Maternal Origin and Migratory History of *Oncorhynchus mykiss* captured in rivers of the Central Valley, California

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Abstract

Analysis of otolith strontium-to-calcium (Sr:Ca) ratios was used to determine maternal origin (anadromous v. non-anadromous) and migratory history (anadromous v. non-anadromous) of rainbow trout (*Oncorhynchus mykiss*) collected in tributaries of the Sacramento-San Joaquin River system in the Central Valley of California between 2001 and 2007. Listed as *threatened* under the Endangered Species Act, little is known about the distribution of anadromous rainbow trout in Central Valley streams or the relation of sympatric anadromous and non-anadromous life history types. Ambient water chemistry of streams studied was sufficiently low in Sr:Ca ratios to allow discrimination of maternal origin and migratory history with mean Sr:Ca ratios ranging from 2.89 to 4.51 $mmol \cdot mol^{-1}$, although one site along the migration corridor of the San Joaquin River was as high as 8.05 $mmol \cdot mol^{-1}$. Of 964 otoliths examined, 224 were determined to be from fish who were the progeny of anadromous rainbow trout (i.e., steelhead) females and 740 were the progeny of non-anadromous rainbow trout females. Progeny of steelhead maternal origin were present at all sites sampled but the proportion of steelhead progeny varied among sites (0.04 to 0.74). Based on transects of otolith Sr:Ca ratios, only five fish were confirmed to be adult steelhead but, due to conservation concerns, sampling of adult steelhead was not our intention. The remaining 214 fish > age-4 were non-anadromous. Sixteen of the 214 fish > age-4 determined to be non-anadromous adults were the progeny of steelhead females.

Introduction

The Central Valley of California is drained by the Sacramento and San Joaquin Rivers and was once home to large runs of Chinook salmon (*Oncorhynchus tshawytscha*) and steelhead (*O. mykiss*) (Yoshiyama et al. 2000). Steelhead, the anadromous form of rainbow trout, were historically distributed throughout the Sacramento-San Joaquin River system in the Central Valley of California (Busby et al. 1996; McEwan 2001). Reduction of spawning and rearing habitats throughout the Central Valley has resulted in declines of steelhead returning to these streams (McEwan 2001; Lindley et al. 2006) and, in 1998, steelhead populations in the Central Valley were listed as *threatened* under the Endangered Species Act. Despite their popularity as a game fish and status as a threatened species, little is known about the biology, status, and life history of steelhead populations in the Central Valley. Lindley et al. (2007) recommend that in order to assess the risk of extinction or develop effective recovery actions for steelhead in the Central Valley, determining the distribution of steelhead and assessing the relationship between resident and anadromous forms of *O. mykiss* is a fundamental need. Lindley et al. (2007) stress that any quantitative assessment of population viability would be inadequate unless the role resident fish play in population maintenance and persistence of *O. mykiss* in the Central Valley is known.

Similar to other regions, Central Valley rivers contain both anadromous and non-anadromous (resident) life history forms of rainbow trout. How these two phenotypes are related and interact is of concern to both resource managers and researchers. Foote et al. (1989) identified three possible genetic relationships between life history forms of salmonids. First, alternative life history forms are genetically isolated and represent separate reproductively isolated populations. Second, alternative life history forms are not genetically distinct. Third, alternative life history forms are genetically distinct within a local area but are more similar to one another than they are to their respective life history forms outside the local area. Whether sympatric life history forms are treated as single populations exhibiting polyphenism or as reproductively isolated populations has profound implications in decisions related to protection and recovery of species (Zimmerman and Reeves 2000).

In assessing the relation of resident and anadromous rainbow trout, no single answer has emerged to describe population structure of rainbow trout. Neave (1944) first examined the relation of anadromous and non-anadromous rainbow trout in the Cowichan River of British Columbia using meristic analyses and rearing-release experiments. Neave (1944) concluded that the two life history forms should be treated as different reproductively isolated populations and that migratory behavior was hereditary. Zimmerman and Reeves (2000) used otolith microchemistry and spawning surveys to examine potential reproductive isolation between anadromous and non-anadromous rainbow trout in the Deschutes River, Oregon. Differences in the timing of spawning and spawning locations suggested that anadromous rainbow trout (steelhead) were reproductively isolated from non-anadromous rainbow trout. Further, Zimmerman and Reeves (2000) used otolith microchemistry to test maternal origin of adult steelhead and non-anadromous rainbow trout finding that no adult steelhead were the progeny of resident female rainbow trout and no adult rainbow trout were the progeny of steelhead females. As a result, Zimmerman and Reeves (2000) concluded that the two life history forms were acting as biological species in the Deschutes River. Conversely, steelhead of resident rainbow trout maternal origin and resident rainbow trout of steelhead maternal origin were detected in the Babine River, British Columbia (Zimmerman and Reeves 2000). Using genetic methods, Narum et al. (2004) identified genetic divergence and reproductive isolation between anadromous and non-anadromous rainbow trout in the Walla Walla River, Washington. Collectively, these results suggest that the relation of resident and anadromous rainbow trout varies among locations. Introductions of non-anadromous rainbow trout stocks derived from Sacramento River populations to Argentina gave rise to anadromous life history forms (Pascual et al. 2001), indicating that non-anadromous forms found in the Sacramento River system may contribute to anadromous populations in some circumstances. To date, however, little work exists to describe the relationship of steelhead and resident rainbow trout in Central Valley streams.

Analysis of otolith microchemistry provides two important tools in the study of migratory polyphenism in salmonids. First, the chemical composition of otoliths can be used to describe migration in anadromous fishes (Kalish 1990; Secor 1992; Zimmerman

et al. 2003). Strontium (Sr), an element with similar binding characteristics to calcium (Ca), is substituted for calcium in the calcium carbonate matrix of otoliths at levels relative to the concentration of strontium in the environment (Kalish 1990; Zimmerman 2005). The concentration of strontium is generally greater in seawater than in freshwater. As a result, analysis of Sr:Ca ratios across the otolith of a fish can be used to describe the migratory history of that fish between freshwater and seawater (Howland et al. 2001; Zimmerman 2005). Further, comparison of Sr/Ca ratios in the primordia and freshwater growth region can be used to determine maternal origin (resident or anadromous) based on the assumption that primordia composition reflects the environment in which yolk precursors develop (in the ocean for anadromous forms) (Kalish 1990; Volk et al. 2000; Zimmerman and Reeves 2002).

Although steelhead are monitored in some Central Valley streams, such as the American and Feather Rivers, in some streams of the Central Valley the occurrence of anadromous rainbow trout has not been documented in recent years. Anecdotal evidence and reports from anglers, however, suggests that they are present in these locations. We used analysis of otolith composition to determine maternal origin (steelhead versus resident) and migratory history of rainbow trout captured in seven Central Valley streams. Based on our determination of the maternal origin and migratory history of rainbow trout we determined the occurrence of steelhead progeny in Central Valley streams to better define the distribution of anadromous rainbow trout to aid in development of monitoring and recovery efforts.

Methods

Otolith Collection

Otolith samples were collected from wild rainbow trout/steelhead found in the anadromous reaches of six Central Valley streams: the Sacramento River, Deer Creek, Yuba River, Calaveras River, Stanislaus River and Tuolumne River between 2001 and 2007 (Figure 1). These streams are representative of the two major river basins that are found in the Central Valley, the Sacramento and San Joaquin rivers. A small number of samples was also obtained from fish in the Merced and San Joaquin rivers. Collections were made primarily by the California Department of Fish and Game. Other agencies that contributed rainbow trout otoliths for this study were the United States Fish and

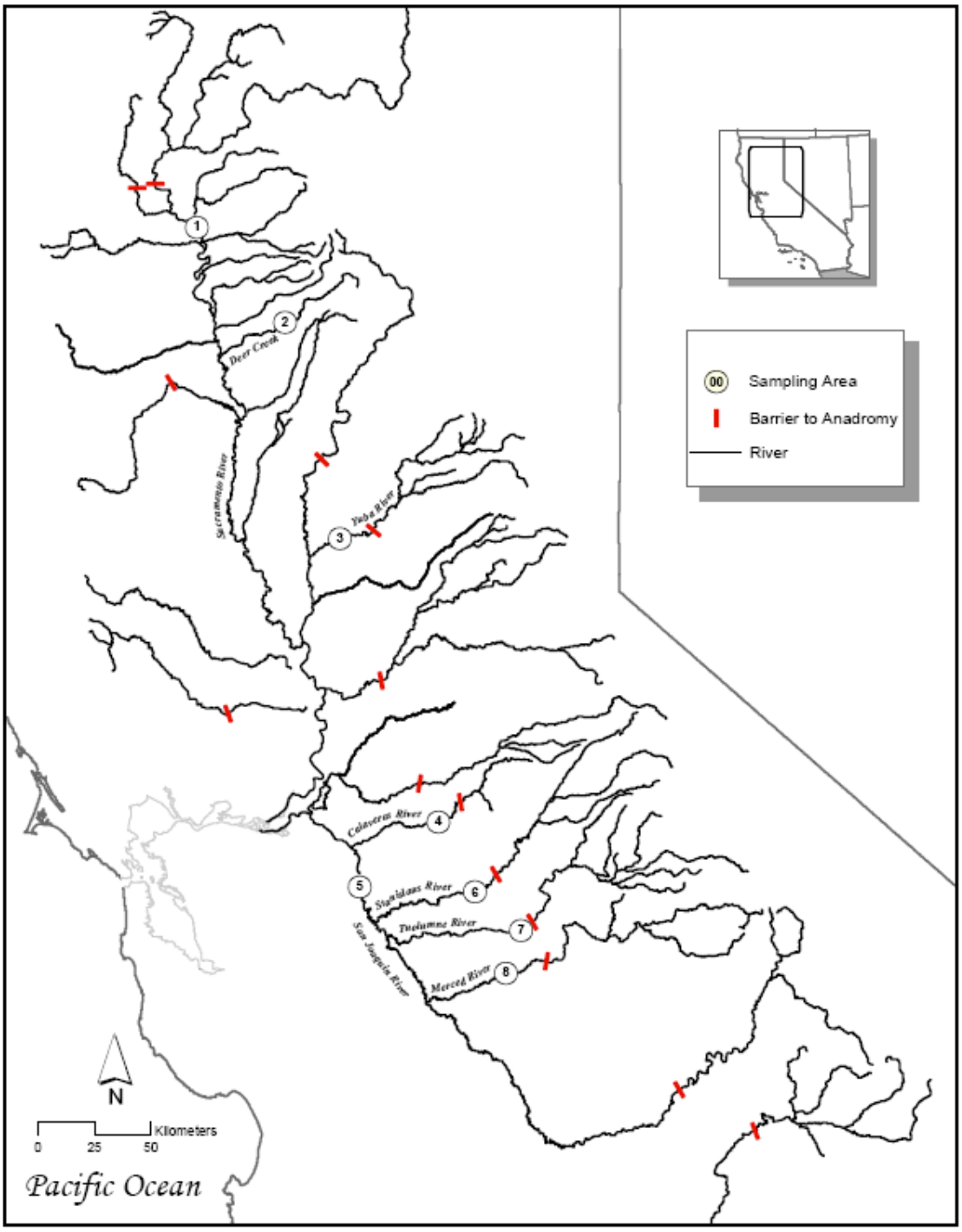

Figure 1. Central Valley streams and rivers, locations of otolith sampling, and barriers to anadromy.

Wildlife Service (USFWS) and NOAA Fisheries. Some samples were also provided by consultants under contract to USFWS (Stanislaus River) and water districts (Calaveras and Yuba rivers) working on these streams.

Fish and otolith collection efforts concentrated on the upper anadromous reaches of most streams, in the spawning and rearing areas where rainbow trout were most likely to be found. An exception to this was the San Joaquin River, where only six juvenile rainbow trout were collected from a smolt trap. Sampling was primarily conducted during the months of October through May coinciding with the anadromous adult rainbow trout migration and juvenile emigration. Sampling was limited during summer months because warm water temperatures (greater than 21 °C) could result in excessive mortality of fish during capture. Fish were captured by beach seining, rotary screw traps, electrofishing, carcass surveys, and hook and line. Adults with mature gonads were not sacrificed for otoliths. Each fish was measured (fork length) and otoliths were removed, cleaned, and stored dry in plastic vials. Where possible, otolith samples were obtained from archives, incidental mortalities from ongoing projects, and carcass surveys in order to reduce the impact on Central Valley steelhead, which are listed as *threatened* under the Endangered Species Act.

Otolith Preparation and Microchemical Analysis

Prior to preparation for chemical analyses, otoliths were immersed in water on a black background and reflected light was used to accentuate the presumed annuli. The age of each fish was determined by counting alternating translucent and opaque regions. Under reflected light, annuli correspond to the translucent zone (Kalish et al. 1995). Fish were aged and grouped by age class: young-of-year, age-1, age-2, and age-3. Fish age-4 and greater were lumped into a single age category.

One sagittal otolith from each fish was mounted sulcus side down with Crystal Bond 509 on a microscope cover slip attached on one edge to a standard microscope slide. The otolith was ground with 2000-grit sandpaper in the sagittal plane to the level of the nucleus. The mounting medium was heated and the otolith turned sulcus side up. The otolith was then ground with 2000-grit sandpaper in the sagittal plane to the level of the primordia and polished with a slurry of 0.05-µm alumina paste. The cover slip was

then cut with a scribe so that several prepared otoliths could be mounted on a petrographic slide for chemical analyses.

Two methods of analysis were used to measure chemical composition of otoliths. First, a wavelength dispersive electron microprobe was used to determine maternal origin of each fish following the methods of Zimmerman and Reeves (2000; 2002) and Zimmerman and Nielsen (2003). Prior to analysis, slides and otoliths were carbon coated. A 15-kV, 50-nA, 10-µm diameter beam was used for these analyses. Strontiantite and calcite were used as standards for Sr and Ca, respectively. The two elements were analyzed simultaneously and a counting time of 40 s was used to maximize precision (Toole and Nielsen 1992). Sr:Ca ratios were measured in a minimum of 4 points adjacent to primordia and in an equal number of points along a transect in the first summer of growth. A fish was determined to be of anadromous maternal origin if the mean Sr:Ca ratio of the primordia associated points (hereafter referred to as core region) was significantly higher than that in the first-summer growth region based on an unpaired one-tailed *t*-test with $\alpha = 0.05$. Based on these results, each fish was classified as the progeny of an anadromous (steelhead) or non-anadromous female parent.

After determination of maternal origin, the slides were polished to remove the carbon coat. Migratory history (anadromous or non-anadromous) was determined for each fish by measuring Sr:Ca ratios along a standard axis from the center of the otolith core to the edge of the otolith using a laser ablation system (New Wave 213 nm) coupled to an Agilent 7500c quadropole inductively coupled plasma mass spectrometer (LA-ICPMS) following the methods of Arai et al. (2007) and Brenkman et al. (2007). Laser transects were conducted at a pulse rate of 10 hz and a beam diameter of 30 µm. Calibration was conducted using standardized reference materials (NIST 612). Calcium was used as an internal standard. Core to edge transects of Sr:Ca ratios were visually examined for significant increases in otolith Sr:Ca indicating migration to higher salinity environments.

Water Chemistry

Because some freshwaters are high in ambient strontium, it is important to confirm water chemistry of locations where otoliths are collected (Rieman et al. 1994; Zimmerman 2005). Water samples were collected from a central location within each

stream reach where otoliths were collected in March, July, and November in 2003, 2004, and 2005. Ca and Sr were analyzed using standard methods SM311B and SM3113, respectively (APHA et al. 1992). Mean elemental concentrations and molar ratios of Sr:Ca were calculated to characterize water chemistry at each location.

Results

Maternal Origin and Migratory History

A total of 964 otoliths was examined to determine age, maternal origin, and migratory history. Young-of-year (or age-0) fish were collected from only three sites: Deer Creek, Yuba River, and Calaveras River (Table 1). Age composition of samples analyzed varied among locations (Table 1). Similarly, length composition of fish analyzed varied among locations (Table 1; Figure 2). Mean length at age varied among locations (Table 1).

Mean (± SD) otolith Sr:Ca ratios (reported as atomic ratios) in the first summer growth region (freshwater growth region) ranged from 0.0005 ± 0.0002 to 0.0016 ± 0.0002 (Appendix 1). Mean otolith Sr:Ca ratios in freshwater growth regions were positively correlated with ambient water Sr:Ca ratios ($r^2 = 0.75$, n = 7, $P = 0.01$; Figure 3). Mean otolith Sr:Ca in the freshwater growth regions, however, was weakly correlated with mean ambient water Sr concentrations ($r^2 = 0.11$, n = 7) indicating that it is the Sr:Ca ratio of the water, rather than Sr concentration, that controls otolith Sr:Ca ratios. Because only six fish were collected in the San Joaquin River, it was excluded from this regression.

Mean otolith Sr:Ca ratios in core regions ranged from 0.0003 ± 0.0003 to 0.0024 ± 0.0001 (Appendix 1). The difference between core and freshwater growth region Sr:Ca ratios were of a bimodal distribution with modes corresponding to determined maternal origin (Figure 4). Of the 964 otoliths examined, 224 were classified as steelhead progeny and 740 were classified as progeny of non-anadromous females (Appendix 1). The proportion of steelhead progeny ranged from 0.04 in the Merced River to 0.74 in Deer Creek (Figure 5). Of the six juvenile fish captured in the San Joaquin River at Mossdale, presumed to be steelhead smolts based on location and date of capture, coloration, and size, two fish were of anadromous maternal origin and four fish were of non-anadromous maternal origin.

Table 1. Mean fork length ± SD (mm) and sample size (n) in parentheses of wild steelhead/rainbow trout collected for otolith analyses in rivers of the Central Valley between 2001 and 2007.

	Age Class				
Location	0	1	2	3	≥ 4
Sacramento River		216 ± 12 (8)	294 ± 34 (12)	367 ± 21 (32)	488 ± 52 (102)
Deer Creek	81 ± 8 (49)	142 ± 28 (74)	208 ± 15 (30)	297 ± 28 (2)	
Yuba River	68 ± 24 (26)	228 ± 2 (5)	271 ± 24 (27)	348 ± 25 (40)	424 ± 29 (43)
Calaveras River	115 ± 22 (16)	190 ± 9 (29)	251 ± 28 (84)	335 ± 29 (43)	479 ± 104 (8)
San Joaquin River			238 ± 37 (6)		
Stanislaus River		175 ± 20 (18)	253 ± 28 (77)	342 ± 27 (47)	474 ± 74 (15)
Tuolumne River		178 ± 14 (37)	251 ± 36 (36)	356 ± 23 (36)	444 ± 36 (38)
Merced River			235 ± 25 (5)	348 ± 25 (5)	520 ± 99 (13)

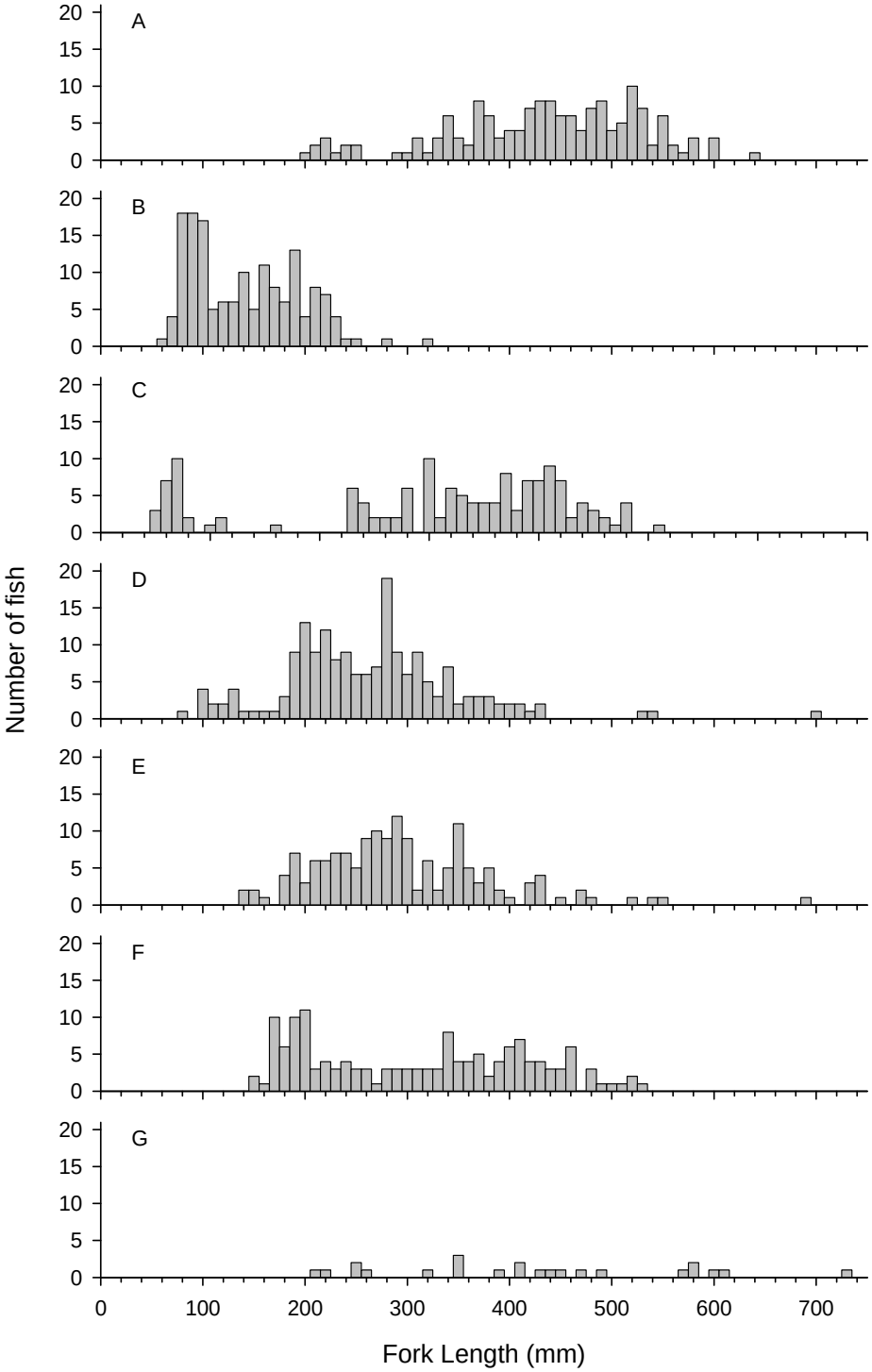

Figure 2. Frequency distribution of fork length (mm) of wild steelhead/rainbow trout collected for otolith analyses: (A) Sacramento River, (B) Deer Creek, (C) Yuba River, (D) Calaveras River, (E) Stanislaus River, (F) Tuolumne River, and (G) Merced River.

