

Riparian Restoration on California's Coast
November 3, 2005

An Introduction to the
Monterey Peninsula Water
Management District's
Restoration Program



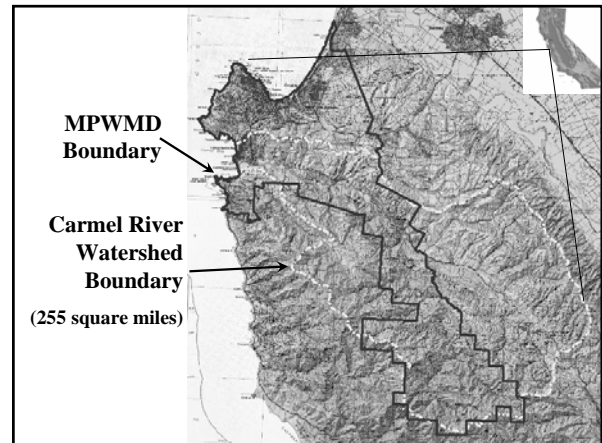
www.mpwmd.dst.ca.us

Overview

- MPWMD mission and boundary
- What does MPWMD manage?
- Why is restoration necessary on the Carmel River
- Design concepts for river restoration projects
- The Schulte Restoration Project
- Conclusion

Mission Statement

The mission of the Monterey Peninsula Water Management District is to manage, augment, and protect water resources for the benefit of the community and the environment.



What does the MPWMD manage?

- 40 water distribution systems
- California American Water (Cal-Am) comprises some of these water distribution systems
- 900 private wells that derive their supply from sources within the District
- Sources within the District include the Carmel River, its tributaries, the Carmel River Alluvial Aquifer and Seaside Coastal Subareas

The Relationship between
Cal-Am and MPWMD

- Cal-Am provides water to 95 percent of the customers and produces 80 percent of the total supply within the District
- The State Water Resources Control Board regulates most of Cal-Am's Water production
- Order 95-10 requires Cal-Am to offset the unlawful diversions from the Carmel River (10,730 acre-feet) before any water is allocated for new construction
- MPWMD and Cal-Am have cooperated to develop innovative water conservation measures to keep water use within established state limits

Riparian Restoration on California's Coast

November 3, 2005

MPWMD's Environmental Protection Program

- Annual steelhead rescues from approximately eight miles of the drying river
- Sleepy Hollow steelhead rearing facility
- Spawning gravel injection
- Carmel River restoration
- Carmel River channel maintenance
- Monitoring surface water flow and quality
- Monitoring groundwater storage and quality

Why is Restoration Necessary on the Carmel River?



A Riparian-Wetland Area is Candidate for Restoration

- when it can't
 - dissipate stream energy during high flows
 - filter sediment and capture bedload
 - improve flood-water retention
 - develop root masses that stabilize streambanks
 - develop diverse ponding and channel characteristics
 - support greater biodiversity

