

# RECLAMATION

*Managing Water in the West*

## Roza Dam Evaluation Post Modifications

- Gate Operation
- Gate Modifications
- Evaluation



U.S. Department of the Interior  
Bureau of Reclamation

# Roller Gate Operation

- Low flow operation inhibits fish from passing dam
- Underflow, low flow in early spring, existing bypass system
- Tuck to operate with 1' surface spill requires ~ 1200 cfs



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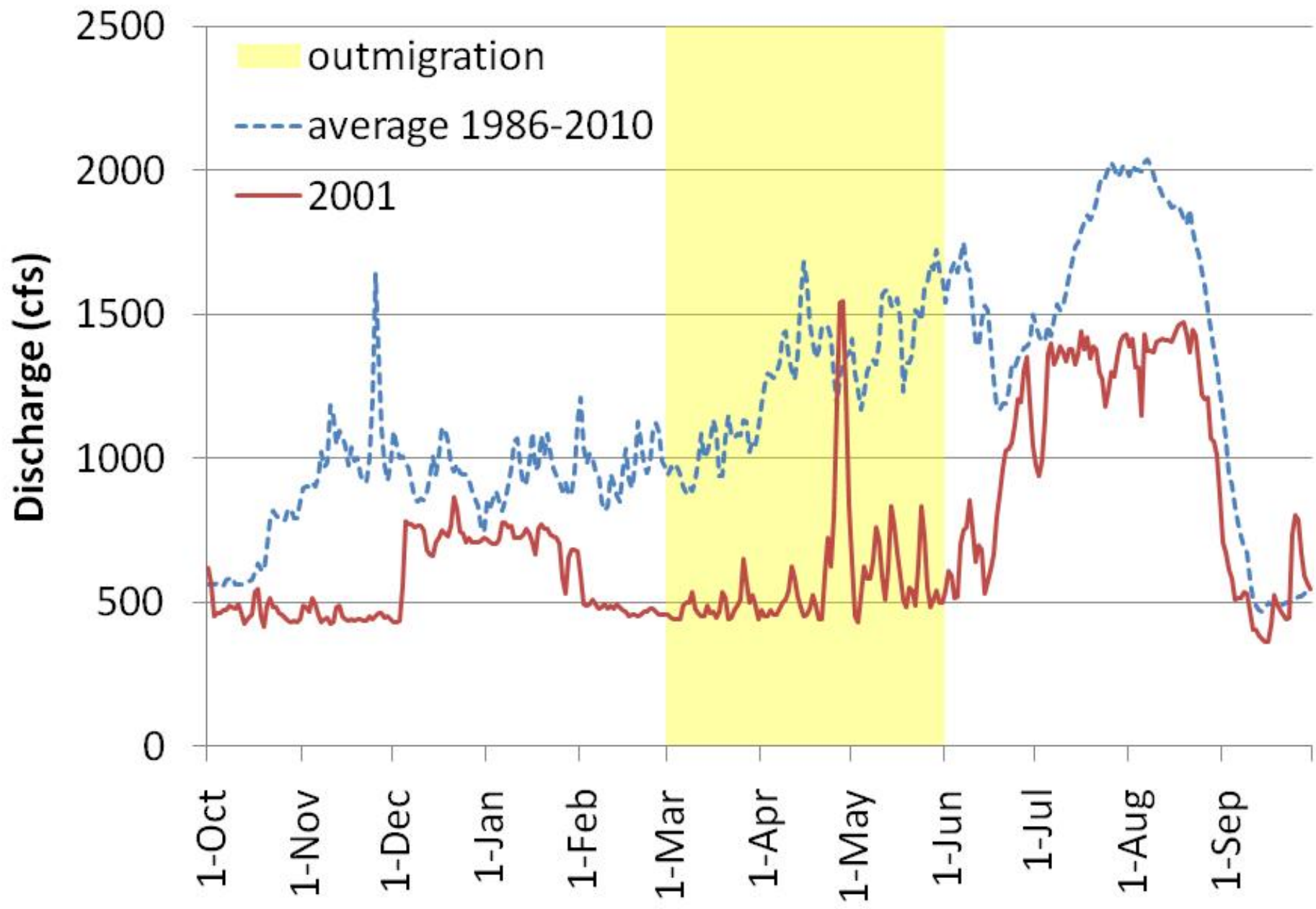
# Roller Gate Operation

Roller Gate Opening (inches)	Discharge below Roza (cfs)
1.2	400
2.4	500
3.6	600
4.8	700
6.0-8.4	800
9.6	900
10.8	1,000
12	1,100
13.2	1,200

