Strain	Madera	1965	C[1]		19956	San Joaquin		CDFG. 1999b
Rainbow Trout-Kamloops Strain	Madera	1965	F[2]		12482	Moccasin		CDFG. 1999b
Rainbow Trout-Whitney Strain	Madera	1965	F[2]		9980	San Joaquin		CDFG. 1999b
Rainbow Trout	Madera	1963	F[2]		23727	Moccasin		CDFG. 1999b
Rainbow Trout	Madera	1963	F[2]		24483	San Joaquin		CDFG. 1999b

Table CAWG 7-Appendix C-35. Historical Fish Stocking Information for Mammoth Pool (Continued).

Species	County	Year	Size	Pounds	Number of Fish	Hatchery	Comment	Reference
Rainbow Trout	Madera	1962	F[2]		50000	San Joaquin		CDFG. 1999b
Rainbow Trout	Madera	1961	F[2]		93600	San Joaquin		CDFG. 1999b
Rainbow Trout	Madera	1960	F[2]		562500	San Joaquin		CDFG. 1999b

1 Fingerling
2 Catchable
3 Subcatchable
4 Brood Stock

Table CAWG 7-Appendix C-36. Historical Fish Population Information for Mammoth Pool Reservoir.

Species	Date	Population Estimate	Biomass (kg)	Density				Number Collected	Fork Length (mm)	Comments	References
				kg/ha	lb/ac	Fish/km	Fish/Mile				
Brown Trout	1998	present								p. 2-147	SCE. 2000b
Rainbow Trout	1998	present								p. 2-147	SCE. 2000b
Brook trout	1998	present								p. 2-147	SCE. 2000b
Golden Shiner	1998	present								p. 2-147	SCE. 2000b
Sacramento sucker	1998	probably present								p. 2-147	SCE. 2000b
Rainbow Trout	1972-1977	present						615		p. 2-29, 92% of fish caught in several creel censuses	BASI. 1987b
Brown Trout	1972-1977	present						29		p. 2-29, 4% of fish caught in several creel censuses	BASI. 1987b
Brook Trout	1972-1977	present						2		p. 2-29, >1% of fish caught in several creel censuses	BASI. 1987b
Silver salmon (coho)	1972-1977	present						22		p. 2-29, 3% of fish caught in several creel censuses	BASI. 1987b
Brown Trout	1968-1969	present								p. 2-29, 62% of fish caught in gill nets	BASI. 1987b

Table CAWG 7-Appendix C-36. Historical Fish Population Information for Mammoth Pool Reservoir (Continued).

Species	Date	Population Estimate	Biomass (kg)	Density				Number Collected	Fork Length (mm)	Comments	References
				kg/ha	lb/ac	Fish/km	Fish/Mile				
Rainbow Trout	1968-1969	present								p. 2-29, 24% of fish caught in gill nets	BASI. 1987b
Brook Trout	1968-1969	Present								p. 2-29, 8% of fish caught in gill nets	BASI. 1987b
Golden Shiner	1968-1969	Present								p. 2-29, 6% of fish caught in gill nets	BASI. 1987b
Rainbow Trout	4/68	Present						692		p. 2-29, 80% of fish caught in creel census	BASI. 1987b
Brown Trout	4/68	Present						121		p. 2-29, 14% of fish caught in creel census	BASI. 1987b
Brook Trout	4/68	Present						51		p. 2-29, 6% of fish caught in creel census	BASI. 1987b
Rainbow Trout	08/24/1946	Present						5	177.8-279.4	Catch of CK Fisher Jr. in Mammoth Pool	CDFG. 1946a
Rainbow Trout	09/01/1946	Present						15	177.8-292.1	Catch of one man on SJR from SFSJR confl to 0.5 mi upstream	CDFG. 1946b
Rainbow Trout	8/45	Present	2.7					2	508-635	Caught on SJR below the Mammoth Pool	Fresno Bee. 1945

Table CAWG 7-Appendix C-36. Historical Fish Population Information for Mammoth Pool Reservoir (Continued).

Species	Date	Population Estimate	Biomass (kg)	Density				Number Collected	Fork Length (mm)	Comments	References
				kg/ha	lb/ac	Fish/km	Fish/Mile				
Brown Trout	5/45	Present	1.8					1		Mr. Harris caught in Mammoth Pool	Fresno Bee. 1945
Rainbow Trout	08/21/1943	Present						15	127-304.8	Catch of one man at China Bar	CDFG. 1943
Brown Trout	08/21/1943	Present						7	152.4-304.8	Catch of one man at China Bar	CDFG. 1943

Table CAWG 7-Appendix C-37. Historical Fish Stocking Information for San Joaquin River Dam 6 Forebay.

Species	County	Year	Size	Pounds	Number of Fish	Hatchery	Comment	Reference
Rainbow Trout	Fresno	1979			1,700	SCE		BSAI. 1987b
Rainbow Trout	Fresno	post-1979					"Additional fish (rainbows) have been planted in subsequent years but records are not available."	BSAI. 1987b

Table CAWG 7-Appendix C-38. Historical Fish Population Information for San Joaquin River Dam 6 Forebay.

Species	Date	Population Estimate	Biomass (kg)	Density				Number Collected	Fork Length (mm)	Comments	References
				kg/ha	lb/ac	Fish/km	Fish/Mile				
Rainbow Trout	1987	Present									BASI. 1987b
Brown Trout	1987	Present									BASI. 1987b
Sacramento Sucker	1987	Present								spawn in the San Joaquin River above the lake	BASI. 1987b
Brook Trout	1987	Possibly present									BASI. 1987b

Table CAWG 7-Appendix C-39. Historical Fish Stocking Information for Huntington Lake.

Species	County	Year	Size	Pounds	Number of Fish	Hatchery	Comment	Reference
Kokanee Salmon	Fresno	2002	F[1]		10,428	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	2002	C[2]		34,600	San Joaquin		CDFG. 2002
Kokanee Salmon	Fresno	2001	F[1]	77	10,087	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	2001	C[2]	19,400	37,080	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	2000	C[2]	14,850	26,470	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1999	C[2]	16,000	27,800	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1999	F	1031	92,034	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1999	C[2]	720	450	Big Creek		CDFG. 2002
Rainbow Trout	Fresno	1998	C[2]		25,200	San Joaquin		CDFG. 2002
Brook Trout	Fresno	1997	F[1]		37,140	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1997	C[2]		26,850	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1997	F[1]		59,343	San Joaquin		CDFG. 2002
Kokanee Salmon	Fresno	1996	F[1]		49,761	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1996	C[2]		38,830	San Joaquin		CDFG. 2002
KOK-BL	Fresno	1995	F[1]		38,115	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1995	C[2]		39,300	San Joaquin		CDFG. 2002
KOK-BL	Fresno	1994	F[1]		7,600	San Joaquin		CDFG. 2002
KOK-RJC	Fresno	1994	F[1]		36,302	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1994	C[2]		39,940	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1994	F[1]		73,140	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1993	C[2]		40,700	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1993	B[3]		462	San Joaquin		CDFG. 2002
Brook Trout	Fresno	1992	C[2]		23,400	San Joaquin		CDFG. 2002

Table CAWG 7-Appendix C-39. Historical Fish Stocking Information for Huntington Lake (Continued).

Species	County	Year	Size	Pounds	Number of Fish	Hatchery	Comment	Reference
Kokanee Salmon	Fresno	1992	F[1]		33,635	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1992	C[2]		30950	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1992	B[3]		20	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1992	C[2]		30,950	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1992	F[1]		211,246	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1991	C[2]		50350	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1991	F[1]		18795	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1991	B		950	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1991	C[2]		50,350	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1991	F[1]		18,795	San Joaquin		CDFG. 2002
Brook Trout	Fresno	1990	S[4]		4840	San Joaquin		CDFG. 2002
Brook Trout	Fresno	1990	S[4]		480	San Joaquin		CDFG. 2002
Kokanee Salmon	Fresno	1990	F[1]		60,000	Silverado FB		CDFG. 2002
Rainbow Trout	Fresno	1990	C[2]		94460	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1990	F[1]		107164	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1990	C[2]		94,460	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1990	F[1]		104,164	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1990	6-8 in	741	2,594	SCE	near dam 1-10/11	SCE. 1990
Rainbow Trout	Fresno	1990	6-8 in	647	2,960	SCE	near the Marina-10/11	SCE. 1990
Rainbow Trout	Fresno	1990	6-8 in	354	1,416	SCE	near the Marina-10/12	SCE. 1990
Brook Trout	Fresno	1989	B[3]		1,050	San Joaquin		CDFG. 2002
Kokanee Salmon	Fresno	1989	F[1]		72,450	Silverado FB		CDFG .2002
Rainbow Trout	Fresno	1989	F[1]		111,600	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1989	C[2]		100,400	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1989	F[1]		111,600	San Joaquin		CDFG. 2002

Table CAWG 7-Appendix C-39. Historical Fish Stocking Information for Huntington Lake (Continued).

Species	County	Year	Size	Pounds	Number of Fish	Hatchery	Comment	Reference
Rainbow Trout, Whitney Strain	Fresno	1989	C[2]		100,400	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1988	C[2]		76,180	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1988	C[2]		76,180	San Joaquin		CDFG. 2002
Rainbow Trout, Whitney Strain	Fresno	1988	F[1]		284,760	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1987	F[1]		244,160	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1987	B[3]		1,363	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1987	C[2]		66,300	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1987	C[2]		8,100	SCE		CDFG. 2002
Rainbow Trout	Fresno	1987	F[1]		244,160	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1987	B[3]		1,363	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1987	C[2]		66,300	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1987	C[2]		8,100	SCE		CDFG. 2002
Kokanee Salmon	Fresno	1986	F[1]		162,000	Silverado FB		CDFG. 2002
Rainbow Trout	Fresno	1986	C[2]		77,935	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1986	F[1]		123,200	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1986	C[2]		77,935	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1986	F[1]		123,200	San Joaquin		CDFG. 2002
Brook Trout	Fresno	1985	C[2]		15,930	San Joaquin		CDFG. 2002
Kokanee Salmon	Fresno	1985	F[1]		149,000	Silverado FB		CDFG. 2002
Rainbow Trout	Fresno	1985	C[2]		42,460	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1985	F[1]		40,192	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1985	C[2]		4,000	SCE		CDFG. 2002

Table CAWG 7-Appendix C-39. Historical Fish Stocking Information for Huntington Lake (Continued).

Species	County	Year	Size	Pounds	Number of Fish	Hatchery	Comment	Reference
Rainbow Trout	Fresno	1985	C[2]		42,460	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1985	F[1]		40,192	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1985	C[2]		4,000	SCE		CDFG. 2002
Brown Trout	Fresno	1984	S[4]		500	San Joaquin		CDFG. 2002
Kokanee Salmon	Fresno	1984	F[1]		1,536,000	SFB		CDFG. 2002
Rainbow Trout	Fresno	1984	B[3]		300	SCE		CDFG. 2002
Rainbow Trout	Fresno	1984	C[2]		74,200	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1984	C[2]		74,200	San Joaquin		CDFG. 2002
Kokanee Salmon	Fresno	1983	F[1]		150,720	SFB		CDFG. 2002
Rainbow Trout	Fresno	1983	C[2]		90,250	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1983	F[1]		50,400	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1983	F[1]		20,400	San Joaquin		CDFG. 2002
Brook Trout	Fresno	1982	F[1]		960	San Joaquin		CDFG. 2002
Kokanee Salmon	Fresno	1982	F[1]		100,035	SFB		CDFG. 2002
Rainbow Trout	Fresno	1982	C[2]		62,450	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1982	F[1]		2,100	San Joaquin		CDFG. 2002
Brook Trout	Fresno	1981	F[1]		50,007	San Joaquin		CDFG. 2002
Kokanee Salmon	Fresno	1981	F[1]		72,000	Moccasin		CDFG. 2002
Rainbow Trout	Fresno	1981	C[2]		84,150	San Joaquin		CDFG. 2002
Kokanee Salmon	Fresno	1980	F[1]		100,705	Moccasin		CDFG. 2002
Rainbow Trout	Fresno	1980	C[2]		85,170	San Joaquin		CDFG. 2002
Brook Trout	Fresno	1979	C[2]		6,800	San Joaquin		CDFG. 2002

Table CAWG 7-Appendix C-39. Historical Fish Stocking Information for Huntington Lake (Continued).

Species	County	Year	Size	Pounds	Number of Fish	Hatchery	Comment	Reference
Kokanee Salmon	Fresno	1979	F[1]		50,400	Moccasin		CDFG. 2002
Rainbow Trout	Fresno	1979	C[2]		83,785	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1978	C[2]		82,200	San Joaquin		CDFG. 2002
Brook Trout	Fresno	1977	C[2]		69,050	San Joaquin		CDFG. 2002
Brook Trout	Fresno	1977	F[1]		19,730	San Joaquin		CDFG. 2002
Kokanee Salmon	Fresno	1977	F[1]		76,800	Moccasin		CDFG. 2002
Rainbow Trout	Fresno	1977	C[2]		64,100	San Joaquin		CDFG. 2002
Brook Trout	Fresno	1976	C[2]		89,780	San Joaquin		CDFG. 2002
Brook Trout	Fresno	1976	F[1]		101,500	San Joaquin		CDFG. 2002
Kokanee Salmon	Fresno	1976	F[1]		60,000	Moccasin		CDFG. 2002
Brook Trout	Fresno	1975	C[2]		103,500	San Joaquin		CDFG. 2002
Kokanee Salmon	Fresno	1975	F[1]		97,280	Moccasin		CDFG. 2002
Kokanee Salmon	Fresno	1974	F[1]		67,200	Moccasin		CDFG. 2002
Rainbow Trout	Fresno	1974	C[2]		98,740	San Joaquin		CDFG. 2002
Brook Trout	Fresno	1973	C[2]		83,368	San Joaquin		CDFG. 2002
Brook Trout	Fresno	1972	C[2]		119,400	San Joaquin		CDFG. 2002
Brook Trout	Fresno	1972	F[1]		21,706	San Joaquin		CDFG. 2002
Kokanee Salmon	Fresno	1972	F[1]		120,000	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1971	C[2]		87,832	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1971	S[4]		11,475	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1970	C[2]		69,768	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1969	C[2]		66,199	San Joaquin		CDFG. 2002

Table CAWG 7-Appendix C-39. Historical Fish Stocking Information for Huntington Lake (Continued).

Species	County	Year	Size	Pounds	Number of Fish	Hatchery	Comment	Reference
Rainbow Trout	Fresno	1969	S[4]		7,200	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1969	C[2]	ad clip	7,210	SCE		CDFG. 2002
Rainbow Trout	Fresno	1968	C[2]		110,037	San Joaquin		CDFG. 2002
Rainbow Trout, Shasta Strain	Fresno	1968	S		20,019	San Joaquin		CDFG. 2002
Kokanee Salmon	Fresno	1967	F[1]		308,000	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1967	S[4]		19,892	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1967	C[2]		68,021	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1966	S[4]		19,992	San Joaquin		CDFG. 2002
Rainbow and Brook Trout	Fresno	1966	C[2]		127,154	San Joaquin		CDFG. 2002
Kokanee Salmon	Fresno	1965	F[1]		83,200	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1965	C[2]		45,845	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1965	S[4]		20,704	San Joaquin		CDFG. 2002
Kokanee Salmon	Fresno	1964	F[1]		77,000	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1964	C[2]		72,066	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1964	S[4]		10,069	San Joaquin		CDFG. 2002
Kokanee Salmon	Fresno	1963	F[1]		75,020	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1963	C[2]		66,726	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1963	S[4]		15,810	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1963	C[2]		1,500	SCE		CDFG. 2002
Kokanee Salmon	Fresno	1962	F[1]		75,000	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1962	S[4]		15,008	San Joaquin		CDFG. 2002

Table CAWG 7-Appendix C-39. Historical Fish Stocking Information for Huntington Lake (Continued).

Species	County	Year	Size	Pounds	Number of Fish	Hatchery	Comment	Reference
Rainbow Trout	Fresno	1962	C[2]		64,912	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1962	F[1]		32,000	San Joaquin		CDFG. 2002
Kokanee Salmon	Fresno	1961	F[1]		75,000	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1961	C[2]		79,605	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1961	S[4]		16,525	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1960	C[2]		70,760	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1960	S[4]		14,930	Sequoia		CDFG. 2002
Kokanee Salmon	Fresno	1959	F[1]		109,550	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1959	C[2]		65,100	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1959	S[4]		15,004	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1958	C[2]		69,890	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1958	S[4]		15,912	Sequoia		CDFG. 2002
Rainbow Trout	Fresno	1957	C[2]		82,205	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1957	S[4]		12,800	Sequoia		CDFG. 2002
Rainbow Trout	Fresno	1956	C[2]		61,606	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1956	S[4]		29,655	Sequoia/ San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1955	C[2]		34,544	Sequoia/ San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1954	C[2]		1,250	Buckeye Pond		CDFG. 2002
Rainbow Trout	Fresno	1954	C[2] (F[1])		32,234	Sequoia		CDFG. 2002
Rainbow Trout, Shasta Strain	Fresno	1954	C[2](S[1])		24,544	Sequoia		CDFG. 2002
Rainbow Trout	Fresno	1953	C[2]		3,850	Buckeye Pond		CDFG. 2002
RT-F	Fresno	1953	C[2]		31,882	Sequoia		CDFG. 2002

Table CAWG 7-Appendix C-39. Historical Fish Stocking Information for Huntington Lake (Continued).

Species	County	Year	Size	Pounds	Number of Fish	Hatchery	Comment	Reference
Rainbow Trout, Shasta Strain	Fresno	1953	C[2]		20,410	Sequoia		CDFG. 2002
Rainbow Trout	Fresno	1952	C[2]		19,820	Sequoia		CDFG. 2002
Rainbow Trout	Fresno	1952	F[1]	19798	40,001	Sequoia	9/22-9/26 - 1/4 mile E. Home Creek N. side of Lake	Fresno County. 1940-1969
Rainbow Trout	Fresno	1952	C[2]	3100	19,820	Sequoia	6/4-8/8 - Near Home Camp abut 1/2 mi. NE	Fresno County. 1940-1969
Rainbow Trout, Whitney Strain	Fresno	1952	F[1]		40,004	Sequoia		CDFG. 2002
Brook Trout	Fresno	1951	F[1]		19,890	Kings River		CDFG. 2002
Brook Trout	Fresno	1951	F[1]		9,240	Madera		CDFG. 2002
Brook Trout	Fresno	1951	26 /oz.	48	19,890	Kings River	7/2-7/3 - 1/4 mi. below HL Guard Sta.	Fresno County. 1940-1953
Brook Trout	Fresno	1951	15 /oz	48	9,240	Madera	8/31 -North Shore	Fresno County. 1940-1954
Rainbow Trout	Fresno	1951	C[2]		52,187	Sequoia		CDFG. 2002
Rainbow Trout	Fresno	1951	8.5 /lb	6280	52,187	Sequoia	5/19-9/27 - Will O'The Wisp Lakeshore Resort	Fresno County. 1940-1969
Brook Trout	Fresno	1950	F[1]		23,625	Kaweah		CDFG. 2002
Brook Trout	Fresno	1950	15 /oz	98.5	23,625	Kaweah	08-Jul	Fresno County. 1940-1952
Rainbow Trout	Fresno	1950	C[2]		20,990	Sequoia		CDFG. 2002
Rainbow Trout	Fresno	1950	F[1]		31,728	Sequoia		CDFG. 2002
Rainbow Trout	Fresno	1950	5-8.3 /lb	3350	20,990	Sequoia	5/19-8/3 - 9 plants	Fresno County. 1940-1969
Rainbow Trout	Fresno	1950	2 /oz	1020	31,728	Sequoia	9/10-9/12 - 4 plants	Fresno County. 1940-1969
Rainbow Trout	Fresno	1949	6-7.8 /lb	187.5	20,380	Sequoia	5/24-7/20 -9 plants	Fresno County. 1940-1968
Rainbow Trout	Fresno	1949	1.8/oz	1900	54,720	Sequoia	9/25-9/27- 8 plants	Fresno County. 1940-1969

Table CAWG 7-Appendix C-39. Historical Fish Stocking Information for Huntington Lake (Continued).

Species	County	Year	Size	Pounds	Number of Fish	Hatchery	Comment	Reference
Rainbow Trout	Fresno	1948	1.4-1.8 /oz	1300	33,060	Sequoia	10/1-10/7 - 10 plants	Fresno County. 1940-1967
Rainbow Trout	Fresno	1947	1.5-2.0/oz	1470	40,400	Sequoia	9/16-10/16 - 6 plants	Fresno County. 1940-1966
Rainbow Trout	Fresno	1946	1-1.5 /oz	885	19,720	Sequoia	5/22-5/26 - 6 plants	Fresno County. 1940-1964
Rainbow Trout	Fresno	1946	2.4-3.5/oz	862.5	37,100	Sequoia	9/17-9/20 - 4 plants	Fresno County. 1940-1965
Rainbow Trout	Fresno	1945	1.1-1.3/oz	2405	39,606	Sequoia	5/9-5/22 -22 plants	Fresno County. 1940-1963
Rainbow Trout	Fresno	1944	1.4-2/oz	1327.5	40,000	Sequoia	6/12-6/19 -14 plants	Fresno County. 1940-1962
Rainbow Trout	Fresno	1943	0.06-1/oz	2636	31,989	Sequoia	4/19-5/7- 37 plants	Fresno County. 1940-1960
Rainbow Trout	Fresno	1943	13.5/oz	38	8,235	Kings River	14-Jul	Fresno County. 1940-1961
Rainbow Trout	Fresno	1942	30-40/oz	241	151,200	Kings River	5/28-6/15 - 8 plants	Fresno County. 1940-1957
Rainbow Trout	Fresno	1942	14/oz	111.25	24,920	Huntington Lake	17-Aug	Fresno County. 1940-1958
Rainbow Trout	Fresno	1942	3.7/oz	130	7,696	Sequoia	02-Oct	Fresno County. 1940-1959
Rainbow Trout	Fresno	1941	33-39/oz	203	111,195	Kings River	5/23-6/12 -5 plants	Fresno County. 1940-1955
Rainbow Trout	Fresno	1941	1.05-1.5/oz	772.5	15,492	Sequoia	10/21-11/6 - 8 plants	Fresno County. 1940-1956
Rainbow Trout	Fresno	1940	22-34/oz	20	111,735	Kings River	6/7-7/1/1940-10 plants	Fresno County. 1940-1952
Rainbow Trout	Fresno	1940	10.5/oz	211	35,385	Huntington Lake	8/19 -1 plant	Fresno County. 1940-1953
Rainbow Trout	Fresno	1940	2.25/oz	170	6,110	Sequoia	11/29-1 plant	Fresno County. 1940-1954

1 Fingerling
2 Catchable
3 Brood Stock
4 Subcatchable

Table CAWG 7-Appendix C-40. Historical Fish Population Information for Huntington Lake.

Species	Date	Population Estimate	Biomass (kg)	Density				Number Collected	Fork Length (mm)	Comments	References
				kg/ha	lb/ac	Fish/km	Fish/Mile				
Brown Trout	7/3/81	Present						3	310-396	Gill net sampling.	CDFG. 1957-1982
Kokanee	7/3/81	Present						1	173	Gill net sampling.	CDFG. 1957-1982
Rainbow Trout	7/3/81	Present						22	163-300	Gill net sampling.	CDFG. 1957-1982
Sacramento Sucker	7/3/81	Present						20	168-351	Gill net sampling.	CDFG. 1957-1982
Brown Trout	11/21/80	Present						7	325-340	Gill net sampling.	CDFG. 1957-1982
Kokanee	11/21/80	Present						11	198-300	Gill net sampling.	CDFG. 1957-1982
Rainbow Trout	11/21/80	Present						8	178-274	Gill net sampling.	CDFG. 1957-1982
Sacramento Sucker	11/21/80	Present						58	168-366	Gill net sampling.	CDFG. 1957-1982
Brown Trout	10/24/80	Present						3	269-660	Gill net sampling.	CDFG. 1957-1982
Rainbow Trout	10/24/80	Present						4	173-259	Gill net sampling.	CDFG .1957-1982
Sacramento Sucker	10/24/80	Present						64	168-483	Gill net sampling.	CDFG .1957-1982
Brown Trout	8/7/80	Present						1	234	Gill net sampling.	CDFG. 1957-1982
Rainbow Trout	8/7/80	Present						2	239-285	Gill net sampling.	CDFG .1957-1982
Sacramento Sucker	8/7/80	Present						29	158-340	Gill net sampling.	CDFG. 1957-1982
Brown Trout	11/30-12/1/78	Present						8	200-410	Gill net sampling.	CDFG. 1964-1978
Kokanee	11/30-12/1/78	Present						22	190-390	Gill net sampling.	CDFG. 1964-1978

Table CAWG 7-Appendix C-40. Historical Fish Population Information for Huntington Lake (Continued).

Species	Date	Population Estimate	Biomass (kg)	Density				Number Collected	Fork Length (mm)	Comments	References
				kg/ha	lb/ac	Fish/km	Fish/Mile				
Sacramento Sucker	11/30-12/1/78	Present						33	220-420	Gill net sampling.	CDFG. 1964-1978
Brown Trout	08/78	Present						1		Caught by anglers (creel census).	CDFG. 1957-1978
Kokanee	08/78	Present						11		Caught by anglers (creel census).	CDFG. 1957-1978
Rainbow Trout	08/78	Present						198		Caught by anglers (creel census).	CDFG. 1957-1978
Brook Trout	6/24/78	Present						1		Caught by anglers (creel census).	CDFG. 1957-1978
Brown Trout	6/24/78	Present						1		Caught by anglers (creel census).	CDFG. 1957-1978
Kokanee	6/24/78	Present						12		Caught by anglers (creel census).	CDFG. 1957-1978
Rainbow Trout	6/24/78	Present						23		Caught by anglers (creel census).	CDFG. 1957-1978
Brook Trout	7/18/74	Present						1	310	Gill net sampling.	CDFG. 1957-1982
Brown Trout	7/18/74	Present						8	290-368	Gill net sampling.	CDFG. 1957-1982
Rainbow Trout	7/18/74	Present						17	150-234	Gill net sampling.	CDFG. 1957-1982
Sacramento Sucker	7/18/74	Present						108	152-470	Gill net sampling.	CDFG. 1957-1982
Brown Trout	7/17/74	Present						3	292-376	Gill net sampling.	CDFG. 1957-1982
Rainbow Trout	7/17/74	Present						5	163-252	Gill net sampling.	CDFG. 1957-1982
Brown Trout	7/16/74	Present						8	290-391	Gill net sampling.	CDFG. 1957-1982
Rainbow Trout	7/16/74	Present						1	224	Gill net sampling.	CDFG. 1957-1982

Table CAWG 7-Appendix C-40. Historical Fish Population Information for Huntington Lake (Continued).

Species	Date	Population Estimate	Biomass (kg)	Density				Number Collected	Fork Length (mm)	Comments	References
				kg/ha	lb/ac	Fish/km	Fish/Mile				
Sacramento Sucker	7/16/74	Present						21	137-310	Gill net sampling.	CDFG. 1957-1982
Brook Trout	8/25/73	Present						78		Creel census.	CDFG. 1957-1978
Brook Trout	8/25-26/73	Present						33	273*****	Gill net sampling. *****Mean Length.	CDFG. 1969 & 1974
Brown Trout	8/25-26/73	Present						1	343*****	Gill net sampling. *****Mean Length.	CDFG. 1969 & 1974
Sacramento Sucker	8/25-26/73	Present						18	340*****	Gill net sampling. *****Mean Length.	CDFG. 1969 & 1974
Brook Trout	8/24-25/73	Present						10	238*****	Gill net sampling. *****Mean Length.	CDFG. 1969 & 1974
Brown Trout	8/24-25/73	Present						3	393*****	Gill net sampling. *****Mean Length.	CDFG. 1969 & 1974
Sacramento Sucker	8/24-25/73	Present						7	300*****	Gill net sampling. *****Mean Length.	CDFG. 1969 & 1974
Brook Trout	8/23-24/73	Present						7	278*****	Gill net sampling. *****Mean Length.	CDFG. 1969 & 1974
Sacramento Sucker	8/23-24/73	Present						3	328*****	Gill net sampling. *****Mean Length.	CDFG. 1969 & 1974
Brook Trout	8/22-23/73	Present						9	263*****	Gill net sampling. *****Mean Length.	CDFG. 1969 & 1974
Brown Trout	8/22-23/73	Present						2	603*****	Gill net sampling. *****Mean Length.	CDFG .1969 & 1974
Kokanee	8/22-23/73	Present						1	313*****	Gill net sampling. *****Mean Length.	CDFG. 1969 & 1974
Sacramento Sucker	8/22-23/73	Present						10	300*****	Gill net sampling. *****Mean Length.	CDFG. 1969 & 1974
Brook Trout	8/21-22/73	Present						11	238*****	Gill net sampling. *****Mean Length.	CDFG. 1969 & 1974
Brown Trout	8/21-22/73	Present						3	270*****	Gill net sampling. *****Mean Length.	CDFG. 1969 & 1974

Table CAWG 7-Appendix C-40. Historical Fish Population Information for Huntington Lake (Continued).

