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# Four Years of Sampling Restored and Created Habitats as Part of the Napa River/Napa Creek Flood Protection Project

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**Stillwater Sciences**



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# Program Origin



The Napa River Fisheries Monitoring Program was created to evaluate the benefits of the Napa River/Napa Creek Flood Protection Project on threatened and endangered fish species.

Key participants:

- U.S. Army Corps of Engineers
- Napa County Flood Control and Water Conservation District



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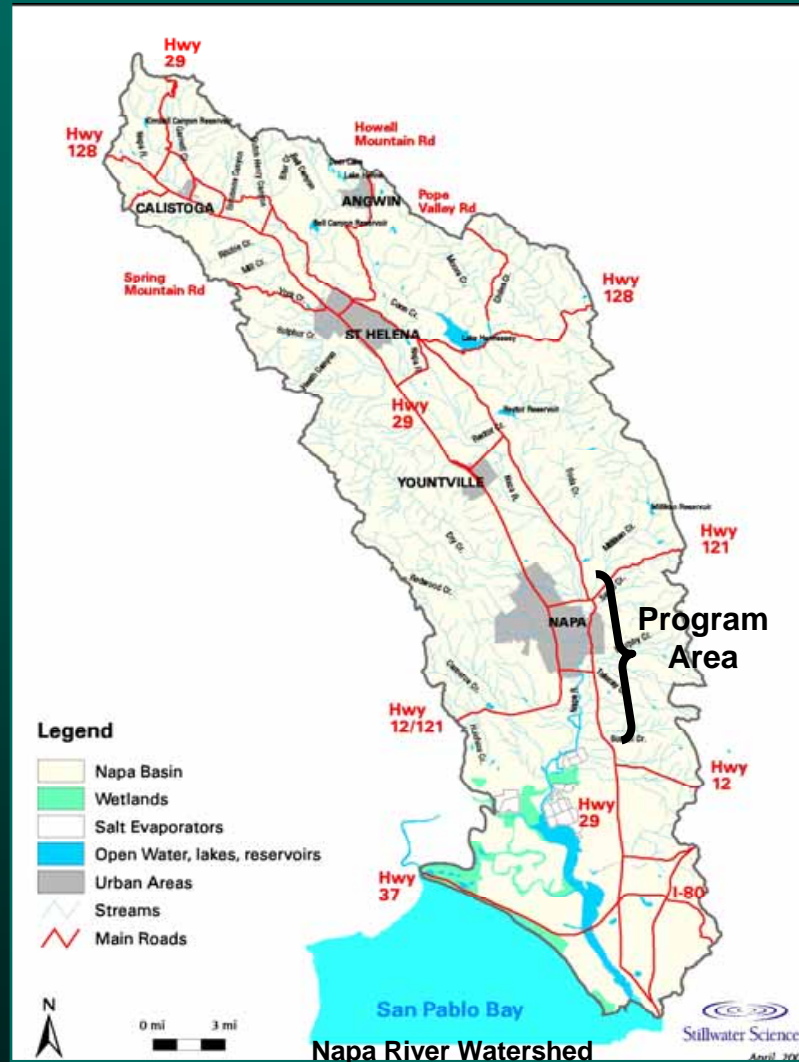
# Program Objectives

- Document presence and relative abundance of fish species utilizing restored and created habitats.
- Document life stages present and seasonality of fish species in restored and created habitats.
- Evaluate correlations between species presence and environmental conditions.



