



# Solutions for Flooding of Butano Creek on Pescadero Creek Road

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*Public Meeting – November 17, 2014*



# Goals of the Meeting

- Explain the causes of flooding at the bridge and what can be done to address these causes
- Understand the role of sediment
- Review solutions
- Discuss pros and cons for the environment, permitting, and costs
- Discuss next steps



# Sediment Budget Conclusions

**Credit:** Setenay Frucht - SF Bay Regional Water Quality Control Board  
Martin Trso - contractor to UC Berkeley

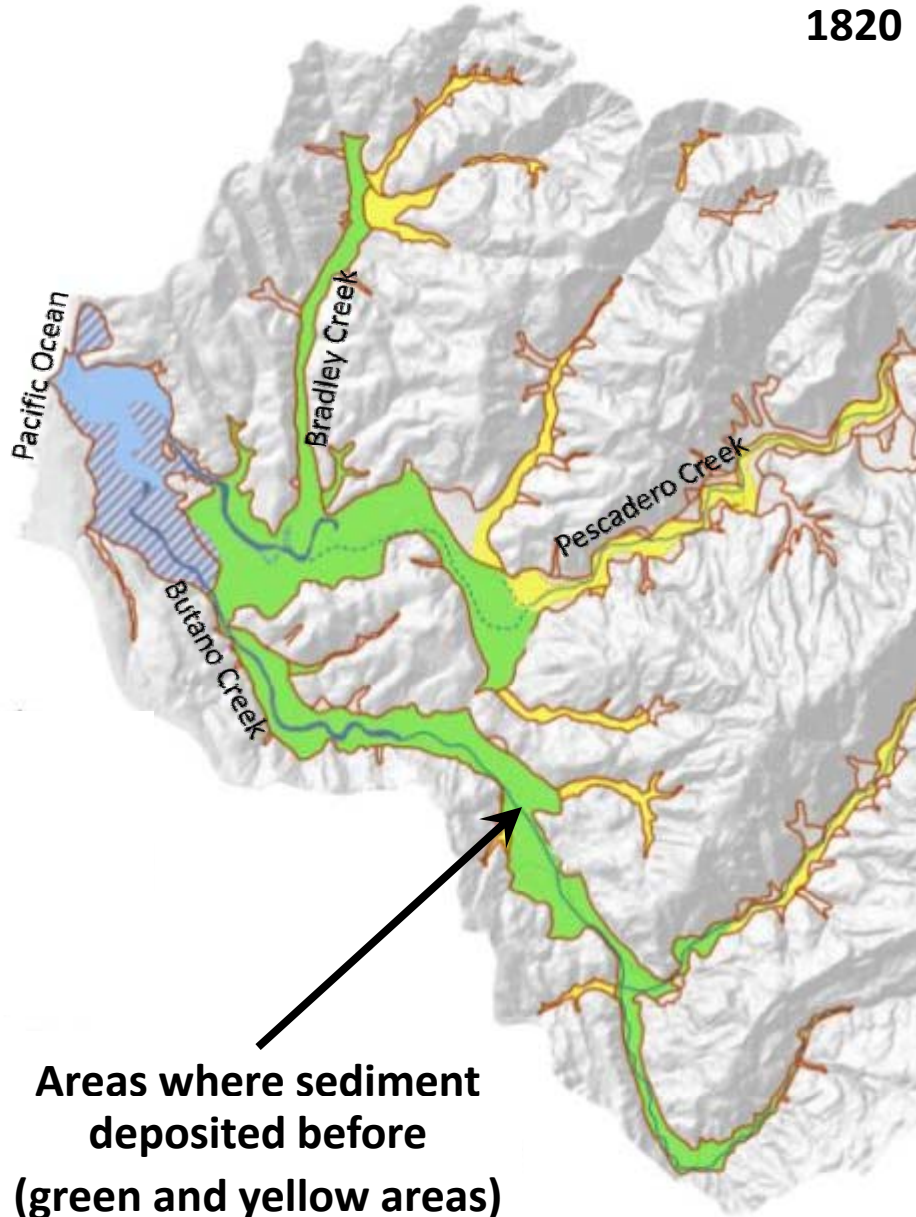
## Key findings regarding Butano Creek:

- Over the last **200 years** changes in land use combined with channel management have altered the amount of sediment delivered to and moving through the creeks and the marsh/lagoon.
- Sediment delivery to Butano Creek has **increased by 2.5 times**
- **Channel incision** is the largest sediment source of increased sediment load
- Historical **floodplains are disconnected** from the creek and are no longer able to store sediment, instead they are a source
- Butano Creek appears to be the major contributor to sedimentation in the marsh
- Elevated sediment loads are expected to continue



# Change in Areas Where Sediment Gets Deposited

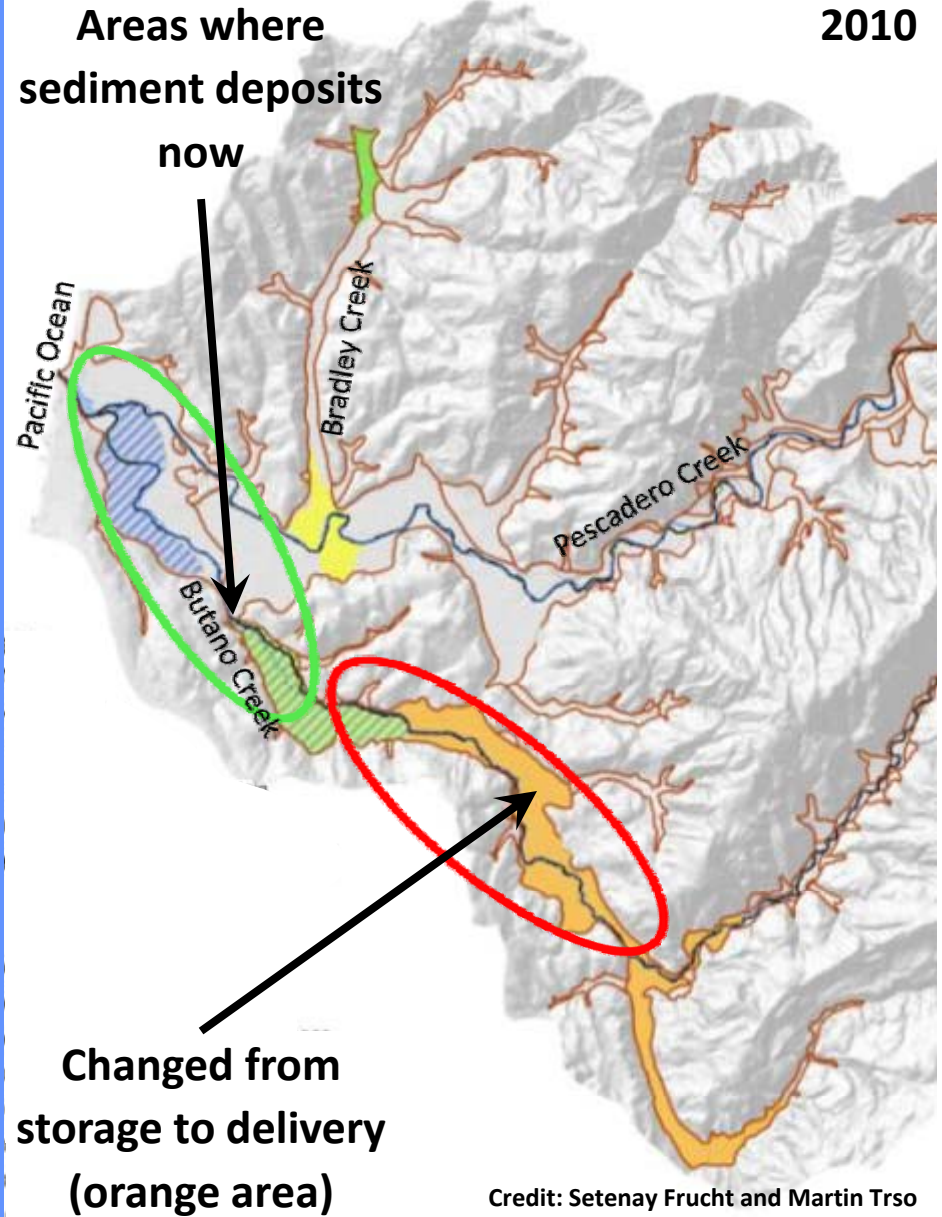
1820



Areas where sediment deposited before  
(green and yellow areas)

Areas where  
sediment deposits  
now

2010



Changed from  
storage to delivery  
(orange area)

