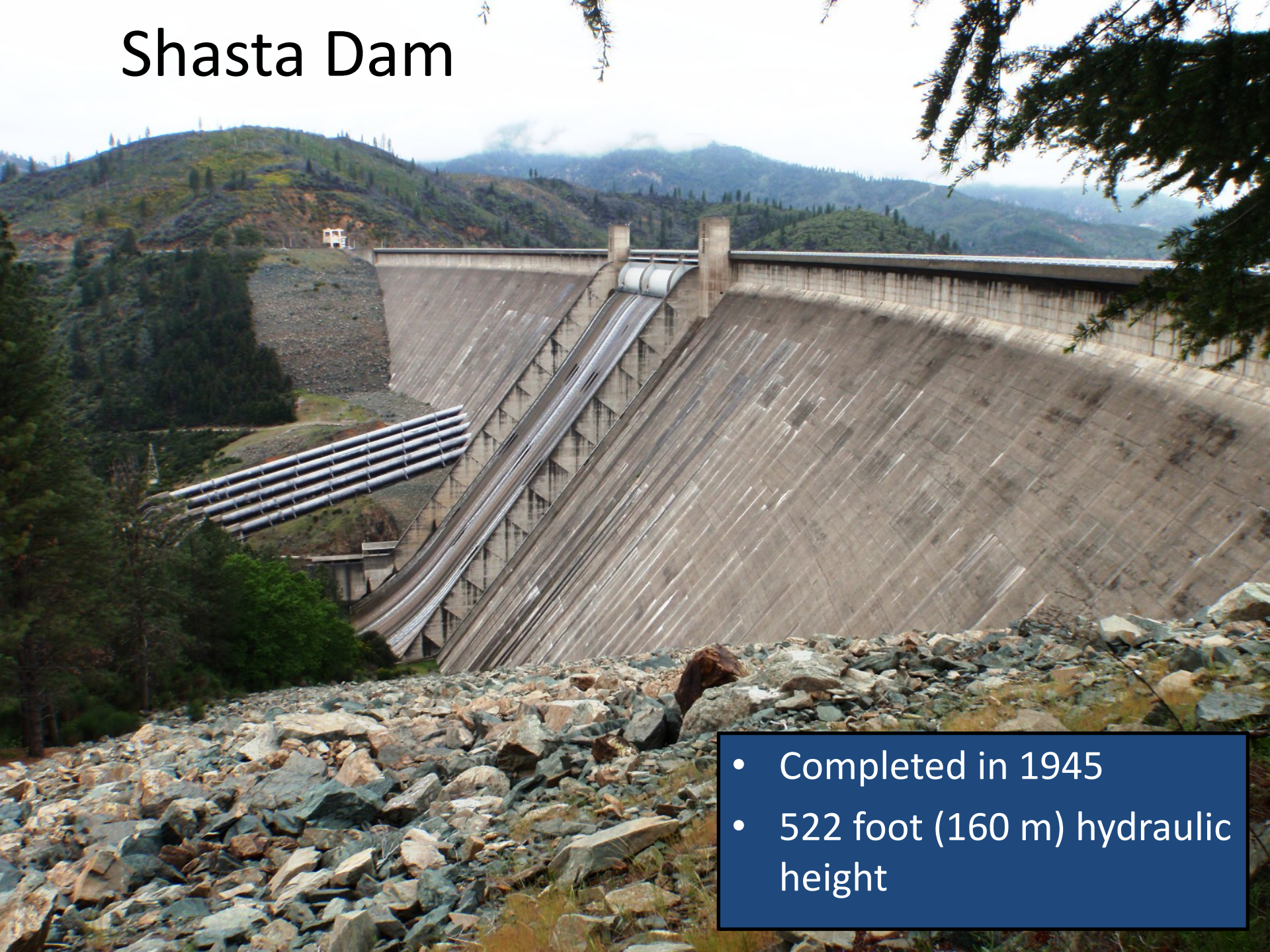


Pilot Program Upstream and Downstream Fish Passage at Shasta Dam



Randy Beckwith
CA Fish Passage Forum
September 27, 2017

Shasta Dam

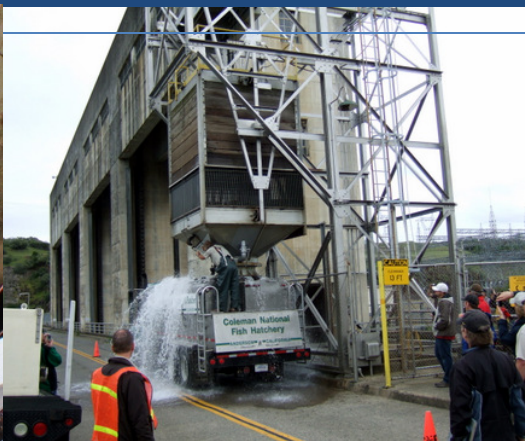


- Completed in 1945
- 522 foot (160 m) hydraulic height

Keswick Dam



- 10 miles downstream of Shasta Dam