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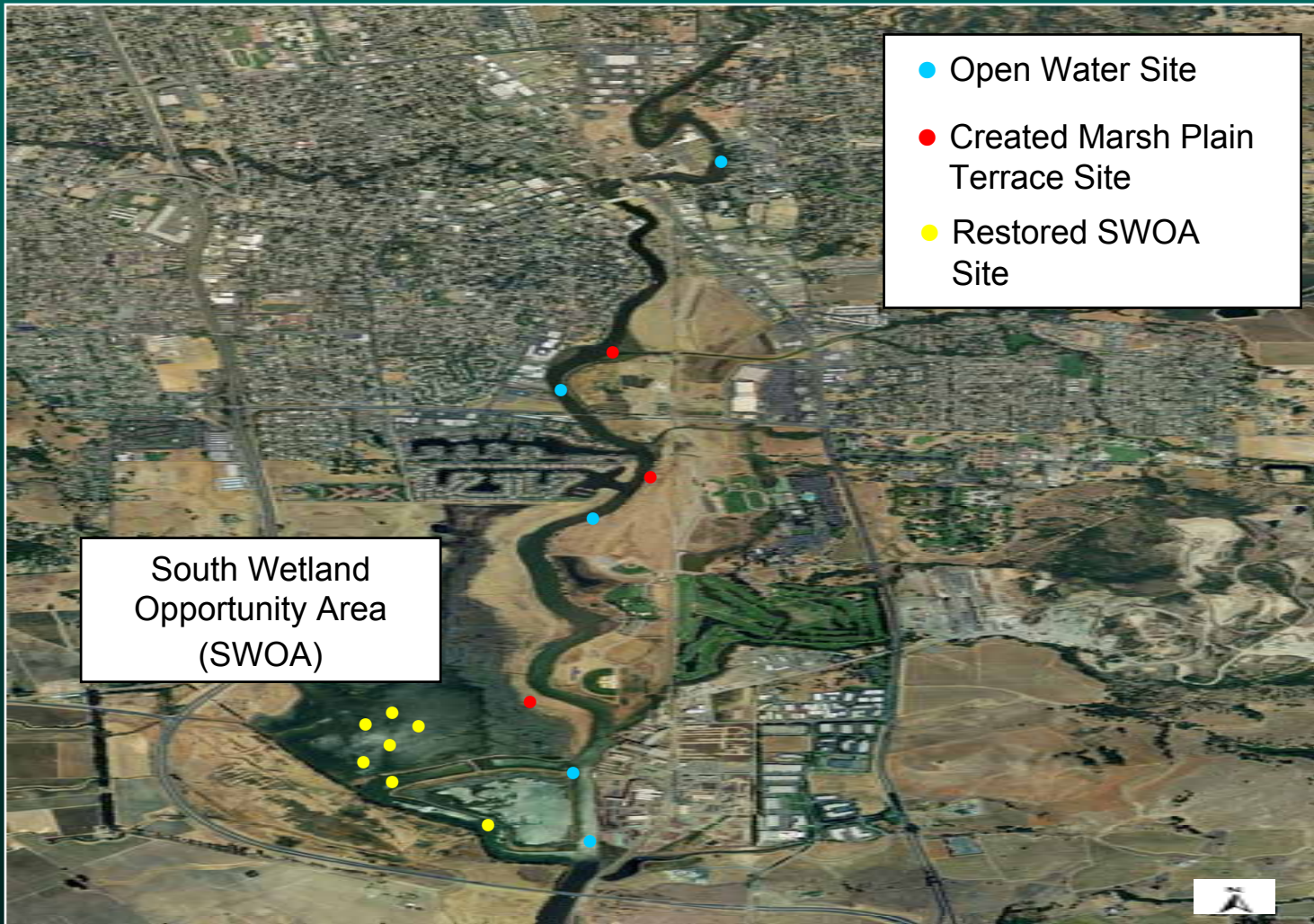
# Napa River Watershed





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# Aerial photograph of project area





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# Marsh Plain Terrace Creation



Prior to construction,  
July 2000.



Post-construction, 2001.



Beach seining, February 2003.



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Prior to construction, July 2000.



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# Marsh Plain Terrace Creation



Post-construction, 2001.



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# Marsh Plain Terrace Creation



Beach seining, February 2003.



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# Restoration of the South Wetland Opportunity Area



Pre-restoration  
condition in the  
SWOA, June 2001.



Restored condition in the  
SWOA, March 2004.



SWOA levee breach,  
March 2004.



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# Restoration of the South Wetland Opportunity Area



Pre-restoration  
condition in  
the SWOA,  
June 2001.