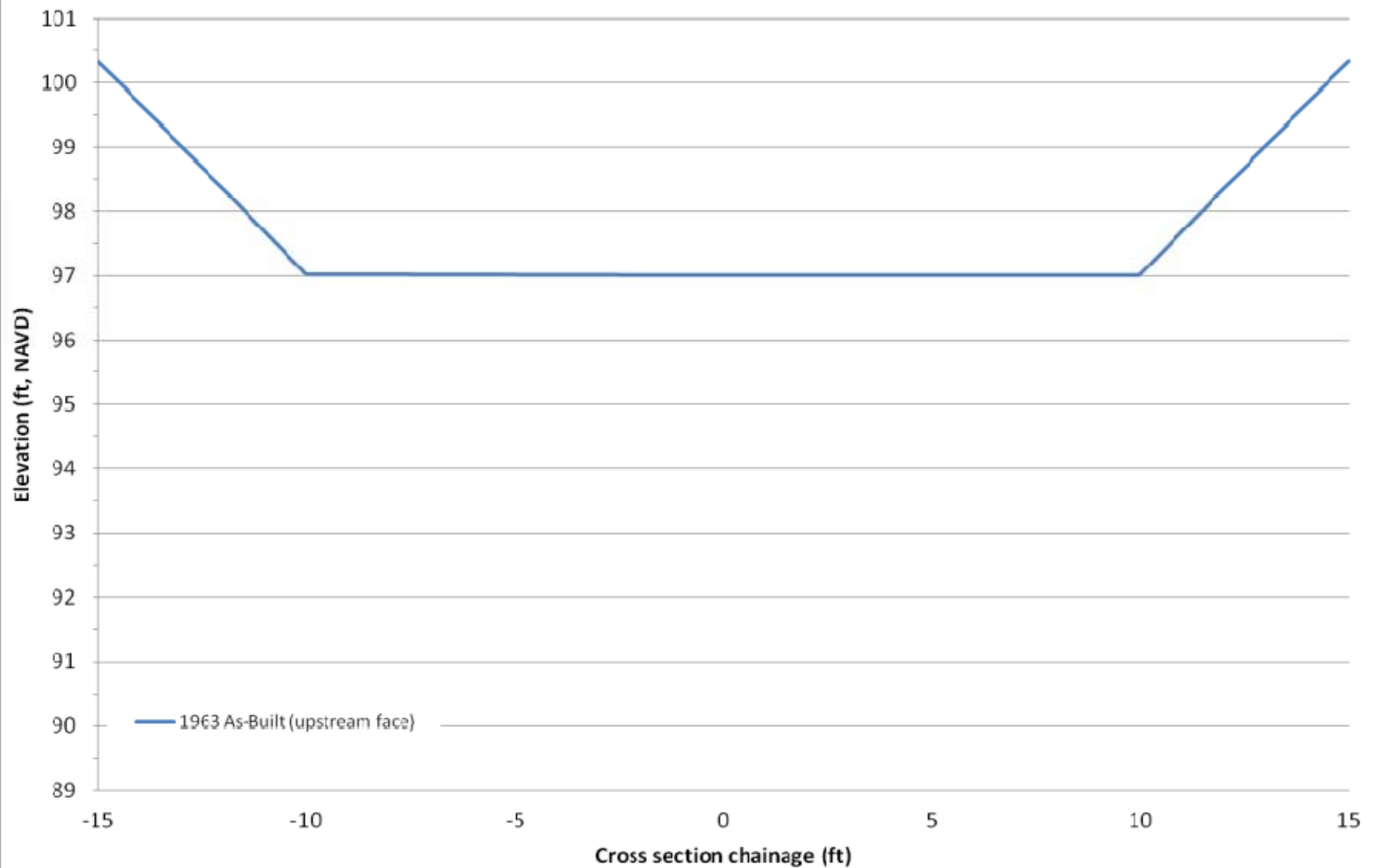
Credit: Setenay Frucht and Martin Trso

# Cross Section at Cloverdale Road Bridge

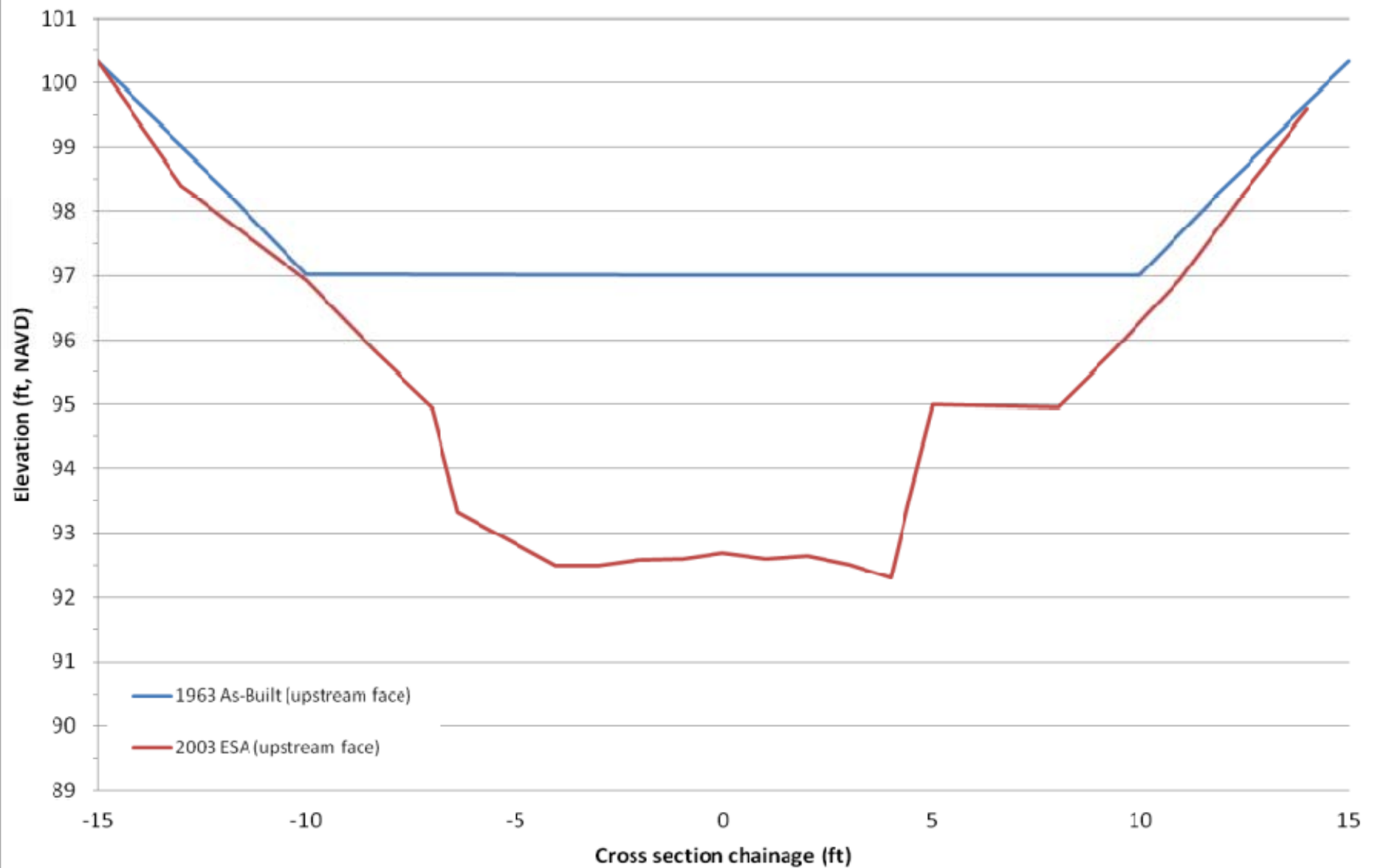


Looking downstream  
at the channel at this  
location

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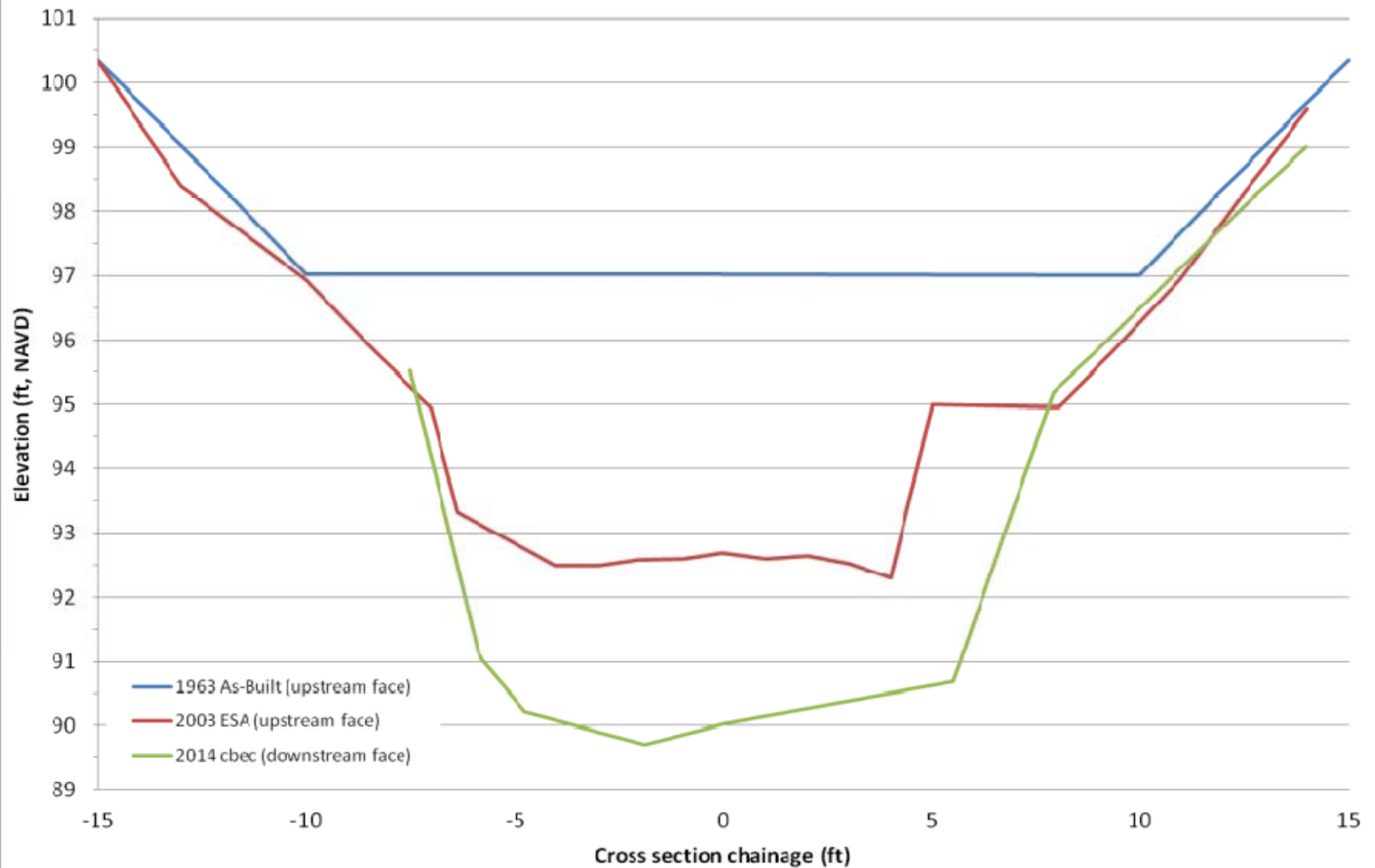


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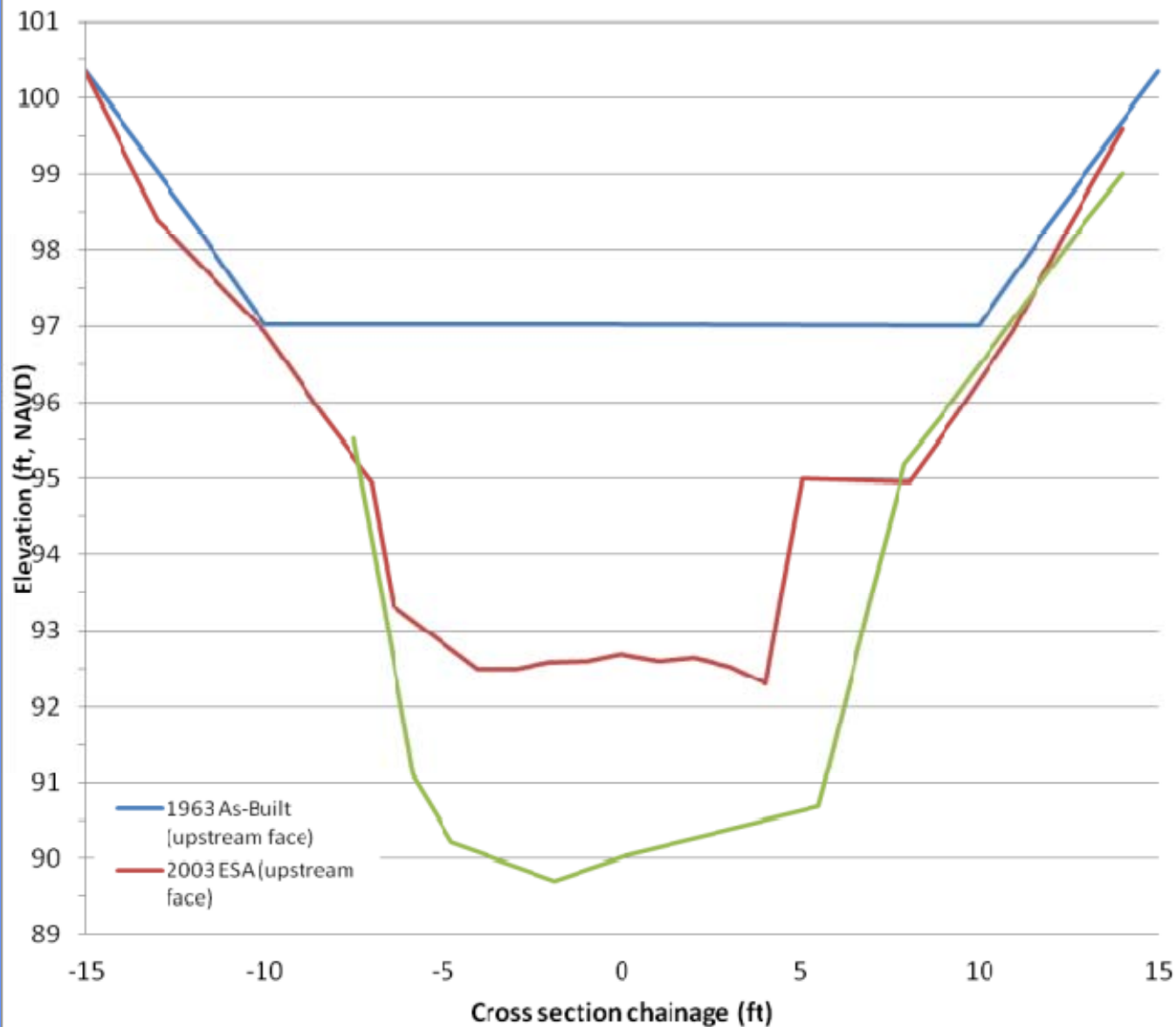
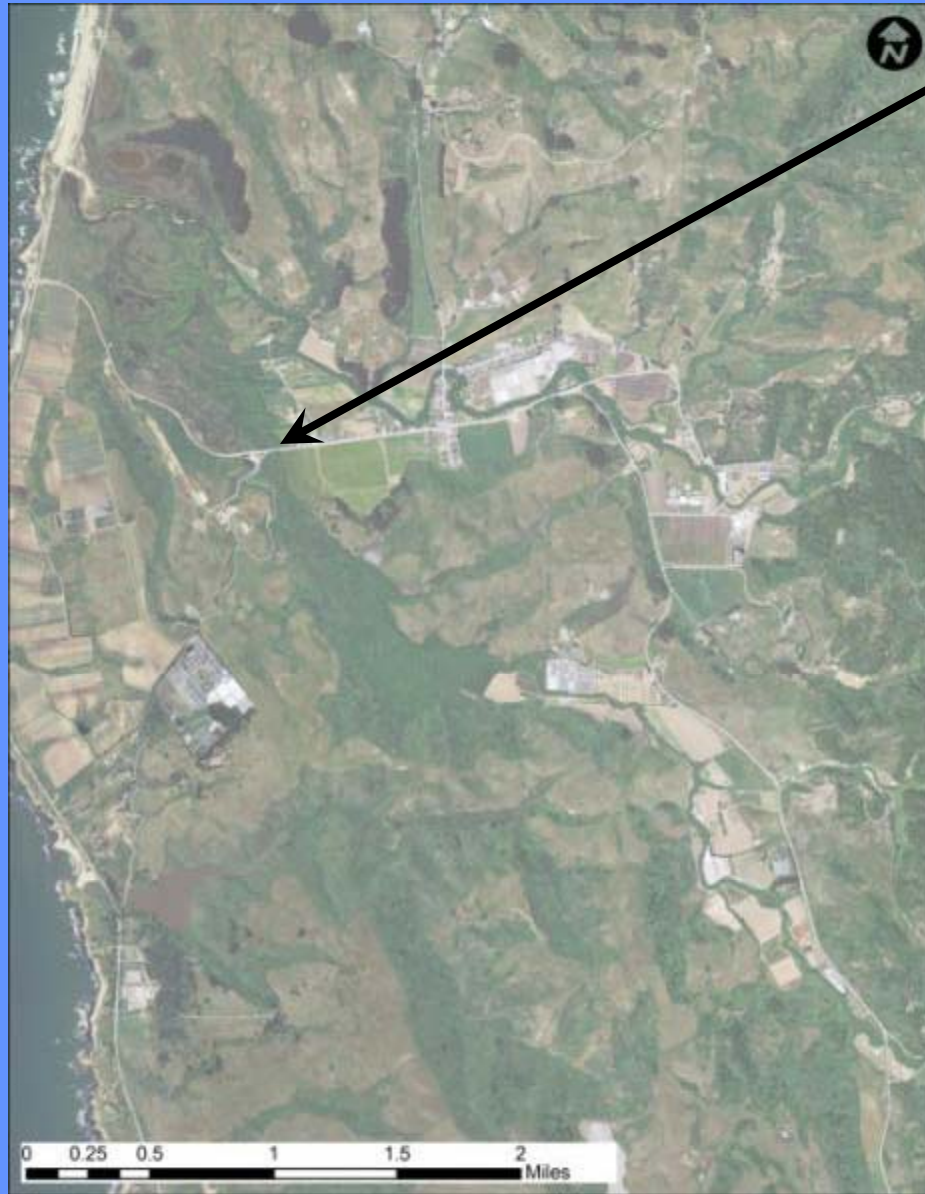