Species	Date	Population Estimate	Biomass (kg)	Density				Number Collected	Fork Length (mm)	Comments	References
				kg/ha	lb/ac	Fish/km	Fish/Mile				
Sacramento Sucker	8/21-22/73	Present						3	295*****	Gill net sampling. *****Mean Length.	CDFG. 1969 & 1974
Brook Trout	8/20-21/73	Present						22	283*****	Gill net sampling. *****Mean Length.	CDFG. 1969 & 1974
Brown Trout	8/20-21/73	Present						4	395*****	Gill net sampling. *****Mean Length.	CDFG. 1969 & 1974
Sacramento Sucker	8/20-21/73	Present						13	283*****	Gill net sampling. *****Mean Length.	CDFG. 1969 & 1974
Brook Trout	8/19-20/73	Present						8	240*****	Gill net sampling. *****Mean Length.	CDFG. 1969 & 1974
Brown Trout	8/19-20/73	Present						1	275	Gill net sampling.	CDFG. 1969 & 1974
Sacramento Sucker	8/19-20/73	Present						5	250*****	Gill net sampling. *****Mean Length.	CDFG. 1969 & 1974
Kokanee	8/25/73	Present						1		Creel census.	CDFG. 1969 & 1974
Brook Trout	8/24/73	Present						3	278*****	Gill net sampling. *****Mean Length.	CDFG. 1969 & 1974
Brook Trout	8/24/73	Present						3		Creel census, in Rancheria Cove.	CDFG. 1969 & 1974
Kokanee	8/24/73	Present						1		Creel census, in Rancheria Cove.	CDFG. 1969 & 1974
Sacramento Sucker	8/24/73	Present						5	335*****	Gill net sampling. *****Mean Length.	CDFG. 1969 & 1974
Sacramento Sucker	8/24/73	Present						1		Creel census, in Rancheria Cove.	CDFG. 1969 & 1974
Brook Trout	8/23/73	Present						3	295*****	Gill net sampling. *****Mean Length.	CDFG. 1969 & 1974
Brook Trout	8/23/73	Present						6		Creel census, near main dam.	CDFG. 1969 & 1974
Brown Trout	8/23/73	Present						1	475*****	Gill net sampling. *****Mean Length.	CDFG. 1969 & 1974

Table CAWG 7-Appendix C-40. Historical Fish Population Information for Huntington Lake (Continued).

Species	Date	Population Estimate	Biomass (kg)	Density				Number Collected	Fork Length (mm)	Comments	References
				kg/ha	lb/ac	Fish/km	Fish/Mile				
Sacramento Sucker	8/23/73	Present						1	225*****	Gill net sampling. *****Mean Length.	CDFG. 1969 & 1974
Brook Trout	7/11/73	Present						38	145-300	Gill net sampling.	CDFG. 1964-1978
Brown Trout	7/11/73	Present						3	563-800	Gill net sampling.	CDFG. 1964-1978
Sacramento Sucker	7/11/73	Present						15	163-350	Gill net sampling.	CDFG. 1964-1978
Brook Trout	7/7/73	Present						234		Caught by anglers (creel census).	CDFG. 1957-1978
Rainbow Trout	7/7/73	Present						5		Caught by anglers (creel census).	CDFG. 1957-1978
Rainbow Trout	04/72	Present						5		Caught by anglers (creel census).	CDFG. 1957-1978
Brook Trout	5/24-25/72	Present						5	495-559	Gill net sampling.	CDFG. 1957-1982
Brown Trout	5/24-25/72	Present						3	457-699	Gill net sampling.	CDFG. 1957-1982
Kokanee	5/24-25/72	Present						1	546	Gill net sampling.	CDFG. 1957-1982
Rainbow Trout	5/24-25/72	Present						1	533	Gill net sampling.	CDFG. 1957-1982
Sacramento Sucker	5/24-25/72	Present						34	432-1143	Gill net sampling.	CDFG. 1957-1982
Brown Trout	9/14-15/70	Present						4	173-381	Gill net sampling.	CDFG. 1957-1982
Kokanee	9/14-15/70	Present						4	208-338	Gill net sampling.	CDFG. 1957-1982
Sacramento Sucker	9/14-15/70	Present						60	175-465	Gill net sampling.	CDFG. 1957-1982
Brown Trout	9/23-24/69	Present						1	394	Gill net sampling.	CDFG. 1957-1982
Kokanee	9/23-24/69	Present						2	279-292	Gill net sampling.	CDFG. 1957-1982

Table CAWG 7-Appendix C-40. Historical Fish Population Information for Huntington Lake (Continued).

Species	Date	Population Estimate	Biomass (kg)	Density				Number Collected	Fork Length (mm)	Comments	References
				kg/ha	lb/ac	Fish/km	Fish/Mile				
Rainbow Trout	9/23-24/69	Present						13	130-508	Gill net sampling.	CDFG. 1957-1982
Sacramento Sucker	9/23-24/69	Present						56	180-401	Gill net sampling.	CDFG. 1957-1982
Brown Trout	6/18-19/69	Present						2	259-305	Gill net sampling.	CDFG. 1957-1982
Rainbow Trout	6/18-19/69	Present						2	191-216	Gill net sampling.	CDFG. 1957-1982
Sacramento Sucker	6/18-19/69	Present						58	216-361	Gill net sampling.	CDFG. 1957-1982
Rainbow Trout	7/16/69	Present						2	102-150	Electrofishing.	CDFG. 1969 & 1974
Sacramento Sucker	7/16/69	Present						7	79-302	Electrofishing.	CDFG. 1969 & 1974
Brook Trout	06/68	Present						(658)****		Caught by anglers (creel census).****Combined total caught from 6/20/68-6/30/68	CDFG. 1957-1978
Brown Trout	06/68	Present						(73)****		Caught by anglers (creel census).****Combined total caught from 6/20/68-6/30/68	CDFG. 1957-1978
Kokanee	06/68	Present						(180)****		Caught by anglers (creel census).****Combined total caught from 6/20/68-6/30/68	CDFG. 1957-1978
Rainbow Trout	06/68	Present						(7194)****		Caught by anglers (creel census).****Combined total caught from 6/20/68-6/30/68	CDFG. 1957-1978

Table CAWG 7-Appendix C-40. Historical Fish Population Information for Huntington Lake (Continued).

Species	Date	Population Estimate	Biomass (kg)	Density				Number Collected	Fork Length (mm)	Comments	References
				kg/ha	lb/ac	Fish/km	Fish/Mile				
Brown Trout	10/65	Present						1		Caught by anglers (creel census).	CDFG. 1957-1978
Kokanee	10/65	Present						1		Caught by anglers (creel census).	CDFG. 1957-1978
Rainbow Trout	10/65	Present						120		Caught by anglers (creel census).	CDFG. 1957-1978
Rainbow Trout	09/65	Present						378		Caught by anglers (creel census).	CDFG. 1957-1978
Brown Trout	08/65	Present						4		Caught by anglers (creel census).	CDFG. 1957-1978
Rainbow Trout	08/65	Present						45		Caught by anglers (creel census).	CDFG. 1957-1978
Brown Trout	12/64	Present						8	358***	Gill net sampling. ***Mean length.	CDFG. 1957-1982
Kokanee	12/64	Present						46	279***	Gill net sampling. ***Mean length.	CDFG. 1957-1982
Rainbow Trout	12/64	Present						64	254***	Gill net sampling. ***Mean length.	CDFG. 1957-1982
Sacramento Sucker	12/64	Present						61	508***	Gill net sampling. ***Mean length (approximate).	CDFG. 1957-1982
Brook Trout	10/64	Present						1		Gill net sampling.	CDFG. 1957-1982
Brown Trout	10/64	Present						18		Gill net sampling.	CDFG. 1957-1982
Kokanee	10/64	Present						1		Gill net sampling.	CDFG. 1957-1982
Rainbow Trout	10/64	Present						45		Gill net sampling.	CDFG. 1957-1982
Sacramento Sucker	10/64	Present						179		Gill net sampling.	CDFG. 1957-1982
Brown Trout	7/15-16/64	Present						6	229-556	Gill net sampling.	CDFG. 1964-1978

Table CAWG 7-Appendix C-40. Historical Fish Population Information for Huntington Lake (Continued).

Species	Date	Population Estimate	Biomass (kg)	Density				Number Collected	Fork Length (mm)	Comments	References
				kg/ha	lb/ac	Fish/km	Fish/Mile				
Rainbow Trout	7/15-16/64	Present						7	147-307	Gill net sampling.	CDFG. 1964-1978
Sacramento Sucker	7/15-16/64	Present						115	147-333	Gill net sampling.	CDFG. 1964-1978
Rainbow Trout	9/3/64	Present						6		Caught by anglers (creel census).	CDFG. 1957-1978
Brown Trout	09/64	Present						6**		Gill net sampling. **Approximate number caught.	CDFG. 1957-1982
Kokanee	09/64	Present						Large number		Gill net sampling. No quantification provided.	CDFG. 1957-1982
Sacramento Sucker	09/64	Present						168**		Gill net sampling. **Approximate number caught.	CDFG. 1957-1982
Brown Trout	10/17-18/57	Present						14	(292-762)*	Gill net sampling. *Lengths given from both Sept. and Oct. samples.	CDFG. 1957-1982
Rainbow Trout	10/17-18/57	Present						3	(178-279)*	Gill net sampling. *Lengths given from both Sept. and Oct. samples.	CDFG. 1957-1982
Sacramento Sucker	10/17-18/57	Present						37	(152-178)*	Gill net sampling. *Lengths given from both Sept. and Oct. samples.	CDFG. 1957-1982
Rainbow Trout	7/27/57	Present						57		Caught by anglers (creel census).	CDFG. 1957-1978
Brown Trout	6/9/57	Present						5		Caught by anglers (creel census).	CDFG. 1957-1978

Table CAWG 7-Appendix C-40. Historical Fish Population Information for Huntington Lake (Continued).

Species	Date	Population Estimate	Biomass (kg)	Density				Number Collected	Fork Length (mm)	Comments	References
				kg/ha	lb/ac	Fish/km	Fish/Mile				
Rainbow Trout	6/9/57	Present						392		Caught by anglers (creel census).	CDFG. 1957-1978
Sacramento Sucker	6/9/57	Present						3		Caught by anglers (creel census).	CDFG. 1957-1978
Brown Trout	5/29/57	Present						2	152-203	Caught by anglers (creel census).	CDFG. 1957-1978
Rainbow Trout	5/29/57	Present						126		Caught by anglers (creel census).	CDFG. 1957-1978
Brown Trout	4/28/57	Present						5	229-292	Caught by anglers (creel census).	CDFG. 1957-1978
Rainbow Trout	4/28/57	Present						70	51-292	Caught by anglers (creel census).	CDFG. 1957-1978
Brown Trout	5/23/49	Present						1	787	Largest BWT caught - 13 lbs, 31".	Fresno Bee. 1949
Rainbow Trout	6/30/43	Present							178	Reported by anglers - large numbers RT taken.	Dill. 1943b
Brown Trout	9/11/37	Present						1	406		CDFG. 1937b
Rainbow Trout	9/11/37	Present						4	140-406		CDFG. 1937b
Brook Trout	8/28-29/34	Present								Lake survey; recommend stocking RT; seen in Deer Cr.	CDFG. 1934e
Brown Trout	8/28-29/34	Abundant								Lake survey; recommend stocking RT.	CDFG. 1934e
Kokanee	8/28-29/34	Present								Lake survey; recommend stocking RT.	CDFG. 1934e

Table CAWG 7-Appendix C-40. Historical Fish Population Information for Huntington Lake (Continued).

Species	Date	Population Estimate	Biomass (kg)	Density				Number Collected	Fork Length (mm)	Comments	References
				kg/ha	lb/ac	Fish/km	Fish/Mile				
Rainbow Trout	8/28-29/34	Abundant								Lake survey; recommend stocking RT.	CDFG. 1934e
Sacramento Sucker	8/28-29/34	Present								Lake survey; recommend stocking RT.	CDFG. 1934e
Brook Trout	7/3/34	Present								Lake survey; recommend stocking BWT & RT.	CDFG. 1934e
Brown Trout	7/3/34	Present								Lake survey; recommend stocking BWT & RT.	CDFG. 1934e
Rainbow Trout	7/3/34	Present								Lake survey; recommend stocking BWT & RT.	CDFG. 1934e

Table CAWG 7-Appendix C-41. Historical Fish Population Information for Big Creek Dam 4 Forebay.

Species	Date	Population Estimate	Biomass (kg)	Density				Number Collected	Average Fork Length (mm)	Comments	References
				kg/ha	lb/ac	Fish/km	Fish/Mile				
Rainbow Trout	1987	Present						see comments		p. 2-41: "large rainbow trout have been known to escape from [the SCE hatchery] and enter the adjacent [Dam 4] forebay."	BSAI. 1987b
Brown Trout	1987	Likely present								p. 2-41: Likely present, but have not been captured.	BSAI. 1987b
Brook Trout	1987	Likely present								p. 2-41: Likely present, but have not been captured.	BSAI. 1987b

Table CAWG 7-Appendix C-42. Historical Fish Stocking Information for Big Creek Dam 5 Forebay.

Species	County	Year	Size	Pounds	Number of Fish	Hatchery	Comment	Reference
Rainbow Trout	Fresno	1979			1,600	SCE	p. 2-41	BSAI. 1987b

Table CAWG 7-Appendix C-43. Historical Fish Population Information for Big Creek Dam 5 Forebay.

Species	Date	Population Estimate	Biomass (kg)	Density				Number Collected	Fork Length (mm)	Comments	References
				kg/ha	lb/ac	Fish/km	Fish/Mile				
Brown Trout	1987	Likely present								p. 2-41: Likely present, but have not been captured.	BSAI. 1987b
Brook Trout	1987	Likely present								p. 2-41: Likely present, but have not been captured.	BSAI. 1987b

Table CAWG 7-Appendix C-44. Historical Fish Stocking Information for Balsam Meadow Forebay.

Species	County	Year	Size (Length [mm])	Pounds	Number. of Fish	Hatchery	Comment	Reference
Rainbow Trout	Fresno	1999	C	170		SCE	Balsam Forebay	CDFG. 2002

C = Catchables

Table CAWG 7-Appendix C-45. Historical Fish Population Information for Balsam Meadow Forebay.

Species	Date	Population Estimate	Biomass (kg)	Density				Number Collected	Average Fork Length (mm)	Comments	References
				kg/ha	lb/ac	Fish/km	Fish/Mile				
Brook Trout	6/11/92	Present						1	280	Entrainment results.	ENTRIX. 1992b
Prickly Sculpin	6/11/92	Present						20	15	Entrainment results.	ENTRIX. 1992b
Brook Trout	6/10/92	Present						2		Entrainment results.	ENTRIX. 1992b
Green Sunfish	6/10/92	Present						1	50	Entrainment results.	ENTRIX. 1992b
Prickly Sculpin	6/10/92	Present						1	20	Entrainment results.	ENTRIX. 1992b
Brook Trout	6/9/92	Present						2	240	Entrainment results.	ENTRIX. 1992b
Brown Bullhead	6/9/92	Present						1	62	Entrainment results.	ENTRIX. 1992b
Brown Trout	6/9/92	Present						2		Entrainment results.	ENTRIX. 1992b
Carp	6/9/92	Present						1		Entrainment results.	ENTRIX. 1992b
Golden Shiner	6/9/92	Present						1	35	Entrainment results.	ENTRIX. 1992b
Green Sunfish	6/9/92	Present						2	46	Entrainment results.	ENTRIX. 1992b
Prickly Sculpin	6/9/92	Present						1	41	Entrainment results. Juvenile lifestage.	ENTRIX. 1992b
Prickly Sculpin	6/9/92	Present						1	19	Entrainment results. Larval lifestage.	ENTRIX. 1992b
Rainbow Trout	6/9/92	Present						3		Entrainment results.	ENTRIX. 1992b
Kokanee	12/20/91	Present						1		Entrainment results.	ENTRIX. 1991e
Kokanee	12/19/91	Present						1		Entrainment results.	ENTRIX. 1991e

Table CAWG 7-Appendix C-45. Historical Fish Population Information for Balsam Meadow Forebay (Continued).

Species	Date	Population Estimate	Biomass (kg)	Density				Number Collected	Average Fork Length (mm)	Comments	References
				kg/ha	lb/ac	Fish/km	Fish/Mile				
Kokanee	12/18/91	Present						1		Entrainment results.	ENTRIX. 1991e
Black Crappie	10/28/91	Present						3	85	Entrainment results.	ENTRIX. 1991d
Brown Trout	10/28/91	Present						1		Entrainment results.	ENTRIX. 1991d
Golden Shiner	10/28/91	Present						1	68	Entrainment results.	ENTRIX. 1991d
Green Sunfish	10/28/91	Present						32	34	Entrainment results.	ENTRIX. 1991d
Kokanee	10/28/91	Present						4		Entrainment results.	ENTRIX. 1991d
Prickly Sculpin	10/28/91	Present						1	91	Entrainment results.	ENTRIX. 1991d
Rainbow Trout	10/28/91	Present						1	280	Entrainment results.	ENTRIX. 1991d
Black Crappie	10/27/91	Present						3	85	Entrainment results.	ENTRIX. 1991d
Green Sunfish	10/27/91	Present						10	30	Entrainment results.	ENTRIX. 1991d
Kokanee	10/27/91	Present						4		Entrainment results.	ENTRIX. 1991d
Prickly Sculpin	10/27/91	Present						2	90	Entrainment results.	ENTRIX. 1991d
Black Crappie	10/26/91	Present						1	74	Entrainment results.	ENTRIX. 1991d
Green Sunfish	10/26/91	Present						5	32	Entrainment results.	ENTRIX. 1991d
Kokanee	10/26/91	Present						6		Entrainment results.	ENTRIX. 1991d
Rainbow Trout	10/26/91	Present						2	252	Entrainment results.	ENTRIX. 1991d
Carp	9/20/91	Present						3		Entrainment results.	ENTRIX. 1991c
Green Sunfish	9/20/91	Present						1	22	Entrainment results.	ENTRIX. 1991c

Table CAWG 7-Appendix C-45. Historical Fish Population Information for Balsam Meadow Forebay (Continued).

Species	Date	Population Estimate	Biomass (kg)	Density				Number Collected	Average Fork Length (mm)	Comments	References
				kg/ha	lb/ac	Fish/km	Fish/Mile				
Kokanee	9/20/91	Present						1		Entrainment results.	ENTRIX. 1991c
Rainbow Trout	9/20/91	Present						1	220	Entrainment results.	ENTRIX. 1991c
Green Sunfish	9/19/91	Present						14	22	Entrainment results.	ENTRIX. 1991c
Rainbow Trout	9/19/91	Present						1		Entrainment results.	ENTRIX. 1991c
Carp	9/17/91	Present						1		Entrainment results.	ENTRIX. 1991c
Green Sunfish	9/17/91	Present						11	26	Entrainment results.	ENTRIX. 1991c
Kokanee	9/17/91	Present						3		Entrainment results.	ENTRIX. 1991c
Carp	8/16/91	Present						2	50	Entrainment results.	ENTRIX. 1991b
Green Sunfish	8/16/91	Present						2	19	Entrainment results.	ENTRIX. 1991b
Prickly Sculpin	8/16/91	Present						1	67	Entrainment results. Juvenile lifestage.	ENTRIX. 1991b
Prickly Sculpin	8/16/91	Present						2	17	Entrainment results. Post-larval lifestage.	ENTRIX. 1991b
Rainbow Trout	8/16/91	Present						4	222	Entrainment results.	ENTRIX. 1991b
Smallmouth Bass	8/16/91	Present						18	47	Entrainment results.	ENTRIX. 1991b
Carp	8/14/91	Present						6	51	Entrainment results.	ENTRIX. 1991b
Green Sunfish	8/14/91	Present						21	13	Entrainment results.	ENTRIX. 1991b
Prickly Sculpin	8/14/91	Present						33	15	Entrainment results.	ENTRIX. 1991b
Smallmouth Bass	8/14/91	Present						27	43	Entrainment results.	ENTRIX. 1991b

Table CAWG 7-Appendix C-45. Historical Fish Population Information for Balsam Meadow Forebay (Continued).

Species	Date	Population Estimate	Biomass (kg)	Density				Number Collected	Average Fork Length (mm)	Comments	References
				kg/ha	lb/ac	Fish/km	Fish/Mile				
Carp	8/13/91	Present						4	47	Entrainment results.	ENTRI.X 1991b
Green Sunfish	8/13/91	Present						8	18	Entrainment results.	ENTRIX. 1991b
Prickly Sculpin	8/13/91	Present						2	80	Entrainment results. Adult lifestage.	ENTRIX. 1991b
Prickly Sculpin	8/13/91	Present						33	19	Entrainment results. Post-larval lifestage.	ENTRIX. 1991b
Smallmouth Bass	8/13/91	Present						22	39	Entrainment results.	ENTRIX. 1991b
Carp	8/2/91	Present						2	47	Entrainment results.	ENTRIX. 1991a
Green Sunfish	8/2/91	Present						2	59	Entrainment results.	ENTRIX. 1991a
Prickly Sculpin	8/2/91	Present						68	17	Entrainment results.	ENTRIX. 1991a
Smallmouth Bass	8/2/91	Present						60	33	Entrainment results.	ENTRIX. 1991a
Brown Bullhead	8/1/91	Present						1	140	Entrainment results.	ENTRIX. 1991a
Carp	8/1/91	Present						1	55	Entrainment results.	ENTRIX. 1991a
Catfish spp.	8/1/91	Present						1	33	Entrainment results.	ENTRIX. 1991a
Prickly Sculpin	8/1/91	Present					184	1	83	Entrainment results. Adult lifestage.	ENTRIX. 1991a
Prickly Sculpin	8/1/91	Present						2	48	Entrainment results. Juvenile lifestage.	ENTRIX. 1991a

Table CAWG 7-Appendix C-45. Historical Fish Population Information for Balsam Meadow Forebay (Continued).

Species	Date	Population Estimate	Biomass (kg)	Density				Number Collected	Average Fork Length (mm)	Comments	References
				kg/ha	lb/ac	Fish/km	Fish/Mile				
Prickly Sculpin	8/1/91	Present						16	17	Entrainment results. Post-larval lifestage.	ENTRIX. 1991a
Rainbow Trout	8/1/91	Present						3	68	Entrainment results. Juvenile lifestage.	ENTRIX. 1991a
Rainbow Trout	8/1/91	Present						3	133	Entrainment results. Adult lifestage.	ENTRIX. 1991a
Smallmouth Bass	8/1/91	Present						60	33	Entrainment results.	ENTRIX. 1991a
Green Sunfish	7/31/91	Present					110	1	63	Entrainment results.	ENTRIX. 1991a
Rainbow Trout	7/31/91	Present					21	3		Entrainment results.	ENTRIX. 1991a
Smallmouth Bass	7/31/91	Present					195	8	37	Entrainment results.	ENTRIX. 1991a
-	Sep-82									"no fish were collected in Balsam Creek near the forebay site."	FERC. 1982b
-	1982									"Fish plantings are not recommended for Balsam Meadow forebay "	FERC. 1982a

Table CAWG 7-Appendix C-46. Historical Fish Stocking Information for Shaver Lake.

Species	County	Year	Size	Pounds	Number of Fish	Hatchery	Comment	Reference
Rainbow Trout	Fresno	2002	C[2]	34632	34,632	San Joaquin		CDFG. 1999a
Kokanee Salmon	Fresno	2002	F[3]	50132	50,132	San Joaquin		CDFG. 1999a
Rainbow Trout	Fresno	2001	C[2]	20450	38,978	San Joaquin		CDFG. 1999a
Kokanee Salmon	Fresno	2001	F[3]	397	50,022	San Joaquin		CDFG. 1999a
Rainbow Trout	Fresno	2000	C[2]	18050	33,470	San Joaquin		CDFG. 1999a
Kokanee Salmon	Fresno	2000	F[3]	255	49,980	San Joaquin		CDFG. 1999a
Rainbow Trout	Fresno	1999	C[2]		36,280	San Joaquin		CDFG. 1999a
Rainbow Trout	Fresno	1999	C[2]	770	453	Big Creek		CDFG. 1999a
Kokanee Salmon	Fresno	1999	F[3]		50,067	San Joaquin		CDFG. 1999a
Rainbow Trout	Fresno	1999	F[3]		130,410	San Joaquin		CDFG. 1999a
Rainbow Trout	Fresno	1998	C[2]		33,100	San Joaquin		CDFG. 1999a
Kokanee Salmon	Fresno	1998	F[3]		50,464	San Joaquin		CDFG. 1999a
Rainbow Trout	Fresno	1997	C[2]		31,900	San Joaquin		CDFG. 1999a
Kokanee Salmon	Fresno	1997	F[3]		52,052	San Joaquin		CDFG. 1999a
Rainbow Trout	Fresno	1996	C[2]		40,840	San Joaquin		CDFG. 1999a
Brook Trout	Fresno	1996	F[3]		40,128	San Joaquin		CDFG. 1999a
Kokanee Salmon	Fresno	1996	F[3]		49,720	San Joaquin		CDFG. 1999a
Kokanee Salmon-Taylor Strain	Fresno	1995	F[3]		49,920	San Joaquin		CDFG. 1999a
Rainbow Trout	Fresno	1995	F[3]		42,900	San Joaquin		CDFG. 1999a

Table CAWG 7-Appendix C-46. Historical Fish Stocking Information for Shaver Lake (Continued).

Species	County	Year	Size	Pounds	Number of Fish	Hatchery	Comment	Reference
Rainbow Trout	Fresno	1995	F[3]		85,385	San Joaquin		CDFG. 1999a
Rainbow Trout	Fresno	1994	C[2]		42,800	San Joaquin		CDFG. 1999a
Kokanee Salmon	Fresno	1994	F[3]		51,240	San Joaquin		CDFG. 1999a
Rainbow Trout	Fresno	1994	F[3]		226,050	San Joaquin		CDFG. 1999a
Rainbow Trout	Fresno	1993	B[1]		650	San Joaquin		CDFG. 1999a
Rainbow Trout	Fresno	1993	C[2]		49,100	San Joaquin		CDFG. 1999a
Rainbow Trout	Fresno	1992	B[1]		82	San Joaquin		CDFG. 1999a
Brook Trout	Fresno	1992	C[2]		21,300	San Joaquin		CDFG. 1999a
Rainbow Trout	Fresno	1992	C[2]		33,450	San Joaquin		CDFG. 1999a
Kokanee Salmon	Fresno	1992	F[3]		49,910	San Joaquin		CDFG. 1999a
Rainbow Trout	Fresno	1992	F[3]		35,280	San Joaquin		CDFG. 1999a
Rainbow Trout	Fresno	1991	C[2]		56,090	San Joaquin		CDFG. 1999a
Rainbow Trout	Fresno	1990	B[1]		1,200	San Joaquin		CDFG. 1999a
Rainbow Trout	Fresno	1990	C[2]		96,600	San Joaquin		CDFG. 1999a
Kokanee Salmon	Fresno	1990	F[3]		60,000			CDFG. 1999a
Rainbow Trout	Fresno	1990	F[3]		110,840	San Joaquin		CDFG. 1999a
Brook Trout	Fresno	1990	S[4]		10,000	San Joaquin		CDFG. 1999a
Rainbow Trout	Fresno	1989	C[2]		92,450	San Joaquin		CDFG. 1999a
Kokanee Salmon	Fresno	1989	F[3]		44,550	Silverado FB		CDFG. 1999a
Rainbow Trout	Fresno	1989	F[3]		151,660	San Joaquin		CDFG. 1999a
Rainbow Trout	Fresno	1988	C[2]		72,700	San Joaquin		CDFG. 1999a
Rainbow Trout	Fresno	1987	B[1]		1,344	San Joaquin		CDFG. 1999a

Table CAWG 7-Appendix C-46. Historical Fish Stocking Information for Shaver Lake (Continued).

Species	County	Year	Size	Pounds	Number of Fish	Hatchery	Comment	Reference
Rainbow Trout	Fresno	1987	C[2]		29,580	San Joaquin		CDFG. 1999a
Rainbow Trout	Fresno	1986	C[2]		66,218	San Joaquin		CDFG. 1999a
Brook Trout	Fresno	1970	S[4]		16,000			CDFG. 1999a
Brook Trout	Fresno	1975	B[1]		933	San Joaquin		CDFG. 1999a
Brook Trout	Fresno	1975	C[2]		85,298	San Joaquin		CDFG. 1999a
Brook Trout	Fresno	1975	F[3]		69,120	Moccasin		CDFG. 1999a
Brook Trout	Fresno	1976	B[1]		1,376	San Joaquin		CDFG. 1999a & CDFG. 2002
Brook Trout	Fresno	1976	C[2]		74,200	San Joaquin		CDFG. 1999a
Brook Trout	Fresno	1976	F[3]		99,160	San Joaquin		CDFG. 1999a
Brook Trout	Fresno	1977	B[1]		2,243	San Joaquin		CDFG. 2002
Brook Trout	Fresno	1977	C[2]		78,185	San Joaquin		BSAI. 1987c
Brook Trout	Fresno	1979	C[2]		47,680	San Joaquin		CDFG. 1999a
Brook Trout	Fresno	1980	F[3]		65,123	San Joaquin		CDFG. 1999a
Brook Trout	Fresno	1981	F[3]		50,007	San Joaquin		CDFG. 1999a
Brook Trout	Fresno	1981	S[4]		11,400	San Joaquin		CDFG. 1999a
Brook Trout	Fresno	1983	F[3]		50,400	San Joaquin		CDFG. 1999a
Brook Trout	Fresno	1985	C[2]		18,200	San Joaquin		CDFG. 1999a
Brown Trout	Fresno	1908-1911						CDFG. 1999a
Brown Trout	Fresno	1975	F[3]		69,120			CDFG. 1999a
Brown Trout	Fresno	1983	C[2]		50,400			CDFG. 1999a
Eagle Lake Trout	Fresno	1985	F[3]		27,500	San Joaquin		CDFG. 1999a
Kokanee Salmon	Fresno	1982	F[3]		52,000	San Joaquin		CDFG. 1999a

Table CAWG 7-Appendix C-46. Historical Fish Stocking Information for Shaver Lake (Continued).

Species	County	Year	Size	Pounds	Number of Fish	Hatchery	Comment	Reference
Kokanee Salmon	Fresno	1985	F[3]		53,280	Silverado FB		CDFG. 1999a
Kokanee Salmon	Fresno	1986	F[3]		54,000	Silverado FB		CDFG. 1999a
Largemouth bass	Fresno	1912						ESA. 1985
Rainbow and Brook Trout	Fresno	1966	C[2]		108,016	San Joaquin		CDFG. 1999a
Rainbow and Brook Trout	Fresno	1971	C[2]		103,244	San Joaquin		CDFG. 1999a
Rainbow and Brook Trout	Fresno	1971	S[4]		38,675	San Joaquin & Kern River		CDFG. 1999a
Rainbow and Brook Trout	Fresno	1972	C[2]		105,170	San Joaquin & Kern River		CDFG. 1999a
Rainbow Trout	Fresno	1950	C[2]		18509	Sequoia		ESA. 1985
Rainbow Trout	Fresno	1951	C[2]		16,470	Sequoia		CDFG. 1999a
Rainbow Trout	Fresno	1952	C[2]		19,000	Sequoia		CDFG. 1999a
Rainbow Trout	Fresno	1953	C[2]		4,200	Buckeye		CDFG. 1999a
Rainbow Trout	Fresno	1953	C[2](F)[3]		31,681	Sequoia		CDFG. 1999a
Rainbow Trout	Fresno	1953	C[2](S)[4]		24,530	Sequoia		CDFG. 1999a
Rainbow Trout	Fresno	1954	C[2]		5,240	Buckeye		CDFG. 1999a
Rainbow Trout	Fresno	1954	C[2]		12,415	Moorehouse		CDFG. 1999a
Rainbow Trout	Fresno	1954	C[2]		16,230	Sequoia		CDFG. 1999a
Rainbow Trout	Fresno	1954	C[2]		64,010	Sequoia		CDFG. 1999a
Rainbow Trout	Fresno	1955	C[2]		70,440	B-Seq-San Joaquin		CDFG. 1999a
Rainbow Trout	Fresno	1956	C[2]		72,300	San Joaquin		CDFG. 1999a
Rainbow Trout	Fresno	1956	C[2]		4,200	Sequoia		CDFG. 1999a

Table CAWG 7-Appendix C-46. Historical Fish Stocking Information for Shaver Lake (Continued).

