2004 Annual Report

Fish Salvage at the Tracy Fish Collection Facility

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Introduction

The Tracy Fish Collection Facility (TFCF) diverts (salvages) fish from water exported from the San Francisco Estuary. The TFCF began operation in 1957 and uses a louver-bypass system to salvage fish from the exported water. The salvaged fish are returned to the San Francisco Estuary by loading the salvaged fish into tanker trucks and trucking them to predetermined release sites.

Exports

The CVP exported roughly 2,695,000 acre-feet (AF) of water in 2004; less than the 2,784,000 AF in 2003. Monthly water exports ranged from a low of 58,984 AF in May to a high of 272,383 AF in August. With the exception of April through June, monthly exports ranged from 215,762 – 272,383 AF (Figure 1).

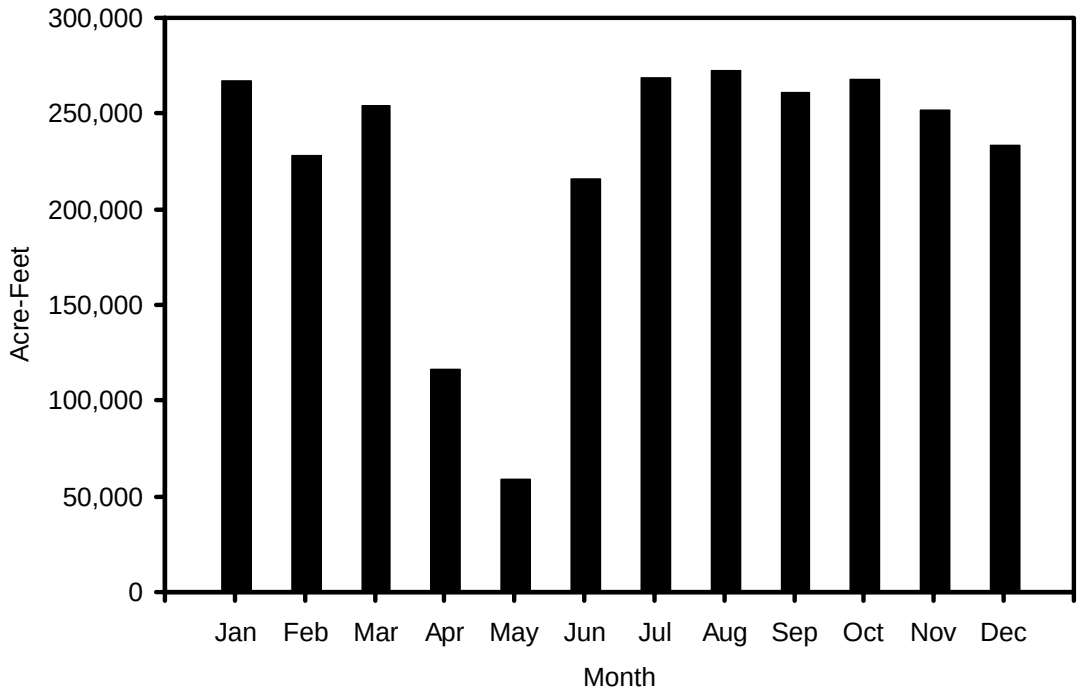

Figure 1. Monthly exports (Acre-Feet) for the Central Valley Project, 2004.

Fish Salvage

The composition of salvage at the Federal Facility was dominated by threadfin shad, striped bass, and American shad in 2004. At Federal Facility roughly 5.87 million fish and mitten crabs. The 2004 salvage is represented by 1 invertebrate species (mitten crabs), 44 fish species, and 1 fish taxa (unknown lamprey). Threadfin shad accounted for 73% of the annual salvage followed by striped bass and American shad (Appendix Table 1). These 3 species constituted 90% of the annual salvage. The percentage of annual salvage represented by threadfin shad has increased markedly since 1995 (Figure 2). Density of fish (individuals salvaged per 10,000 m^3) was highest from November and December (Figure 3).

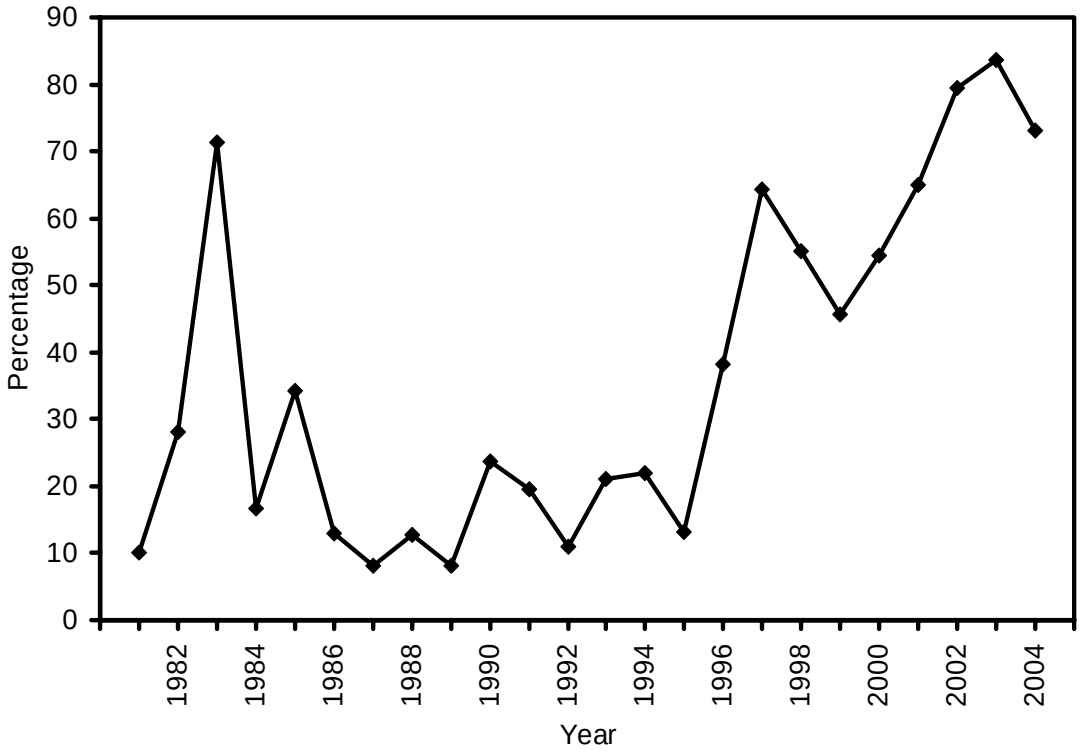

Figure 2. Percentage of annual salvage (percentage) represented by threadfin shad at the Federal Facility, 1981 – 2004.

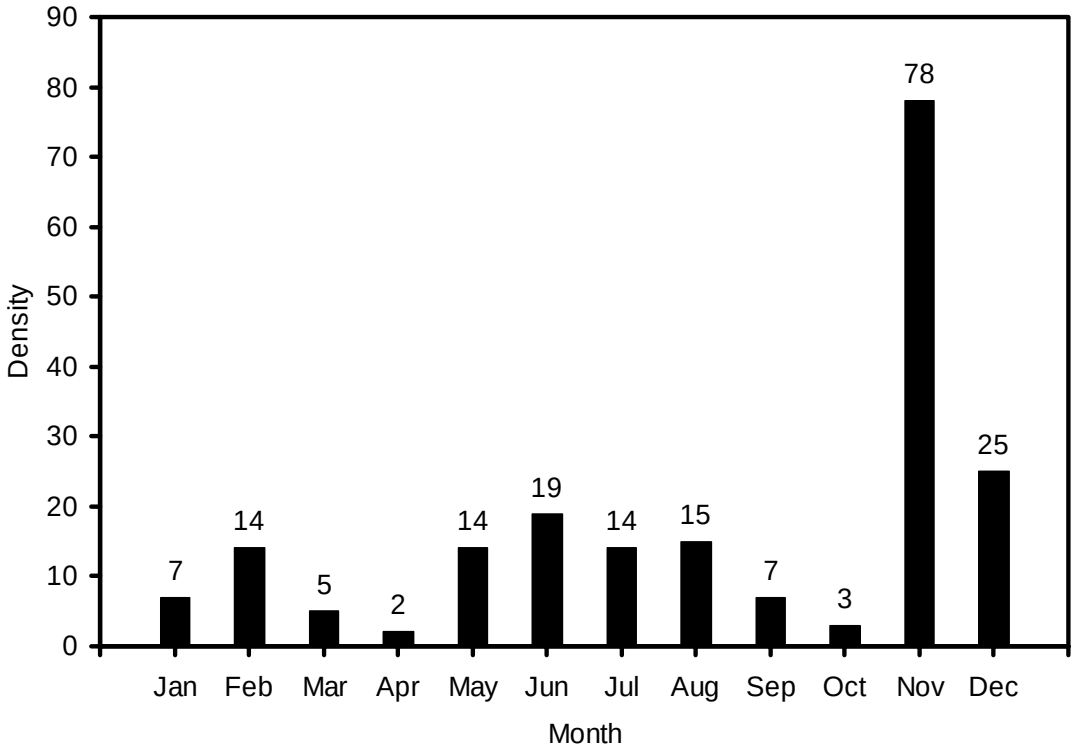

Figure 3. Monthly density (ind/10,000 m^3) for all taxa combined at the Federal Facility, 2004.