- Hydraulic height is 118 feet (36 m)



Upstream Passage

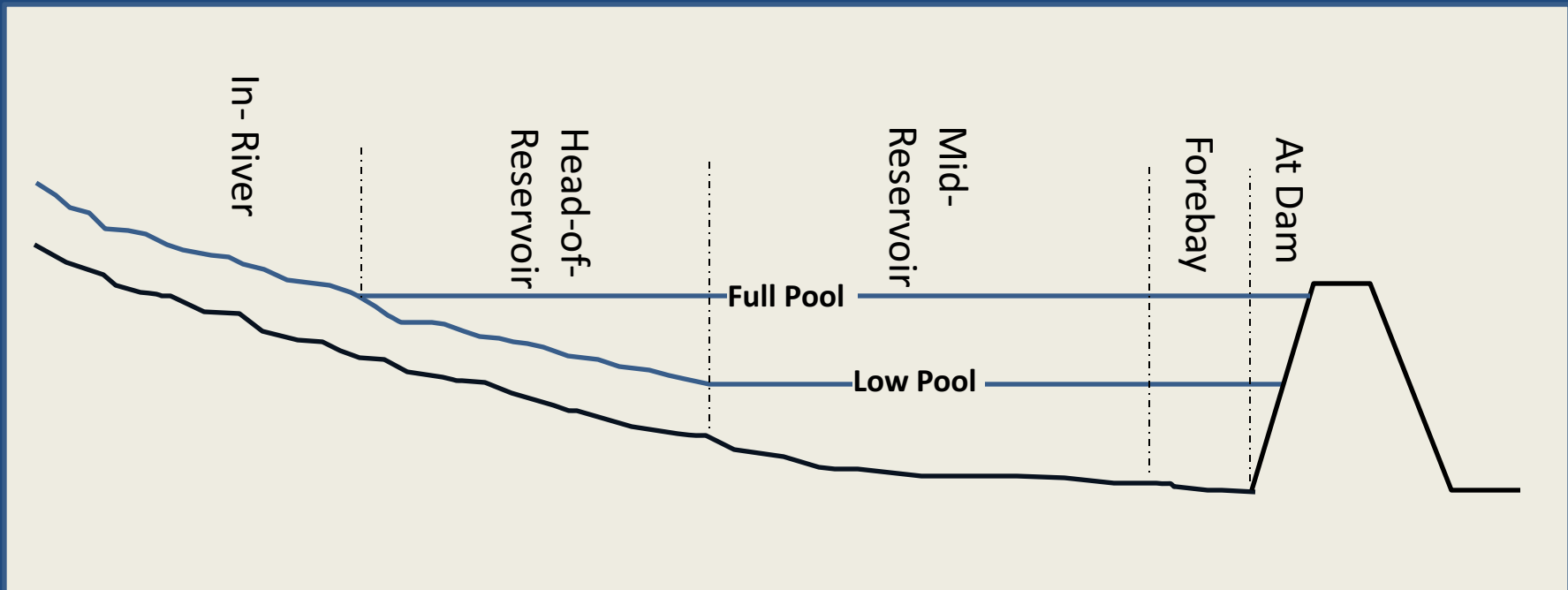
- Initially trucking captive broodstock juveniles from Livingston Stone Hatchery
- Release into McCloud River just below McCloud Dam at Ash Camp
- Migration Behavior
 - Movement
 - Timing
 - Habitat Use
 - Growth
- Using adults later