Species	County	Year	Size	Pounds	Number of Fish	Hatchery	Comment	Reference
Rainbow Trout	Fresno	1956	S[4]		35,160	Sequoia & San Joaquin		CDFG. 1999a
Rainbow Trout	Fresno	1957	C[2]		86,600	Sequoia		CDFG. 1999a
Rainbow Trout	Fresno	1957	S[4]		26,100	Sequoia		CDFG. 1999a
Rainbow Trout	Fresno	1958	C[2]		75,080	San Joaquin		CDFG. 1999a
Rainbow Trout	Fresno	1958	S[4]		27,542	Sequoia		CDFG. 1999a
Rainbow Trout	Fresno	1959	C[2]		59,505	San Joaquin		CDFG. 1999a
Rainbow Trout	Fresno	1959	S[4]		25,130	Sequoia		CDFG. 1999a
Rainbow Trout	Fresno	1960	C[2]		59,500	San Joaquin		CDFG. 1999a
Rainbow Trout	Fresno	1960	S[4]		27,184	Sequoia		CDFG. 1999a
Rainbow Trout	Fresno	1961	C[2]		33,750	San Joaquin		CDFG. 1999a
Rainbow Trout	Fresno	1961	S[4]		25,004	Moccasin		CDFG. 1999a
Rainbow Trout	Fresno	1962	C[2]		76,990	San Joaquin		BSAI. 1987c
Rainbow Trout	Fresno	1962	S[4]		25,008	San Joaquin		CDFG. 1999a
Rainbow Trout	Fresno	1963	C[2]		74,093	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1963	S[4]		24,950	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1964	C[2]		49,964	San Joaquin		CDFG. 1999a
Rainbow Trout	Fresno	1964	C[2]		2,000	Big Creek		CDFG. 1999a
Rainbow Trout	Fresno	1964	F[3]		22,600	Big Creek		CDFG. 1999a
Rainbow Trout	Fresno	1964	S[4]		19,987	San Joaquin		CDFG. 1999a
Rainbow Trout	Fresno	1964	S[4]		20,000	Big Creek		CDFG. 2002
Rainbow Trout	Fresno	1965	C[2]		55,620	San Joaquin		CDFG. 1999a
Rainbow Trout	Fresno	1965	F[3] & S[4]		62,500	Big Creek		CDFG. 1999a
Rainbow Trout	Fresno	1965	S[4]		30,036	San Joaquin		CDFG. 1999a
Rainbow Trout	Fresno	1966	S[4]		29,990	San Joaquin		CDFG. 1999a
Rainbow Trout	Fresno	1966	S[4]	Lv clip	8,888	Big Creek		CDFG. 1999a

Table CAWG 7-Appendix C-46. Historical Fish Stocking Information for Shaver Lake (Continued).

Species	County	Year	Size	Pounds	Number of Fish	Hatchery	Comment	Reference
Rainbow Trout	Fresno	1967	C[2]		91,316	San Joaquin		CDFG. 1999a
Rainbow Trout	Fresno	1967	S[4]		16,620	San Joaquin		CDFG. 1999a
Rainbow Trout	Fresno	1967	S[4]		25,198	Big Creek		CDFG. 1999a
Rainbow Trout	Fresno	1968	C[2]		71,873	San Joaquin		CDFG. 1999a
Rainbow Trout	Fresno	1968	S[4]		30,112	San Joaquin		CDFG. 1999a
Rainbow Trout	Fresno	1969	C[2]		77,866	San Joaquin		CDFG. 1999a
Rainbow Trout	Fresno	1969	C[2]		10,000	Big Creek		CDFG. 1999a
Rainbow Trout	Fresno	1970	C[2]		68,072	San Joaquin		CDFG. 1999a
Rainbow Trout	Fresno	1973	C[2]		76,640	San Joaquin		CDFG. 1999a
Rainbow Trout	Fresno	1974	C[2]		78,440	San Joaquin		CDFG. 1999a
Rainbow Trout	Fresno	1978	C[2]		69,200	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1979	1/lb		300	Big Creek		CDFG. 1999a
Rainbow Trout	Fresno	1979	4/lb		5,200	Big Creek		CDFG. 1999a
Rainbow Trout	Fresno	1979	C[2]		31,950	San Joaquin		CDFG. 2002
Rainbow Trout	Fresno	1980	C[2]		92,600	San Joaquin		CDFG. 1999a
Rainbow Trout	Fresno	1981	C[2]		72,400	San Joaquin		CDFG. 1999a
Rainbow Trout	Fresno	1982	C[2]		62,200	San Joaquin		CDFG. 1999a
Rainbow Trout	Fresno	1983	C[2]		82,550	San Joaquin		CDFG. 1999a
Rainbow Trout	Fresno	1984	B[1]	2-3 lb ea	200	Big Creek		CDFG. 1999a
Rainbow Trout	Fresno	1984	C[2]		2,000	Big Creek		CDFG. 1999a
Rainbow Trout	Fresno	1984	C[2]	2/lb	600	Big Creek		CDFG. 1999a
Rainbow Trout	Fresno	1984	C[2]	1/lb	700	Big Creek		CDFG. 1999a
Rainbow Trout	Fresno	1984	C[2]		69,920	San Joaquin		CDFG. 1999a
Rainbow Trout	Fresno	1984	S[4]		10,000	Big Creek		CDFG. 1999a
Rainbow Trout	Fresno	1984	S[4]	16/lb	585	Big Creek		CDFG. 1999a

Table CAWG 7-Appendix C-46. Historical Fish Stocking Information for Shaver Lake (Continued).

Species	County	Year	Size	Pounds	Number of Fish	Hatchery	Comment	Reference
Rainbow Trout	Fresno	1985	C[2]		31,937	San Joaquin		CDFG. 1999a
Rainbow Trout	Fresno	1985	C[2]		24,000	Big Creek		CDFG. 1999a
Rainbow Trout	Fresno	1985	F[3]		40,192	San Joaquin		CDFG. 1999a
Rainbow Trout	Fresno	1986	F[3]		145,375	San Joaquin		CDFG. 1999a
Rainbow Trout, Coleman X Shata Strain	Fresno	1970	S[4]		2,440	San Joaquin		CDFG. 1999a
Smallmouth Bass	Fresno	1979	4.8/lb		230	Central Valley		CDFG. 1999a
Smallmouth Bass	Fresno	1979	Adult		26	Pine Flat Res.		CDFG. 1999a
Threadfin Shad	Fresno	6/12/63	2/oz		700	Central Valley		CDFG. 1999a

[1] Brood Stock

[2] Catchable

[3] Fingerling

[4] Subcatable

Table CAWG 7-Appendix C-47. Historical Fish Population Information for Shaver Lake.

Species	Date	Population Estimate	Biomass (kg)	Density				Number Collected	Fork Length (mm)	Comments	References
				kg/ha	lb/ac	Fish/km	Fish/Mile				
Smallmouth Bass	5/88	Present						1		Collected by electrofishing.	BSAI 1989
Smallmouth Bass	5/88	Present						9		Collected by electrofishing.	BSAI 1989
Smallmouth Bass	5/88	Present						1		Collected by electrofishing.	BSAI 1989
Smallmouth Bass	5/88	Present						1		Collected by electrofishing.	BSAI 1989
Smallmouth Bass	5/88	Present						19		Collected by electrofishing.	BSAI 1989
Smallmouth Bass	5/88	Present						20		Collected by electrofishing.	BSAI 1989
Smallmouth Bass	5/88	Present						100	100-290	Collected by electrofishing.	BSAI 1989
Bass (*Micropterus* sp.)	1986	Present						500		p. 3-15: young of year collected for stocking elsewhere	BSAI 1987c
Rainbow Trout	12/86	Present						59		Creel survey.	BSAI 1987c
Rainbow Trout	11/86	Present						136		Creel survey.	BSAI 1987c
Rainbow Trout	11/86	Present						1		Creel survey.	BSAI 1987c
Rainbow Trout	10/86	Present						1		Creel survey.	BSAI 1987c
Rainbow Trout	10/86	Present						16		Creel survey.	BSAI 1987c

Table CAWG 7-Appendix C-47. Historical Fish Population Information for Shaver Lake (Continued).

Species	Date	Population Estimate	Biomass (kg)	Density				Number Collected	Fork Length (mm)	Comments	References
				kg/ha	lb/ac	Fish/km	Fish/Mile				
Rainbow Trout	10/86	Present						125		Creel survey.	BSAI. 1987c
Largemouth Bass	9/86	Present						4		Creel survey.	BSAI. 1987c
Largemouth Bass	9/86	Present						2		Creel survey.	BSAI. 1987c
Largemouth Bass	9/86	Present						6		Creel survey.	BSAI. 1987c
Largemouth Bass	9/86	Present						3		Creel survey.	BSAI. 1987c
Largemouth Bass	9/86	Present						700		Creel survey.	BSAI. 1987c
Largemouth Bass	9/86	Present						42		Creel survey.	BSAI. 1987c
Carp	8/86	Present						1		Creel survey.	BSAI .1987c
Carp	8/86	Present						2		Creel survey.	BSAI. 1987c
Kokanee	8/86	Present						37		Creel survey.	BSAI. 1987c
Kokanee	8/86	Present						1		Creel survey.	BSAI. 1987c
Kokanee	8/86	Present						1		Creel survey.	BSAI. 1987c
Kokanee	8/86	Present						307		Creel survey.	BSAI. 1987c
Kokanee	8/86	Present						1		Creel survey.	BSAI. 1987c
Kokanee	8/86	Present						58		Creel survey.	BSAI. 1987c
Brown Trout	7/86	Present						6		Creel survey.	BSAI. 1987c
Bullhead	7/86	Present						1		Creel survey.	BSAI. 1987c
Bullhead	7/86	Present						7		Creel survey.	BSAI. 1987c
Bullhead	7/86	Present						33		Creel survey.	BSAI. 1987c
Bullhead	7/86	Present						2		Creel survey.	BSAI. 1987c
Carp	7/86	Present						521		Creel survey.	BSAI. 1987c

Table CAWG 7-Appendix C-47. Historical Fish Population Information for Shaver Lake (Continued).

Species	Date	Population Estimate	Biomass (kg)	Density				Number Collected	Fork Length (mm)	Comments	References
				kg/ha	lb/ac	Fish/km	Fish/Mile				
Carp	7/86	Present						39		Creel survey.	BSAI. 1987c
Bluegill	6/86	Present						1		Creel survey.	BSAI. 1987c
Brook Trout	6/86	Present						2		Creel survey.	BSAI. 1987c
Brook Trout	6/86	Present						3		Creel survey.	BSAI. 1987c
Brook Trout	6/86	Present						1		Creel survey.	BSAI. 1987c
Brook Trout	6/86	Present						13		Creel survey.	BSAI. 1987c
Brown Bullhead	6/86	Present						160		Creel survey.	BSAI. 1987c
Brown Trout	6/86	Present						49		Creel survey.	BSAI. 1987c
Bass (*Micropterus* sp.)	4/69	Present						1		p. 3-15: electrofishing	BSAI. 1987c
Black Bullhead	4/69	Present						2		p. 3-15: electrofishing	BSAI. 1987c
Black Crappie	4/69	Present						1		p. 3-15: electrofishing	BSAI. 1987c
Bluegill	4/69	Present						96		p. 3-15: electrofishing, 32 had been planted the previous fall	BSAI. 1987c
Rainbow Trout	1969-70, 1976	Present						2		p. 3-15: gill netting surveys 1969, 1970, 1976	BSAI. 1987c
Rainbow Trout	1969-70, 1976	Present						10		p. 3-15: gill netting surveys 1969, 1970, 1976	BSAI. 1987c

Table CAWG 7-Appendix C-47. Historical Fish Population Information for Shaver Lake (Continued).

Species	Date	Population Estimate	Biomass (kg)	Density				Number Collected	Fork Length (mm)	Comments	References
				kg/ha	lb/ac	Fish/km	Fish/Mile				
Rainbow Trout	1969-70, 1976	Present						18		p. 3-15: gill netting surveys 1969, 1970, 1976	BSAI. 1987c
Rainbow Trout	1969-70, 1976	Present						3		p. 3-15: gill netting surveys 1969, 1970, 1976	BSAI. 1987c
Sacramento Sucker	1969-70, 1976	Present						8		p. 3-15: gill netting surveys 1969, 1970, 1976	BSAI. 1987c
Sacramento Sucker	1969-70, 1976	Present						11		p. 3-15: gill netting surveys 1969, 1970, 1976	BSAI. 1987c
Sacramento Sucker	1969-70, 1976	Present						39		p. 3-15: gill netting surveys 1969, 1970, 1976	BSAI. 1987c

APPENDIX D

Fish Growth Back Calculations

Table CAWG 7-Appendix D-1. Back Calculations of Length at Age and Growth Increments for Brown Trout by Cohort and Year for South Fork San Joaquin River, Rosgen Level I B Channel Site (SFSJR1), Upstream Florence Lake Reach, 2002.

Mean Back Calculated Length (FL, mm) at Age*

	Cohort							Summary of All Values by Age		
Age of Growth	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002****	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	55	55.3	55.3	55.3
1	-	-	-	83	92	79	-	84.8	91.6	79.4
2	-	-	-	-	128	136	124	129.6	136.2	124.3
3	-	-	-	-	-	195	178	186.4	194.9	177.9
4	-	-	-	-	-	-	238	237.8	237.8	237.8
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	1	12	6	0	3			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002****	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	55	55.3	55.3	55.3
1	-	-	-	83	92	79	0	84.8	91.6	79.4
2	-	-	-	-	45	45	45	44.8	45.0	44.5
3	-	-	-	-	-	67	42	54.1	66.5	41.7
4	-	-	-	-	-	-	43	42.9	42.9	42.9
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	1	12	6	0	3			

* Note: Individual cohorts are identified by color. Cohort year is identified at Age 0.

* *Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-2. Back Calculations of Length at Age and Growth Increments for Brown Trout by Cohort and Year for South Fork San Joaquin River, Rosgen Level I C Channel Site (SFSJR2), Florence Lake to Bear Creek, 2002.

Mean Back Calculated Length (FL, mm) at Age*

	Cohort							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	62	61.6	61.6	61.6
1	-	77	71	-	72	72	79	74.2	78.8	71.1
2	-	-	109	95	-	94	106	101.1	108.9	94.5
3	-	-	-	134	122	-	114	123.1	133.9	113.5
4	-	-	-	-	166	157	-	161.7	166.1	157.3
5	-	-	-	-	-	202	184	193.0	201.7	184.3
6	-	-	-	-	-	-	220	219.6	219.6	219.6
Number of Fish Included	1	3	0	1	2	2	10			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	62	61.6	61.6	61.6
1	-	77	71	-	72	72	79	74.2	78.8	71.1
2	-	-	32	24	-	22	34	28.1	33.9	22.3
3	-	-	-	25	27	-	19	23.5	26.5	19.1
4	-	-	-	-	32	36	-	33.8	35.5	32.1
5	-	-	-	-	-	36	27	31.4	35.7	27.0
6	-	-	-	-	-	-	18	17.8	17.8	17.8
Number of Fish Included	1	3	0	1	2	2	10			

* Note: Individual cohorts are identified by color. Cohort year is identified at Age 0.

* *Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-3. Back Calculations of Length at Age and Growth Increments for Brown Trout by Cohort and Year for South Fork San Joaquin River, Rosgen Level I B Channel Site (SFSJR3), Florence Lake to Bear Creek.

Mean Back Calculated Length (FL, mm) at Age *

	Cohort							Summary of All Values by Age		
Age of Growth	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002****	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	74	74.3	74.3	74.3
1	-	-	88	82	85	87	92	86.7	91.7	82.3
2	-	-	-	114	113	115	114	114.0	114.8	113.0
3	-	-	-	-	138	146	140	141.7	146.4	138.3
4	-	-	-	-	-	162	170	165.8	169.8	161.8
5	-	-	-	-	-	-	179	178.9	178.9	178.9
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	3	7	10	14	3	3			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002****	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	74	74.3	74.3	74.3
1	-	-	88	82	85	87	92	72.3	91.7	82.3
2	-	-	-	25	31	30	28	22.8	30.7	25.5
3	-	-	-	-	25	33	26	20.9	33.3	24.6
4	-	-	-	-	-	24	23	15.7	23.5	23.4
5	-	-	-	-	-	-	17	8.6	17.2	17.2
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	3	7	10	14	3	3			

* Note: Individual cohorts are identified by color. Cohort year is identified at Age 0.

* *Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-4. Back Calculations of Length at Age and Growth Increments for Brown Trout by Cohort and Year for South Fork San Joaquin River, Rosgen Level I B Channel Site (SFSJR5), Bear Creek to Mono Crossing, 2002.

Mean Back Calculated Length (FL, mm) at Age*

	Cohort							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	-	-	-	-
1	-	82	70	78	72	78	60	73.4	82.1	60.2
2	-	-	130	110	118	104	118	116.1	130.2	103.9
3	-	-	-	164	136	145	127	142.8	163.8	126.8
4	-	-	-	-	207	167	171	181.8	207.1	167.0
5	-	-	-	-	-	236	187	211.4	236.0	186.8
6	-	-	-	-	-	-	260	260.0	260.0	260.0
Number of Fish Included	1	3	6	3	1	2	0			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	-	-	-	-
1	-	82	70	78	72	78	60	73.4	82.1	60.2
2	-	-	48	40	40	32	40	40.0	48.1	32.2
3	-	-	-	34	26	26	23	27.2	33.7	22.9
4	-	-	-	-	43	31	27	33.7	43.3	26.9
5	-	-	-	-	-	29	20	24.3	28.9	19.8
6	-	-	-	-	-	-	24	24.0	24.0	24.0
Number of Fish Included	1	3	6	3	1	2	0			

* Note: Individual cohorts are identified by color. Cohort year is identified at Age 0.

* *Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-5. Back Calculations of Length at Age and Growth Increments for Rainbow Trout by Cohort and Year for South Fork San Joaquin River, Rosgen Level I B Channel Site (SFSJR5), Bear Creek to Mono Crossing, 2002.

Mean Back Calculated Length (FL, mm) at Age*

	Cohort							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	60	60.0	60.0	60.0
1	-	-	-	-	69	63	61	64.3	68.6	60.9
2	-	-	-	-	-	98	95	96.4	97.9	94.9
3	-	-	-	-	-	-	119	118.8	118.8	118.8
4	-	-	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	0	3	1	1	1			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	60	60.0	60.0	60.0
1	-	-	-	-	69	63	61	64.3	68.6	60.9
2	-	-	-	-	-	29	31	30.4	31.4	29.3
3	-	-	-	-	-	-	21	20.9	20.9	20.9
4	-	-	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	0	3	1	1	1			

* Note: Individual cohorts are identified by color. Cohort year is identified at Age 0.
* *Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-6. Back Calculations of Length at Age and Growth Increments for Rainbow Trout by Cohort and Year for South Fork San Joaquin River, Rosgen Level I G Channel Site (SFSJR4), Bear Creek to Mono Crossing, 2002.

Mean Back Calculated Length (FL, mm) at Age*

	Cohort							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	68	68.0	68.0	68.0
1	-	-	-	-	-	86	-	85.8	85.8	85.8
2	-	-	-	-	-	-	113	113.4	113.4	113.4
3	-	-	-	-	-	-	-	-	-	-
4	-	-	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	0	0	1	0	2			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	68	68.0	68.0	68.0
1	-	-	-	-	-	86	-	85.8	85.8	85.8
2	-	-	-	-	-	-	28	27.7	27.7	27.7
3	-	-	-	-	-	-	-	-	-	-
4	-	-	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	0	0	1	0	2			

* Note: Individual cohorts are identified by color. Cohort year is identified at Age 0.

* *Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-7. Back Calculations of Length at Age and Growth Increments for Brown Trout by Cohort and Year for South Fork San Joaquin River, Rosgen Level I C Channel Site (SFSJR6), Bear Creek to Mono Crossing, 2002.

Mean Back Calculated Length (FL, mm) at Age*

	Cohort							Summary of All Values by Age		
Age of Growth	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002****	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	-	-	-	-
1	-	69	69	69	74	-	73	70.8	74.0	68.8
2	-	-	89	96	97	102	-	95.9	102.0	89.3
3	-	-	-	133	119	122	122	124.3	133.2	119.4
4	-	-	-	-	165	143	146	151.5	165.4	142.9
5	-	-	-	-	-	195	164	179.3	195.0	163.6
6	-	-	-	-	-	-	217	217.3	217.3	217.3
Number of Fish Included	4	1	4	1	0	3	0			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002****	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	-	-	-	-
1	-	69	69	69	74	-	73	70.8	74.0	68.8
2	-	-	20	27	28	28	-	25.7	28.0	20.4
3	-	-	-	44	24	26	20	28.3	44.0	20.0
4	-	-	-	-	32	24	24	26.5	32.1	23.6
5	-	-	-	-	-	30	21	25.1	29.7	20.6
6	-	-	-	-	-	-	22	22.2	22.2	22.2
Number of Fish Included	4	1	4	1	0	3	0			

* Note: Individual cohorts are identified by color. Cohort year is identified at Age 0.

* *Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-8. Back Calculations of Length at Age and Growth Increments for Rainbow Trout by Cohort and Year for South Fork San Joaquin River, Rosgen Level I C Channel Site (SFSJR6), Bear Creek to Mono Crossing, 2002.

Mean Back Calculated Length (FL, mm) at Age *

	Cohort							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	61	61.0	61.0	61.0
1	-	-	76	-	73	-	63	70.7	76.0	62.9
2	-	-	-	116	-	100	-	108.1	116.0	100.1
3	-	-	-	-	144	-	124	134.1	144.0	124.1
4	-	-	-	-	-	164	-	164.0	164.0	164.0
5	-	-	-	-	-	-	188	188.0	188.0	188.0
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	1	0	3	0	4	7			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	61	61.0	61.0	61.0
1	-	-	76	-	73	-	63	70.7	76.0	62.9
2	-	-	-	40	-	27	-	33.5	40.0	27.1
3	-	-	-	-	28	-	24	26.0	28.0	24.0
4	-	-	-	-	-	20	-	20.0	20.0	20.0
5	-	-	-	-	-	-	24	24.0	24.0	24.0
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	1	0	3	0	4	7			

* Note: Individual cohorts are identified by color. Cohort year is identified at Age 0.

* *Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-9. Back Calculations of Length at Age and Growth Increments for Brown Trout by Cohort and Year for South Fork San Joaquin River, Rosgen Level I B Channel Site (SFSJR7), Mono Crossing to Rattlesnake Crossing, 2002.

Mean Back Calculated Length (FL, mm) at Age*

	Cohort							Summary of All Values by Age		
Age of Growth	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002****	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	83	83.0	83.0	83.0
1	-	70	75	70	74	-	69	71.7	75.1	69.3
2	-	-	94	101	96	105	-	99.2	105.2	93.8
3	-	-	-	122	129	126	132	127.4	132.5	121.5
4	-	-	-	-	159	163	155	159.1	162.9	155.3
5	-	-	-	-	-	187	175	180.9	186.7	175.2
6	-	-	-	-	-	-	209	209.0	209.0	209.0
Number of Fish Included	1	1	1	3	0	8	1			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002****	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	83	83.0	83.0	83.0
1	-	70	75	70	74	-	69	71.7	75.1	69.3
2	-	-	24	26	26	31	-	26.8	31.0	24.1
3	-	-	-	28	28	30	27	28.2	29.9	27.3
4	-	-	-	-	38	34	29	33.4	37.5	29.1
5	-	-	-	-	-	28	12	20.0	27.7	12.3
6	-	-	-	-	-	-	22	22.3	22.3	22.3
Number of Fish Included	1	1	1	3	0	8	1			

* Note: Individual cohorts are identified by color. Cohort year is identified at Age 0.

* *Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-10. Back Calculations of Length at Age and Growth Increments for Rainbow Trout by Cohort and Year for South Fork San Joaquin River, Rosgen Level I B Channel Site (SFSJR7), Mono Crossing to Rattlesnake Crossing, 2002.

Mean Back Calculated Length (FL, mm) at Age*

	Cohort							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	66	66.1	66.1	66.1
1	-	72	-	76	73	73	64	71.5	75.7	63.6
2	-	-	91	-	106	104	101	100.6	106.2	91.1
3	-	-	-	116	-	141	128	128.4	140.8	116.0
4	-	-	-	-	151	-	161	156.3	161.4	151.1
5	-	-	-	-	-	190	-	189.9	189.9	189.9
6	-	-	-	-	-	-	225	225.0	225.0	225.0
Number of Fish Included	1	0	1	2	4	9	30			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	66	66.1	66.1	66.1
1	-	72	-	76	73	73	64	71.5	75.7	63.6
2	-	-	19	-	30	31	27	27.1	31.4	19.4
3	-	-	-	25	-	35	24	27.8	34.6	23.9
4	-	-	-	-	35	-	21	27.8	35.1	20.6
5	-	-	-	-	-	39	-	38.8	38.8	38.8
6	-	-	-	-	-	-	35	35.1	35.1	35.1
Number of Fish Included	1	0	1	2	4	9	30			

* Note: Individual cohorts are identified by color. Cohort year is identified at Age 0.
* *Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-11. Back Calculations of Length at Age and Growth Increments for Brown Trout by Cohort and Year for South Fork San Joaquin River, Rosgen Level I G Channel Site (SFSJR8), Rattlesnake Crossing to Confluence with San Joaquin River, 2002.

Mean Back Calculated Length (FL, mm) at Age*

	Cohort							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	-	-	-	-
1	-	-	-	81	83	80	72	79.1	82.9	72.4
2	-	-	-	-	112	116	118	115.3	117.6	111.9
3	-	-	-	-	-	140	148	144.2	148.0	140.4
4	-	-	-	-	-	-	170	169.8	169.8	169.8
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	1	1	4	6	0			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	-	-	-	-
1	-	-	-	81	83	80	72	79.1	82.9	72.4
2	-	-	-	-	31	33	37	33.9	37.3	31.0
3	-	-	-	-	-	28	32	30.1	31.8	28.5
4	-	-	-	-	-	-	29	29.3	29.3	29.3
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	1	1	4	6	0			

* Note: Individual cohorts are identified by color. Cohort year is identified at Age 0.

* *Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-12. Back Calculations of Length at Age and Growth Increments for Rainbow Trout by Cohort and Year for South Fork San Joaquin River, rosgen Level I G Channel Site (SFSJR8), Rattlesnake Crossing to San Joaquin River Confluence, 2002.

Mean Back Calculated Length (FL, mm) at Age*

	Cohort							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	72	72.1	72.1	72.1
1	-	-	-	85	83	79	-	82.5	85.1	79.0
2	-	-	-	-	115	117	110	114.0	116.7	109.8
3	-	-	-	-	-	148	147	147.7	148.2	147.2
4	-	-	-	-	-	-	173	172.7	172.7	172.7
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	1	2	4	0	21			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	72	72.1	72.1	72.1
1	-	-	-	85	83	79	-	82.5	85.1	79.0
2	-	-	-	-	30	33	31	31.5	33.4	30.3
3	-	-	-	-	-	33	31	31.7	32.9	30.5
4	-	-	-	-	-	-	24	24.4	24.4	24.4
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	1	2	4	0	21			

* Note: Individual cohorts are identified by color. Cohort year is identified at Age 0.

* *Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-13. Back Calculations of Length at Age and Growth Increments for Brown Trout by Cohort and Year for Tombstone Creek, Rosgen Level I Aa+/C/E Channel Site (Tomb2 and Tomb 3), Below Diversion, 2002.

Mean Back Calculated Length (FL, mm) at Age*

	Cohort							Summary of All Values by Age		
Age of Growth	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002****	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	45	45.2	45.2	45.2
1	-	-	66	-	71	61	-	65.7	70.5	60.7
2	-	-	-	97	-	95	102	98.3	102.3	95.2
3	-	-	-	-	145	-	136	140.4	145.0	135.7
4	-	-	-	-	-	174	-	174.4	174.4	174.4
5	-	-	-	-	-	-	204	203.8	203.8	203.8
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	2	0	2	1	0	5			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002****	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	45	45.2	45.2	45.2
1	-	-	66	-	71	61	-	65.7	70.5	60.7
2	-	-	-	32	-	25	42	32.7	41.6	24.7
3	-	-	-	-	48	-	40	44.0	47.6	40.5
4	-	-	-	-	-	29	-	29.4	29.4	29.4
5	-	-	-	-	-	-	29	29.4	29.4	29.4
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	2	0	2	1	0	5			

* Note: Individual cohorts are identified by color. Cohort year is identified at Age 0.

* *Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-14. Back Calculations of Length at Age and Growth Increments for Golden Trout by Cohort and Year for Hooper Creek, Rosgen Level I Aa+ Channel Site (Hoop1), Above Diversion, 2002.

Mean Back Calculated Length (FL, mm) at Age*

	Cohort							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	-	-	-	-
1	-	-	-	-	85	79	72	78.8	85.0	72.1
2	-	-	-	-	-	115	109	112.3	115.3	109.3
3	-	-	-	-	-	-	136	136.5	136.5	136.5
4	-	-	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	0	2	4	5	0			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	-	-	-	-
1	-	-	-	-	85	79	72	78.8	85.0	72.1
2	-	-	-	-	-	30	30	30.1	30.3	29.9
3	-	-	-	-	-	-	21	21.1	21.1	21.1
4	-	-	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	0	2	4	5	0			

* Note: Individual cohorts are identified by color. Cohort year is identified at Age 0.