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# Restoration of the South Wetland Opportunity Area



SWOA levee breach, March 2004.



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# Restoration of the South Wetland Opportunity Area



Restored condition in the SWOA, March 2004.



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# Methods



- program duration 2001–2004
- 14 sampling sites
- sampling gears include otter trawl, beach seine, purse seine, fyke nets, and 20 mm tow-net

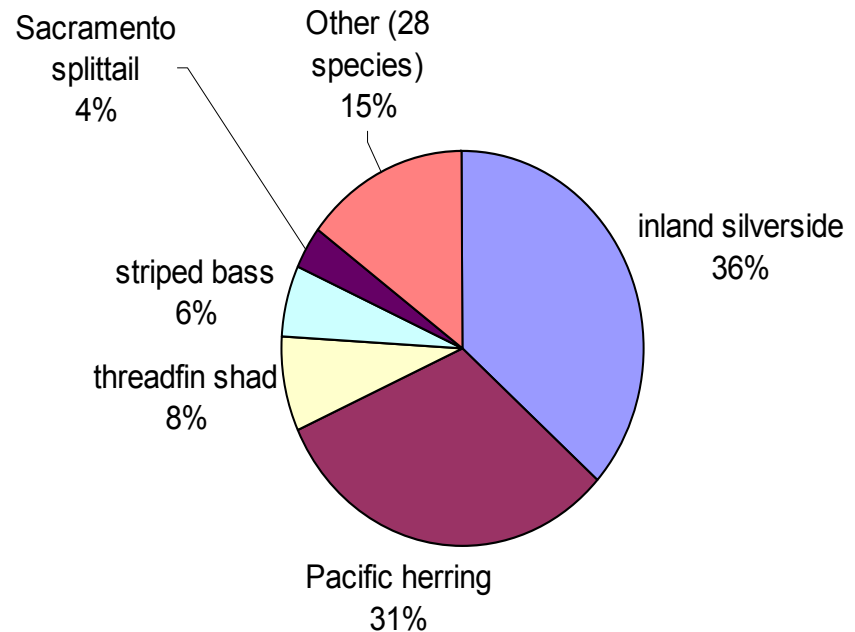


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# Juvenile and Adult Fishes Collected 2001-2004 Summary



- 33 species
- 17 native and 16 introduced
- 12,791 total specimens collected
  - 4,689 Inland silverside
  - 4,016 Pacific herring
  - 994 Threadfin shad
  - 738 Striped bass
  - 457 Sacramento splittail



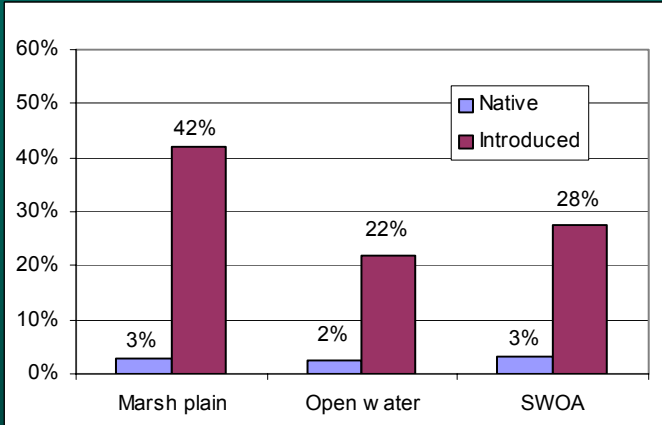


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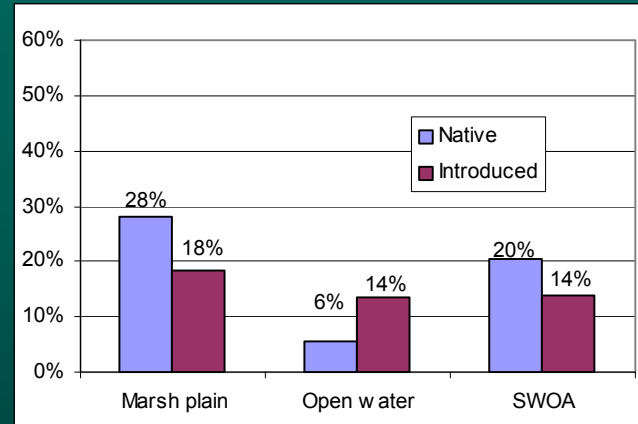
# Native and introduced fish in three habitat types