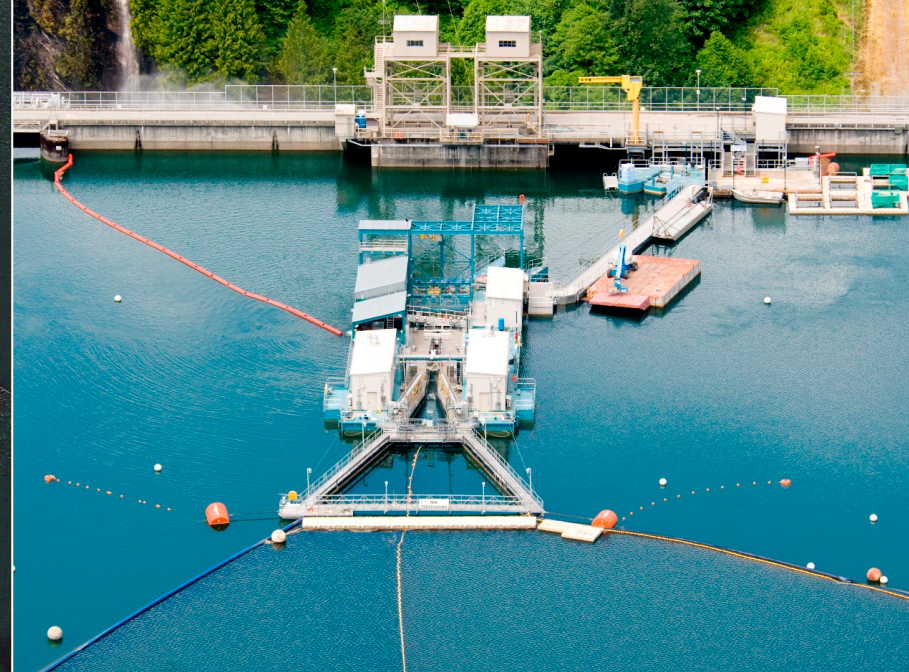


Downstream Passage Sequence

- Collect juveniles using a collection system
- Do something to ID them (tags, marks?)
- Move them to a transport truck
- Drive to below Keswick Dam
- Fish stress investigations?
- Release into Sac River