Delta Smelt

Salvage of delta smelt continued the declining trend since 2002 at the Federal Facility (Figure 4). The annual salvage of delta smelt in 2004 was roughly 41% the salvage in 2003: 6,769 in 2004 as opposed to 16,662 in 2003.

Delta smelt salvage in 2004 occurred from December through June with peak values in May (Figure 5). The monthly salvage in May accounted for 49% of the annual salvage and consisted of juvenile delta smelt.

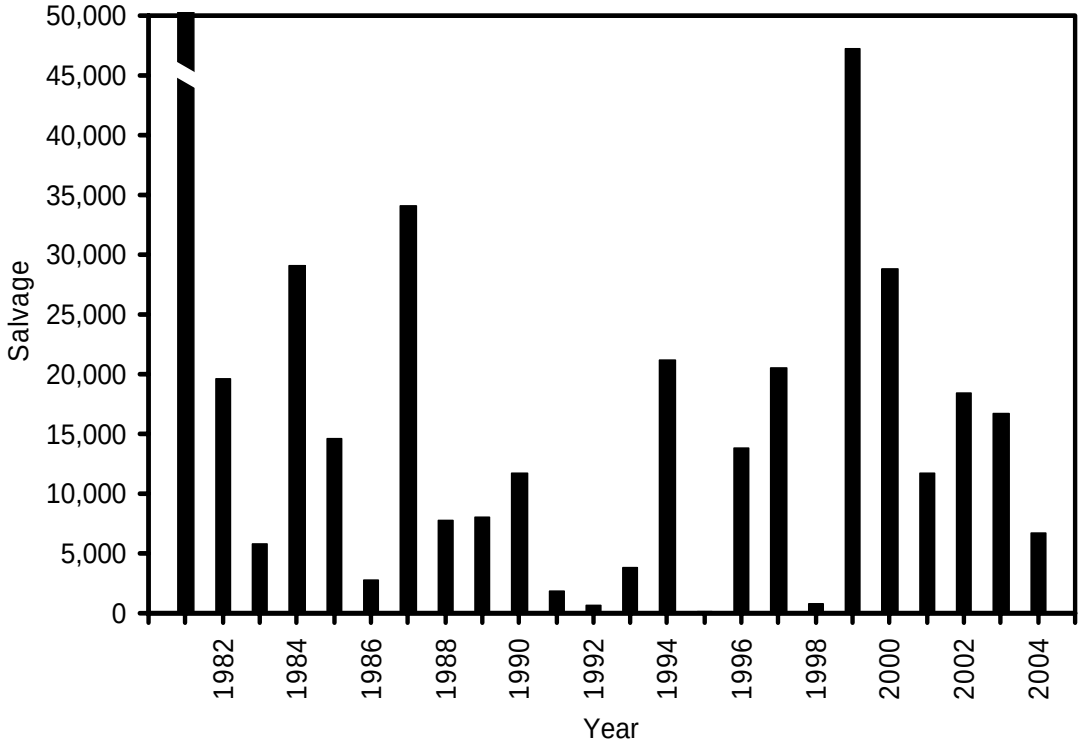

Figure 4. Annual salvage of delta smelt at the Federal Facility, 1981 – 2004. The 1981 salvage (274,288) has been truncated for scale considerations.

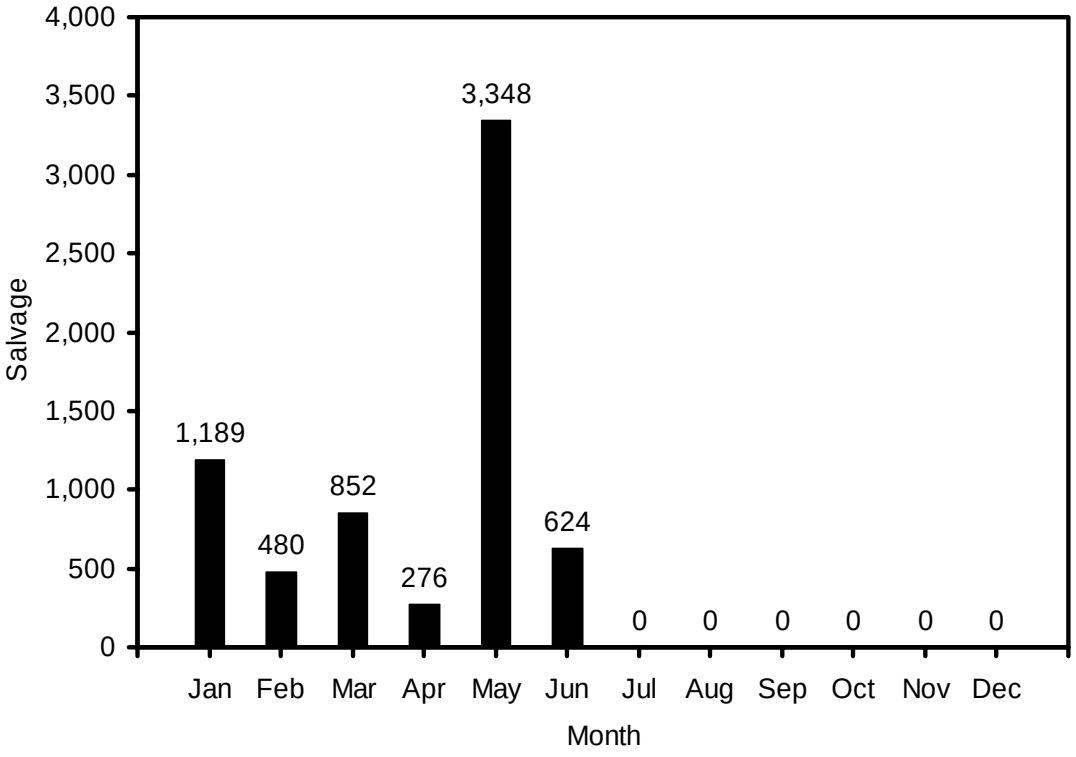

Figure 5. Monthly salvage of delta smelt at the Federal Facility, 2004.

Chinook Salmon

The annual salvage and loss of Chinook salmon in 2004 were composed of primarily wild, fall run[1], juveniles. The combined salvage (wild and hatchery) of Chinook salmon were low in 2004; continuing the trend of low salvage since 2001 (Figure 6).

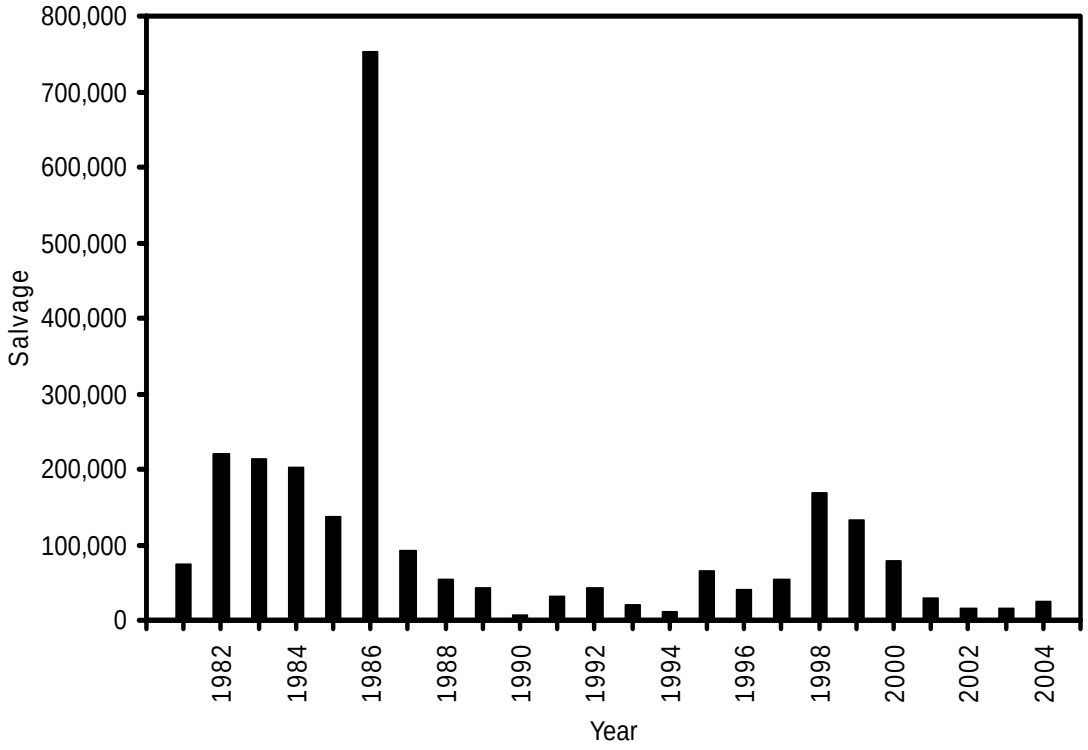

Figure 6. Combined salvage Chinook salmon at the Federal Facility, 1981 – 2004.