* *Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-15. Back Calculations of Length at Age and Growth Increments for Golden Trout by Cohort and Year for Hooper Creek, Rosgen Level I Aa+ Channel Site (Hoop2), Below Diversion, 2002.

Mean Back Calculated Length (FL, mm) at Age*

	Cohort							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	82	82.0	82.0	82.0
1	-	-	82	83	83	78	74	80.1	83.5	74.5
2	-	-	-	124	126	124	120	123.6	126.0	119.8
3	-	-	-	-	153	155	150	152.5	155.4	149.7
4	-	-	-	-	-	187	170	178.3	187.0	169.6
5	-	-	-	-	-	-	208	208.5	208.5	208.5
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	1	1	1	4	4	6			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	82	82.0	82.0	82.0
1	-	-	82	83	83	78	74	80.1	83.5	74.5
2	-	-	-	42	43	41	42	42.0	42.8	40.9
3	-	-	-	-	28	29	25	27.7	29.4	25.3
4	-	-	-	-	-	34	14	24.4	34.4	14.3
5	-	-	-	-	-	-	22	21.5	21.5	21.5
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	1	1	1	4	4	6			

* Note: Individual cohorts are identified by color. Cohort year is identified at Age 0.

* *Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-16. Back Calculations of Length at Age and Growth Increments for Brook Trout by Cohort and Age for Crater Creek, Rosgen Level I Aa+ Channel Site (Crat1), Above Diversion, 2002.

Mean Back Calculated Length (FL, mm) at Age*

	Cohort							Summary of All Values by Age		
Age of Growth	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002****	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	61	60.5	60.5	60.5
1	-	-	-	71	68	-	70	69.6	71.0	67.6
2	-	-	-	-	95	94	-	94.9	95.3	94.5
3	-	-	-	-	-	120	121	120.5	121.2	119.8
4	-	-	-	-	-	-	144	144.1	144.1	144.1
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	2	2	0	2	2			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002****	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	61	60.5	60.5	60.5
1	-	-	-	71	68	-	70	69.6	71.0	67.6
2	-	-	-	-	24	27	-	25.6	26.9	24.3
3	-	-	-	-	-	24	27	25.6	26.7	24.5
4	-	-	-	-	-	-	24	24.3	24.3	24.3
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	2	2	0	2	2			

* Note: Individual cohorts are identified by color. Cohort year is identified by Age 0.
**Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-17. Back Calculations of Length at Age and Growth Increments for Brook Trout by Cohort and Year for Crater Creek, Rosgen Level I Aa+ Channel Site (Crat2), Below Diversion, 2002.

Mean Back Calculated Length (FL, mm) at Age

	Cohort							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002*	Average	Maximum	Minimum
0	-	-	-	-	-	-	56	56.0	56.0	56.0
1	-	-	-	-	78	68	68	71.2	77.8	67.6
2	-	-	-	-	-	102	95	98.8	102.2	95.4
3	-	-	-	-	-	-	127	126.6	126.6	126.6
4	-	-	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	0	1	6	2	3			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002*	Average	Maximum	Minimum
0	-	-	-	-	-	-	56	56.0	56.0	56.0
1	-	-	-	-	78	68	68	71.2	77.8	67.6
2	-	-	-	-	-	24	28	26.1	27.8	24.4
3	-	-	-	-	-	-	24	24.4	24.4	24.4
4	-	-	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	0	1	6	2	3			

* Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-18. Back Calculations of Length at Age and Growth Increments of Brook Trout by Cohort and Year for Crater Creek, Rosgen Level I Aa+ Channel Site (Crat4), Diversion Channel Reach, 2002.

Mean Back Calculated Length (FL, mm) at Age*

	Cohort							Summary of All Values by Age		
Age of Growth	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002****	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	58	58.0	58.0	58.0
1	-	-	74	71	71	69	71	71.3	74.0	69.3
2	-	-	-	101	100	99	100	99.9	101.1	98.7
3	-	-	-	-	128	123	121	124.0	128.2	120.7
4	-	-	-	-	-	146	142	144.1	146.0	142.1
5	-	-	-	-	-	-	172	172.3	172.3	172.3
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	1	5	7	5	5	2			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002****	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	58	58.0	58.0	58.0
1	-	-	74	71	71	69	71	71.3	74.0	69.3
2	-	-	-	27	29	28	31	28.6	30.7	27.1
3	-	-	-	-	27	24	22	24.2	27.1	22.0
4	-	-	-	-	-	18	19	18.4	19.1	17.8
5	-	-	-	-	-	-	26	26.3	26.3	26.3
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	1	5	7	5	5	2			

* Note: Individual cohorts are identified by color. Cohort year is identified at Age 0.

* *Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-19. Back Calculations of Length at Age and Growth Increments for Brown Trout by Cohort and Year for Bear Creek, Rosgen Level I B Channel Site (Bear1), Above Diversion, 2002.

Mean Back Calculated Length (FL, mm) at Age*

	Cohort							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	74	74.1	74.1	74.1
1	-	-	-	83	80	72	76	77.6	82.6	71.8
2	-	-	-	-	128	120	98	115.5	127.8	98.5
3	-	-	-	-	-	168	155	161.9	168.4	155.5
4	-	-	-	-	-	-	206	206.1	206.1	206.1
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	3	13	9	1	7			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	74	74.1	74.1	74.1
1	-	-	-	83	80	72	76	77.6	82.6	71.8
2	-	-	-	-	45	40	27	37.3	45.2	26.6
3	-	-	-	-	-	41	35	37.9	40.6	35.2
4	-	-	-	-	-	-	38	37.7	37.7	37.7
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	3	13	9	1	7			

* Note: Individual cohorts are identified by color. Cohort year is identified at Age 0.

* *Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-20. Back Calculations of Length at Age and Growth Increments of Brown Trout by Cohort and Year for Bear Creek, Rosgen Level I B Channel Site, Below Diversion, 2002. (Bear2)

Mean Back Calculated Length (FL, mm) at Age*

	Cohort							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	74	74.4	74.4	74.4
1	-	-	49	51	49	45	39	46.5	50.6	38.6
2	-	-	-	61	64	61	56	60.6	64.2	55.6
3	-	-	-	-	73	77	75	75.1	77.4	73.0
4	-	-	-	-	-	83	89	85.6	88.5	82.7
5	-	-	-	-	-	-	87	87.0	87.0	87.0
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	1	2	8	6	1	20			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	74	74.4	74.4	74.4
1	-	-	49	51	49	45	39	46.5	50.6	38.6
2	-	-	-	12	14	13	10	12.2	13.5	10.3
3	-	-	-	-	12	13	14	12.9	13.8	11.6
4	-	-	-	-	-	10	11	10.4	11.1	9.7
5	-	-	-	-	-	-	4	4.3	4.3	4.3
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	1	2	8	6	1	20			

* Note: Individual cohorts are identified by color. Cohort year is identified at Age 0.

* *Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-21. Back Calculations of Length at Age and Growth Increments for Brook Trout by Cohort and Year for Camp 62 Creek, Rogen Level I Aa+ Channel Site (C62-1), Above Diversion, 2002.

Mean Back Calculated Length (FL, mm) at Age *

	Cohort							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	58	58.0	58.0	58.0
1	-	-	76	72	80	77	65	73.9	79.6	65.3
2	-	-	-	102	103	117	110	108.1	117.0	102.2
3	-	-	-	-	135	133	145	137.7	144.6	132.9
4	-	-	-	-	-	155	160	157.8	160.2	155.4
5	-	-	-	-	-	-	189	188.7	188.7	188.7
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	1	4	4	4	12	2			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	58	58.0	58.0	58.0
1	-	-	76	72	80	77	65	73.9	79.6	65.3
2	-	-	-	27	31	37	33	32.1	37.4	26.6
3	-	-	-	-	33	29	28	30.1	33.3	27.6
4	-	-	-	-	-	20	27	23.6	27.3	20.0
5	-	-	-	-	-	-	33	33.3	33.3	33.3
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	1	4	4	4	12	2			

* Note: Individual cohorts are identified by color. Cohort year is identified at Age 0.

** Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-22. Back Calculations of Length at Age and Growth Increments for Brook Trout by Cohort and Year for Camp 62 Creek, Rosgen Level I Aa+ Channel Site (C62-2), Below Diversion, 2002.

Mean Back Calculated Length (FL, mm) at Age*

	Cohort							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	57	56.5	56.5	56.5
1	-	-	75	85	80	80	65	76.9	84.9	65.1
2	-	-	-	104	115	109	93	105.6	115.0	93.5
3	-	-	-	-	137	141	133	137.1	140.9	133.3
4	-	-	-	-	-	163	167	164.8	166.8	162.7
5	-	-	-	-	-	-	186	185.7	185.7	185.7
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	2	2	3	8	13	2			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	57	56.5	56.5	56.5
1	-	-	75	85	80	80	65	76.9	84.9	65.1
2	-	-	-	30	30	30	14	25.7	30.0	13.5
3	-	-	-	-	32	26	24	27.5	32.5	24.1
4	-	-	-	-	-	26	26	25.8	25.9	25.8
5	-	-	-	-	-	-	23	22.9	22.9	22.9
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	2	2	3	8	13	2			

* Note: Individual cohorts are idnetified by color. Cohort year is identified at Age 0>

* * Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-23. Back Calculations of Length at Age and Growth Increments for Brook Trout by Cohort and Year for Chinquapin Creek, Rosgen Level I Aa+ Channel Site (Chin1), Above Diversion, 2002.

Mean Back Calculated Length (FL, mm) at Age

	Cohort							Summary of All Values by Age		
Age of Growth	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002***	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	64	64.0	64.0	64.0
1	-	-	-	93	75	89	75	82.9	92.7	74.6
2	-	-	-	-	119	102	123	114.8	123.3	102.2
3	-	-	-	-	-	161	128	144.5	161.0	128.0
4	-	-	-	-	-	-	188	187.5	187.5	187.5
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	2	5	2	5	2			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002***	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	64	64.0	64.0	64.0
1	-	-	-	93	75	89	75	82.9	92.7	74.6
2	-	-	-	-	26	27	34	29.2	33.9	26.3
3	-	-	-	-	-	42	26	33.9	41.9	25.8
4	-	-	-	-	-	-	27	26.5	26.5	26.5
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	2	5	2	5	2			

* Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

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Table CAWG 7-Appendix D-24. Back Calculations of Length at Age and Growth Increments for Brook Trout by Cohort and Year for Chinquapin Creek, Rosgen Level I Aa+ Channel Site (Chin2), Below Diversion, 2002.

Mean Back Calculated Length (FL, mm) at Age*

	Cohort							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	70	69.5	69.5	69.5
1	-	-	-	78	72	69	69	71.9	78.3	68.8
2	-	-	-	-	111	100	99	103.4	111.0	99.4
3	-	-	-	-	-	136	129	132.3	136.0	128.6
4	-	-	-	-	-	-	161	161.0	161.0	161.0
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	3	8	8	9	2			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	70	69.5	69.5	69.5
1	-	-	-	78	72	69	69	71.9	78.3	68.8
2	-	-	-	-	33	28	31	30.4	32.7	28.0
3	-	-	-	-	-	25	29	27.0	29.0	25.0
4	-	-	-	-	-	-	25	25.0	25.0	25.0
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	3	8	8	9	2			

* Note: Individual cohorts are identified by color. Cohort year is identified at Age 0.

** Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-25. Back Calculations of Length at Age and Growth Increments for Brook Trout by Cohort and Year for Bolsillo Creek, Rosgen Level I B Channel Site (Bols1), Above Diversion, 2002.

Mean Back Calculated Length (FL, mm) at Age*

	Cohort							Summary of All Values by Age		
Age of Growth	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002****	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	69	68.5	68.5	68.5
1	-	-	71	70	71	72	69	70.6	71.7	68.6
2	-	-	-	99	95	101	102	99.4	102.1	95.0
3	-	-	-	-	130	132	130	130.6	132.0	129.9
4	-	-	-	-	-	150	157	153.2	156.8	149.7
5	-	-	-	-	-	-	172	172.0	172.0	172.0
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	3	2	5	10	5	2			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002****	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	69	68.5	68.5	68.5
1	-	-	71	70	71	72	69	70.6	71.7	68.6
2	-	-	-	28	25	30	30	28.3	30.4	24.7
3	-	-	-	-	31	37	29	32.2	37.1	28.7
4	-	-	-	-	-	20	25	22.2	24.7	19.7
5	-	-	-	-	-	-	22	22.3	22.3	22.3
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	3	2	5	10	5	2			

* Note: Individual cohorts are identified by color. Cohort year is identified at Age 0

** Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-26. Back Calculations of Length at Age and Growth Increments of Brook Trout by Cohort and Year for Bolsillo Creek, Rosgen Level I B Channel Site, Below Diversion, 2002. (Bols3)

Mean Back Calculated Length (FL, mm) at Age*

	Cohort							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	59	59.0	59.0	59.0
1	-	-	77	68	69	70	65	69.7	77.0	64.8
2	-	-	-	113	98	99	98	102.0	113.0	97.9
3	-	-	-	-	137	124	126	129.0	137.0	123.9
4	-	-	-	-	-	155	152	153.3	155.0	151.6
5	-	-	-	-	-	-	173	173.0	173.0	173.0
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	1	4	4	7	5	2			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	59	59.0	59.0	59.0
1	-	-	77	68	69	70	65	69.7	77.0	64.8
2	-	-	-	36	30	30	28	31.1	36.0	28.3
3	-	-	-	-	24	26	28	25.9	27.7	24.0
4	-	-	-	-	-	18	28	22.9	27.7	18.0
5	-	-	-	-	-	-	18	18.0	18.0	18.0
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	1	4	4	7	5	2			

* Note: Individual cohorts are identified by color. Cohort year is identified at Age 0.

** Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-27. Back Calculations of Length at Age and Growth Increments for Brook Trout by Cohort and Year for Bolsillo Creek, Rosgen Level I Aa+ Channel Site (Bols2), Below Diversion, 2002.

Mean Back Calculated Length (FL, mm) at Age*

	Cohort							Summary of All Values by Age		
Age of Growth	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002****	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	-	-	-	-
1	-	-	-	-	75	73	61	69.9	75.5	61.2
2	-	-	-	-	-	108	104	105.7	107.6	103.8
3	-	-	-	-	-	-	136	136.3	136.3	136.3
4	-	-	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	0	2	6	7	0			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002****	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	-	-	-	-
1	-	-	-	-	75	73	61	69.9	75.5	61.2
2	-	-	-	-	-	32	31	31.4	32.1	30.6
3	-	-	-	-	-	-	29	28.7	28.7	28.7
4	-	-	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	0	2	6	7	0			

* Note: Individual cohorts are identified by color. Cohort year is identified at Age 0.

** Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-28. Back Calculations of Length at Age and Growth Increments for Brown Trout by Cohort and Year for Mono Creek, Rosgen Level I B Channel Site (Mono), 2002.

Mean Back Calculated Length (FL, mm) at Age*

	Cohort							Summary of All Values by Age		
Age of Growth	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002****	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	-	-	-	-
1	-	-	-	81	75	-	-	77.8	80.7	74.9
2	-	-	-	-	104	99	-	101.4	104.0	98.8
3	-	-	-	-	-	129	133	131.2	132.9	129.4
4	-	-	-	-	-	-	151	150.7	150.7	150.7
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	2	1	0	0	0			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002****	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	-	-	-	-
1	-	-	-	81	75	-	-	77.8	80.7	74.9
2	-	-	-	-	23	24	-	23.6	23.9	23.3
3	-	-	-	-	-	25	34	29.8	34.1	25.4
4	-	-	-	-	-	-	21	21.2	21.2	21.2
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	2	1	0	0	0			

* Note: Individual cohorts are identified by color. Cohort year is identified at Age 0.
* *Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-29. Back Calculations of Length at Age and Growth Increments for Brown Trout by Cohort and Year for San Joaquin River, Rosgen Level I G Channel Site (SJRM1), Upper Mammoth Reach, 2002.

Mean Back Calculated Length (FL, mm) at Age*

	Cohort							Summary of All Values by Age		
Age of Growth	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002****	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	-	-	-	-
1	-	-	78	71	79	78	70	75.3	78.7	69.9
2	-	-	-	107	107	112	109	108.6	111.7	106.6
3	-	-	-	-	137	139	135	137.1	139.0	134.9
4	-	-	-	-	-	173	162	167.4	172.6	162.2
5	-	-	-	-	-	-	188	188.0	188.0	188.0
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	1	1	1	2	4	0			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002****	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	-	-	-	-
1	-	-	78	71	79	78	70	75.3	78.7	69.9
2	-	-	-	29	36	33	30	31.9	35.6	28.6
3	-	-	-	-	31	32	23	28.7	32.0	23.2
4	-	-	-	-	-	35	23	29.2	35.2	23.1
5	-	-	-	-	-	-	15	15.4	15.4	15.4
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	1	1	1	2	4	0			

* Note: Individual cohorts are identified by color. Cohort year is identified at Age 0.

* *Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-30. Back Calculations of Length at Age and Growth Increments for Rainbow Trout by Cohort and Year for San Joaquin River, Rosgen Level I G Channel Site (SJRM1), Upper Mammoth Reach, 2002.

Mean Back Calculated Length (FL, mm) at Age*

	Cohort							Summary of All Values by Age		
Age of Growth	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002****	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	-	-	-	-
1	-	-	78	71	79	78	70	75.3	78.7	69.9
2	-	-	-	107	107	112	109	108.6	111.7	106.6
3	-	-	-	-	137	139	135	137.1	139.0	134.9
4	-	-	-	-	-	173	162	167.4	172.6	162.2
5	-	-	-	-	-	-	188	188.0	188.0	188.0
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	1	1	1	2	4	0			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002****	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	66	-	-	-
1	-	-	78	71	79	78	70	75.3	78.7	69.9
2	-	-	-	29	36	33	30	31.9	35.6	28.6
3	-	-	-	-	31	32	23	28.7	32.0	23.2
4	-	-	-	-	-	35	23	29.2	35.2	23.1
5	-	-	-	-	-	-	15	25.4	15.4	15.4
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	1	1	1	2	4	0			

* Note: Individual cohorts are identified by color. Cohort year is identified at Age 0.
* *Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG7-Appendix D-31. Back Calculations of Length at Age and Growth Increments for Brown Trout by Cohort and Year for San Joaquin River, Rosgen Level I B Channel Site (SJRM2), Lower Mammoth Reach, 2002.

Mean Back Calculated Length (FL, mm) at Age*

	Cohort							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	66	66.0	66.0	66.0
1	-	83	-	-	-	-	63	72.9	82.6	63.2
2	-	-	125	-	-	-	-	124.8	124.8	124.8
3	-	-	-	156	-	-	-	156.5	156.5	156.5
4	-	-	-	-	211	-	-	211.4	211.4	211.4
5	-	-	-	-	-	239	-	238.9	238.9	238.9
6	-	-	-	-	-	-	279	279.0	279.0	279.0
Number of Fish Included	1	0	0	0	0	4	2			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	66	66.0	66.0	66.0
1	-	83	-	-	-	-	63	72.9	82.6	63.2
2	-	-	42	-	-	-	-	42.2	42.2	42.2
3	-	-	-	32	-	-	-	31.7	31.7	31.7
4	-	-	-	-	55	-	-	54.9	54.9	54.9
5	-	-	-	-	-	27	-	27.5	27.5	27.5
6	-	-	-	-	-	-	40	40.1	40.1	40.1
Number of Fish Included	1	0	0	0	0	4	2			

* Note: Individual cohorts are identified by color. Cohort year is identified at Age 0.

* *Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-32. Back Calculations of Length at Age and Growth Increments for Brown Trout by Cohort and Year for Rock Creek, Rosgen Level I Aa+ Channel Site (Rock1), Above Diversion, 2002.

Mean Back Calculated Length (FL, mm) at Age*

	Cohort							Summary of All Values by Age		
Age of Growth	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002****	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	57	57.3	57.3	57.3
1	-	131	106	118	105	110	111	113.4	131.1	105.0
2	-	-	157	138	141	125	126	137.3	157.5	124.8
3	-	-	-	187	159	169	144	164.8	187.5	143.7
4	-	-	-	-	223	180	194	198.9	222.9	179.8
5	-	-	-	-	-	223	200	211.6	222.9	200.4
6	-	-	-	-	-	-	243	243.0	243.0	243.0
Number of Fish Included	2	5	1	3	5	1	14			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002****	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	57	57.3	57.3	57.3
1	-	131	106	118	105	110	111	113.4	131.1	105.0
2	-	-	26	32	23	20	16	23.4	31.9	16.3
3	-	-	-	30	21	29	19	24.7	30.0	18.8
4	-	-	-	-	35	21	25	27.0	35.4	20.9
5	-	-	-	-	-	-	21	20.6	20.6	20.6
6	-	-	-	-	-	-	20	20.1	20.1	20.1
Number of Fish Included	2	5	1	3	5	1	14			

* Note: Individual cohorts are identified by color. Cohort year is identified at Age 0.

* *Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-33. Back Calculations of Length at Age and Growth Increments for Rainbow Trout by Cohort and Year for Rock Creek, Rosgen Level I Aa+ Channel Site (Rock1), Above Diversion, 2002.

Mean Back Calculated Length (FL, mm) at Age*

	Cohort							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	-	-	-	-
1	-	-	104	104	106	103	-	104.4	106.3	103.0
2	-	-	-	132	135	131	129	131.5	134.5	128.5
3	-	-	-	-	155	156	147	152.6	155.9	147.0
4	-	-	-	-	-	181	178	179.7	181.4	178.0
5	-	-	-	-	-	-	203	203.3	203.3	203.3
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	3	1	1	2	0	0			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	-	-	-	-
1	-	-	104	104	106	103	-	104.4	106.3	103.0
2	-	-	-	28	30	24	25	27.0	30.3	24.3
3	-	-	-	-	23	21	16	20.2	22.7	16.4
4	-	-	-	-	-	26	22	24.3	26.4	22.1
5	-	-	-	-	-	-	22	21.9	21.9	21.9
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	3	1	1	2	0	0			

* Note: Individual cohorts are identified by color. Cohort year is identified at Age 0.

* *Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-34. Back Calculations of Length at Age and Growth Increments for Brown Trout by Cohort and Year for Rock Creek, Rosgen Level I Aa+ Channel Site (Rock2), Below Diversion, 2002.

Mean Back Calculated Length (FL, mm) at Age*

	Cohort							Summary of All Values by Age		
Age of Growth	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002****	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	-	-	-	-
1	-	90	84	-	87	-	71	82.9	90.1	70.5
2	-	-	128	115	-	112	0	118.2	127.9	112.0
3	-	-	-	156	145	-	133	144.6	155.9	133.1
4	-	-	-	-	181	169	-	175.1	181.4	168.8
5	-	-	-	-	-	221	194	207.2	220.9	193.6
6	-	-	-	-	-	-	253	253.3	253.3	253.3
Number of Fish Included	1	5	0	2	0	7	0			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002****	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	-	-	-	-
1	-	90	84	-	87	0	71	82.9	90.1	70.5
2	-	-	38	31	-	25	0	31.3	37.7	25.4
3	-	-	-	28	30	-	21	26.3	29.8	21.1
4	-	-	-	-	25	24	-	24.8	25.4	24.1
5	-	-	-	-	-	39	25	32.1	39.5	24.8
6	-	-	-	-	-	-	32	32.5	32.5	32.5
Number of Fish Included	1	5	0	2	0	7	0			

* Note: Individual cohorts are identified by color. Cohort year is identified at Age 0.

* *Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-35. Back Calculations of Length at Age and Growth Increments for Rainbow Trout by Cohort and Year for Rock Creek, Rosgen Level I Aa+ Channel Site (Rock2), Below Diversion, 2002.

Mean Back Calculated Length (FL, mm) at Age *

	Cohort							Summary of All Values by Age		
Age of Growth	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002****	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	-	-	-	-
1	-	88	-	74	70	77	66	75.0	87.9	65.9
2	-	-	132	-	102	103	121	114.6	132.0	101.9
3	-	-	-	179	-	132	130	147.0	179.1	129.7
4	-	-	-	-	220	-	153	186.6	220.2	152.9
5	-	-	-	-	-	261	-	261.4	261.4	261.4
6	-	-	-	-	-	-	300	299.6	299.6	299.6
Number of Fish Included	1	0	2	1	2	6	0			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002****	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	-	-	-	-
1	-	88	-	74	70	77	66	75.0	87.9	65.9
2	-	-	44	-	28	33	44	37.3	44.4	27.5
3	-	-	-	47	-	30	27	34.7	47.1	26.6
4	-	-	-	-	41	-	21	30.9	41.2	20.6
5	-	-	-	-	-	41	-	41.2	41.2	41.2
6	-	-	-	-	-	-	38	38.2	38.2	38.2
Number of Fish Included	1	0	2	1	2	6	0			

* Note: Individual cohorts are identified by color. Cohort year is identified at Age 0.

* *Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-36. Back Calculations of Length at Age and Growth Increments for Brown Trout by Cohort and Year for San Joaquin River, Rosgen Level I G Channel Site (SJRS1), Upper Stevenson Reach, 2002.

Mean Back Calculated Length (FL, mm) at Age*

	Cohort							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	-	-	-	-
1	-	-	-	-	-	-	78	77.8	77.8	77.8
2	-	-	-	-	-	-	-	-	-	-
3	-	-	-	-	-	-	-	-	-	-
4	-	-	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	0	0	0	1	0			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	-	-	-	-
1	-	-	-	-	-	-	78	77.8	77.8	77.8
2	-	-	-	-	-	-	-	-	-	-
3	-	-	-	-	-	-	-	-	-	-
4	-	-	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	0	0	0	1	0			

* Note: Individual cohorts are identified by color. Cohort year is identified at Age 0.

* *Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-37. Back Calculations of Length at Age and Growth Increments for Rainbow Trout by Cohort and Year for San Joaquin River, Rosgen Level I G Channel Site (SJRS1), Upper Stevenson Reach, 2002.

Mean Back Calculated Length (FL, mm) at Age*

	Cohort							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	-	-	-	-
1	-	-	-	-	-	-	78	77.8	77.8	77.8
2	-	-	-	-	-	-	-	-	-	-
3	-	-	-	-	-	-	-	-	-	-
4	-	-	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	0	0	0	1	0			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	-	-	-	-
1	-	-	-	-	-	-	78	77.8	77.8	77.8
2	-	-	-	-	-	-	-	-	-	-
3	-	-	-	-	-	-	-	-	-	-
4	-	-	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	0	0	0	1	0			

* Note: Individual cohorts are identified by color. Cohort year is identified at Age 0.

* *Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-38. Back Calculations of Length at Age and Growth Increments for Brown Trout by Cohort and Year for San Joaquin River, Rosgen Level I G Channel Site (SJRS2), Lower Stevenson Reach, 2002.

Mean Back Calculated Length (FL, mm) at Age *

	Cohort							Summary of All Values by Age		
Age of Growth	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002****	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	-	-	-	-
1	-	-	-	-	-	-	71	71.0	71.0	71.0
2	-	-	-	-	-	-	-	-	-	-
3	-	-	-	-	-	-	-	-	-	-
4	-	-	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	0	0	0	1	0			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002****	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	-	-	-	-
1	-	-	-	-	-	-	71	71.0	71.0	71.0
2	-	-	-	-	-	-	-	-	-	-
3	-	-	-	-	-	-	-	-	-	-
4	-	-	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	0	0	0	1	0			

* Note: Individual cohorts are identified by color. Cohort year is identified at Age 0.

* *Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-39. Back Calculations for Length at Age and Growth Increments for Brown Trout by Cohort and Year for Big Creek, Rosgen Level I A Channel Site (BC2), Powerhouse 1 to Dam 1, 2002.

Mean Back Calculated Length (FL, mm) at Age *

	Cohort							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	56	56.1	56.1	56.1
1	-	-	66	71	65	72	66	67.9	71.8	65.3
2	-	-	-	94	104	94	108	100.0	108.2	93.8
3	-	-	-	-	119	127	120	122.1	126.6	119.2
4	-	-	-	-	-	145	152	148.2	151.7	144.7
5	-	-	-	-	-	-	173	173.5	173.5	173.5
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	6	6	8	2	5	9			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	56	56.1	56.1	56.1
1	-	-	66	71	65	72	66	67.9	71.8	65.3
2	-	-	-	28	33	29	36	31.5	36.3	27.5
3	-	-	-	-	25	22	26	24.7	26.3	22.5
4	-	-	-	-	-	26	25	25.3	25.5	25.1
5	-	-	-	-	-	-	29	28.7	28.7	28.7
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	6	6	8	2	5	9			

* Note: Individual cohorts are identified by color. Cohort year is identified at Age 0.

* *Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-40. Back Calculations of Length at Age and Growth Increments of Brown Trout by Cohort and Year for Big Creek, Rosgen Level I B Channel Site, Downstream Dam 1, 2002. (BC3)

Mean Back Calculated Length (FL, mm) at Age*

	Cohort							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	-	-	-	-
1	-	-	-	81	69	80	-	76.7	81.0	69.0
2	-	-	-	-	116	97	113	108.7	116.0	97.0
3	-	-	-	-	-	145	126	135.5	145.0	126.0
4	-	-	-	-	-	-	170	170.0	170.0	170.0
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	5	2	3	0	0			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	-	-	-	-
1	-	-	-	81	69	80	-	76.7	81.0	69.0
2	-	-	-	-	35	28	33	32.0	35.0	28.0
3	-	-	-	-	-	29	29	29.0	29.0	29.0
4	-	-	-	-	-	-	25	25.0	25.0	25.0
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	5	2	3	0	0			

* Note: Individual cohorts are identified by color. Cohort year is identified at Age 0.

* *Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-41. Back Calculations of Length at Age and Growth Increments for Brown Trout by Cohort and Year for Big Creek, Rosgen Level I Aa+ Channel Site (BC4), Upstream Powerhouse 1 Reach, 2002.