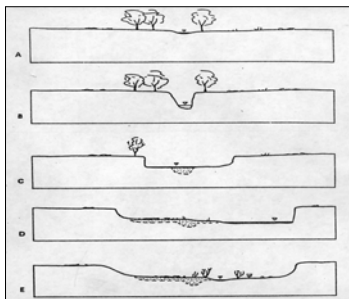
Impacts to Bank Stability



San Clemente Reservoir
2001

Evolution of an Incised Channel

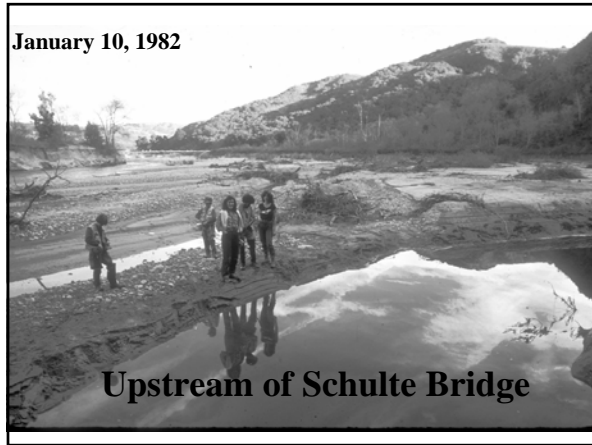
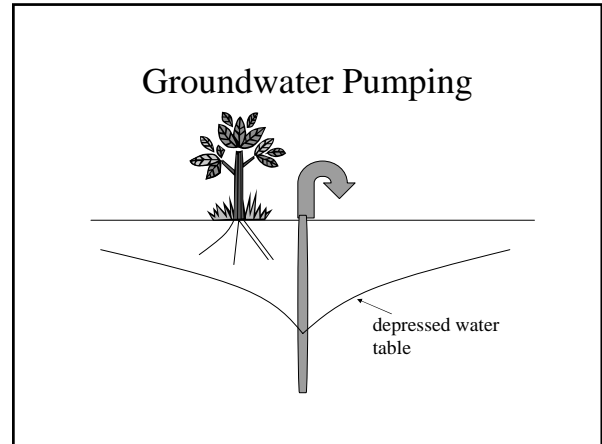
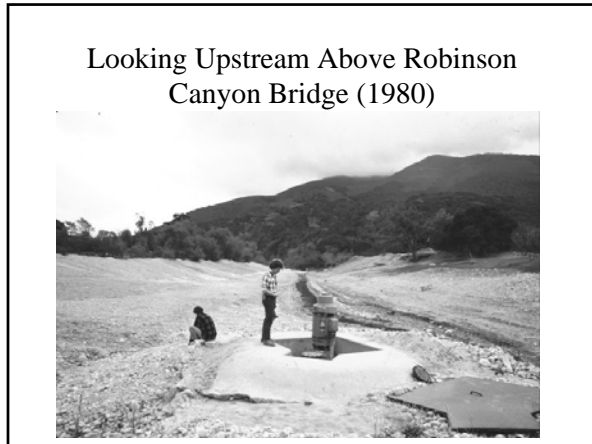
(Schumm, et al., 1984)



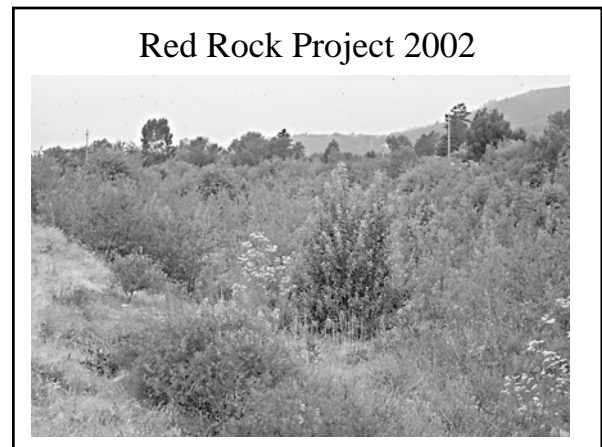
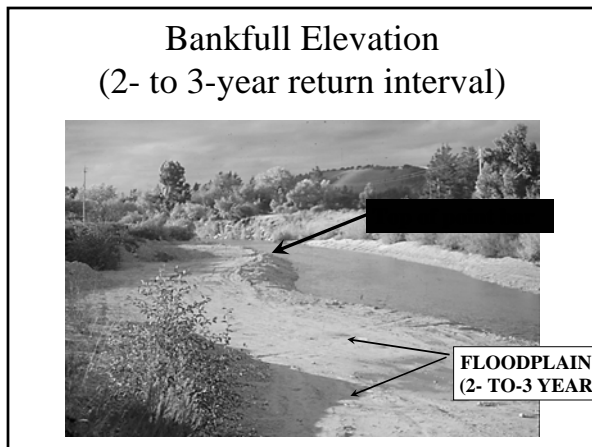
Impacts to Riparian Species

- Dam Building
- Diversions
- Channel Incision
- Groundwater Removal
- Vegetation Clearing
- Livestock Grazing
- Urban Encroachment