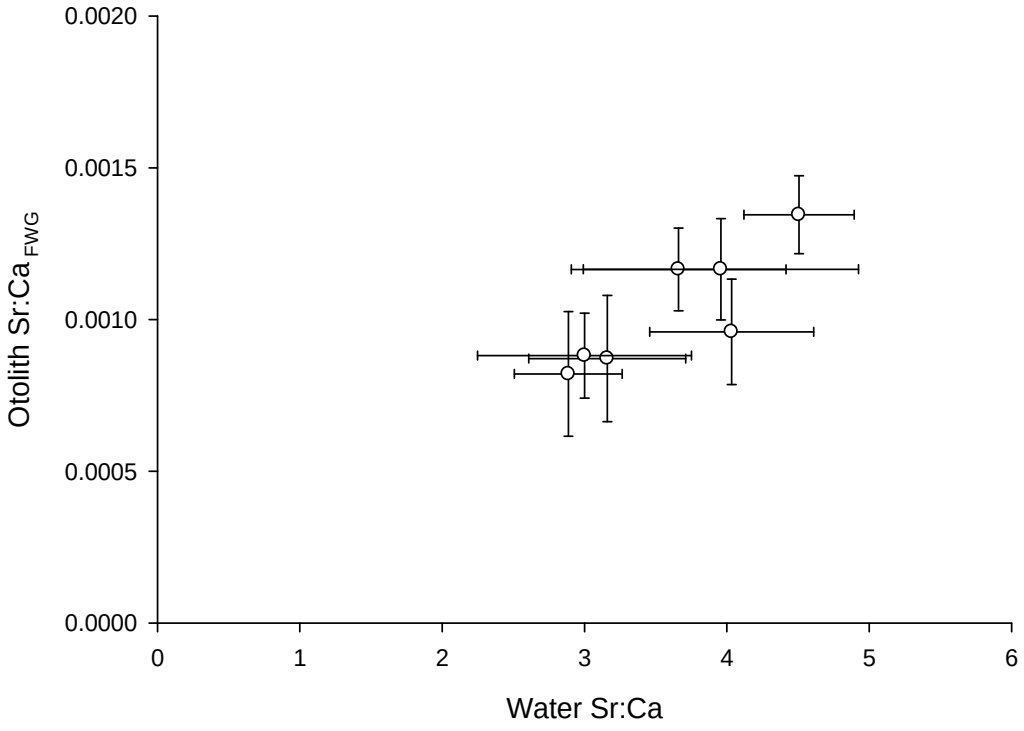

Figure 3. Mean water Sr:Ca ratios and mean otolith Sr:Ca ratios measured in freshwater growth regions of wild steelhead/rainbow trout collected from Central Valley streams, California.

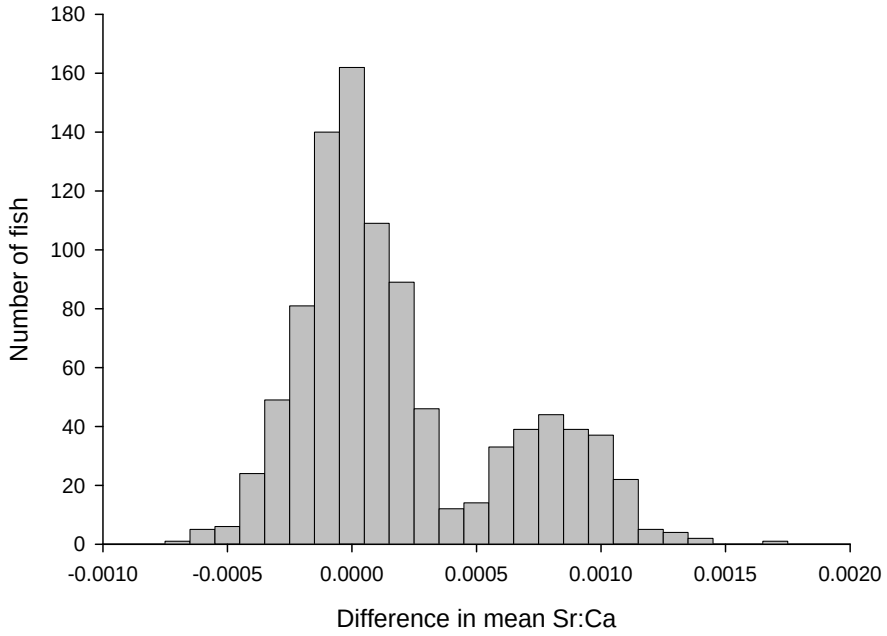

Figure 4. Frequency distribution of the difference between mean core Sr:Ca ratios and mean freshwater growth region Sr:Ca ratios for 964 wild steelhead/rainbow trout captured in Central Valley streams, California between 2001 and 2007.

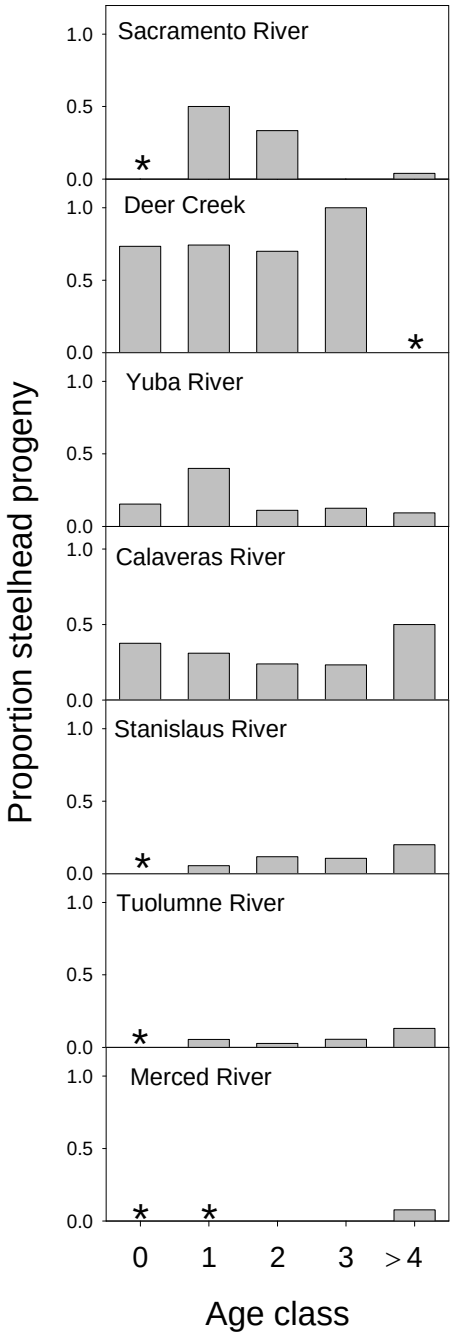

Figure 5. Proportion of steelhead/rainbow trout of steelhead maternal origin by age-class in streams of the Central Valley, California. Age-class 4 includes fish age-4 and greater and asterisks indicate no fish in this age-class.

Otolith Sr:Ca ratios along transects of otoliths from 959 fish were low and consistent with patterns expected for resident fish (Figure 6). Five fish were characterized by increased Sr:Ca ratios in the older otolith growth regions indicating migration to high Sr:Ca ratio (presumably marine) environments (Figure 7) and were classified as anadromous adults (steelhead). Fork length of anadromous fish ranged from 455 to 700 mm and all anadromous fish were age-4 or older. Two adult steelhead were detected in the Calaveras River (FL = 535 and 700 mm). One steelhead each was detected in the Sacramento River (FL = 460 mm), Stanislaus River (FL = 690 mm), and Tuolumne River (FL = 455 mm). Three rainbow trout greater than 600 mm were collected in the Merced River, but none of these were characterized by increased otolith Sr:Ca ratios indicating that they had not migrated to saltwater. Similarly, several fish of 570 to 600 mm were captured in the Sacramento River and were all classified as freshwater residents. Two fish were classified as "unknown" migratory history because otolith transects were measured through vateritic regions and a reliable migratory history could not be determined.

Water Chemistry

Mean Sr concentrations at all sites were less than 1 ppm and mean Ca concentrations ranged from 4.54 to 33.58 ppm (Table 2). Sr:Ca ratios of ambient stream water ranged from 2.1 to 8.1 $mmol \cdot mol^{-1}$ among the sampling sites and dates and mean Sr:Ca ratios ranged from 2.88 to 6.74 $mmol \cdot mol^{-1}$ (Table 2). San Joaquin River was characterized by Sr:Ca ratios ranging from 5.5 to 8.1 $mmol \cdot mol^{-1}$, which are approaching values observed in marine waters (Bruland 1983). Donohoe et al. (in press) determined that discrimination of steelhead versus non-anadromous progeny using otolith Sr:Ca core values is appropriate in streams with water Sr:Ca < 5 $mmol \cdot mol^{-1}$ but limited at higher values. Using this criterion, water chemistry among all locations, with the exception of the San Joaquin River, are low enough to allow discrimination of maternal origin.

Discussion

Steelhead progeny were detected in all Central Valley streams examined but because otolith based analyses are lethal, we were unable to collect sufficient samples to determine the actual composition of anadromous (steelhead) and non-anadromous rainbow trout progeny at any one point in time. Simply documenting the occurrence of

Table 2. Elevation (m), distance from Golden Gate (km), mean Ca concentration (± SD), mean Sr concentration (± SD), and Sr:Ca ratio ($mmol \cdot mol^{-1}$) in Central Valley rivers, California. Numbers correspond to sample area identifiers in Figure 1.

	Location	Elevation (m)	Distance (km)	Ca (ppm)	Sr (ppb)	Sr:Ca ($mmol \cdot mol^{-1}$)
1	Sacramento River	115	550	13.5 ± 4.0	91 ± 43	3.00 ± 0.75
2	Deer Creek	606	499	9.1 ± 0.9	73 ± 18	3.66 ± 0.75
3	Yuba River	61	301	9.8 ± 0.8	62 ± 11	2.89 ± 0.38
4	Calaveras River	76	217	20.5 ± 3.3	140 ± 22	3.16 ± 0.55
5	San Joaquin River	4	186	33.6 ± 12.8	503 ± 204	6.74 ± 1.11
6	Stanislaus River	98	310	7.6 ± 1.5	74 ± 15	4.51 ± 0.39
7	Tuolumne River	55	317	4.5 ± 0.9	39 ± 12	3.96 ± 0.97
8	Merced River	91	366	5.6 ± 3.2	48 ± 25	4.03 ± 0.57

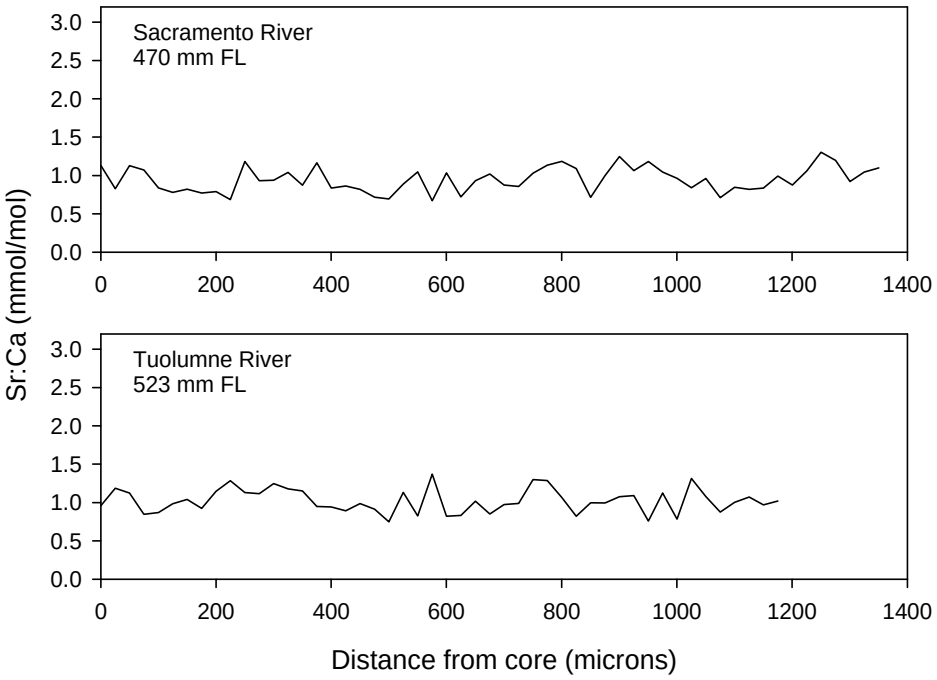

Figure 6. Representative transects of otolith Sr:Ca ratios for fish classified as resident rainbow trout from Central Valley rivers, California.

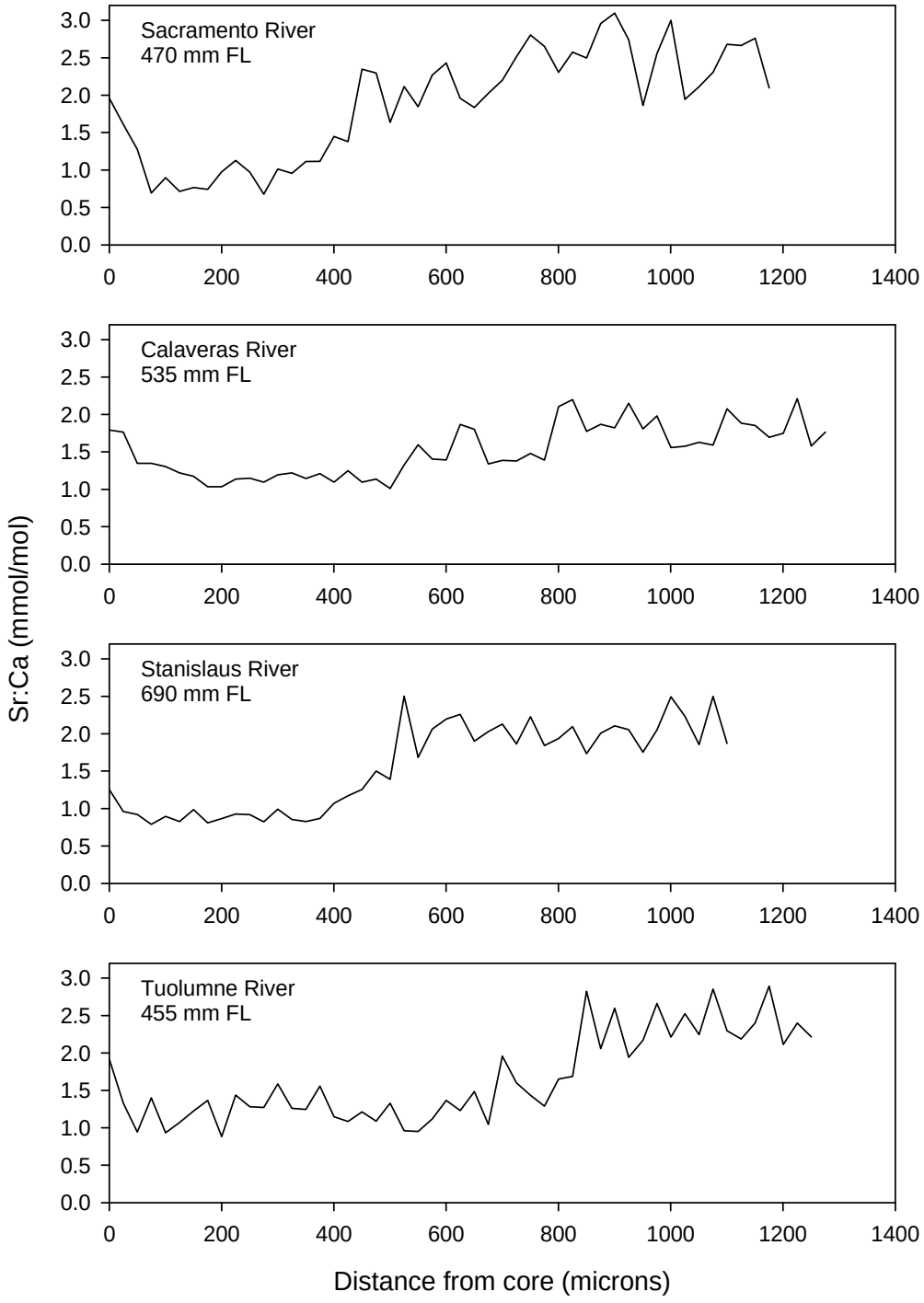

Figure 7. Representative transects of otolith Sr:Ca ratios for fish classified as anadromous rainbow trout (steelhead) from Central Valley rivers, California.

steelhead progeny in some of these sites is significant, however. Due to limited monitoring of steelhead in Central Valley streams, little information exists concerning the distribution of steelhead spawning. These results begin to address this gap in our knowledge of steelhead distribution and life history within the Central Valley.

Our estimates of steelhead occurrence should be viewed as conservative estimates. Donohoe et al. (in press) and Volk et al. (2000) demonstrate that otolith core Sr:Ca ratios may be reduced in progeny of anadromous females with protracted residence in freshwater before spawning such as observed in summer steelhead and steelhead with long migrations, as maternal signals can be lost through dilution effects. Presumably, winter steelhead (the form found in Central Valley streams) do not hold sufficiently long in freshwater to result in significant dilution, but Donohoe et al. (in press) found evidence of such dilution effects when coupled with higher ambient Sr:Ca ratios in some streams. Donohoe et al. (in press), therefore, suggested that determination of maternal origin should be limited fish coming from streams with Sr:Ca ratios less than 5.5 $mmol \cdot mol^{-1}$. All tributary sites we examined were below this value (Table 2). Donohoe et al. (in press) provide a model approach to use in place of methods used by Zimmerman and Reeves (2002). Zimmerman and Reeves (2002) used *t*-tests to compare mean Sr:Ca ratios in primordia with those in the freshwater growth region (as we did in this study); if mean primordia values were significantly higher than mean freshwater growth region values, the fish was classified as the progeny of an anadromous female. The method presented by Donohoe et al. (in press) uses core Sr:Ca values, migration difficulty index (elevation · distance from ocean), and ambient water Sr:Ca ratios to distinguish progeny of anadromous and non-anadromous rainbow trout. We used the equations provided by Donohoe et al. (in press) to calculate predicted otolith core Sr:Ca ratios for resident and anadromous progeny in our study sites. Observed mean core Sr:Ca ratios for progeny classified as resident and anadromous were similar to those predicted by the Donohoe et al. (in press) model indicating that both methods are appropriate for assessing maternal origin for fish from these streams (Figure 8). Deer Creek, however, stands out as an outlier with greater observed mean core Sr:Ca ratios than predicted using the Donohoe et al. (in press) models. Given the distance and elevation of Deer Creek, the Donohoe et al. (in press) model predicts that we should be unable to use core Sr:Ca ratios to discriminate

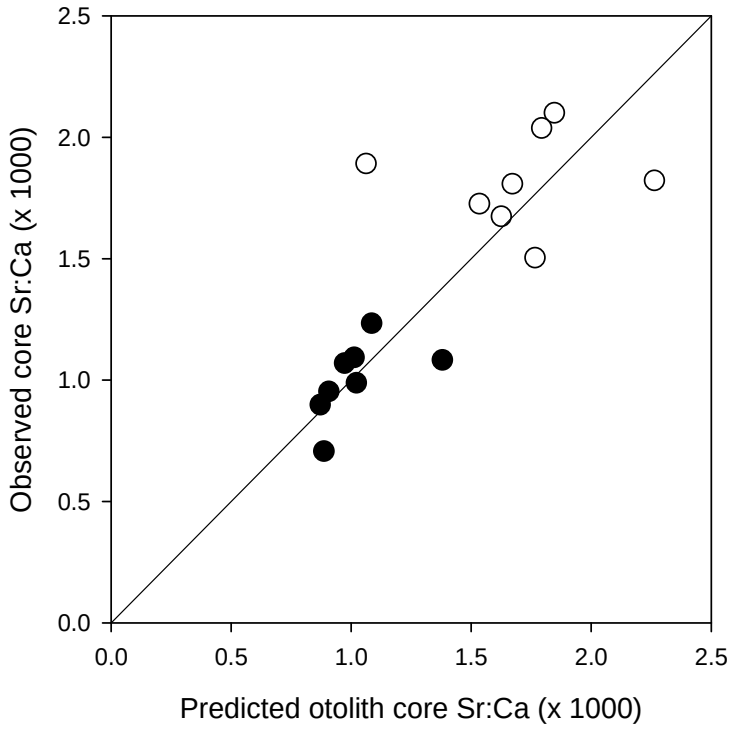

Figure 8. Predicted otolith core Sr:Ca ratios using Donohoe et al. (in press) model versus mean Sr:Ca ratios observed in fish classified as resident rainbow trout (solid circles) and anadromous rainbow trout (open circles) progeny from Central Valley rivers, California. The line represents a 1:1 relationship.

anadromous and non-anadromous progeny. It is unclear why this population stands out with greater core Sr:Ca ratios than predicted.

