

What's Mud Got to do with it?

Environmental Impacts of Reservoir Sediment Removal Scenarios

Case Study: Matilija Reservoir, Ventura County, California

Presented to ASDSO 2001 Annual Conference

by

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Tetra Tech Inc. ISG



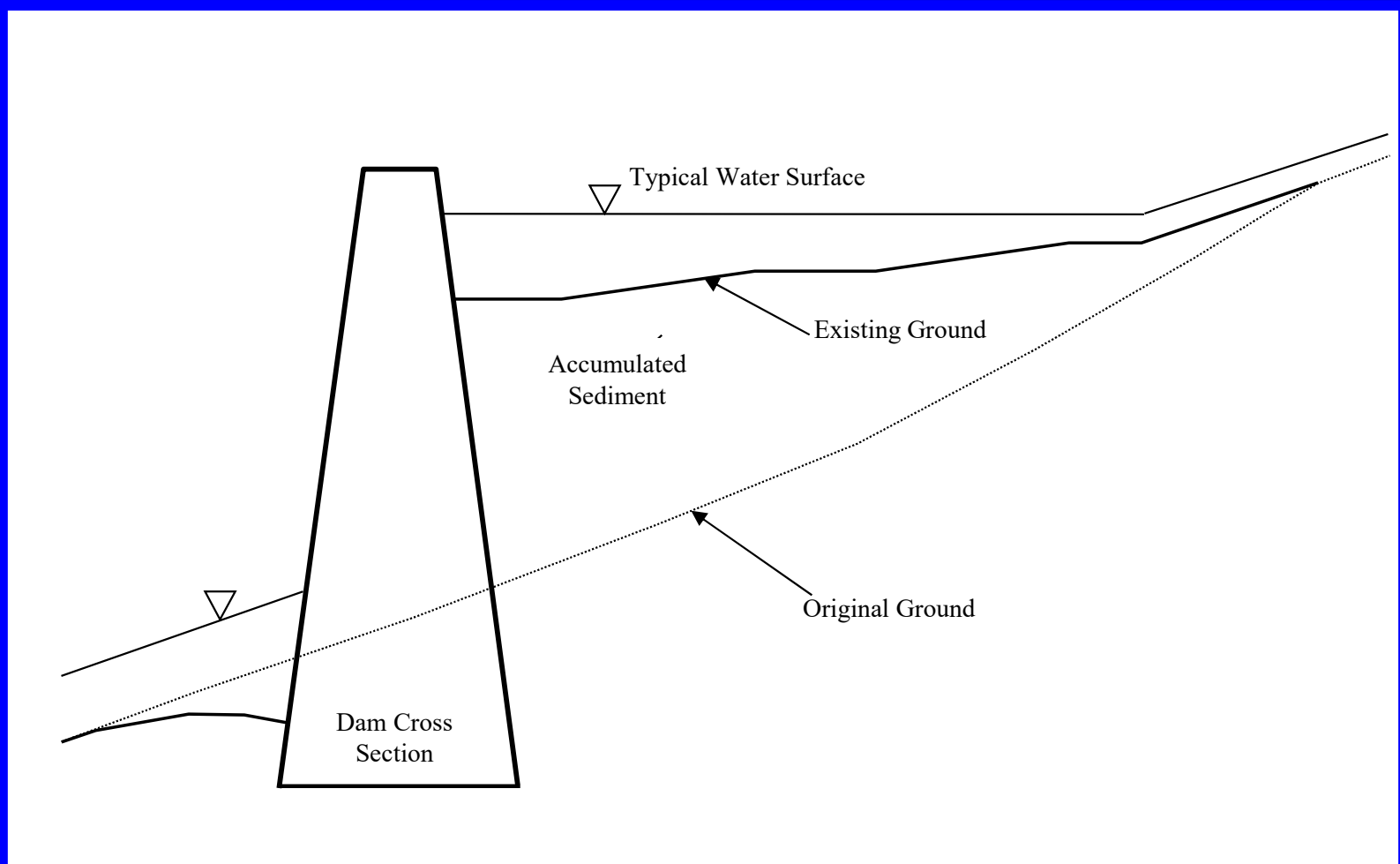
About the Author



‘nuff said...

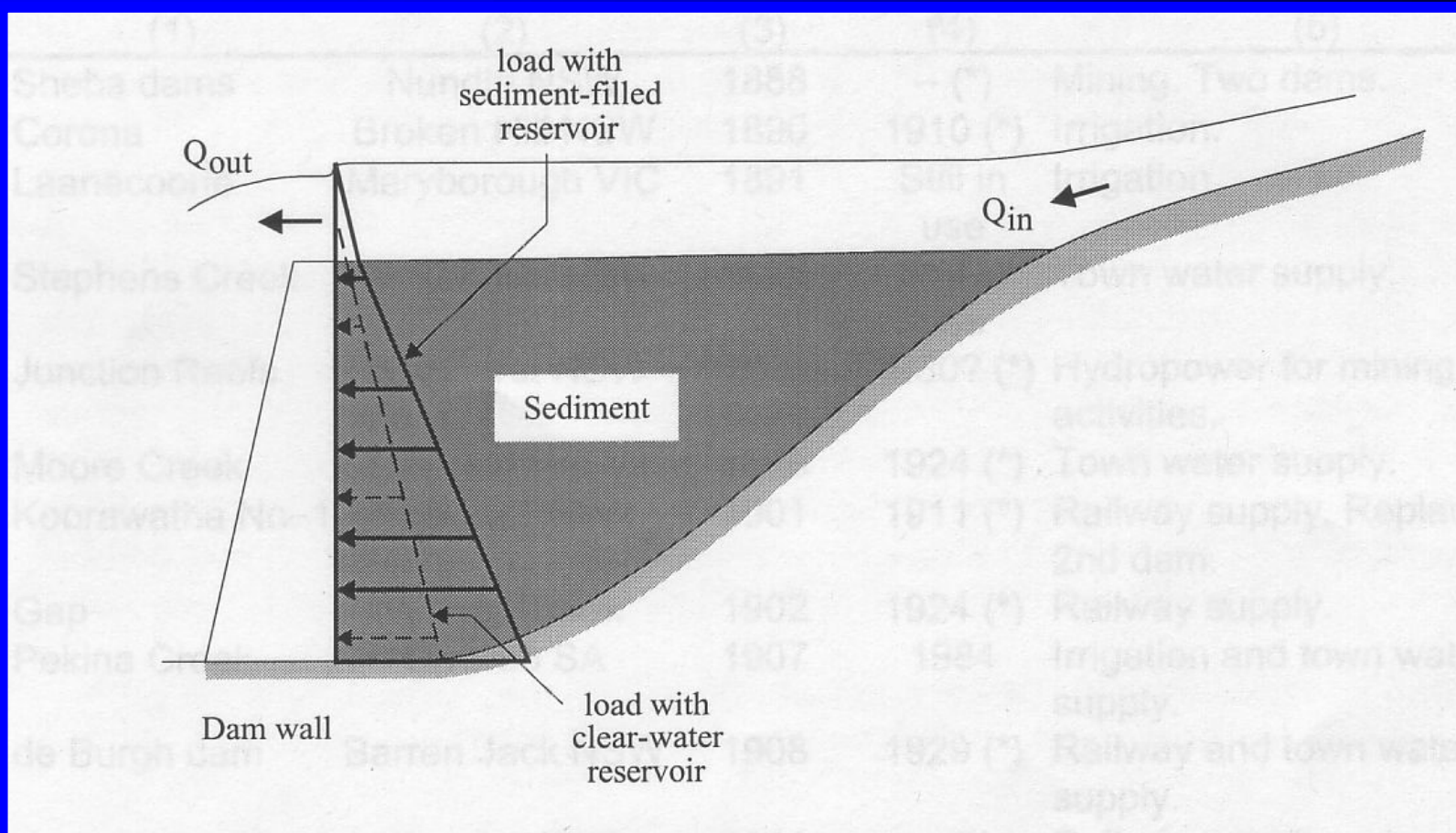
Reservoir Siltation

- Trap Efficiency: Annual Sediment Accumulation / Reservoir Volume
- Reservoir Life: Lifespan (yrs) = Reservoir Volume / Annual Sediment Accumulation



Reservoir Siltation

- Dam Wall Pressure Diagram: Additional Load from Saturated Sediment



De Burgh Dam Wall Pressure Diagram from H. Chanson's "Siltation of Australian Reservoirs"



Reservoir Siltation

- Without sediment management, virtually all dams will silt in over time
- Lose capacity = lose functionality
- What to do with non-functioning dams: stabilize or remove?

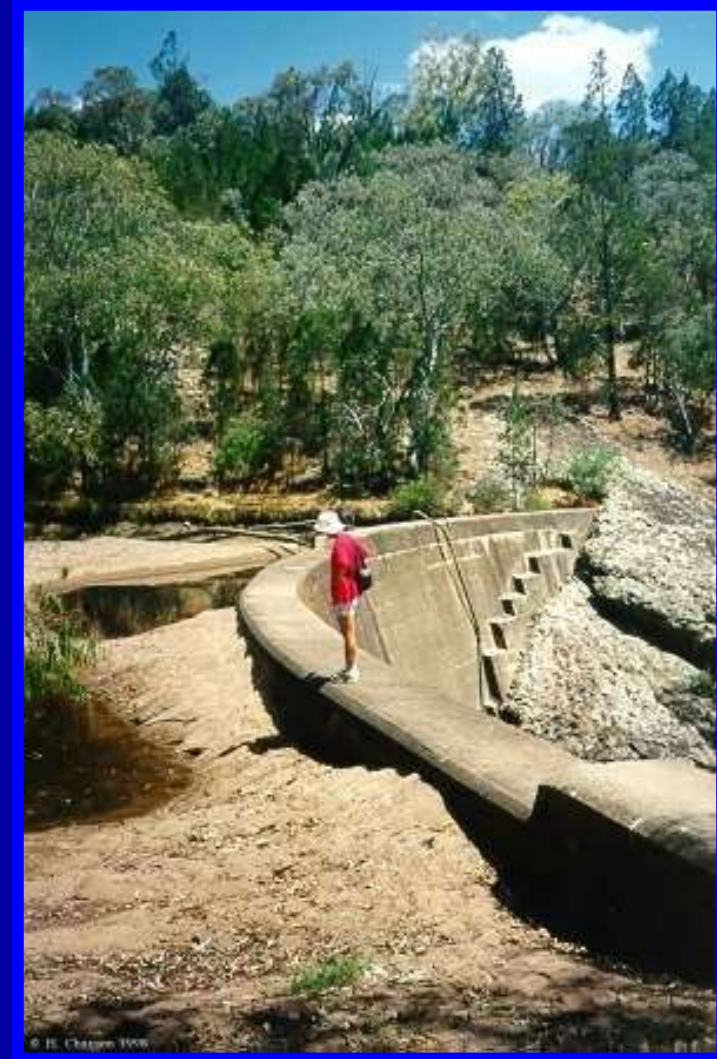


De Burgh and Cunningham Dam photos courtesy of University of Queensland at Brisbane