Photo credit: Setenay Frucht and Martin Trso

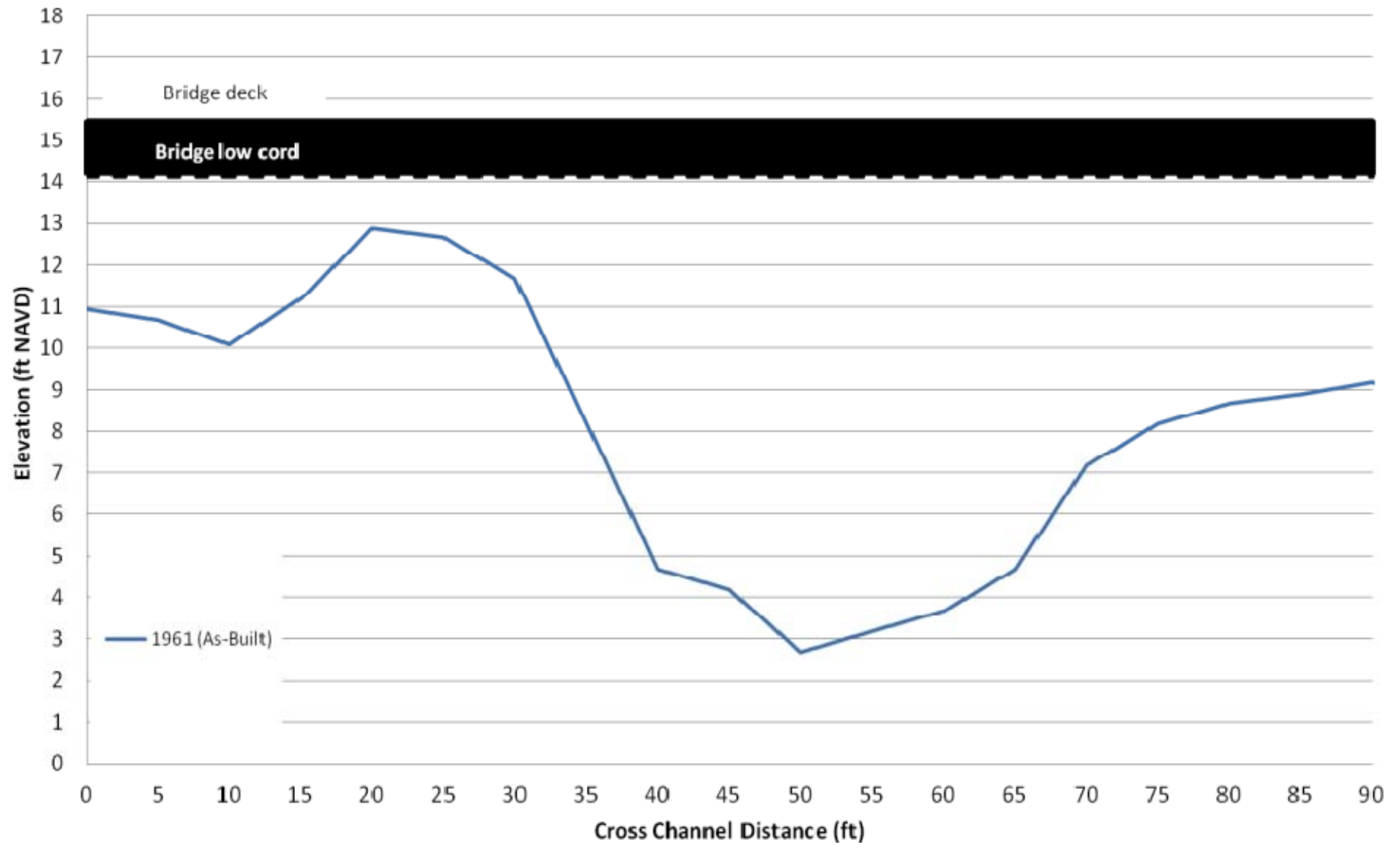
# Cross Section at Pescadero Road Bridge



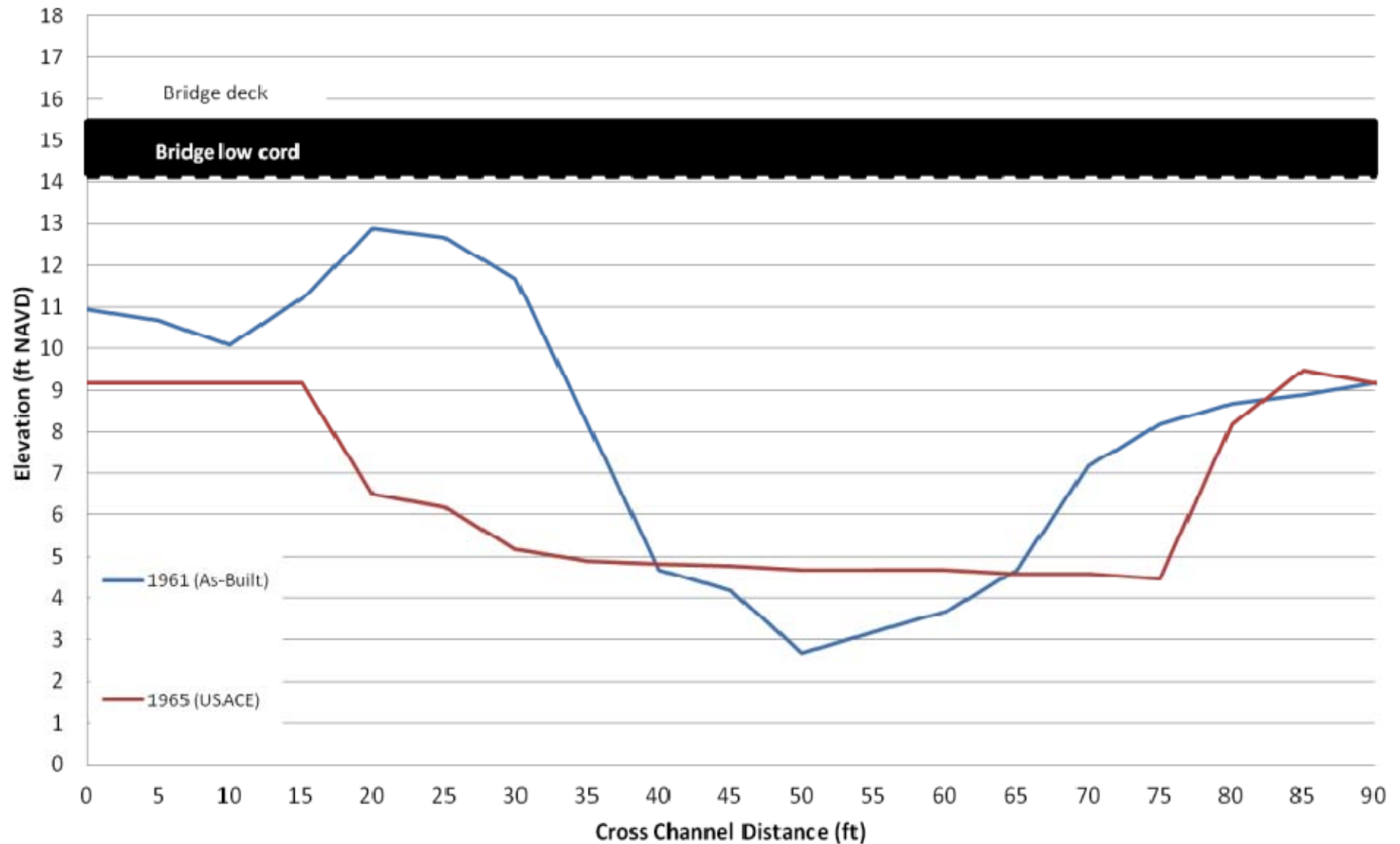
Looking downstream at the channel at this location



# Cross Section at Pescadero Road Bridge

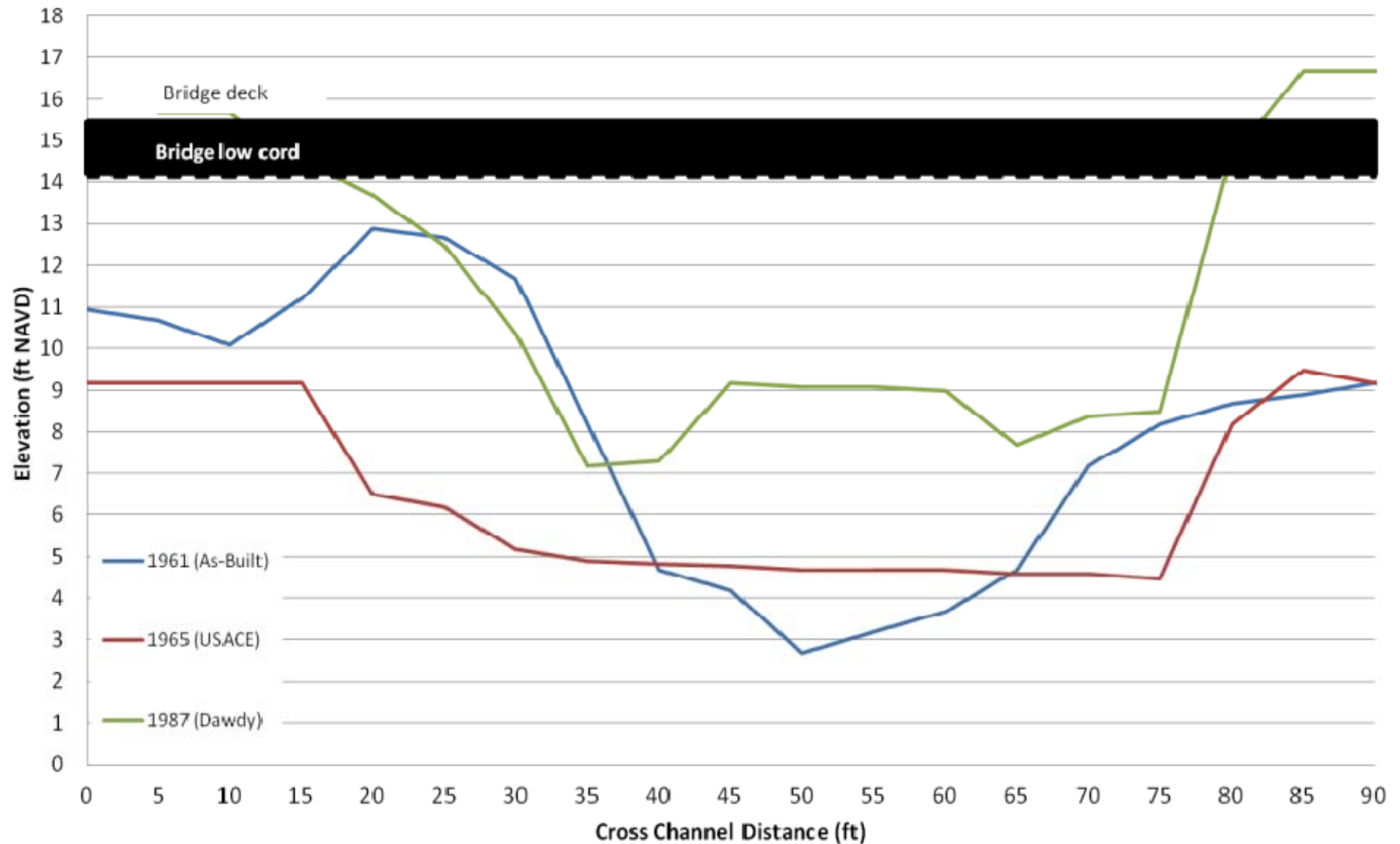


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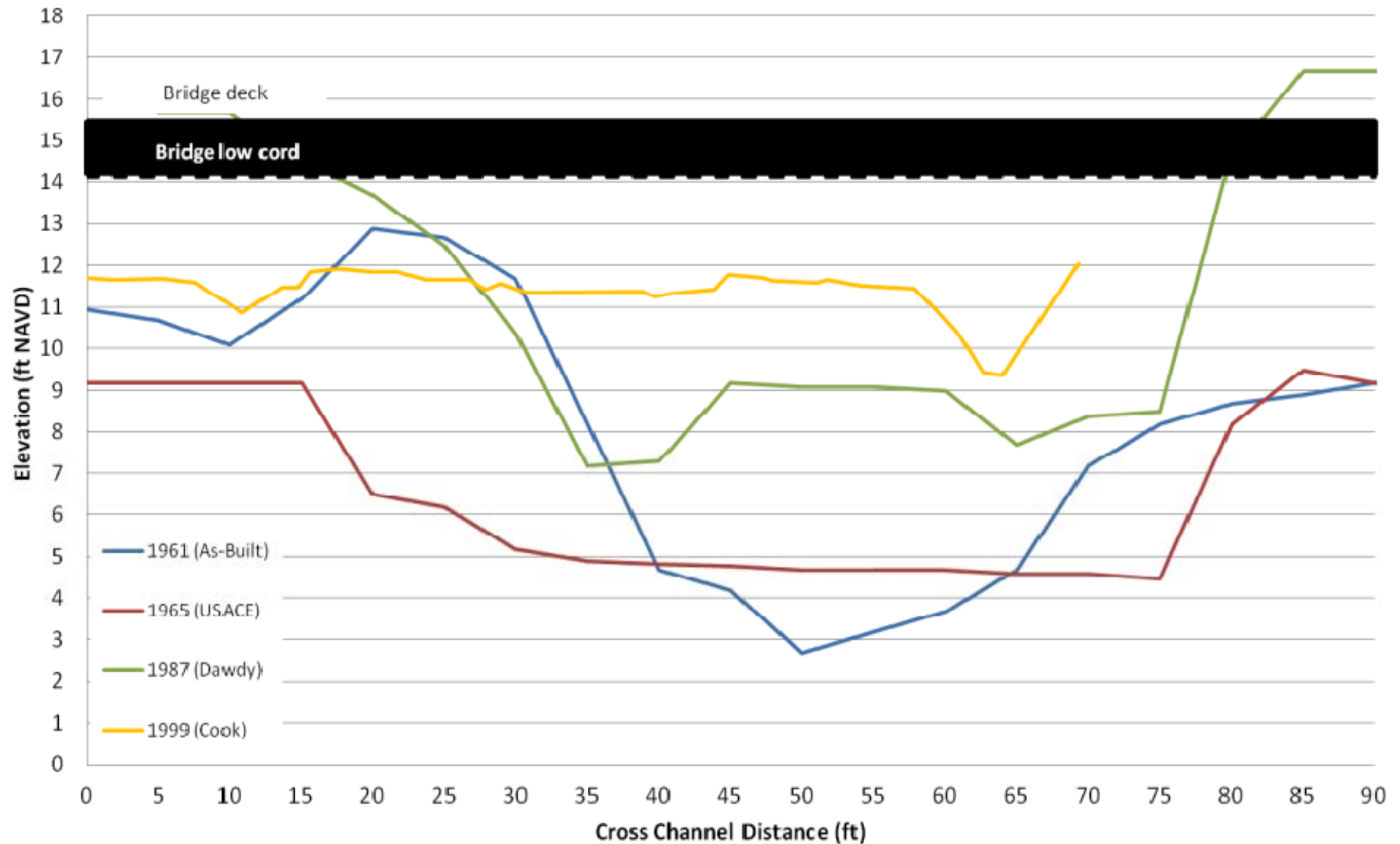