Riparian Restoration on California's Coast
November 3, 2005

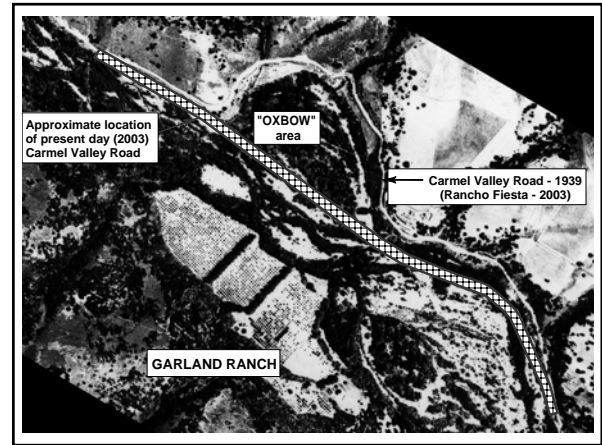
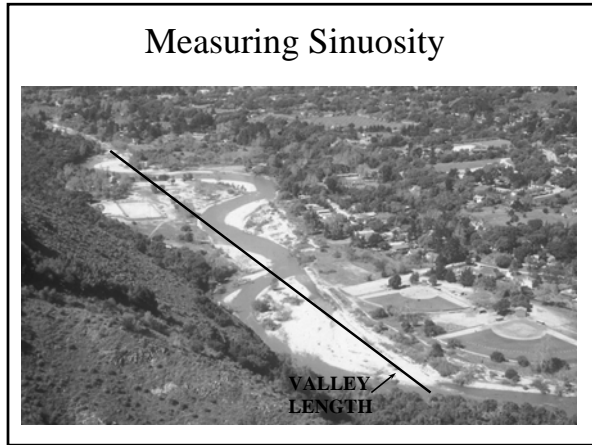
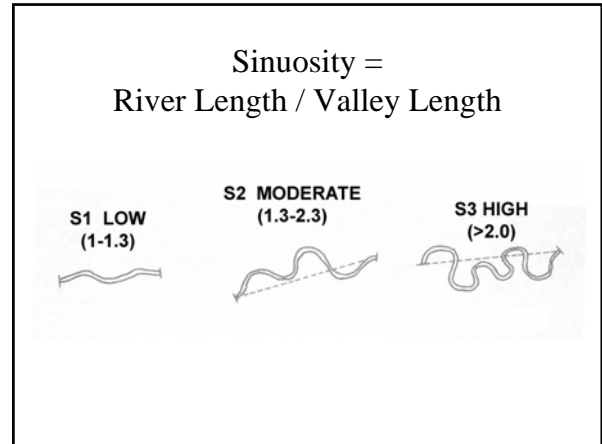
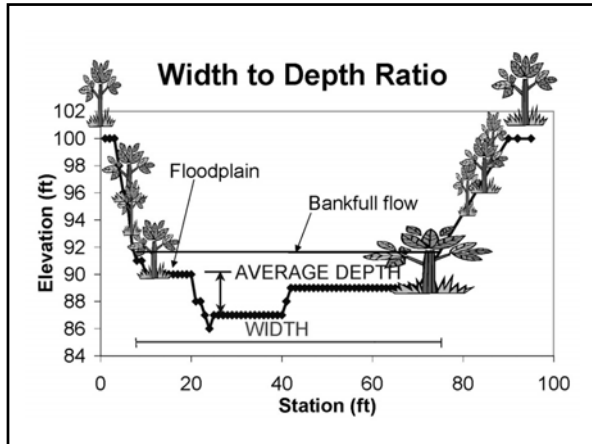


- Design Concepts for River Restoration Projects
- Historical aerial photos showing channel alignment
 - Fluvial Geomorphology and the role it plays in channel design
 - Functioning floodplains (bankfull discharge)
 - Sediment transport (width to depth ratio)
 - Sinuosity
 - Flood frequency and return intervals
 - Habitat components (revegetation and large wood)