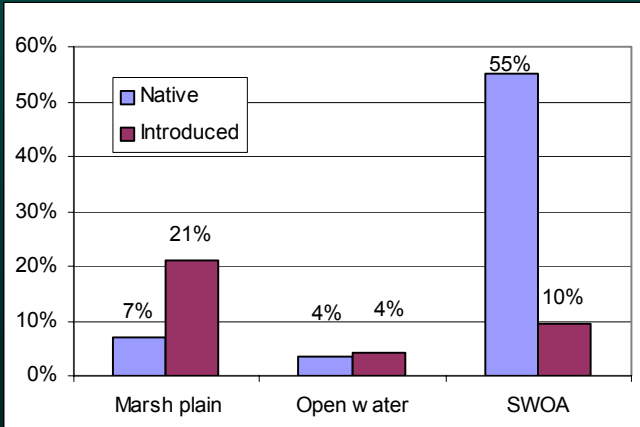
Native and introduced fish captured in summer and winter



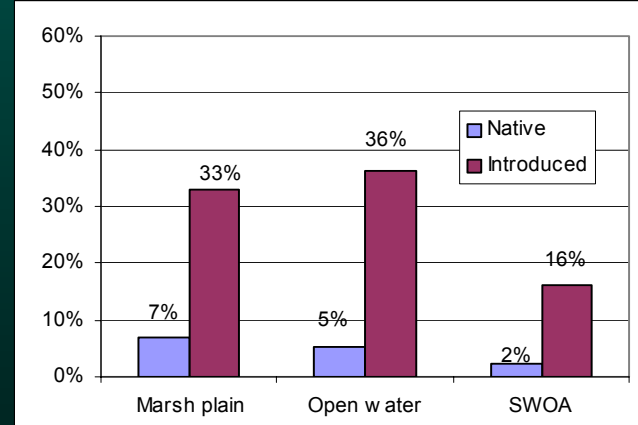
Native and introduced fish captured in spring, excluding two most dominant species (inland silverside and Pacific herring)



Native and introduced fish captured in spring

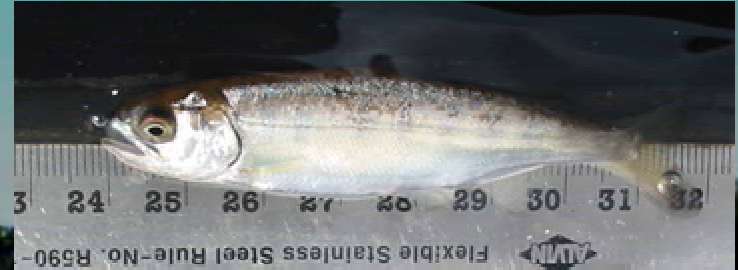


Native and introduced fish captured in summer and winter, excluding two most dominant species (inland silverside and Pacific herring)

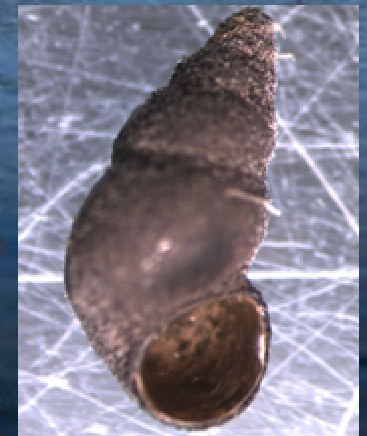


# Additional Species of Note

- eight chum salmon captured in 2004, 57–84 mm FL.
- four Chinook salmon captured in 2002-2004, 49–105 mm FL
- three steelhead captured 2002-2004, 72–208 mm FL
- 2001, one adult delta smelt in SWOA and 3,800 larvae captured by CDFG
- New Zealand mudsnail documented in July 2004