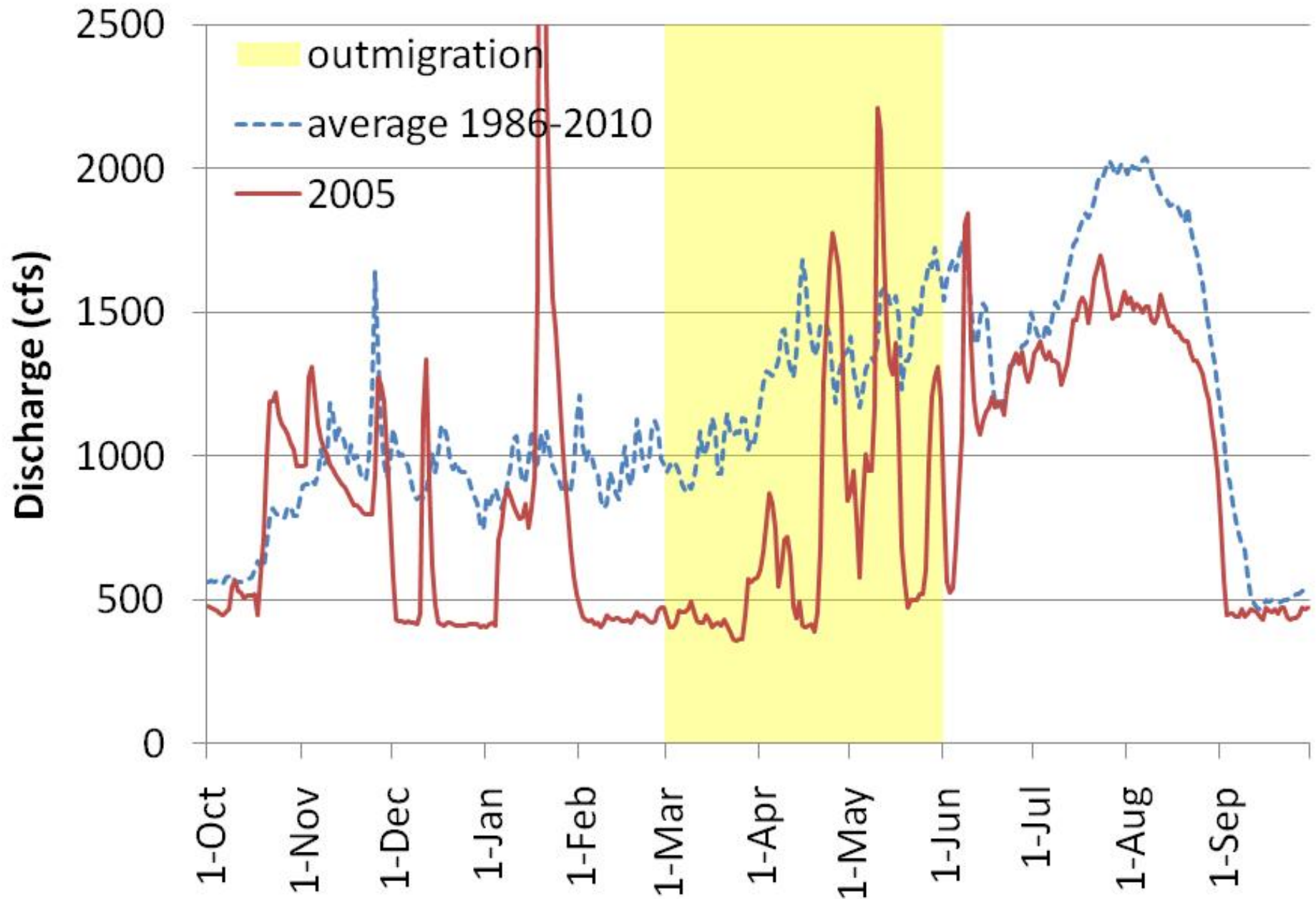
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