Mean Back Calculated Length (FL, mm) at Age*

	Cohort							Summary of All Values by Age		
Age of Growth	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002****	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	-	-	-	-
1	-	88	72	69	68	66	-	72.4	87.8	66.3
2	-	-	132	110	105	107	103	111.2	131.7	102.6
3	-	-	-	168	142	138	142	147.5	167.6	138.4
4	-	-	-	-	199	176	167	180.9	199.3	166.9
5	-	-	-	-	-	226	202	214.1	226.5	201.8
6	-	-	-	-	-	-	246	245.8	245.8	245.8
Number of Fish Included	3	7	5	12	2	0	0			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002****	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	-	-	-	-
1	-	88	72	69	68	66	-	72.4	87.8	66.3
2	-	-	44	39	36	39	36	38.8	43.9	36.0
3	-	-	-	36	32	34	35	34.2	35.9	32.1
4	-	-	-	-	32	34	29	31.4	34.1	28.5
5	-	-	-	-	-	27	25	26.2	27.1	25.3
6	-	-	-	-	-	-	19	19.3	19.3	19.3
Number of Fish Included	3	7	5	12	2	0	0			

* Note: Individual cohorts are identified by color. Cohort year is identified at Age 0.

* *Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-42. Back Calculations of Length at Age and Growth Increments for Brown Trout by Cohort and Year for Big Creek, Rosgen Level I A Channel Site (BC5), Powerhouse 2 to Dam 4 Reach, 2002.

Mean Back Calculated Length (FL, mm) at Age*

	Cohort							Summary of All Values by Age		
Age of Growth	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002****	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	-	-	-	-
1	-	-	86	83	76	76	69	78.2	86.4	69.1
2	-	-	-	130	124	117	118	122.1	129.8	116.8
3	-	-	-	-	166	164	146	158.5	166.0	145.9
4	-	-	-	-	-	204	192	197.9	204.0	191.8
5	-	-	-	-	-	-	238	238.3	238.3	238.3
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	1	2	4	2	2	0			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002****	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	-	-	-	-
1	-	-	86	83	76	76	69	78.2	86.4	69.1
2	-	-	-	43	41	41	42	41.6	43.4	40.6
3	-	-	-	-	36	40	29	35.0	39.8	29.0
4	-	-	-	-	-	38	28	33.0	38.0	28.1
5	-	-	-	-	-	-	34	34.4	34.4	34.4
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	1	2	4	2	2	0			

* Note: Individual cohorts are identified by color. Cohort year is identified at Age 0.

* *Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-43. Back Calculations of Length at Age and Growth Increments for Rainbow Trout by Cohort and Year for Big Creek, Rosgen Level I A Channel (BC5), Powerhouse 2 to Dam 4, 2002.

Mean Back Calculated Length (FL, mm) at Age*

	Cohort							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	-	-	-	-
1	-	-	-	82	-	71	67	73.4	81.6	67.2
2	-	-	-	-	119	-	100	109.7	119.1	100.3
3	-	-	-	-	-	154	-	153.5	153.5	153.5
4	-	-	-	-	-	-	174	174.3	174.3	174.3
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	2	0	1	12	0			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	-	-	-	-
1	-	-	-	82	-	71	67	73.4	81.6	67.2
2	-	-	-	-	37	-	29	33.2	37.4	29.0
3	-	-	-	-	-	34	-	34.5	34.5	34.5
4	-	-	-	-	-	-	21	20.8	20.8	20.8
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	2	0	1	12	0			

* Note: Individual cohorts are identified by color. Cohort year is identified at Age 0.

* *Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-44. Back Calculations of Length at Age and Growth Increments for Brown Trout by Cohort and Year for Big Creek, Rosgen Level I Aa+ Channel Site (BC7), Powerhouse 8 to Dam 5 Reach, 2002.

Mean Back Calculated Length (FL, mm) at Age*

	Cohort							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	-	-	-	-
1	-	-	-	74	83	78	72	77.0	83.4	74.1
2	-	-	-	-	119	122	105	115.5	121.7	105.4
3	-	-	-	-	-	145	150	147.5	150.0	145.0
4	-	-	-	-	-	-	161	161.1	161.1	161.1
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	1	6	1	3	0			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	-	-	-	-
1	-	-	-	74	83	78	72	77.0	83.4	72.1
2	-	-	-	-	45	38	27	36.8	45.0	27.0
3	-	-	-	-	-	26	28	27.0	28.3	25.7
4	-	-	-	-	-	-	16	16.1	16.1	16.1
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	1	6	1	3	0			

* Note: Individual cohorts are identified by color. Cohort year is identified at Age 0.

* *Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-45. Back Calculations of Length at Age and Growth Increments for Brown Trout by Cohort and Year for Big Creek, Rosgen Level I A Channel Site (BC6), Powerhouse 8 to Dam 5 Reach, 2002.

Mean Back Calculated Length (FL, mm) at Age*

	Cohort							Summary of All Values by Age		
Age of Growth	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002****	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	-	-	-	-
1	-	-	-	74	73	74	69	72.8	74.4	69.5
2	-	-	-	-	113	119	115	115.4	118.6	112.5
3	-	-	-	-	-	144	149	146.6	148.9	144.3
4	-	-	-	-	-	-	178	178.1	178.1	178.1
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	2	2	4	6	0			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002****	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	-	-	-	-
1	-	-	-	74	73	74	69	72.8	74.4	69.5
2	-	-	-	-	38	45	41	41.5	45.2	38.1
3	-	-	-	-	-	32	30	31.0	31.8	30.3
4	-	-	-	-	-	-	34	33.8	33.8	33.8
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	2	2	4	6	0			

* Note: Individual cohorts are identified by color. Cohort year is identified at Age 0.

* *Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-46. Back Calculations of Length at Age and Growth Increments for Rainbow Trout by Cohort and Year for Big Creek, Rosgen Level I A Channel Site (BC6), Powerhouse 8 to Dam 5, 2002.

Mean Back Calculated Length (FL, mm) at Age*

	Cohort							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	67	67.0	67.0	67.0
1	-	-	-	-	71	74	78	74.6	78.1	71.1
2	-	-	-	-	-	100	114	107.0	113.9	100.1
3	-	-	-	-	-	-	137	137.5	137.5	137.5
4	-	-	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	0	0	1	4	1			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	67	67.0	67.0	67.0
1	-	-	-	-	71	74	78	74.6	78.1	71.1
2	-	-	-	-	-	29	39	34.2	39.4	28.9
3	-	-	-	-	-	-	37	37.4	37.4	37.4
4	-	-	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	0	0	1	4	1			

* Note: Individual cohorts are identified by color. Cohort year is identified at Age 0.

* *Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-47. Back Calculations of Length at Age and Growth Increments for Rainbow Trout by Cohort and Year for Big Creek, Rosgen Level I Aa+ Channel (BC7), Powerhouse 8 to Dam 5, 2002.

Mean Back Calculated Length (FL, mm) at Age*

	Cohort							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	-	-	-	-
1	-	-	-	88	84	78	70	79.9	87.9	69.7
2	-	-	-	-	130	122	111	121.0	129.8	111.3
3	-	-	-	-	-	155	153	154.4	155.4	153.4
4	-	-	-	-	-	-	188	188.0	188.0	188.0
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	1	3	5	10	0			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	-	-	-	-
1	-	-	-	88	84	78	70	79.9	87.9	69.7
2	-	-	-	-	42	38	33	37.7	41.9	33.4
3	-	-	-	-	-	26	32	28.6	31.7	25.6
4	-	-	-	-	-	-	33	32.6	32.6	32.6
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	1	3	5	10	0			

* Note: Individual cohorts are identified by color. Cohort year is identified at Age 0.

* *Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-48. Back Calculations of Length at Age and Growth Increments for Brown Trout by Cohort and Year for Pitman Creek, Rosgen Level I B Channel Site (Pitm1), Above Diversion, 2002.

Mean Back Calculated Length (FL, mm) at Age*

	Cohort							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	70	70.0	70.0	70.0
1	-	-	83	73	85	84	-	54.2	85.1	73.5
2	-	-	-	118	111	119	113	92.4	119.0	111.0
3	-	-	-	-	149	139	146	108.7	149.0	139.4
4	-	-	-	-	-	184	166	116.8	184.0	166.3
5	-	-	-	-	-	-	209	104.3	208.7	208.7
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	2	3	3	1	0	1			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	70	70.0	70.0	70.0
1	-	-	83	73	85	84	-	54.2	85.1	73.5
2	-	-	-	35	38	34	30	27.3	37.5	29.8
3	-	-	-	-	31	28	27	21.6	30.7	27.3
4	-	-	-	-	-	35	27	20.6	35.0	26.9
5	-	-	-	-	-	-	25	12.4	24.7	24.7
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	2	3	3	1	0	1			

* Note: Individual cohorts are identified by color. Cohort year is identified at Age 0.

* *Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-49. Back Calculations of Length at Age and Growth Increments for Rainbow Trout by Cohort and Year for Pitman Creek, Rosgen Level I B Channel Site (Pitm1), Above Diversion, 2002.

Mean Back Calculated Length (FL, mm) at Age*

	Cohort							Summary of All Values by Age		
Age of Growth	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002****	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	61	60.6	60.6	60.6
1	-	-	79	86	78	67	80	78.0	86.5	66.5
2	-	-	-	136	112	109	100	114.2	135.7	99.9
3	-	-	-	-	182	141	133	152.0	182.3	132.8
4	-	-	-	-	-	217	172	194.7	217.4	172.0
5	-	-	-	-	-	-	257	257.0	257.0	257.0
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	1	1	7	5	1	24			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002****	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	61	60.6	60.6	60.6
1	-	-	79	86	78	67	80	78.0	86.5	66.5
2	-	-	-	56	26	31	33	36.6	56.2	26.0
3	-	-	-	-	47	29	24	33.1	46.6	24.1
4	-	-	-	-	-	35	31	33.1	35.2	31.0
5	-	-	-	-	-	-	40	39.5	39.5	39.5
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	1	1	7	5	1	24			

* Note: Individual cohorts are identified by color. Cohort year is identified at Age 0.

* *Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-50. Back Calculations for Length at Age and Growth Increments for Brown Trout by Cohort and Year for Pitman Creek, Rosgen Level I B Channel Site (Pitm2), Below Diversion, 2002.

Mean Back Calculated Length (FL, mm) at Age*

	Cohort							Summary of All Values by Age		
Age of Growth	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002****	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	-	-	-	-
1	-	-	-	76	-	-	-	76.5	76.5	76.5
2	-	-	-	-	110	-	-	110.3	110.3	110.3
3	-	-	-	-	-	143	-	143.1	143.1	143.1
4	-	-	-	-	-	-	156	156.3	156.3	156.3
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	0	0	2	0	0			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002****	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	-	-	-	-
1	-	-	-	76	-	-	-	76.5	76.5	76.5
2	-	-	-	-	34	-	-	33.9	33.9	33.9
3	-	-	-	-	-	33	-	32.7	32.7	32.7
4	-	-	-	-	-	-	13	13.2	13.2	13.2
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	0	0	2	0	0			

* Note: Individual cohorts are identified by color. Cohort year is identified at Age 0.

* *Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-51. Back Calculations of Length at Age and Growth Increments for Rainbow Trout by Cohort and Year for Pitman Creek, Rosgen Level I B Channel Site (Pitm2), Below Diversion, 2002.

Mean Back Calculated Length (FL, mm) at Age*

	Cohort							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	71	71.3	71.3	71.3
1	-	76	-	75	77	74	79	76.1	79.4	74.0
2	-	-	119	-	101	108	100	107.1	118.9	100.4
3	-	-	-	160	-	126	130	138.9	160.3	126.5
4	-	-	-	-	176	-	152	163.9	175.6	152.2
5	-	-	-	-	-	198	-	198.2	198.2	198.2
6	-	-	-	-	-	-	219	218.9	218.9	218.9
Number of Fish Included	2	0	1	4	2	2	3			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	71	71.3	71.3	71.3
1	-	76	-	75	77	74	79	76.1	79.4	74.0
2	-	-	43	-	26	31	26	31.8	43.4	25.8
3	-	-	-	41	-	26	22	29.6	41.4	21.5
4	-	-	-	-	15	-	26	20.5	25.8	15.3
5	-	-	-	-	-	23	-	22.6	22.6	22.6
6	-	-	-	-	-	-	21	20.7	20.7	20.7
Number of Fish Included	2	0	1	4	2	2	3			

* Note: Individual cohorts are identified by color. Cohort year is identified at Age 0.

* *Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-52. Back Calculations of Length at Age and Growth Increments of Brook Trout by Cohort and Age for Pitman Creek, Rosgen Level I B Channel Site (Pitm2), Below Diversion, 2002.

Mean Back Calculated Length (FL, mm) at Age *

	Cohort							Summary of All Values by Age		
Age of Growth	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002****	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	-	-	-	-
1	-	-	-	-	-	71	-	71.2	71.2	71.2
2	-	-	-	-	-	-	97	97.4	97.4	97.4
3	-	-	-	-	-	-	-	-	-	-
4	-	-	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	0	0	2	0	0			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002****	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	-	-	-	-
1	-	-	-	-	-	71	-	71.2	71.2	71.2
2	-	-	-	-	-	-	26	26.1	26.1	26.1
3	-	-	-	-	-	-	-	-	-	-
4	-	-	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	0	0	2	0	0			

* Note: Individual cohorts are identified by color. Cohort year is identified at Age 0.

* *Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-53. Back Calculations of Length at Age and Growth Increments for Rainbow Trout by Cohort and Year for Balsam Creek, Rosgen Level I Aa+ Channel Site (Bals1), Above Diversion, 2002.

Mean Back Calculated Length (FL, mm) at Age*

	Cohort							Summary of All Values by Age		
Age of Growth	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002****	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	48	48.3	48.3	48.3
1	-	-	-	-	85	79	81	81.5	84.5	79.1
2	-	-	-	-	-	143	116	129.4	142.6	116.1
3	-	-	-	-	-	-	190	189.6	189.6	189.6
4	-	-	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	0	1	15	13	11			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002****	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	48	48.3	48.3	48.3
1	-	-	-	-	85	79	81	81.5	84.5	79.1
2	-	-	-	-	-	58	37	47.5	58.1	37.0
3	-	-	-	-	-	-	47	47.0	47.0	47.0
4	-	-	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	0	1	15	13	11			

* Note: Individual cohorts are identified by color. Cohort year is identified at Age 0.

* *Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-54. Back Calculations of Length at Age and Growth Increments for Rainbow Trout by Cohort and Year for Balsam Creek, Rosgen Level 1 Aa+ Channel Site (Bals2), Below Diversion, 2002.

Mean Back Calculated Length (FL, mm) at Age*

	Cohort							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	-	-	-	-
1	-	-	-	-	-	86	-	85.5	85.5	85.5
2	-	-	-	-	-	-	120	119.8	119.8	119.8
3	-	-	-	-	-	-	-	-	-	-
4	-	-	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	0	0	1	0	0			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	-	-	-	-
1	-	-	-	-	-	86	-	85.5	85.5	85.5
2	-	-	-	-	-	-	34	34.3	34.3	34.3
3	-	-	-	-	-	-	-	-	-	-
4	-	-	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	0	0	1	0	0			

* Note: Individual cohorts are identified by color. Cohort year is identified at Age 0.

* *Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-55. Back Calculations of Length at Age and Growth Increments for Rainbow Trout by Cohort and Year for Ely Creek, Rosgen Level I Aa+ Channel Site (Ely1), Above Diversion, 2002.

Mean Back Calculated Length (FL, mm) at Age*

	Cohort							Summary of All Values by Age		
Age of Growth	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002****	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	-	-	-	-
1	-	-	76	69	65	-	-	70.0	75.7	65.0
2	-	-	-	106	103	108	-	105.8	108.3	103.4
3	-	-	-	-	138	132	143	137.8	143.4	132.2
4	-	-	-	-	-	170	159	164.4	170.0	158.7
5	-	-	-	-	-	-	200	200.4	200.4	200.4
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	4	7	1	0	0	0			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002****	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	-	-	-	-
1	-	-	76	69	65	-	-	70.0	75.7	65.0
2	-	-	-	30	34	43	-	35.8	43.3	30.0
3	-	-	-	-	32	29	35	32.0	35.1	28.9
4	-	-	-	-	-	32	26	29.3	32.1	26.5
5	-	-	-	-	-	-	30	30.5	30.5	30.5
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	4	7	1	0	0	0			

* Note: Individual cohorts are identified by color. Cohort year is identified at Age 0.

* *Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-56. Back Calculations of Length at Age and Growth Increments for Rainbow Trout by Cohort and Year for Ely Creek, Rosgen Level I Aa+ Channel Site (Ely2), Below Diversion, 2002.

Mean Back Calculated Length (FL, mm) at Age*

	Cohort							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	-	-	-	-
1	-	-	78	-	76	70	64	72.1	77.8	63.8
2	-	-	-	107	-	107	91	101.6	106.8	91.3
3	-	-	-	-	143	-	137	139.8	142.7	136.8
4	-	-	-	-	-	186	-	185.6	185.6	185.6
5	-	-	-	-	-	-	205	204.5	204.5	204.5
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	2	0	6	1	3	0			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	-	-	-	-
1	-	-	78	-	76	70	64	72.1	77.8	63.8
2	-	-	0	29	-	30	21	26.8	30.4	20.9
3	-	-	-	-	36	-	30	33.1	35.9	30.2
4	-	-	-	-	-	43	-	42.8	42.8	42.8
5	-	-	-	-	-	-	19	18.9	18.9	18.9
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	2	0	6	1	3	0			

* Note: Individual cohorts are identified by color. Cohort year is identified at Age 0.

* *Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-57. Back Calculations of Length at Age and Growth Increments for Golden Trout by Cohort and Year for Ely Creek, Rosgen Level I Aa+ Channel Site (Ely2), Below Diversion, 2002.

Mean Back Calculated Length (FL, mm) at Age*

	Cohort							Summary of All Values by Age		
Age of Growth	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002****	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	-	-	-	-
1	-	-	-	-	73	64	65	67.2	73.2	63.6
2	-	-	-	-	-	103	95	99.0	102.9	95.1
3	-	-	-	-	-	-	131	131.0	131.0	131.0
4	-	-	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	0	3	1	1	0			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002****	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	-	-	-	-
1	-	-	-	-	73	64	65	67.2	73.2	63.6
2	-	-	-	-	-	30	32	30.6	31.6	29.7
3	-	-	-	-	-	-	28	28.0	28.0	28.0
4	-	-	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	0	3	1	1	0			

* Note: Individual cohorts are identified by color. Cohort year is identified at Age 0.

* *Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-58. Back Calculations of Length at Age and Growth Increments for Golden Trout by Cohort and Year for North Fork Stevenson Creek, Rosgen Level I A+ Channel Site (NFSC2), Below Tunnel 7, 2002.

Mean Back Calculated Length (FL, mm) at Age

	Cohort							Summary of All Values by Age		
Age of Growth	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002***	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	-	-	-	-
1	-	-	-	78	74	76	71	74.6	78.5	70.5
2	-	-	-	-	118	105	102	108.7	118.3	102.5
3	-	-	-	-	-	146	124	134.9	145.7	124.1
4	-	-	-	-	-	-	167	167.3	167.3	167.3
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	1	5	6	16	0			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002***	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	-	-	-	-
1	-	-	-	78	74	76	71	74.6	78.5	70.5
2	-	-	-	-	40	32	27	32.8	39.8	26.9
3	-	-	-	-	-	27	19	23.0	27.4	18.7
4	-	-	-	-	-	-	22	21.6	21.6	21.6
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	1	5	6	16	0			

* Note: Individual cohorts are identified by color. Cohort year is identified at Age 0.

* *Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-59. Back Calculations Length at Age and Growth Increments for Brown Trout by Cohort and Year for North Fork Stevenson Creek, Rosgen Level I G Channel Site (NFSC3), Below Tunnel 7, 2002.

Mean Back Calculated Length (FL, mm) at Age *

	Cohort							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	63	62.5	62.5	62.5
1	-	-	76	74	72	70	79	74.1	79.1	69.8
2	-	-	-	123	113	117	104	114.4	123.2	103.7
3	-	-	-	-	150	149	143	147.4	150.0	143.2
4	-	-	-	-	-	189	177	182.7	188.6	176.7
5	-	-	-	-	-	-	211	211.2	211.2	211.2
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	3	12	4	2	1	6			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	63	62.5	62.5	62.5
1	-	-	76	74	72	70	79	74.1	79.1	69.8
2	-	-	-	48	39	45	34	41.6	47.6	34.0
3	-	-	-	-	27	36	26	29.4	35.6	25.9
4	-	-	-	-	-	39	28	33.2	38.6	27.8
5	-	-	-	-	-	-	23	22.6	22.6	22.6
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	3	12	4	2	1	6			

* Note: Individual cohorts are identified by color. Cohort year is identified at Age 0.

* *Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-60. Back Calculations of Length at Age and Growth Increments for Rainbow Trout by Cohort and Year for North Fork Stevenson Creek, Rosgen Level I G Channel Site (NFSC3), Below Tunnel 7, 2002.

Mean Back Calculated Length (FL, mm) at Age*

	Cohort							Summary of All Values by Age		
Age of Growth	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002****	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	-	-	-	-
1	-	-	-	67	68	66	77	69.4	76.6	66.4
2	-	-	-	-	101	102	99	100.6	102.1	98.6
3	-	-	-	-	-	133	131	131.8	132.9	130.8
4	-	-	-	-	-	-	160	160.3	160.3	160.3
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	5	6	2	9	0			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002****	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	-	-	-	-
1	-	-	-	67	68	66	77	69.4	76.6	66.4
2	-	-	-	-	34	35	32	33.6	34.6	32.2
3	-	-	-	-	-	32	29	30.3	31.9	28.6
4	-	-	-	-	-	-	27	27.4	27.4	27.4
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	5	6	2	9	0			

* Note: Individual cohorts are identified by color. Cohort year is identified at Age 0.
* *Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-61. Back Calculations of Length at Age and Growth Increments of Golden Trout by Cohort and Year for North Fork Stevenson Creek, Rosgen Level I G Channel Site (NFSC3), Below Tunnel 7, 2002.

Mean Back Calculated Length (FL, mm) at Age *

	Cohort							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	-	-	-	-
1	-	-	-	-	75	-	-	74.5	74.5	74.5
2	-	-	-	-	-	119	-	119.1	119.1	119.1
3	-	-	-	-	-	-	149	148.9	148.9	148.9
4	-	-	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	0	1	0	0	0			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	-	-	-	-
1	-	-	-	-	75	-	-	74.5	74.5	74.5
2	-	-	-	-	-	45	-	44.6	44.6	44.6
3	-	-	-	-	-	-	30	29.8	29.8	29.8
4	-	-	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	0	1	0	0	0			

* Note: Individual cohorts are identified by color. Cohort year is identified at Age 0.

* *Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-62. Back Calculations of Length at Age and Growth Increments for Brown Trout by Cohort and Year for North Fork Stevenson Creek, Rosgen Level I C Channel Site (NFSC4), Below Tunnel 7, 2002.

Mean Back Calculated Length (FL, mm) at Age*

	Cohort							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	68	68.4	68.4	68.4
1	-	-	-	41	36	41	-	39.5	41.1	36.2
2	-	-	-	-	46	39	49	44.9	49.2	39.1
3	-	-	-	-	-	50	41	45.5	49.5	41.5
4	-	-	-	-	-	-	54	54.4	54.4	54.4
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	1	1	5	0	8			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	68	68.4	68.4	68.4
1	-	-	-	41	36	41	0	39.5	41.1	36.2
2	-	-	-	-	5	3	8	5.4	8.1	2.9
3	-	-	-	-	-	3	2	2.7	3.1	2.3
4	-	-	-	-	-	-	5	4.9	4.9	4.9
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	1	1	5	0	8			

* Note: Individual cohorts are identified by color. Cohort year is identified at Age 0.

* *Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-63. Back Calculations of Length at Age and Growth Increments for Rainbow Trout by Cohort and Year for North Fork Stevenson Creek, Rosgen Level I C Channel (NFSC4), Below Tunnel 7, 2002.

Mean Back Calculated Length (FL, mm) at Age*

	Cohort							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	-	-	-	-
1	-	-	-	-	38	38	39	38.4	39.2	37.8
2	-	-	-	-	-	45	45	44.8	45.1	44.5
3	-	-	-	-	-	-	49	48.7	48.7	48.7
4	-	-	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	0	2	3	3	0			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	-	-	-	-
1	-	-	-	-	38	38	39	38.4	39.2	37.8
2	-	-	-	-	-	7	7	6.8	6.9	6.8
3	-	-	-	-	-	-	4	4.2	4.2	4.2
4	-	-	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	0	2	3	3	0			

* Note: Individual cohorts are identified by color. Cohort year is identified at Age 0.

* *Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-64. Back Calculations of Length at Age and Growth Increments for Rainbow Trout by Cohort and Year for Stevenson Creek, Rosgen Level I Aa+ Channel Site (Stev1), Below Shaver Lake, 2002.

Mean Back Calculated Length (FL, mm) at Age*

	Cohort							Summary of All Values by Age		
Age of Growth	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002****	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	52	52.1	52.1	52.1
1	-	-	-	99	75	75	76	81.2	98.7	74.7
2	-	-	-	-	130	112	104	115.1	129.6	103.7
3	-	-	-	-	-	154	136	145.1	153.8	136.4
4	-	-	-	-	-	-	177	177.2	177.2	177.2
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	1	1	7	1	7			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002****	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	52	52.1	52.1	52.1
1	-	-	-	99	75	75	76	81.2	98.7	74.7
2	-	-	-	-	31	37	29	32.3	37.2	28.9
3	-	-	-	-	-	24	25	24.4	24.5	24.2
4	-	-	-	-	-	-	23	23.4	23.4	23.4
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	1	1	7	1	7			

* Note: Individual cohorts are identified by color. Cohort year is identified at Age 0.

* *Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-65. Back Calculations of Length at Age and Growth Increments for Rainbow Trout by Cohort and Year for Stevenson Creek, Rosgen Level I B Channel Site (Stev2), Below Shaver Lake, 2002.

Mean Back Calculated Length (FL, mm) at Age*

	Cohort							Summary of All Values by Age		
Age of Growth	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002****	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	-	-	-	-
1	-	-	-	73	83	76	71	75.9	83.1	71.3
2	-	-	-	-	97	114	112	108.0	114.5	97.2
3	-	-	-	-	-	115	128	121.6	128.4	114.7
4	-	-	-	-	-	-	135	135.3	135.3	135.3
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	1	2	2	2	0			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002****	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	-	-	-	-
1	-	-	-	73	83	76	71	75.9	83.1	71.3
2	-	-	-	-	24	31	36	30.6	36.5	23.8
3	-	-	-	-	-	17	14	15.7	17.5	14.0
4	-	-	-	-	-	-	21	20.7	20.7	20.7
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	0	1	2	2	2	0			

* Note: Individual cohorts are identified by color. Cohort year is identified at Age 0.

* *Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-66. Back Calculations of Length at Age and Growth Increments for Rainbow Trout by Cohort and Year for Stevenson Creek, Rosgen Level I A Channel Site (Stev3), Below Shaver Lake, 2002.

Mean Back Calculated Length (FL, mm) at Age*

	Cohort							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	-	-	-	-
1	-	-	72	71	69	65	71	69.4	72.4	65.2
2	-	-	-	103	95	91	85	93.3	102.5	85.1
3	-	-	-	-	131	117	116	121.3	130.7	116.1
4	-	-	-	-	-	149	143	145.7	148.7	142.6
5	-	-	-	-	-	-	167	166.9	166.9	166.9
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	2	4	1	1	1	0			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth							Summary of All Values by Age		
Age of Growth	1996	1997	1998	1999	2000	2001	2002**	Average	Maximum	Minimum
0	-	-	-	-	-	-	-	-	-	-
1	-	-	72	71	69	65	71	69.4	72.4	65.2
2	-	-	-	30	24	22	20	24.1	30.1	19.9
3	-	-	-	0	28	22	26	25.3	28.2	22.2
4	-	-	-	-	-	18	25	21.8	25.5	18.0
5	-	-	-	-	-	-	18	18.2	18.2	18.2
6	-	-	-	-	-	-	-	-	-	-
Number of Fish Included	0	2	4	1	1	1	0			

* Note: Individual cohorts are identified by color. Cohort year is identified at Age 0.

* *Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-67. Back Calculations of Length at Age and Growth Increments for Brown Trout by Cohort and Year for Florence Lake.

Mean Back Calculated Length (FL, mm) at Age

	Cohort														
Age of Growth	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002***	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1	-	-	-	-	-	-	-	73	73	78	-	-	74.9	78.0	73.4
2	-	-	-	-	-	-	-	-	124	130	122	-	125.2	129.9	122.1
3	-	-	-	-	-	-	-	-	-	151	169	161	160.3	169.3	150.9
4	-	-	-	-	-	-	-	-	-	-	178	207	192.6	207.0	178.2
5	-	-	-	-	-	-	-	-	-	-	-	227	226.9	226.9	226.9
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Number of Fish	-	-	-	-	-	-	2	2	2	-	-	-			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth														
Age of Growth	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002***	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1	-	-	-	-	-	-	-	73	73	78	-	-	74.9	78.0	73.4
2	-	-	-	-	-	-	-	-	50	57	44	-	50.3	56.5	44.1
3	-	-	-	-	-	-	-	-	-	27	39	39	35.1	39.3	27.3
4	-	-	-	-	-	-	-	-	-	-	27	38	32.5	37.7	27.3
5	-	-	-	-	-	-	-	-	-	-	-	49	48.6	48.6	48.6
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Number of Fish	-	-	-	-	-	-	2	2	2	-	-	-			

* Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-68. Back Calculations of Length at Age and Growth Increments by Cohort and Year for Rainbow Trout for Bear Forebay, 2002

Mean Back Calculated Length (FL, mm) at Age

	Cohort														
Age of Growth	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002***	**Average**	**Maximum**	**Minimum**
0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0
1	-	0	0	0	0	0	0	76	0	0	0	0	76.0	76.0	76.0
2	-	-	0	0	0	0	0	0	108	0	0	0	108.3	108.3	108.3
3	-	-	-	0	0	0	0	0	0	135	0	0	134.7	134.7	134.7
4	-	-	-	-	0	0	0	0	0	0	161	0	161.1	161.1	161.1
5	-	-	-	-	-	0	0	0	0	0	0	185	184.5	184.5	184.5
6	-	-	-	-	-	-	0	0	0	0	0	0	0.0	0.0	0.0
7	-	-	-	-	-	-	-	0	0	0	0	0	0.0	0.0	0.0
8	-	-	-	-	-	-	-	-	0	0	0	0	0.0	0.0	0.0
9	-	-	-	-	-	-	-	-	-	0	0	0	0.0	0.0	0.0
10	-	-	-	-	-	-	-	-	-	-	0	0	0.0	0.0	0.0
11	-	-	-	-	-	-	-	-	-	-	-	0	0.0	0.0	0.0
Number of Fish	0	0	0	0	0	0	1	0	0	0	0	0			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth														
Age of Growth	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002***	**Average**	**Maximum**	**Minimum**
0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0
1	-	0	0	0	0	0	0	76	0	0	0	0	76.0	76.0	76.0
2	-	-	0	0	0	0	0	0	32	0	0	0	32.3	32.3	32.3
3	-	-	-	0	0	0	0	0	0	26	0	0	26.4	26.4	26.4
4	-	-	-	-	0	0	0	0	0	0	26	0	26.4	26.4	26.4
5	-	-	-	-	-	0	0	0	0	0	0	23	23.5	23.5	23.5
6	-	-	-	-	-	-	0	0	0	0	0	0	0.0	0.0	0.0
7	-	-	-	-	-	-	-	0	0	0	0	0	0.0	0.0	0.0
8	-	-	-	-	-	-	-	-	0	0	0	0	0.0	0.0	0.0
9	-	-	-	-	-	-	-	-	-	0	0	0	0.0	0.0	0.0
10	-	-	-	-	-	-	-	-	-	-	0	0	0.0	0.0	0.0
11	-	-	-	-	-	-	-	-	-	-	-	0	0.0	0.0	0.0
Number of Fish	0	0	0	0	0	0	1	0	0	0	0	0			

* Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-69. Back Calculations of Length at Age and Growth Increments for Brown Trout by Cohort and Year for Bear Forebay, 2002.