Chum salmon



NZMS



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# Sacramento splittail summary



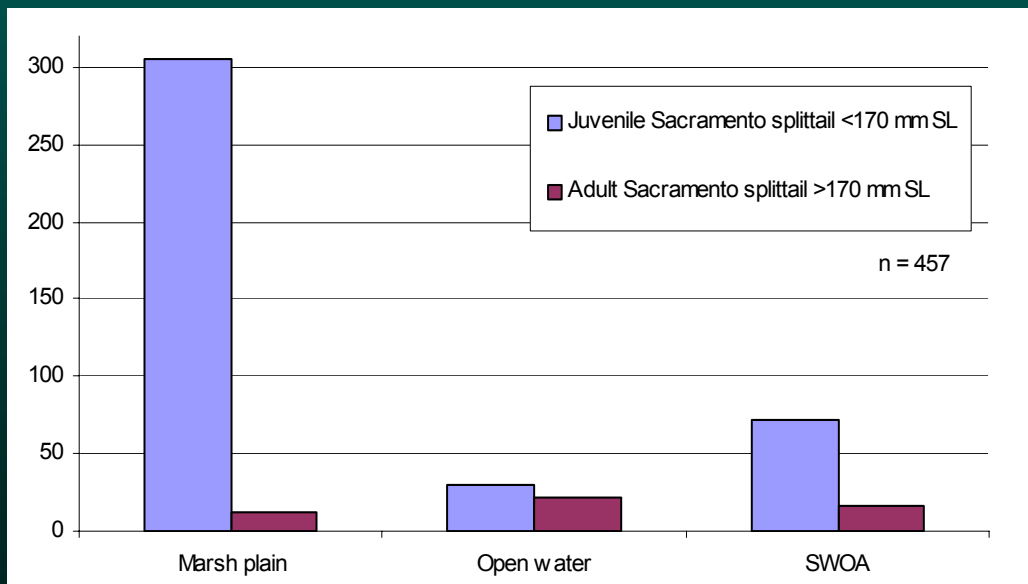
- 457 captured (407 juveniles, 50 adults)
- second—most abundant native fish
- found in all habitat types
- juveniles more abundant in created marsh plain terraces