Sediment Removal

- Transport
 - Natural
 - Mechanical
 - Slurry Pipe
 - Conveyor
 - Truck
- Leave in Place
 - Stabilization
- Combination



Koorawatha Dam photos courtesy of University of Queensland at Brisbane



Sediment Removal

- Natural Transport



Sediment Removal

- Mechanical Removal



Photos courtesy of City of Big Rapids (17,000 CY removed)



Sediment Removal

- Stabilize in Place



Sediment Removal

- Combination



Photo courtesy of City of Big Rapids (17,000 removed mechanically, ~80,000 removed naturally)

Environmental Impacts

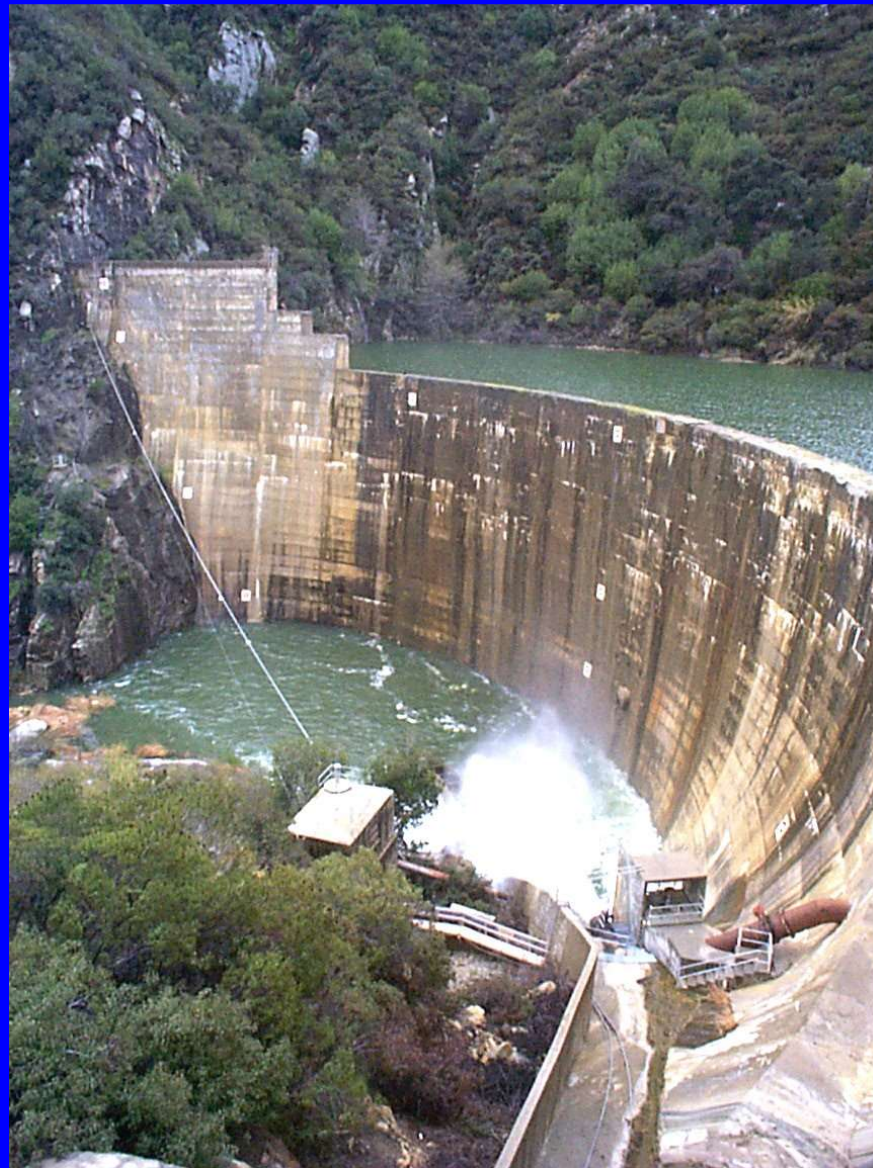


- Contamination
- Fisheries
- Existing Habitat



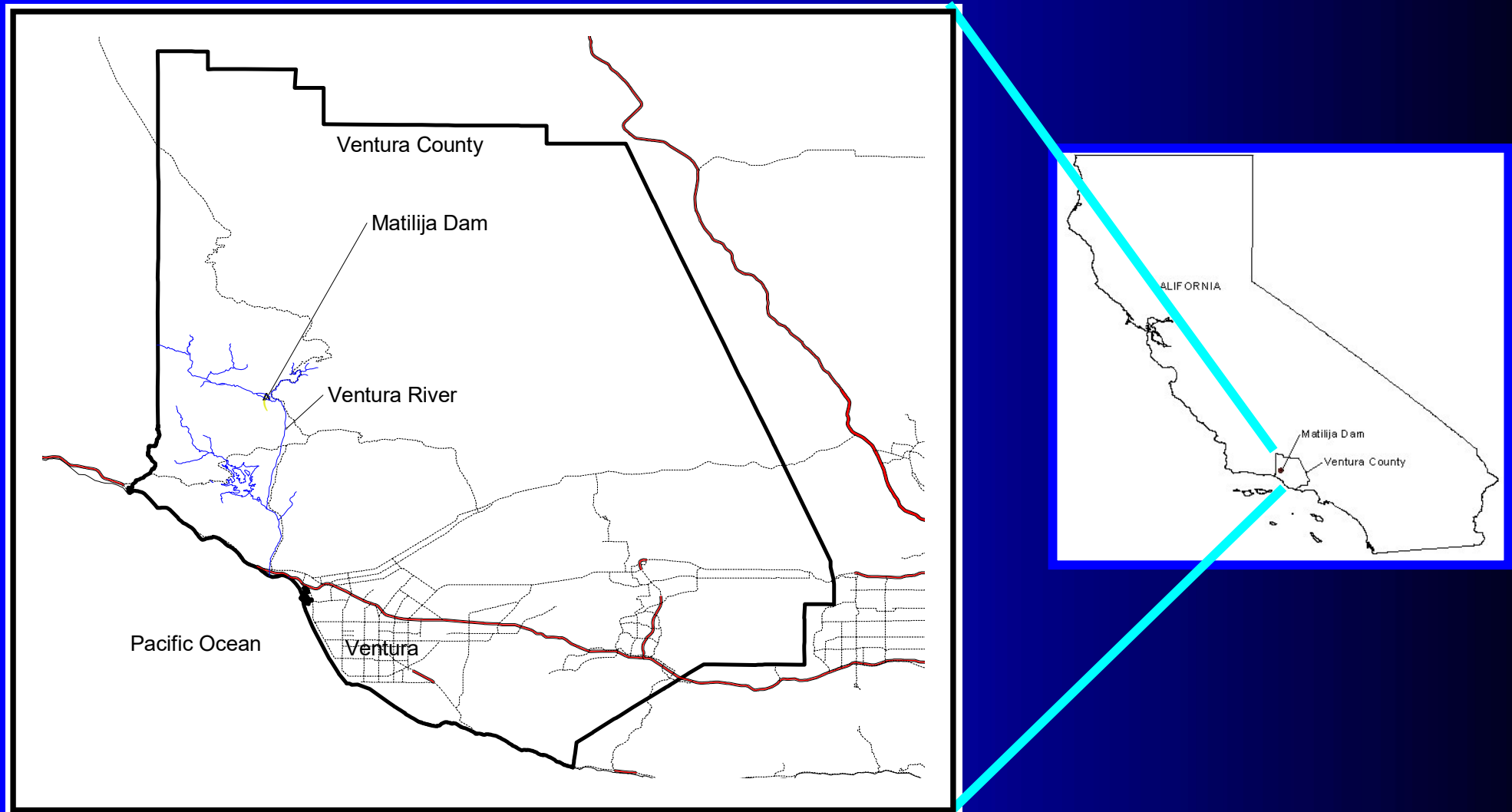
Case Study

Matilija Dam



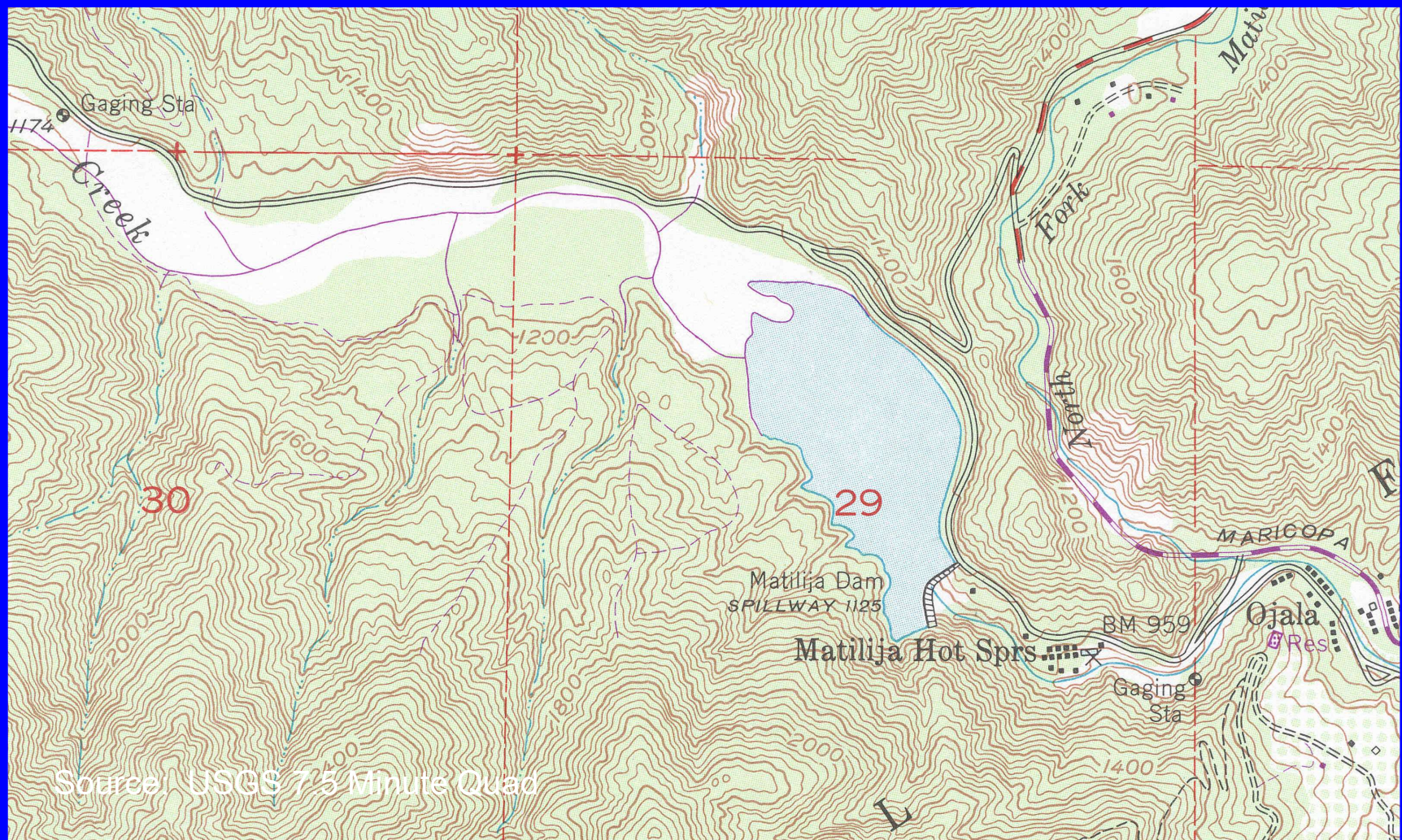
Project Location

- Matilija Creek and North Fork Ventura join to form Ventura River



Project Location

- Matilija Dam and Reservoir ~1 mi. above confluence



Project Background

Dam History

- 190-foot concrete arch dam constructed 1947-1948
- Primary purposes: flood control and water supply
- Original reservoir capacity 7,000 acre-feet
- Dam notched to 160 feet in 1965
- Reduced reservoir capacity 3,800 acre-feet



Project Background

Problems

- Currently filled in with sediment (within 17 ft of crest)
- No storage = no flood peak attenuation
- Blocks fish passage to steelhead spawning habitat



Project Background

Problems

- American Rivers - 3rd most endangered river
- World Commission on Dams Final Report



Press Release mentions Matilija specifically

Agencies Involved

Coalition of agencies recommend removal - move to reconnaissance

Federal

- U.S. Army Corps of Engineers
- U.S. Bureau of Reclamation
- U.S. Fish and Wildlife Service
- U.S. Forest Service
- National Fish and Wildlife Foundation
- National Park Service
- United States Geological Survey

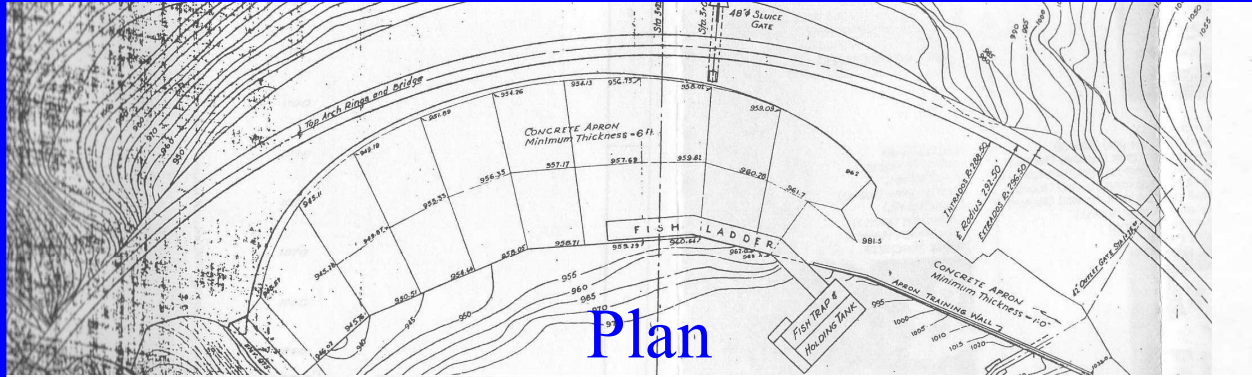
Non-Federal

- Ventura County
- California Department of Fish and Game
- California Coastal Conservancy
- California Regional Water Quality Control Board
- Cities of Ventura, Oxnard, Port Hueneme, and Ojai
- Casitas Municipal Water District
- Matilija Coalition