Otoliths collected from juvenile rainbow trout in the San Joaquin River at Mossdale (Location 5 in Figure 1) were presumed to be steelhead smolts but included fish of both anadromous maternal origin and non-anadromous maternal origin suggesting that resident rainbow trout can produce smolts in the Central Valley. With such a small sample size we are unable to draw too many conclusions about the contribution of progeny of non-anadromous females to the emigration of smolts. Similarly, in presumed steelhead smolts collected in an estuary of a small central California coastal stream, juveniles of both steelhead and non-anadromous maternal origin were present (Zimmerman, unpublished data). Further work is needed to assess the contribution of non-anadromous progeny as smolts and the fate of these fish compared to smolts of anadromous maternal origin.

Our results do suggest that the proportional occurrence of steelhead progeny may vary among locations (and presumably among years). Deer Creek, for example, is dominated by steelhead progeny while the Tuolumne and Stanislaus rivers were dominated by resident rainbow trout progeny. In the Sacramento River, progeny of steelhead were present in samples of age-1 and age-2 fish but rare in age 3 and older samples. Since steelhead in the Sacramento River predominately smolt at age-2 (Hallock 1989), it is likely that the reduction in the occurrence of steelhead progeny in older ages is a result of smolt emigration. Further work is needed to better assess the contribution of steelhead and rainbow trout to the anadromous population of *O. mykiss* in streams throughout the Central Valley. Tagging studies of smolts and pedigree studies such as that described by Seamons et al. (2004) and suggested by Hendry et al. (2004) could provide an opportunity to address the relation of anadromous and non-anadromous rainbow trout and the role of environmental variables in controlling life history. Studies of this sort could use hypervariable microsatellite markers to assess lifetime reproductive success of individuals that adopt different life histories (resident v. anadromous) across a range of stream conditions and individual characteristics such as growth, size, energy density, and age (Hendry et al. 2004). Although studies of this type would be difficult and costly, they offer the promise of better understanding the relation of anadromous and

non-anadromous life history forms as requested by Lindley et al. (2007). Paired studies built upon existing monitoring efforts across the range of environmental conditions observed in Central Valley streams (such as Deer Creek and the Stanislaus River) provide ample opportunity for studies of this type.

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Appendix 1. ID Code, location, fork length (mm), age class, mean Sr:Ca ratios ± SD in primordia and freshwater growth regions (FWG), maternal origin, and migratory history of wild steelhead/rainbow trout collected from rivers in the Central Valley, California.

CDFG No	Location	Length (mm)	Age	Mean Sr:Ca ± SD		Maternal Origin	Migratory History
				Primordia	FWG		
cvr001031502100	Calaveras River	405	4	0.0007 ± 0.0004	0.0007 ± 0.0003	Resident	Resident
cvr001051006001	Calaveras River	371	3	0.0008 ± 0.0003	0.0007 ± 0.0001	Resident	Resident
cvr001051006002	Calaveras River	305	3	0.0023 ± 0.0004	0.0014 ± 0.0002	Steelhead	Resident
cvr001051006004	Calaveras River	392	3	0.0009 ± 0.0003	0.0009 ± 0.0003	Resident	Resident
cvr001051006005	Calaveras River	342	3	0.0010 ± 0.0003	0.0010 ± 0.0002	Resident	Resident
cvr001051006006	Calaveras River	320	3	0.0007 ± 0.0003	0.0009 ± 0.0002	Resident	Resident
cvr001051006007	Calaveras River	289	2	0.0008 ± 0.0002	0.0007 ± 0.0001	Resident	Resident
cvr001051006008	Calaveras River	304	3	0.0008 ± 0.0003	0.0007 ± 0.0001	Resident	Resident
cvr001051006009	Calaveras River	253	2	0.0010 ± 0.0003	0.0011 ± 0.0002	Resident	Resident
cvr001051006010	Calaveras River	250	2	0.0010 ± 0.0003	0.0010 ± 0.0003	Resident	Resident
cvr001051006012	Calaveras River	220	2	0.0012 ± 0.0005	0.0008 ± 0.0004	Resident	Resident
cvr001051006013	Calaveras River	272	2	0.0010 ± 0.0003	0.0008 ± 0.0002	Resident	Resident
cvr001052306002	Calaveras River	275	2	0.0018 ± 0.0002	0.0008 ± 0.0003	Steelhead	Resident
cvr001052306003	Calaveras River	270	2	0.0008 ± 0.0003	0.0008 ± 0.0002	Resident	Resident
cvr001052306004	Calaveras River	372	3	0.0009 ± 0.0003	0.0009 ± 0.0002	Resident	Resident
cvr001052306005	Calaveras River	398	3	0.0007 ± 0.0001	0.0011 ± 0.0003	Resident	Resident
cvr001052306006	Calaveras River	276	2	0.0007 ± 0.0004	0.0011 ± 0.0002	Resident	Resident
cvr001052306007	Calaveras River	312	3	0.0014 ± 0.0004	0.0011 ± 0.0002	Resident	Resident
cvr001052306008	Calaveras River	281	2	0.0007 ± 0.0003	0.0008 ± 0.0003	Resident	Resident
cvr001052306009	Calaveras River	233	2	0.0011 ± 0.0003	0.0006 ± 0.0002	Resident	Resident
cvr001052306011	Calaveras River	280	2	0.0018 ± 0.0002	0.0011 ± 0.0002	Steelhead	Resident
cvr001052306013	Calaveras River	275	2	0.0019 ± 0.0004	0.0008 ± 0.0002	Steelhead	Resident
cvr001052306016	Calaveras River	290	2	0.0008 ± 0.0004	0.0008 ± 0.0002	Resident	Resident
cvr001052306017	Calaveras River	278	2	0.0007 ± 0.0002	0.0013 ± 0.0003	Resident	Resident
cvr001052306018	Calaveras River	275	2	0.0007 ± 0.0003	0.0013 ± 0.0003	Resident	Resident
cvr001052306019	Calaveras River	215	2	0.0008 ± 0.0004	0.0008 ± 0.0004	Resident	Resident
cvr001070203001	Calaveras River	107	0	0.0010 ± 0.0003	0.0010 ± 0.0003	Resident	Resident
cvr001070203003	Calaveras River	91	0	0.0016 ± 0.0004	0.0008 ± 0.0003	Steelhead	Resident
cvr001070203004	Calaveras River	121	0	0.0018 ± 0.0003	0.0008 ± 0.0002	Steelhead	Resident
cvr001070203005	Calaveras River	116	0	0.0017 ± 0.0004	0.0007 ± 0.0001	Steelhead	Resident
cvr001070203006	Calaveras River	123	0	0.0007 ± 0.0001	0.0007 ± 0.0004	Resident	Resident
cvr001070203007	Calaveras River	98	0	0.0007 ± 0.0003	0.0009 ± 0.0004	Resident	Resident
cvr001070203009	Calaveras River	204	2	0.0013 ± 0.0003	0.0011 ± 0.0002	Resident	Resident
cvr001070203010	Calaveras River	226	2	0.0013 ± 0.0002	0.0011 ± 0.0004	Resident	Resident
cvr001070203012	Calaveras River	216	2	0.0012 ± 0.0004	0.0007 ± 0.0004	Resident	Resident

CDFG No	Location	Length (mm)	Age	Mean Sr:Ca ± SD		Maternal Origin	Migratory History
				Primordia	FWG		
cvr001070203013	Calaveras River	226	2	0.0022 ± 0.0004	0.0013 ± 0.0005	Steelhead	Resident
cvr001070203014	Calaveras River	233	2	0.0019 ± 0.0003	0.0009 ± 0.0002	Steelhead	Resident
cvr001070203016	Calaveras River	262	2	0.0011 ± 0.0002	0.0012 ± 0.0002	Resident	Resident
cvr002070203001	Calaveras River	310	3	0.0008 ± 0.0002	0.0008 ± 0.0003	Resident	Resident
cvr002070203002	Calaveras River	214	2	0.0008 ± 0.0004	0.0009 ± 0.0004	Resident	Resident
cvr002070203003	Calaveras River	218	2	0.0007 ± 0.0003	0.0009 ± 0.0004	Resident	Resident
cvr002070203006	Calaveras River	128	0	0.0009 ± 0.0003	0.0006 ± 0.0002	Resident	Resident
cvr002070203009	Calaveras River	91	0	0.0011 ± 0.0005	0.0012 ± 0.0003	Resident	Resident
cvr002070203025	Calaveras River	76	0	0.0008 ± 0.0003	0.0009 ± 0.0003	Resident	Resident
cvr002070203027	Calaveras River	122	0	0.0015 ± 0.0002	0.0008 ± 0.0003	Steelhead	Resident
cvr002070203032	Calaveras River	203	1	0.0010 ± 0.0003	0.0009 ± 0.0002	Resident	Resident
cvr002070203034	Calaveras River	215	2	0.0011 ± 0.0003	0.0007 ± 0.0002	Resident	Resident
cvr002070203036	Calaveras River	223	2	0.0014 ± 0.0002	0.0007 ± 0.0002	Resident	Resident
cvr002070203038	Calaveras River	210	2	0.0019 ± 0.0003	0.0013 ± 0.0004	Steelhead	Resident
cvr002070203040	Calaveras River	366	3	0.0009 ± 0.0002	0.0006 ± 0.0002	Resident	Resident
cvr002070203041	Calaveras River	115	0	0.0012 ± 0.0001	0.0011 ± 0.0004	Resident	Resident
cvr002070203043	Calaveras River	110	0	0.0018 ± 0.0003	0.0007 ± 0.0001	Steelhead	Resident
cvr002070203049	Calaveras River	99	0	0.0010 ± 0.0002	0.0010 ± 0.0002	Resident	Resident
cvr002120506001	Calaveras River	279	2	0.0009 ± 0.0003	0.0007 ± 0.0002	Resident	Resident
cvr002120506002	Calaveras River	318	3	0.0009 ± 0.0003	0.0010 ± 0.0003	Resident	Resident
cvr003102802001	Calaveras River	368	3	0.0010 ± 0.0002	0.0009 ± 0.0003	Resident	Resident
cvr003102802002	Calaveras River	324	3	0.0014 ± 0.0002	0.0006 ± 0.0003	Steelhead	Resident
cvr003102802003	Calaveras River	324	3	0.0005 ± 0.0003	0.0007 ± 0.0002	Resident	Resident
cvr003102802004	Calaveras River	355	3	0.0010 ± 0.0003	0.0007 ± 0.0003	Resident	Resident
cvr003102802005	Calaveras River	527	4	0.0018 ± 0.0003	0.0007 ± 0.0001	Steelhead	Resident
cvr003102802006	Calaveras River	419	4	0.0008 ± 0.0003	0.0008 ± 0.0002	Resident	Resident
cvr006111303004	Calaveras River	176	1	0.0010 ± 0.0002	0.0008 ± 0.0002	Resident	Resident
cvr006111303006	Calaveras River	135	0	0.0010 ± 0.0003	0.0011 ± 0.0003	Resident	Resident
cvr007011805001	Calaveras River	535	4	0.0018 ± 0.0003	0.0009 ± 0.0001	Steelhead	Steelhead
cvr007030106001	Calaveras River	337	3	0.0013 ± 0.0002	0.0007 ± 0.0004	Resident	Resident
cvr007030106002	Calaveras River	235	2	0.0008 ± 0.0003	0.0007 ± 0.0003	Resident	Resident
cvr007030106003	Calaveras River	303	3	0.0023 ± 0.0004	0.0007 ± 0.0002	Steelhead	Resident
cvr007050306002	Calaveras River	276	2	0.0010 ± 0.0004	0.0013 ± 0.0003	Resident	Resident
cvr007050306003	Calaveras River	301	3	0.0019 ± 0.0003	0.0012 ± 0.0002	Steelhead	Resident
cvr007050306004	Calaveras River	355	3	0.0008 ± 0.0004	0.0011 ± 0.0003	Resident	Resident

CDFG No	Location	Length (mm)	Age	Mean Sr:Ca ± SD		Maternal Origin	Migratory History
				Primordia	FWG		
cvr007050306005	Calaveras River	346	3	0.0014 ± 0.0004	0.0012 ± 0.0004	Resident	Resident
cvr007050306006	Calaveras River	291	2	0.0012 ± 0.0003	0.0008 ± 0.0002	Resident	Resident
cvr007050306007	Calaveras River	284	2	0.0011 ± 0.0004	0.0009 ± 0.0003	Resident	Resident
cvr007050306008	Calaveras River	275	2	0.0010 ± 0.0003	0.0009 ± 0.0004	Resident	Resident
cvr007050306009	Calaveras River	278	2	0.0008 ± 0.0003	0.0007 ± 0.0002	Resident	Resident
cvr007050306010	Calaveras River	266	2	0.0009 ± 0.0002	0.0007 ± 0.0002	Resident	Resident
cvr007050306011	Calaveras River	196	1	0.0008 ± 0.0003	0.0007 ± 0.0002	Resident	Resident
cvr007050306011	Calaveras River	196	1	0.0008 ± 0.0003	0.0007 ± 0.0002	Resident	Resident
cvr007050306012	Calaveras River	250	2	0.0019 ± 0.0003	0.0007 ± 0.0003	Steelhead	Resident
cvr007050306013	Calaveras River	260	2	0.0009 ± 0.0005	0.0008 ± 0.0002	Resident	Resident
cvr007050306014	Calaveras River	278	2	0.0011 ± 0.0004	0.0008 ± 0.0004	Resident	Resident
cvr007050306015	Calaveras River	199	1	0.0011 ± 0.0003	0.0011 ± 0.0002	Resident	Resident
cvr007050306016	Calaveras River	421	4	0.0019 ± 0.0004	0.0007 ± 0.0002	Steelhead	Resident
cvr007050306017	Calaveras River	382	3	0.0016 ± 0.0002	0.0007 ± 0.0002	Steelhead	Resident
cvr007050306018	Calaveras River	289	2	0.0007 ± 0.0003	0.0007 ± 0.0003	Resident	Resident
cvr007050306019	Calaveras River	298	3	0.0013 ± 0.0003	0.0008 ± 0.0002	Resident	Resident
cvr007050306020	Calaveras River	290	2	0.0011 ± 0.0003	0.0013 ± 0.0003	Resident	Resident
cvr007050306021	Calaveras River	340	3	0.0009 ± 0.0003	0.0009 ± 0.0004	Resident	Resident
cvr007050306022	Calaveras River	300	3	0.0008 ± 0.0003	0.0007 ± 0.0003	Resident	Resident
cvr007050306023	Calaveras River	270	2	0.0008 ± 0.0003	0.0007 ± 0.0003	Resident	Resident
cvr007050306024	Calaveras River	289	2	0.0007 ± 0.0003	0.0007 ± 0.0002	Resident	Resident
cvr007050306025	Calaveras River	270	2	0.0017 ± 0.0001	0.0007 ± 0.0001	Steelhead	Resident
cvr007050306026	Calaveras River	265	2	0.0014 ± 0.0002	0.0008 ± 0.0003	Resident	Resident
cvr007050306027	Calaveras River	260	2	0.0019 ± 0.0003	0.0008 ± 0.0002	Steelhead	Resident
cvr007050306028	Calaveras River	245	2	0.0008 ± 0.0003	0.0011 ± 0.0002	Resident	Resident
cvr007050306029	Calaveras River	216	2	0.0010 ± 0.0003	0.0009 ± 0.0003	Resident	Resident
cvr007050306030	Calaveras River	215	2	0.0018 ± 0.0003	0.0007 ± 0.0002	Steelhead	Resident
cvr007051006001	Calaveras River	385	3	0.0008 ± 0.0003	0.0007 ± 0.0004	Resident	Resident
cvr007051006002	Calaveras River	355	3	0.0008 ± 0.0003	0.0007 ± 0.0004	Resident	Resident
cvr007051006003	Calaveras River	276	2	0.0007 ± 0.0004	0.0007 ± 0.0002	Resident	Resident
cvr007051006004	Calaveras River	340	3	0.0007 ± 0.0002	0.0008 ± 0.0003	Resident	Resident
cvr007051006005	Calaveras River	260	2	0.0009 ± 0.0003	0.0008 ± 0.0002	Resident	Resident
cvr007051006007	Calaveras River	277	2	0.0020 ± 0.0002	0.0010 ± 0.0002	Steelhead	Resident
cvr007051006008	Calaveras River	280	2	0.0009 ± 0.0003	0.0009 ± 0.0003	Resident	Resident
cvr007051006009	Calaveras River	290	2	0.0008 ± 0.0003	0.0007 ± 0.0002	Resident	Resident

CDFG No	Location	Length (mm)	Age	Mean Sr:Ca ± SD		Maternal Origin	Migratory History
				Primordia	FWG		
cvr007051006010	Calaveras River	300	3	0.0006 ± 0.0005	0.0007 ± 0.0003	Resident	Resident
cvr007051006011	Calaveras River	240	2	0.0019 ± 0.0003	0.0007 ± 0.0003	Steelhead	Resident
cvr007051006012	Calaveras River	250	2	0.0012 ± 0.0003	0.0007 ± 0.0004	Resident	Resident
cvr007051006013	Calaveras River	269	2	0.0018 ± 0.0003	0.0012 ± 0.0002	Steelhead	Resident
cvr007051006016	Calaveras River	236	2	0.0006 ± 0.0003	0.0009 ± 0.0003	Resident	Resident
cvr007051006017	Calaveras River	238	2	0.0020 ± 0.0004	0.0007 ± 0.0002	Steelhead	Resident
cvr007051006018	Calaveras River	223	2	0.0014 ± 0.0004	0.0006 ± 0.0002	Resident	Resident
cvr007051006019	Calaveras River	215	2	0.0011 ± 0.0003	0.0011 ± 0.0003	Resident	Resident
cvr007051006020	Calaveras River	340	3	0.0011 ± 0.0003	0.0010 ± 0.0004	Resident	Resident
cvr007051006021	Calaveras River	325	3	0.0010 ± 0.0003	0.0009 ± 0.0002	Resident	Resident
cvr007051006022	Calaveras River	340	3	0.0009 ± 0.0002	0.0007 ± 0.0002	Resident	Resident
cvr007051006023	Calaveras River	374	3	0.0016 ± 0.0004	0.0006 ± 0.0002	Steelhead	Resident
cvr007111303001	Calaveras River	205	2	0.0013 ± 0.0003	0.0010 ± 0.0002	Resident	Resident
cvr007111303002	Calaveras River	227	2	0.0017 ± 0.0002	0.0009 ± 0.0002	Steelhead	Resident
cvr007111303003	Calaveras River	235	2	0.0012 ± 0.0002	0.0010 ± 0.0004	Resident	Resident
cvr007111303005	Calaveras River	198	1	0.0014 ± 0.0003	0.0011 ± 0.0003	Resident	Resident
cvr007111303006	Calaveras River	201	1	0.0013 ± 0.0005	0.0010 ± 0.0002	Resident	Resident
cvr007111303007	Calaveras River	172	1	0.0016 ± 0.0003	0.0009 ± 0.0002	Steelhead	Resident
cvr007111303010	Calaveras River	185	1	0.0016 ± 0.0003	0.0007 ± 0.0003	Steelhead	Resident
cvr007111303011	Calaveras River	184	1	0.0020 ± 0.0003	0.0007 ± 0.0002	Steelhead	Resident
cvr007111303016	Calaveras River	190	1	0.0017 ± 0.0004	0.0013 ± 0.0004	Steelhead	Resident
cvr007120506001	Calaveras River	318	3	0.0007 ± 0.0004	0.0013 ± 0.0002	Resident	Resident
cvr007120506002	Calaveras River	274	2	0.0007 ± 0.0004	0.0012 ± 0.0002	Resident	Resident
cvr007120506003	Calaveras River	255	2	0.0010 ± 0.0003	0.0008 ± 0.0003	Resident	Resident
cvr007120506004	Calaveras River	335	3	0.0018 ± 0.0003	0.0009 ± 0.0002	Steelhead	Resident
cvr007120506005	Calaveras River	278	2	0.0008 ± 0.0003	0.0009 ± 0.0003	Resident	Resident
cvr007120506006	Calaveras River	332	3	0.0006 ± 0.0003	0.0007 ± 0.0002	Resident	Resident
cvr007120506007	Calaveras River	405	4	0.0012 ± 0.0003	0.0007 ± 0.0004	Resident	Resident
cvr007120506008	Calaveras River	304	3	0.0011 ± 0.0003	0.0007 ± 0.0002	Resident	Resident
cvr007120506009	Calaveras River	281	2	0.0017 ± 0.0004	0.0007 ± 0.0002	Steelhead	Resident
cvr007120506010	Calaveras River	296	2	0.0008 ± 0.0003	0.0010 ± 0.0004	Resident	Resident
cvr007120506011	Calaveras River	315	3	0.0017 ± 0.0003	0.0010 ± 0.0002	Steelhead	Resident
cvr007120506012	Calaveras River	219	2	0.0007 ± 0.0005	0.0007 ± 0.0003	Resident	Resident
cvr007120506013	Calaveras River	280	2	0.0018 ± 0.0003	0.0006 ± 0.0003	Steelhead	Resident
cvr007120506014	Calaveras River	202	1	0.0014 ± 0.0003	0.0011 ± 0.0003	Resident	Resident