adult Sacramento splittail



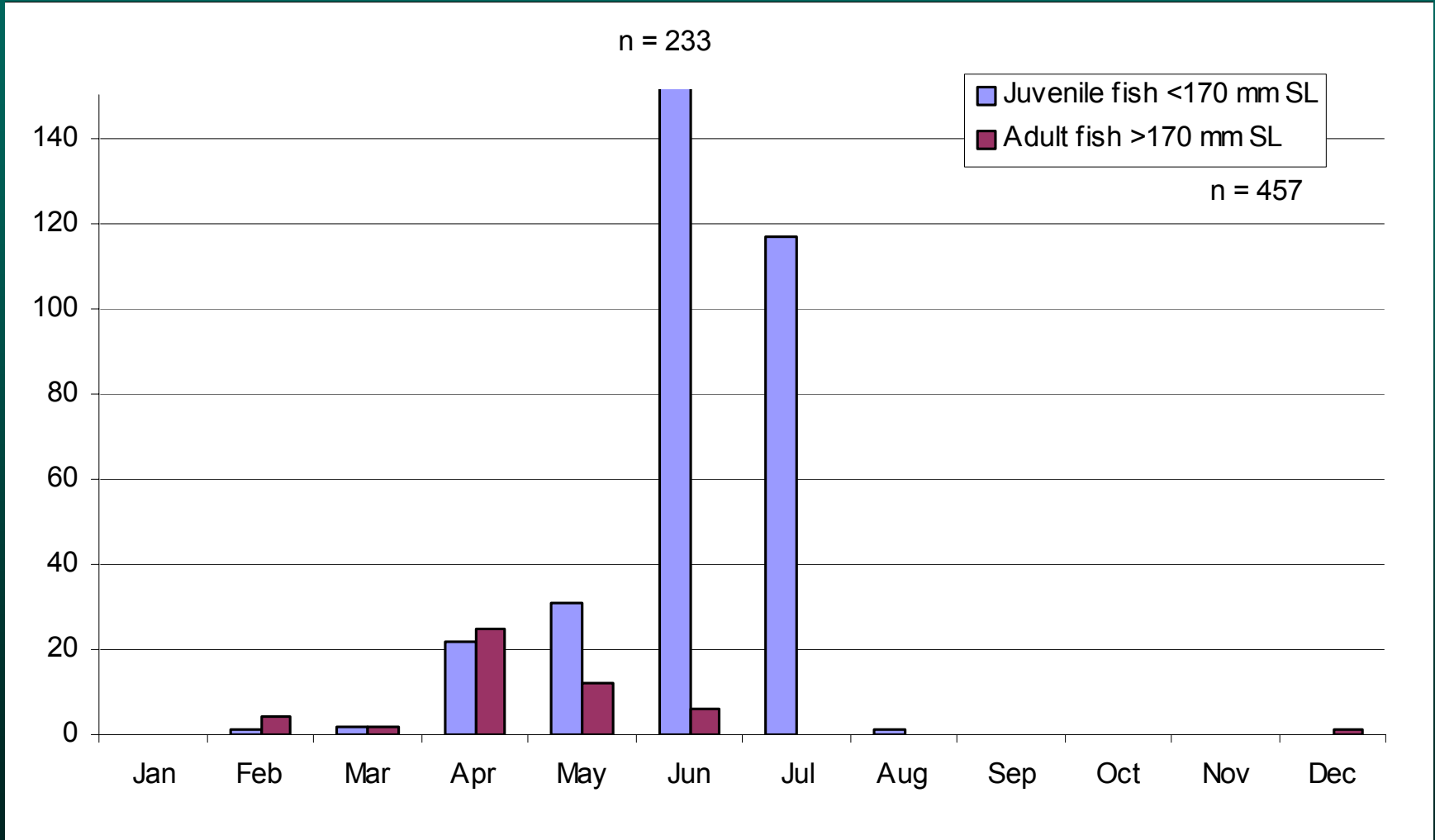
adult Sacramento splittail  
with spawning coloration