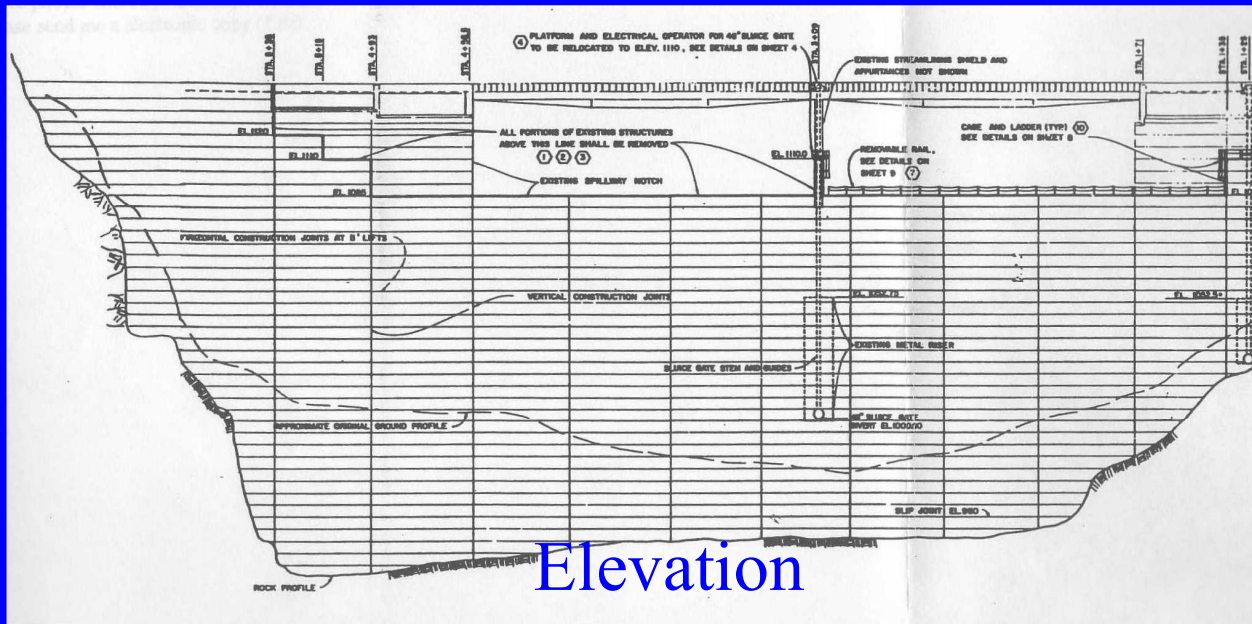


Project Background

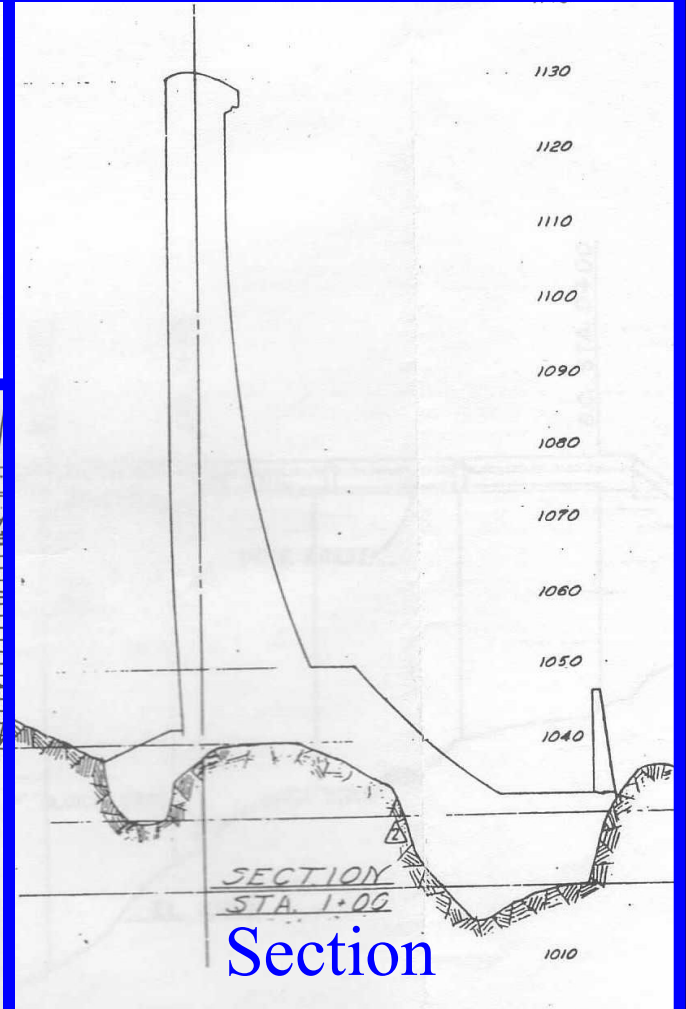
Existing Dam



Plan



Elevation

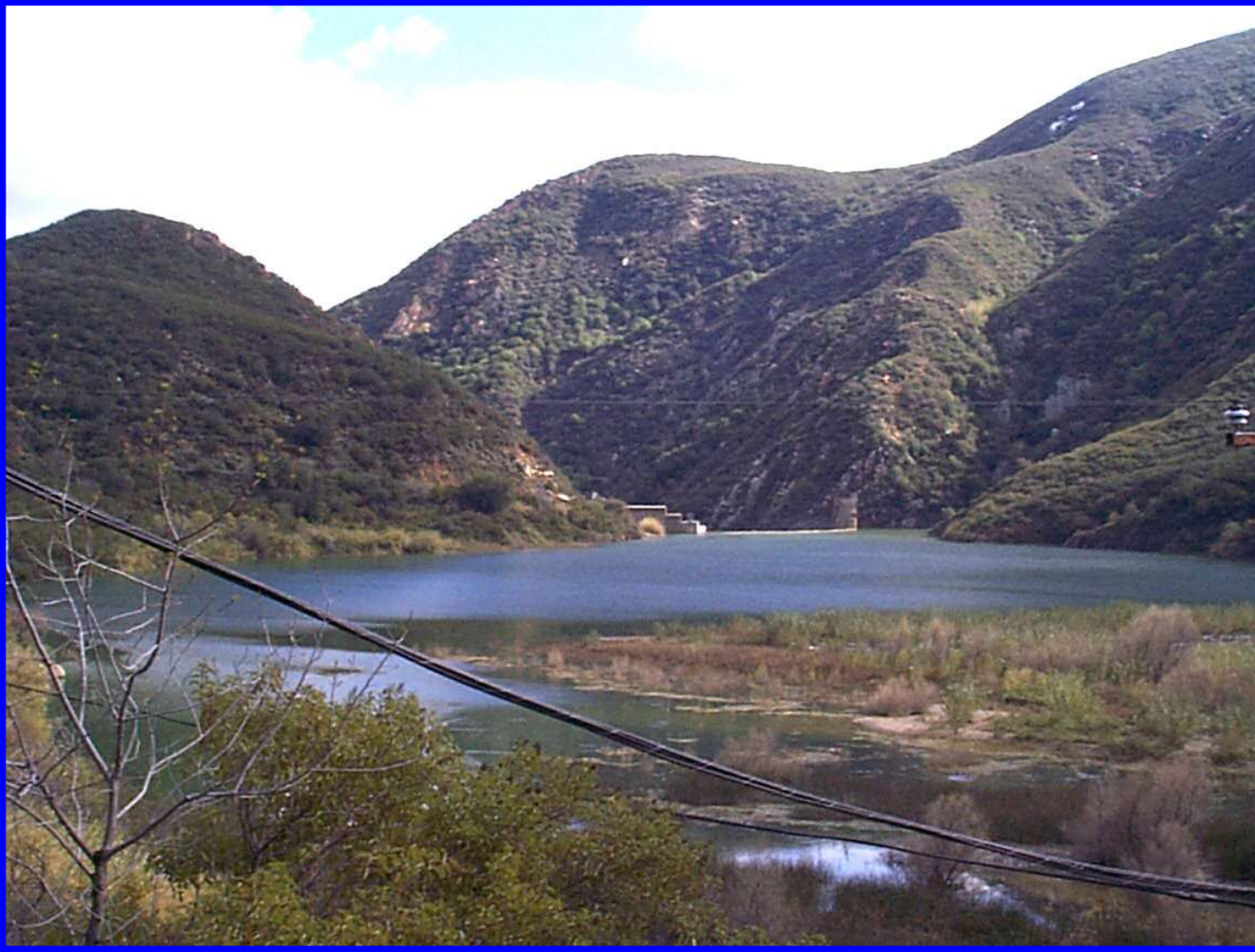


Section



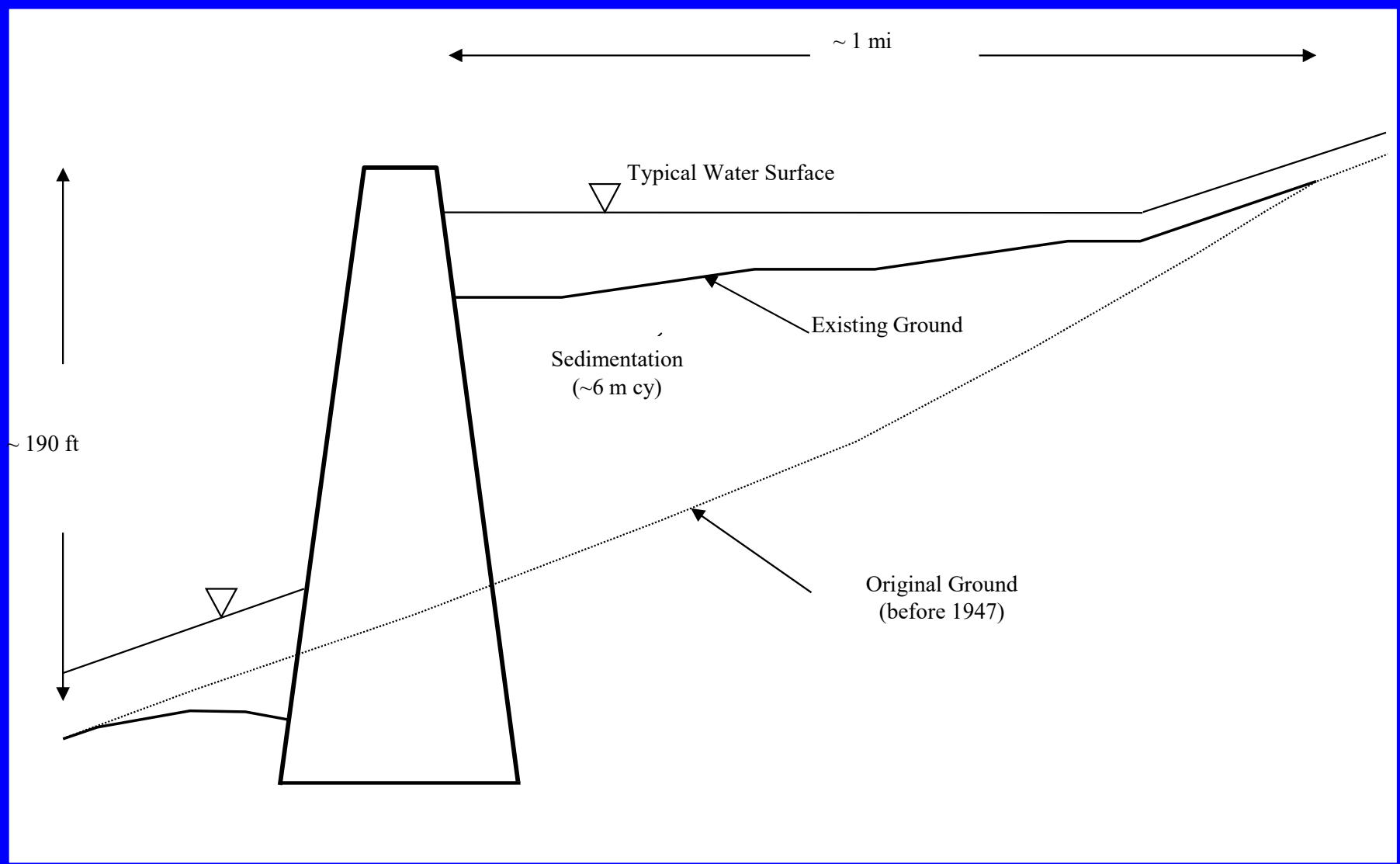
Project Background

Existing Reservoir



Project Background

Schematic Profile



Project Background