Mean Back Calculated Length (FL, mm) at Age

	Cohort														
Age of Growth	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002*	Average	Maximum	Minimum
0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1	-	-	-	-	-	-	-	-	-	77	82	79	79.2	81.5	77.2
2	-	-	-	-	-	-	-	-	-	-	111	118	114.6	118.1	111.1
3	-	-	-	-	-	-	-	-	-	-	-	151	151.2	151.2	151.2
4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Number of Fish	-	-	-	-	-	-	-	-	2	1	1	-			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth														
Age of Growth	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002*	Average	Maximum	Minimum
0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1	-	-	-	-	-	-	-	-	-	77	82	79	79.2	81.5	77.2
2	-	-	-	-	-	-	-	-	-	-	34	37	35.2	36.6	33.9
3	-	-	-	-	-	-	-	-	-	-	-	40	40.1	40.1	40.1
4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Number of Fish	-	-	-	-	-	-	-	-	2	1	1	-			

* Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-70. Back Calculations of Length at Age and Growth Increments for Brown Trout by Cohort and Year for Mono Forebay, 2002.

Mean Back Calculated Length (FL, mm) at Age

	Cohort														
Age of Growth	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002*	Average	Maximum	Minimum
0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1	-	-	-	-	-	-	-	-	78	82	-	74	78.1	82.0	74.0
2	-	-	-	-	-	-	-	-	-	116	122	-	118.8	122.0	115.7
3	-	-	-	-	-	-	-	-	-	-	160	174	167.0	174.0	159.9
4	-	-	-	-	-	-	-	-	-	-	-	201	200.8	200.8	200.8
5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Number of Fish	-	-	-	-	-	-	-	1	1	-	1	-			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth														
Age of Growth	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002*	Average	Maximum	Minimum
0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1	-	-	-	-	-	-	-	-	78	82	-	74	78.1	82.0	74.0
2	-	-	-	-	-	-	-	-	-	37	40	-	38.7	40.0	37.4
3	-	-	-	-	-	-	-	-	-	-	44	52	48.1	52.0	44.2
4	-	-	-	-	-	-	-	-	-	-	-	41	40.8	40.8	40.8
5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Number of Fish	-	-	-	-	-	-	-	1	1	-	1	-			

* Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-71. Back Calculations of Length at Age and Growth Increments for Brown Trout by Cohort and Year for Mammoth Pool 2002

Mean Back Calculated Length (FL, mm) at Age

	Cohort														
Age of Growth	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002*	Average	Maximum	Minimum
0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1	-	-	-	-	-	-	-	79	71	69	-	-	73.0	79.3	69.0
2	-	-	-	-	-	-	-	-	117	109	107	-	110.8	116.8	107.1
3	-	-	-	-	-	-	-	-	-	137	132	139	135.9	138.9	132.0
4	-	-	-	-	-	-	-	-	-	-	192	180	186.1	192.3	179.9
5	-	-	-	-	-	-	-	-	-	-	-	261	261.2	261.2	261.2
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Number of Fish	-	-	-	-	-	-	2	3	1	-	-	-			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth														
Age of Growth	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002*	Average	Maximum	Minimum
0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1	-	-	-	-	-	-	-	79	71	69	-	-	73.0	79.3	69.0
2	-	-	-	-	-	-	-	-	38	38	38	-	37.8	38.2	37.5
3	-	-	-	-	-	-	-	-	-	20	23	32	25.1	31.8	20.1
4	-	-	-	-	-	-	-	-	-	-	55	48	51.6	55.3	47.9
5	-	-	-	-	-	-	-	-	-	-	-	69	69.0	69.0	69.0
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Number of Fish	-	-	-	-	-	-	2	3	1	-	-	-			

* Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-72. Back Calculations of Length at Age and Growth Increments for Rainbow Trout by Cohort and Year for Dam 6, 2002.

Mean Back Calculated Length (FL, mm) at Age

	Cohort														
Age of Growth	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002***	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1	-	-	-	-	-	-	85	-	84	-	-	-	84.5	85.4	83.6
2	-	-	-	-	-	-	-	147	-	130	-	-	138.7	147.3	130.0
3	-	-	-	-	-	-	-	-	194	-	175	-	184.6	194.3	174.8
4	-	-	-	-	-	-	-	-	-	254	-	226	240.2	254.1	226.4
5	-	-	-	-	-	-	-	-	-	-	316	-	316.1	316.1	316.1
6	-	-	-	-	-	-	-	-	-	-	-	346	346.0	346.0	346.0
7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Number of Fish	-	-	-	-	-	1	-	3	-	-	-	-			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth														
Age of Growth	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002***	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1	-	-	-	-	-	-	85	-	84	-	-	-	84.5	85.4	83.6
2	-	-	-	-	-	-	-	62	-	46	-	-	54.2	61.9	46.4
3	-	-	-	-	-	-	-	-	47	-	45	-	45.9	47.0	44.8
4	-	-	-	-	-	-	-	-	-	60	-	52	55.7	59.8	51.6
5	-	-	-	-	-	-	-	-	-	-	62	-	61.9	61.9	61.9
6	-	-	-	-	-	-	-	-	-	-	-	30	29.9	29.9	29.9
7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Number of Fish	-	-	-	-	-	1	-	3	-	-	-	-			

* Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-73. Back Calculations of Length at Age and Growth Increments for Brown Trout by Cohort and Year for Dam 6, 2002.

Mean Back Calculated Length (FL, mm) at Age

	Cohort														
Age of Growth	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002***	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1	-	-	-	-	-	-	97	-	93	-	89	-	93.1	96.8	89.0
2	-	-	-	-	-	-	-	145	-	139	-	132	138.4	144.7	132.0
3	-	-	-	-	-	-	-	-	228	-	200	-	214.2	228.5	200.0
4	-	-	-	-	-	-	-	-	-	297	-	252	274.7	297.3	252.2
5	-	-	-	-	-	-	-	-	-	-	348	-	348.2	348.2	348.2
6	-	-	-	-	-	-	-	-	-	-	-	390	390.0	390.0	390.0
7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Number of Fish	-	-	-	-	-	1	-	6	-	1	-	-			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth														
Age of Growth	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002***	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1	-	-	-	-	-	-	97	-	93	-	89	-	93.1	96.8	89.0
2	-	-	-	-	-	-	-	48	-	45	-	43	45.3	47.9	43.0
3	-	-	-	-	-	-	-	-	84	-	61	-	72.6	83.8	61.4
4	-	-	-	-	-	-	-	-	-	69	-	52	60.5	68.8	52.2
5	-	-	-	-	-	-	-	-	-	-	51	-	50.9	50.9	50.9
6	-	-	-	-	-	-	-	-	-	-	-	42	41.9	41.9	41.9
7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Number of Fish	-	-	-	-	-	1	-	6	-	1	-	-			

* Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-74. Back Calculations of Length at Age and Growth Increments for Rainbow Trout by Cohort and Year for Huntington Lake 2002.

Mean Back Calculated Length (FL, mm) at Age

	Cohort														
Age of Growth	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002*	Average	Maximum	Minimum
0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1	-	-	-	-	-	-	-	-	96	87	-	81	88.2	96.4	80.8
2	-	-	-	-	-	-	-	-	-	152	131	-	141.0	151.5	130.6
3	-	-	-	-	-	-	-	-	-	-	207	223	214.8	223.0	206.7
4	-	-	-	-	-	-	-	-	-	-	-	237	237.4	237.4	237.4
5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Number of Fish	-	-	-	-	-	-	-	1	1	-	1	-			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth														
Age of Growth	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002*	Average	Maximum	Minimum
0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1	-	-	-	-	-	-	-	-	96	87	-	81	88.2	96.4	80.8
2	-	-	-	-	-	-	-	-	-	55	43	-	49.1	55.2	43.1
3	-	-	-	-	-	-	-	-	-	-	55	92	73.8	92.4	55.2
4	-	-	-	-	-	-	-	-	-	-	-	31	30.6	30.6	30.6
5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Number of Fish	-	-	-	-	-	-	-	1	1	-	1	-			

* Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-75. Back Calculations of Length at Age and Growth Increments for Brown Trout by Cohort and Year for Huntington Lake 2002.

Mean Back Calculated Length (FL, mm) at Age

	Cohort														
Age of Growth	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002*	Average	Maximum	Minimum
0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1	-	-	-	-	-	-	114	107	-	85	-	-	102.1	114.0	85.4
2	-	-	-	-	-	-	-	175	153	-	124	-	150.7	175.0	124.4
3	-	-	-	-	-	-	-	-	237	193	-	172	200.8	237.0	172.4
4	-	-	-	-	-	-	-	-	-	292	227	-	259.7	292.0	227.3
5	-	-	-	-	-	-	-	-	-	-	385	283	334.1	385.0	283.2
6	-	-	-	-	-	-	-	-	-	-	-	471	471.0	471.0	471.0
7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Number of Fish	-	-	-	-	-	1	1	-	2	-	-	-			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth														
Age of Growth	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002*	Average	Maximum	Minimum
0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1	-	-	-	-	-	-	114	107	-	85	-	-	102.1	114.0	85.4
2	-	-	-	-	-	-	-	61	46	-	39	-	48.6	61.0	39.0
3	-	-	-	-	-	-	-	-	62	40	-	48	50.1	62.0	40.2
4	-	-	-	-	-	-	-	-	-	55	34	-	44.7	55.0	34.4
5	-	-	-	-	-	-	-	-	-	-	93	56	74.4	93.0	55.8
6	-	-	-	-	-	-	-	-	-	-	-	86	86.0	86.0	86.0
7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Number of Fish	-	-	-	-	-	1	1	-	2	-	-	-			

* Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-76. Back Calculations of Length at Age and Growth Increments for Rainbow Trout by Cohort and Year for Dam 4 Forebay 2002.

Mean Back Calculated Length (FL, mm) at Age

	Cohort														
Age of Growth	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002***	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1	-	-	-	-	-	-	-	-	-	-	-	69	69.0	69.0	69.0
2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Number of Fish	-	-	-	-	-	-	-	-	-	-	11	-			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth														
Age of Growth	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002***	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1	-	-	-	-	-	-	-	-	-	-	-	69	69.0	69.0	69.0
2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Number of Fish	-	-	-	-	-	-	-	-	-	-	11	-			

* Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-77. Back Calculations of Length at Age and Growth Increments for Brown Trout by Cohort and Year for Dam 4 Forebay 2002.

Mean Back Calculated Length (FL, mm) at Age

	Cohort														
Age of Growth	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002***	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1	-	-	-	-	-	-	-	95	91	94	-	67	86.9	95.2	67.4
2	-	-	-	-	-	-	-	-	141	155	138	-	144.8	155.0	138.4
3	-	-	-	-	-	-	-	-	-	209	220	196	208.2	220.1	195.8
4	-	-	-	-	-	-	-	-	-	-	301	280	290.1	300.6	279.6
5	-	-	-	-	-	-	-	-	-	-	-	364	364.0	364.0	364.0
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Number of Fish	-	-	-	-	-	-	1	3	1	-	1	-			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth														
Age of Growth	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002***	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1	-	-	-	-	-	-	-	95	91	94	-	67	86.9	95.2	67.4
2	-	-	-	-	-	-	-	-	46	64	44	-	51.4	63.8	44.4
3	-	-	-	-	-	-	-	-	-	68	65	57	63.4	67.8	57.4
4	-	-	-	-	-	-	-	-	-	-	92	60	75.7	91.8	59.5
5	-	-	-	-	-	-	-	-	-	-	-	63	63.4	63.4	63.4
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Number of Fish	-	-	-	-	-	-	1	3	1	-	1	-			

* Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-78. Back Calculations of Length at Age and Growth Increments for Rainbow Trout by Cohort and Year for Dam 5 Forebay, 2002.

Mean Back Calculated Length (FL, mm) at Age

	Cohort														
Age of Growth	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002*	Average	Maximum	Minimum
0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1	-	-	-	-	-	-	-	-	-	97	-	-	96.7	96.7	96.7
2	-	-	-	-	-	-	-	-	-	-	129	-	129.0	129.0	129.0
3	-	-	-	-	-	-	-	-	-	-	-	180	180.4	180.4	180.4
4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Number of Fish	-	-	-	-	-	-	-	-	1	-	-	-			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth														
Age of Growth	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002*	Average	Maximum	Minimum
0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1	-	-	-	-	-	-	-	-	-	97	-	-	96.7	96.7	96.7
2	-	-	-	-	-	-	-	-	-	-	32	-	32.3	32.3	32.3
3	-	-	-	-	-	-	-	-	-	-	-	51	51.4	51.4	51.4
4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Number of Fish	-	-	-	-	-	-	-	-	1	-	-	-			

* Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-79. Back Calculations of Length at Age and Growth Increments for Brown Trout by Cohort and Year for Dam 5 Forebay, 2002.

Mean Back Calculated Length (FL, mm) at Age

	Cohort														
Age of Growth	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002***	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1	-	-	-	-	-	-	-	-	102	97	81	-	93.2	102.2	80.7
2	-	-	-	-	-	-	-	-	-	149	155	140	147.9	154.8	139.6
3	-	-	-	-	-	-	-	-	-	-	181	195	187.7	194.8	180.6
4	-	-	-	-	-	-	-	-	-	-	-	225	225.4	225.4	225.4
5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Number of Fish	-	-	-	-	-	-	-	2	4	2	-	-			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth														
Age of Growth	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002***	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1	-	-	-	-	-	-	-	-	102	97	81	-	93.2	102.2	80.7
2	-	-	-	-	-	-	-	-	-	47	58	59	54.7	58.9	47.2
3	-	-	-	-	-	-	-	-	-	-	31	40	35.6	40.1	31.1
4	-	-	-	-	-	-	-	-	-	-	-	45	44.8	44.8	44.8
5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Number of Fish	-	-	-	-	-	-	-	2	4	2	-	-			

* Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-80. Back Calculations of Length at Age and Growth Increments for Rainbow Trout by Cohort and Year for Balsam Forebay, 2002.

Mean Back Calculated Length (FL, mm) at Age

	Cohort														
Age of Growth	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002***	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1	-	-	-	-	-	-	-	-	69	68	-	-	68.8	69.4	68.3
2	-	-	-	-	-	-	-	-	-	94	105	-	99.5	104.7	94.3
3	-	-	-	-	-	-	-	-	-	-	123	148	135.8	148.3	123.3
4	-	-	-	-	-	-	-	-	-	-	-	165	164.8	164.8	164.8
5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Number of Fish	-	-	-	-	-	-	-	1	1	-	-	-			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth														
Age of Growth	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002***	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1	-	-	-	-	-	-	-	-	69	68	-	-	68.8	69.4	68.3
2	-	-	-	-	-	-	-	-	-	25	36	-	30.6	36.3	24.9
3	-	-	-	-	-	-	-	-	-	-	29	44	36.3	43.6	29.1
4	-	-	-	-	-	-	-	-	-	-	-	42	41.5	41.5	41.5
5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Number of Fish	-	-	-	-	-	-	-	1	1	-	-	-			

* Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

Table CAWG 7-Appendix D-81. Back Calculations of Length at Age and Growth Increments for Brown Trout by Cohort and Year for Balsam Forebay, 2002

Mean Back Calculated Length (FL, mm) at Age

	Cohort														
Age of Growth	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002***	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1	-	-	-	86	-	-	-	-	-	-	-	-	85.5	85.5	85.5
2	-	-	-	-	130	-	-	-	-	-	-	-	129.7	129.7	129.7
3	-	-	-	-	-	166	-	-	-	-	-	-	166.5	166.5	166.5
4	-	-	-	-	-	-	203	-	-	-	-	-	203.3	203.3	203.3
5	-	-	-	-	-	-	-	284	-	-	-	-	284.2	284.2	284.2
6	-	-	-	-	-	-	-	-	365	-	-	-	365.2	365.2	365.2
7	-	-	-	-	-	-	-	-	-	439	-	-	438.7	438.7	438.7
8	-	-	-	-	-	-	-	-	-	-	505	-	505.0	505.0	505.0
9	-	-	-	-	-	-	-	-	-	-	-	556	556.5	556.5	556.5
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Number of Fish	-	-	1	-	-	-	-	-	-	-	-	-			

Mean Calculated Yearly Growth Increment (mm)

	Year of Growth														
Age of Growth	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002***	**Average**	**Maximum**	**Minimum**
0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1	-	-	-	86	-	-	-	-	-	-	-	-	86.0	86.0	86.0
2	-	-	-	-	44	-	-	-	-	-	-	-	44.2	44.2	44.2
3	-	-	-	-	-	37	-	-	-	-	-	-	36.8	36.8	36.8
4	-	-	-	-	-	-	37	-	-	-	-	-	36.8	36.8	36.8
5	-	-	-	-	-	-	-	81	-	-	-	-	80.9	80.9	80.9
6	-	-	-	-	-	-	-	-	81	-	-	-	80.9	80.9	80.9
7	-	-	-	-	-	-	-	-	-	74	-	-	73.6	73.6	73.6
8	-	-	-	-	-	-	-	-	-	-	66	-	66.2	66.2	66.2
9	-	-	-	-	-	-	-	-	-	-	-	52	51.5	51.5	51.5
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Number of Fish	-	-	1	-	-	-	-	-	-	-	-	-			

* Note: Full growth to annulus may not have been achieved by fish sampled during 2002.

APPENDIX E

Consultation Records

Big Creek Collaborative
Combined Aquatic Working Group

July 10, 2002

Final Meeting Notes

Time:	10:00 – 3:00 PM	**Moderator:**	Wayne Lifton
Location:	USFS Offices – Clovis, CA	**Facilitator**:	Bill Pistor
Teleconference No.:	1-800-556-4976	**Recorder**:	Wayne Lifton/Mitchell Katzel
Teleconference Name:	Combined Aquatic Working Group		

Attended By	Mitchell Katzel	ENTRIX
	Mike Henry	FERC
	Geoff Rabone	SCE
	Mark Newquist	SCE
	Wayne Allen	SCE
	Steve Rowan	SCE
	Wayne Lifton	ENTRIX
	Phil Strand	USFS
	Bill Pistor	Kearns & West
	Britt Fecko	SWRCB
	Lonnie Schardt	HLA
	Julie Means	CDFG
	Carson Cox	SWRCB

Phone Participants None

Handouts

- Agenda
- June meeting notes
- Carson Cox's comments on May Meeting Notes
- Larry Wise's map package
- Mitchell Katzel's aerial Overflight Forms
- Wayne Lifton's Candidate Fish Site and Macroinvertebrate Site Selection tables

Action Items Discussed

- CD-ROM identification still needs to be completed.
- Other materials went out
- Lind versus modified Lind still under discussion in subgroup.

It was suggested that all future meeting notes be more of a summary and a record of agreements/disagreements rather than pseudo transcriptions.
Need to avoid attributions unless someone wants to go formally on the record.

Geomorphology Update

Mitchell Katzel:
Verification of Rosgen Types and collection of other data.
NF Stevenson Creek outlet is Tunnel 7, Gate 2.
Stevenson Creek, review of changes based on ground.
Further clarification will be provided as work continues.

Did you see much woody debris? Not a lot. Not much geomorphic function.

Fish and Macroinvertebrate Sampling

Wayne Lifton's Presentation
We are only identifying sampling sites for those streams where we know the Rosgen stream typing. As we verify the Rosgen types from the Level I classification, we will stratify and identify the sampling locations.

Fish Sampling
Objective: determine fish abundance, growth, (etc based on CAWG-7) to be sampled in representative manner based on channel geomorphic type and habitat type (CAWG-1, -2).

Electrofishing sampling

Snorkeling surveys – habitats too deep for electrofishing

Stratification – sample one of each major Rosgen type, use Hawkins/collapsed habitat types that are representative based on habitat mapping. 100 meter sites per plan.

Reference sites – one site in comparable channel type upstream of Project diversion for small and medium size diversions. Upstream of diversions are not always the same Rosgen types as downstream. Larger streams – may not have good references to survey. Example is Stevenson Reach of San Joaquin River; Mammoth Pool Reach is upstream. It is not an adequate reference.

Discussion of streams and habitats to be sampled based on handout and slides. These included:
Adit No. 8, Balsam Creek, Ely Creek, NF Stevenson Creek, Stevenson Creek, Rock Creek, Ross Creek, Camp 62 Creek, Chinquapin Creek, North and South Slide Creeks, Crater Creek, Crater Creek Diversion, Hooper Creek, and Tombstone Creek.

Can you tell the difference between wild and hatchery fish in streams that are stocked? Usually yes, by appearance. Scales can be definitive if there is doubt.
Comment: Stratification approach is a good approach. Stratification procedure may help explain number differences between locations. In the past, stratification was just based

on visual observation and access.

Stevenson Creek – is above the Lake a suitable reference reach? We will need to evaluate.

Mammoth Pool Reach, San Joaquin River, SF San Joaquin River, Mono Creek, and Bolsillo Creek are waiting for Rosgen type verifications before determining fish sampling locations. Plan to present these to CAWG at next meeting.

No objections to proposed fish sampling sites.

Action Item 1: Copy of letter to USFWS for SWRCB electrofishing sampling.
It may be on website, otherwise will bring to next meeting.

<u>Macroinvertebrate Sampling</u>

Based on CAWG-10 Plan - focus is on water quality not macroinvertebrate community *per se.* Slide presentation.

Discussion of streams and habitats to be sampled based on handout and slides. These included:
Adit No. 8, Balsam Creek, Ely Creek, NF Stevenson Creek, Stevenson Creek, Rock Creek, Ross Creek, Camp 62 Creek, Chinquapin Creek, North and South Slide Creeks, Crater Creek, Crater Creek Diversion, Hooper Creek, and Tombstone Creek.

Comment: Macroinvertebrate sampling has been controversial; methodology is based on effects of toxics in the stream, not diversions.

Factors affecting macroinvertebrate sampling

Stratification – reduce variability due to channel type, substrate, and habitat type, in order to identify Project effects. Use reference sites that do not contribute additional variability or confounding comparisons. We have found that substrate size influences benthic community. Sample only one Rosgen Level I Channel type per study plan.

One sampling site at the upstream and downstream ends of each bypass reach.

RBP methodology specifies sampling riffle habitat. Some sites have no riffles. Runs are a potential substitute, but some sites have no runs.

Comment: Sampling should be representative of the reach.
We will visually estimate substrate particle size at sampling site. We probably won't have many choices for where we sample. RBP used as a water quality component.

Comment: Does study give any meaningful data if it's not done in a riffle or run?
Pools can be sampled, but we need to use different methods than for riffle/run. Cascades not practical to sample. Taxa and metrics from other habitat types may not be comparable, may confound use of metrics.

Comment: How are we considering tributary inputs?
We are not considering tributaries in these streams. We may want to give some thought to tributary influences in deciding where we sample. This is not a big issue on the streams we are discussing today, but sampling location on the larger streams have not yet been determined; we should consider tributary influences on the larger streams (**Action Item for August meeting**).

Decisions: There are three choices for sampling macroinvertebrates above and below diversions in a given stream type given the lack of riffles and runs in some reaches.

Proposal:
(1) If riffles are present in bypass reach but not above diversion, sample riffles – no reference site used above diversion.
(2) Where riffles are not available in bypass reach, but runs are, sample runs. Sample runs if available above diversion.
(3) If neither riffle nor run available, do not sample.

Discussion of potential approaches.
Suggest we sample riffles, stays closer to protocol. Better for diagnosing impacts to use riffles. Riffles tend to have greater diversity than runs. Larger rivers, runs can be more productive; on smaller streams riffles are more productive.

Concern expressed about not having an upstream reference, even if you use runs as a reference for riffles downstream. Concern for confounding results. Is sampling the riffle below diversion going to tell us anything about the Project diversion effect if there is no reference riffle upstream of the diversion? It will tell us something about the health of the stream, but you can't attribute anything to Project effects without the upstream reference.

Wayne – A way to address this is to compare runs above and below diversion, only the one run station immediately below the diversion. Riffles below the diversion would also be sampled including at the end of the reach, and intermediate station in long reaches. Only one channel type would be sampled per study plan. This would allow both a comparison above and below the diversion, and a comparison of changes along the bypass reach.

SWRCB – Would like to check with Russ Kanz before making a final decision on sampling protocol decisions. Will get back to the group, if any concerns.

List of streams with appropriate reference sites. **No objections to Wayne's proposal for sites and approach.**

Need reference sites for Stevenson Creek, if any. Will discuss with Geomorphologists.

Comment: Is there an example of instream flow release requirement for macroinvertebrates? None was identified.

<u>Short Lunch Break</u>

<u>Review of BiCEPs Instream Flow Studies</u>

After lunch, Larry Wise presented BiCEP PHABSIM studies done in mid-1980's.

The BiCEP project, conducted in the 1980's, evaluated the potential environmental effects associated with increasing the generation capacity of the Big Creek System. As part of these studies, an evaluation of fish habitat as a function of flow was undertaken in Big Creek, and the San Joaquin River below Mammoth Pool.

Reaches included:

Lower Big Creek (Big Creek Powerhouse 8 to Dam 5)
Upper Big Creek (Big Creek Powerhouse 2 to Dam 4)
Mammoth Reach (Mammoth Pool to Mammoth Pool Powerhouse)
Stevenson Reach (Powerhouse 3 to Dam 6)

Objectives of BiCEP PHABSIM Model Review:

1. Review of BiCEPs PHABSIM models to determine their utility in the ALP process and in meeting the informational needs of the CAWG
2. Provide recommendations regarding their use and their limitations

Review Criteria:

Is the habitat type identified in each of the models?
Do the model statistics for mean error and velocity adjustment factors fall within acceptable boundaries?
Do the range of flows in these models meet those needed for the current study or can they be extended to meet this range?
At what Flow are the headpins overtopped?
Are the transects representative of channel-types and mesohabitat types?
Have channel changes occurred that would affect the validity of the use of the models?

Explanation of PHABSIM model.

What's the probability of potential for significant change in channel type since 1984 when BiCEP transects were surveyed? Geomorphology will have to consider the potential for channel change since 1984.

Lower Big Creek Conclusions/Recommendations

- Habitat types identified in models, riffle not represented
- Calibration statistics within recommended tolerances
- Range of simulations limited by extent of channel profile survey, but may be extended to 75 cfs
- Re-weight habitat models to reflect recent habitat mapping

Upper Big Creek Conclusions/Recommendations:

- Habitat types identified in models
- Calibration statistics for most transects within recommended tolerances
- Range of simulations limited by extent of channel profile survey
- Upper range of simulations may be limited to 20 to 33 cfs at 5 of 15 transects
- Solutions for extending simulation range
    - Obtain additional transect measurements
    - Apply Lower Big Creek models to Upper Big Creek Reach

Mammoth Reach Conclusions/Recommendations:

- Habitat types identified in models
- Stage Discharge Relationships acceptable
- Velocity calibrations for most transects acceptable for some flows based on VAFs for a three flow model
- Re-weight habitat models to reflect recent habitat mapping
- Recommend attempting re-calibration using IFG-4A method
- Upper range of simulations limited to 375 cfs at 9 transects based on headpin elevations
- Additional transects needed to simulate whitewater flows (600 - 1,500 cfs)

Stevenson Reach – are Mammoth transects appropriate for Stevenson Reach? Need to complete channel geomorphology Rosgen Level I assessment.

If Mammoth Reach conclusions are applicable:

- Appropriate simulation range insufficient for whitewater flows (500 - 800 cfs), will need to add transects to simulate whitewater flows
- Re-weight habitat models to reflect recent habitat mapping

Need to select for any supplementary transects in September. Measurements to be made in Spring 2003. Hope to get report out in about two weeks, depends upon receiving geomorphology results.

Other Project reaches where IFIM needs to be performed but are not included in the BiCEP work:

- SF San Joaquin River
- Mono Creek
- Stevenson Creek
- NF Stevenson Creek

WETTED PERIMETER

Small tributaries with no storage
Diverted only during run-off period
Habitat bottlenecks likely to occur during base flow period
Sample reach upstream and bypass reach downstream of diversions
Studies dependent upon the presence of run-off due to lack of storage
Select sites and transects this fall

Measure 3 riffles (runs where riffles are not available)
Measure Stage-Q relationship
Determine flow needed to reach inflection point (where channel bottom fills with water)
Determine passage conditions

Seven tributaries for WP studies to be considered during field trip:
Ross Creek, Rock Creek, Adit 8 Creek (break in pipe is source of water), Ely Creek, Balsam Creek, and Pitman Creek.