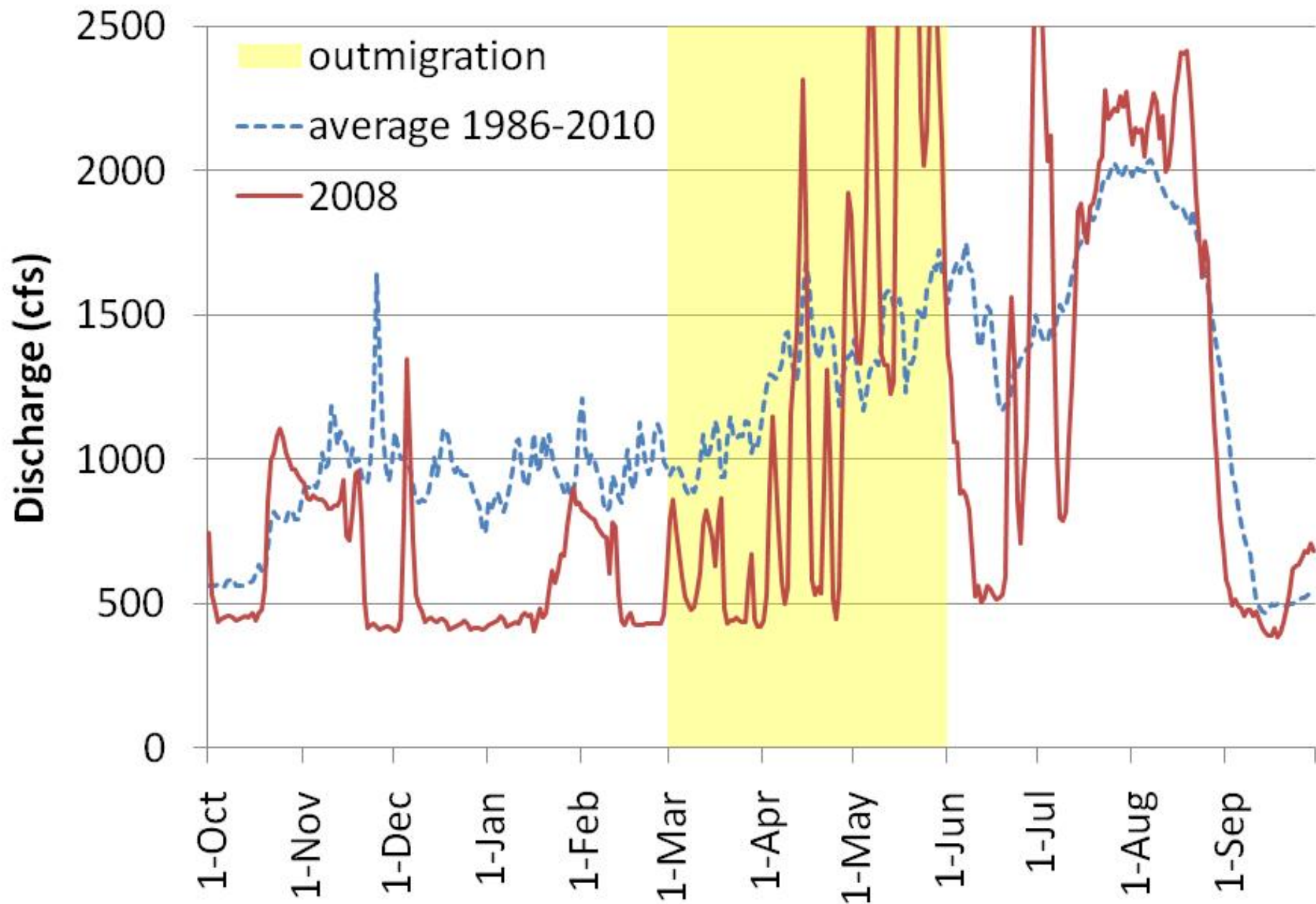
# Flows Below Roza Dam