Existing Flood Flows

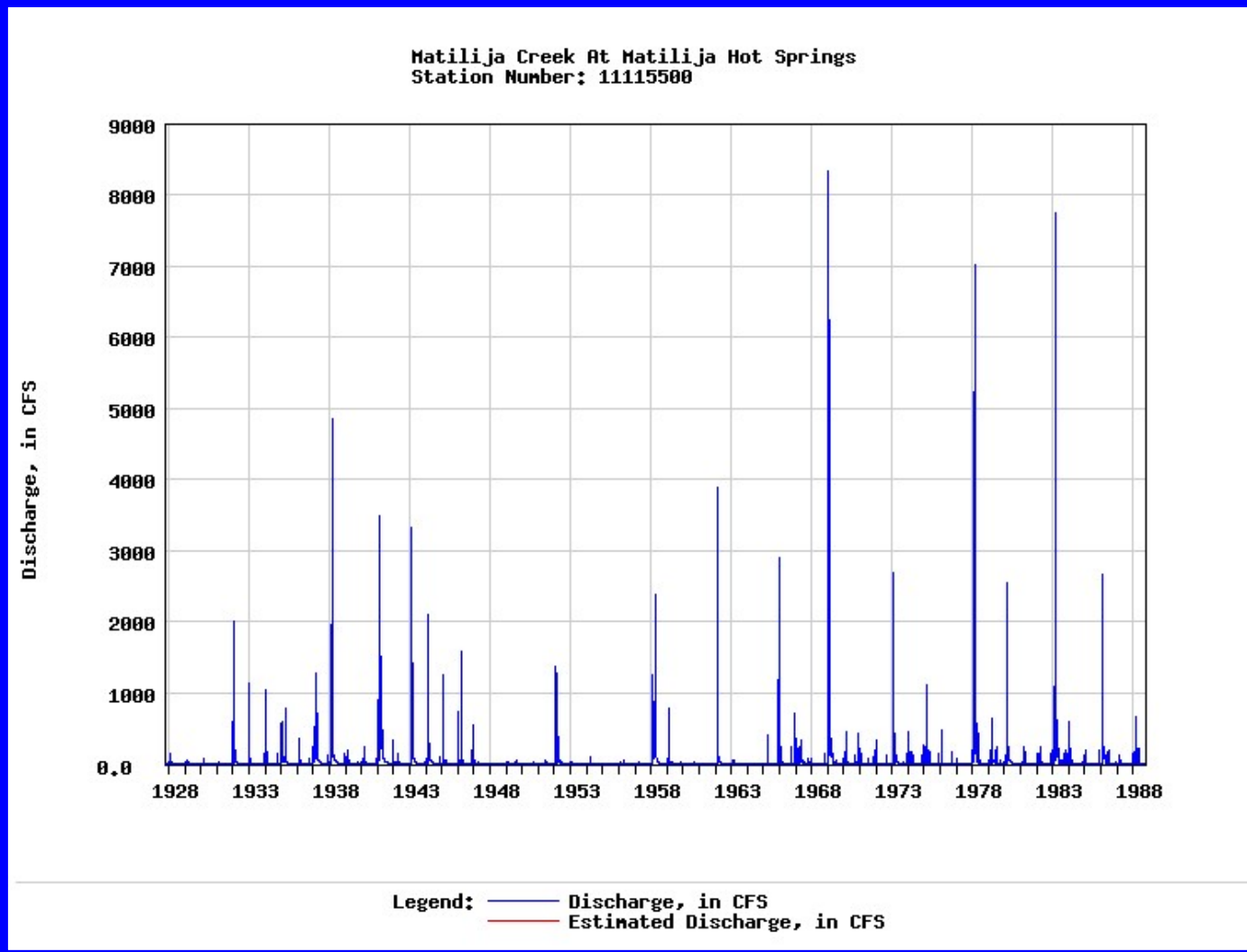


Photo courtesy of Paul Jenkins, Matilija Coalition



Project Background

Existing Flood Flows



Courtesy of USGS



Project Background

Existing Dam and Reservoir Bottom



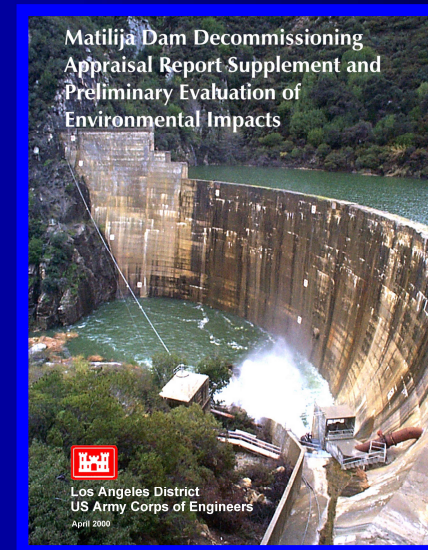
Photo courtesy of Paul Jenkins, Matilija Coalition