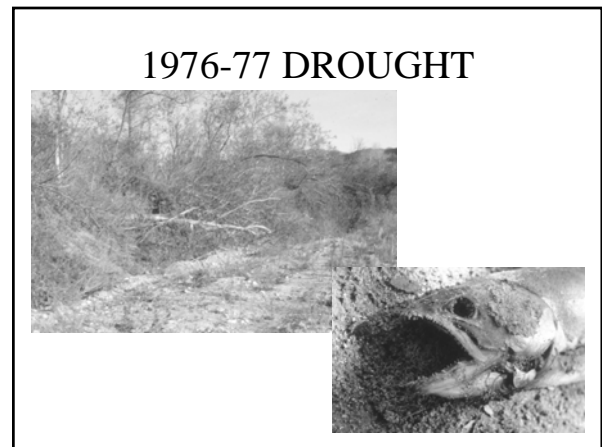


Riparian Restoration on California's Coast

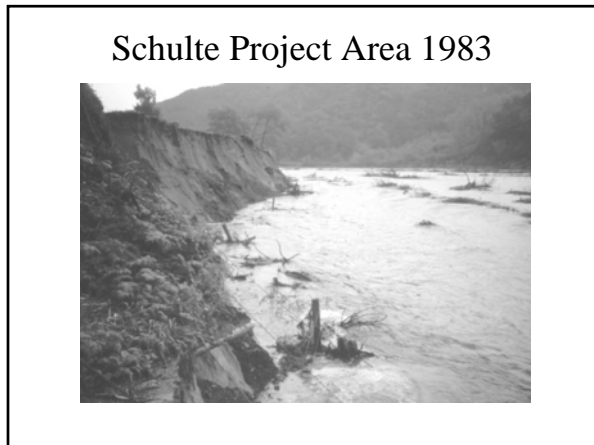
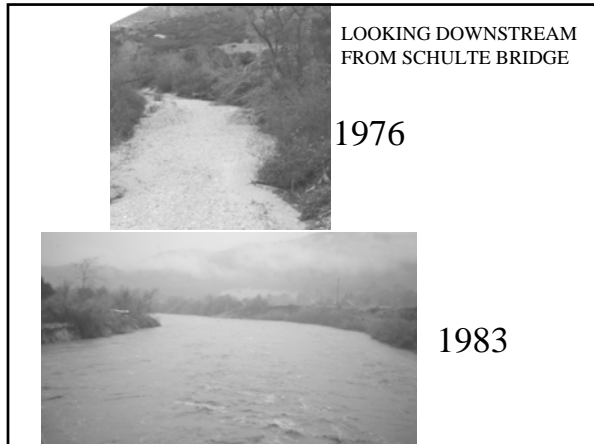
November 3, 2005



- History of Schulte Restoration Project**
- 1959 Large-scale municipal pumping of groundwater
 - 1976/77 Severe drought leads to die-off of streamside vegetation
 - 1978-1986 Moderate river flows erode approximately 100 acres of land in eight year period
 - 1983 Carmel River Management Plan adopted
 - 1987 Schulte demonstration restoration project
 - Schulte project functions during high river flows in January 1995 (9,800 cfs), March 1995 (16,000 cfs), and February 1998 (12,000 cfs)