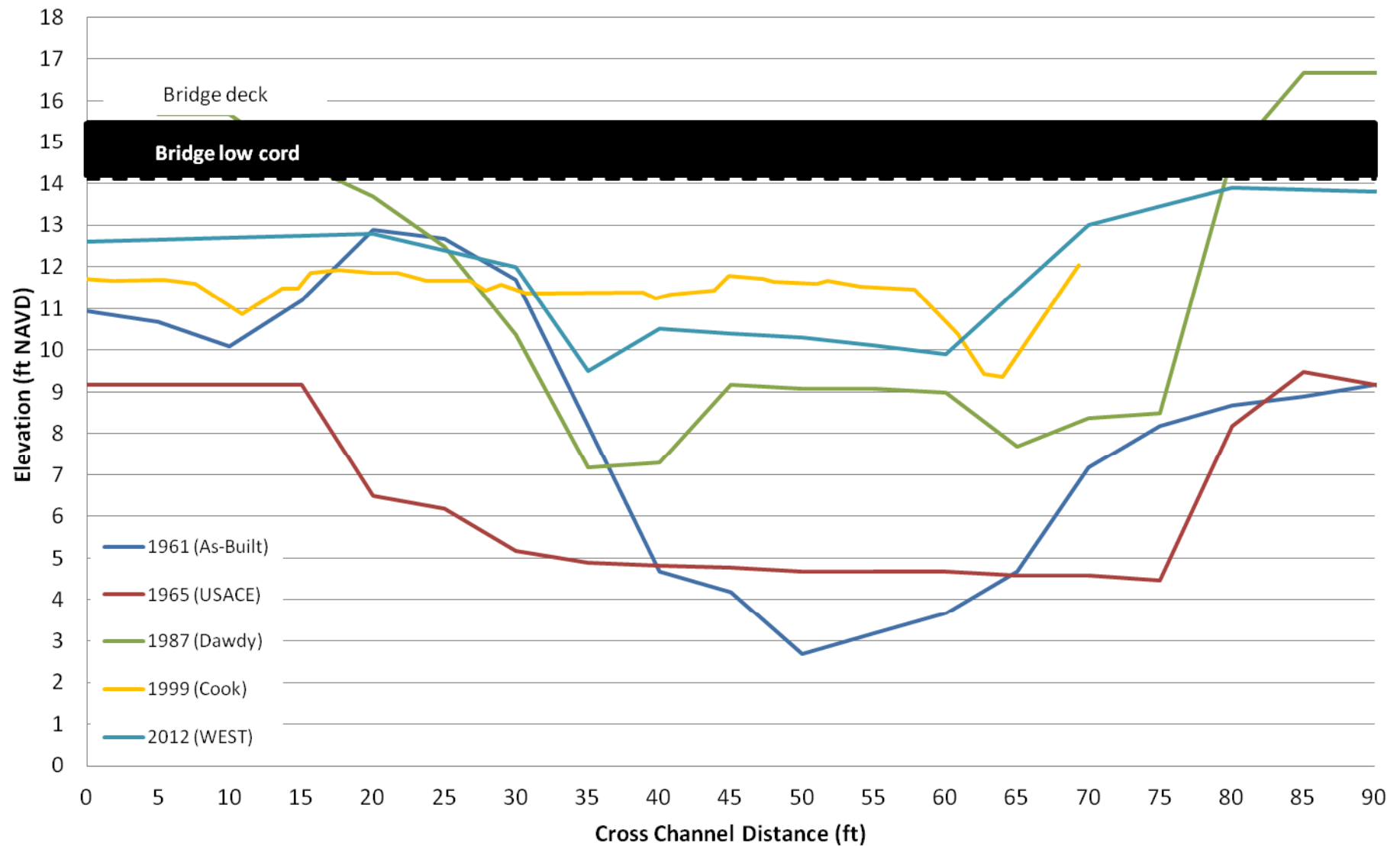
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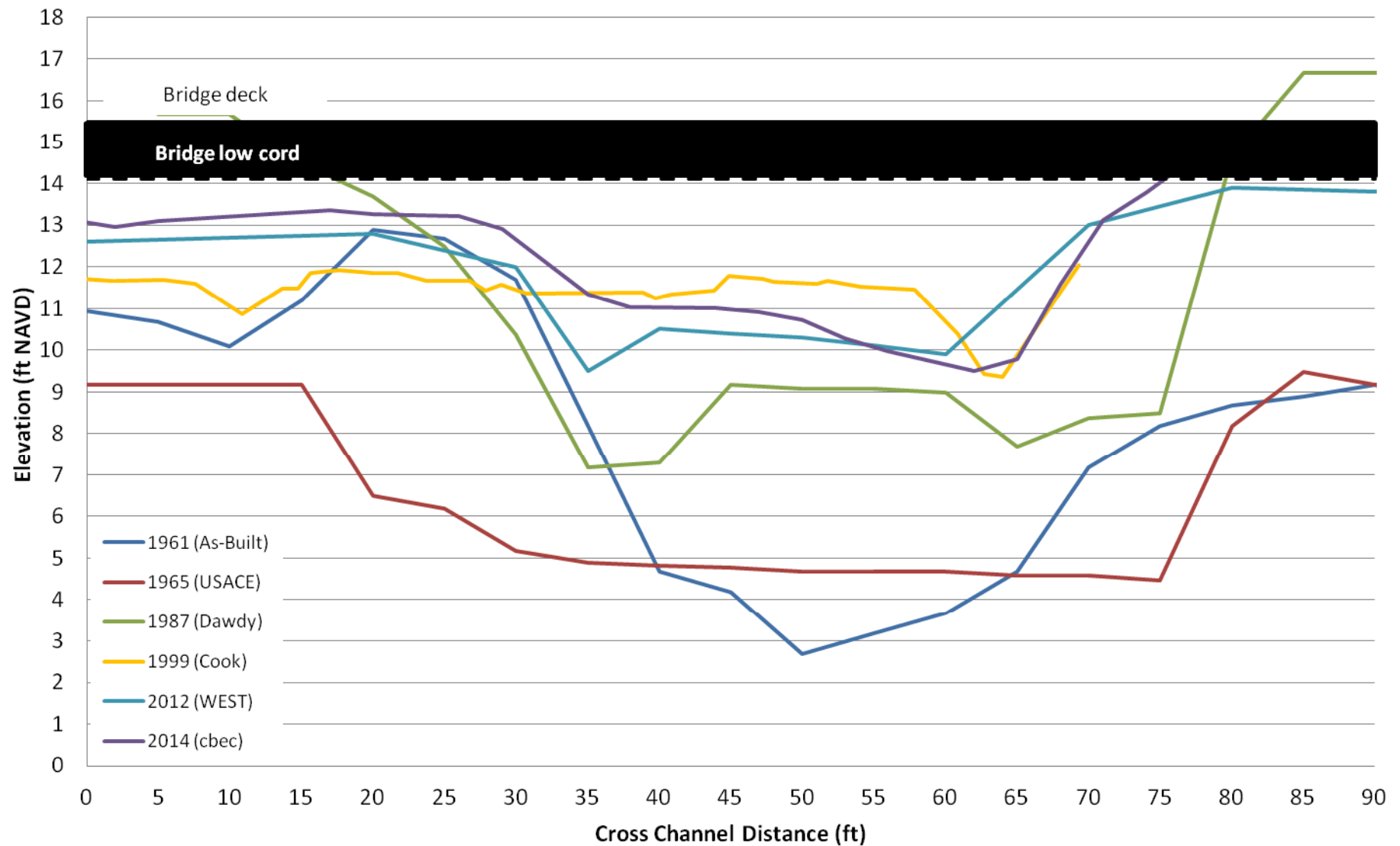
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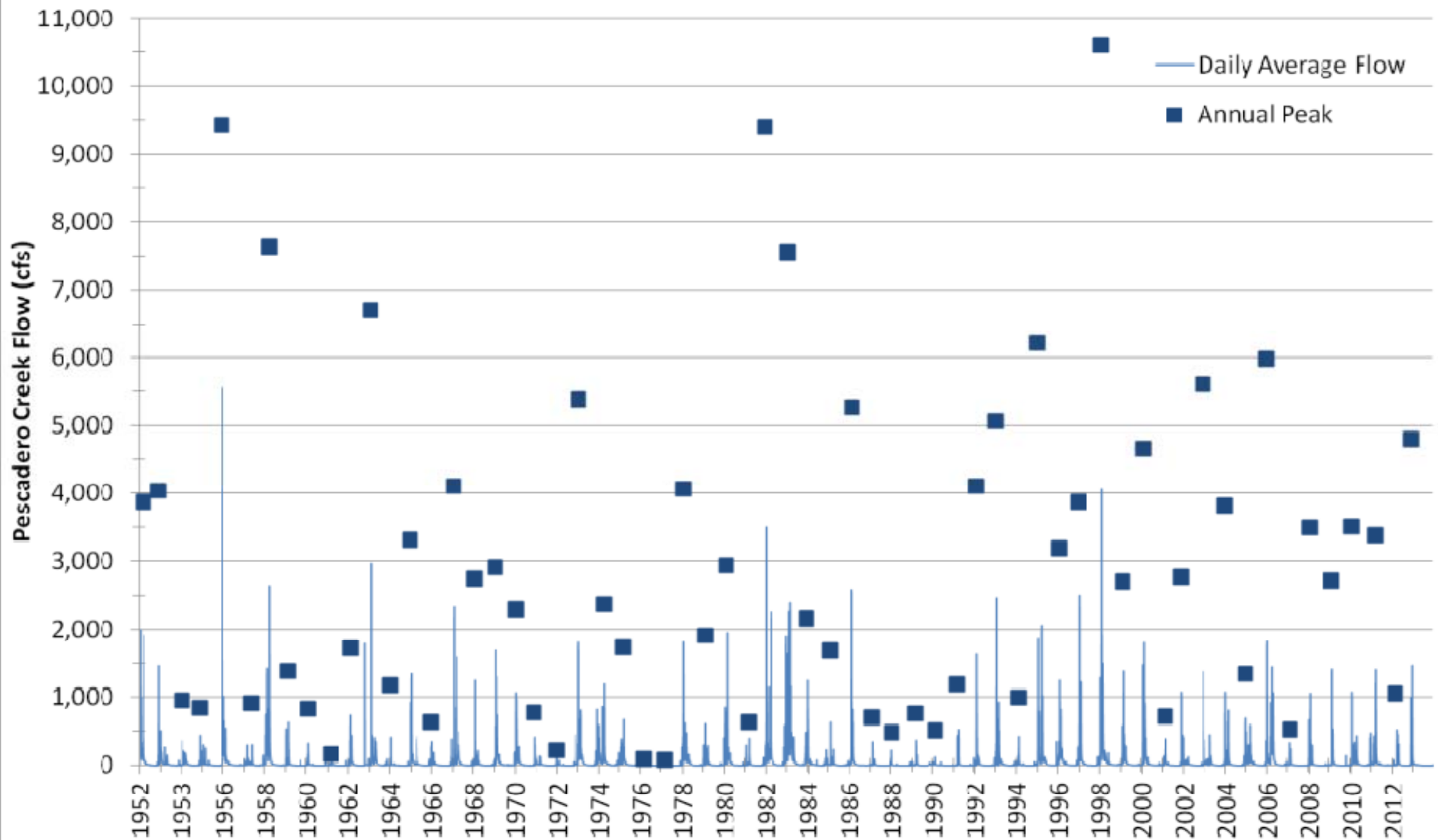