Project Background

Reconnaissance/Feasibility Study

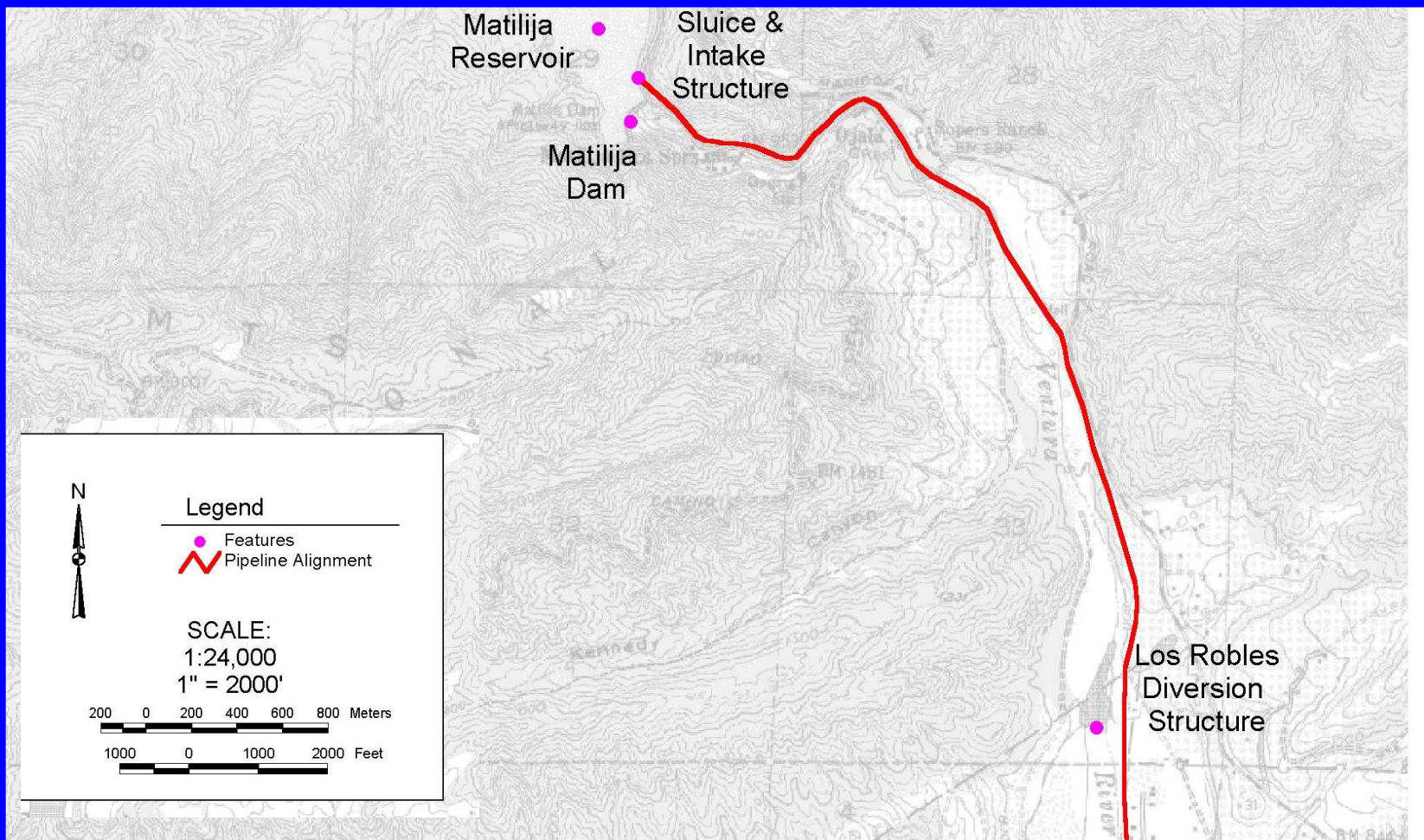
- Appraisal Report completed by U.S. Bureau of Reclamation and U.S. Army Corps of Engineers
- Recommendation: Move to feasibility



Alternatives

Slurry Line

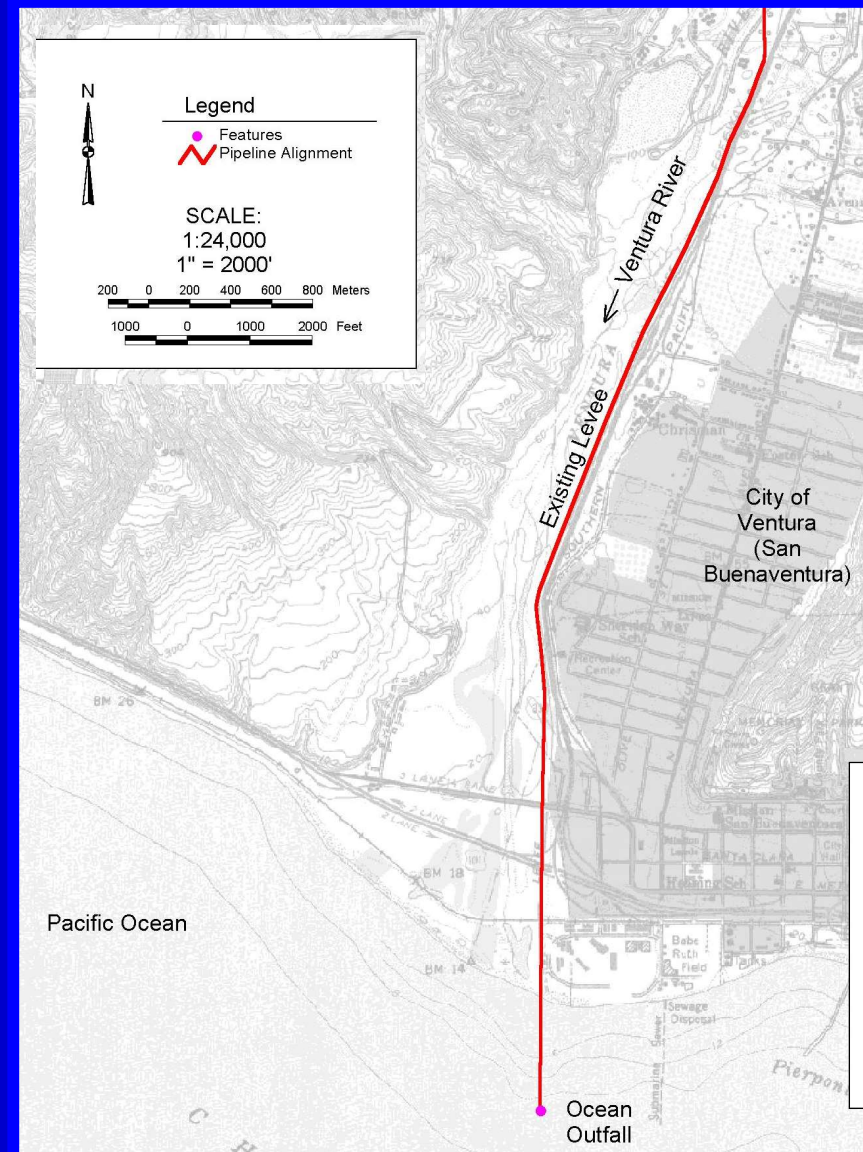
- Potential Inlet Location / Pipeline Alignment



Alternatives

Slurry Line

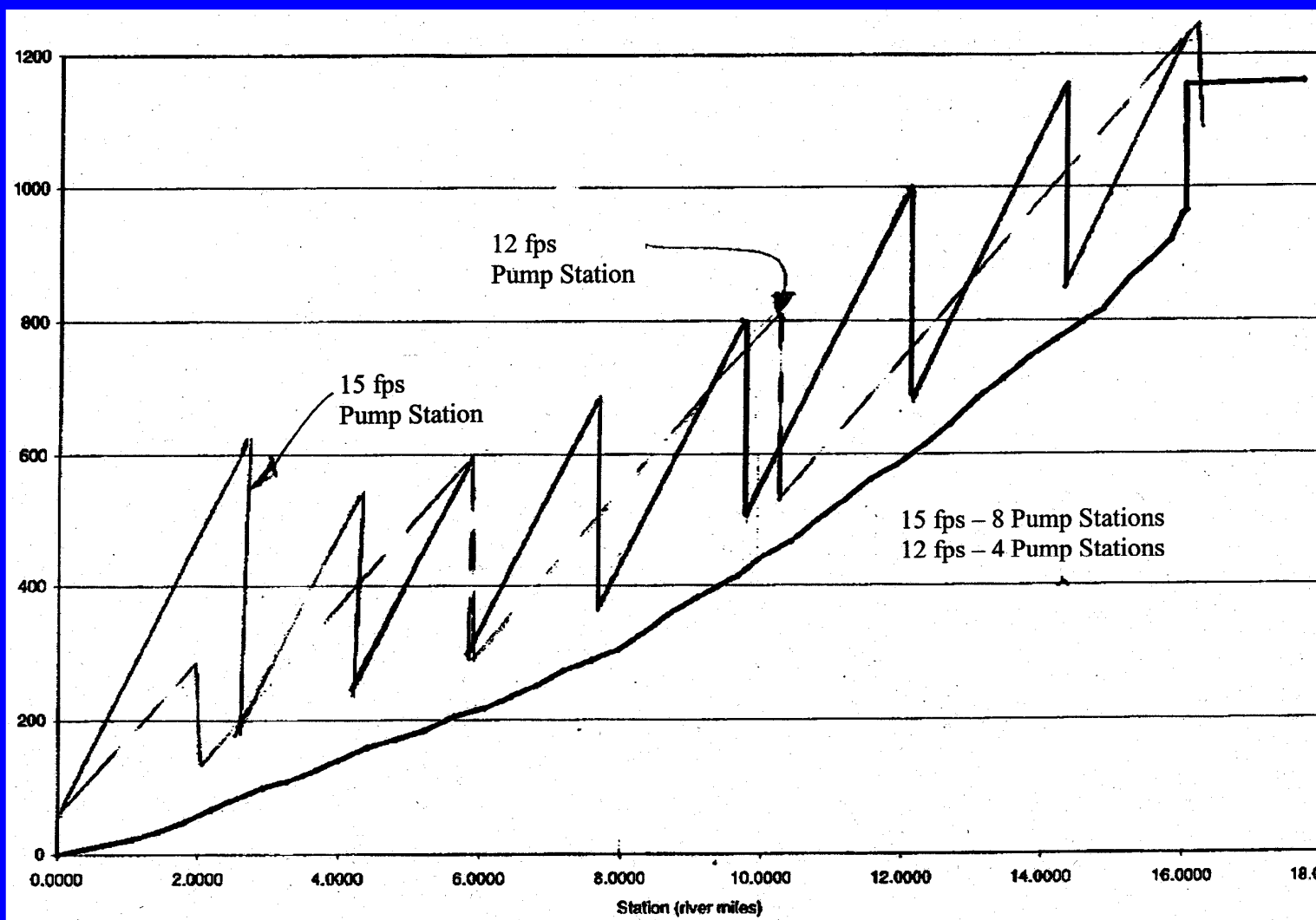
- Potential Outlet Location / Pipeline Alignment