Adit 8 Creek has 4 riffles for review by CAWG
Ely Creek has 5 riffles suitable for CAWG review below diversion
Rock Creek - 3 sites above diversion suitable for review; 2 sites below diversion

Comment - Consider plunge pool approach for Rock Creek and Bolsillo Creek? Consider amount of flow needed to transport food through pools. Look at velocity distribution through pools – literature suggests you need 0.3 ft/sec to move food through pools.

Field trip to select WP transects to begin July 29.

IFIM Transect Selections
Aug 19-23 - SF San Joaquin River
Sep 23-27 - Mono Creek, Stevenson Creek, NF Stevenson Creek, Big Creek below Huntington Lake

Geomorphology Subgroup

Vegetation Encroachment included:
Aerial Survey Reconnaissance Data Sheet
CAWG agrees on Aerial Survey data forms – with one modification:
(1) Add Active or Inactive to Tributary Recruitment conditions

Ground Survey Forms to be finalized via Phone Conference.

Report from Amphibian Subgroup

Phil Strand reviewed work by subgroup and recommendations.
Yosemite toad methodology– handout
    Yosemite toad methodology approved
Mountain Yellow-legged frog
    Handout
    Geographical and geomorphic stratification
Changes in sites:
Keep SFSJR Mono Xing to Rattlesnake, drop South Slide
Mono Creek above Lake Edison in place of Bear to be explained.

Approved MYLF site selection and methodology

Western Pond turtle pools are found in cascade/high gradient streams

Use Reese methodology for WPT, as discussed in subgroup. **No objections.**

Modifying approach based on fish and Foothill Yellow-Legged Frog surveys.
Focus surveys to look for them where they haven't been found.

Use both geographic and geomorphic stratification. Habitat quality (based on suitability analysis) is variable. Species is very mobile. Surveys need to be done by the end of July. Another meeting may be needed, probably next week to address sites and pool definition.

List of Action Items

1. Incorporate Carson's comments into 6/12 CAWG meeting summary

2. Meeting summary – Format improvement – July notes as model – Review in August meeting

3. SCE – USFWS letter Re: amphibians and electrofishing. Copy to Britt Fecko

4. August meeting topic – Tributary inputs for macroinvertebrates – S. Fork San Joaquin River in particular

5. Call Re: Wayne proposal on Run/Run reference and Riffle BD. Britt/Carson to check with Russ. Call With Russ and others, if needed

6. Remaining Geomorphology verification – remaining stream sample sites identified at August CAWG

7. Report on BiCEP transect use in ALP—discuss in August meeting

8. Transect selection: Field trip 7/29 – 8/02, 8/19 SFSJR, 9/23 Mono, Stevenson, NF Stevenson, Big Creek below Huntington Lake

9. Combine 7/10/02 presentations (Larry and Wayne) onto CD ROM and distribute

10. Teleconference – Geomorphology ground survey forms

Approvals/Concurrence

1. Fish Sampling sites

2. Macroinvertebrate Sampling Sites and Proposed Approach (Pending feedback from SWRCB regarding use of runs in upstream reference sites and immediately below the diversion for those streams with runs, but without riffles upstream of diversion, and having riffles present in bypass reach. Riffles in bypass reach would be sampled per study plan.)

3. Yosemite Toad Methodology as recommended by Amphibian Subgroup.

4. Mountain Yellow-legged Frog methodology as recommended by Amphibian Subgroup.

5. Reese Western Pond Turtle Methodology as recommended Amphibian Subgroup.

Big Creek Collaborative
Combined Aquatic Working Group

August 14, 2002

FINAL Meeting Notes

Time:	10 AM to 4 PM	**Moderator:**	Wayne Lifton
Location:	USFS Offices in Clovis	**Facilitator**:	Bill Pistor
Teleconference No.:	1-800-556-4976	**Recorder**:	Wayne Lifton/ Mitchell Katzel/ Larry Wise
Teleconference Name:	Combined Aquatic Working Group		
Attended By	Larry Wise	ENTRIX	
	Lonnie Schardt	HLA	
	Julie Means	CDFG	
	Wayne Allen	SCE	
	Bill Pistor	Kearns & West	
	Britt Fecko	SWRCB	
	Phil Strand	USFS	
	Steve Rowan	SCE	
	Wayne Lifton	ENTRIX	
	Carson Cox	SWRCB	
	Mitchell Katzel	ENTRIX	
	Julie Tupper	USFS	
Phone Participants	**For Amphibian Portion**		
	Laurraine Tigas	ENTRIX	
	Kathy Little	ENTRIX	
	John Hale		

<u>Review Previous Action Items</u>

- Discuss Run sampling for BMI
- May meting notes approved
- CD ROM of July presentations distributed
- July meeting notes approved
- SCE letter to USFWS re: electrofishing and amphibians. Copy sent to Britt.
- Brief discussion – EPA protocol uses runs. ENTRIX has call into Jim Harrington, will report results. Britt and Carson checked with Russ Kanz- he said runs OK and move forward or check with Harrington.

- September plenary meeting moved to Wednesday September 12
- CAWG Thursday September 13
- Recreation meeting Tuesday September 11
- Bill to follow up on September meeting schedule with group.
- Other action items to be addressed during today's meeting

Geomorphology Verification Presentation:

Rosgen reach breaks for San Joaquin River, SF San Joaquin River, Big Creek, Mono Creek
Review of Rosgen reach breaks Level 1.5.
CD-ROM passed out to subgroup 2 weeks ago. Will be revised later based on evaluation of field data.

SF San Joaquin River starting from confluence B and G, mostly G2 highly entrenched and confined becomes B at Rattlesnake Crossing. B2 and B3 based on substrate, C at Mono Hot Springs. B and G upstream. CS/B5 – near Jackass Meadow. Candidate for quantitative study lots of sand with gravel.

Macroinvertebrate and Fish Study Sites Presentation

Fish and Macroinvertebrate site selection
Review objectives
Streams to be discussed listed in handouts for fish and macroinvertebrates
Stratification strategy presented again from July presentation
For fish will sample all Rosgen Level I channel types representing >5% of a reach.
100 m sites with all major habitat types will be used for fish sampling.

Sampling sites to be selected for sites not previously approved. Waited for verification of channel types by geomorphology team. Sampling Sites based on Rosgen Channel Types from Level I and then verified from the Level 1.5 channel typing from aerial surveys and ground surveys. Includes additional reaches due to increased number of stream types than originally delineated from just Level I typing.
Streams include:

- SF SJR
- Mono Creek
- Bolsillo Creek
- Mammoth Pool Reach SJR
- Stevenson Reach of SJR
- Big Creek
- Pitman Creek

Fish Sampling

South Fork San Joaquin River:

- Primarily Rosgen Level I: B and G Channel Types with small areas of C.
- B Channel Type dominant downstream of Florence Lake
- G Channel Type dominant downstream of Hoffman Creek
- Sampling of Channel Types constituting >5% of length in each reach
- Sampling in reaches identified in CAWG-7.

Handout of fish sampling sites lists reaches and candidate sites.
SFSJR:
Florence to Bear – sample B and C not G type. Look at potential reference sites upstream of Florence.
Bear to Mono – sample B, C, and G
Rattlesnake to Mono – Sample B type channel
Rattlesnake to Confluence – very inaccessible. G-type channel One site identified upstream of Hoffman.

Description of potential reference reach sampling units (B and G channel types) upstream of Florence Lake to compare with SF San Joaquin River below Florence Lake for fish. No reference available for C type channel. References mostly valid for upper end of project reach – lower end is substantially lower in elevation.

Mono Creek- all B channel. One site below diversion. No adequate channel reference for Mono Creek above diversion because above is another bypass reach.

Bolsillo Creek-B channel above and below diversion, Aa+ channel also present below diversion. One site in each of these reaches.

Fish sampling in Mammoth Pool reach of SJR – B and G channel types, one site in each. No upstream reference, but this will be discussed later in presentation.

Stevenson Reach-all G channel type. Access can be challenging.
Sample two sites, one each in upper and lower portions of reach

Big Creek Dam 4 to PH 2 (Upper Big Creek Reach). Almost all A Channel type. No suitable reference upstream due to bypassed reach. One sampling site in A channel type.

Dam 5 to PH 8 (Lower Big Creek Reach). Primarily A channel, with Aa+ section in lower ½ mile. One sampling site in each channel type.

Big Creek below Huntington Lake Reach-Big Creek two miles below the dam to be verified by geomorphology team on the ground for next CAWG meeting. Will present potential fish sampling sites at that time.

Pitman Creek-Two channel types present B and Aa+. Only B present upstream of the diversion. We propose to sample three sites: B-above the diversion, B and Aa+ below the diversion.

Clarify that we are sampling representative reaches vs individual habitat units. We are sampling sites containing representative habitat types by channel type and stream reach. A stakeholder raised a concern that we may not be sampling large pools. Pools in candidate sites are selected to be representative of types for channel and reach type. Bigger, deeper pools will be snorkeled. Prefer to sample contiguous habitat types.

A question was asked as to how the group will address fishing pressure?
Will integrate data at some point in the future to tell the whole story regarding fish population issues; consider temperature, water quality, recreation take, stocking, hydrology, geomorphology, etc.

Macroinvertebrate Sampling

Macroinvertebrate sampling protocols described. If riffles are not present above diversion, but run is and is present below diversion, we will sample run above and immediately below the diversion and riffles throughout the bypass reach.
Are we taking into account the CSBP suggested alternate methodology if you don't have riffles? Spot sampling vs. Best available habitat discussion. Original EPA methodology was based on sampling cobble, and was not meant for pools or cascades. ENTRIX has called Jim Harrington at CDFG, but we have not talked with him at this time. Will discuss with him and adopt suggestions, as applicable.

South Fork San Joaquin River. Mostly B and G channel types. B channel dominant type below Florence Lake and in the vicinity of the diverted tributaries. G channel dominant in lower portion of reach including inaccessible areas. Both types are present at the bottom of the reach. Propose to sample B channel type, all candidate sites are riffles. Sample eight sites between Florence Lake and confluence with San Joaquin River.

Description of potential reference reach sampling units (B channel types) upstream of Florence Lake to compare with SF San Joaquin River below Florence Lake for macroinvertebrates.
Mono Creek downstream of Mono Diversion

- Rosgen Level I: B Type Channel
- Riffles Present
- Upstream reach is below Vermilion Valley Dam
- Reach upstream of Lake Edison sampled for Vermilion relicensing, may represent a potential reference

Four sites to be sampled in Mono Creek. Sampling will be conducted in similar substrate types – we don't want to sample sand in one location and gravel in another because this will confound the study results.

Bolsillo Creek. Bolsillo will be sampled above and below the diversion.
B channel type AD, B and Aa+ channel types BD
Sample B channel type AD and BD.

Mammoth Pool Reach. B and G channel types, B channel is the majority.
Propose to sample B type channel. There are riffles present in each of the B channel segments. Unclear as to whether the San Joaquin River section below the Mainstem San Joaquin River and SF San Joaquin River confluence could be used as a partial reference. It has upstream diversions on the South Fork, but also a major unregulated drainage area input. Subject of discussion for today, as well.

Can we sample B and G channel type instead of just the B channel type? Is this a change in the study plan? G channel type macroinvertebrate results are likely to be different than the B channel type results.

How do we sample every 2 miles and still consistently sample the same channel type? It seems like we are mixing and matching methodologies. We are using two approaches, point source (i.e., for example the Rock Creek spoils pile) and then comparing longitudinally above and below diversion ("ambient water quality" approach).

It is to our advantage to hold channel types constant to compare type B to type B. It may be difficult to sample across channel types and interpret the results. Try to reduce the factors that influence the results. Comparing above and below the diversion, you must hold the channel type constant. However, there are reasons to sample across channel types because this is considering things at a bigger scale to get at the overall stream aquatic health- longitudinal change issues. Concerns over the sediment input from the Rock Creek spoils pile and measuring effect on BMIs.

Proposed wording that stakeholders would like to have information across different channel types, sampling approximately every two miles to address issue of overall health of aquatic ecosystem, in addition to following the existing Study Plan which holds channel types constant above and below Project facilities to specifically addresses effect of diversions. State Board staff expressed that the proposal to have information across different channel types and sampling approximately every two miles is already a part of the study plan and is not an addition.

Channel type was over-riding factor in deciding where to put sampling locations according to existing Study Plan. We are reducing the variability by sticking to one channel type. State Board staff believe according to the existing study plan that channel type should only be one factor in deciding where to put sampling locations and see value in comparing CSVP information across channel types.

It is valuable to sample both types, but comparing across is adding too much variability and will confound results. Important to factor out this variability. Other factors such as temperature and elevation already contribute a lot of variability. State Water Board staff do not agree with this statement and see value in analyzing CSVP information both within and between channel types.

Proposal to sample B and G but treat as two "reaches" in Mammoth Reach:

Two sites in G type

Two sites in B type

Samples will likely come up with differences in BMIs. Must have an understanding that comparisons between channel types are likely to be confounded by differences. Move Site 3 upstream of Shakeflat Creek from the B into the G channel section. Put a site above Rock Creek in the G channel section. Proposed sites will address here spoils pile issue concerns. This provides data for longitude of reach and provides data also for within channel type comparisons. Stakeholders will have information to make comparisons either way. Seems agreeable group move on.

Discussion of reach from top of Mammoth Pool and NF-SF Confluence, one site will be sampled for reference placed in the first appropriate riffle upstream of inundation zone of Mammoth Pool.

Stevenson Reach - Only G type channel in this reach, which will be sampled at four locations. Access can be a problem in this reach. Riffles are available at each candidate site.

Big Creek

<u>Big Creek Dam 4 to PH 2 (Upper Reach).</u> Mainly A type channel. Riffles present at candidate sites. Sample three sites. No adequate reference, reach upstream is diverted.

<u>Big Creek Dam 5 to PH 8 (Lower Reach).</u> Mainly A type channel. Riffles present at candidate sites. Sample two sites. No adequate reference, reach upstream is diverted.

Pitman Creek. Two Rosgen channel types present: B and Aa+. Upstream of diversion B Channel Type with run habitat. Small section of B below diversion, but no riffles or runs. Aa+ below the diversion contains run habitat. B Channel run above diversion may lead to confounded comparisons. Propose to sample Aa+ channel only.

Would like to sample B channel AD to use as a reference to B channel BD on other sites without other references. The Aa+ channel section below the diversion can be compared with other Aa+ channel type reference sites on other streams, where the variability due to flow, altitude, drainage area, etc. is minimized.

Proposal to take one sample in the B-channel section above the diversion. SCE agrees to include this sample for reference reach purposes, not for comparison with the Aa+ channel section.

Next Steps:

Verify geomorphology for Rancheria Creek and for Big Creek between Huntington Lake and PH 1. Bring candidate sites to September CAWG meeting.

Does CAWG want sampling site in the lower South Fork Near Hoffman confluence? Access would require a 2-3 day commitment of time. There is a site near confluence. No, don't think this is worth the time for one site.

Channel Type	A		B	
Percent of Reach Length	***95.3%***		***4.7%***	
Habitat Classification	Percent	No. of transects	Percent	No. of transects
FLATWATER	6%	1	4%	3
RIFFLE	7%	2	15%	0 (+2)
SHALLOW POOL	15%	5	5%	0
DEEP POOL	51%	4	45%	0 (+2)

<u>BiCEP Model Review (</u>*Larry Wise: BiCEP presentation)*
Presentation of conclusions of Hydraulic Review
Recommend re-calibration of model using IFG4-A
Re-cap of last time. Conclusions of hydraulic review. Stage – discharge relationships look good.
Add transects as suggested.

Big Creek Reach
<u>Lower Big Creek</u>
Aa+ - type channel not represented in BiCEP models. Major habitat types are deep pools, cascade and shallow pools. CAWG recommended adding transects to represent deep and shallow pools (3 transects each). No transects in cascades as they don't provide substantial habitat. How important is it to pick three additional transects for Shallow Pool when it represents only 12% of a reach length that represents 29% of the reach length (i.e., 3% of the channel length)? It could be important because it may be the only significant area of fish production.

A-type channel represented in BiCEP model, except riffles. Recommend adding two transects to represent riffles.

<u>Upper Big Creek</u>
A-type channel: Information provided at meeting regarding habitats represented by existing transects was incorrect. Correct habitat representation provided below.

Original Information:

Corrected Information:

Based on this corrected information, we would recommend that one transect be added to better represent flatwater habitat. The initial proposed addition of transects to riffles and deep pools is now unnecessary.

B-type channel: very short reach of channel, but flatwater (run) represented in BiCEP

Channel Type	A		B	
Percent of Reach Length	***95.3%***		***4.7%***	
Habitat Classification	Percent	No. of transects	Percent	No. of transects
FLATWATER	6%	5	4%	3
RIFFLE	7%	1 (+1)	15%	0 (+2)
SHALLOW POOL	15%	6	5%	0
DEEP POOL	51%	0 (+3)	45%	0 (+2)

model by three transects. CAWG recommended adding two transects to riffles and two to deep pools to round out representation of habitat in this channel type. No transects would be placed in shallow pools.

SJR Mammoth Pool Reach
Mammoth – recommend recalibration using IFG 4A to extend range of flow simulation.

G-type channel: All habitat types adequately represented in G-type channel. No additional transects recommended for modeling usual range of flows.
B-type channel: Riffles not represented and deep pools underrepresented. Recommended adding two transects to each of these two habitat types.

Stevenson Reach
No BiCEP transect in Stevenson Reach. In BiCEP, Mammoth transects were used to represent Stevenson Reach.

Mammoth and Stevenson Reach have similar channel type, habitat type composition, and similar widths and depths. Recommend accepting use of Mammoth G-channel transects in Stevenson Reach.

State Board would like to see the BiCEP transect models peer reviewed. Some CDFG staff in the Region were involved in the BiCEP model. Gary Smith – CDFG can do the review. USFS would also like to peer review of the report. They will contact R2. SCE would like to see the peer reviewers consider if the additional transects proposed are necessary and cost-effective. Potential peer reviewers list: Gary Smith, Craig (?Chris) Hunter (State Board recommendation), Mark Gard (USFWS), Dudley Reiser (from R2).
Wayne Lifton to ask USFWS (Gary Taylor) about possible Mark Gard peer review.
Get it out quickly
Reviews must be back before September CAWG meeting.

Need review completed by CAWG meeting on September 12. Report done by August 26 for peer review. Let Bill Pistor know by 26th who will be reviewing report.

Postpone IFIM transect selection presentation due to lack of time. Reschedule to Tuesday 20th from 3:00-5:00 PM - Meeting to review Larry's presentation. Meeting to be facilitated.

Amphibians Study Discussion
Proposed pool definition for Western Pond Turtles. No objections to language in hand-out. Approval from CAWG.

Riparian Study Discussion
Substrate Size characteristics data collection is a concern in conjunction with the riparian vegetation. What is riparian vegetation nexus with particle size data?
Discussion of riparian data collection sheet, concern about what substrate data are being collected, especially out of channel/microhabitat.
Concern with field crews already out there doing geomorphology surveys. If this isn't decided may miss opportunity. Riparian info important for designing qualitative studies with PFC, SCI. How important is it?

Add to Riparian Data Collection Form information on Substrate at specific sites where riparian vegetation is growing. Data Sheet to now include:
Left Bank Dominant Particle Size Subdominant Particle Size

Right Bank   Dominant Particle Size Subdominant Particle Size
Data Sheet approved with modifications.

Riparian Data to be collected by Riparian/Botanist (John Hale for week of August 19).

Geomorphology
A reminder to everyone that the CD-ROM is mislabeled, it should indicate that the material represents the Rosgen "Level 1.5" classification and not Level I. We will do something about the labels.

Everyone has reviewed the memo material on CD-ROM, candidate study reaches for quantitative not to be sampled. There are 28 miles to be ground-truthed.

What if we feel there are holes in qualitative surveys? CAWG approves the list of ground survey sites for qualitative study.

Mitchell wants a concurrence from group on locations of ground survey sites for qualitative study. Approved.

Candidate sites for quantitative sites. Do not collect qualitative data at these locations. Mitch and Woody will be prepared to initiate first discussions regarding quantitative studies for the CAWG meeting on September 12th.

IFIM Transect Selection Schedule:
Upper Basin Sept 23-27
Sept 30 - Oct 4

Wayne to take care of CSBP question follow-up.

Agreement Actions:

1. CAWG agrees to fish and macroinvertebrate sampling sites as modified during the meeting today.

2. CAWG agrees on adding a macroinvertebrate site in G1/G2 section above Mammoth Pool since there is an added G sampling site below Mammoth Pool. The sampling will need to be done quickly since the elevation of Mammoth is dropping quickly.

3. CAWG approves list of Geomorphology Ground Survey Sites for Qualitative Study.

4. Western Pond Turtle pool definition approved.

5. Riparian forms approved with modification.

6. Geomorphology ground level qualitative study sites approved.

List of Action Items

Action Item 1: Kearns & West to finalize and distribute September meeting schedule.

Action Item 2: South Fork San Joaquin River - field for electrofishing, snorkeling, fish and macroinvertebrates (Sept). Let group (Britt) know when scheduled.

Action Item 3: Question: CSBP – alternatives for dealing w/ when a riffle is not available – i.e. spot sampling. Issue: can you compare a spot sampled riffle in reference reach with a "normal" riffle in BD reach?

Action Item 4: BiCEP PHABSIM Report and proposed additional transects:

- USFS/R2 review – Julie Tupper to contact Dudley Riser
- CDFG background and reviewers – Julie Means to contact Gary Smith and Dale Mitchell
- Carson verify from Canaday – Craig Hunter or Chris ? and proceed from there
- USFWS – Wayne Lifton to contact USFWS (Gary Taylor) to see if Mark Gard or other reviewer available
- Larry – report out quickly target date: 8/26/02

Group check with experts and report on Tuesday
* Fast review – concluded by September 12, 2002

Action Item 5: New transect selection - schedule meeting/call for next week – Tuesday 8/20/02 from 3 to 5 PM at USFS office in Clovis.

Action Item 6: Geomorphology data sheet needs substrate (dominant; subdominant; left and right bank (looking down); setting; comment and location).

Action Item 7: John Hale (or other riparian person) to go with geomorphology crew to help identify plants and locations.

FINAL

Big Creek Collaborative Relicensing
Combined Aquatics Working Group
Meeting Summary
September 12, 2002
10:00 AM – 3:00PM

Attendees:

Present:	Julie Means	CDFG
	Larry Wise	Entrix
	Wayne Lifton	Entrix
	Wayne Thompson	Federation of Fly Fishers
	Mike Henry	FERC
	Roger Robb	Friant Water Users Authority
	Lonnie Schardt	Huntington Lake Association
	Bill Pistor (Facilitator)	Kearns & West
	Bryan Harland (Notetaker)	Kearns & West
	Larry Lockwood	SAMS Coalition
	Geoff Rabone	Southern California Edison
	Wayne Allen	Southern California Edison
	Carson Cox	SWRCB
	Britt Fecko	SWRCB
	Rick Hopson	US Forest Service
	Cindy Whelan	US Forest Service
	Phil Strand	US Forest Service

Phone: [none]

Introduction, Ground rules, Agenda – Bill Pistor (Facilitator, Kearns & West) proposed ending the meeting at 3 today so that CRWG members can make it to the Cultural Resources Working Group meeting at 4PM at the Prather Forest Service Office. He then distributed and reviewed the meeting agenda with the group, which approved the agenda with the change in meeting time **[Attachment A: CAWG September 12, 2002 Meeting Agenda]**. Bill reviewed the groundrules from the Big Creek Collaborative Communications Protocol.

Review Previous Action Items – The CAWG reviewed action items from the Aug 14 and 20th meetings. Below are any action items from either of those meetings that are not yet completed (all actions are completed if not listed below):

- BICEP PHABSIM Report and proposed transect selection peer review
    - Julie Tupper contact Dudley Riser
    - Carson verify from Canaday
    - Julie Means has not heard back from Gary Smith and Dale Mitchell, by the end of the week she should hear from them.
    - Wayne Lifton to contact USFWS, has not heard back from them yet.

- Mike asked about the range of low to high flows Entrix is looking at in the middle range velocity measurements. Mike drew diagrams on flip chart to explain his issue. Suggested using the low flow and high flow velocities only and not the middle set of velocities to measure the IFG4. Whitewater flows are too high to extrapolate down to these flows. The group agreed.
- Britt to contact Russ Kanz RE: Pit amphibian experience (8/20 - Action Item 8).
- Check in with Recreation group after their walk through (8/20 - Action Item 8).

Mike Henry (FERC) asked about the reference to spawning gravel with Geomorphology. Wayne Lifton (Entrix) stated that the Stevenson Creek is a self contained creek that will need to be looked at for spawning gravel. Phil Strand (USFS) said that it might have been him that made the reference.

Schedule Riparian & Amphibian SubGroup Meetings – members were asked if they could make a combo Riparian (2 hrs) & Amphibian (3hrs) subgroup meeting on Oct 28th from 10AM to 4PM (10AM to 12PM for Riparian / 1PM to 4PM for Amphibian). **Action:** Julie Means (CDFG) will check availability of CDFG office for that day, if not available, **Action:** Phil Strand (USFS) will check the availability of the Clovis USFS office. **Action:** Janelle Nolan-Summers (Entrix) will provide meeting materials and agenda in advance to subgroup members.

Review and Approve Meeting Notes – Bill moved to postpone approving the meeting summaries due to a comment that needs to be addressed in the August 14th summary. **Action:** The revised meeting notes will be sent out to CAWG members at a later date for approval. **Agreement:** The group agreed.

ID Stream Sampling Locations for Fish and Macroinvertebrates for Rancheria Creek and Big Creek Downstream of Huntngton Lake
Wayne Lifton (Entrix) provided handouts to the group with sampling site locations RE: CAWG 7 & CAWG 10 **[Attachment B: CAWG September 12, 2002 PowerPoint Slides]**.

CAWG-7: Fish
Wayne reviewed Channel Types and characteristics for Big Creek and Rancheria Creek (cascade, riffle, pool habitats). Question was asked if the dog legged section that creates an artificial channel needs to be sampled. Are we trying to sample above and below the energy dissipation structure, which created an artificial channel, to see the impacts vs. the natural channel?

A suggestion was made to stay with the natural channels and the project effects to those and not sample the unnatural channels. Wayne proposed sampling above and below the channel and an extra sample in the artificial affected channel. **Agreement:** The group agreed.

Bill asked if the group approves the proposed approach for fish. The group agreed.

CAWG-10: Macroinvertebrates
Wayne reviewed sampling sites for CAWG-10 (channel types and characteristics). Rancheria Creek and Big Creek. Wayne asked if, based on the CAWG-7 discussion, does the group want to do a spot sample in the artificial channel as well? **Agreement:** The group agreed.

A question was raised as to whether the CAWG will be sampling above and below the dam on Big Creek? Wayne said that the group will have to make that decision because there are no good reference sites. Balsam, and Stevenson might be good references. A stakeholder stated that he would prefer more samplings in the B channel types. Wayne suggested taking an extra B channel sample. **Agreement:** The group agreed to adding a B channel sample between the two proposed B channel sample sites.

<u>Instream Flow/Wetted Perimeter</u> – Larry Wise (Entrix) reviewed the topics for discussion of Instream Flow / Wetted Perimeter studies with a PowerPoint Presentation**.**

Raionale for Number of Transects by Channel and Habitat Type
Larry gave the reasons for transect selections for PHABSIM studies and an overview of the ALP PHABSIM and wetted perimeter studies. Larry explained how streams were categorized for the study plan development by using Rosgen channel types. By placing transects in each major habitat type within each Rosgen channel type, variability is reduced. The number of transects used in other relicensing studies –Lower Tule, Pit, and Stanislaus– done by different environmental engineering firms show that the number of proposed transects for the Big Creek Relicensing are equal to or greater than the number of transects being used for other current relicensings.

A comment was made that the number of transects that have been selected are within the protocols he's read. Another stakeholder said that Gary Smith likes the rule of 3 (3 within each habitat and 3 replicates). A proposal was made that the group agree to an established process for transect selection in writing.

The group discussed that it would be difficult to decide at a working group meeting on what the rules of transects selections should be, since it's often a decision that is made in the field based on the channels and similarity to other channels.

A stakeholder suggested a meeting between the experts for the transects selection process. Bill proposed a conference call with the SWRCB, the CDFG and Gary Smith to review the proposed transect methodology. The CDFG agreed to participating in a conference call/meeting to go over the transect selection to give the SWRCB a comfort level with the transects selection.

Bill asked if there was a consensus on the proposed approach on the number of transects selections. The CAWG, with the exception of the SWRCB, agreed on the protocol for transect selection. The SWRCB would like to consult with Gary Smith who works in an advisory capacity for the SWRCB and CDFG before agreeing to the approach. The CDFG agreed to participate in the consultation meeting with Gary Smith, who is working for both the CDFG and SWRCB.

Bill proposed the following process for review and approval of the transect selection (see below)

Proposed approach to resolve the number of transects question:

1.) Immediately following today's CAWG meeting: Julie, Carson, Britt, and Larry Meet Re: number of transect selection
2.) Blurb on 2, 2, 3 rationale explained by Larry emailed to the group on September 13.
3.) SWRCB and CADFG call w/Gary Smith Friday September 13th.
4.) Follow-Up with Wayne, if necessary on Monday September 16th.
5.) Decision Mid-Next Week. Kearns & West will make calls to the SWRCB and CADFG to get the decision.

Agreement: The group agreed to this process and will be provided with an update on the process before the next working group meeting.

Major Habitats for the South Fork San Joaquin River by Channel Type
Larry gave a presentation on the Rosgen channel types on the South Fork San Joaquin River.

Larry explained that it would be extremely dangerous and difficult to do samples in the South Fork San Joaquin below Rattlesnake Crossing. Larry suggested that since the data can be replicated elsewhere, that the CAWG not sample the inaccessible reach and instead use data from comparable reaches with similar channel types. **Agreement:** The group also agreed to not do samples in the G channels and use the G channel near Florence dam to represent the inaccessible G channel downstream.

South Fork San Joaquin B Channel Summary

- Place new transects in riffles and runs in area below Mono Crossing
- 2 transects per habitat type
- Use transects in upstream B-type channel to represent pools in this area

Bill asked for a consensus on the proposed channel selection for B channel types. **Agreement:** The group agreed, pending the decision on the approach to the numbers of transects, per the earlier action item with SWRCB and CDFG consultation with Gary Smith.