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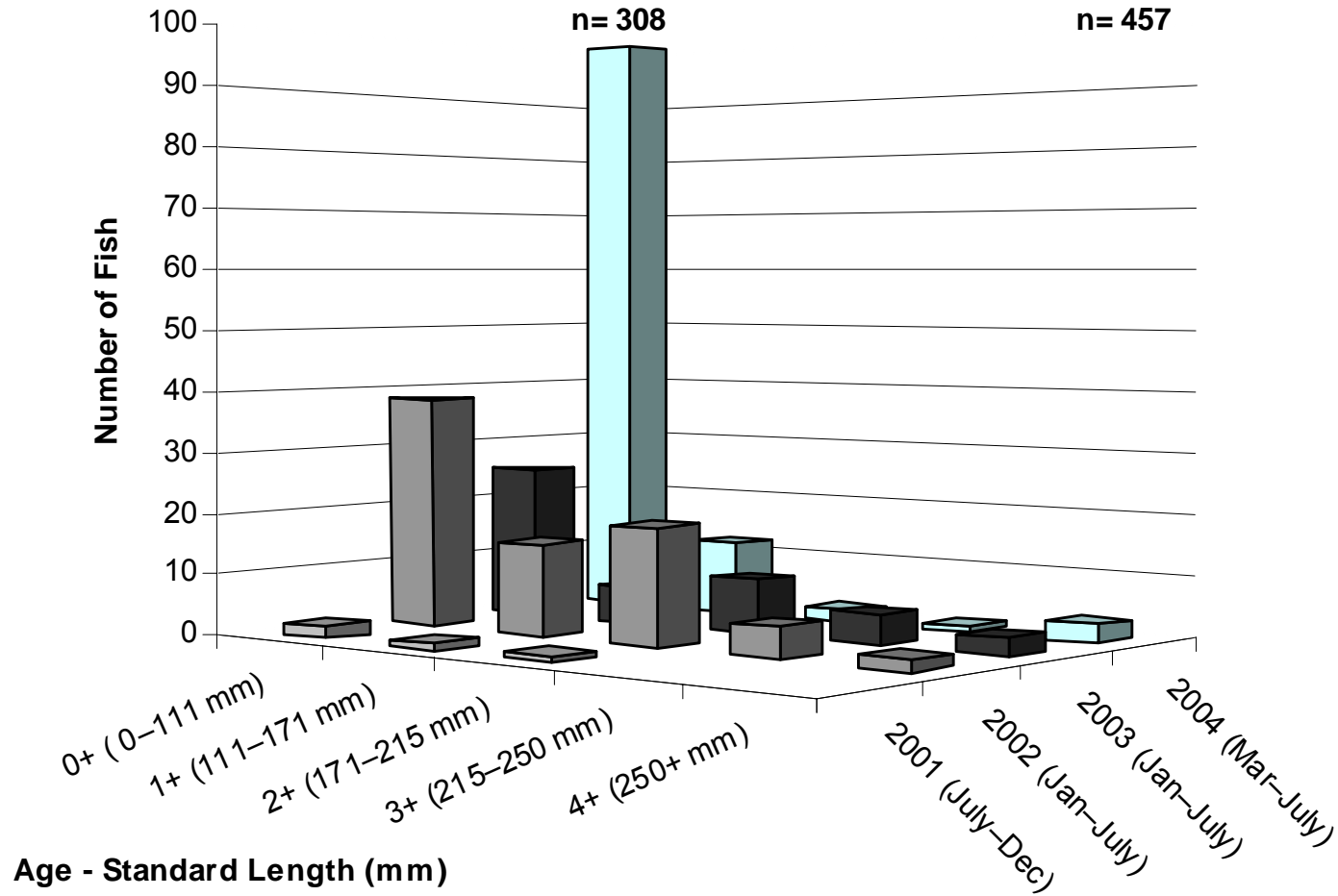
# Juvenile and adult Sacramento splittail captured between July 2001 and July 2002, January and July 2003, and March and July 2004