Downstream Passage Juvenile Collection Location

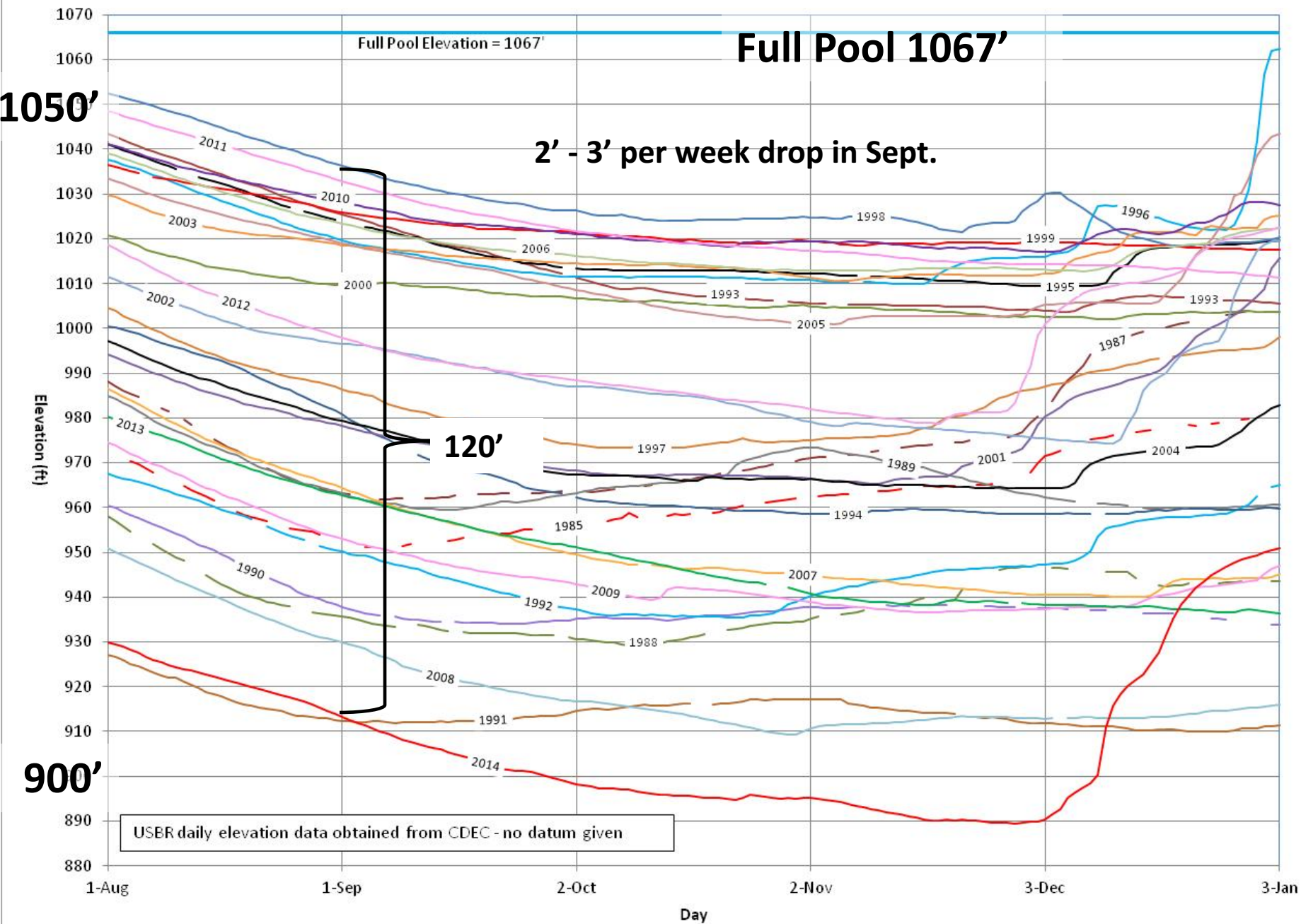


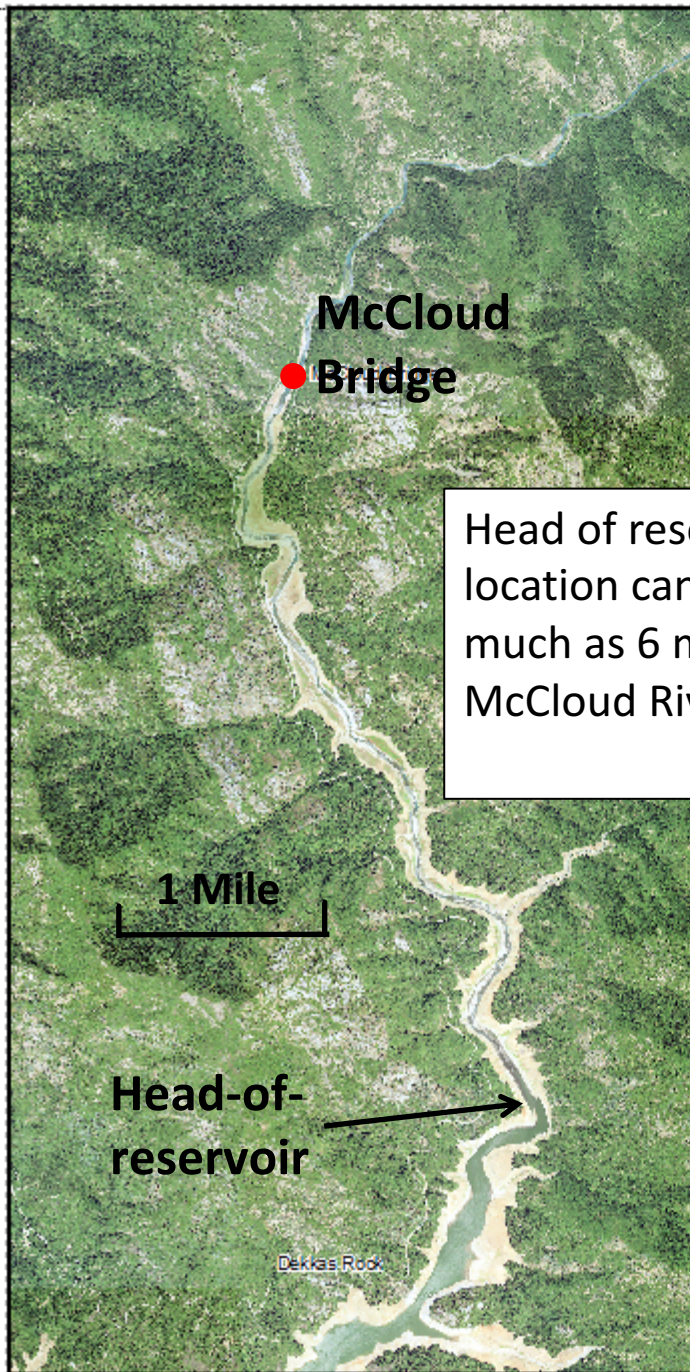


Main Juvenile Collection Challenges

- Large fluctuations in reservoir elevation
- High potential debris loads
- High water temperatures in reservoir
- High flows in the McCloud River
- Big, long reservoir
- Multiple culturally significant sites along lower McCloud River
- Private fishing clubs along lower McCloud River
- Recreation and resident fish impacts
- No power