CDFG No	Location	Length (mm)	Age	Mean Sr:Ca ± SD		Maternal Origin	Migratory History
				Primordia	FWG		
cvr007120506015	Calaveras River	308	3	0.0015 ± 0.0003	0.0010 ± 0.0003	Resident	Resident
cvr007120506017	Calaveras River	249	2	0.0016 ± 0.0001	0.0007 ± 0.0002	Steelhead	Resident
cvr007120506018	Calaveras River	191	1	0.0007 ± 0.0003	0.0007 ± 0.0002	Resident	Resident
cvr007120506019	Calaveras River	222	2	0.0009 ± 0.0003	0.0007 ± 0.0002	Resident	Resident
cvr007120506020	Calaveras River	233	2	0.0015 ± 0.0003	0.0008 ± 0.0003	Resident	Resident
cvr007120506021	Calaveras River	198	1	0.0016 ± 0.0004	0.0013 ± 0.0004	Steelhead	Resident
cvr007120506022	Calaveras River	197	1	0.0007 ± 0.0004	0.0014 ± 0.0002	Resident	Resident
cvr007120506023	Calaveras River	192	1	0.0007 ± 0.0004	0.0008 ± 0.0003	Resident	Resident
cvr007120506024	Calaveras River	170	1	0.0009 ± 0.0003	0.0007 ± 0.0002	Resident	Resident
cvr008011805001	Calaveras River	300	3	0.0014 ± 0.0003	0.0007 ± 0.0002	Resident	Resident
cvr008030106001	Calaveras River	245	2	0.0009 ± 0.0003	0.0008 ± 0.0002	Resident	Resident
cvr008030106002	Calaveras River	211	2	0.0008 ± 0.0002	0.0014 ± 0.0004	Resident	Resident
cvr008030106003	Calaveras River	368	3	0.0008 ± 0.0002	0.0007 ± 0.0002	Resident	Resident
cvr008041302001	Calaveras River	700	4	0.0008 ± 0.0002	0.0007 ± 0.0002	Resident	Steelhead
cvr009042505001	Calaveras River	194	1	0.0007 ± 0.0003	0.0007 ± 0.0003	Resident	Resident
cvr009042505002	Calaveras River	190	1	0.0017 ± 0.0002	0.0009 ± 0.0004	Steelhead	Resident
cvr009042505003	Calaveras River	176	1	0.0009 ± 0.0003	0.0014 ± 0.0003	Resident	Resident
cvr009102504001	Calaveras River	195	1	0.0020 ± 0.0004	0.0009 ± 0.0003	Steelhead	Resident
cvr009102504004	Calaveras River	310	3	0.0017 ± 0.0004	0.0007 ± 0.0002	Steelhead	Resident
cvr009102504007	Calaveras River	220	2	0.0009 ± 0.0003	0.0009 ± 0.0002	Resident	Resident
cvr009102504008	Calaveras River	199	1	0.0010 ± 0.0003	0.0011 ± 0.0002	Resident	Resident
cvr009102504009	Calaveras River	199	1	0.0012 ± 0.0003	0.0009 ± 0.0002	Resident	Resident
cvr010102504001	Calaveras River	188	1	0.0011 ± 0.0003	0.0008 ± 0.0002	Resident	Resident
cvr011020706001	Calaveras River	210	2	0.0010 ± 0.0004	0.0007 ± 0.0004	Resident	Resident
cvr011030106001	Calaveras River	158	0	0.0008 ± 0.0005	0.0007 ± 0.0002	Resident	Resident
cvr011030106002	Calaveras River	182	1	0.0016 ± 0.0003	0.0007 ± 0.0002	Steelhead	Resident
cvr011051506001	Calaveras River	423	4	0.0016 ± 0.0003	0.0008 ± 0.0004	Steelhead	Resident
cvr020042005001	Calaveras River	306	3	0.0020 ± 0.0004	0.0010 ± 0.0002	Steelhead	Resident
cvr020042005002	Calaveras River	255	2	0.0020 ± 0.0002	0.0009 ± 0.0002	Steelhead	Resident
cvr020042005003	Calaveras River	223	2	0.0018 ± 0.0003	0.0008 ± 0.0002	Steelhead	Resident
cvr020042005004	Calaveras River	228	2	0.0007 ± 0.0002	0.0008 ± 0.0002	Resident	Resident
cvr020042005005	Calaveras River	200	1	0.0012 ± 0.0003	0.0007 ± 0.0002	Resident	Resident
cvr020042005006	Calaveras River	205	2	0.0011 ± 0.0003	0.0012 ± 0.0003	Resident	Resident
cvr020042005007	Calaveras River	206	2	0.0007 ± 0.0003	0.0008 ± 0.0002	Resident	Resident
cvr020042005008	Calaveras River	232	2	0.0009 ± 0.0002	0.0009 ± 0.0002	Resident	Resident

CDFG No	Location	Length (mm)	Age	Mean Sr:Ca ± SD		Maternal Origin	Migratory History
				Primordia	FWG		
cvr020042005009	Calaveras River	189	1	0.0010 ± 0.0003	0.0010 ± 0.0003	Resident	Resident
cvr020042005010	Calaveras River	182	1	0.0018 ± 0.0004	0.0007 ± 0.0003	Steelhead	Resident
cvr020042005011	Calaveras River	185	1	0.0009 ± 0.0003	0.0006 ± 0.0003	Resident	Resident
cvr020042005012	Calaveras River	150	0	0.0017 ± 0.0002	0.0012 ± 0.0003	Steelhead	Resident
cvr021102406001	Calaveras River	273	2	0.0008 ± 0.0001	0.0011 ± 0.0004	Resident	Resident
der001070703001	Deer Creek	125	1	0.0008 ± 0.0001	0.0010 ± 0.0005	Resident	Resident
der001070703005	Deer Creek	93	0	0.0011 ± 0.0003	0.0013 ± 0.0004	Resident	Resident
der001070703008	Deer Creek	140	1	0.0019 ± 0.0002	0.0012 ± 0.0003	Steelhead	Resident
der001070703011	Deer Creek	160	1	0.0011 ± 0.0003	0.0013 ± 0.0003	Resident	Resident
der001070703012	Deer Creek	160	1	0.0012 ± 0.0003	0.0011 ± 0.0003	Resident	Resident
der001070703013	Deer Creek	115	1	0.0006 ± 0.0003	0.0013 ± 0.0004	Resident	Resident
der001070703014	Deer Creek	110	1	0.0011 ± 0.0003	0.0013 ± 0.0004	Resident	Resident
der001070703015	Deer Creek	114	1	0.0021 ± 0.0003	0.0011 ± 0.0004	Steelhead	Resident
der001070703016	Deer Creek	100	1	0.0011 ± 0.0003	0.0012 ± 0.0001	Resident	Resident
der001070703017	Deer Creek	81	0	0.0008 ± 0.0001	0.0010 ± 0.0005	Resident	Resident
der001070703018	Deer Creek	83	0	0.0010 ± 0.0003	0.0012 ± 0.0002	Resident	Resident
der001070703019	Deer Creek	93	0	0.0011 ± 0.0003	0.0010 ± 0.0002	Resident	Resident
der001070703019	Deer Creek	93	0	0.0020 ± 0.0003	0.0010 ± 0.0002	Steelhead	Resident
der001r030105001	Deer Creek	219	2	0.0020 ± 0.0002	0.0012 ± 0.0003	Steelhead	Resident
der001r030305002	Deer Creek	183	1	0.0017 ± 0.0003	0.0009 ± 0.0002	Steelhead	Resident
der001r030305003	Deer Creek	184	1	0.0017 ± 0.0004	0.0012 ± 0.0002	Steelhead	Resident
der001r030305003	Deer Creek	184	1	0.0017 ± 0.0004	0.0012 ± 0.0002	Steelhead	Resident
der001r030305004	Deer Creek	171	1	0.0018 ± 0.0003	0.0009 ± 0.0002	Steelhead	Resident
der001r032405005	Deer Creek	244	2	0.0018 ± 0.0004	0.0011 ± 0.0002	Steelhead	Resident
der001r033105006	Deer Creek	204	2	0.0019 ± 0.0004	0.0011 ± 0.0004	Steelhead	Resident
der001r033105007	Deer Creek	228	2	0.0019 ± 0.0002	0.0009 ± 0.0003	Steelhead	Resident
der001r033105008	Deer Creek	180	1	0.0021 ± 0.0003	0.0013 ± 0.0003	Steelhead	Resident
der001r033105009	Deer Creek	160	1	0.0018 ± 0.0003	0.0012 ± 0.0003	Steelhead	Resident
der001R040405010	Deer Creek	181	1	0.0012 ± 0.0003	0.0013 ± 0.0004	Resident	Resident
der001R040405011	Deer Creek	190	2	0.0021 ± 0.0003	0.0013 ± 0.0003	Steelhead	Resident
der001R040405012	Deer Creek	208	2	0.0019 ± 0.0003	0.0011 ± 0.0003	Steelhead	Resident
der001R040405013	Deer Creek	191	2	0.0015 ± 0.0003	0.0013 ± 0.0002	Steelhead	Resident
der001r040505014	Deer Creek	205	2	0.0019 ± 0.0003	0.0013 ± 0.0002	Steelhead	Resident
der001r040505015	Deer Creek	205	2	0.0010 ± 0.0003	0.0012 ± 0.0003	Resident	Resident
der001r040705016	Deer Creek	199	2	0.0017 ± 0.0003	0.0011 ± 0.0002	Steelhead	Resident

CDFG No	Location	Length (mm)	Age	Mean Sr:Ca ± SD		Maternal Origin	Migratory History
				Primordia	FWG		
der001r041205017	Deer Creek	215	2	0.0018 ± 0.0004	0.0012 ± 0.0002	Steelhead	Resident
der001r041205018	Deer Creek	152	1	0.0018 ± 0.0003	0.0011 ± 0.0003	Steelhead	Resident
der001r041305019	Deer Creek	193	2	0.0020 ± 0.0004	0.0010 ± 0.0006	Steelhead	Resident
der001r041505020	Deer Creek	227	2	0.0019 ± 0.0003	0.0012 ± 0.0002	Steelhead	Resident
der002070803001	Deer Creek	184	1	0.0018 ± 0.0003	0.0012 ± 0.0003	Steelhead	Resident
der002070803003	Deer Creek	107	1	0.0012 ± 0.0003	0.0013 ± 0.0002	Resident	Resident
der002070803005	Deer Creek	205	2	0.0012 ± 0.0003	0.0012 ± 0.0003	Resident	Resident
der002070803007	Deer Creek	181	1	0.0019 ± 0.0002	0.0012 ± 0.0004	Steelhead	Resident
der002070803009	Deer Creek	100	1	0.0018 ± 0.0004	0.0013 ± 0.0004	Steelhead	Resident
der002070803010	Deer Creek	102	1	0.0017 ± 0.0003	0.0012 ± 0.0002	Steelhead	Resident
der002070803011	Deer Creek	122	1	0.0010 ± 0.0003	0.0009 ± 0.0002	Resident	Resident
der002070803012	Deer Creek	98	1	0.0010 ± 0.0004	0.0012 ± 0.0002	Resident	Resident
der003091103003	Deer Creek	185	2	0.0010 ± 0.0003	0.0012 ± 0.0002	Resident	Resident
der003091103004	Deer Creek	222	2	0.0019 ± 0.0004	0.0010 ± 0.0003	Steelhead	Resident
der004091103001	Deer Creek	163	1	0.0010 ± 0.0004	0.0011 ± 0.0003	Resident	Resident
der004091103002	Deer Creek	221	2	0.0011 ± 0.0003	0.0013 ± 0.0002	Resident	Resident
der005091003001	Deer Creek	156	1	0.0019 ± 0.0003	0.0013 ± 0.0004	Steelhead	Resident
der005091003002	Deer Creek	158	1	0.0018 ± 0.0001	0.0012 ± 0.0001	Steelhead	Resident
der006091003001	Deer Creek	204	2	0.0019 ± 0.0002	0.0013 ± 0.0002	Steelhead	Resident
der006091003002	Deer Creek	187	2	0.0020 ± 0.0003	0.0013 ± 0.0003	Steelhead	Resident
der006091003003	Deer Creek	161	1	0.0020 ± 0.0003	0.0015 ± 0.0004	Steelhead	Resident
der006092705001	Deer Creek	180	1	0.0020 ± 0.0003	0.0013 ± 0.0003	Steelhead	Resident
der006092705002	Deer Creek	138	1	0.0020 ± 0.0003	0.0011 ± 0.0002	Steelhead	Resident
der006092705003	Deer Creek	136	1	0.0011 ± 0.0005	0.0011 ± 0.0003	Resident	Resident
der006092705004	Deer Creek	119	1	0.0020 ± 0.0003	0.0013 ± 0.0003	Steelhead	Resident
der006092705005	Deer Creek	172	1	0.0010 ± 0.0004	0.0011 ± 0.0002	Resident	Resident
der006092705006	Deer Creek	190	2	0.0016 ± 0.0003	0.0009 ± 0.0002	Steelhead	Resident
der006092705007	Deer Creek	140	1	0.0019 ± 0.0002	0.0014 ± 0.0004	Steelhead	Resident
der006092705008	Deer Creek	159	1	0.0017 ± 0.0003	0.0012 ± 0.0003	Steelhead	Resident
der006092705009	Deer Creek	126	1	0.0020 ± 0.0003	0.0012 ± 0.0002	Steelhead	Resident
der006092705010	Deer Creek	158	1	0.0011 ± 0.0004	0.0011 ± 0.0002	Resident	Resident
der006092705011	Deer Creek	167	1	0.0013 ± 0.0003	0.0014 ± 0.0003	Resident	Resident
der006092705012	Deer Creek	161	1	0.0020 ± 0.0003	0.0013 ± 0.0003	Steelhead	Resident
der006092705013	Deer Creek	205	2	0.0009 ± 0.0005	0.0011 ± 0.0002	Resident	Resident
der006092705014	Deer Creek	277	3	0.0020 ± 0.0003	0.0009 ± 0.0001	Steelhead	Resident

CDFG No	Location	Length (mm)	Age	Mean Sr:Ca ± SD		Maternal Origin	Migratory History
				Primordia	FWG		
der006092705015	Deer Creek	317	3	0.0018 ± 0.0003	0.0011 ± 0.0003	Steelhead	Resident
der007091003001	Deer Creek	216	2	0.0012 ± 0.0003	0.0013 ± 0.0002	Resident	Resident
der007091003002	Deer Creek	161	1	0.0020 ± 0.0003	0.0011 ± 0.0002	Steelhead	Resident
der007091003004	Deer Creek	194	2	0.0019 ± 0.0002	0.0011 ± 0.0002	Steelhead	Resident
der007091003006	Deer Creek	183	1	0.0019 ± 0.0002	0.0010 ± 0.0003	Steelhead	Resident
der007091003007	Deer Creek	153	1	0.0019 ± 0.0003	0.0012 ± 0.0002	Steelhead	Resident
der007091003009	Deer Creek	234	2	0.0011 ± 0.0003	0.0012 ± 0.0002	Resident	Resident
der007091003010	Deer Creek	144	1	0.0019 ± 0.0003	0.0010 ± 0.0002	Steelhead	Resident
der007091003012	Deer Creek	144	1	0.0019 ± 0.0003	0.0013 ± 0.0003	Steelhead	Resident
der007091003013	Deer Creek	218	2	0.0011 ± 0.0003	0.0013 ± 0.0003	Resident	Resident
der007092605002	Deer Creek	84	0	0.0021 ± 0.0004	0.0012 ± 0.0002	Steelhead	Resident
der007092605006	Deer Creek	72	0	0.0011 ± 0.0002	0.0010 ± 0.0004	Resident	Resident
der007092605007	Deer Creek	84	0	0.0019 ± 0.0003	0.0014 ± 0.0001	Steelhead	Resident
der007092605008	Deer Creek	93	0	0.0019 ± 0.0003	0.0013 ± 0.0002	Steelhead	Resident
der007092605009	Deer Creek	79	0	0.0020 ± 0.0002	0.0011 ± 0.0003	Steelhead	Resident
der007092605011	Deer Creek	72	0	0.0013 ± 0.0003	0.0012 ± 0.0002	Resident	Resident
der007092605011	Deer Creek	72	0	0.0011 ± 0.0003	0.0013 ± 0.0004	Resident	Resident
der007092605012	Deer Creek	88	0	0.0011 ± 0.0003	0.0011 ± 0.0002	Resident	Resident
der007092605013	Deer Creek	74	0	0.0020 ± 0.0002	0.0011 ± 0.0002	Steelhead	Resident
der007092605014	Deer Creek	68	0	0.0019 ± 0.0003	0.0014 ± 0.0003	Steelhead	Resident
der007092605015	Deer Creek	69	0	0.0019 ± 0.0003	0.0013 ± 0.0003	Steelhead	Resident
der007092605016	Deer Creek	132	1	0.0012 ± 0.0003	0.0014 ± 0.0002	Resident	Resident
der007092605017	Deer Creek	131	1	0.0019 ± 0.0003	0.0013 ± 0.0002	Steelhead	Resident
der007092605018	Deer Creek	88	0	0.0020 ± 0.0004	0.0014 ± 0.0004	Steelhead	Resident
der007092605019	Deer Creek	83	0	0.0011 ± 0.0003	0.0012 ± 0.0004	Resident	Resident
der007092605020	Deer Creek	88	0	0.0022 ± 0.0003	0.0014 ± 0.0001	Steelhead	Resident
der007092605022	Deer Creek	85	0	0.0019 ± 0.0004	0.0013 ± 0.0002	Steelhead	Resident
der007092605023	Deer Creek	108	1	0.0018 ± 0.0003	0.0012 ± 0.0002	Steelhead	Resident
der007092605024	Deer Creek	113	1	0.0019 ± 0.0002	0.0014 ± 0.0002	Steelhead	Resident
der007092605026	Deer Creek	139	1	0.0019 ± 0.0003	0.0014 ± 0.0002	Steelhead	Resident
der007092605027	Deer Creek	136	1	0.0016 ± 0.0002	0.0009 ± 0.0002	Steelhead	Resident
der007092605028	Deer Creek	144	1	0.0020 ± 0.0004	0.0011 ± 0.0002	Steelhead	Resident
der007092605029	Deer Creek	215	2	0.0016 ± 0.0002	0.0011 ± 0.0003	Steelhead	Resident
der007092605029	Deer Creek	215	2	0.0019 ± 0.0002	0.0011 ± 0.0003	Steelhead	Resident
der007092605030	Deer Creek	100	1	0.0021 ± 0.0003	0.0012 ± 0.0003	Steelhead	Resident

CDFG No	Location	Length (mm)	Age	Mean Sr:Ca ± SD		Maternal Origin	Migratory History
				Primordia	FWG		
der007092605031	Deer Creek	85	0	0.0019 ± 0.0004	0.0012 ± 0.0003	Steelhead	Resident
der007092705001	Deer Creek	75	0	0.0019 ± 0.0004	0.0009 ± 0.0004	Steelhead	Resident
der007092705003	Deer Creek	91	0	0.0019 ± 0.0004	0.0011 ± 0.0003	Steelhead	Resident
der007092705004	Deer Creek	92	0	0.0022 ± 0.0003	0.0012 ± 0.0002	Steelhead	Resident
der007092705004	Deer Creek	92	0	0.0021 ± 0.0003	0.0012 ± 0.0002	Steelhead	Resident
der007092705005	Deer Creek	86	0	0.0018 ± 0.0003	0.0010 ± 0.0002	Steelhead	Resident
der007092705006	Deer Creek	87	0	0.0020 ± 0.0003	0.0012 ± 0.0003	Steelhead	Resident
der007092705008	Deer Creek	76	0	0.0017 ± 0.0003	0.0009 ± 0.0003	Steelhead	Resident
der007092705009	Deer Creek	110	1	0.0010 ± 0.0003	0.0012 ± 0.0002	Resident	Resident
der007092705010	Deer Creek	77	0	0.0017 ± 0.0002	0.0011 ± 0.0003	Steelhead	Resident
der007092705011	Deer Creek	78	0	0.0018 ± 0.0003	0.0009 ± 0.0003	Steelhead	Resident
der007092705012	Deer Creek	78	0	0.0019 ± 0.0003	0.0013 ± 0.0002	Steelhead	Resident
der007092705014	Deer Creek	73	0	0.0011 ± 0.0003	0.0011 ± 0.0003	Resident	Resident
der007092705016	Deer Creek	81	0	0.0020 ± 0.0001	0.0012 ± 0.0004	Steelhead	Resident
der007092705017	Deer Creek	78	0	0.0019 ± 0.0003	0.0012 ± 0.0002	Steelhead	Resident
der007092705018	Deer Creek	73	0	0.0020 ± 0.0002	0.0014 ± 0.0002	Steelhead	Resident
der007092705019	Deer Creek	86	0	0.0012 ± 0.0003	0.0013 ± 0.0004	Resident	Resident
der007092705020	Deer Creek	59	0	0.0019 ± 0.0003	0.0011 ± 0.0002	Steelhead	Resident
der007092705021	Deer Creek	91	0	0.0011 ± 0.0004	0.0014 ± 0.0002	Resident	Resident
der007092705022	Deer Creek	79	0	0.0018 ± 0.0002	0.0012 ± 0.0002	Steelhead	Resident
der007092705023	Deer Creek	127	1	0.0020 ± 0.0003	0.0011 ± 0.0002	Steelhead	Resident
der007092705024	Deer Creek	217	2	0.0019 ± 0.0003	0.0012 ± 0.0003	Steelhead	Resident
der007092705025	Deer Creek	181	1	0.0019 ± 0.0003	0.0012 ± 0.0002	Steelhead	Resident
der007092705026	Deer Creek	177	1	0.0021 ± 0.0003	0.0014 ± 0.0003	Steelhead	Resident
der007092705027	Deer Creek	202	2	0.0019 ± 0.0002	0.0011 ± 0.0004	Steelhead	Resident
der007092705028	Deer Creek	147	1	0.0019 ± 0.0003	0.0011 ± 0.0002	Steelhead	Resident
der007092705029	Deer Creek	168	1	0.0019 ± 0.0002	0.0011 ± 0.0002	Steelhead	Resident
der007092705030	Deer Creek	163	1	0.0021 ± 0.0003	0.0012 ± 0.0002	Steelhead	Resident
der007092705031	Deer Creek	155	1	0.0019 ± 0.0005	0.0013 ± 0.0003	Steelhead	Resident
der007092705032	Deer Creek	172	1	0.0020 ± 0.0003	0.0010 ± 0.0004	Steelhead	Resident
der007092705033	Deer Creek	168	1	0.0017 ± 0.0003	0.0010 ± 0.0003	Steelhead	Resident
der007092705034	Deer Creek	151	1	0.0010 ± 0.0002	0.0009 ± 0.0003	Resident	Resident
der007092705035	Deer Creek	142	1	0.0020 ± 0.0003	0.0012 ± 0.0002	Steelhead	Resident
der007092705036	Deer Creek	140	1	0.0011 ± 0.0003	0.0012 ± 0.0002	Resident	Resident
der007092705037	Deer Creek	134	1	0.0018 ± 0.0005	0.0011 ± 0.0003	Steelhead	Resident