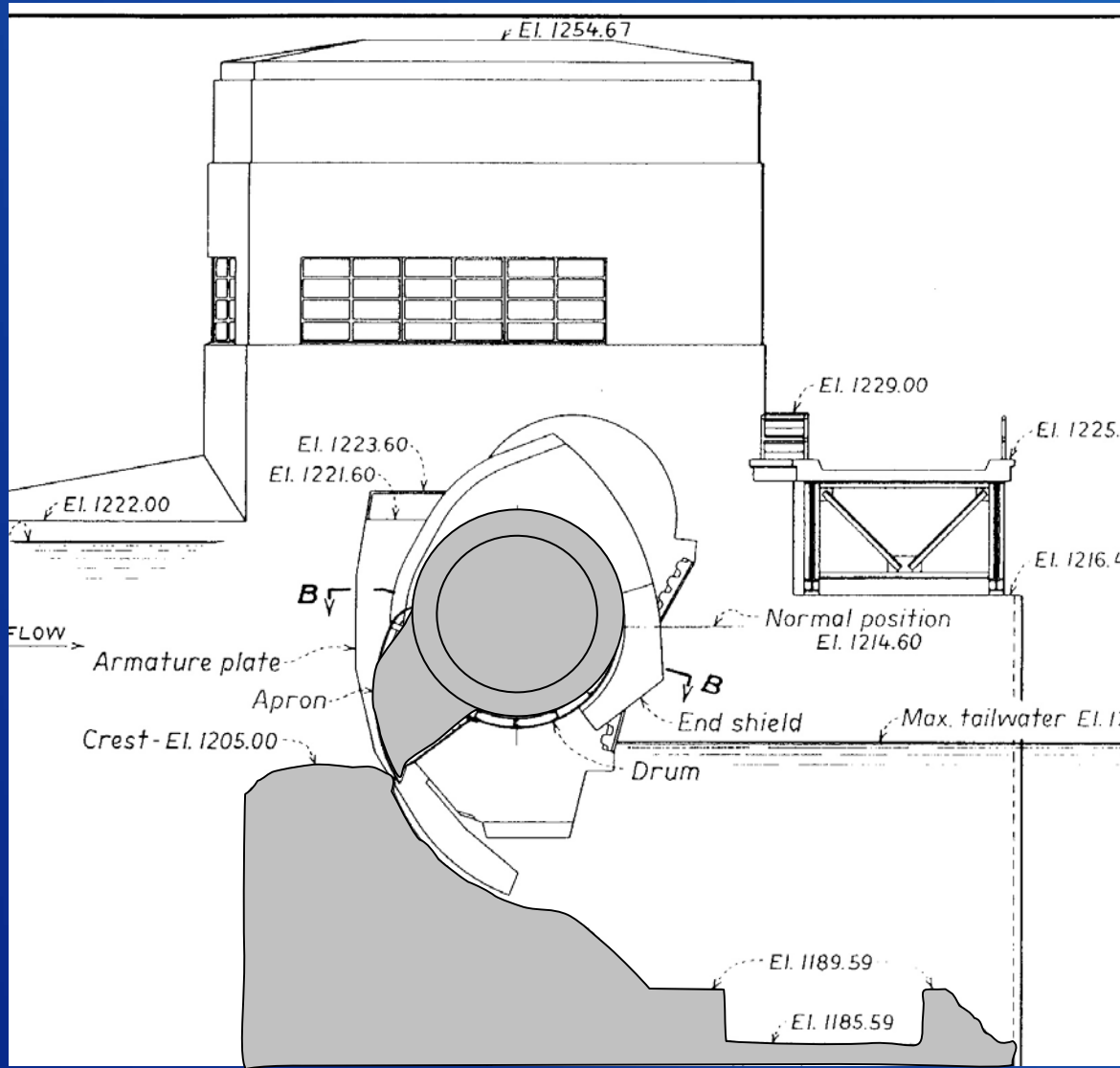
# Flows Below Roza Dam



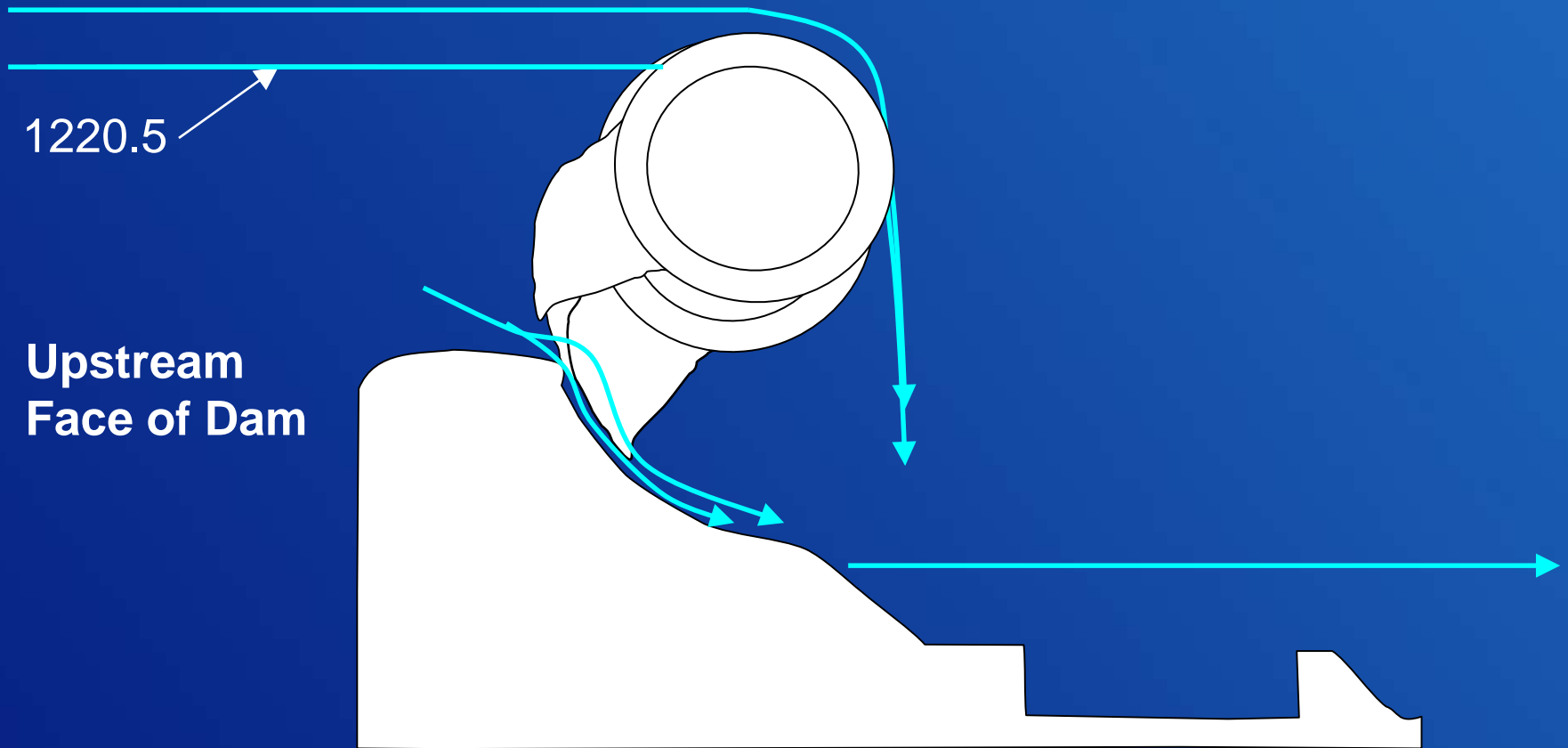
# Flows Below Roza Dam



# Roza