1985 - 2014 Shasta Lake Reservoir Elevation for Aug 1 - Jan 3





Low Reservoir: 12/3/2014 image
Stage: 890

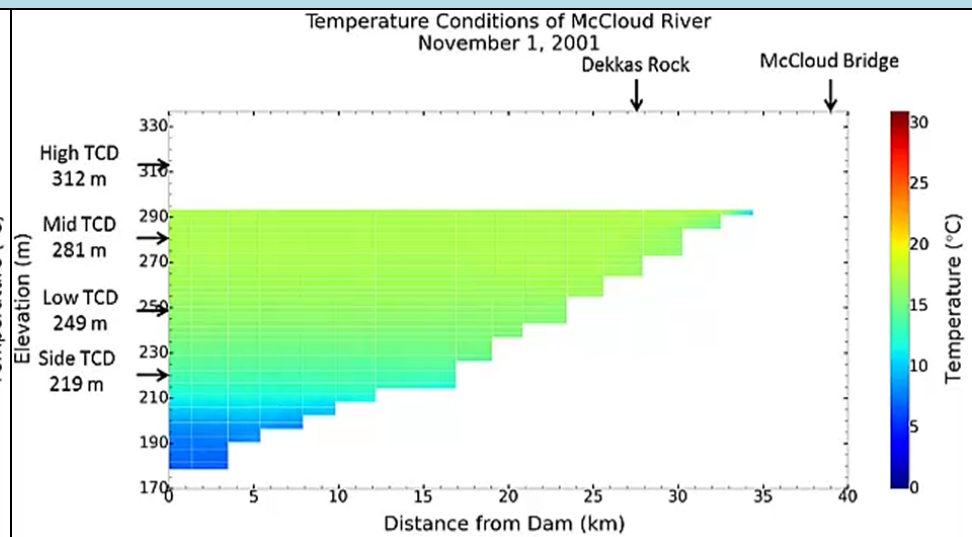
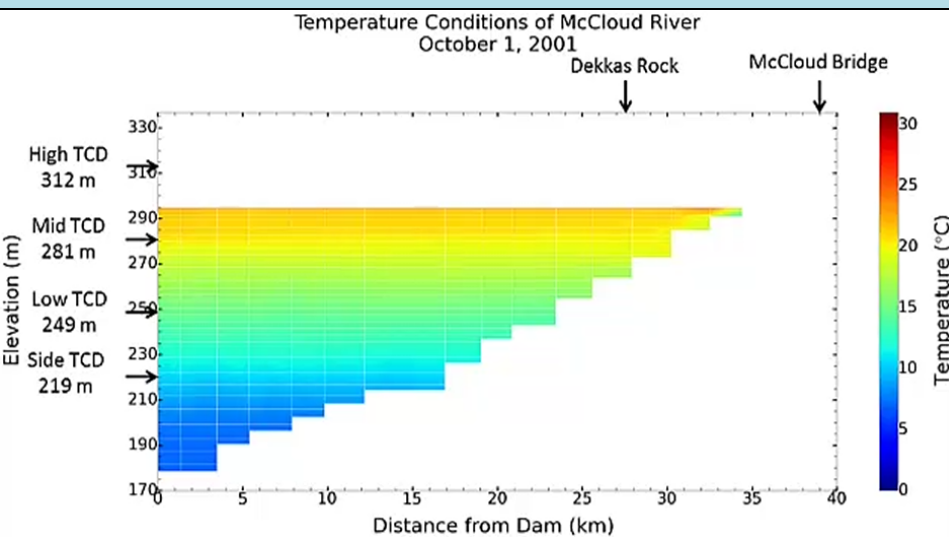
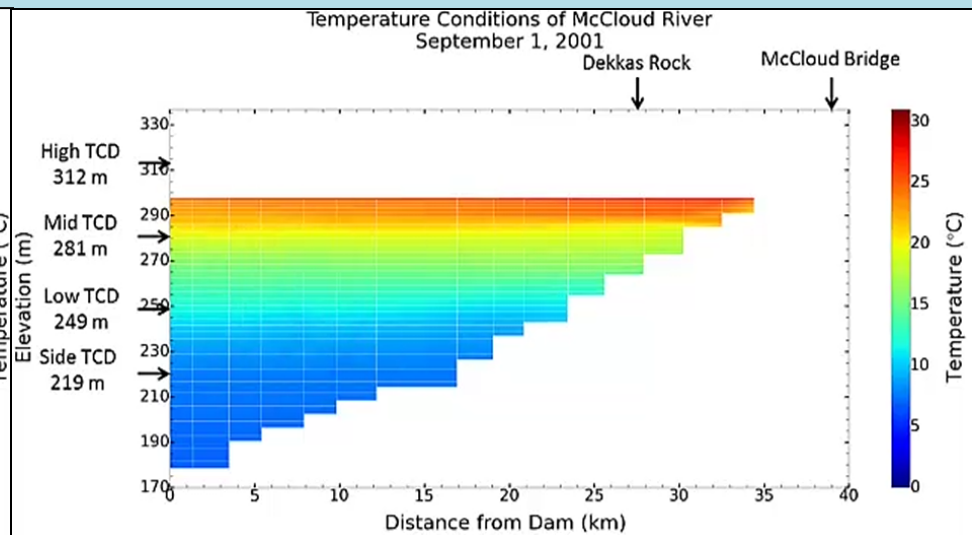
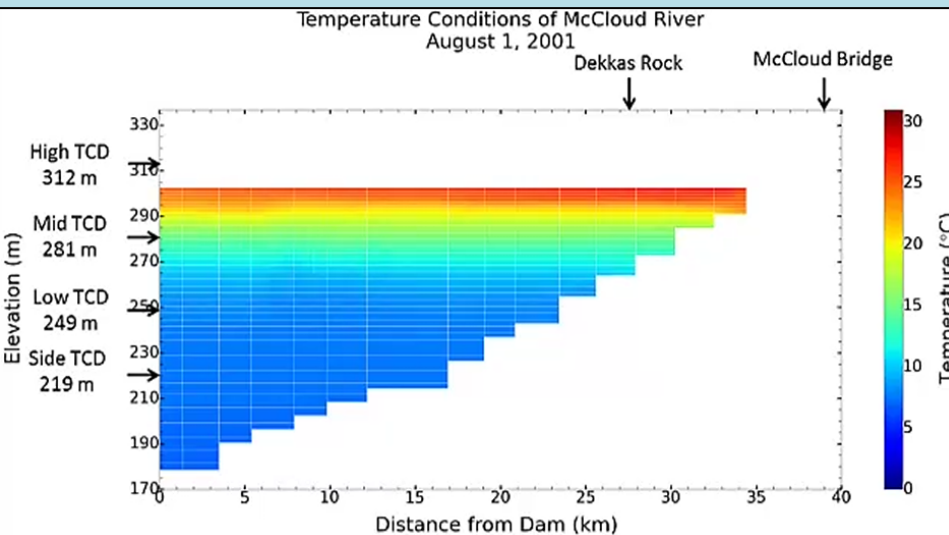