CDFG No	Location	Length (mm)	Age	Mean Sr:Ca ± SD		Maternal Origin	Migratory History
				Primordia	FWG		
der007092705038	Deer Creek	113	1	0.0019 ± 0.0003	0.0013 ± 0.0001	Steelhead	Resident
der007092705040	Deer Creek	128	1	0.0019 ± 0.0004	0.0012 ± 0.0003	Steelhead	Resident
der007092705041	Deer Creek	97	1	0.0020 ± 0.0004	0.0013 ± 0.0002	Steelhead	Resident
der007092705042	Deer Creek	122	1	0.0020 ± 0.0003	0.0013 ± 0.0002	Steelhead	Resident
der007092705043	Deer Creek	87	0	0.0018 ± 0.0003	0.0012 ± 0.0003	Steelhead	Resident
der007092705045	Deer Creek	115	1	0.0020 ± 0.0003	0.0010 ± 0.0002	Steelhead	Resident
der007092705047	Deer Creek	97	1	0.0021 ± 0.0005	0.0013 ± 0.0003	Steelhead	Resident
der007092705050	Deer Creek	75	0	0.0020 ± 0.0003	0.0012 ± 0.0002	Steelhead	Resident
der007092705051	Deer Creek	76	0	0.0018 ± 0.0003	0.0010 ± 0.0003	Steelhead	Resident
der007092705052	Deer Creek	83	0	0.0018 ± 0.0004	0.0010 ± 0.0003	Steelhead	Resident
der007092705053	Deer Creek	89	0	0.0016 ± 0.0004	0.0010 ± 0.0002	Steelhead	Resident
der007092705054	Deer Creek	80	0	0.0019 ± 0.0003	0.0012 ± 0.0002	Steelhead	Resident
der007092705055	Deer Creek	98	1	0.0017 ± 0.0003	0.0009 ± 0.0002	Steelhead	Resident
der007092705056	Deer Creek	98	1	0.0016 ± 0.0003	0.0011 ± 0.0001	Steelhead	Resident
der007092705057	Deer Creek	66	0	0.0010 ± 0.0004	0.0008 ± 0.0003	Resident	Resident
der007092705058	Deer Creek	94	1	0.0017 ± 0.0003	0.0010 ± 0.0002	Steelhead	Resident
der007092705059	Deer Creek	63	0	0.0018 ± 0.0003	0.0010 ± 0.0001	Steelhead	Resident
der007092705060	Deer Creek	73	0	0.0018 ± 0.0003	0.0011 ± 0.0003	Steelhead	Resident
der007092705061	Deer Creek	82	0	0.0018 ± 0.0002	0.0011 ± 0.0002	Steelhead	Resident
der008041905001	Deer Creek	189	2	0.0010 ± 0.0004	0.0008 ± 0.0003	Resident	Resident
stn001021704005	Stanislaus River	350	3	0.0012 ± 0.0003	0.0013 ± 0.0002	Resident	Resident
stn001022206001	Stanislaus River	259	2	0.0009 ± 0.0004	0.0012 ± 0.0001	Resident	Resident
stn001022206002	Stanislaus River	245	2	0.0014 ± 0.0002	0.0015 ± 0.0003	Resident	Resident
stn001022206004	Stanislaus River	225	2	0.0011 ± 0.0003	0.0013 ± 0.0005	Resident	Resident
stn001110503002	Stanislaus River	311	3	0.0011 ± 0.0002	0.0013 ± 0.0005	Resident	Resident
stn001110503003	Stanislaus River	342	3	0.0013 ± 0.0006	0.0012 ± 0.0004	Resident	Resident
stn001110503004	Stanislaus River	182	1	0.0022 ± 0.0002	0.0013 ± 0.0002	Steelhead	Resident
stn001110905001	Stanislaus River	185	1	0.0012 ± 0.0002	0.0013 ± 0.0003	Resident	Resident
stn001110905002	Stanislaus River	420	4	0.0012 ± 0.0003	0.0013 ± 0.0004	Resident	Resident
stn001110905003	Stanislaus River	331	3	0.0014 ± 0.0003	0.0014 ± 0.0002	Resident	Resident
stn001110905004	Stanislaus River	142	1	0.0012 ± 0.0002	0.0014 ± 0.0002	Resident	Resident
stn001110905005	Stanislaus River	190	1	0.0012 ± 0.0002	0.0013 ± 0.0004	Resident	Resident
stn001110905006	Stanislaus River	174	1	0.0015 ± 0.0002	0.0015 ± 0.0004	Resident	Resident
stn001111606001	Stanislaus River	428	4	0.0020 ± 0.0004	0.0013 ± 0.0004	Steelhead	Resident
stn001111606002	Stanislaus River	314	3	0.0014 ± 0.0003	0.0015 ± 0.0001	Resident	Resident

CDFG No	Location	Length (mm)	Age	Mean Sr:Ca ± SD		Maternal Origin	Migratory History
				Primordia	FWG		
stn001111606003	Stanislaus River	295	2	0.0009 ± 0.0004	0.0012 ± 0.0002	Resident	Resident
stn001111606004	Stanislaus River	298	2	0.0009 ± 0.0003	0.0011 ± 0.0003	Resident	Resident
stn001111606005	Stanislaus River	284	2	0.0010 ± 0.0004	0.0012 ± 0.0002	Resident	Resident
stn001111606006	Stanislaus River	380	3	0.0016 ± 0.0005	0.0016 ± 0.0003	Resident	Resident
stn001111606011	Stanislaus River	235	2	0.0009 ± 0.0002	0.0012 ± 0.0003	Resident	Resident
stn001111606012	Stanislaus River	319	3	0.0015 ± 0.0001	0.0015 ± 0.0003	Resident	Resident
stn001111606013	Stanislaus River	281	2	0.0013 ± 0.0002	0.0015 ± 0.0003	Resident	Resident
stn001111606014	Stanislaus River	373	3	0.0011 ± 0.0004	0.0012 ± 0.0004	Resident	Resident
stn001111606015	Stanislaus River	334	3	0.0015 ± 0.0002	0.0015 ± 0.0002	Resident	Resident
stn001111606016	Stanislaus River	237	2	0.0009 ± 0.0004	0.0012 ± 0.0002	Resident	Resident
stn001111606017	Stanislaus River	285	2	0.0022 ± 0.0004	0.0015 ± 0.0003	Steelhead	Resident
stn001111606018	Stanislaus River	262	2	0.0012 ± 0.0004	0.0013 ± 0.0003	Resident	Resident
stn001111606019	Stanislaus River	262	2	0.0019 ± 0.0002	0.0012 ± 0.0002	Steelhead	Resident
stn002022206001	Stanislaus River	330	3	0.0009 ± 0.0003	0.0012 ± 0.0004	Resident	Resident
stn002022206002	Stanislaus River	295	2	0.0014 ± 0.0004	0.0014 ± 0.0004	Resident	Resident
stn002031506001	Stanislaus River	234	2	0.0024 ± 0.0004	0.0014 ± 0.0005	Steelhead	Resident
stn002031506002	Stanislaus River	445	4	0.0010 ± 0.0004	0.0012 ± 0.0004	Resident	Resident
stn002031506003	Stanislaus River	221	2	0.0016 ± 0.0002	0.0016 ± 0.0005	Resident	Resident
stn002060705001	Stanislaus River	290	2	0.0011 ± 0.0002	0.0012 ± 0.0004	Resident	Resident
stn002110503001	Stanislaus River	340	3	0.0015 ± 0.0002	0.0012 ± 0.0002	Resident	Resident
stn003110503002	Stanislaus River	225	2	0.0017 ± 0.0005	0.0012 ± 0.0002	Steelhead	Resident
stn003110503003	Stanislaus River	216	2	0.0023 ± 0.0003	0.0014 ± 0.0002	Steelhead	Resident
stn003110905001	Stanislaus River	183	1	0.0013 ± 0.0002	0.0013 ± 0.0004	Resident	Resident
stn003110905002	Stanislaus River	208	2	0.0012 ± 0.0004	0.0013 ± 0.0002	Resident	Resident
stn003110905003	Stanislaus River	158	1	0.0011 ± 0.0002	0.0013 ± 0.0003	Resident	Resident
stn003110905004	Stanislaus River	177	1	0.0013 ± 0.0002	0.0015 ± 0.0002	Resident	Resident
stn004110503001	Stanislaus River	215	2	0.0014 ± 0.0004	0.0015 ± 0.0002	Resident	Resident
stn004110503003	Stanislaus River	190	1	0.0016 ± 0.0004	0.0015 ± 0.0002	Resident	Resident
stn004110503004	Stanislaus River	190	1	0.0011 ± 0.0002	0.0012 ± 0.0001	Resident	Resident
stn005022206001	Stanislaus River	279	2	0.0009 ± 0.0002	0.0012 ± 0.0001	Resident	Resident
stn005022206002	Stanislaus River	260	2	0.0015 ± 0.0002	0.0015 ± 0.0002	Resident	Resident
stn005110503001	Stanislaus River	195	1	0.0011 ± 0.0002	0.0014 ± 0.0002	Resident	Resident
stn005110503002	Stanislaus River	198	1	0.0013 ± 0.0002	0.0013 ± 0.0002	Resident	Resident
stn006110503001	Stanislaus River	206	2	0.0009 ± 0.0002	0.0016 ± 0.0003	Resident	Resident
stn006110503001	Stanislaus River	206	2	0.0009 ± 0.0002	0.0016 ± 0.0003	Resident	Resident

CDFG No	Location	Length (mm)	Age	Mean Sr:Ca ± SD		Maternal Origin	Migratory History
				Primordia	FWG		
stn007031506001	Stanislaus River	260	2	0.0013 ± 0.0002	0.0013 ± 0.0002	Resident	Resident
stn007031506002	Stanislaus River	253	2	0.0010 ± 0.0002	0.0012 ± 0.0004	Resident	Resident
stn007031506003	Stanislaus River	233	2	0.0010 ± 0.0003	0.0012 ± 0.0003	Resident	Resident
stn007110905012	Stanislaus River	398	3	0.0023 ± 0.0003	0.0015 ± 0.0002	Steelhead	Resident
stn007110905013	Stanislaus River	253	2	0.0013 ± 0.0003	0.0014 ± 0.0001	Resident	Resident
stn007110905014	Stanislaus River	312	3	0.0012 ± 0.0005	0.0013 ± 0.0003	Resident	Resident
stn007110905015	Stanislaus River	295	2	0.0016 ± 0.0001	0.0016 ± 0.0004	Resident	Resident
stn007110905016	Stanislaus River	305	3	0.0011 ± 0.0004	0.0012 ± 0.0001	Resident	Resident
stn009110905007	Stanislaus River	290	2	0.0024 ± 0.0002	0.0015 ± 0.0004	Steelhead	Resident
stn009110905008	Stanislaus River	315	3	0.0013 ± 0.0002	0.0013 ± 0.0004	Resident	Resident
stn009110905009	Stanislaus River	220	2	0.0009 ± 0.0002	0.0012 ± 0.0002	Resident	Resident
stn009110905010	Stanislaus River	320	3	0.0014 ± 0.0002	0.0015 ± 0.0002	Resident	Resident
stn009110905011	Stanislaus River	370	3	0.0012 ± 0.0003	0.0014 ± 0.0003	Resident	Resident
stn009110905013	Stanislaus River	205	2	0.0012 ± 0.0002	0.0013 ± 0.0005	Resident	Resident
stn010110905001	Stanislaus River	140	1	0.0016 ± 0.0003	0.0016 ± 0.0002	Resident	Resident
stn010110905002	Stanislaus River	350	3	0.0009 ± 0.0002	0.0012 ± 0.0002	Resident	Resident
stn010110905003	Stanislaus River	220	2	0.0013 ± 0.0002	0.0014 ± 0.0001	Resident	Resident
stn012110905017	Stanislaus River	350	3	0.0011 ± 0.0001	0.0013 ± 0.0004	Resident	Resident
stn012110905018	Stanislaus River	250	2	0.0011 ± 0.0002	0.0012 ± 0.0002	Resident	Resident
stn012110905019	Stanislaus River	285	2	0.0011 ± 0.0004	0.0012 ± 0.0002	Resident	Resident
stn012110905020	Stanislaus River	200	2	0.0013 ± 0.0005	0.0014 ± 0.0002	Resident	Resident
stn012110905021	Stanislaus River	190	1	0.0014 ± 0.0003	0.0014 ± 0.0005	Resident	Resident
stn012110905022	Stanislaus River	345	3	0.0011 ± 0.0004	0.0013 ± 0.0002	Resident	Resident
stn012110905024	Stanislaus River	380	3	0.0025 ± 0.0002	0.0016 ± 0.0005	Steelhead	Resident
stn013060705001	Stanislaus River	230	2	0.0010 ± 0.0005	0.0012 ± 0.0003	Resident	Resident
stn013060705002	Stanislaus River	412	4	0.0014 ± 0.0002	0.0015 ± 0.0004	Resident	Resident
stn013110905004	Stanislaus River	365	3	0.0013 ± 0.0003	0.0013 ± 0.0004	Resident	Resident
stn013110905005	Stanislaus River	210	2	0.0012 ± 0.0005	0.0013 ± 0.0004	Resident	Resident
stn013110905006	Stanislaus River	233	2	0.0011 ± 0.0002	0.0012 ± 0.0002	Resident	Resident
stn014060705001	Stanislaus River	265	2	0.0022 ± 0.0004	0.0015 ± 0.0002	Steelhead	Resident
stn016021704001	Stanislaus River	224	2	0.0021 ± 0.0003	0.0014 ± 0.0003	Steelhead	Resident
stn016021704002	Stanislaus River	290	2	0.0012 ± 0.0002	0.0013 ± 0.0002	Resident	Resident
stn016022206001	Stanislaus River	322	3	0.0015 ± 0.0004	0.0016 ± 0.0003	Resident	Resident
stn016022206002	Stanislaus River	230	2	0.0012 ± 0.0001	0.0013 ± 0.0004	Resident	Resident
stn016111606001	Stanislaus River	267	2	0.0012 ± 0.0002	0.0014 ± 0.0002	Resident	Resident

CDFG No	Location	Length (mm)	Age	Mean Sr:Ca ± SD		Maternal Origin	Migratory History
				Primordia	FWG		
stn016111606002	Stanislaus River	300	3	0.0020 ± 0.0002	0.0014 ± 0.0004	Steelhead	Resident
stn016111606003	Stanislaus River	347	3	0.0011 ± 0.0005	0.0012 ± 0.0004	Resident	Resident
stn016111606004	Stanislaus River	335	3	0.0009 ± 0.0004	0.0012 ± 0.0002	Resident	Resident
stn016111606005	Stanislaus River	344	3	0.0013 ± 0.0002	0.0014 ± 0.0002	Resident	Resident
stn016111606006	Stanislaus River	359	3	0.0013 ± 0.0003	0.0014 ± 0.0002	Resident	Resident
stn016111606007	Stanislaus River	337	3	0.0020 ± 0.0002	0.0013 ± 0.0002	Steelhead	Resident
stn016111606008	Stanislaus River	282	2	0.0016 ± 0.0002	0.0015 ± 0.0002	Resident	Resident
stn016111606009	Stanislaus River	342	3	0.0013 ± 0.0002	0.0013 ± 0.0004	Resident	Resident
stn016111606010	Stanislaus River	280	2	0.0013 ± 0.0003	0.0014 ± 0.0003	Resident	Resident
stn016111606011	Stanislaus River	385	3	0.0013 ± 0.0004	0.0014 ± 0.0004	Resident	Resident
stn023022206001	Stanislaus River	261	2	0.0011 ± 0.0003	0.0013 ± 0.0004	Resident	Resident
stn023022206002	Stanislaus River	249	2	0.0013 ± 0.0003	0.0014 ± 0.0004	Resident	Resident
stn023022206003	Stanislaus River	347	3	0.0012 ± 0.0002	0.0013 ± 0.0004	Resident	Resident
stn024022206004	Stanislaus River	255	2	0.0009 ± 0.0002	0.0012 ± 0.0003	Resident	Resident
stn024022206005	Stanislaus River	220	2	0.0016 ± 0.0001	0.0016 ± 0.0002	Resident	Resident
stn024031506001	Stanislaus River	300	3	0.0010 ± 0.0002	0.0012 ± 0.0003	Resident	Resident
stn026021704005	Stanislaus River	278	2	0.0013 ± 0.0002	0.0015 ± 0.0002	Resident	Resident
stn026022706001	Stanislaus River	220	2	0.0012 ± 0.0005	0.0013 ± 0.0002	Resident	Resident
stn027022206002	Stanislaus River	345	3	0.0010 ± 0.0002	0.0012 ± 0.0002	Resident	Resident
stn027022206003	Stanislaus River	355	3	0.0019 ± 0.0002	0.0012 ± 0.0002	Steelhead	Resident
stn027022206004	Stanislaus River	359	3	0.0013 ± 0.0001	0.0015 ± 0.0002	Resident	Resident
stn027022206005	Stanislaus River	242	2	0.0012 ± 0.0004	0.0014 ± 0.0002	Resident	Resident
stn027031506001	Stanislaus River	180	1	0.0013 ± 0.0002	0.0013 ± 0.0005	Resident	Resident
stn028022206001	Stanislaus River	307	3	0.0014 ± 0.0004	0.0015 ± 0.0002	Resident	Resident
stn031020305001	Stanislaus River	260	2	0.0011 ± 0.0003	0.0013 ± 0.0002	Resident	Resident
stn031020805001	Stanislaus River	275	2	0.0013 ± 0.0003	0.0014 ± 0.0004	Resident	Resident
stn031021005001	Stanislaus River	252	2	0.0013 ± 0.0005	0.0013 ± 0.0002	Resident	Resident
stn031021705001	Stanislaus River	140	1	0.0011 ± 0.0003	0.0013 ± 0.0005	Resident	Resident
stn031022805002	Stanislaus River	274	2	0.0011 ± 0.0002	0.0012 ± 0.0003	Resident	Resident
stn031030105001	Stanislaus River	239	2	0.0013 ± 0.0004	0.0014 ± 0.0002	Resident	Resident
stn031030105003	Stanislaus River	247	2	0.0014 ± 0.0004	0.0015 ± 0.0005	Resident	Resident
stn031030105004	Stanislaus River	300	3	0.0012 ± 0.0002	0.0013 ± 0.0003	Resident	Resident
stn031030505001	Stanislaus River	263	2	0.0015 ± 0.0002	0.0016 ± 0.0004	Resident	Resident
stn031032405010	Stanislaus River	251	2	0.0012 ± 0.0004	0.0013 ± 0.0002	Resident	Resident
stn031032505001	Stanislaus River	286	2	0.0014 ± 0.0002	0.0014 ± 0.0004	Resident	Resident