Roller Gate XS



# Roza Dam Operations Pre-Mod



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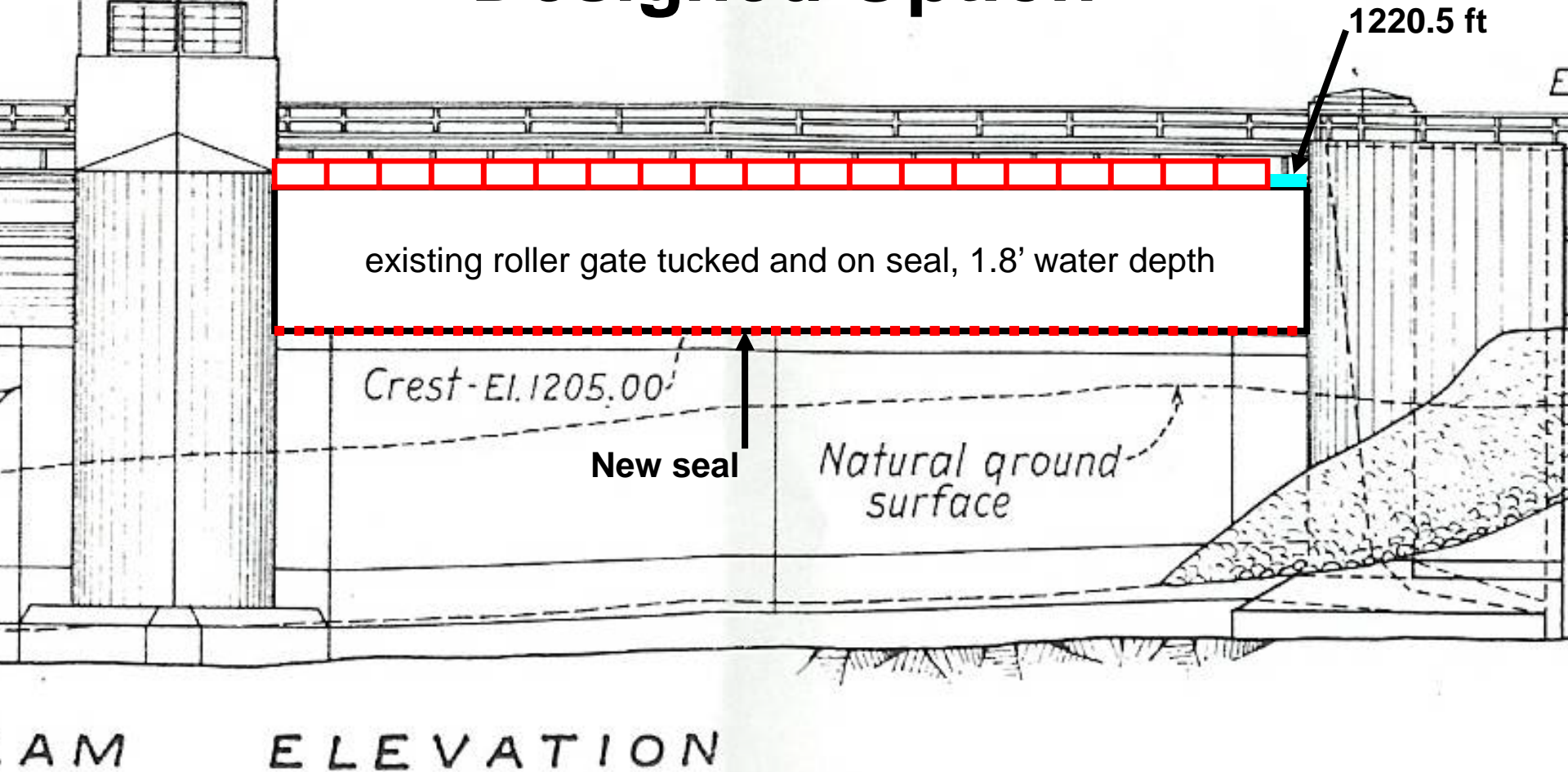