Alternatives

Slurry Line

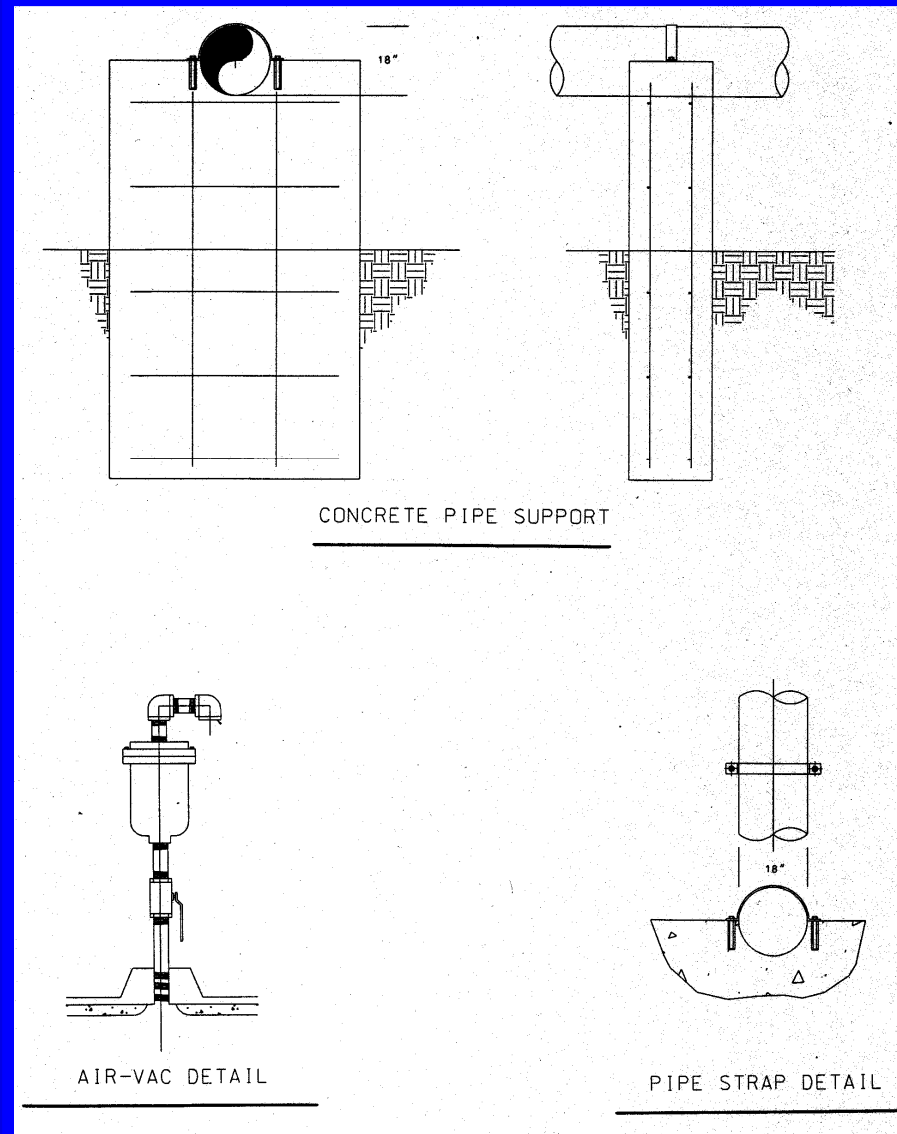
- Pipeline and Energy Grade Profile with Pumping Stations



Alternatives

Slurry Line

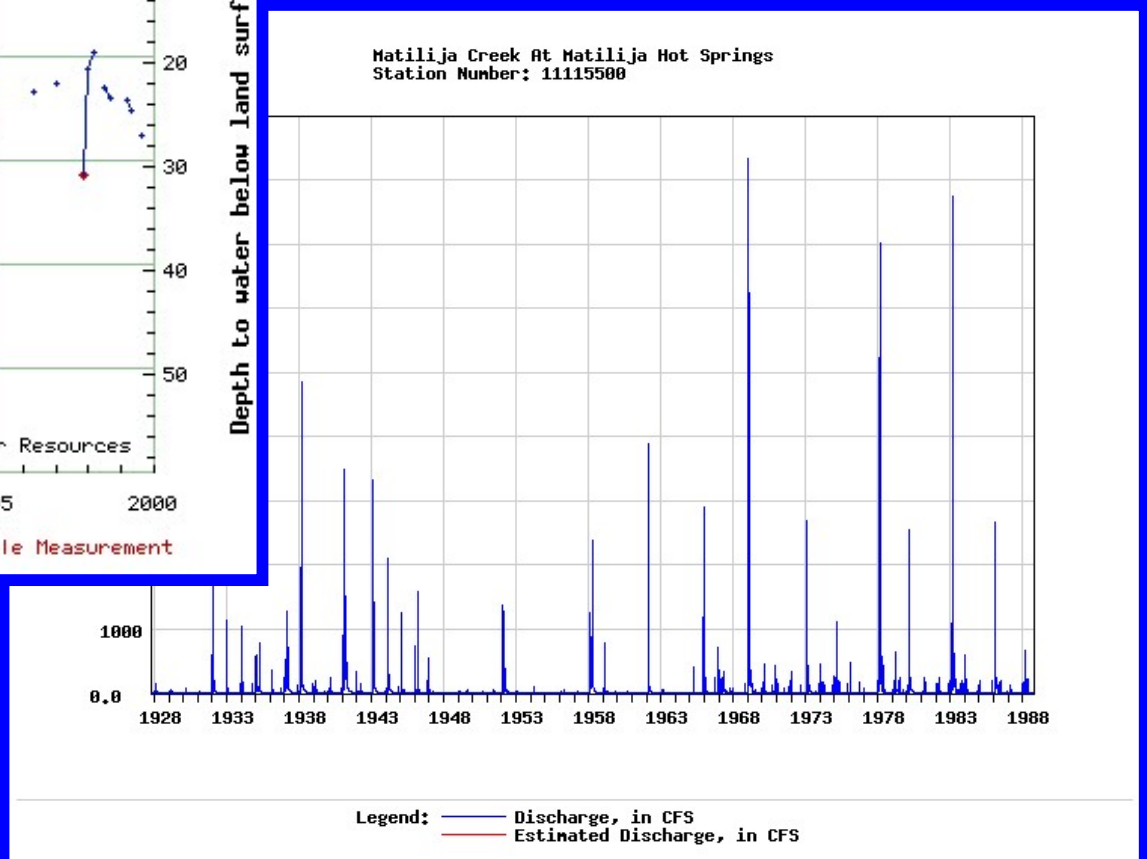
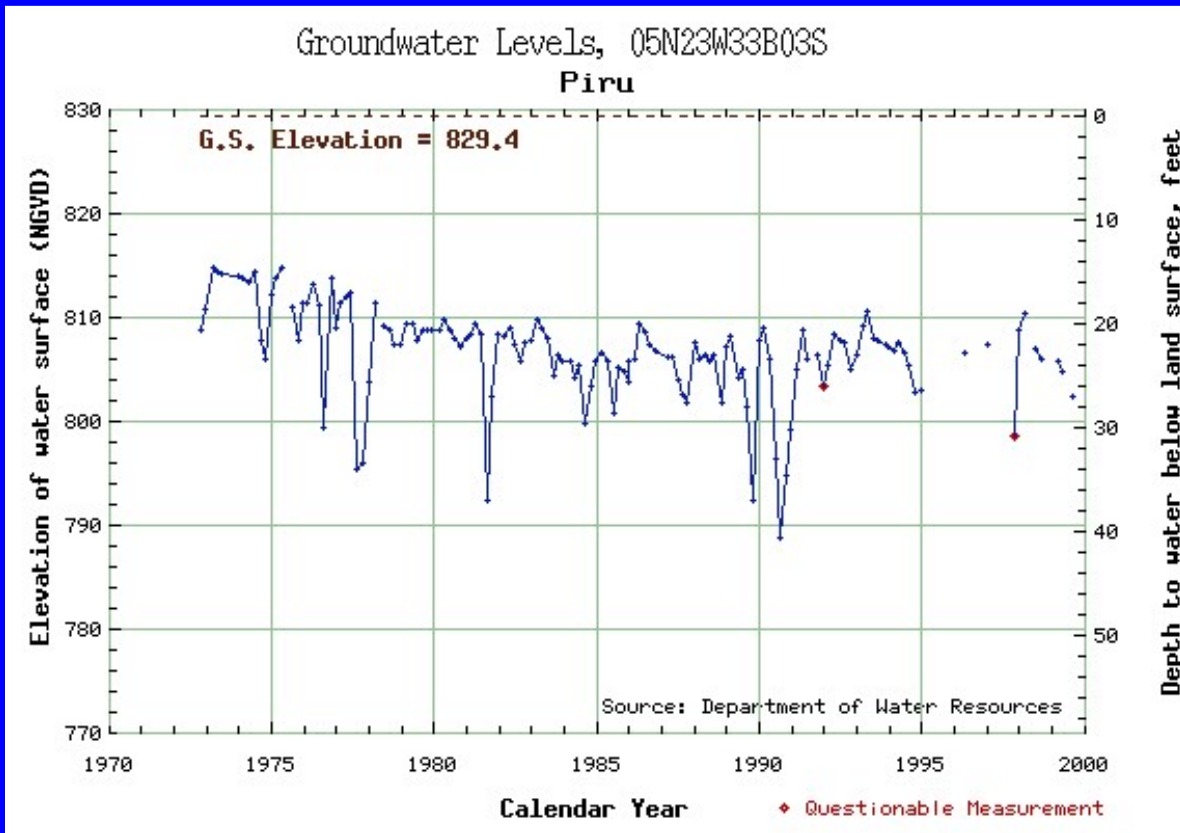
- Pipeline Supports