The Federal Facility salvaged 21,433 wild fish, 2,700 hatchery fish and 84 fish of unknown origin. The loss of wild fish was 13,334 as opposed to 1,806 hatchery fish.

Salvage of wild fish by race was:

- fall run - 17,976
- late-fall run – 37
- spring run - 2,352
- winter run - 1,068.

1. Race is determined by using the “Delta” length/race key

Loss (an estimate of mortality resulting from entrainment) by race of wild fish was:

- fall run - 11,066
- late-fall run – 24
- spring run - 1,532
- winter run – 712.

Salvage/loss occurred primarily from February through May (Figure 7). The salvage of 15,720 in March accounted for 73% of all wild Chinook salmon salvaged in 2004 (Figure 7).

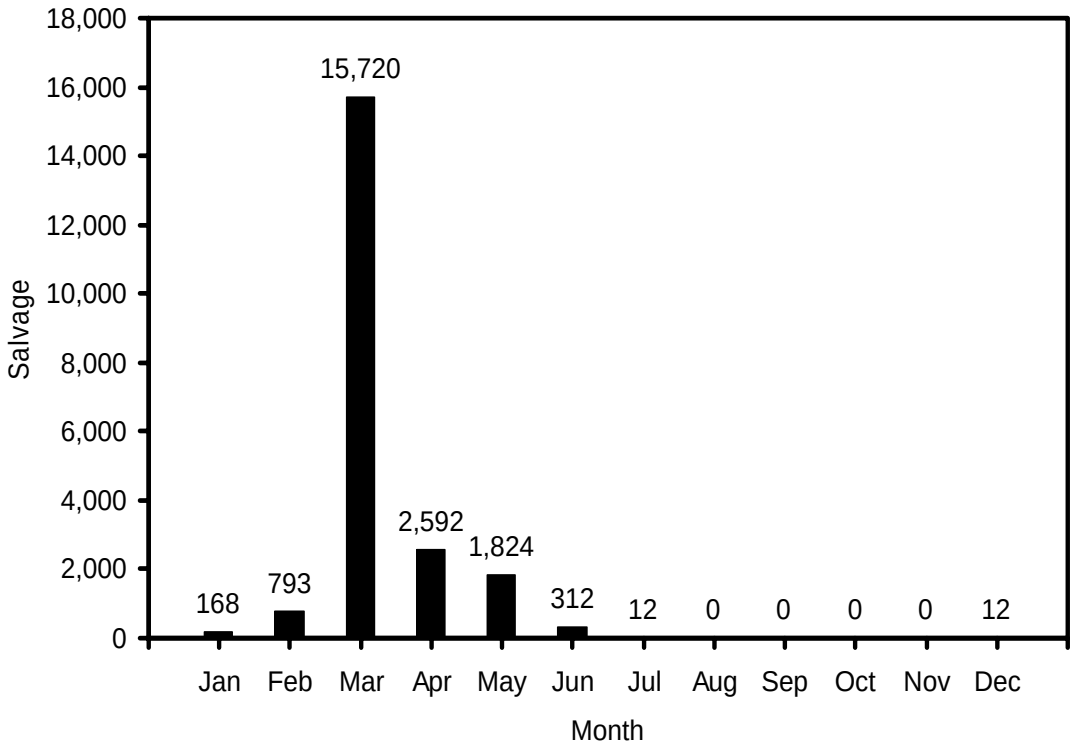

Figure 7. Salvage of wild Chinook salmon at the Federal Facility, 2004.

Steelhead

The combined salvage of steelhead in 2004 was less than that reported in 2003. The Federal Facility salvaged 5,186 steelhead in 2004 as opposed to 6,871 in 2003. With the exception of 2002 and 2004, annual salvage of steelhead has been increasing since 1997 (Figure 8).

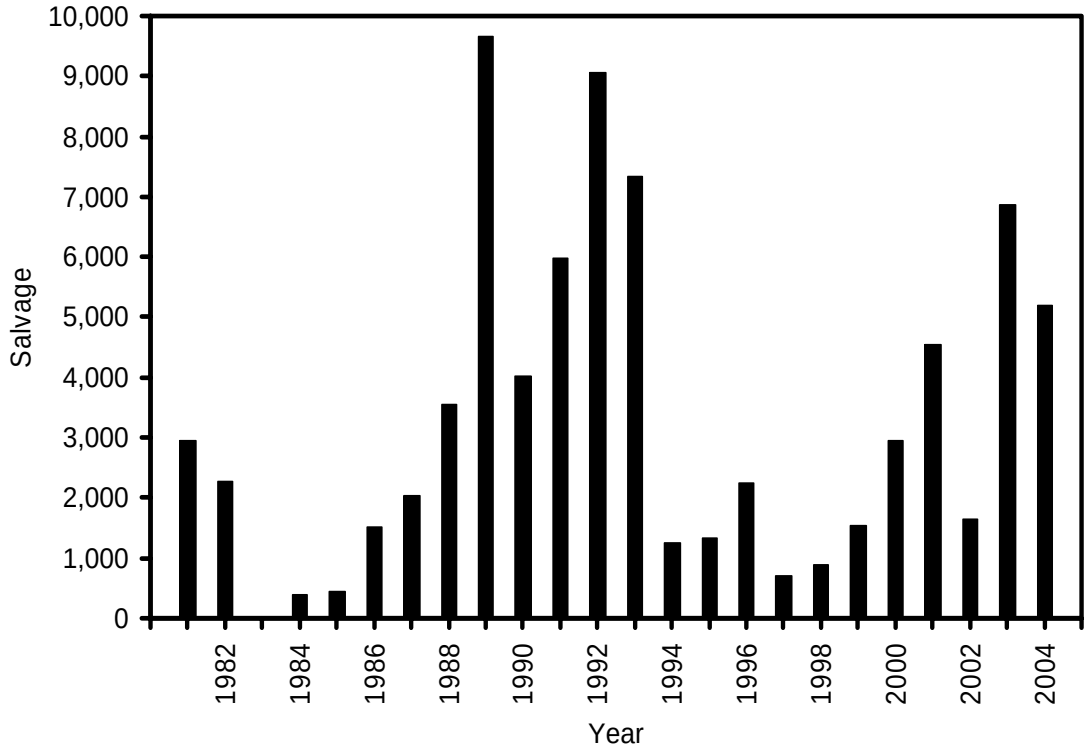

Figure 8. Annual combined salvage of steelhead at the Federal Facility, 1981 – 2004.

The salvage of steelhead in 2004 was predominately hatchery fish and occurred predominately in February. The Federal Facility salvaged 4,354 hatchery steelhead, comprising 84% of the annual salvage. The peak salvage of hatchery steelhead coincided with the peak salvage of wild steelhead. The salvage of wild steelhead, 832, occurred predominately from January through May with peak salvage in February and March (Figure 9). The salvage of hatchery steelhead occurred from January through April with peak salvage in February (Figure 9). The monthly salvage of hatchery steelhead in February, 3,300, accounted for 76% for the annual salvage of hatchery steelhead and 64% of the combined annual salvage.

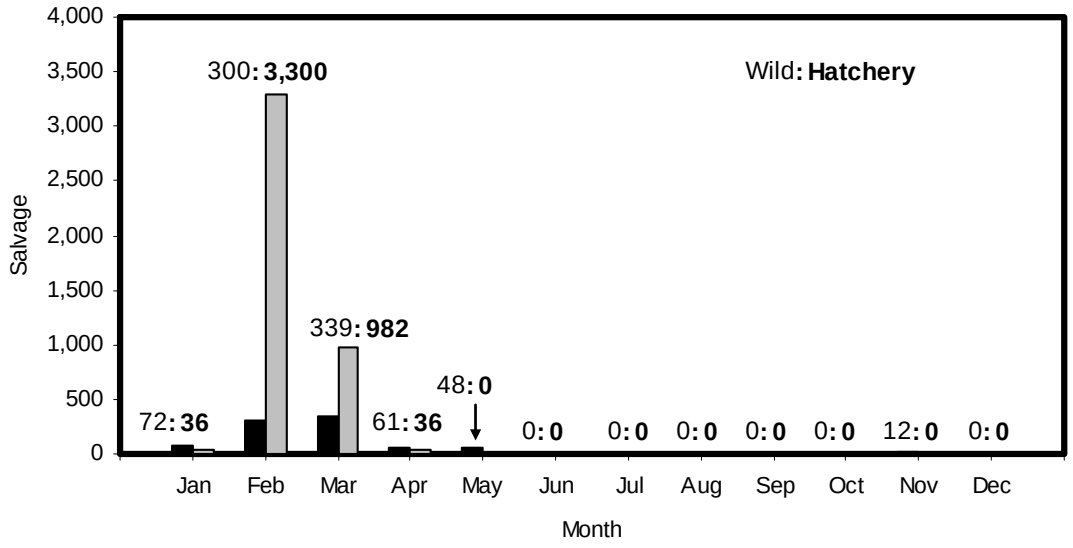

Figure 9. Monthly salvage of wild and hatchery steelhead at the Federal Facility, 2004.