# Previous Study

- Visual observations of juvenile salmonids jumping out of water in Roza pool when flow target was in 400-500 cfs range
- After tuck fish appeared to have left over the gate and no more jumping
- Hydroacoustic observations in spring of 2005, 2006, and 2007
  - Showed that densities of fish decreased after tucks began and increased after tucks were discontinued
- All qualitative data only



# Designed Option



East gate maintains forebay elevation. Manual weir gates hold back water over part of the gate while keeping the west roller gate on seal. Full length deflector on downstream side of dam directs fish to deep water.

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# Roller Gate Mods Update

- All modifications completed and tested by Dec 16, 2010





# Roller Gate Mods Update



10/12/2010

# Flow over roller gate

Weirs down	Linear feet of surface flow	cfs over roller gate *
0	2.9	20
1	7.5	57
1.63	10.4	81
3	16.7	131
11	53.4	426
23	108.5	869
*given 1.8 ft water depth		

# HPA provisions

- Reclamation will monitor fish passage at the manual weirs to develop an operational protocol for the weirs that considers flow, timing, and weir settings that optimize smolt and adult survival
- Reclamation will study to ensure that passage and survival of migrating salmonids is maintained or improved between the Roza Dam forebay and the confluence with the Naches River

# Study Development

- **Determine best way to investigate**
  - PIT tags?
  - HTI tags?
- **Large number of PIT tagged fish in YKFP made PIT tags logical choice**
- **Existing PIT tag technology was not capable of good detection near such large metal infrastructure**
- **Pacific States Marine Fisheries Commission developed technology to make detections work in this situation**



# Prototype PIT tag antenna





# PIT tag antenna installation



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# Roza Roller Gate Fish Passage Operations



1.63 manual weirs  
down

03/02/2011

ON



# Roza Roller Gate Fish Passage Operations



04/18/2011

ON



# Benefits

- **Detector on dam allows**
  - Yakama Nation to monitor releases from hatchery
  - YFO to document how many fish are passing over the gate at low to medium flows
  - Estimates of survival and travel time between Roza Dam and Prosser
- **Detector near end of reach above confluence with Naches allows**
  - Estimates of fish survival and travel time between the dam and the confluence with the Naches river
  - YFO to document fish passing dam at high flows