Alternatives

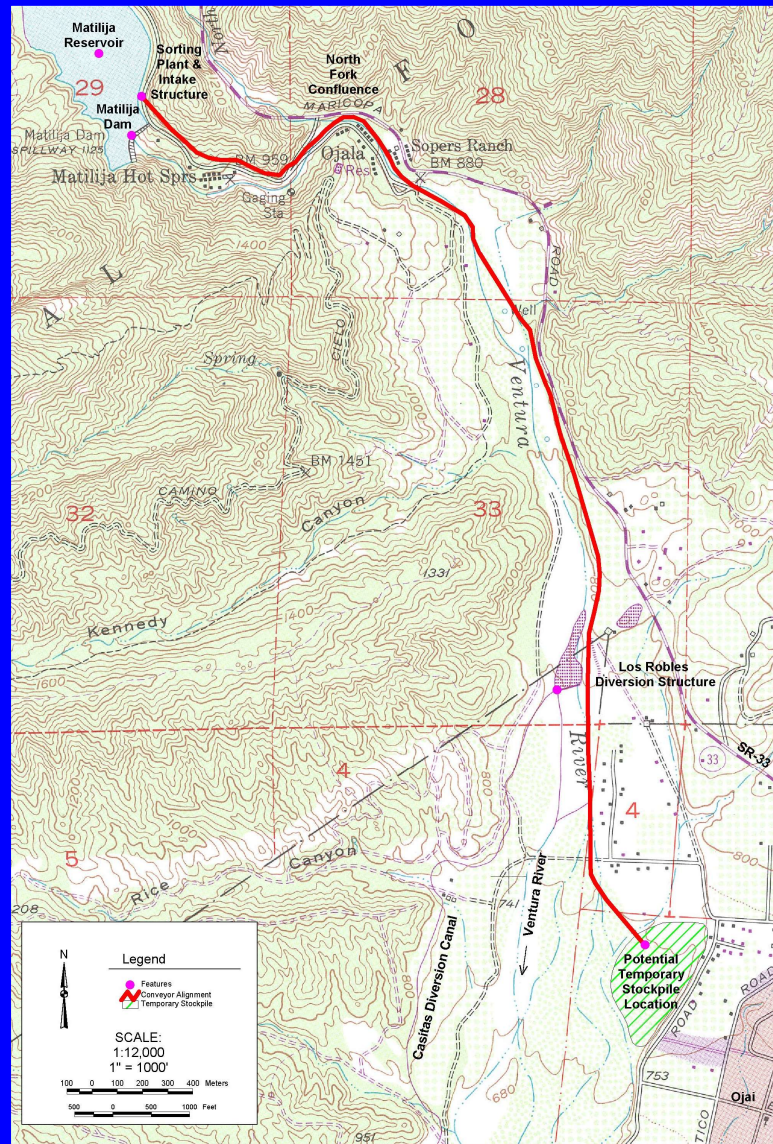
Slurry Line

- Available Water Supply



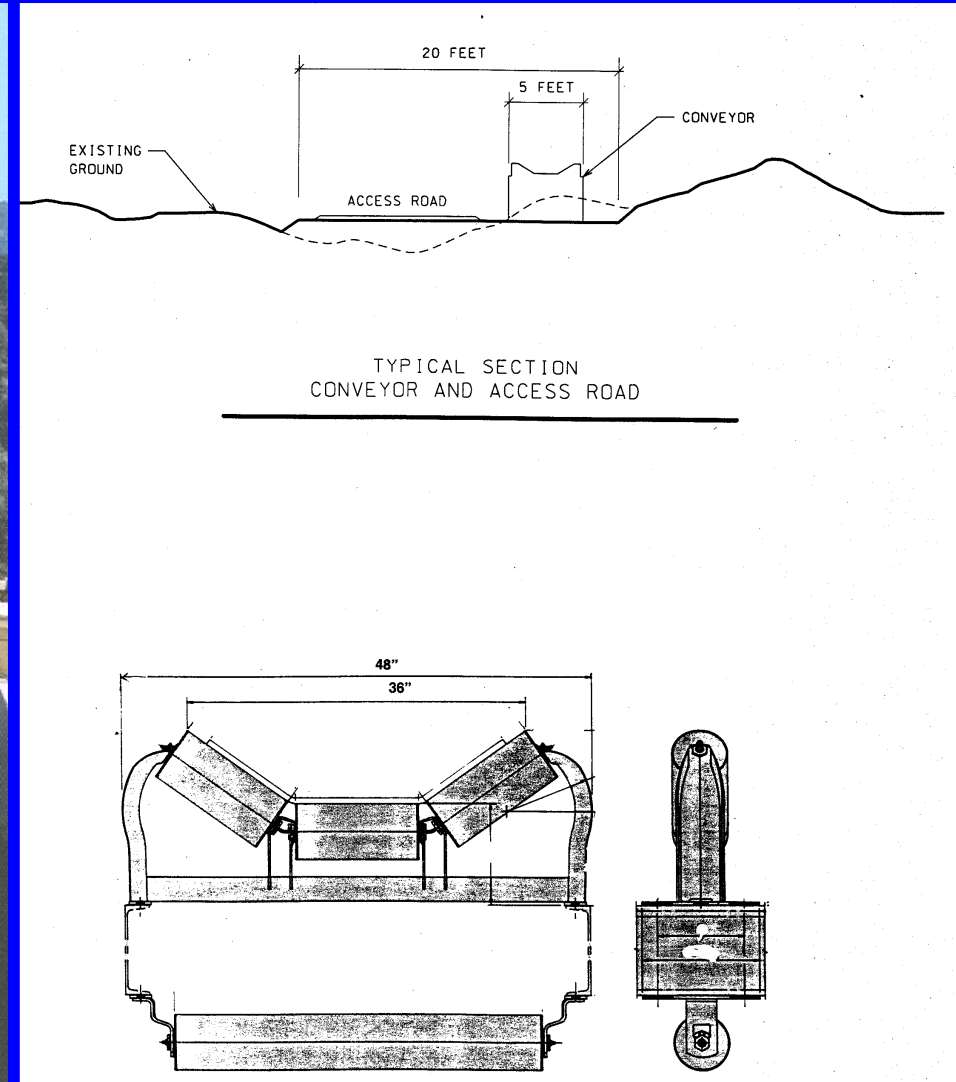
Alternatives Conveyor

- Alignment



Alternatives

Conveyor



Environmental Impacts

Key Issues

- Volume of sediment behind the dam (> 6 million CY)
- Natural transport through river system might destroy limited remaining steelhead habitat
- Environmental effects from hauling sediment away
- Existing wetland habitat at reservoir



Environmental Impacts

Benefits

- Steelhead passage to upstream habitat
- Restore sediment transport processes and supply to beaches
- Eliminate potential safety hazard