Striped Bass

The salvage of striped bass at the Federal Facility was low in 2004, a trend that started in 1994. Salvage at the Federal Facility was 542,072, over 3 times that in 2003 (165,358). However, even these salvages are proportionally small when compared to previous years, especially before 1989, when annual salvages were commonly a million or more (Figure 10).

Salvage of striped bass occurred in all months in 2004 (Figure 11). Salvage ranged from 2,811 in October to 279,240 in June. The June monthly salvage, primarily composed of young-of-the-year fish, accounted for 52% of the annual salvage.

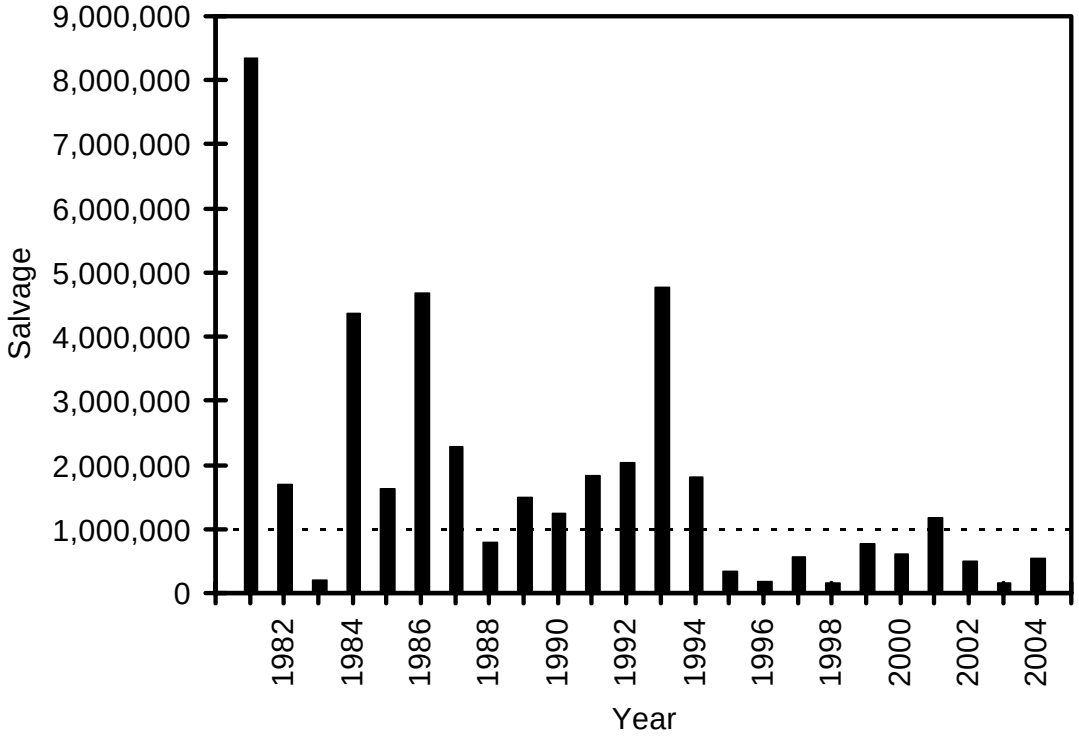

Figure 10. Annual salvage of striped bass at the Federal Facility, 1981 – 2004.

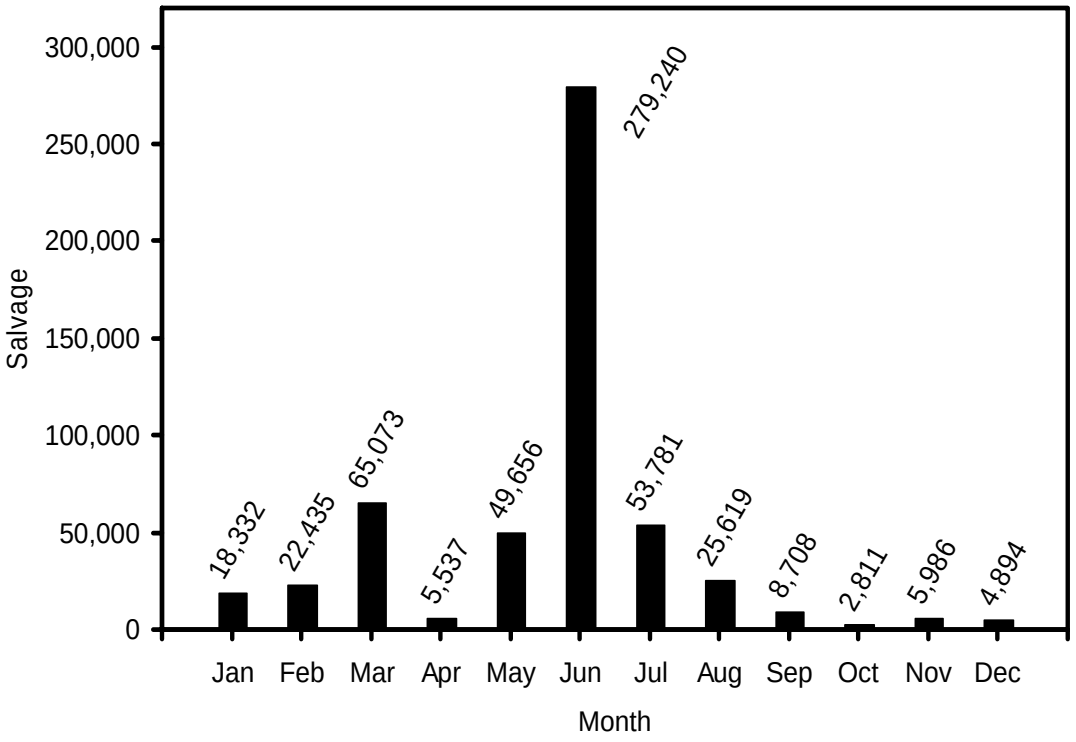

Figure 11. Monthly salvage of striped bass at the Federal Facility, 2004.

American Shad

The salvage of American shad at the Federal Facility was slightly less in 2004 than in 2003. The salvage at CVP was 429,978, roughly 88% of the salvage in 2003 (488,033). However, there is no trend through time for American shad annual salvage (Figure 12).

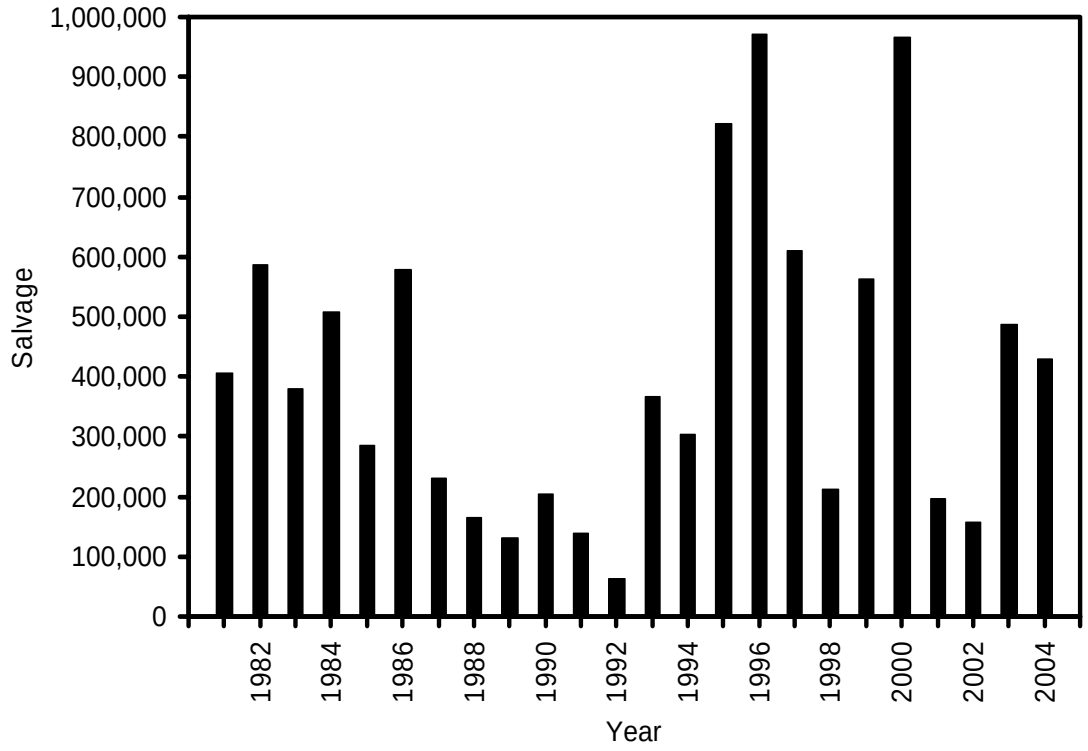

Figure 12. Annual salvage of American shad at the Federal Facility, 1981 – 2004.