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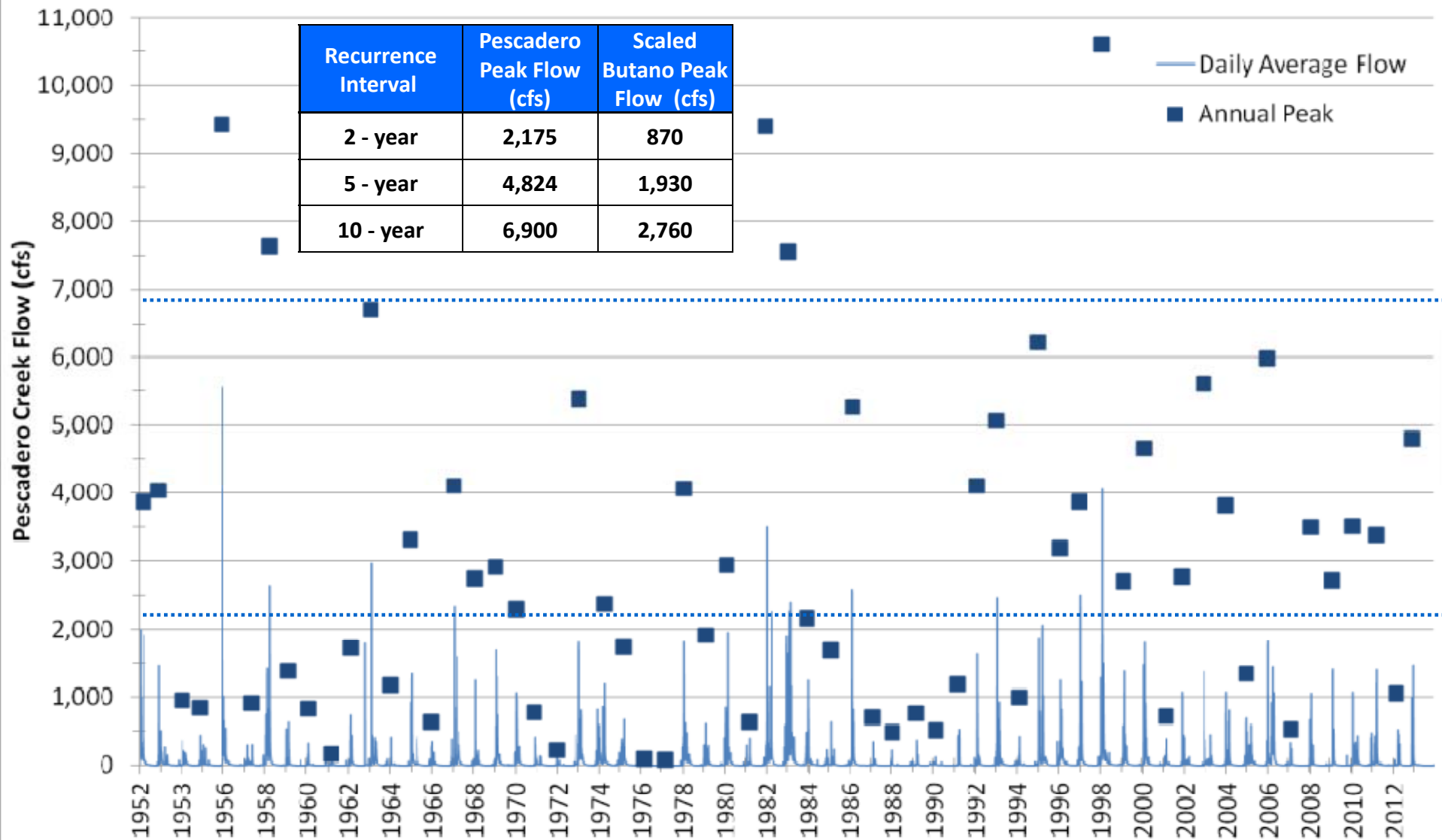




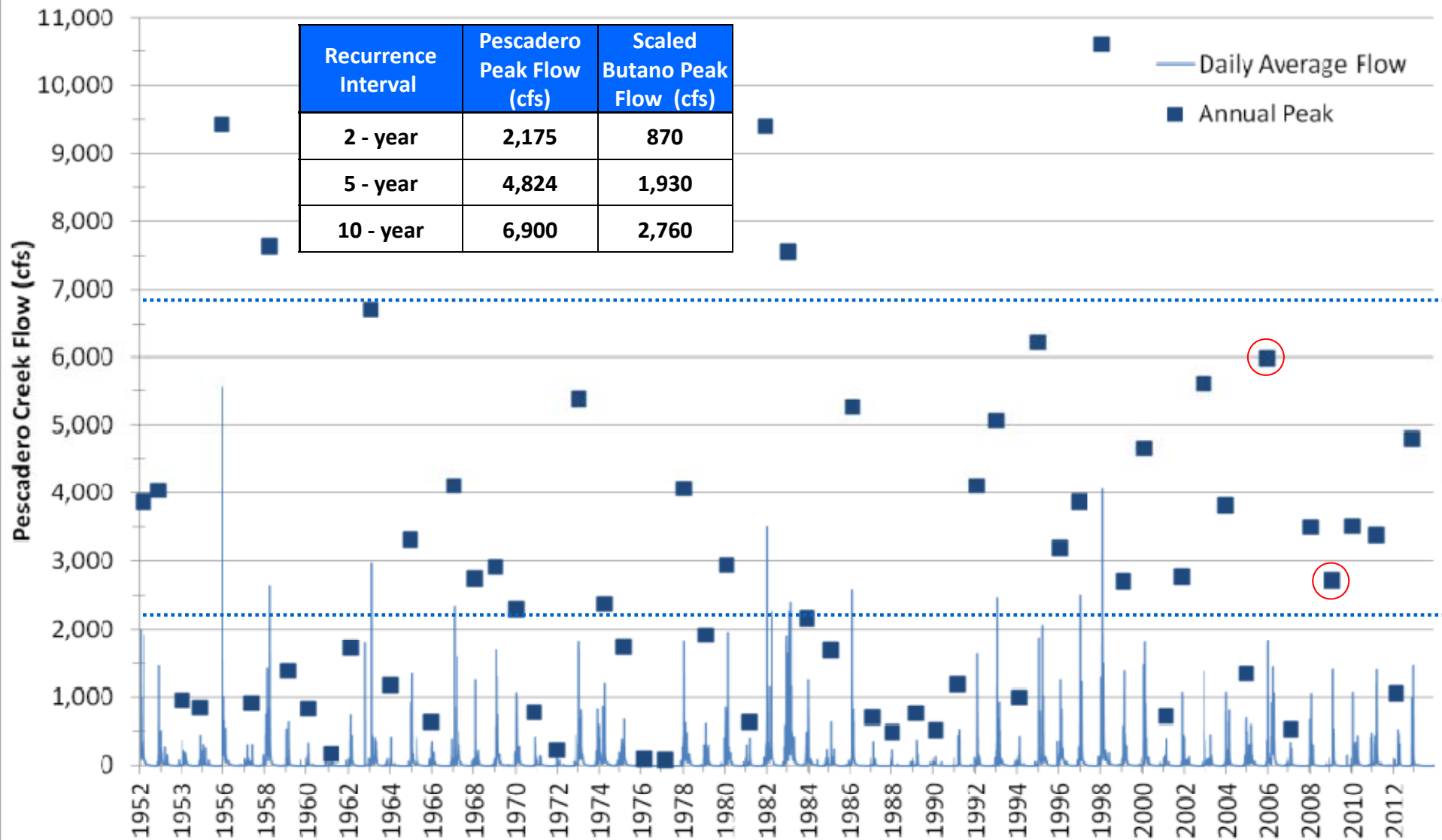
# Pescadero Creek Daily Average Flows and Flood Peaks



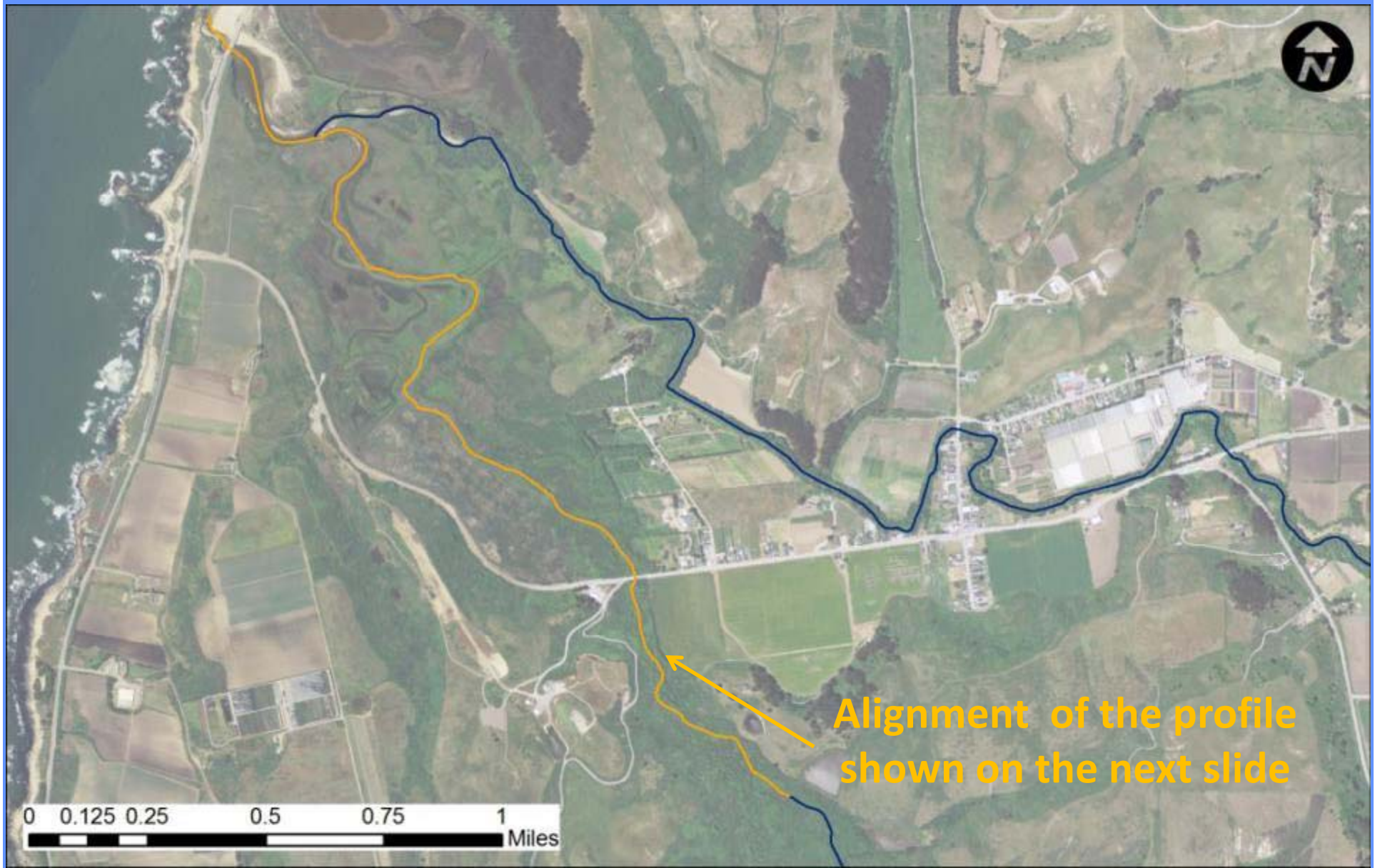
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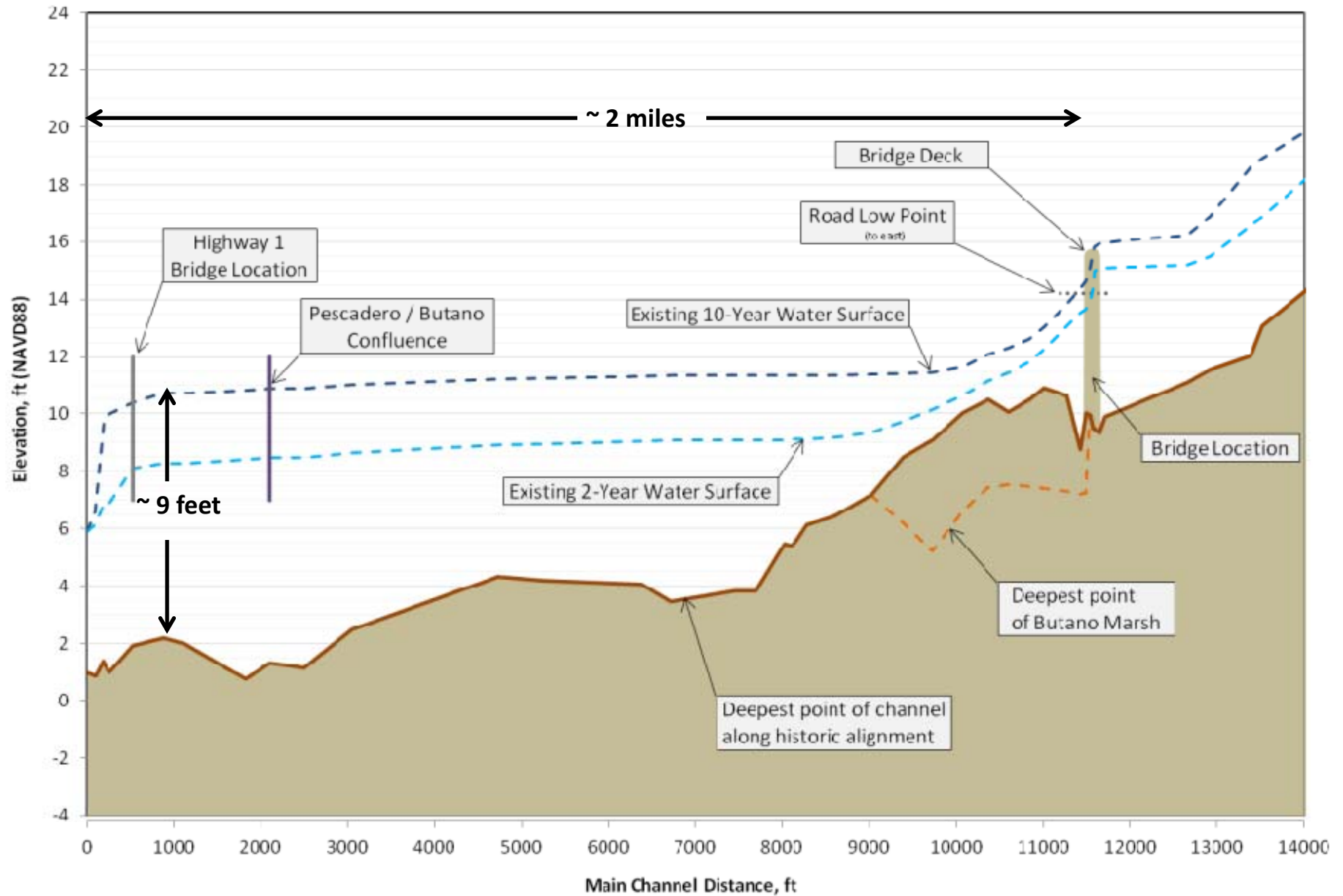