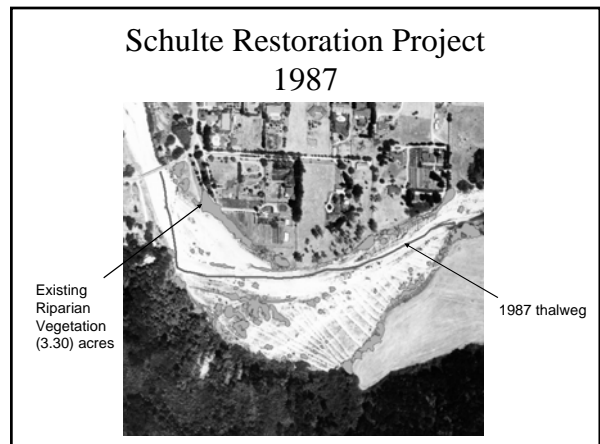


Riparian Restoration on California's Coast
November 3, 2005

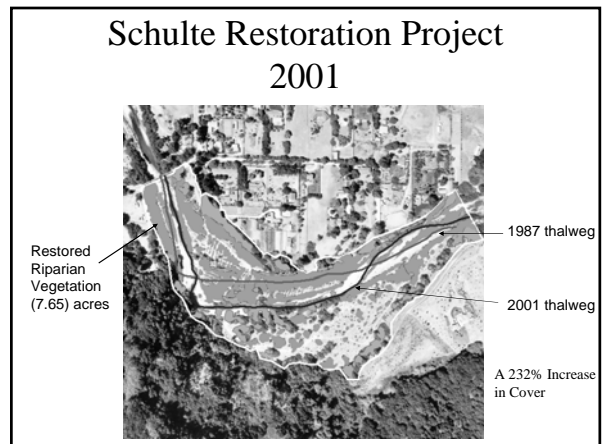
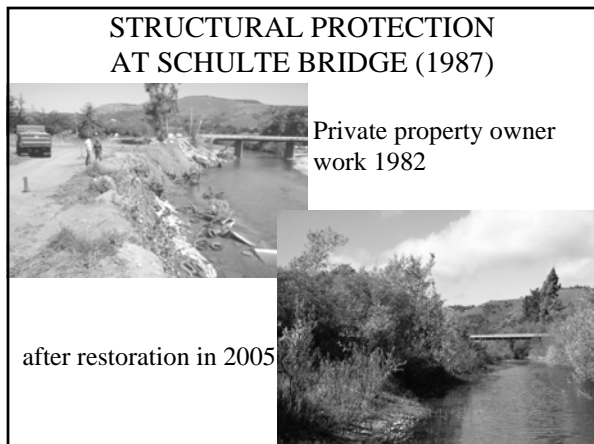
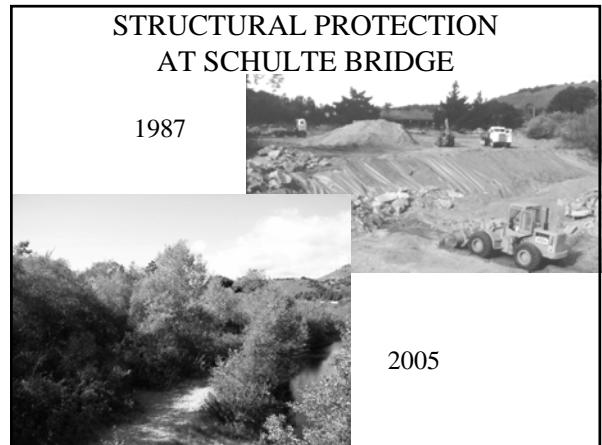
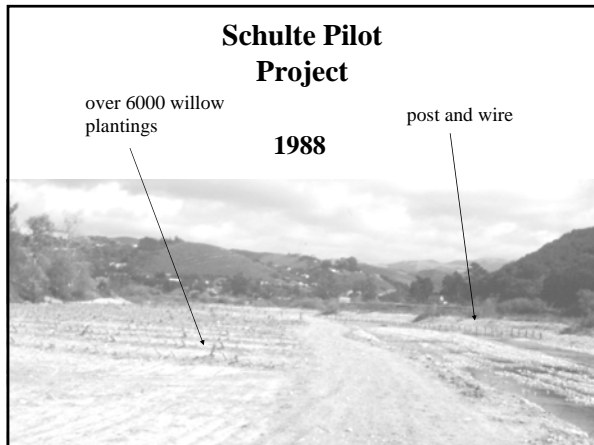
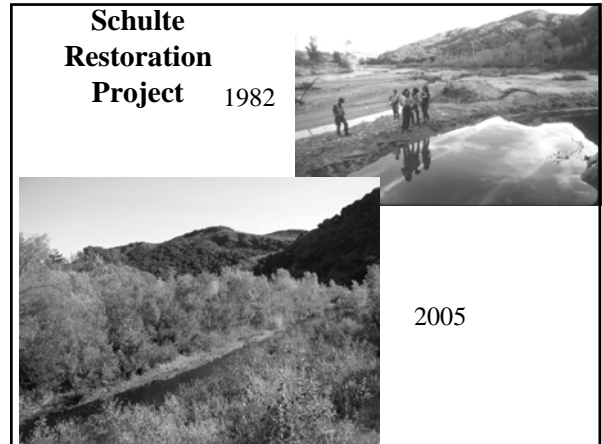
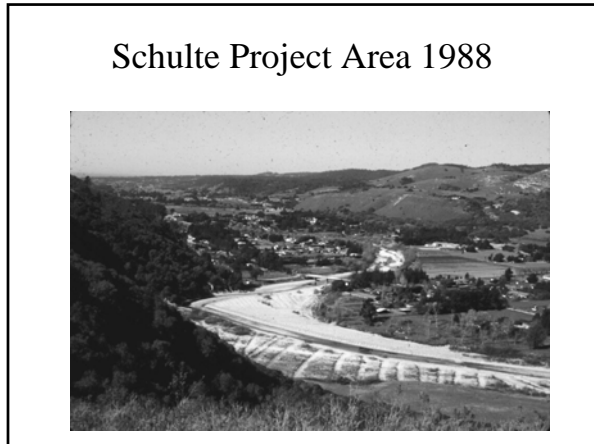


- Schulte Restoration Project Benchmarks
- Project location River Mile 6.7 to 7.5
 - Approximate length 4000 lineal feet
 - Post and wire construction
 - Concrete rubble covered by native material by Schulte Bridge
 - Excavation of fish pools and low flow channel
 - Extensive revegetation and irrigation
 - Total cost in today's dollars would be approximately from \$400,000 to \$600,000

- Permits Required for River Work
- Grading permit Monterey County Planning and Building Inspection Department
 - Authorization from Monterey County Water Resources Agency
 - Regional Water Quality Control Board
 - California Department of Fish and Game stream alteration agreement
 - U.S. Army Corps of Engineers
 - NOAA Fisheries
 - U.S. Fish and Wildlife Service (USFWS)