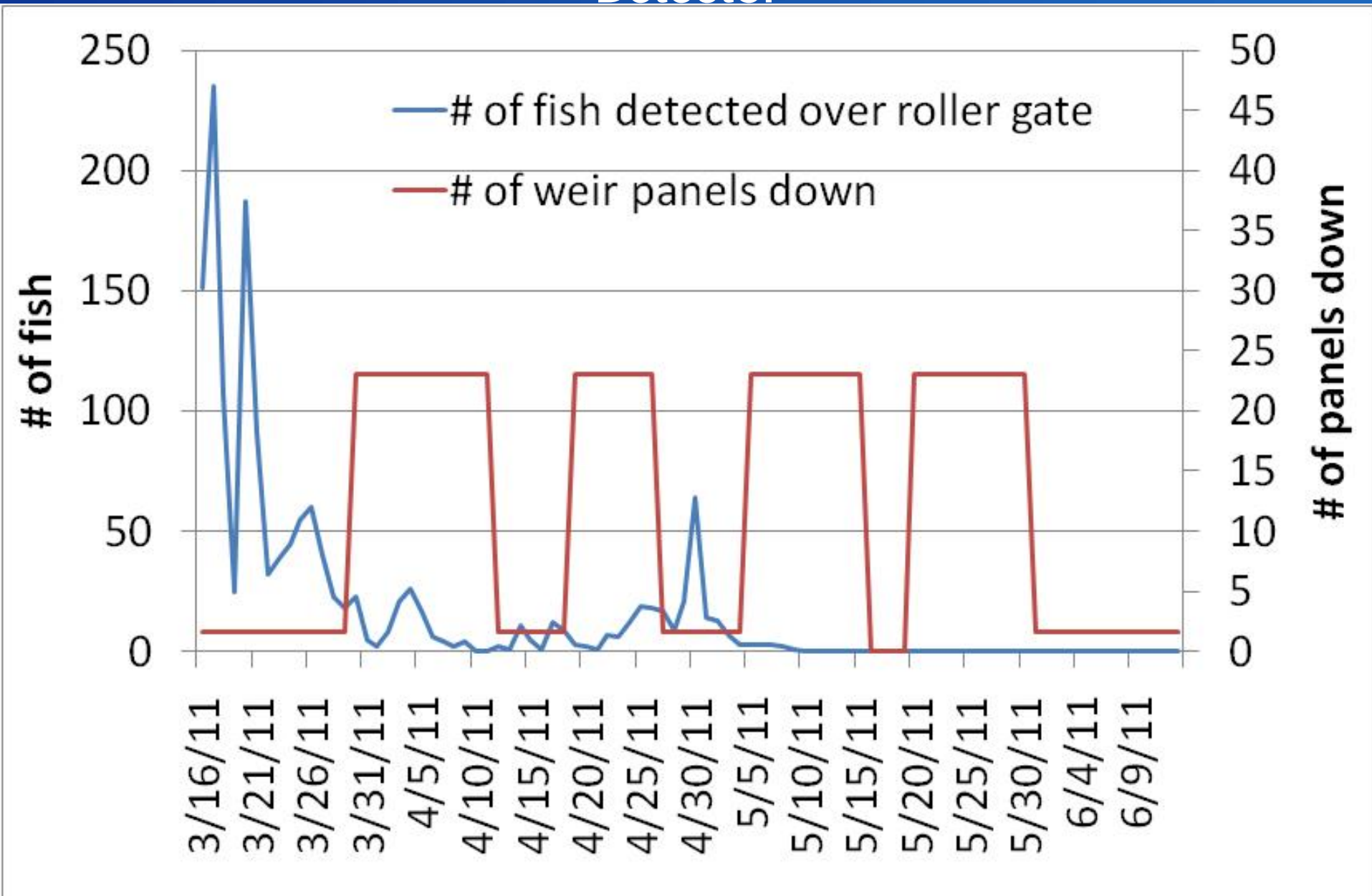
# Roza Fish Passage Evaluation

- **With PIT tag detector on Roller Gate and Chandler**
- **Beneficial data:**
  - Develop relationship between predation and flow in bypassed reach (Mike Porter PIT tag collection)
  - Get survival data from Roza to Chandler at various flow scenarios, qualitative relative to Roza bypassed reach
  - General passage conditions in an above average water year
  - Enhance *O. mykiss* monitoring for YKFP anadromous versus resident study by reducing need for number of fish handled and getting an intermediate point for survival to chandler
  - Continue refining relationship between fish going over the gate versus through the fish bypass at different diversion rates and flows above the dam
  - Continue refining detection efficiency under different scenarios