# Butano Creek Profile

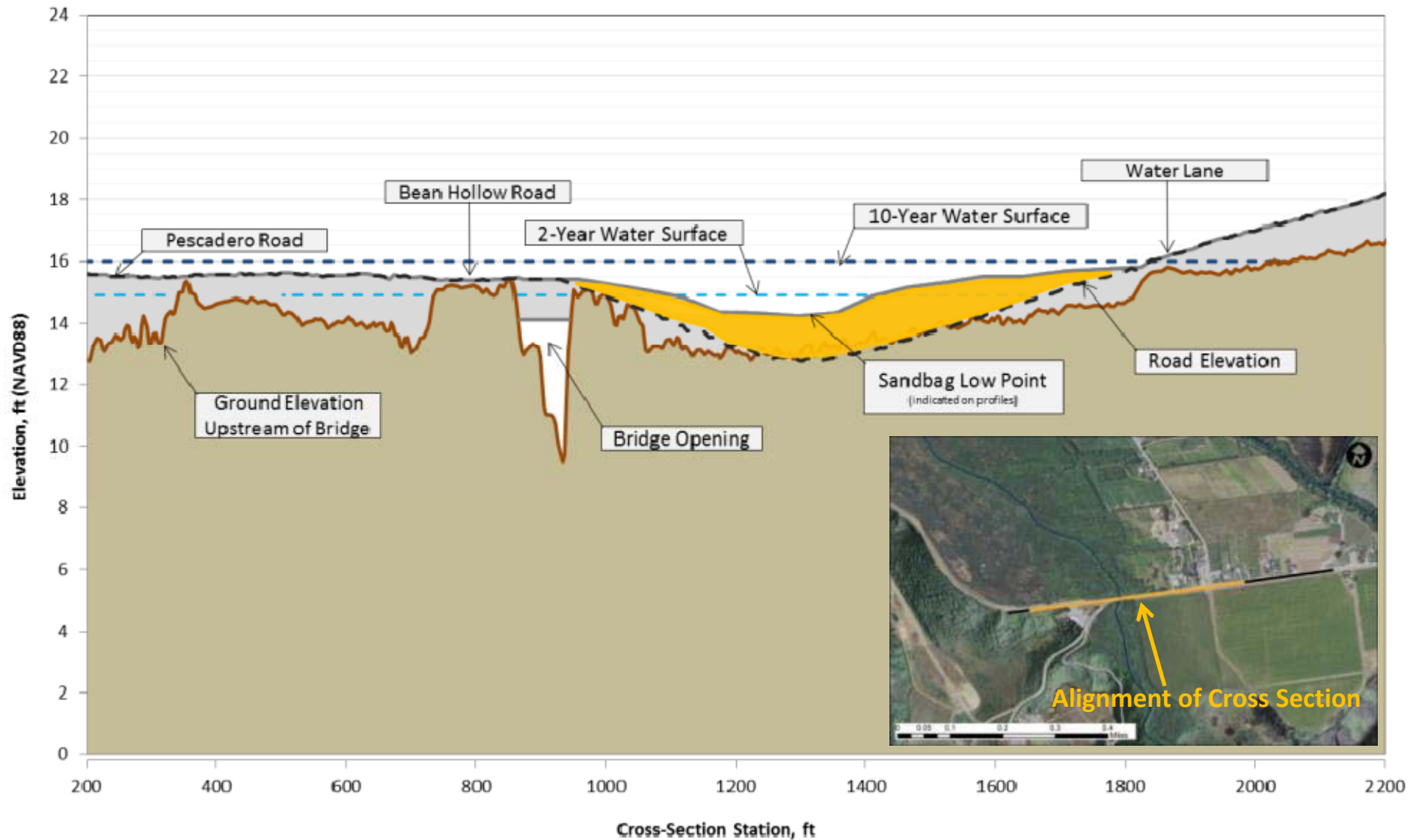




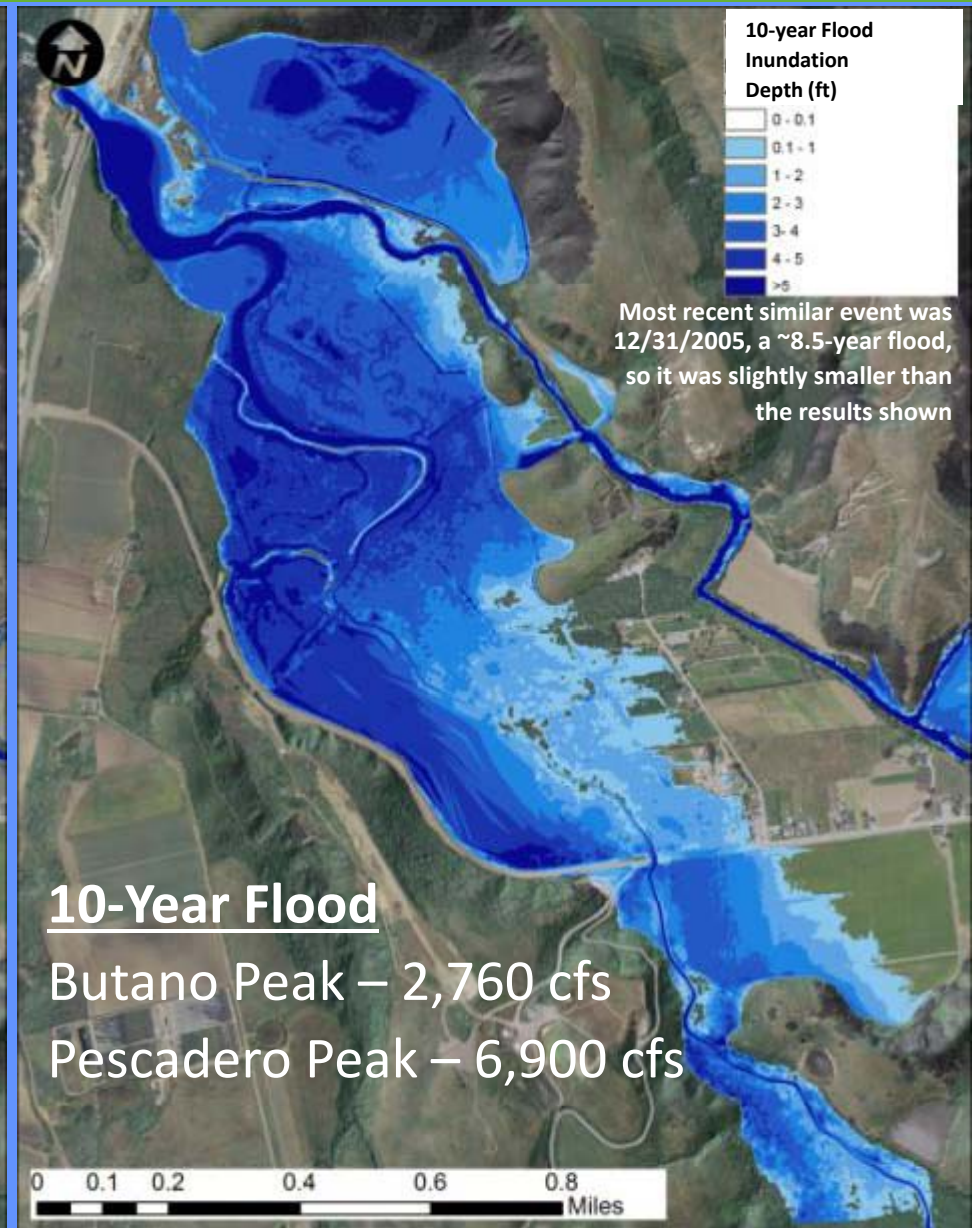
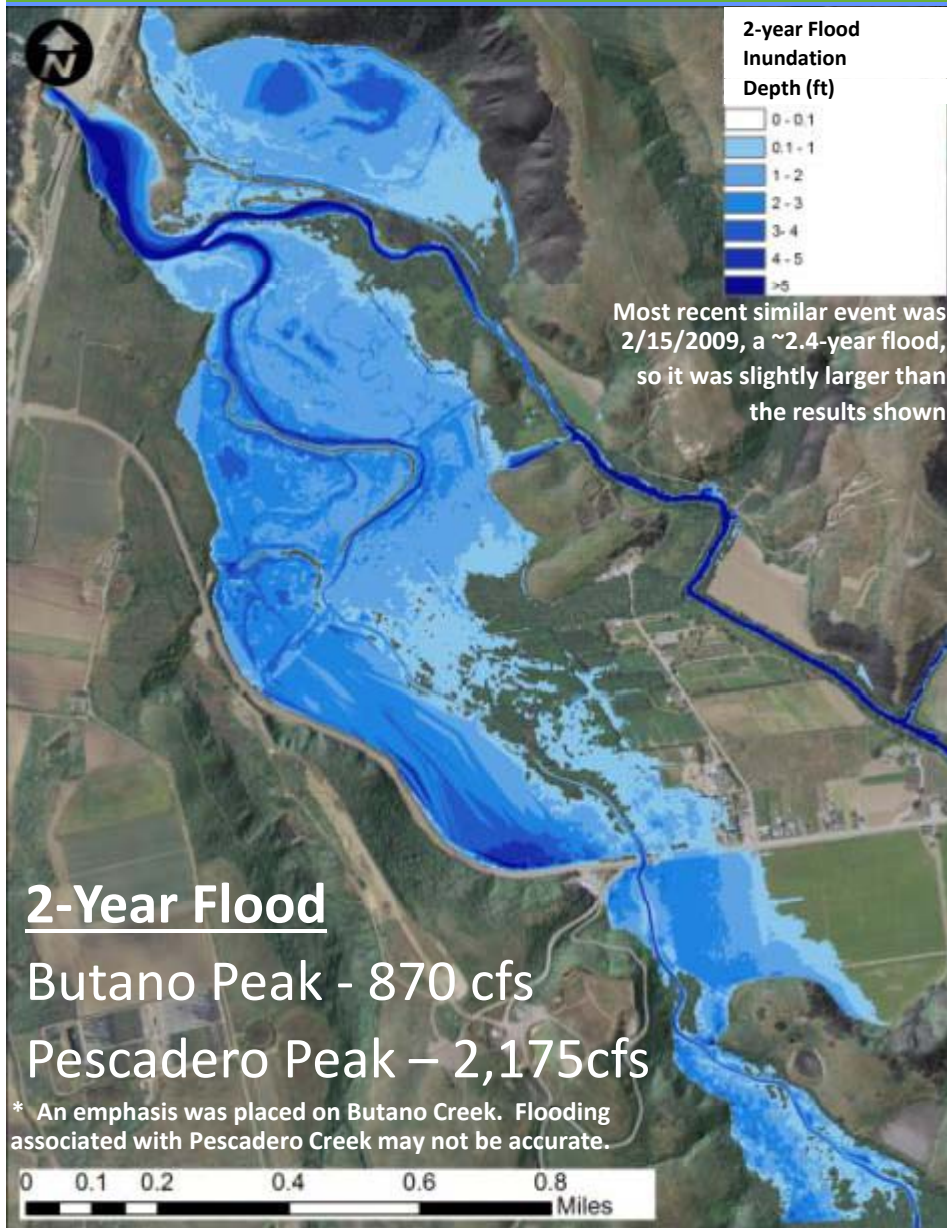
## Peak Water Surface Profiles - Existing Conditions



# Looking Downstream at Pescadero Creek Road



# Existing Condition Flooding Extents

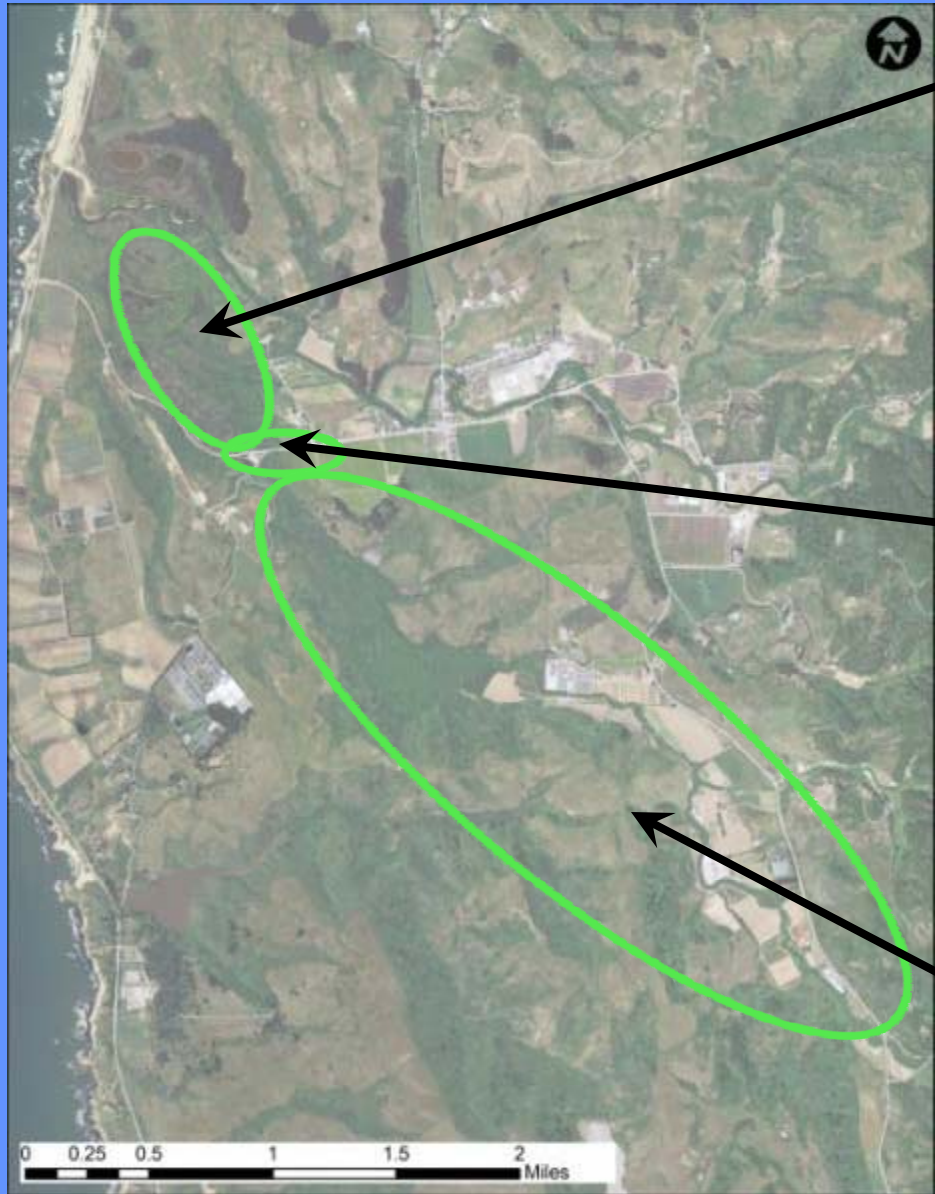


# Many Solutions were Proposed and Analyzed

- Do nothing
- Dredge within county right-of-way
- Dredge beyond county right-of-way
- Sigma Prime dredging concept
- Dredge within right-of-way and along the road a short distance
- Dredge irrigation ditch in Butano Marsh
- Create new channel parallel to historic channel in Butano marsh
- Create a bypass channel through fire station
- Raise roadway
- Construct causeway and raise roadway
- Reduce sediment supply from upstream
- Solution to improve habitat and restore sediment storage
- New concepts developed by team (combination of components)
- Vegetation management / removal without dredging
- Create storage pond / reservoir in Butano Marsh