CDFG No	Location	Length (mm)	Age	Mean Sr:Ca ± SD		Maternal Origin	Migratory History
				Primordia	FWG		
stn031040505001	Stanislaus River	273	2	0.0010 ± 0.0002	0.0012 ± 0.0005	Resident	Resident
stn032021705001	Stanislaus River	271	2	0.0016 ± 0.0004	0.0016 ± 0.0002	Resident	Resident
stn032021705002	Stanislaus River	261	2	0.0013 ± 0.0002	0.0013 ± 0.0002	Resident	Resident
stn032021705003	Stanislaus River	270	2	0.0014 ± 0.0002	0.0015 ± 0.0003	Resident	Resident
stn032021905001	Stanislaus River	264	2	0.0009 ± 0.0002	0.0012 ± 0.0003	Resident	Resident
stn032022405001	Stanislaus River	263	2	0.0009 ± 0.0002	0.0011 ± 0.0003	Resident	Resident
stn032030105004	Stanislaus River	272	2	0.0012 ± 0.0005	0.0013 ± 0.0002	Resident	Resident
stn032030205001	Stanislaus River	229	2	0.0013 ± 0.0005	0.0013 ± 0.0002	Resident	Resident
stn032032405001	Stanislaus River	202	2	0.0012 ± 0.0002	0.0013 ± 0.0004	Resident	Resident
stn032032505001	Stanislaus River	277	2	0.0013 ± 0.0003	0.0013 ± 0.0004	Resident	Resident
stn032040505001	Stanislaus River	287	2	0.0017 ± 0.0002	0.0011 ± 0.0003	Steelhead	Resident
stn036022406001	Stanislaus River	520	4	0.0011 ± 0.0002	0.0013 ± 0.0002	Resident	Resident
stn072602625	Stanislaus River	290	2	0.0012 ± 0.0005	0.0012 ± 0.0005	Resident	Resident
stn072602626	Stanislaus River	300	3	0.0013 ± 0.0003	0.0014 ± 0.0002	Resident	Resident
stn072602633	Stanislaus River	360	3	0.0011 ± 0.0001	0.0013 ± 0.0002	Resident	Resident
stn080701629	Stanislaus River	290	2	0.0012 ± 0.0006	0.0011 ± 0.0004	Resident	Resident
stn111402634	Stanislaus River	470	4	0.0014 ± 0.0004	0.0014 ± 0.0004	Resident	Resident
stn111502635	Stanislaus River	420	4	0.0013 ± 0.0003	0.0013 ± 0.0003	Resident	Resident
stn120302621	Stanislaus River	475	4	0.0014 ± 0.0002	0.0013 ± 0.0002	Resident	Resident
stn120302622	Stanislaus River	380	3	0.0015 ± 0.0003	0.0013 ± 0.0003	Resident	Resident
stn120602632	Stanislaus River	370	3	0.0011 ± 0.0002	0.0011 ± 0.0001	Resident	Resident
stn121102623	Stanislaus River	250	2	0.0009 ± 0.0004	0.0013 ± 0.0004	Resident	Resident
stnDFG724	Stanislaus River	429	4	0.0015 ± 0.0003	0.0015 ± 0.0002	Resident	Resident
STNDFG725	Stanislaus River	425	4	0.0013 ± 0.0002	0.0014 ± 0.0002	Resident	Resident
STNDFG726	Stanislaus River	535	4	0.0020 ± 0.0004	0.0013 ± 0.0002	Steelhead	Unknown
STNDFG733	Stanislaus River	470	4	0.0014 ± 0.0002	0.0015 ± 0.0002	Resident	Resident
STNDFG734	Stanislaus River	180	1	0.0012 ± 0.0002	0.0013 ± 0.0003	Resident	Resident
STNDFG735	Stanislaus River	240	2	0.0013 ± 0.0002	0.0014 ± 0.0004	Resident	Resident
STNDFG736	Stanislaus River	150	1	0.0013 ± 0.0002	0.0013 ± 0.0002	Resident	Resident
stndfg812	Stanislaus River	350	3	0.0011 ± 0.0002	0.0013 ± 0.0002	Resident	Resident
STNDFG813	Stanislaus River	430	4	0.0016 ± 0.0004	0.0016 ± 0.0002	Resident	Resident
STNDFG815	Stanislaus River	300	3	0.0011 ± 0.0005	0.0012 ± 0.0002	Resident	Resident
STNDFG816	Stanislaus River	545	4	0.0013 ± 0.0004	0.0014 ± 0.0003	Resident	Resident
STNDFG818	Stanislaus River	390	3	0.0013 ± 0.0002	0.0013 ± 0.0002	Resident	Resident
STNDFG820	Stanislaus River	380	3	0.0009 ± 0.0002	0.0011 ± 0.0002	Resident	Resident

CDFG No	Location	Length (mm)	Age	Mean Sr:Ca ± SD		Maternal Origin	Migratory History
				Primordia	FWG		
STNDFG821	Stanislaus River	360	3	0.0012 ± 0.0003	0.0014 ± 0.0003	Resident	Resident
STNDFG839	Stanislaus River	690	4	0.0020 ± 0.0004	0.0013 ± 0.0003	Steelhead	Steelhead
tou001052405002	Tuolumne River	287	2	0.0010 ± 0.0004	0.0011 ± 0.0002	Resident	Resident
tou001052405003	Tuolumne River	400	4	0.0010 ± 0.0004	0.0008 ± 0.0002	Resident	Resident
tou001052405004	Tuolumne River	440	4	0.0018 ± 0.0003	0.0010 ± 0.0002	Steelhead	Resident
tou001102803002	Tuolumne River	294	2	0.0011 ± 0.0003	0.0014 ± 0.0002	Resident	Resident
tou002102803001	Tuolumne River	188	1	0.0011 ± 0.0004	0.0014 ± 0.0002	Resident	Resident
tou002102803005	Tuolumne River	174	1	0.0010 ± 0.0003	0.0011 ± 0.0003	Resident	Resident
tou002111306001	Tuolumne River	474	4	0.0022 ± 0.0001	0.0011 ± 0.0004	Steelhead	Resident
tou002111306002	Tuolumne River	290	2	0.0010 ± 0.0004	0.0012 ± 0.0004	Resident	Resident
tou002111306003	Tuolumne River	430	4	0.0011 ± 0.0003	0.0011 ± 0.0002	Resident	Resident
tou002111306004	Tuolumne River	365	3	0.0019 ± 0.0004	0.0009 ± 0.0004	Steelhead	Resident
tou002111306005	Tuolumne River	490	4	0.0012 ± 0.0005	0.0011 ± 0.0003	Resident	Resident
tou002111306006	Tuolumne River	220	2	0.0012 ± 0.0003	0.0013 ± 0.0002	Resident	Resident
tou002111306007	Tuolumne River	192	1	0.0012 ± 0.0003	0.0014 ± 0.0002	Resident	Resident
tou002111306013	Tuolumne River	296	2	0.0011 ± 0.0003	0.0014 ± 0.0003	Resident	Resident
tou002111705001	Tuolumne River	523	4	0.0013 ± 0.0003	0.0011 ± 0.0001	Resident	Resident
tou002111705002	Tuolumne River	405	4	0.0011 ± 0.0003	0.0013 ± 0.0003	Resident	Resident
tou002111705003	Tuolumne River	363	3	0.0010 ± 0.0004	0.0014 ± 0.0002	Resident	Resident
tou002111705004	Tuolumne River	453	4	0.0011 ± 0.0003	0.0014 ± 0.0004	Resident	Resident
tou002111705005	Tuolumne River	205	2	0.0010 ± 0.0004	0.0013 ± 0.0001	Resident	Resident
tou002111705006	Tuolumne River	455	4	0.0010 ± 0.0004	0.0012 ± 0.0004	Resident	Resident
tou002111705009	Tuolumne River	515	4	0.0011 ± 0.0003	0.0011 ± 0.0002	Resident	Resident
tou002111705010	Tuolumne River	310	2	0.0012 ± 0.0001	0.0011 ± 0.0004	Resident	Resident
tou003021506001	Tuolumne River	229	2	0.0012 ± 0.0003	0.0010 ± 0.0003	Resident	Resident
tou003021506002	Tuolumne River	258	2	0.0010 ± 0.0002	0.0008 ± 0.0003	Resident	Resident
tou003021506003	Tuolumne River	398	3	0.0009 ± 0.0002	0.0012 ± 0.0004	Resident	Resident
tou003101905002	Tuolumne River	210	2	0.0011 ± 0.0004	0.0010 ± 0.0003	Resident	Resident
tou003102803001	Tuolumne River	195	1	0.0011 ± 0.0003	0.0014 ± 0.0003	Resident	Resident
tou003102803002	Tuolumne River	188	1	0.0011 ± 0.0003	0.0014 ± 0.0004	Resident	Resident
tou003102803004	Tuolumne River	204	2	0.0012 ± 0.0003	0.0012 ± 0.0002	Resident	Resident
tou003102803005	Tuolumne River	228	2	0.0011 ± 0.0005	0.0011 ± 0.0003	Resident	Resident
tou003102803005	Tuolumne River	228	2	0.0010 ± 0.0002	0.0014 ± 0.0004	Resident	Resident
tou003102803007	Tuolumne River	255	2	0.0011 ± 0.0003	0.0009 ± 0.0001	Resident	Resident
tou003102803008	Tuolumne River	246	2	0.0012 ± 0.0003	0.0012 ± 0.0003	Resident	Resident

CDFG No	Location	Length (mm)	Age	Mean Sr:Ca ± SD		Maternal Origin	Migratory History
				Primordia	FWG		
tou003102803009	Tuolumne River	248	2	0.0011 ± 0.0003	0.0010 ± 0.0003	Resident	Resident
tou004102605001	Tuolumne River	405	4	0.0011 ± 0.0001	0.0010 ± 0.0001	Resident	Resident
tou004102605002	Tuolumne River	460	4	0.0011 ± 0.0002	0.0010 ± 0.0002	Resident	Resident
tou004111306008	Tuolumne River	459	4	0.0011 ± 0.0003	0.0014 ± 0.0002	Resident	Resident
tou004111306009	Tuolumne River	480	4	0.0021 ± 0.0002	0.0012 ± 0.0003	Steelhead	Resident
tou004111306010	Tuolumne River	338	3	0.0011 ± 0.0002	0.0011 ± 0.0004	Resident	Resident
tou004111306011	Tuolumne River	332	3	0.0010 ± 0.0002	0.0014 ± 0.0003	Resident	Resident
tou004111306012	Tuolumne River	359	3	0.0011 ± 0.0003	0.0010 ± 0.0003	Resident	Resident
tou004111306012	Tuolumne River	359	3	0.0011 ± 0.0003	0.0010 ± 0.0003	Resident	Resident
tou004111306014	Tuolumne River	385	3	0.0012 ± 0.0004	0.0010 ± 0.0001	Resident	Resident
tou004111306015	Tuolumne River	305	2	0.0011 ± 0.0003	0.0013 ± 0.0002	Resident	Resident
tou004111306016	Tuolumne River	325	3	0.0011 ± 0.0003	0.0013 ± 0.0004	Resident	Resident
tou008111705001	Tuolumne River	218	2	0.0013 ± 0.0003	0.0011 ± 0.0002	Resident	Resident
tou008111705002	Tuolumne River	360	3	0.0010 ± 0.0002	0.0010 ± 0.0004	Resident	Resident
tou008111705003	Tuolumne River	420	4	0.0011 ± 0.0003	0.0011 ± 0.0002	Resident	Resident
tou008111705004	Tuolumne River	145	1	0.0010 ± 0.0003	0.0008 ± 0.0001	Resident	Resident
tou008111705005	Tuolumne River	219	2	0.0011 ± 0.0004	0.0012 ± 0.0003	Resident	Resident
Tou009111705006	Tuolumne River	275	2	0.0011 ± 0.0003	0.0009 ± 0.0003	Resident	Resident
Tou009111705007	Tuolumne River	376	3	0.0011 ± 0.0003	0.0010 ± 0.0002	Resident	Resident
Tou009111705008	Tuolumne River	196	1	0.0011 ± 0.0003	0.0011 ± 0.0002	Resident	Resident
tou009111705009	Tuolumne River	401	4	0.0011 ± 0.0003	0.0013 ± 0.0002	Resident	Resident
Tou009111705010	Tuolumne River	232	2	0.0012 ± 0.0004	0.0011 ± 0.0002	Resident	Resident
Tou009111705011	Tuolumne River	236	2	0.0011 ± 0.0003	0.0013 ± 0.0001	Resident	Resident
Tou009111705012	Tuolumne River	200	2	0.0011 ± 0.0003	0.0011 ± 0.0002	Resident	Resident
tou033021506001	Tuolumne River	233	2	0.0011 ± 0.0003	0.0009 ± 0.0002	Resident	Resident
tou033021506002	Tuolumne River	330	3	0.0011 ± 0.0003	0.0014 ± 0.0003	Resident	Resident
tou033021506003	Tuolumne River	310	2	0.0019 ± 0.0003	0.0009 ± 0.0002	Steelhead	Resident
tou033021506004	Tuolumne River	511	4	0.0010 ± 0.0003	0.0011 ± 0.0003	Resident	Resident
tou033021506005	Tuolumne River	254	2	0.0012 ± 0.0003	0.0014 ± 0.0003	Resident	Resident
tou033021506006	Tuolumne River	237	2	0.0010 ± 0.0005	0.0011 ± 0.0003	Resident	Resident
tou033021506007	Tuolumne River	365	3	0.0011 ± 0.0003	0.0013 ± 0.0003	Resident	Resident
Tou033102605001	Tuolumne River	409	4	0.0011 ± 0.0003	0.0013 ± 0.0004	Resident	Resident
Tou033102605002	Tuolumne River	190	1	0.0009 ± 0.0003	0.0010 ± 0.0003	Resident	Resident
Tou033102605003	Tuolumne River	169	1	0.0010 ± 0.0004	0.0013 ± 0.0002	Resident	Resident
Tou033102605004	Tuolumne River	200	2	0.0011 ± 0.0003	0.0010 ± 0.0002	Resident	Resident

CDFG No	Location	Length (mm)	Age	Mean Sr:Ca ± SD		Maternal Origin	Migratory History
				Primordia	FWG		
tou034021506001	Tuolumne River	275	2	0.0010 ± 0.0002	0.0012 ± 0.0002	Resident	Resident
Tou034102605001	Tuolumne River	182	1	0.0012 ± 0.0001	0.0014 ± 0.0002	Resident	Resident
Tou034102605002	Tuolumne River	215	2	0.0011 ± 0.0003	0.0011 ± 0.0003	Resident	Resident
Tou034102605003	Tuolumne River	158	1	0.0010 ± 0.0003	0.0013 ± 0.0003	Resident	Resident
Tou034102605004	Tuolumne River	175	1	0.0009 ± 0.0002	0.0012 ± 0.0004	Resident	Resident
Tou034102605005	Tuolumne River	176	1	0.0011 ± 0.0005	0.0010 ± 0.0002	Resident	Resident
Tou034102605006	Tuolumne River	200	2	0.0012 ± 0.0001	0.0011 ± 0.0004	Resident	Resident
Tou034102605007	Tuolumne River	163	1	0.0011 ± 0.0003	0.0013 ± 0.0002	Resident	Resident
Tou034102605008	Tuolumne River	168	1	0.0010 ± 0.0003	0.0011 ± 0.0002	Resident	Resident
Tou034102605009	Tuolumne River	185	1	0.0022 ± 0.0004	0.0010 ± 0.0002	Steelhead	Resident
Tou034102605012	Tuolumne River	196	1	0.0010 ± 0.0003	0.0011 ± 0.0002	Resident	Resident
Tou034102605013	Tuolumne River	199	1	0.0011 ± 0.0003	0.0011 ± 0.0004	Resident	Resident
Tou034102605014	Tuolumne River	183	1	0.0011 ± 0.0003	0.0011 ± 0.0002	Resident	Resident
Tou034102605015	Tuolumne River	180	1	0.0010 ± 0.0003	0.0011 ± 0.0002	Resident	Resident
Tou034102605016	Tuolumne River	181	1	0.0010 ± 0.0002	0.0012 ± 0.0003	Resident	Resident
Tou034102605017	Tuolumne River	193	1	0.0012 ± 0.0003	0.0012 ± 0.0002	Resident	Resident
Tou034102605018	Tuolumne River	161	1	0.0010 ± 0.0004	0.0012 ± 0.0002	Resident	Resident
Tou034102605019	Tuolumne River	197	1	0.0009 ± 0.0003	0.0013 ± 0.0004	Resident	Resident
tou035021506001	Tuolumne River	409	4	0.0019 ± 0.0003	0.0012 ± 0.0003	Steelhead	Resident
tou035021506002	Tuolumne River	261	2	0.0011 ± 0.0003	0.0010 ± 0.0002	Resident	Resident
tou035102605001	Tuolumne River	169	1	0.0011 ± 0.0003	0.0013 ± 0.0003	Resident	Resident
tou035102605002	Tuolumne River	180	1	0.0011 ± 0.0003	0.0009 ± 0.0003	Resident	Resident
tou035102605003	Tuolumne River	416	4	0.0009 ± 0.0004	0.0011 ± 0.0003	Resident	Resident
tou035102605004	Tuolumne River	381	3	0.0011 ± 0.0003	0.0010 ± 0.0002	Resident	Resident
tou035102605005	Tuolumne River	400	4	0.0013 ± 0.0003	0.0012 ± 0.0002	Resident	Resident
tou035102605006	Tuolumne River	190	1	0.0012 ± 0.0004	0.0013 ± 0.0002	Resident	Resident
tou035102605007	Tuolumne River	194	1	0.0012 ± 0.0002	0.0013 ± 0.0002	Resident	Resident
tou035102605008	Tuolumne River	169	1	0.0011 ± 0.0003	0.0013 ± 0.0002	Resident	Resident
tou035102605009	Tuolumne River	150	1	0.0011 ± 0.0004	0.0011 ± 0.0003	Resident	Resident
tou035102605010	Tuolumne River	164	1	0.0011 ± 0.0002	0.0011 ± 0.0002	Resident	Resident
tou035102605011	Tuolumne River	172	1	0.0011 ± 0.0004	0.0013 ± 0.0002	Resident	Resident
tou035102605012	Tuolumne River	183	1	0.0022 ± 0.0003	0.0014 ± 0.0004	Steelhead	Resident
tou035102605013	Tuolumne River	183	1	0.0011 ± 0.0003	0.0008 ± 0.0002	Resident	Resident
tou035102605014	Tuolumne River	450	4	0.0010 ± 0.0003	0.0013 ± 0.0002	Resident	Resident
tou035111306001	Tuolumne River	333	3	0.0021 ± 0.0002	0.0011 ± 0.0002	Steelhead	Resident

CDFG No	Location	Length (mm)	Age	Mean Sr:Ca ± SD		Maternal Origin	Migratory History
				Primordia	FWG		
tou035111306003	Tuolumne River	332	3	0.0013 ± 0.0003	0.0013 ± 0.0002	Resident	Resident
tou035111306004	Tuolumne River	363	3	0.0011 ± 0.0003	0.0011 ± 0.0002	Resident	Resident
tou035111306005	Tuolumne River	390	3	0.0011 ± 0.0002	0.0014 ± 0.0004	Resident	Resident
tou035111306006	Tuolumne River	350	3	0.0010 ± 0.0003	0.0013 ± 0.0003	Resident	Resident
tou035111306007	Tuolumne River	386	3	0.0010 ± 0.0002	0.0014 ± 0.0002	Resident	Resident
tou035111306008	Tuolumne River	394	3	0.0011 ± 0.0003	0.0011 ± 0.0004	Resident	Resident
tou035111306009	Tuolumne River	161	1	0.0010 ± 0.0003	0.0013 ± 0.0003	Resident	Resident
tou035111306010	Tuolumne River	411	4	0.0011 ± 0.0003	0.0014 ± 0.0002	Resident	Resident
tou036021506001	Tuolumne River	248	2	0.0011 ± 0.0003	0.0013 ± 0.0003	Resident	Resident
tou038111306001	Tuolumne River	340	3	0.0010 ± 0.0004	0.0012 ± 0.0002	Resident	Resident
tou038111306003	Tuolumne River	338	3	0.0011 ± 0.0004	0.0013 ± 0.0002	Resident	Resident
tou038111306004	Tuolumne River	170	1	0.0010 ± 0.0003	0.0011 ± 0.0002	Resident	Resident
tou038111306005	Tuolumne River	342	3	0.0011 ± 0.0003	0.0015 ± 0.0002	Resident	Resident
tou038111306006	Tuolumne River	395	3	0.0010 ± 0.0003	0.0009 ± 0.0003	Resident	Resident
tou038111306008	Tuolumne River	285	2	0.0010 ± 0.0003	0.0015 ± 0.0002	Resident	Resident
tou038111306009	Tuolumne River	315	2	0.0011 ± 0.0004	0.0008 ± 0.0002	Resident	Resident
tou038111306010	Tuolumne River	170	1	0.0011 ± 0.0003	0.0014 ± 0.0002	Resident	Resident
tou038111306011	Tuolumne River	368	3	0.0010 ± 0.0003	0.0011 ± 0.0002	Resident	Resident
tou038111306012	Tuolumne River	275	2	0.0011 ± 0.0002	0.0008 ± 0.0002	Resident	Resident
tou038111306013	Tuolumne River	374	3	0.0011 ± 0.0003	0.0013 ± 0.0002	Resident	Resident
tou038111306014	Tuolumne River	299	2	0.0013 ± 0.0003	0.0011 ± 0.0002	Resident	Resident
tou038111306015	Tuolumne River	337	3	0.0012 ± 0.0003	0.0014 ± 0.0004	Resident	Resident
tou038111306016	Tuolumne River	348	3	0.0010 ± 0.0004	0.0009 ± 0.0002	Resident	Resident
tou038111306017	Tuolumne River	391	3	0.0010 ± 0.0004	0.0009 ± 0.0003	Resident	Resident
tou111500029	Tuolumne River	424	4	0.0010 ± 0.0005	0.0012 ± 0.0003	Resident	Resident
tou111500030	Tuolumne River	405	4	0.0011 ± 0.0002	0.0011 ± 0.0003	Resident	Resident
tou111500030	Tuolumne River	405	4	0.0011 ± 0.0002	0.0010 ± 0.0003	Resident	Resident
tou112200032	Tuolumne River	415	4	0.0012 ± 0.0004	0.0012 ± 0.0001	Resident	Resident
tou112200033	Tuolumne River	440	4	0.0010 ± 0.0004	0.0015 ± 0.0002	Resident	Resident
tou112900034	Tuolumne River	430	4	0.0010 ± 0.0003	0.0011 ± 0.0002	Resident	Unknown
tou11302028	Tuolumne River	350	3	0.0010 ± 0.0003	0.0007 ± 0.0004	Resident	Resident
tou120298015	Tuolumne River	340	3	0.0011 ± 0.0002	0.0012 ± 0.0003	Resident	Resident
tou120399017	Tuolumne River	320	3	0.0011 ± 0.0003	0.0011 ± 0.0002	Resident	Resident
tou120799019	Tuolumne River	320	3	0.0012 ± 0.0002	0.0014 ± 0.0004	Resident	Resident
tou120899020	Tuolumne River	430	4	0.0014 ± 0.0003	0.0013 ± 0.0002	Resident	Resident