Salvage of American shad occurred at during all months in 2004. Salvage ranged from 348 in May to 282,012 in November (Figure 13). The November salvage at November at CVP accounted for 66% of the annual salvage.

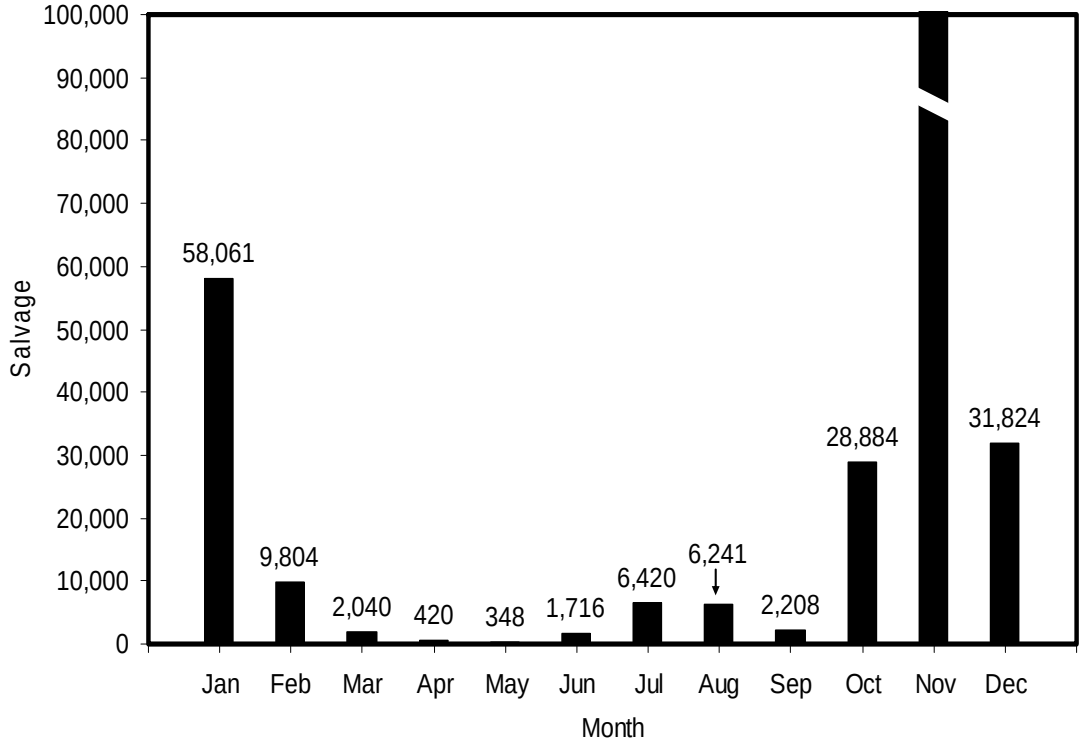

Figure 13. Monthly salvage of American shad at the Federal Facility, 2004. The November salvage (282,012) value has been truncated for scale considerations.

Sacramento Splittail

The salvage of splittail at the Federal Facility was low in 2004, but not unusually low, 13,131 as compared to 13,666 in 2003. The lowest salvage for the period of record, 1981 – 2004, occurred in 1994: 2,824. Large salvages of splittail (for this species, greater than 150,000) have occurred only in 1982, 1983, 1986, 1995, and 1998 (Figure 14).

Salvage of splittail in 2004 occurred predominately in May and June (Figure 15). Salvage during May and June accounted for 80% of the annual salvage in 2004.

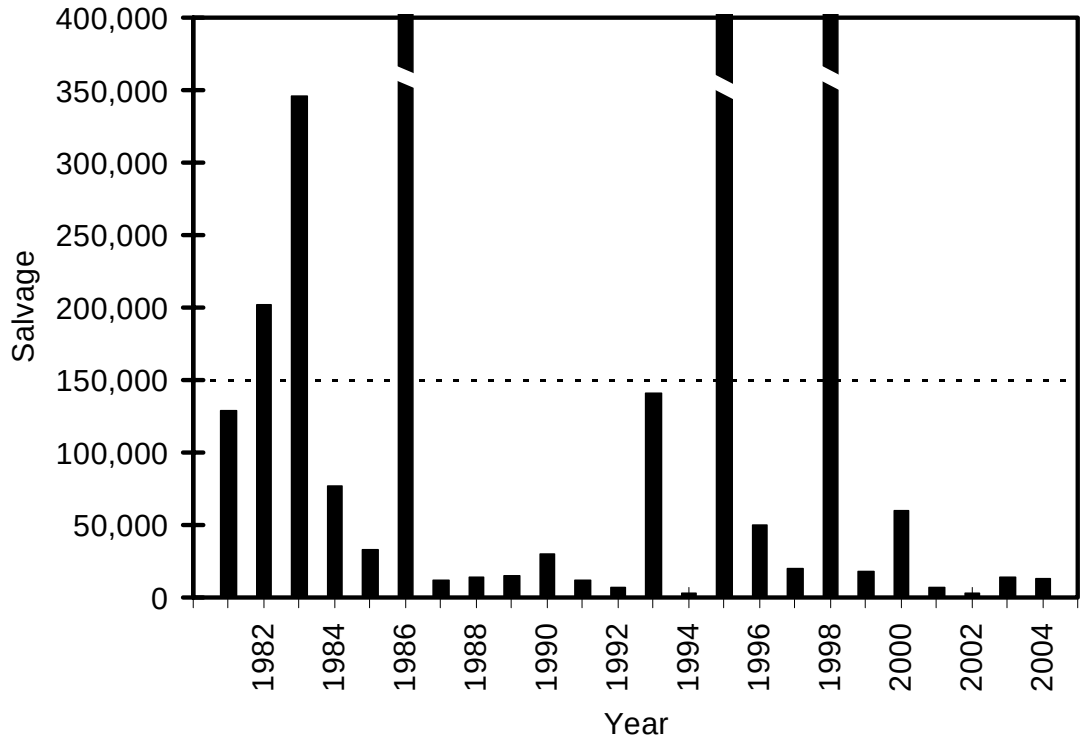

Figure 14. Annual salvage of splittail at the Federal Facility, 1981 – 2004. The salvages for 1986 (1,231,283), 1995 (3,143,156), and 1998 (2,051,660) have been truncated for scale considerations.

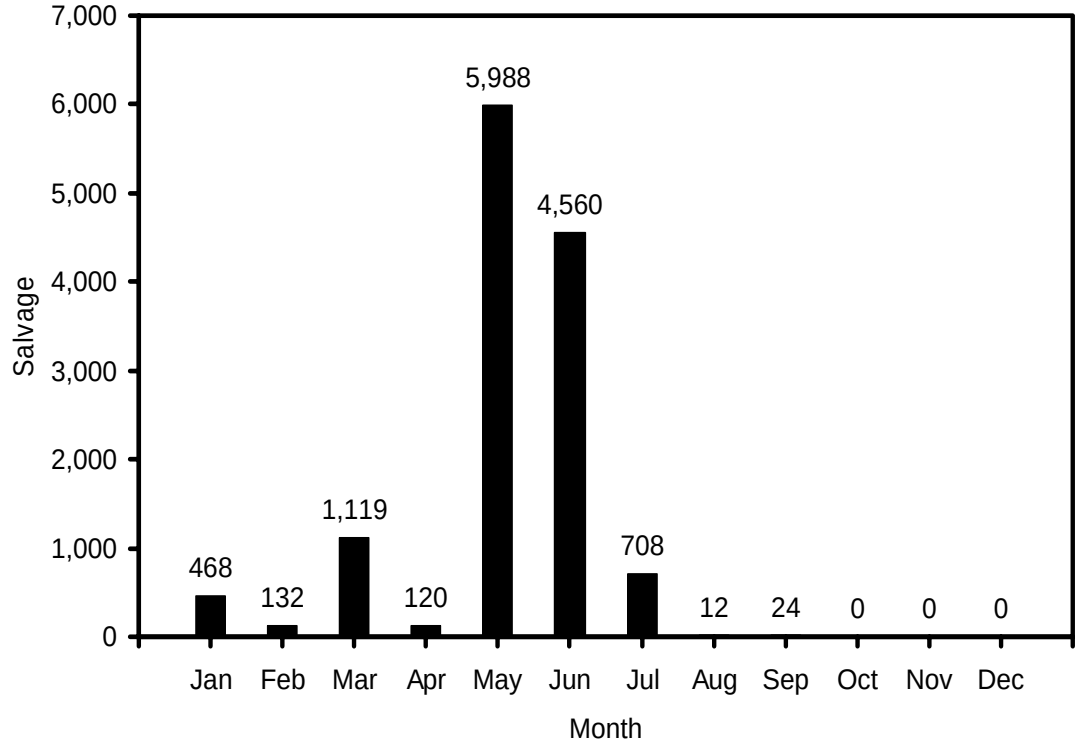

Figure 15. Monthly salvage of splittail at the Federal Facility, 2004.