# Roza Fish Passage Evaluation

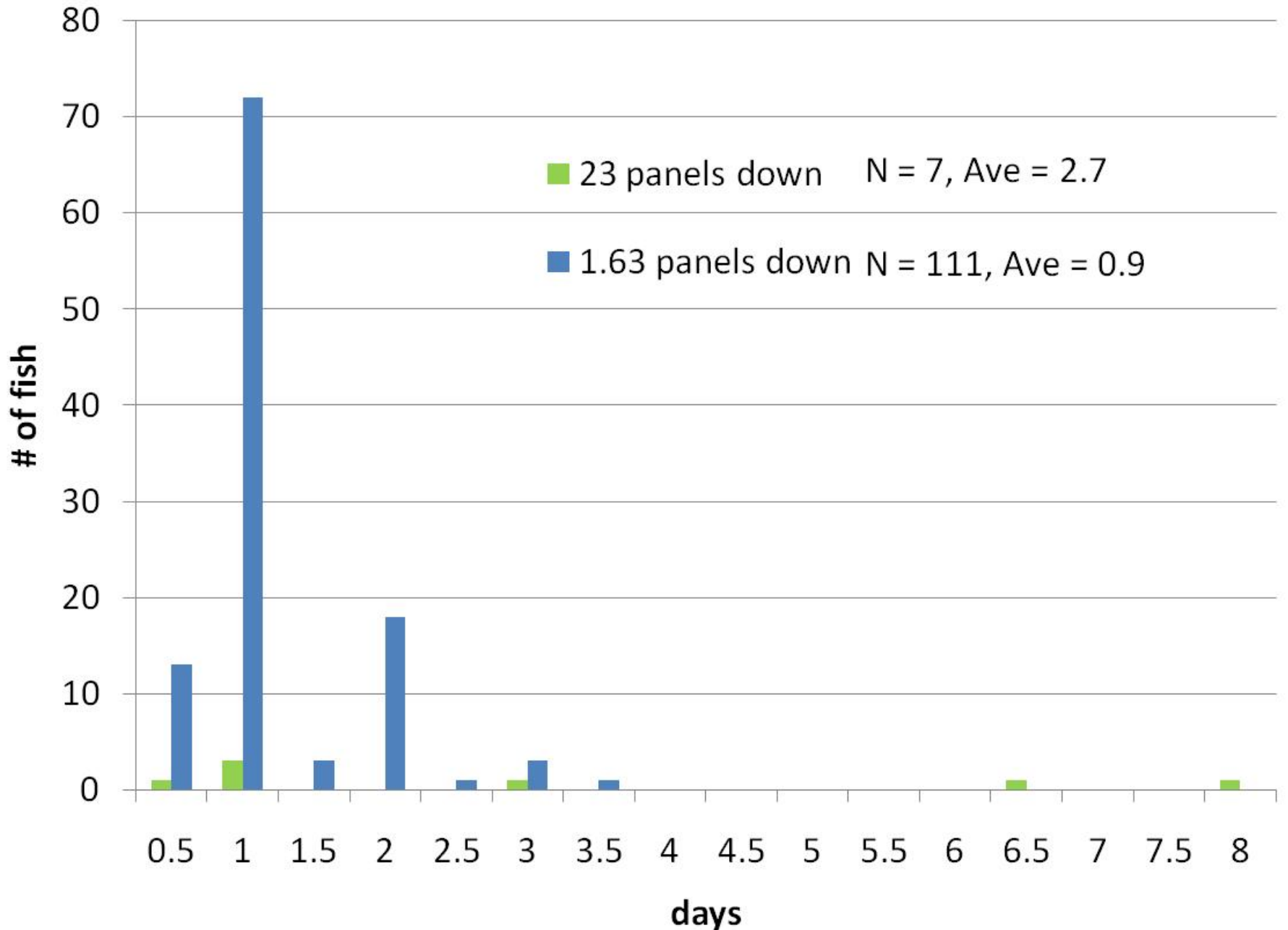
- **Quantitatively determine travel time through Roza pool**
  - **WDFW HPA requires us to study the relationship between weir configuration and survival**
  - **Yakama Nation collects fish at juvenile fish bypass trap, PIT tag if not already, and release at Roza recreation area boat launch**
  - **This occurred for weeks of March 28, April 11, 18, 25, and May 2**
  - **Data = time stamp of fish at release and detection points, weir configuration, flow**

# Total Hatchery Smolts over Roller Gate PIT Tag Detector





# Roza Roller Gate PIT Tag Detections



# Funding

- **Roza Dam PIT tag detector**
  - YFO contributing ~\$12,000 for parts and some labor to build the PIT tag antennas
  - Yakama Nation supplying PIT tagged fish from hatchery and coho program (\$100,000/year) and transceivers (\$20,000)
  - PSMFC providing design and fabrication of antenna (~\$30,000) as well as antenna maintenance and on-line monitoring/data management (\$8,600/yr)
  - Reclamation contributed ~\$100,000 to provide power and telemetry infrastructure at dam

- Downstream Channel-spanning PIT tag detector estimated to cost \$70,000-\$100,000