CDFG No	Location	Length (mm)	Age	Mean Sr:Ca ± SD		Maternal Origin	Migratory History
				Primordia	FWG		
tou121002602	Tuolumne River	500	4	0.0011 ± 0.0002	0.0013 ± 0.0002	Resident	Resident
tou121100042	Tuolumne River	473	4	0.0011 ± 0.0003	0.0010 ± 0.0004	Resident	Resident
tou121100043	Tuolumne River	455	4	0.0010 ± 0.0004	0.0009 ± 0.0003	Resident	Resident
tou121800037	Tuolumne River	355	3	0.0011 ± 0.0004	0.0014 ± 0.0003	Resident	Resident
tou122700038	Tuolumne River	455	4	0.0020 ± 0.0002	0.0013 ± 0.0002	Steelhead	Steelhead
tou122700041	Tuolumne River	501	4	0.0011 ± 0.0004	0.0010 ± 0.0005	Resident	Resident
tou122800035	Tuolumne River	443	4	0.0010 ± 0.0004	0.0011 ± 0.0004	Resident	Resident
tou122800036	Tuolumne River	446	4	0.0010 ± 0.0002	0.0010 ± 0.0005	Resident	Resident
TOUDFG04t0128	Tuolumne River	330	3	0.0010 ± 0.0003	0.0011 ± 0.0001	Resident	Resident
toudfg101905001	Tuolumne River	440	4	0.0010 ± 0.0002	0.0013 ± 0.0004	Resident	Resident
yub001022305001	Yuba River	406	4	0.0008 ± 0.0001	0.0006 ± 0.0004	Resident	Resident
yub001032105001	Yuba River	157	0	0.0009 ± 0.0004	0.0007 ± 0.0002	Resident	Resident
yub001032105002	Yuba River	240	2	0.0010 ± 0.0003	0.0011 ± 0.0001	Resident	Resident
yub001061004001	Yuba River	102	0	0.0012 ± 0.0003	0.0012 ± 0.0003	Resident	Resident
yub001061604001	Yuba River	325	3	0.0009 ± 0.0002	0.0007 ± 0.0002	Resident	Resident
yub001071104001	Yuba River	54	0	0.0017 ± 0.0003	0.0008 ± 0.0002	Steelhead	Resident
yub001071206001	Yuba River	420	4	0.0006 ± 0.0004	0.0005 ± 0.0003	Resident	Resident
yub001071206002	Yuba River	385	3	0.0010 ± 0.0003	0.0008 ± 0.0002	Resident	Resident
yub001071206003	Yuba River	350	3	0.0008 ± 0.0003	0.0006 ± 0.0003	Resident	Resident
yub001071206004	Yuba River	350	3	0.0018 ± 0.0003	0.0008 ± 0.0003	Steelhead	Resident
yub001071206005	Yuba River	330	3	0.0008 ± 0.0003	0.0008 ± 0.0001	Resident	Resident
yub001071206006	Yuba River	280	2	0.0009 ± 0.0003	0.0006 ± 0.0004	Resident	Resident
yub001071206007	Yuba River	229	1	0.0007 ± 0.0003	0.0008 ± 0.0003	Resident	Resident
yub001071206008	Yuba River	432	4	0.0010 ± 0.0002	0.0007 ± 0.0002	Resident	Resident
yub001071206009	Yuba River	335	3	0.0009 ± 0.0003	0.0011 ± 0.0002	Resident	Resident
yub001071302001	Yuba River	92	0	0.0012 ± 0.0003	0.0013 ± 0.0004	Resident	Resident
yub001071404001	Yuba River	68	0	0.0012 ± 0.0003	0.0011 ± 0.0003	Resident	Resident
yub001071404002	Yuba River	72	0	0.0007 ± 0.0003	0.0005 ± 0.0003	Resident	Resident
yub001072004001	Yuba River	63	0	0.0014 ± 0.0004	0.0005 ± 0.0002	Steelhead	Resident
yub001072204001	Yuba River	352	3	0.0013 ± 0.0003	0.0012 ± 0.0003	Resident	Resident
yub001072302005	Yuba River	57	0	0.0009 ± 0.0003	0.0007 ± 0.0003	Resident	Resident
yub001072602001	Yuba River	105	0	0.0012 ± 0.0004	0.0013 ± 0.0003	Resident	Resident
yub001072902001	Yuba River	61	0	0.0009 ± 0.0003	0.0007 ± 0.0003	Resident	Resident
yub001072902002	Yuba River	62	0	0.0008 ± 0.0002	0.0006 ± 0.0003	Resident	Resident
yub001072902004	Yuba River	33	0	0.0012 ± 0.0003	0.0011 ± 0.0002	Resident	Resident

CDFG No	Location	Length (mm)	Age	Mean Sr:Ca ± SD		Maternal Origin	Migratory History
				Primordia	FWG		
yub001080302005	Yuba River	53	0	0.0018 ± 0.0003	0.0010 ± 0.0004	Steelhead	Resident
yub001080502001	Yuba River	70	0	0.0008 ± 0.0003	0.0006 ± 0.0002	Resident	Resident
yub001080502002	Yuba River	58	0	0.0008 ± 0.0002	0.0010 ± 0.0003	Resident	Resident
yub001082804001	Yuba River	324	3	0.0006 ± 0.0004	0.0005 ± 0.0002	Resident	Resident
yub001090404001	Yuba River	405	4	0.0005 ± 0.0003	0.0005 ± 0.0003	Resident	Resident
yub001100605001	Yuba River	388	3	0.0010 ± 0.0003	0.0007 ± 0.0002	Resident	Resident
yub001100605002	Yuba River	510	4	0.0007 ± 0.0003	0.0007 ± 0.0002	Resident	Resident
yub001102606001	Yuba River	315	3	0.0013 ± 0.0003	0.0012 ± 0.0002	Resident	Resident
yub001102606002	Yuba River	445	4	0.0018 ± 0.0003	0.0009 ± 0.0004	Steelhead	Resident
yub001102606003	Yuba River	294	2	0.0009 ± 0.0002	0.0010 ± 0.0004	Resident	Resident
yub001102606004	Yuba River	298	2	0.0006 ± 0.0002	0.0006 ± 0.0002	Resident	Resident
yub001102606005	Yuba River	301	3	0.0013 ± 0.0003	0.0012 ± 0.0003	Resident	Resident
yub001112205001	Yuba River	410	4	0.0010 ± 0.0003	0.0008 ± 0.0004	Resident	Resident
yub002012704001	Yuba River	267	2	0.0009 ± 0.0004	0.0008 ± 0.0001	Resident	Resident
yub002022206001	Yuba River	319	3	0.0016 ± 0.0003	0.0007 ± 0.0004	Steelhead	Resident
yub002071104001	Yuba River	236	2	0.0008 ± 0.0003	0.0007 ± 0.0002	Resident	Resident
yub002080402001	Yuba River	66	0	0.0009 ± 0.0005	0.0006 ± 0.0003	Resident	Resident
yub002081402001	Yuba River	60	0	0.0019 ± 0.0002	0.0007 ± 0.0002	Steelhead	Resident
yub002081402002	Yuba River	65	0	0.0011 ± 0.0004	0.0011 ± 0.0002	Resident	Resident
yub002081502001	Yuba River	45	0	0.0008 ± 0.0004	0.0006 ± 0.0003	Resident	Resident
yub002082202002	Yuba River	62	0	0.0006 ± 0.0003	0.0005 ± 0.0001	Resident	Resident
yub002082202003	Yuba River	56	0	0.0009 ± 0.0003	0.0008 ± 0.0002	Resident	Resident
yub002082202004	Yuba River	47	0	0.0008 ± 0.0002	0.0010 ± 0.0001	Resident	Resident
yub002082502001	Yuba River	56	0	0.0008 ± 0.0003	0.0010 ± 0.0002	Resident	Resident
yub002082902001	Yuba River	65	0	0.0010 ± 0.0003	0.0007 ± 0.0002	Resident	Resident
yub002090502001	Yuba River	61	0	0.0007 ± 0.0003	0.0007 ± 0.0002	Resident	Resident
yub002091502001	Yuba River	73	0	0.0008 ± 0.0002	0.0008 ± 0.0003	Resident	Resident
yub003012704001	Yuba River	313	3	0.0011 ± 0.0003	0.0007 ± 0.0002	Resident	Resident
yub003012704002	Yuba River	417	4	0.0012 ± 0.0003	0.0006 ± 0.0002	Resident	Resident
yub003012704004	Yuba River	475	4	0.0010 ± 0.0002	0.0007 ± 0.0004	Resident	Resident
yub003020905003	Yuba River	425	4	0.0009 ± 0.0003	0.0009 ± 0.0003	Resident	Resident
yub003022305001	Yuba River	405	4	0.0019 ± 0.0003	0.0009 ± 0.0003	Steelhead	Resident
yub003022305002	Yuba River	478	4	0.0009 ± 0.0003	0.0008 ± 0.0002	Resident	Resident
yub003041305001	Yuba River	403	4	0.0010 ± 0.0002	0.0009 ± 0.0002	Resident	Resident
yub003041305002	Yuba River	434	4	0.0007 ± 0.0003	0.0008 ± 0.0002	Resident	Resident

CDFG No	Location	Length (mm)	Age	Mean Sr:Ca ± SD		Maternal Origin	Migratory History
				Primordia	FWG		
yub003051205001	Yuba River	411	4	0.0009 ± 0.0004	0.0011 ± 0.0003	Resident	Resident
yub003051205003	Yuba River	441	4	0.0013 ± 0.0004	0.0012 ± 0.0002	Resident	Resident
yub003051205005	Yuba River	297	2	0.0011 ± 0.0003	0.0012 ± 0.0002	Resident	Resident
yub003071603001	Yuba River	228	1	0.0011 ± 0.0003	0.0009 ± 0.0001	Resident	Resident
yub003071603003	Yuba River	350	3	0.0008 ± 0.0003	0.0008 ± 0.0002	Resident	Resident
yub003071603004	Yuba River	413	4	0.0009 ± 0.0001	0.0008 ± 0.0003	Resident	Resident
yub003102606001	Yuba River	295	2	0.0007 ± 0.0004	0.0007 ± 0.0002	Resident	Resident
yub003102606002	Yuba River	364	3	0.0010 ± 0.0003	0.0007 ± 0.0002	Resident	Resident
yub003102606003	Yuba River	274	2	0.0007 ± 0.0003	0.0007 ± 0.0002	Resident	Resident
yub003102606004	Yuba River	291	2	0.0008 ± 0.0003	0.0006 ± 0.0002	Resident	Resident
yub003102606005	Yuba River	400	4	0.0008 ± 0.0003	0.0008 ± 0.0003	Resident	Resident
yub003112806002	Yuba River	480	4	0.0008 ± 0.0003	0.0010 ± 0.0002	Resident	Resident
yub003112806004	Yuba River	380	3	0.0008 ± 0.0002	0.0007 ± 0.0004	Resident	Resident
yub003112806005	Yuba River	410	4	0.0008 ± 0.0003	0.0006 ± 0.0001	Resident	Resident
yub003112806006	Yuba River	338	3	0.0008 ± 0.0003	0.0009 ± 0.0002	Resident	Resident
yub003112806007	Yuba River	332	3	0.0012 ± 0.0004	0.0013 ± 0.0003	Resident	Resident
yub003112806008	Yuba River	370	3	0.0010 ± 0.0002	0.0008 ± 0.0002	Resident	Resident
yub003112806009	Yuba River	370	3	0.0007 ± 0.0005	0.0006 ± 0.0003	Resident	Resident
yub003112806010	Yuba River	400	4	0.0006 ± 0.0003	0.0007 ± 0.0002	Resident	Resident
yub003112806012	Yuba River	390	4	0.0009 ± 0.0004	0.0009 ± 0.0002	Resident	Resident
yub003112806013	Yuba River	435	4	0.0012 ± 0.0002	0.0012 ± 0.0002	Resident	Resident
yub004082603001	Yuba River	260	2	0.0006 ± 0.0002	0.0007 ± 0.0003	Resident	Resident
yub004082603002	Yuba River	292	2	0.0008 ± 0.0004	0.0008 ± 0.0003	Resident	Resident
yub004082603003	Yuba River	279	2	0.0008 ± 0.0003	0.0006 ± 0.0003	Resident	Resident
yub004082603004	Yuba River	225	1	0.0017 ± 0.0003	0.0007 ± 0.0002	Steelhead	Resident
yub004082603005	Yuba River	267	2	0.0011 ± 0.0004	0.0010 ± 0.0004	Resident	Resident
yub004091506006	Yuba River	360	3	0.0008 ± 0.0004	0.0006 ± 0.0002	Resident	Resident
yub004091506014	Yuba River	229	1	0.0015 ± 0.0004	0.0012 ± 0.0004	Steelhead	Resident
yub004101400019	Yuba River	317	3	0.0008 ± 0.0003	0.0008 ± 0.0002	Resident	Resident
yub004101400022	Yuba River	227	1	0.0010 ± 0.0003	0.0010 ± 0.0002	Resident	Resident
yub004101400024	Yuba River	389	3	0.0014 ± 0.0003	0.0009 ± 0.0002	Steelhead	Resident
yub004122100001	Yuba River	319	3	0.0009 ± 0.0003	0.0008 ± 0.0002	Resident	Resident
yub004122100004	Yuba River	320	3	0.0009 ± 0.0003	0.0008 ± 0.0004	Resident	Resident
yub004122100006	Yuba River	395	4	0.0011 ± 0.0003	0.0011 ± 0.0004	Resident	Resident
yub004122100008	Yuba River	271	2	0.0009 ± 0.0004	0.0009 ± 0.0006	Resident	Resident

CDFG No	Location	Length (mm)	Age	Mean Sr:Ca ± SD		Maternal Origin	Migratory History
				Primordia	FWG		
yub005062604001	Yuba River	470	4	0.0009 ± 0.0004	0.0008 ± 0.0004	Resident	Resident
yub005091204001	Yuba River	292	2	0.0009 ± 0.0003	0.0010 ± 0.0002	Resident	Resident
yub006020905002	Yuba River	335	3	0.0016 ± 0.0003	0.0007 ± 0.0002	Steelhead	Resident
yub006100603001	Yuba River	257	2	0.0009 ± 0.0002	0.0007 ± 0.0003	Resident	Resident
yub006100603002	Yuba River	360	3	0.0015 ± 0.0004	0.0007 ± 0.0002	Steelhead	Resident
yub006100603003	Yuba River	371	3	0.0008 ± 0.0003	0.0007 ± 0.0003	Resident	Resident
yub006100603005	Yuba River	236	2	0.0022 ± 0.0002	0.0012 ± 0.0002	Steelhead	Resident
yub006100603006	Yuba River	386	3	0.0010 ± 0.0002	0.0009 ± 0.0003	Resident	Resident
yub006100603008	Yuba River	365	3	0.0006 ± 0.0003	0.0005 ± 0.0003	Resident	Resident
yub006100603010	Yuba River	247	2	0.0009 ± 0.0004	0.0010 ± 0.0002	Resident	Resident
yub006100603011	Yuba River	272	2	0.0010 ± 0.0003	0.0009 ± 0.0002	Resident	Resident
yub006100603012	Yuba River	327	3	0.0009 ± 0.0004	0.0009 ± 0.0002	Resident	Resident
yub006100603013	Yuba River	368	3	0.0006 ± 0.0003	0.0005 ± 0.0004	Resident	Resident
yub006100603014	Yuba River	400	4	0.0008 ± 0.0005	0.0008 ± 0.0004	Resident	Resident
yub006100603014	Yuba River	400	4	0.0008 ± 0.0005	0.0008 ± 0.0004	Resident	Resident
yub006100603015	Yuba River	367	3	0.0009 ± 0.0003	0.0010 ± 0.0002	Resident	Resident
yub006100603016	Yuba River	474	4	0.0009 ± 0.0003	0.0006 ± 0.0002	Resident	Resident
yub006100603017	Yuba River	417	4	0.0008 ± 0.0003	0.0007 ± 0.0002	Resident	Resident
yub006100603018	Yuba River	442	4	0.0007 ± 0.0003	0.0011 ± 0.0003	Resident	Resident
yub006100603019	Yuba River	364	3	0.0007 ± 0.0002	0.0008 ± 0.0002	Resident	Resident
yub006100603021	Yuba River	390	4	0.0009 ± 0.0003	0.0007 ± 0.0003	Resident	Resident
yub006100603022	Yuba River	341	3	0.0008 ± 0.0003	0.0008 ± 0.0002	Resident	Resident
yub006100603023	Yuba River	425	4	0.0008 ± 0.0003	0.0009 ± 0.0002	Resident	Resident
yub006100603024	Yuba River	324	3	0.0009 ± 0.0001	0.0009 ± 0.0003	Resident	Resident
yub006100603025	Yuba River	453	4	0.0005 ± 0.0003	0.0006 ± 0.0003	Resident	Resident
yub006100603026	Yuba River	379	3	0.0009 ± 0.0003	0.0008 ± 0.0002	Resident	Resident
yub006100603027	Yuba River	400	4	0.0010 ± 0.0003	0.0011 ± 0.0002	Resident	Resident
yub006100603028	Yuba River	408	4	0.0010 ± 0.0003	0.0006 ± 0.0002	Resident	Resident
yub006100603029	Yuba River	410	4	0.0008 ± 0.0003	0.0007 ± 0.0001	Resident	Resident
yub006100603030	Yuba River	390	4	0.0017 ± 0.0003	0.0005 ± 0.0003	Steelhead	Resident
yub006100603031	Yuba River	393	4	0.0008 ± 0.0003	0.0007 ± 0.0003	Resident	Resident
yub006100603032	Yuba River	410	4	0.0009 ± 0.0004	0.0009 ± 0.0002	Resident	Resident
yub006100603033	Yuba River	307	3	0.0012 ± 0.0003	0.0012 ± 0.0002	Resident	Resident
yub006100603034	Yuba River	297	2	0.0009 ± 0.0005	0.0008 ± 0.0003	Resident	Resident
yub006100603036	Yuba River	241	2	0.0010 ± 0.0004	0.0011 ± 0.0002	Resident	Resident

CDFG No	Location	Length (mm)	Age	Mean Sr:Ca ± SD		Maternal Origin	Migratory History
				Primordia	FWG		
yub006100603037	Yuba River	271	2	0.0016 ± 0.0003	0.0006 ± 0.0003	Steelhead	Resident
yub006100603038	Yuba River	298	2	0.0008 ± 0.0002	0.0007 ± 0.0003	Resident	Resident
yub006100603039	Yuba River	230	2	0.0006 ± 0.0002	0.0008 ± 0.0003	Resident	Resident
yub006100603040	Yuba River	233	2	0.0017 ± 0.0001	0.0008 ± 0.0004	Steelhead	Resident
yub008012704001	Yuba River	370	3	0.0010 ± 0.0004	0.0007 ± 0.0004	Resident	Resident
yub008012704002	Yuba River	360	3	0.0008 ± 0.0003	0.0008 ± 0.0002	Resident	Resident
yub008012704003	Yuba River	418	4	0.0014 ± 0.0004	0.0005 ± 0.0002	Steelhead	Resident
yub008012704004	Yuba River	416	4	0.0016 ± 0.0003	0.0008 ± 0.0002	Resident	Resident
yub008012704005	Yuba River	431	4	0.0010 ± 0.0003	0.0008 ± 0.0002	Resident	Resident
yub008012704006	Yuba River	296	2	0.0013 ± 0.0003	0.0012 ± 0.0003	Resident	Resident
yub008012704007	Yuba River	455	4	0.0008 ± 0.0003	0.0006 ± 0.0004	Resident	Resident
mer020597534	Merced River	730	4	0.0015 ± 0.0004	0.0011 ± 0.0002	Resident	Resident
mer032599016	Merced River	440	4	0.0011 ± 0.0003	0.0009 ± 0.0002	Resident	Resident
mer081500581	Merced River	410	4	0.0015 ± 0.0003	0.0009 ± 0.0002	Resident	Resident
mer081500584	Merced River	465	4	0.0012 ± 0.0002	0.0007 ± 0.0005	Resident	Resident
mer081500585	Merced River	350	3	0.0007 ± 0.0002	0.0010 ± 0.0001	Resident	Resident
mer081500586	Merced River	430	4	0.0010 ± 0.0002	0.0010 ± 0.0002	Resident	Resident
mer081500588	Merced River	205	2	0.0007 ± 0.0001	0.0006 ± 0.0003	Resident	Resident
mer081500589	Merced River	250	2	0.0009 ± 0.0002	0.0009 ± 0.0001	Resident	Resident
mer081500591	Merced River	212	2	0.0007 ± 0.0004	0.0007 ± 0.0003	Resident	Resident
mer081500592	Merced River	250	2	0.0010 ± 0.0003	0.0008 ± 0.0002	Resident	Resident
mer081500593	Merced River	405	4	0.0009 ± 0.0002	0.0010 ± 0.0003	Resident	Resident
mer081500594	Merced River	346	3	0.0009 ± 0.0003	0.0010 ± 0.0003	Resident	Resident
mer101902640	Merced River	445	4	0.0009 ± 0.0003	0.0010 ± 0.0003	Resident	Resident
mer102601564	Merced River	600	4	0.0013 ± 0.0003	0.0009 ± 0.0002	Resident	Resident
mer102601580	Merced River	260	2	0.0008 ± 0.0002	0.0009 ± 0.0001	Resident	Resident
mer102999023	Merced River	385	3	0.0007 ± 0.0004	0.0010 ± 0.0002	Resident	Resident
mer110302620	Merced River	610	4	0.0015 ± 0.0002	0.0011 ± 0.0003	Steelhead	Resident
mer110899658	Merced River	345	3	0.0008 ± 0.0003	0.0009 ± 0.0002	Resident	Resident
mer111302636	Merced River	580	4	0.0013 ± 0.0002	0.0014 ± 0.0004	Resident	Resident
mer111302636	Merced River	580	4	0.0013 ± 0.0002	0.0013 ± 0.0003	Resident	Resident
mer111501563	Merced River	570	4	0.0008 ± 0.0001	0.0010 ± 0.0004	Resident	Resident
mer112099522	Merced River	314	3	0.0010 ± 0.0002	0.0009 ± 0.0004	Resident	Resident
mer122302619	Merced River	490	4	0.0009 ± 0.0004	0.0011 ± 0.0003	Resident	Resident
usfws04-1501	Sacramento River	460	4	0.0006 ± 0.0001	0.0008 ± 0.0004	Resident	Resident