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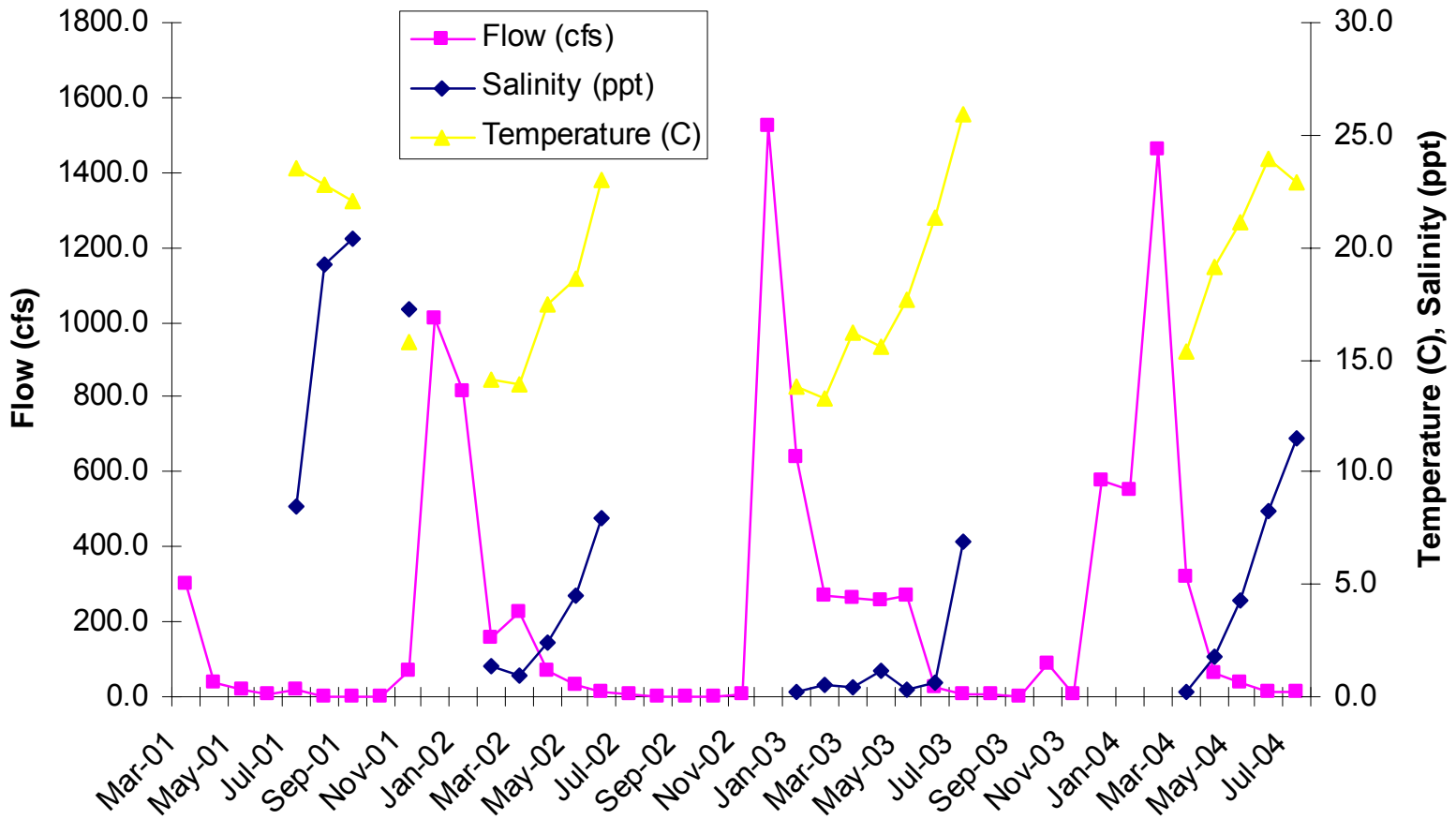
# Age-class distribution and lengths of Sacramento splittail between July 2001 and 2002, January and July 2003, and March and July 2004





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# Environmental conditions in the main channel of the Napa River between March 2001 and July 2004





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# Statistical Methods



- Multivariate linear regression
- Identify possible relationships between CPUE and environmental conditions



starry flounder



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# Results



- Larger numbers of juvenile Sacramento splittail were found in the created marsh plain terrace sites than in the restored SWOA.
- A positive correlation was found between abundance of juvenile Sacramento splittail and salinity.
- Juvenile striped bass abundance was positively correlated with warmer temperature in shallow water habitats.
- Larger numbers of juvenile splittail and inland silversides were captured in 2004.
- 3,300 juvenile Pacific herring were captured in 2002, significantly more than in other years.



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# Management Implications



Created marsh plain terraces and restored floodplain habitat increased rearing habitat for numerous life stages of native and introduced fish in the Napa River.

To make the restored SWOA more suitable for native fish:

- Breach additional levees
  - Increase water circulation
  - Decrease temperatures
  - Provide better access for fish





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# Summary



- 34 fish species observed
- Sampling occurred in three habitat types associated with a “environmentally sustainable” flood control design
- The relative abundance of native fish numbers was highest in spring
- Sacramento splittail were observed in greater numbers in created marsh plain terraces than in restored SWOA habitat
- Created and restored habitat associated with the flood control design provide habitat for native fish
- Program reporting located at <http://www.napariverfishmonitoring.org>



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# Acknowledgements



- U.S. Army Corps of Engineers
- Napa County Flood Control and Water Conservation District
- Stillwater Sciences
- Jones and Stokes Associates