Riparian Restoration on California's Coast
November 3, 2005



Riparian Restoration on California's Coast
November 3, 2005

Schulte Project Area 1988



Schulte Project Area 2001

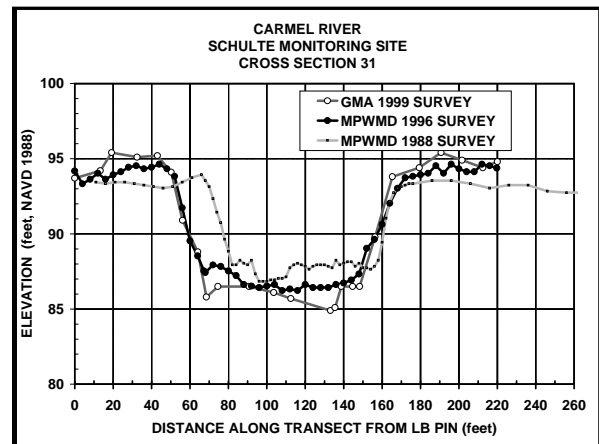
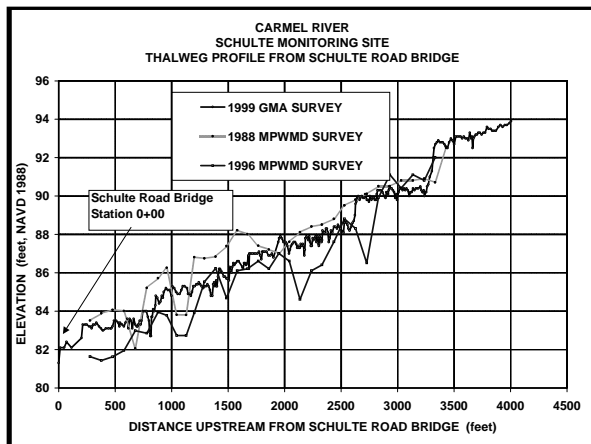


MARCH 1995 @ 16,000 CFS

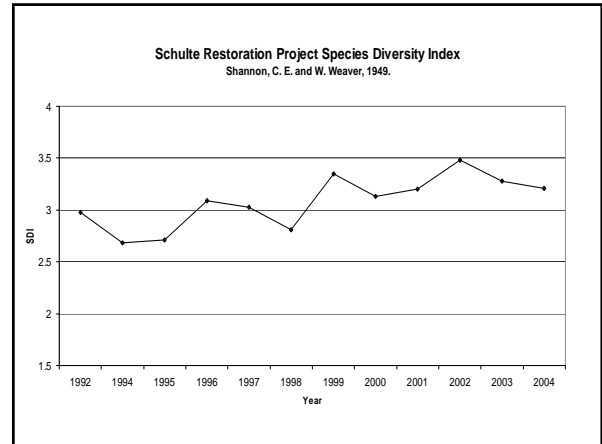
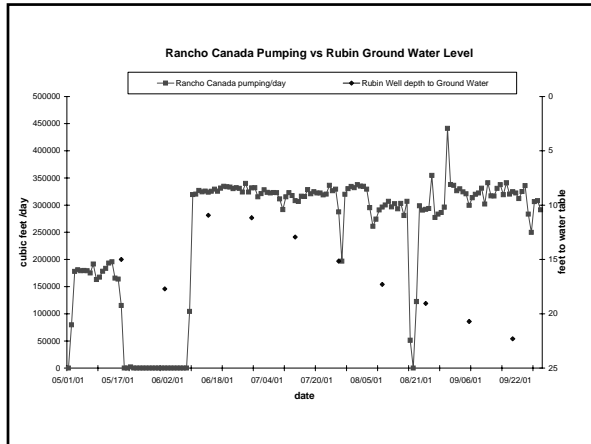


Long-term Monitoring

- Profile and cross-section work documenting changes in topography
- Stream flow and depth to groundwater monitoring
- Vegetation moisture stress monitoring
- Avian species diversity index monitoring
- Vegetation transects monitoring understory recruitment and project diversity



Riparian Restoration on California's Coast November 3, 2005



Conclusions

- Long-term monitoring is key to successful maintenance and verification of channel design and habitat quality.
- Using GIS allowed quantification of restored riparian habitat cover (232 percent increase).
- An increasing SDI trend shows that this project functions as important nesting and feeding grounds for many important avian species.
- A sound commitment to restoration can help shape public attitude toward river work on private property.