# Components of a Solution



Downstream of the bridge

Near the bridge

Upstream of the bridge

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# Dredge within Right of Way

## Summary

- Extent: 50 ft upstream and downstream
- Dimensions: 10 ft deep X 50 ft wide (500 ft<sup>2</sup>)
- Area: 7000 ft<sup>2</sup>
- Volume: 3000 yd<sup>3</sup>

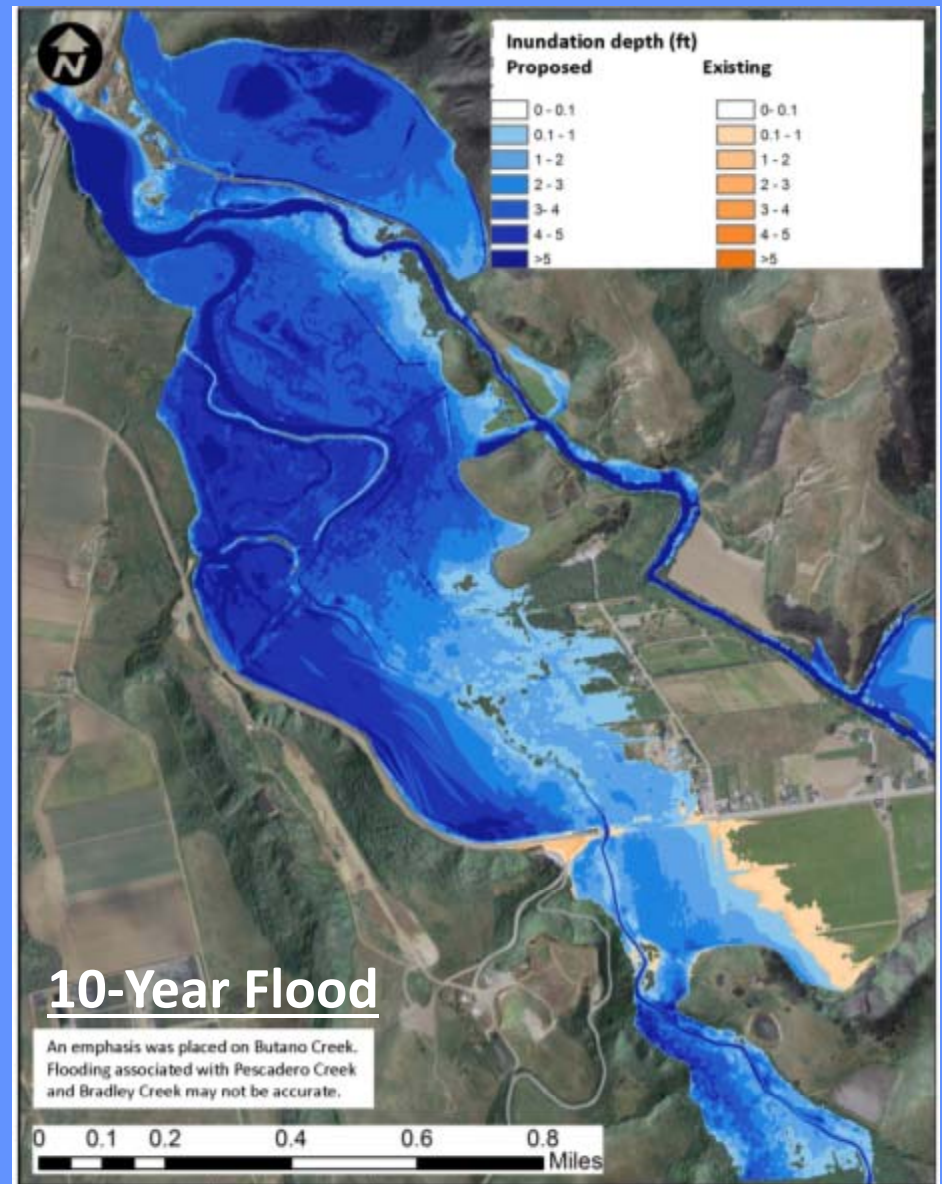
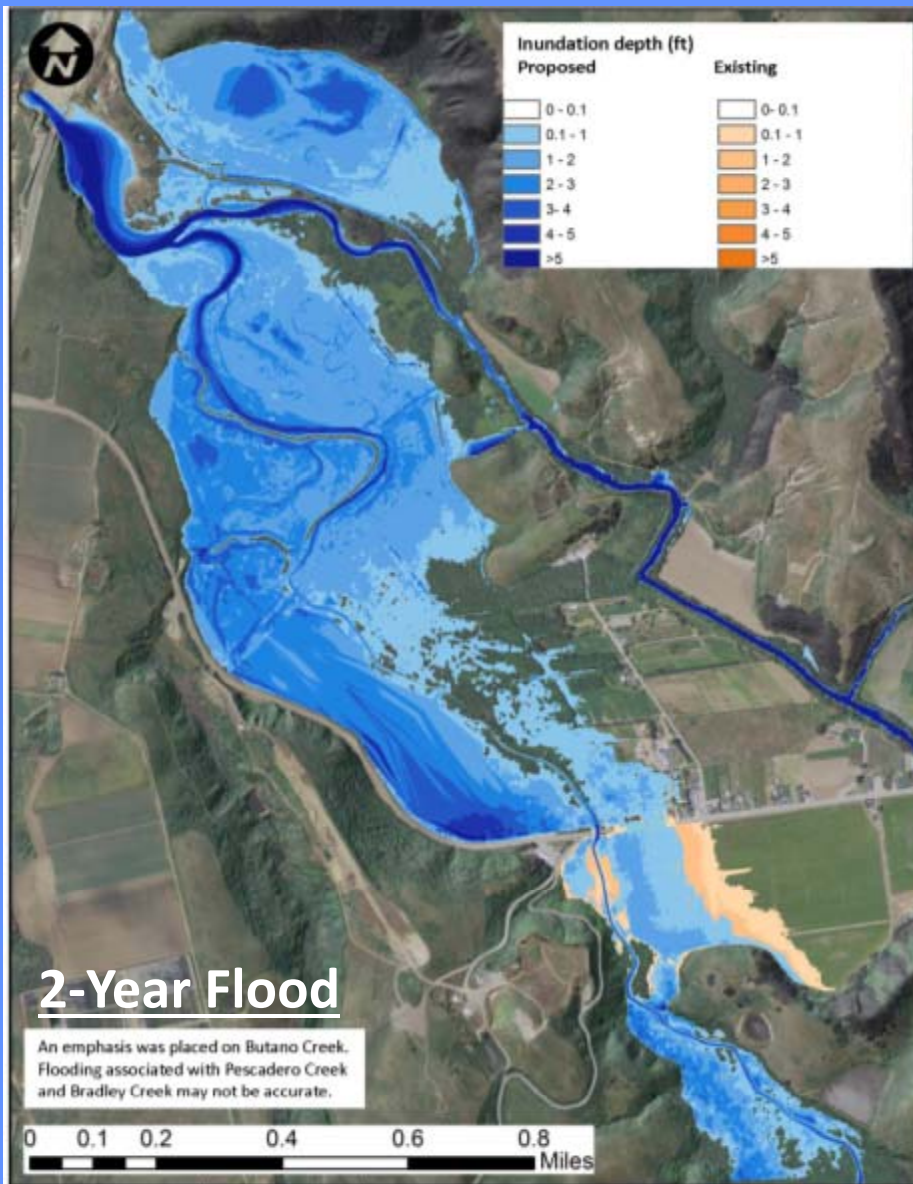
## Flood Benefits

- Reduces amount of frequent flooding
- 2 year event would not overtop sandbags, but could flood road from downstream
- Dredged area fills in rapidly during the first significant flood event (~2 year or larger)

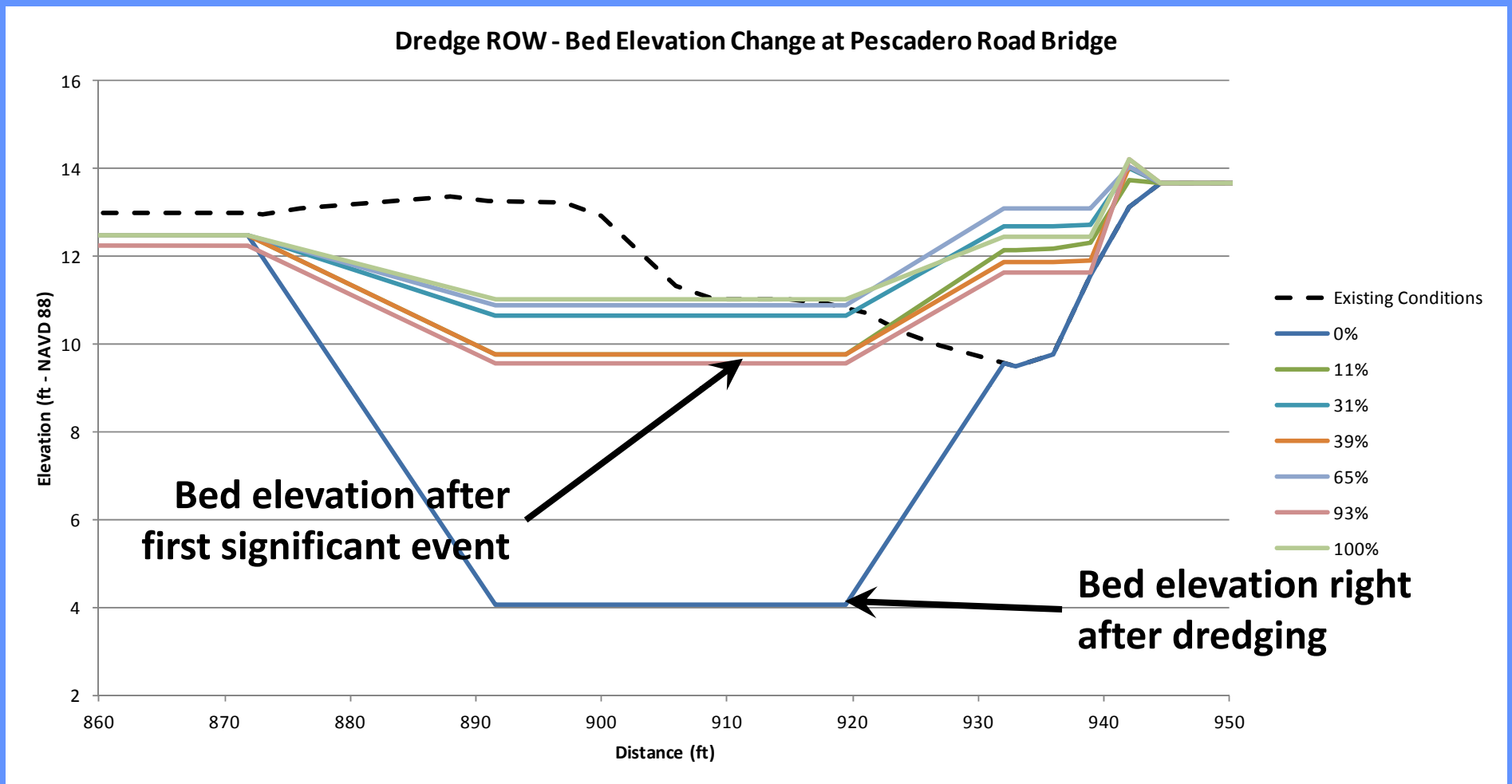




# Dredge within ROW – Inundation Right After Dredging



# Dredge within Right of Way – Change through Time



- Benefits from dredging will not last long unless upstream sediment reduction actions are taken



# Flood Reduction Benefits

Scenario	Simulated Maximum Upstream Water Surface Elevation <sup>1</sup> (ft, NAVD88)			
	Immediate Condition		Future Condition <sup>2</sup>	
	2-Yr Event	10-Yr Event	2-Yr Event	10-Yr Event
Existing condition	14.9	16.0	15.3	16.0
Dredge within ROW	13.6	14.4	15.1	16.0
Dredge ROW & along historical channel	13.5	14.4	14.4	15.9
Dredge ROW & parallel to road and through marsh	13.4	14.2	14.5	16.0
Dredge ROW & ~800 ft parallel to road into marsh	13.4	14.2	14.7	15.5
Reconnect floodplain	14.9	15.9	15.2	16.0
Construct elevated causeway	13.4	14.3	14.4	15.9