Longfin Smelt

Although the salvage of longfin smelt at the Federal Facility was low in 2004, it was not an all time low. The salvage of longfin smelt was 648 in 2004 as opposed to 4,562 in 2003. However, the lowest salvages for the period of record, 1981 - 2004, were 0 in 1982 and 1995. Generally, annual salvages of longfin smelt have been low since 1990 with the exception of 1994 and 2001-2003 (Figure 16). The occurrences of large salvages (over 10,000) has occurred only once since 1990, in 2002 (Figure 16). Salvage of longfin smelt in 2004 occurred in January (24), March (72), April (204) and May (348).

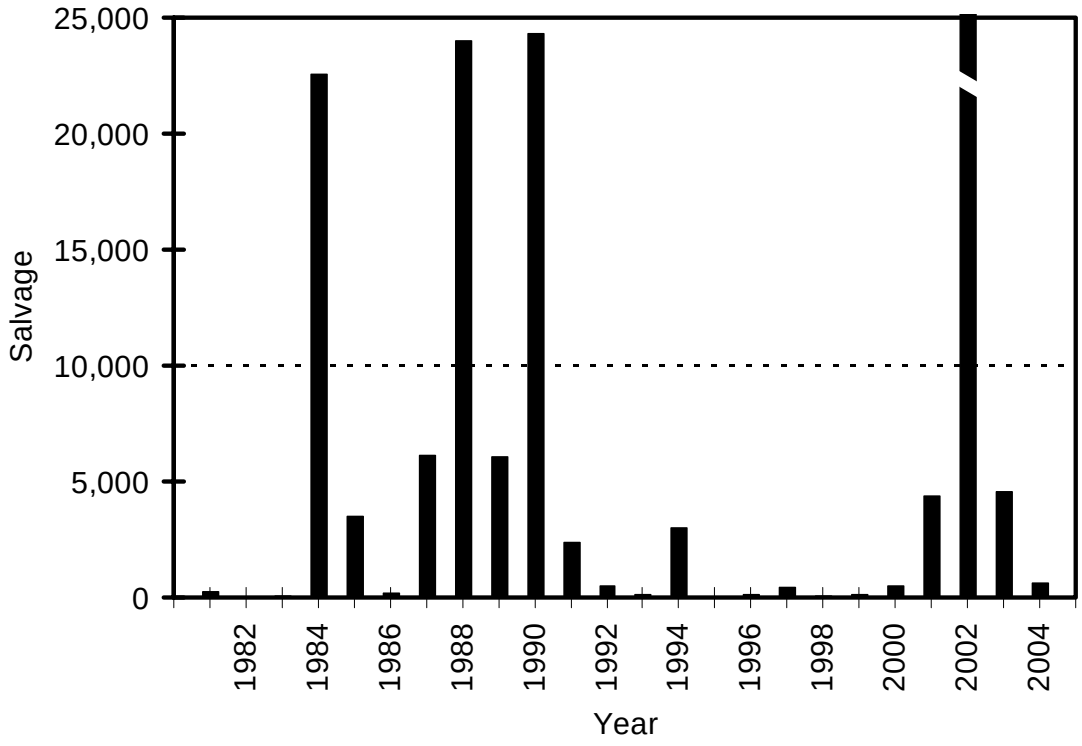

Figure 16. Annual salvage of longfin smelt at the Federal Facility, 1981 – 2004. The salvage in 2002 (43,080) has been truncated for scale considerations. Note: no longfin smelt were salvaged in 1982 or 1995.

Chinese Mitten Crabs

The salvage of mitten crabs in 2004 was a new low for the Federal Facility; 745 (Figure 17). This is slightly less than the salvage in 2003 (804) and much less the high for the period of record, 25,104 in 1999. With the exception of 2001, the salvage of mitten crabs has been declining since 2000 (Figure 17). Salvage of mitten crabs occurred primarily in October, representing 71% of the annual salvage.

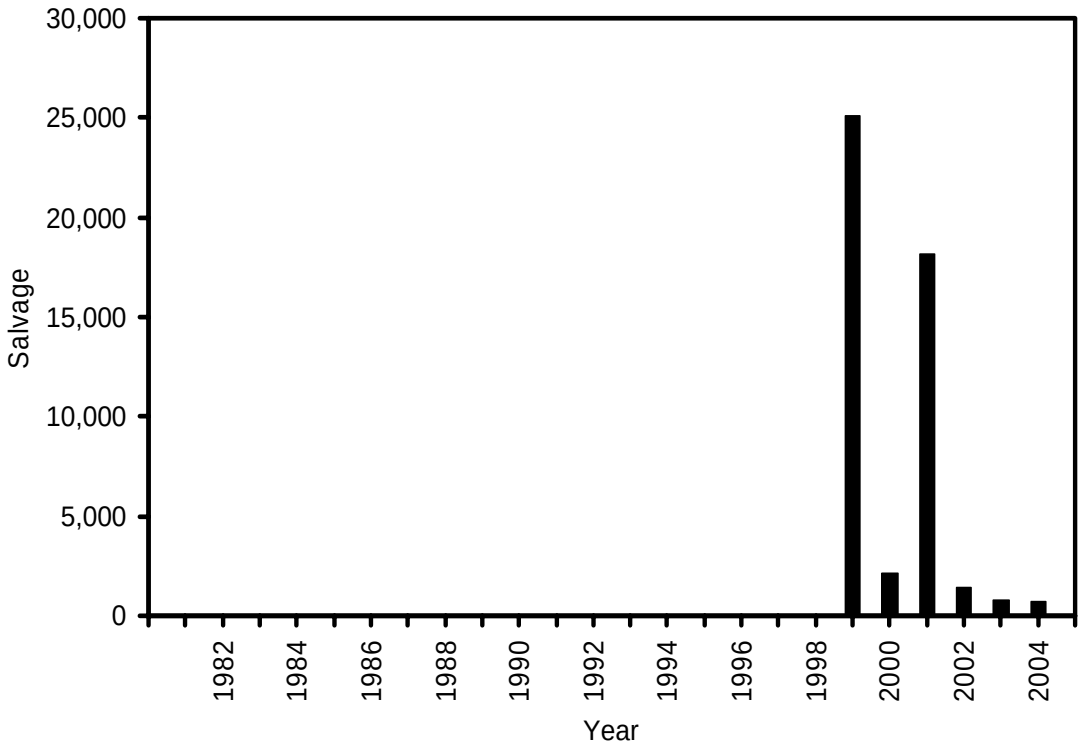

Figure 17. Annual salvage of mitten crabs at the Federal Facility, 1999 – 2004.

Threadfin Shad

The annual salvage of threadfin shad at the Federal Facility was 4,284,220 in 2004, less than the annual salvage in 2003 (6,266,470) and marking the first year since 1999 when annual salvage had not sequentially increased (Figure 18). Not surprisingly, the percentage of annual combined salvage (all taxa) represented by threadfin shad has decreased as well

(Figure 2). In general, the salvage of threadfin shad has been increasing from 1992 – 2003 (Figure 18).