Transect Placement in Non BiCEP Reaches (IFIM Reaches)
Rancheria Creek and Big Creek Wetted Perimeter Studies. The proposal is to put three transects in the riffles of B-Channel types in Rancheria Creek. Proposal to put transects in each of the major habitat types in each of the channel types (four sets) within this reach, except for channel types that are less than 5%.

(Please see PowerPoint Presentation for detailed analysis of Channel types and number of transects)

Agreement: The group agreed on the locations of the transects, with the pending discussion with Gary Smith on the numbers of transects.

BiCEP Review
Bill asked if there has been enough peer review for a discussion on the BiCEP review. The group said that they needed more time to review the documents that were distributed and would like to postpone the discussion for a later date.

Wayne Lifton asked if the group could schedule a meeting to discuss the BiCEP Review on October 3rd at Big Creek in person and conference call from 8AM to 10AM. **Action:** Wayne will distribute an agenda with call-in information to CAWG members. **Agreement:** The group agreed.

<u>Geomorphology-Approach to Quantitative Studies</u> – Mitch gave presentation on the framework for identifying project effects and quantitative studies.
[Attachment C: Montgomery-Buffington Approach to Channel Classification PowerPoint Presentation]

Mitch explained the different categorizations for channels based on the Montgomery-Buffington approach and described the characteristics of each channel type (see Attachment E for further details).

Mitch explained that the different channel types influence the potential responses to change in flow or sediment regime. The intensity of disturbance is an important factor in the channel responses. The further downstream from the disturbance, the more the channel asserts its' natural form.

Montgomery and Buffington categorized different channel types possible response to changing conditions. Bedrock channels are not very likely to respond to change in transport. Riffles have the highest probability to change, but they are the smallest percentage of channel types in the Big Creek Project.

When the group looks at project affects, they should keep in mind how likely these channel types are affected by the project. Also, when developing PM&E measures, these differences in channel types and responses to change are a major factor in deciding where the most effect will be.

There was a brief discussion on the suitability of studies based on differing channel types. The group agreed to discuss that issue at a later date.

A question was asked if there is an instance in the Big Creek Project where the channel type changed entirely. Mitch stated that North Fork Stevenson is probably the best example.

Due to a lack of time, the Geomorphology presentation will be continued at the October CAWG meeting. **Action:** CAWG members also asked Mitch to email copies of this PowerPoint presentation to the group before the October meeting. Mitch agreed.

Agreements

1. The CAWG agreed to Riparian and Amphibian SubGroup meetings on October 28 from 10AM to 4PM (10 to 12: Riparian / 1 to 4 Amphibian).
2. CAWG agreed to postpone approving the Aug 14 and 20 meeting summaries until revised versions have been sent to members for review.
3. CAWG agreed to an extra sample in the “artificial channel” on Rancheria Creek for CAWG-7 and CAWG-10.
4. CAWG agreed to the proposed B channel samples on Big Creek for CAWG-10 and adding another B channel sample between the two B channels.
5. CAWG, with the exception of Britt Fecko, Carson Cox, and Julie Means, agreed to the transect selection rationale proposed by Entrix. Britt, Carson, and Julie will contact Gary Smith on September 13 and report back to CAWG (see action item 3 below).
6. CAWG agreed to not do samples in G channel types on the South Fork San Joaquin, due to inaccessibility. CAWG agreed to use the G channel type near Florence Dam to represent the inaccessible G channel downstream instead.
7. CAWG agreed, pending the SWRCB/CDFG Gary Smith review of transect selection methodology, to the proposed B channel sampling approach on the South Fork San Joaquin River.
8. CAWG agreed, pending the SWRCB/CDFG Gary Smith review of transect selection methodology, to the proposed transect placement in Non BiCEP Reaches.
9. CAWG agreed to a meeting/conference call on October 3 from 8AM to 10AM RE: BiCEP Review.

Unfinished Actions from Previous Meetings

- BICEP PHABSIM Report and proposed transect selection peer review (8/14 - Action Item 4)
  - Julie Tupper contact Dudley Riser
  - Carson verify from Canaday
  - Wayne Lifton to contact USFWS, has not heard back from them yet.
- Britt to contact Russ Kanz RE: Pit amphibian experience (8/20 - Action Item 8).
- Check in with Recreation group after their walk through (8/20 - Action Item 8).

List of Actions from September 12, 2002 Meeting

Action 1: Riparian & Amphibian SubGroup meeting scheduled on October 28 from 10AM to 4PM (10 to 12: Riparian / 1 to 4 Amphibian).. Julie Means will check meeting room availability at the CDFG office in Fresno. If CDFG meeting room is not available, Phil Strand will check meeting room availability at the USFS Clovis Office.

Action 2: The August 14, 2002 CAWG meeting summary will be revised and distributed to CAWG members for final approval.

Action 3: *CDFG & SWRCB secondary review of transect selection methodology*

- Immediately following the September 12, 2002 CAWG meeting, Julie Means (CDFG), Carson Cox (SWRCB), Britt Fecko (SWRCB), and Larry Wise (Entrix) meet to discuss the rationale for transect selection. Larry to give memo to SWRCB & CDG for meeting with Gary Smith.
- Larry to email transect selection memo to CAWG on September 13, 2002.
- SWRCB and CDFG conference call with Gary Smith on September 13, 2002 RE: transect selection.
- On September 16, 2002, SWRCB and CDFG call Wayne Lifton with any questions from Gary Smith call, if necessary. Wayne to relay any questions to Larry; give answers to CDFG & SWRCB by September 18, 2002.
- SWRCB and CDFG to give Wayne Lifton decision if agree with transect select methodology or not by September 19, 2002.

Action 4: CAWG to hold a meeting to discuss the BiCEP review on October 3, 2002 from 8AM to 10AM. Wayne Lifton will distribute agenda and conference call information to CAWG members.

Action 5: Mitch (Entrix) will email the Geomorphology PowerPoint presentation on the Montgomery-Buffington Approach to Channel Classification to CAWG members.

Attachments

Attachment A: CAWG September 12, 2002 Meeting Agenda
Attachment B: CAWG September 12, 2002 PowerPoint Presentation
Attachment C: Montgomery-Buffington Approach to Channel Classification PowerPoint Presentation

APPENDIX F

Physical Measurements Taken at Fish Sampling Sites, 2002

Table CAWG 7-Appendix F-1. Physical Measurements Taken at Stream Fish Sampling Sites, 2002.

Stream	Reach	Rosgen Level I Type Channel	Date	Water Temperature (^oC)*	Observed Turbidity or Discoloration	Conductivity (mS)	DO (mg/L)	pH (units)
SFSJR	Upstream of Florence Lake	B	8/26/2002	13.0	none	0.001	8.2	7.03
SFSJR	Bear Creek to Florence Lake	C	9/4/2002	61.0	none	0.020	8.0	7.50
SFSJR	Bear Creek to Florence Lake	B	9/5/2002	14.8	none	0.021	7.5	7.38
SFSJR	Mono Xing to Bear Creek	B	9/9/2002	15.7	none	0.026	7.8	7.19
SFSJR	Mono Xing to Bear Creek	C	9/10/2002	16.6	none	0.055	8.1	7.33
SFSJR	Mono Xing to Bear Creek	G	9/11/2002	16.8	none	0.023	8.2	7.02
SFSJR	Rattlesnake Xing to Mono Xing	B	10/10/2002	12.9	none	0.069	10.0	8.18
SFSJR	SJR Confl. to Rattlesnake Xing	G	10/8/2002	12.1	none	0.050	9.1	7.33
Mono Creek	Below Diversion (BD)	B	9/17/2002	16.8	none	0.023	8.2	7.02
Bolsillo Creek	AD	B	9/8/2002	11.0	none	0.047	6.6	6.76
Bolsillo Creek	BD	B	10/7/2002	7.8	none	0.048	8.7	7.00
Bolsillo Creek	BD	Aa+	10/3/2002	4.5	none	0.026	10.8	7.08
SJR	Mammoth Reach, Upper Site	G	8/24/2002	18.9	none	0.024	8.7	7.20
SJR	Mammoth Reach, Lower Site	B	8/24/2002	20.4	none	0.026	9.2	8.21
SJR	Stevenson Reach, Upper Site	G	8/21/2002	20.4	none	0.019	8.1	7.10
SJR	Stevenson Reach, Lower Site	G	8/20/2002	22.0	none	0.030	10.9	7.30
Big Creek	PH 1 to Dam 1	A	10/31/2002	8.0	none	0.020	10.3	6.70
Big Creek	PH 1 to Dam 1	Aa+	10/25/2002	6.4	none	0.023	12.6	5.86
Big Creek	PH 1 to Dam 1	B	10/27/2002	11.8	none	0.013	9.8	6.51
Big Creek	PH 1 to Dam 1	G	10/27/2002	12.2	none	0.012	9.4	6.20
Big Creek	PH 2 to Dam 4	A	10/28/2002	8.8	none	0.020	9.9	6.71
Big Creek	PH 8 to Dam 5	A	10/29/2002	12.5	none	0.013	11.6	6.26
Big Creek	PH 8 to Dam 5	Aa+	10/30/2002	10.5	none	0.014	12.8	6.72
Pitman Creek	AD	B	10/26/2002	3.6	none	0.040	12.1	7.18
Pitman Creek	BD Site 1	B	10/28/2002	4.8	none	0.063	11.4	6.85
Pitman Creek	BD Site 2	Aa+	10/28/2002	5.4	none	0.001	12.8	7.63
Balsam Creek	AD	Aa+	7/27/2002	16.0	none	0.030	9.1	7.00
Balsam Creek	BD	Aa+	7/28/2002	14.0	none	0.050	9.1	7.40

Table CAWG 7-Appendix F-1. Physical Measurements Taken at Stream Fish Sampling Sites, 2002 (cont).

Stream	Reach	Rosgen Level I Type Channel	Date	Water Temperature (^oC)*	Observed Turbidity or Discoloration	Conductivity (mS)	DO (mg/L)	pH (units)
Ely Creek	AD	Aa+	7/28/2002	17.0	none	0.070	6.9	7.10
Ely Creek	BD	Aa+	7/28/2002	16.0	none	0.080	7.5	6.80
Rock Creek	AD	Aa+	8/1/2002	21.0	none	0.050	8.4	7.20
Rock Creek	BD	Aa+	10/6/2002	11.5	none	0.043	11.1	6.85
Ross Creek	AD	Aa+	did not sample					
Ross Creek	BD	Aa+	did not sample					
Adit 8 Creek		Aa+	did not sample					
Adit 8 Creek		Aa+	7/27/2002	12.0	none	0.020	10.5	5.80
Bear Creek	AD	B	10/4/2002	9.5	none	0.020	9.8	6.53
Bear Creek	BD	A	10/5/2002	8.5	none	0.020	9.8	7.28
Chinquapin Creek	AD	Aa+	9/6/2002	9.6	none	0.050	8.9	7.52
Chinquapin Creek	BD	Aa+	8/27/2002	12.5	none	0.028	7.1	7.10
Camp 62 Creek	AD	Aa+	8/12/2002	11.9	none	0.020	8.5	7.00
Camp 62 Creek	BD	Aa+	8/13/2002	12.3	none	0.020	8.1	6.90
Crater Creek	AD	Aa+	10/23/2002	2.0	none	0.026	11.7	7.37
Crater Creek	BD	Aa+	10/24/2002	2.3	none	0.037	12.7	6.82
Crater Creek	BD	C/E	did not sample					
Crater Creek	Diversion Channel	Aa+	10/24/2002	2.6	none	0.034	11.7	7.23
Hooper Creek	AD	Aa+	8/11/2002	11.0	none	0.010	11.4	6.00
Hooper Creek	BD	Aa+	8/10/2002	15.0	none	0.010	10.8	6.00
North Slide Creek	AD	Aa+	8/9/2002	11.0	none	0.010	9.8	7.00
North Slide Creek	BD	Aa+	8/9/2002	11.0	none	0.010	9.9	6.90
South Slide Creek	AD	Aa+	8/9/2002	11.0	none	0.010	9.6	6.80
South Slide Creek	BD	Aa+	8/9/2002	11.0	none	0.010	9.7	6.60
Tombstone Creek	AD	Aa+	8/8/2002	10.0	none	0.020	11.0	6.40
Tombstone Creek	BD	Aa+	8/8/2002	12 C	none	0.020	10.2	6.00
Tombstone Creek	BD	C/E	did not sample					

Table CAWG 7-Appendix F-1. Physical Measurements Taken at Stream Fish Sampling Sites, 2002 (cont).

Stream	Reach	Rosgen Level I Type Channel	Date	Water Temperature (^oC)*	Observed Turbidity or Discoloration	Conductivity (mS)	DO (mg/L)	pH (units)
Stevenson Creek	Below Shaver Lake, Site 1	Aa+	8/6/2002	15.0	none	0.020	10.5	6.40
Stevenson Creek	Below Shaver Lake, Site 2	B	8/7/2002	14.0	none	0.020	10.6	6.20
Stevenson Creek	Below Shaver Lake, Site 3	A	10/30/2002	9.0	none	0.016	13.5	6.74
North Fork Stevenson Creek	Above Tunnel 7 Outlet	Aa+	7/26/2002	13.5	none	0.043	7.3	8.10
North Fork Stevenson Creek	Below Tunnel 7 Outlet, Site 1	Aa+	8/2/2002	17.0	none	0.010	8.3	6.60
North Fork Stevenson Creek	Below Tunnel 7 Outlet, Site 2	B	7/26/2002	71.0	none	0.019	6.5	6.50
North Fork Stevenson Creek	Below Tunnel 7 Outlet, Site 3	C	7/29/2002	17.0	none	0.010	8.9	7.20

* Surface water temperature

Table CAWG 7-Appendix F-2. Physical Measurements Taken at Impoundment Fish Sampling Sites, 2002.

Reservoirs and Impoundments[1]	Date	Water Temperature (°C)[2]	Secchi Disk Transparency (m)	Conductivity (mS)	DO (mg/L)	pH (units)
Dam 4 Forebay	5/20/2002	6.4	9.0	0.022	7.1	7.06
Dam 5 Forebay	7/23/2002	12.4	8.6	0.017	7.3	6.45
Dam 6 Forebay	8/28/2002	18.0	7.2	0.030	5.8	6.55
Balsam Meadow Forebay	6/5/2002	10.8	8.9[3]	0.015	9.1	6.44
Bear Diversion Forebay	7/25/2002	14.5	2.4[3]	0.014	5.7	6.61
Mono Diversion Forebay	6/28/2002	15.8	4.1[3]	0.025	6.8	5.78
Florence Lake	9/24/2002	16.7	9.0	0.014	7.0	6.40
Shaver Lake	7/26/2002	22.4	8.9	0.018	5.6	6.84
Mammoth Pool	9/25/2002	21.0	9.9	0.049	7.3	7.14
Huntington Lake	6/25/2002	17.2	8.3	0.017	7.1	5.83

[1] Surface water quality data and secchi depth are provided. See CAWG 4 - Chemical Water Quality for complete data.
[2] Surface water temperature.
[3] Secchi disk was visible on the bottom of the forebay.

APPENDIX G

Fish Survey Results for North Fork Stevenson Creek

CAWG 7-APPENDIX G NORTH FORK STEVENSON CREEK

The fish community of North Fork Stevenson Creek (NFSC) was surveyed in 2002 as part of the CAWG 7 Study. There were four sites sampled in NFSC from July 26 to August 2, 2002. Three of the NFSC sites were equivalent sites to those sampled during previous studies performed by BioSystems (1993) from 1988 to 1992, and by ENTRIX (2002) during 2000 and 2001. These sites were:

1. the Aa+ channel site below the Tunnel 7 outlet (Map Location NFSC2) equivalent to Upper Cascade Site of earlier BioSystems and ENTRIX studies,

2. the G channel site below the Tunnel 7 outlet (Map Location NFSC3) equivalent to Upper Plateau 2 Site, and

3. the C channel site below the Tunnel 7 outlet (Map Location NFSC4) equivalent to Lower Plateau Site

The locations identified for the 2002 study sites were near the same location and within the same Rosgen Level I type channel sites as those identified for the earlier studies. For convenience, the studies are called by the names used in the previous studies.

Fish Populations

The fish community of North Fork Stevenson Creek, in 2002, was composed of brown trout (*Salmo trutta*), rainbow trout (*Oncorhynchus mykiss,* including golden trout hybrids), and Sacramento sucker (*Catostomus occidentalis*). Sculpin species were reported in BioSystems (1993) and ENTRIX (2002), but were not collected in 2002.

Rainbow trout (including hybrids) was the most numerous species collected in 2002 during the electrofishing surveys, comprising 57.9 percent of the total catch (Table CAWG 7-Appendix G-1). Brown trout was the second most abundant species and comprised 39.2 percent of the total catch. Sacramento suckers made up 2.9 percent of the overall catch in 2002. This was similar to the two most recent ENTRIX studies, brown trout and rainbow trout were the two most abundant fish species (Table CAWG 7-Appendix G-1, G-2) (note that only one of the two Upper Plateau sites was sampled in 2002). However, in the BioSystems study (1993) brown trout was the most abundant species.

Table CAWG 7-Appendix G-3 presents a comparison of the trout length ranges recorded during each study performed between 2000 and 2002 for common sites. Table CAWG 7-Appendix G-4 presents a comparison of trout lengths between years for the BioSystems, previous ENTRIX studies, and this study for the Upper Plateau Sites.

Table CAWG 7-Appendix G-5 presents a comparison of trout densities for all of the studies based on common sites sampled. This table indicates that current densities, at each site sampled during 2002, were lower than the average observed during the 1988-1992 period. In addition, densities at sites other than the Upper Cascade declined from 2001 to 2002.

Table CAWG 7-Appendix G-6 presents the numbers of trout (all species) by length category observed in the Lower Plateau and Upper Cascade Sites during the BioSystems (1993) study. The results indicate that the less than 75 mm category, which corresponds to young of the year fish, represented the largest percentage of the total in each year of study. Young of the year averaged 63 percent of the total number of fish at the Lower Plateau Site and 40 percent at the Upper Cascade Site. Table CAWG 7-Appendix G-7 presents the age composition of rainbow (including golden hybrids) and brown trout for the 2000 – 2002 studies. The data indicate that there was considerable variability between sites and sampling years among age classes. Abundance of age 0+ rainbow trout during 2002 suggests that recruitment may have been less successful than in 2001. Brown trout age 0+ abundance showed variability among sites, but in general showed no suggestion of the reduction in abundance observed for rainbow trout.

The BioSystems (1993) study provided information on trout age groups for the Upper Plateau Sites, in terms of two categories age 0+ and adults. During 2002, data were only collected from Upper Plateau Site 2. Therefore, 2002 data represent half of the sampling effort and consequently fewer numbers of trout than would be expected if both sites had been sampled. Table CAWG 7-Appendix G-8 indicates that brown trout were more abundant during 1988-1992 and there was a greater percentage of age 0+ fish than during the past few years. For rainbow trout, abundance during the 1988-1992 period also was greater than during 2000 and later. However, the percentage of age 0+ fish was greater on average in 2000 and 2001. In 2002, no age 0+ rainbow trout was found at Upper Plateau Site 2.

References

BioSystems. 1993. Fish Populations in North Fork Stevenson Creek, 1988-1992. Results of a Monitoring Program Conducted for Southern California Edison's Balsam Meadow Hydroelectric Project. Final Report.

ENTRIX. 2002. North Fork Stevenson Creek Fish Population Monitoring. ENTRIX, Inc. Walnut Creek, CA.

Table CAWG 7-Appendix G-1. Percentage Composition of Fish Species Collected from North Fork Stevenson Creek during Electrofishing Surveys, 1988-1992 and 2000-2002.

	Year								
SPECIES	**1988**	**1989**	**1990**	**1991**	**1992**		**2000**	**2001**	**2002**
Brown Trout	54.8	50.0	61.1	56.4	50.0		43.8	34.3	39.2
Rainbow Trout	37.2	36.5	29.2	27.5	35.2		51.8	61.2	57.9
Sculpin sp.	2.4	2.3	1.2	1.4	0.2		0.9	2.4	0
Sacramento Sucker	5.6	11.2	8.5	14.7	14.6		3.6	2.1	2.9

Table CAWG 7-Appendix G-2. Percent Composition of Species Captured at the NFSC Electrofishing Sites, 2000-2002.

Brown Trout			
Year	Lower Plateau Site	Upper Plateau Sites[1]	Upper Cascade Site
2002	53.4	56.0	0
2001	38.8	40.7	0
2000	N/A[2]	43.8	N/A[2]

Rainbow Trout			
Year	Lower Plateau Site	Upper Plateau Sites[1]	Upper Cascade Site
2002	41.1	42.0	100
2001	60.2	55.9	83.0
2000	N/A[2]	51.8	N/A[2]

Sculpin sp.			
Year	Lower Plateau Site	Upper Plateau Sites[1]	Upper Cascade Site
2002	0	0	0
2001	0	0	17.0
2000	N/A[2]	0.9	N/A[2]

Sacramento Sucker			
Year	Lower Plateau Site	Upper Plateau Sites[1]	Upper Cascade Site
2002	5.5	2.0	0
2001	1.0	3.4	0
2000	N/A[2]	3.6	N/A[2]

1. Only upper plateau Site 2 was sampled in 2002.
2. N/A – Site was not sampled

Table CAWG 7-Appendix G-3. Range of Trout Lengths for NFSC Electrofishing Sites, 2000-2002.

Brown Trout Fork Length (mm)				
Year	**Lower Plateau Site**	**Upper Plateau Site 1**	**Upper Plateau Site 2**	**Upper Cascade Site**
2002	38-208	N/A[2]	40-237	NP[1]
2001	64-255	72-416	80-241	NP[1]
2000	N/A[2]	54-384	82-275	N/A[2]

Rainbow Trout Fork Length (mm)				
Year	**Lower Plateau Site**	**Upper Plateau Site 1**	**Upper Plateau Site 2**	**Upper Cascade Site**
2002	35-218	N/A[2]	101-175	86-188
2001	57-206	55-210	56-160	51-179
2000	N/A[2]	50-233	54-184	N/A[2]

1. NP – Species not present.
2. N/A – Site was not sampled

Table CAWG 7-Appendix G-4. Comparison of Lengths for North Fork Stevenson Creek (1988-2002).

YEAR	SPECIES	TOTAL LENGTH (mm)	
		UPPER PLATEAU SITE 1	UPPER PLATEAU SITE 2
1988	Brown Trout	50 - 395	52 - 234
	Rainbow Trout	41 - 293	111 - 252
1989	Brown Trout	67 - 328	75 - 568
	Rainbow Trout	49 - 242	45 - 211
1990	Brown Trout	63 - 365	74 - 409
	Rainbow Trout	54 - 232	53 - 275
1991	Brown Trout	62 - 275	64 - 415
	Rainbow Trout	46 - 231	58 - 294
1992	Brown Trout	61 - 249	72 - 240
	Rainbow Trout	46 - 231	60 - 243
2000	Brown Trout	54 - 384	82 - 275
	Rainbow Trout	50 - 233	54 - 184
2001	Brown Trout	72 - 416	80 - 241
	Rainbow Trout	55 - 210	56 - 160
2002	Brown Trout	-	40 - 237
	Rainbow Trout	-	101 - 175

Data from 1988-1992 from BioSystems (1993), 2000 – 2001 from ENTRIX (2002), 2002 from this study.

Table CAWG 7-Appendix G-5. Estimated Trout Densities (No./km) for Reaches of North Fork Stevenson Creek Sampled in Multiple Studies.

Location	Estimated Trout Density by Year								
	1988	1989	1990	1991	1992	1988-1992 Average	2000[2]	2001[2]	2002[3]
Lower Plateau	-	3,642[1]	2,835[1]	1,539[1]	1,358[1]	2,344	-	1,869	744
Upper Plateau Site 1	2,392	2,198	4,784	2,704	2,215	2,859	896	1,401	-
Upper Plateau Site 2	1,319	1,217	929	1,588	1,012	1,213	568	1,262	526
Upper Cascade	-	991[1]	1,198[1]	847[1]	1,132[1]	1,042	-	492	583

[1] BioSystems (1993) - Direct Observation Only

[2] ENTRIX 2002

[3] CAWG-7 Study

Table CAWG 7-Appendix G-6. Size Class Information for Trout from Snorkel Surveys for Lower Plateau and Upper Cascade Sites (BioSystems 1993).

Location	Year	TOTAL LENGTH										
		0 – 75 mm		75 – 152 mm		152 – 305 mm		305 – 457 mm		> 457 mm		TOTAL
		No./100m	Percent	No./100m	Percent	No./100m	Percent	No./100m	Percent	No./100m	Percent	
Lower Plateau	**1989**	221.5	61	118.1	32	22.3	6	2.3	1	0	0	364.2
	1990	183.1	65	67.9	24	32.5	11	0	0	0	0	283.5
	1991	104.3	68	36.4	24	10.2	7	0	0	0	0	153.9
	1992	81.0	60	35.4	26	19.4	14	0	0	0	0	135.8
	AVG	**147.5**	**63**	**64.5**	**27**	**21.1**	**10**	**0.6**	**0**	**0**	**0**	**234.4**
Upper Cascade	**1989**	56.8	57	30.5	31	9.2	9	2.6	3	0	0	99.1
	1990	44.0	37	39.4	33	34.8	29	1.6	1	0	0	119.8
	1991	20.7	24	44.0	52	19.7	23	0.3	0	0	0	84.6
	1992	45.3	40	43.6	39	24.0	21	0.3	0	0	0	113.2
	AVG	**41.7**	**40**	**39.4**	**39**	**21.9**	**21**	**1.2**	**1**	**0**	**0**	**104.2**

Table CAWG 7-Appendix G-7. Age Classes for North Fork Stevenson Creek, 2000-2002.

Rainbow Trout

Year Class	0+					
Year	2000		2001		2002	
Sampling Site	N	Percent	N	Percent	N	Percent
Upper Cascade	N/A	N/A	28	71.8%	0	0.0%
Lower Plateau	N/A	N/A	36	58.1%	10	33.3%
Upper Plateau 1	10	30.3%	9	26.5%	N/A	N/A
Upper Plateau 2	13	52.0%	42	64.6%	0	0.0%

Year Class	1+					
Year	2000		2001		2002	
Sampling Site	N	Percent	N	Percent	N	Percent
Upper Cascade	N/A	N/A	4	10.3%	20	42.6%
Lower Plateau	N/A	N/A	13	21.0%	13	43.3%
Upper Plateau 1	14	42.4%	15	44.1%	N/A	N/A
Upper Plateau 2	9	36.0%	19	29.2%	9	52.9%

Year Class	2+					
Year	2000		2001		2002	
Sampling Site	N	Percent	N	Percent	N	Percent
Upper Cascade	N/A	N/A	7	17.9%	19	40.4%
Lower Plateau	N/A	N/A	13	21.0%	6	20.0%
Upper Plateau 1	7	21.2%	10	29.4%	N/A	N/A
Upper Plateau 2	3	12.0%	4	6.2%	3	17.6%

Year Class	3+					
Year	2000		2001		2002	
Sampling Site	N	Percent	N	Percent	N	Percent
Upper Cascade	N/A	N/A	0	0.0%	8	17.0%
Lower Plateau	N/A	N/A	0	0.0%	1	3.3%
Upper Plateau 1	2	6.1%	0	0.0%	N/A	N/A
Upper Plateau 2	0	0.0%	0	0.0%	5	29.4%

[1.] N/A – Site was not sampled

Table CAWG 7-Appendix G-7. Age Classes for North Fork Stevenson Creek, 2000-2002 (cont).

Brown Trout

Year Class	0+					
Year	2000		2001		2002	
Sampling Site	N	Percent	N	Percent	N	Percent
Upper Cascade	N/A	N/A	0	0.0%	0	0
Lower Plateau	N/A	N/A	22	55.0%	31	79.5%
Upper Plateau 1	4	12.9%	14	26.4%	N/A	N/A
Upper Plateau 2	7	38.9%	9	47.4%	6	37.5%

Year Class	1+					
Year	2000		2001		2002	
Sampling Site	N	Percent	N	Percent	N	Percent
Upper Cascade	N/A	N/A	0	0.0%	0	0
Lower Plateau	N/A	N/A	14	35.0%	0	0.0%
Upper Plateau 1	5	16.1%	15	28.3%	N/A	N/A
Upper Plateau 2	4	22.2%	4	21.1%	2	12.5%

Year Class	2+					
Year	2000		2001		2002	
Sampling Site	N	Percent	N	Percent	N	Percent
Upper Cascade	N/A	N/A	0	0.0%	0	0
Lower Plateau	N/A	N/A	1	2.5%	4	10.3%
Upper Plateau 1	15	48.4%	16	30.2%	N/A	N/A
Upper Plateau 2	4	22.2%	4	21.1%	2	12.5%

Year Class	3+					
Year	2000		2001		2002	
Sampling Site	N	Percent	N	Percent	N	Percent
Upper Cascade	N/A	N/A	0	0	0	0
Lower Plateau	N/A	N/A	3	7.5%	4	10.3%
Upper Plateau 1	7	22.6%	8	15.1%	N/A	N/A
Upper Plateau 2	3	16.7%	2	10.5%	6	37.5%

Table CAWG 7-Appendix G-8. Age Group Information for Upper Plateau Sites 1 and 2. *

Year	Age 0+		Adult		Total
	N	Percent	N	Percent	
Brown Trout					
1988	182	80	45	20	227
1989	80	38	13	6	213
1990	115	44	148	56	263
1991	95	34	187	66	282
1992	69	33	139	67	208
AVG	**108**	**46**	**106**	**43**	**239**
2000	11	22	38	78	49
2001	23	32	49	68	72
2002*	6	38	10	62	16
Rainbow Trout					
1988	50	32	104	68	154
1989	35	22	122	78	157
1990	39	31	85	69	124
1991	39	29	96	71	135
1992	65	44	82	56	147
AVG	**46**	**32**	**98**	**68**	**143**
2000	23	40	35	60	58
2001	51	52	48	48	99
2002*	0	0	17	100	17

Note: 1988-1992 data from BioSystems 1993
2000 -2001 data from ENTRIX 2002
2002 data from this study

* 2002 data only contains information from Upper Plateau Site 2, all other years include both sites.