CDFG No	Location	Length (mm)	Age	Mean Sr:Ca ± SD		Maternal Origin	Migratory History
				Primordia	FWG		
usfws04-1502	Sacramento River	376	3	0.0008 ± 0.0003	0.0008 ± 0.0004	Resident	Resident
usfws04-1503	Sacramento River	440	4	0.0004 ± 0.0004	0.0008 ± 0.0002	Resident	Resident
usfws04-1504	Sacramento River	450	4	0.0007 ± 0.0003	0.0008 ± 0.0001	Resident	Resident
usfws04-1505	Sacramento River	520	4	0.0006 ± 0.0004	0.0010 ± 0.0002	Resident	Resident
usfws04-1506	Sacramento River	530	4	0.0009 ± 0.0003	0.0007 ± 0.0002	Resident	Resident
usfws04-1507	Sacramento River	310	2	0.0006 ± 0.0004	0.0009 ± 0.0002	Resident	Resident
usfws04-1508	Sacramento River	490	4	0.0006 ± 0.0004	0.0010 ± 0.0002	Resident	Resident
usfws04-1509	Sacramento River	510	4	0.0018 ± 0.0004	0.0009 ± 0.0003	Steelhead	Resident
usfws04-1511	Sacramento River	385	3	0.0007 ± 0.0003	0.0007 ± 0.0003	Resident	Resident
usfws04-1515	Sacramento River	465	4	0.0006 ± 0.0003	0.0010 ± 0.0003	Resident	Resident
usfws04-1516	Sacramento River	440	4	0.0007 ± 0.0003	0.0010 ± 0.0002	Resident	Resident
usfws04-1517	Sacramento River	430	4	0.0007 ± 0.0004	0.0008 ± 0.0003	Resident	Resident
usfws04-1518	Sacramento River	390	3	0.0008 ± 0.0005	0.0009 ± 0.0003	Resident	Resident
usfws04-1519	Sacramento River	396	3	0.0005 ± 0.0003	0.0011 ± 0.0002	Resident	Resident
usfws04-1520	Sacramento River	410	4	0.0008 ± 0.0004	0.0008 ± 0.0004	Resident	Resident
usfws04-1521	Sacramento River	513	4	0.0007 ± 0.0003	0.0007 ± 0.0002	Resident	Resident
usfws04-1522	Sacramento River	480	4	0.0010 ± 0.0005	0.0009 ± 0.0002	Resident	Resident
usfws04-1523	Sacramento River	460	4	0.0007 ± 0.0004	0.0008 ± 0.0003	Resident	Resident
usfws04-1524	Sacramento River	538	4	0.0010 ± 0.0004	0.0010 ± 0.0002	Resident	Resident
usfws04-1528	Sacramento River	500	4	0.0007 ± 0.0004	0.0007 ± 0.0002	Resident	Resident
usfws04-1530	Sacramento River	430	4	0.0006 ± 0.0003	0.0010 ± 0.0004	Resident	Resident
usfws04-1531	Sacramento River	460	4	0.0016 ± 0.0003	0.0007 ± 0.0003	Steelhead	Steelhead
USFWS04-1532	Sacramento River	430	4	0.0006 ± 0.0003	0.0010 ± 0.0002	Resident	Resident
usfws04-1534	Sacramento River	430	4	0.0008 ± 0.0003	0.0008 ± 0.0004	Resident	Resident
usfws04-1535	Sacramento River	490	4	0.0005 ± 0.0004	0.0010 ± 0.0003	Resident	Resident
usfws04-1536	Sacramento River	380	3	0.0011 ± 0.0003	0.0010 ± 0.0002	Resident	Resident
usfws04-1537	Sacramento River	471	4	0.0005 ± 0.0003	0.0010 ± 0.0003	Resident	Resident
usfws04-1538	Sacramento River	460	4	0.0008 ± 0.0003	0.0006 ± 0.0002	Resident	Resident
usfws04-1539	Sacramento River	440	4	0.0008 ± 0.0002	0.0010 ± 0.0004	Resident	Resident
usfws04-1540	Sacramento River	550	4	0.0010 ± 0.0003	0.0010 ± 0.0002	Resident	Resident
usfws04-1541	Sacramento River	510	4	0.0006 ± 0.0003	0.0011 ± 0.0002	Resident	Resident
usfws04-1542	Sacramento River	350	3	0.0007 ± 0.0003	0.0010 ± 0.0002	Resident	Resident
usfws04-1543	Sacramento River	497	4	0.0010 ± 0.0003	0.0010 ± 0.0003	Resident	Resident
usfws04-1544	Sacramento River	450	4	0.0006 ± 0.0003	0.0008 ± 0.0001	Resident	Resident
usfws04-1545	Sacramento River	520	4	0.0006 ± 0.0002	0.0007 ± 0.0003	Resident	Resident

CDFG No	Location	Length (mm)	Age	Mean Sr:Ca ± SD		Maternal Origin	Migratory History
				Primordia	FWG		
usfws04-1546	Sacramento River	515	4	0.0005 ± 0.0003	0.0009 ± 0.0002	Resident	Resident
usfws04-1547	Sacramento River	365	3	0.0006 ± 0.0002	0.0010 ± 0.0003	Resident	Resident
usfws04-1548	Sacramento River	480	4	0.0007 ± 0.0004	0.0010 ± 0.0001	Resident	Resident
usfws04-1549	Sacramento River	490	4	0.0006 ± 0.0003	0.0010 ± 0.0003	Resident	Resident
usfws04-1550	Sacramento River	370	3	0.0009 ± 0.0003	0.0011 ± 0.0002	Resident	Resident
usfws04-1551	Sacramento River	440	4	0.0005 ± 0.0003	0.0009 ± 0.0003	Resident	Resident
usfws04-1552	Sacramento River	600	4	0.0007 ± 0.0003	0.0011 ± 0.0002	Resident	Resident
usfws04-1554	Sacramento River	400	3	0.0006 ± 0.0005	0.0010 ± 0.0003	Resident	Resident
usfws04-1556	Sacramento River	480	4	0.0006 ± 0.0003	0.0007 ± 0.0002	Resident	Resident
usfws04-1558	Sacramento River	420	4	0.0005 ± 0.0003	0.0008 ± 0.0002	Resident	Resident
usfws04-1559	Sacramento River	490	4	0.0008 ± 0.0004	0.0009 ± 0.0003	Resident	Resident
usfws04-1560	Sacramento River	480	4	0.0019 ± 0.0003	0.0010 ± 0.0003	Steelhead	Resident
USFWS04-1561	Sacramento River	460	4	0.0008 ± 0.0003	0.0009 ± 0.0002	Resident	Resident
usfws04-1562	Sacramento River	400	3	0.0006 ± 0.0002	0.0008 ± 0.0003	Resident	Resident
usfws04-1563	Sacramento River	580	4	0.0006 ± 0.0004	0.0008 ± 0.0002	Resident	Resident
usfws04-1564	Sacramento River	410	4	0.0008 ± 0.0002	0.0010 ± 0.0003	Resident	Resident
usfws04-1565	Sacramento River	510	4	0.0008 ± 0.0003	0.0009 ± 0.0001	Resident	Resident
usfws04-1566	Sacramento River	430	4	0.0007 ± 0.0004	0.0007 ± 0.0002	Resident	Resident
usfws04-1569	Sacramento River	441	4	0.0010 ± 0.0003	0.0010 ± 0.0003	Resident	Resident
usfws04-1572	Sacramento River	440	4	0.0007 ± 0.0001	0.0010 ± 0.0002	Resident	Resident
usfws04-1573	Sacramento River	330	2	0.0006 ± 0.0004	0.0009 ± 0.0003	Resident	Resident
usfws04-1574	Sacramento River	410	4	0.0005 ± 0.0003	0.0009 ± 0.0002	Resident	Resident
usfws04-1575	Sacramento River	440	4	0.0003 ± 0.0003	0.0007 ± 0.0002	Resident	Resident
usfws05-2001	Sacramento River	530	4	0.0008 ± 0.0003	0.0010 ± 0.0002	Resident	Resident
usfws05-2002	Sacramento River	290	2	0.0007 ± 0.0003	0.0010 ± 0.0002	Resident	Resident
usfws05-2003	Sacramento River	475	4	0.0008 ± 0.0004	0.0007 ± 0.0003	Resident	Resident
usfws05-2004	Sacramento River	450	4	0.0007 ± 0.0003	0.0007 ± 0.0002	Resident	Resident
usfws05-2005	Sacramento River	420	4	0.0003 ± 0.0003	0.0008 ± 0.0004	Resident	Resident
usfws05-2006	Sacramento River	370	3	0.0009 ± 0.0002	0.0010 ± 0.0004	Resident	Resident
usfws05-2007	Sacramento River	600	4	0.0007 ± 0.0001	0.0008 ± 0.0001	Resident	Resident
usfws05-2009	Sacramento River	330	2	0.0005 ± 0.0002	0.0007 ± 0.0004	Resident	Resident
usfws05-2010	Sacramento River	340	3	0.0006 ± 0.0003	0.0009 ± 0.0003	Resident	Resident
usfws05-2011	Sacramento River	352	3	0.0010 ± 0.0004	0.0009 ± 0.0003	Resident	Resident
usfws05-2012	Sacramento River	500	4	0.0006 ± 0.0004	0.0010 ± 0.0002	Resident	Resident
usfws05-2013	Sacramento River	500	4	0.0006 ± 0.0003	0.0009 ± 0.0002	Resident	Resident

CDFG No	Location	Length (mm)	Age	Mean Sr:Ca ± SD		Maternal Origin	Migratory History
				Primordia	FWG		
usfws05-2014	Sacramento River	510	4	0.0007 ± 0.0002	0.0006 ± 0.0002	Resident	Resident
usfws05-2016	Sacramento River	420	4	0.0008 ± 0.0003	0.0007 ± 0.0004	Resident	Resident
usfws05-2017	Sacramento River	360	3	0.0004 ± 0.0003	0.0007 ± 0.0003	Resident	Resident
usfws05-2019	Sacramento River	470	4	0.0006 ± 0.0003	0.0010 ± 0.0003	Resident	Resident
usfws05-2020	Sacramento River	430	4	0.0007 ± 0.0003	0.0007 ± 0.0001	Resident	Resident
usfws05-2022	Sacramento River	420	4	0.0015 ± 0.0003	0.0007 ± 0.0002	Steelhead	Resident
usfws05-2023	Sacramento River	428	4	0.0005 ± 0.0003	0.0007 ± 0.0004	Resident	Resident
usfws05-2024	Sacramento River	470	4	0.0010 ± 0.0003	0.0011 ± 0.0004	Resident	Resident
usfws05-2025	Sacramento River	380	3	0.0006 ± 0.0005	0.0010 ± 0.0003	Resident	Resident
usfws05-2026	Sacramento River	480	4	0.0006 ± 0.0003	0.0010 ± 0.0002	Resident	Resident
usfws05-2027	Sacramento River	370	3	0.0006 ± 0.0003	0.0008 ± 0.0002	Resident	Resident
usfws05-2028	Sacramento River	490	4	0.0007 ± 0.0003	0.0008 ± 0.0002	Resident	Resident
usfws05-2029	Sacramento River	335	3	0.0007 ± 0.0004	0.0011 ± 0.0002	Resident	Resident
usfws05-2030	Sacramento River	350	3	0.0007 ± 0.0003	0.0008 ± 0.0002	Resident	Resident
usfws05-2033	Sacramento River	415	4	0.0007 ± 0.0003	0.0010 ± 0.0003	Resident	Resident
usfws05-2034	Sacramento River	402	4	0.0007 ± 0.0003	0.0007 ± 0.0002	Resident	Resident
usfws05-2036	Sacramento River	335	3	0.0008 ± 0.0003	0.0009 ± 0.0002	Resident	Resident
usfws05-2046	Sacramento River	453	4	0.0009 ± 0.0001	0.0013 ± 0.0004	Resident	Resident
usfws05-2056	Sacramento River	333	3	0.0007 ± 0.0002	0.0008 ± 0.0002	Resident	Resident
usr001031704001	Sacramento River	243	2	0.0007 ± 0.0003	0.0007 ± 0.0003	Resident	Resident
usr001031704002	Sacramento River	315	2	0.0020 ± 0.0002	0.0009 ± 0.0002	Steelhead	Resident
usr001031704003	Sacramento River	235	1	0.0014 ± 0.0003	0.0009 ± 0.0002	Steelhead	Resident
usr001031704004	Sacramento River	304	2	0.0007 ± 0.0003	0.0006 ± 0.0002	Resident	Resident
usr001101503001	Sacramento River	218	1	0.0008 ± 0.0002	0.0009 ± 0.0002	Resident	Resident
usr001101503002	Sacramento River	207	1	0.0018 ± 0.0004	0.0013 ± 0.0006	Steelhead	Resident
usr001101503003	Sacramento River	216	1	0.0006 ± 0.0003	0.0010 ± 0.0003	Resident	Resident
usr002101603002	Sacramento River	302	2	0.0016 ± 0.0004	0.0010 ± 0.0003	Steelhead	Resident
usr002101603003	Sacramento River	238	2	0.0019 ± 0.0003	0.0009 ± 0.0003	Steelhead	Resident
usr002101603005	Sacramento River	366	3	0.0008 ± 0.0003	0.0010 ± 0.0002	Resident	Resident
usr002101603006	Sacramento River	375	3	0.0006 ± 0.0003	0.0009 ± 0.0002	Resident	Resident
usr002101603007	Sacramento River	300	2	0.0006 ± 0.0003	0.0009 ± 0.0002	Resident	Resident
usr002101603008	Sacramento River	220	1	0.0018 ± 0.0003	0.0008 ± 0.0002	Steelhead	Resident
usr002101603010	Sacramento River	210	1	0.0010 ± 0.0003	0.0009 ± 0.0003	Resident	Resident
usr003031704001	Sacramento River	327	2	0.0007 ± 0.0003	0.0010 ± 0.0003	Resident	Resident
usr004031704001	Sacramento River	242	2	0.0016 ± 0.0003	0.0007 ± 0.0003	Steelhead	Resident

CDFG No	Location	Length (mm)	Age	Mean Sr:Ca ± SD		Maternal Origin	Migratory History
				Primordia	FWG		
usr005031704001	Sacramento River	228	1	0.0009 ± 0.0003	0.0011 ± 0.0001	Resident	Resident
usr006031704001	Sacramento River	198	1	0.0018 ± 0.0003	0.0008 ± 0.0003	Steelhead	Resident
usr0320022	Sacramento River	530	4	0.0006 ± 0.0003	0.0009 ± 0.0002	Resident	Resident
usr0320031	Sacramento River	450	4	0.0009 ± 0.0002	0.0008 ± 0.0004	Resident	Resident
usr0320033	Sacramento River	530	4	0.0007 ± 0.0002	0.0010 ± 0.0003	Resident	Resident
usr0320034	Sacramento River	490	4	0.0010 ± 0.0003	0.0010 ± 0.0002	Resident	Resident
usr0320038	Sacramento River	520	4	0.0007 ± 0.0002	0.0009 ± 0.0003	Resident	Resident
usr0320040	Sacramento River	520	4	0.0011 ± 0.0003	0.0007 ± 0.0003	Resident	Resident
usr0320041	Sacramento River	420	4	0.0006 ± 0.0003	0.0008 ± 0.0002	Resident	Resident
usr0320042	Sacramento River	520	4	0.0007 ± 0.0004	0.0010 ± 0.0002	Resident	Resident
usr0320044	Sacramento River	370	3	0.0004 ± 0.0003	0.0008 ± 0.0003	Resident	Resident
usr0320045	Sacramento River	380	3	0.0008 ± 0.0004	0.0012 ± 0.0004	Resident	Resident
usr0320047	Sacramento River	380	3	0.0005 ± 0.0004	0.0008 ± 0.0004	Resident	Resident
usr0320051	Sacramento River	450	4	0.0007 ± 0.0001	0.0009 ± 0.0004	Resident	Resident
usr0320053	Sacramento River	420	4	0.0008 ± 0.0003	0.0008 ± 0.0002	Resident	Resident
usr0320055	Sacramento River	370	3	0.0008 ± 0.0003	0.0008 ± 0.0003	Resident	Resident
usr0320060	Sacramento River	340	3	0.0007 ± 0.0002	0.0009 ± 0.0002	Resident	Resident
usr0320061	Sacramento River	370	3	0.0009 ± 0.0003	0.0009 ± 0.0004	Resident	Resident
usr032403002	Sacramento River	520	4	0.0008 ± 0.0003	0.0009 ± 0.0003	Resident	Resident
usr032403003	Sacramento River	435	4	0.0005 ± 0.0002	0.0010 ± 0.0004	Resident	Resident
usr032403004	Sacramento River	440	4	0.0004 ± 0.0002	0.0007 ± 0.0001	Resident	Resident
usr032503005	Sacramento River	344	3	0.0007 ± 0.0002	0.0010 ± 0.0003	Resident	Resident
usr032503006	Sacramento River	430	4	0.0007 ± 0.0003	0.0008 ± 0.0004	Resident	Resident
usr040103007	Sacramento River	550	4	0.0006 ± 0.0002	0.0010 ± 0.0004	Resident	Resident
usr040103008	Sacramento River	573	4	0.0005 ± 0.0003	0.0007 ± 0.0003	Resident	Resident
usr040703009	Sacramento River	544	4	0.0009 ± 0.0002	0.0012 ± 0.0002	Resident	Resident
usr050102sh03	Sacramento River	490	4	0.0008 ± 0.0003	0.0010 ± 0.0003	Resident	Resident
usr050402sh01	Sacramento River	640	4	0.0006 ± 0.0002	0.0007 ± 0.0003	Resident	Resident
usr050402sh02	Sacramento River	580	4	0.0005 ± 0.0002	0.0006 ± 0.0003	Resident	Resident
usr050402sh03	Sacramento River	540	4	0.0008 ± 0.0003	0.0010 ± 0.0004	Resident	Resident
usr051002sh01	Sacramento River	600	4	0.0008 ± 0.0002	0.0009 ± 0.0001	Resident	Resident
usr051102sh01	Sacramento River	550	4	0.0009 ± 0.0002	0.0007 ± 0.0002	Resident	Resident
usr051302sh02	Sacramento River	550	4	0.0008 ± 0.0002	0.0006 ± 0.0002	Resident	Resident
usr051402sh03	Sacramento River	390	3	0.0005 ± 0.0003	0.0009 ± 0.0002	Resident	Resident
usr051602sh01	Sacramento River	530	4	0.0008 ± 0.0002	0.0006 ± 0.0002	Resident	Resident

CDFG No	Location	Length (mm)	Age	Mean Sr:Ca ± SD		Maternal Origin	Migratory History
				Primordia	FWG		
usr052202sh03	Sacramento River	520	4	0.0007 ± 0.0002	0.0010 ± 0.0004	Resident	Resident
usr052802sh02	Sacramento River	570	4	0.0006 ± 0.0002	0.0010 ± 0.0005	Resident	Resident
usr052802sh03	Sacramento River	340	3	0.0007 ± 0.0003	0.0007 ± 0.0003	Resident	Resident
usr052902sh02	Sacramento River	470	4	0.0008 ± 0.0003	0.0008 ± 0.0004	Resident	Resident
usr052902sh03	Sacramento River	550	4	0.0007 ± 0.0002	0.0010 ± 0.0004	Resident	Resident
usr060102sh01	Sacramento River	490	4	0.0006 ± 0.0004	0.0010 ± 0.0003	Resident	Resident
usr060902sh02	Sacramento River	560	4	0.0010 ± 0.0002	0.0009 ± 0.0003	Resident	Resident
usr060902sh03	Sacramento River	510	4	0.0010 ± 0.0008	0.0008 ± 0.0002	Resident	Resident
usr071302sh01	Sacramento River	530	4	0.0007 ± 0.0002	0.0007 ± 0.0003	Resident	Resident
usr081402sh01	Sacramento River	530	4	0.0010 ± 0.0002	0.0009 ± 0.0003	Resident	Resident
usr081502sh02	Sacramento River	520	4	0.0009 ± 0.0001	0.0006 ± 0.0003	Resident	Resident
usr081702sh01	Sacramento River	400	3	0.0006 ± 0.0003	0.0008 ± 0.0003	Resident	Resident
usr69529	Sacramento River	555	4	0.0007 ± 0.0004	0.0009 ± 0.0002	Resident	Resident
sjr040202609	San Joaquin River	235	2	0.0018 ± 0.0002	0.0012 ± 0.0003	Steelhead	Resident
sjr041202604	San Joaquin River	275	2	0.0018 ± 0.0002	0.0012 ± 0.0002	Steelhead	Resident
sjr043002607	San Joaquin River	191	2	0.0011 ± 0.0002	0.0013 ± 0.0003	Resident	Resident
sjr051002606	San Joaquin River	288	2	0.0011 ± 0.0002	0.0014 ± 0.0003	Resident	Resident
sjr051002608	San Joaquin River	211	2	0.0007 ± 0.0003	0.0013 ± 0.0003	Resident	Resident
sjr052202610	San Joaquin River	230	2	0.0014 ± 0.0002	0.0012 ± 0.0002	Resident	Resident