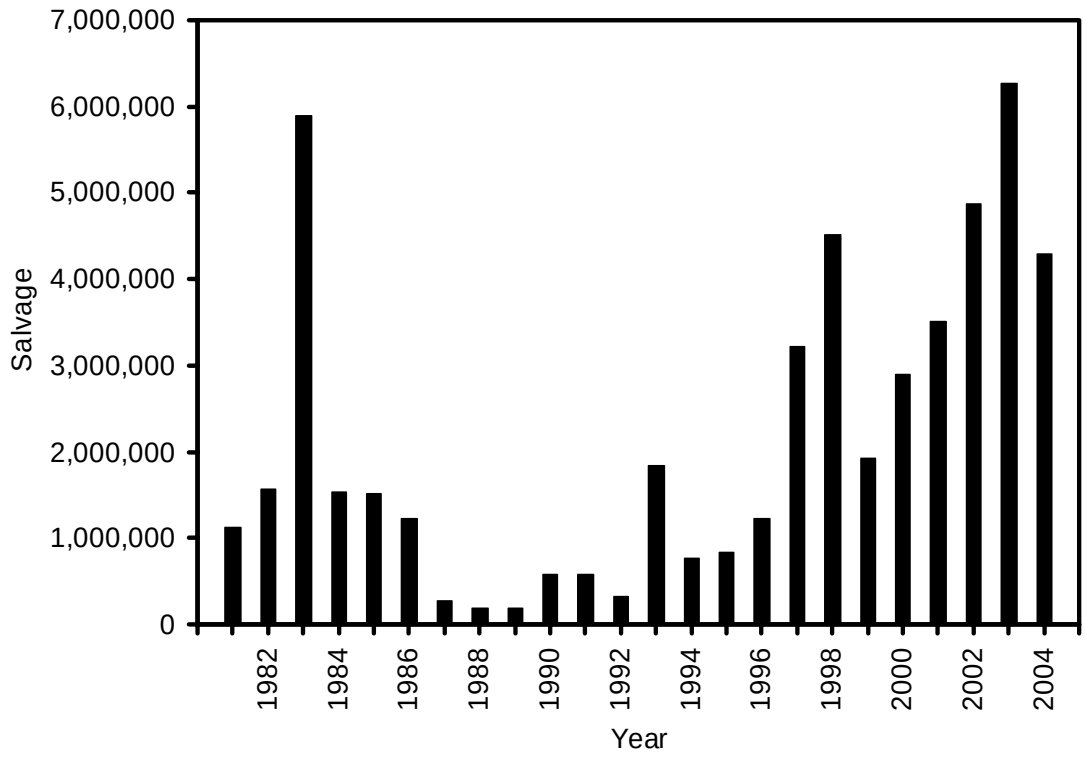

Figure 18. Annual salvage of threadfin shad at the Federal Facility, 1981 – 2004.

Threadfin shad were salvaged throughout 2004. Monthly salvage ranged from 888 in May to 2,017,644 in November (Figure 19). Salvage of threadfin shad occurred primarily from June through December with the salvage in November representing 47% of the annual salvage (Figure 19).

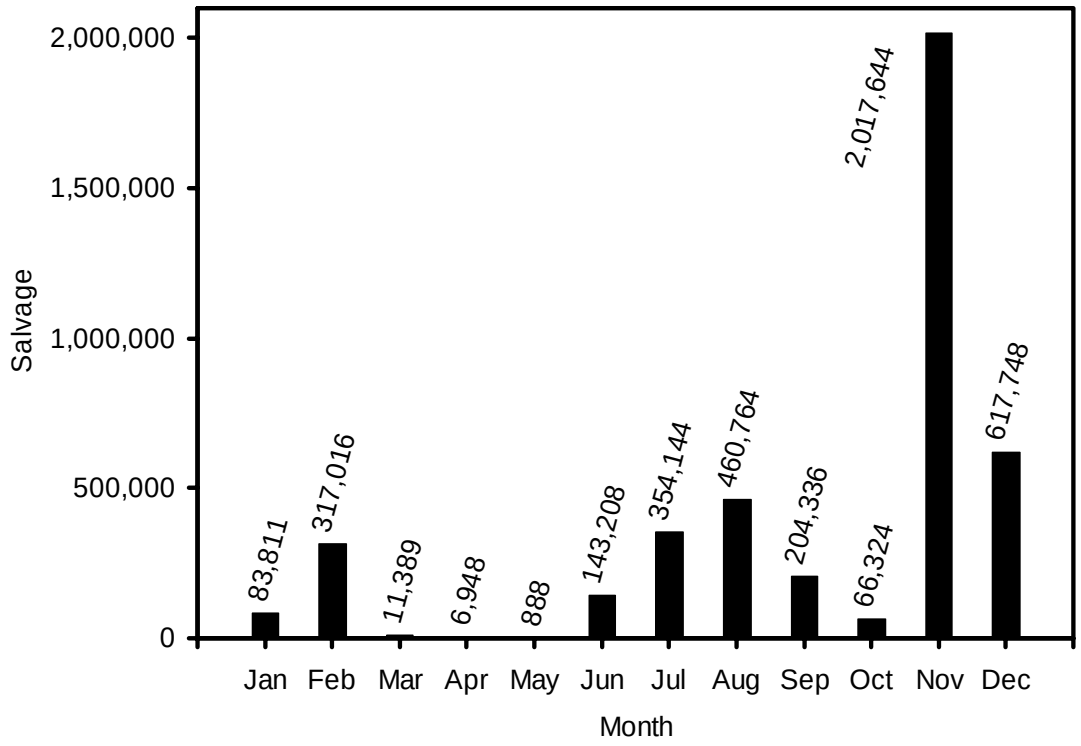

Figure 19. Monthly salvage of threadfin shad at the Federal Facility, 2004.

Inland Silversides

The annual salvage of inland silversides at the Federal Facility in 2004, 51,865, increased slightly from 2003 (49,512). The annual salvage of inland silversides has been sequentially increasing since 1999 (Figure 20). The annual salvages of inland silversides from 1981 – 2004 exhibit 2 modes, roughly 10 years apart (Figure 20). It is too early to determine if the salvage in 2004 is another mode.

Inland silversides were salvaged throughout 2004. Monthly salvage ranged from 12 in May to 24,708 in November (Figure 21). The salvage in November represented 48% of the annual salvage in 2004. The pattern of monthly salvage in 2004 suggests 3 modes (Figure 21).

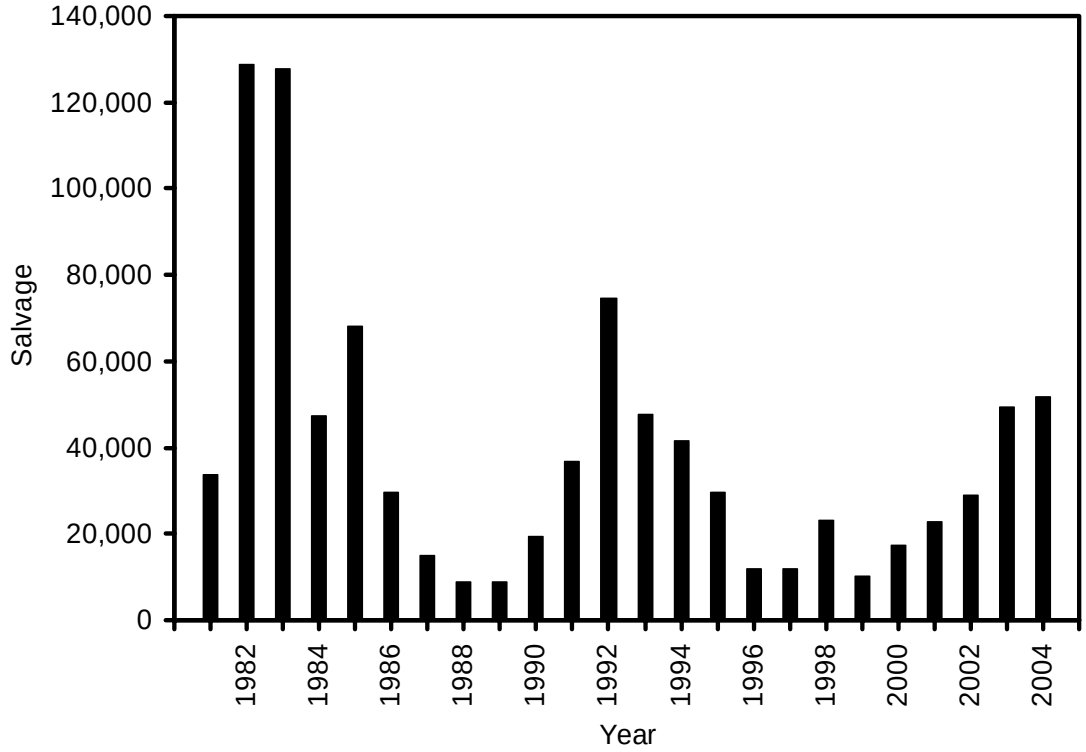

Figure 20. Annual salvage of inland silversides at the Federal Facility, 1981 – 2004.