Environmental Impacts

Beneficial Use of Sediment

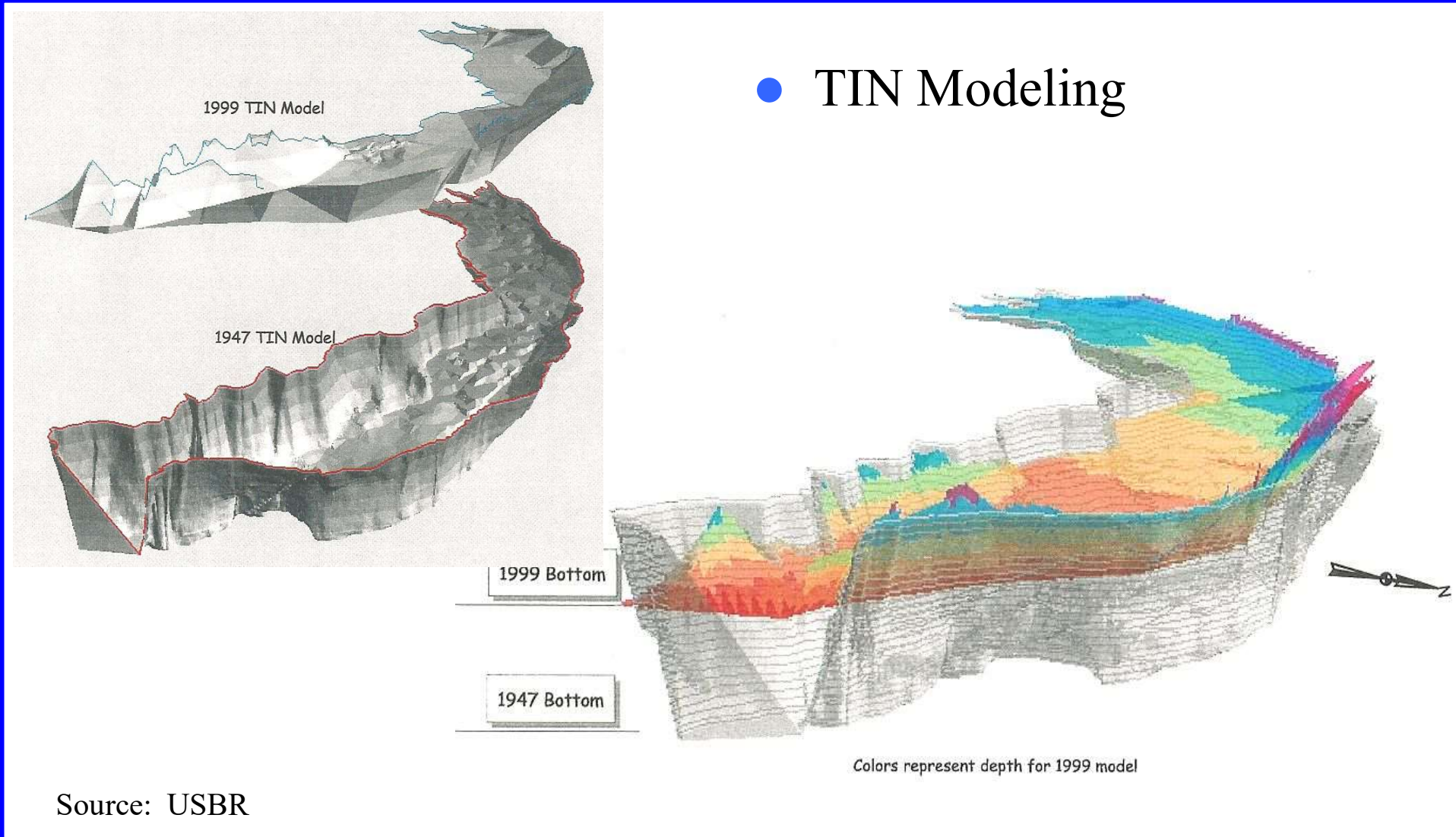
- Resale
- Beach Sand



Environmental Impacts

Sediment Volume

- TIN Modeling



Environmental Impacts

Sediment Composition

- Sampling:
 - Sieve Analyses
 - Pebble Counts
 - Core Samples



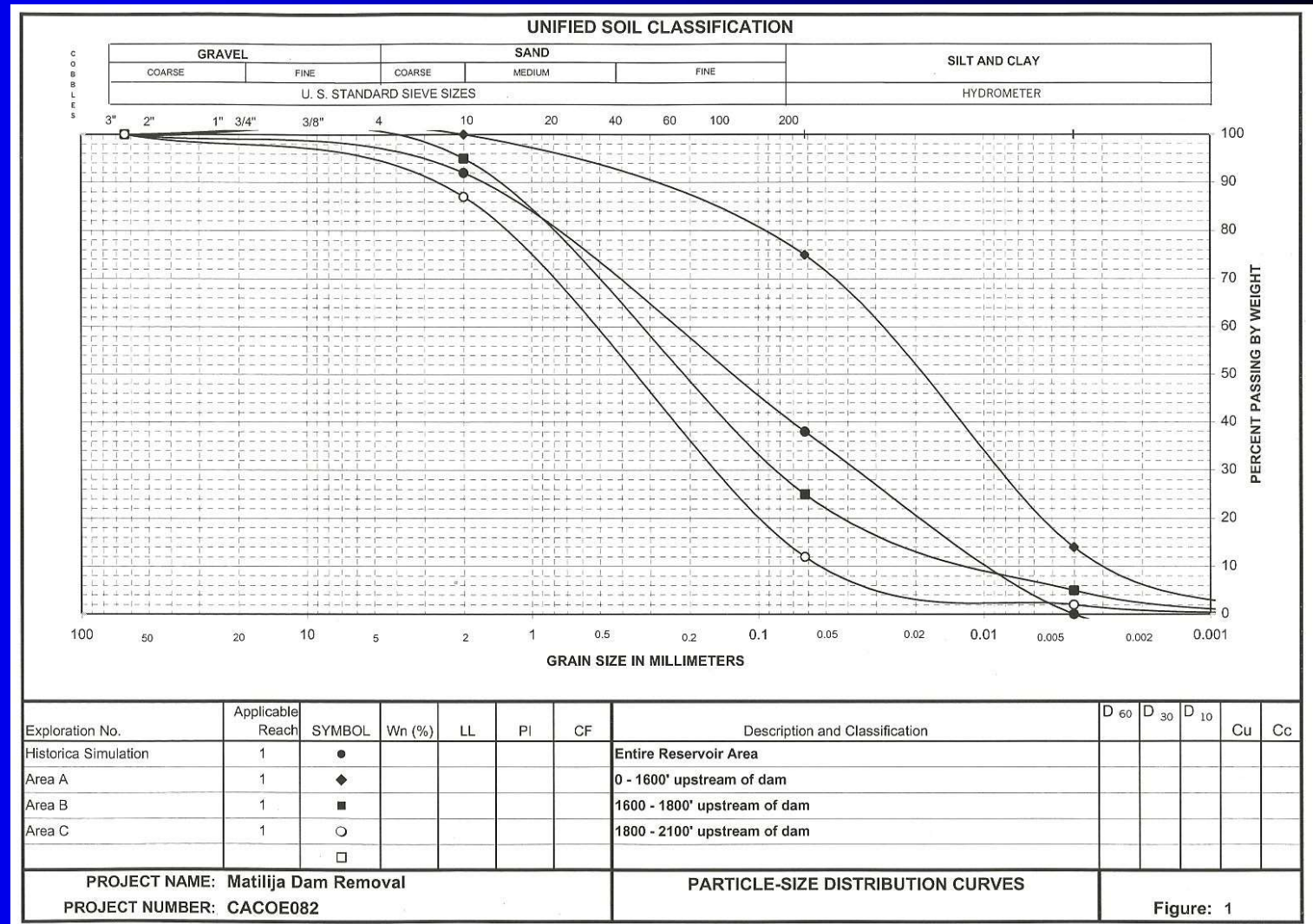
Photos courtesy of Paul Jenkins, Matilija Coalition



Environmental Impacts

Sediment Composition

- Sampling:
 - Silts
 - Sands
 - Gravel
 - Cobbles
 - Boulders



Environmental Impacts

Deposition



Photo courtesy of Paul Jenkins, Matilija Coalition



Environmental Impacts

Deposition

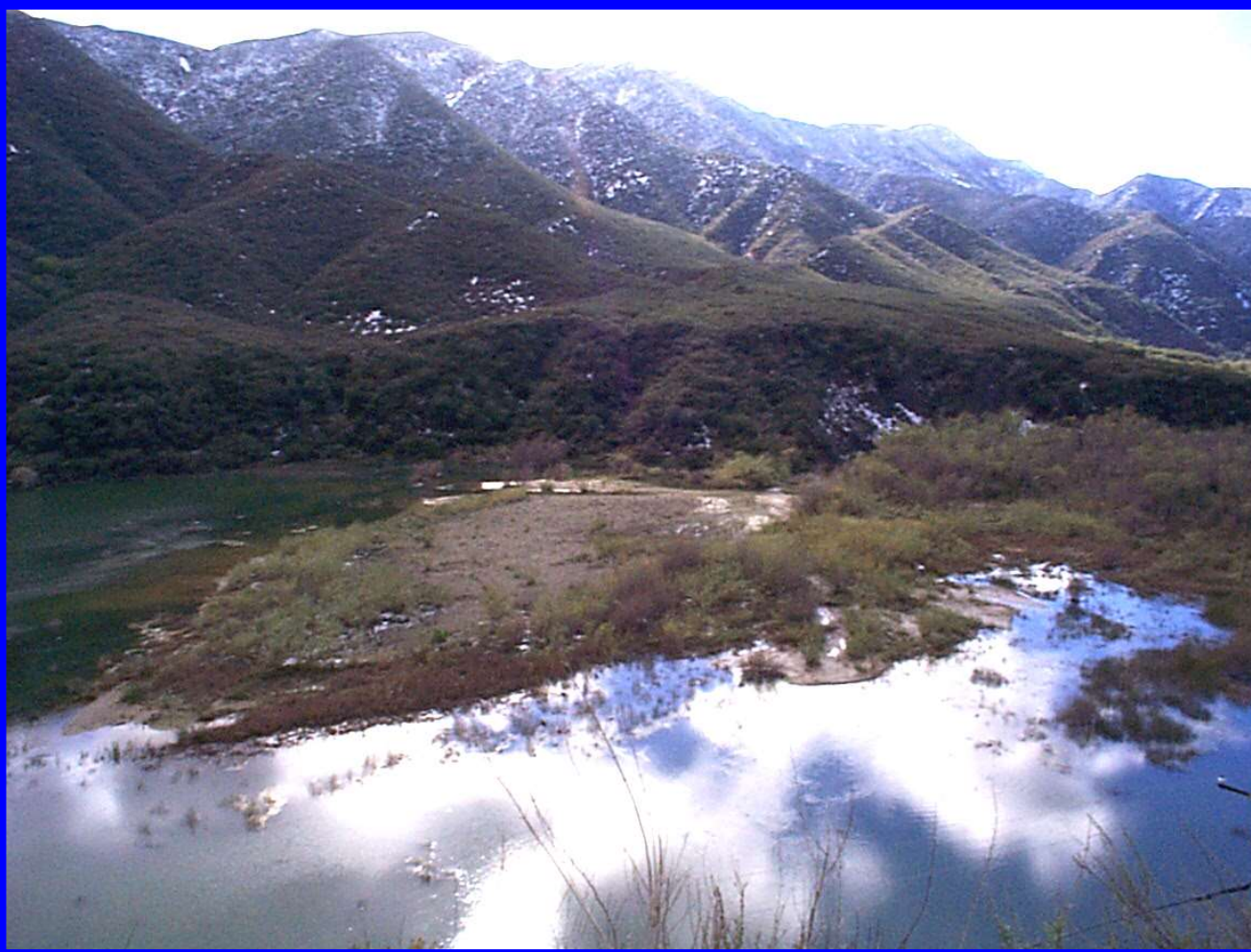
- Robles Diversion Structure



Environmental Impacts

Existing Reservoir Habitat

- Existing Species



Summary

Current Status



Photo courtesy of Paul Jenkins, Matilija Coalition



Summary Conclusions

- Sediment is a major concern in systems with salmon species
- Selected alternative must balance existing reservoir habitat, downstream spawning habitat, beach erosion, and other issues
- Combination of alternatives with innovative removal techniques will be required

Acknowledgements

- U.S. Bureau of Reclamation
- U.S. Army Corps of Engineers, Los Angeles District
- Ventura County
- Matilija Coalition
- Coauthor: Merri Martz, Senior Biologist, Tetra Tech, ISG



Summary

What's Mud Got to do with it?



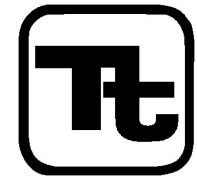
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Seattle



Summary

What's Mud Got to do with it?

A whole dam lot!



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