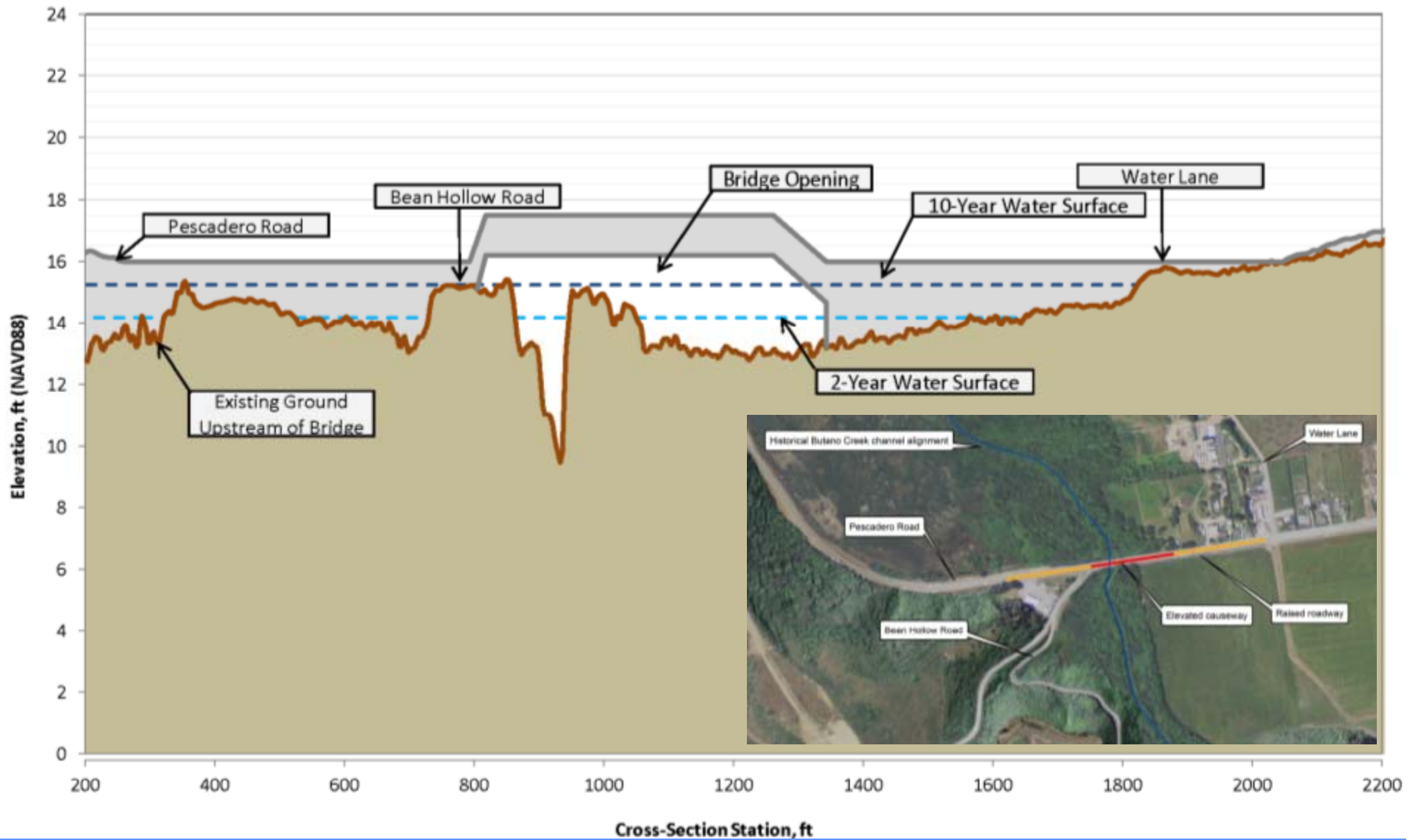
## NOTES:

1 - Results reported for a location immediately upstream of the road.

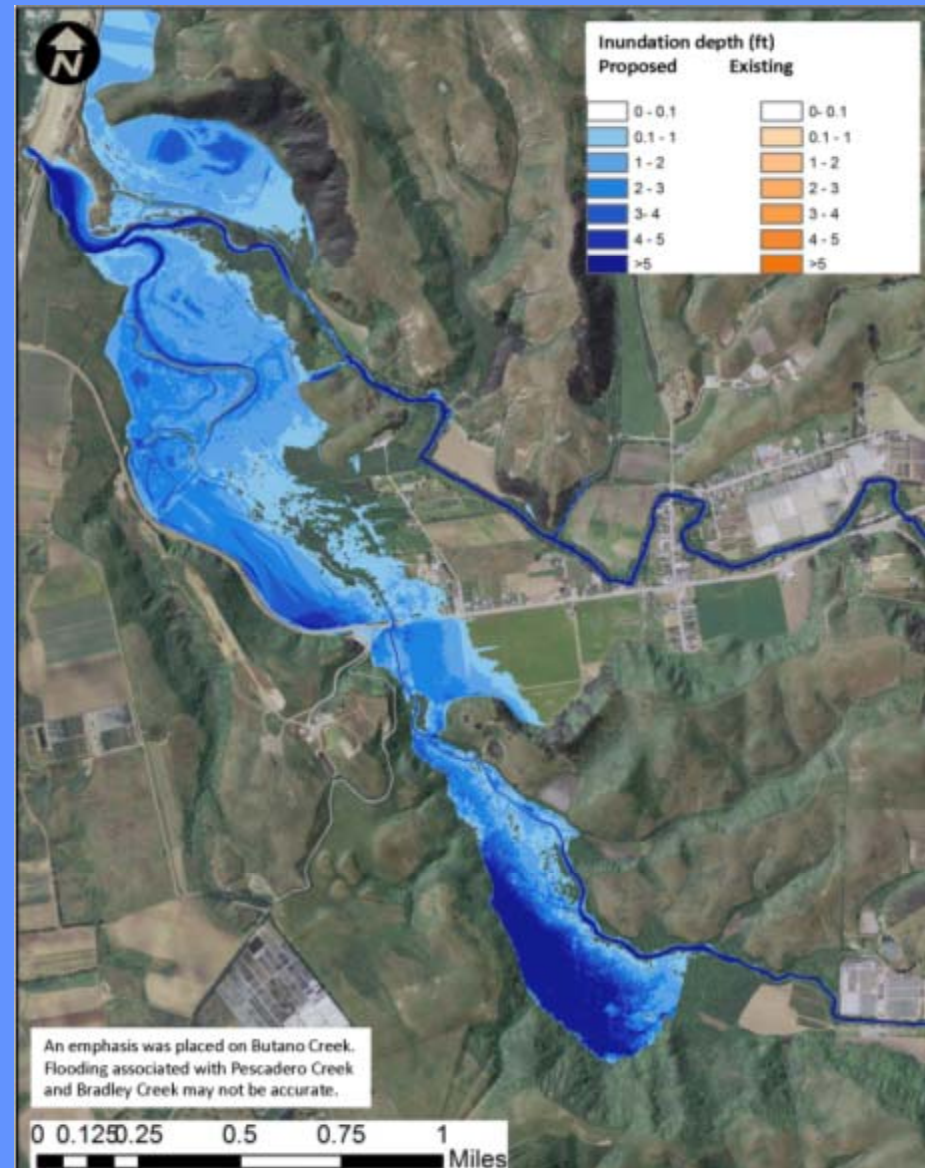
2 - Reflects topographic conditions after 10 years of the sediment transport model was used to estimate the distribution and movement of sediment throughout the project area for a 10-year period.

**\* Low point of sandbags is 14.2 ft & low point of the road is 12.8 ft**

# Causeway



# Floodplain Reconnection & Restoration



## Estimate of Construction Costs

- Costs do not include: planning, design, permitting, mitigation and maintenance.
- Costs assume disposal of dredge material nearby (not at Ox Mountain Landfill in HMB)

Scenario	Estimated Cost
Dredge within ROW	\$168,500 per dredging
Dredge ROW & along Historical Channel	\$2,237,280
Dredge ROW & Parallel to Road and through Marsh	\$1,409,850
Dredge ROW & ~800 ft Parallel to Road into Marsh	\$295,000
Elevated Causeway	\$10,060,000
Floodplain Reconnection (Example Project)	\$688,000



# Permits and Regulatory Compliance

REGULATION	AGENCY	REQUIRED DOCUMENT
Clean Water Act Section 404	USACE	Nationwide Permit or Individual Permit
Clean Water Act Section 401	RWQCB	401 Certification
Endangered Species Act Section 7	USFWS/NMFS	Biological Assessment/Biological Opinion
National Historic Preservation Act	SHPO	Cultural resources report
California Fish and Game Code Section 1602	CDFW	Streambed Alteration Agreement
California Coastal Act	San Mateo County/ Coastal Commission	Coastal Development Permit
California Environmental Quality Act	CDFW or San Mateo County or State Parks	Initial Study/Mitigated Negative Declaration or Environmental Impact Report
Non-Discretionary Permits	San Mateo County	Grading permit application

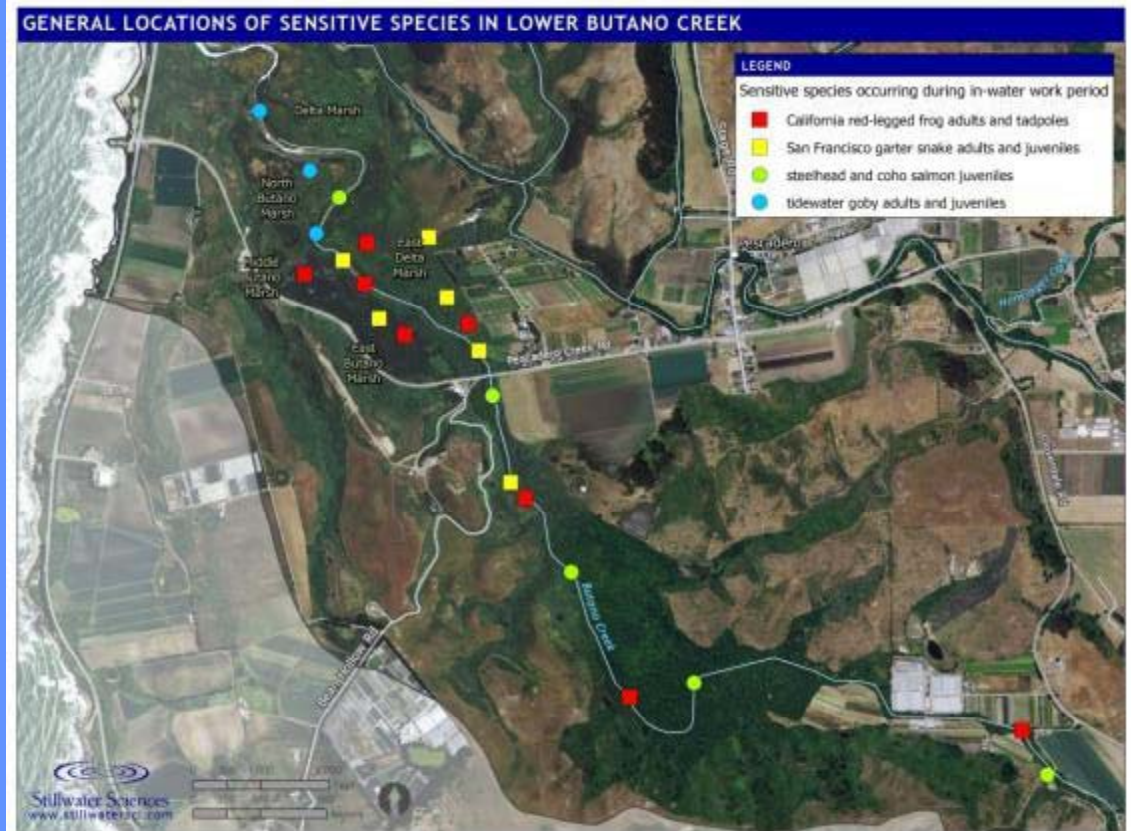
**Not easy, but not impossible**

**Streamlining available for restoration projects**



# Implications for Sensitive Species

- Dredging downstream of the bridge is the only mechanism to improve habitat connectivity and fish passage.
- Dredging at the bridge not likely to harm or benefit
- Floodplain restoration upstream of the bridge will restore habitat, and will improve long-term conditions in marsh



## What We Have Learned

- There is a tremendous amount of sediment coming downstream. Addressing it is important.
- Creating a larger opening at the bridge can help with flooding, but the benefits don't last long.
- Dredging into the marsh helps some, but will still require frequent dredging to prevent road flooding.
- The alignment of downstream dredging doesn't make a big difference on flood levels.
- Elevating the road and expanding the bridge has the longest lasting flood reduction benefits for the road.
- Vegetation management won't solve the problem, but it will help in combination with other actions.
- All solutions will require numerous permits, but all can be permitted.
- Habitat impacts/benefits vary widely, but improving fish passage and reducing sediment loads through floodplain restoration are the most significant benefits.

## The Solution

- Implement upland sediment control activities
- Reconnect/restore upstream floodplains to promote sediment deposition and improve habitat
- Create flow capacity at the road either through dredging or by building a causeway
- Restore/create an open channel to provide habitat connectivity

# Next Steps

[www.sanmateorcd.org/PescaderoFlooding.html](http://www.sanmateorcd.org/PescaderoFlooding.html)



Hydrology | Hydraulics | Geomorphology | Design | Field Services



Photo courtesy Hall Beach Bayview

### Solutions to Flooding on Pescadero Creek Road



Prepared for:  
San Mateo County Resource  
Conservation District

Prepared by:  
cbec, inc. eco engineering  
with assistance from Stillwater Sciences

October 17, 2014

Project # 13-1032



Public Meeting



11/17/2014



Stillwater Sciences