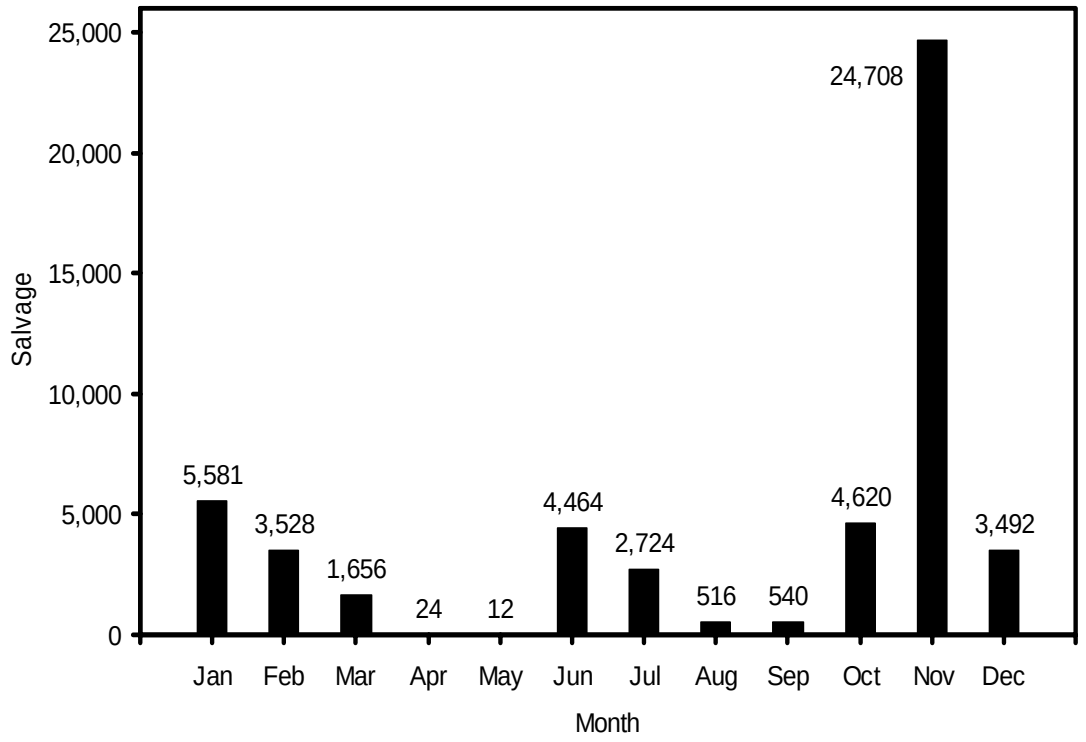

Figure 21. Monthly salvage of inland silversides at the Federal Facility, 2004.

Temperature

Daily mean water temperature showed the expected seasonal pattern at the Federal Facility: low at the beginning of the year, peaking in summer (late July), and a declining trend thereafter (Figure 22). Daily mean temperature ranged from 7 to 25 ^{o}C with an annual mean of 17 ^{o}C.

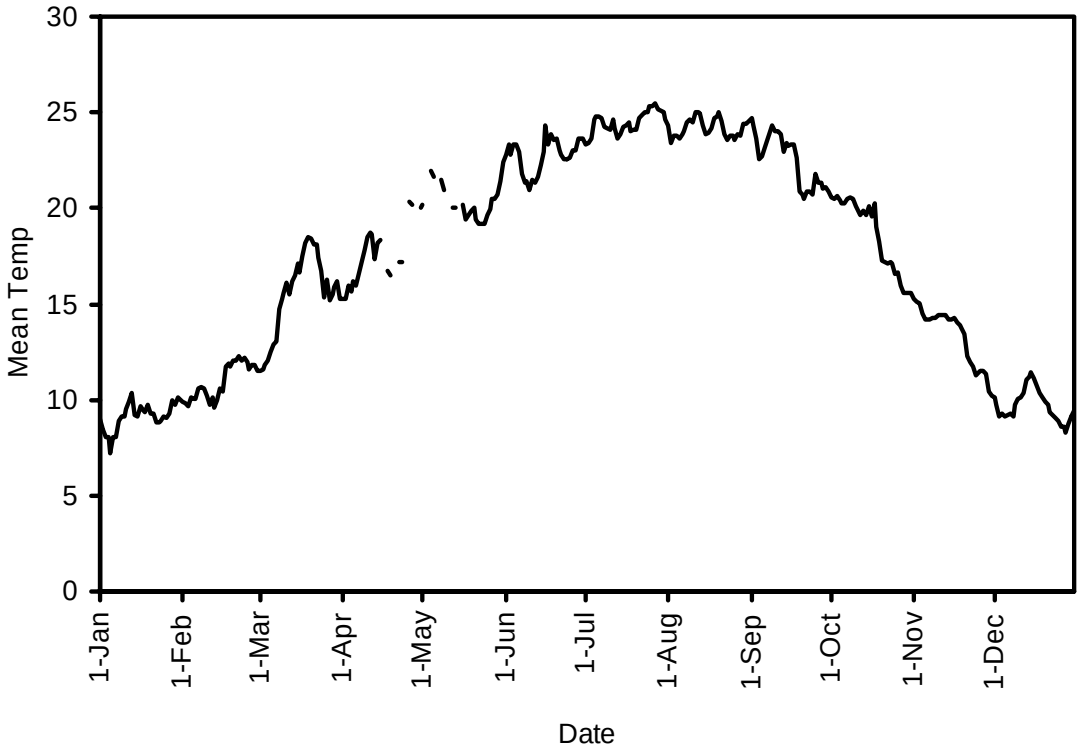

Figure 22. Daily mean temperature (Mean Temp, ^{o}C) for the Federal Facility, January 1st – December 31st, 2004.

Appendix Table 1. Annual salvage by species/taxon and their percentages (%) for the Federal Facility in 2004 and 2003.

	2004		2003	
Species	Salvage	%	Salvage	%
Threadfin Shad	4,284,220	73.0	6,266,470	83.6
Striped Bass	542,072	9.2	165,358	2.2
American Shad	429,978	7.3	488,033	6.5
Bluegill	161,063	2.7	122,035	1.6
Yellowfin Goby	140,533	2.4	114,452	1.5
White Catfish	138,270	2.4	168,114	2.2
Inland Silverside	51,865	0.9	49,512	0.7
Largemouth Bass	37,344	0.6	33,398	0.4
Chinook Salmon[1]	24,217	0.4	16,498	0.2
Channel Catfish	15,915	0.3	13,654	0.2
Splittail	13,131	0.2	13,666	0.2
Delta Smelt	6,769	0.1	16,662	0.2
Steelhead[2]	5,186	0.1	6,871	0.1
Golden Shiner	3,004	0.1	6,516	0.1
Prickly Sculpin	2,176	<0.1	2,544	<0.1
Common Carp	1,671	<0.1	108	<0.1
Redear Sunfish	1,663	<0.1	2,160	<0.1
Black Crappie	1,117	<0.1	1,825	<0.1
Warmouth	1,092	<0.1	1,008	<0.1
Shimofuri Goby	819	<0.1	2,484	<0.1
Chinese Mitten Crab	745	<0.1	804	<0.1
Longfin Smelt	648	<0.1	4,562	0.1
Bigscale Logperch	554	<0.1	480	<0.1
Red Shiner	540	<0.1	60	<0.1
Brown Bullhead	496	<0.1	588	<0.1
Lamprey Unknown	360	<0.1	252	<0.1
Starry Flounder	312	<0.1	360	<0.1
Black Bullhead	267	<0.1	30	<0.1
White Crappie	264	<0.1	24	<0.1
Tule Perch	204	<0.1	228	<0.1
Spotted Bass	156	<0.1	0	0.0
Rainwater Killifish	144	<0.1	108	<0.1
Western Mosquitofish	108	<0.1	120	<0.1
Threespine Stickleback	84	<0.1	132	<0.1
Fathead Minnow	36	<0.1	60	<0.1
Blue Catfish	36	<0.1	72	<0.1
White Bass	36	<0.1	0	0.0
White Sturgeon	24	<0.1	12	<0.1
Pacific Staghorn Sculpin	24	<0.1	48	<0.1
Green Sunfish	13	<0.1	36	<0.1
Hitch	12	<0.1	0	0.0
Sacramento Blackfish	12	<0.1	12	<0.1
Smallmouth Bass	12	<0.1	24	<0.1
Riffle Sculpin	12	<0.1	60	<0.1
Wakasagi	12	<0.1	12	<0.1
Shokihaze Goby	12	<0.1	0	0.0
Goldfish	0	0.0	36	<0.1

Appendix Table 1. (Continued)

	2004		2003	
Species	Salvage	%	Salvage	%
Pacific Brook Lamprey	0	0.0	12	<0.1
Sacramento Sucker	0	0.0	48	<0.1
Freshwater Eel	0	0.0	12	<0.1

[1.] Combined salvage of adipose clipped, unclipped fish and fish of unknown origin.
[2.] Combined salvage of adipose clipped and unclipped fish.