High Reservoir: 2012 NAPP image

Head of reservoir
location can vary by as
much as 6 miles on the
McCloud River

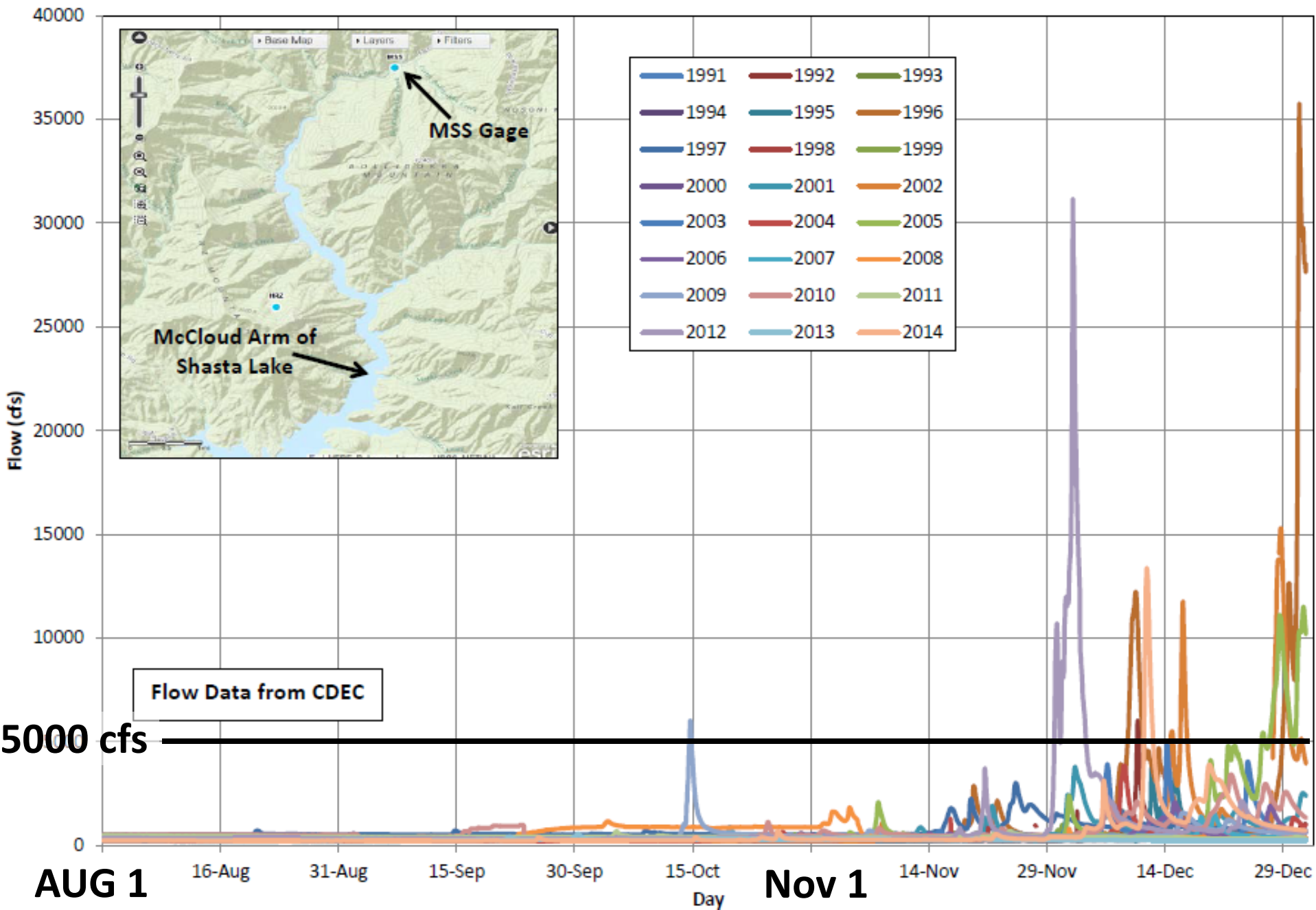


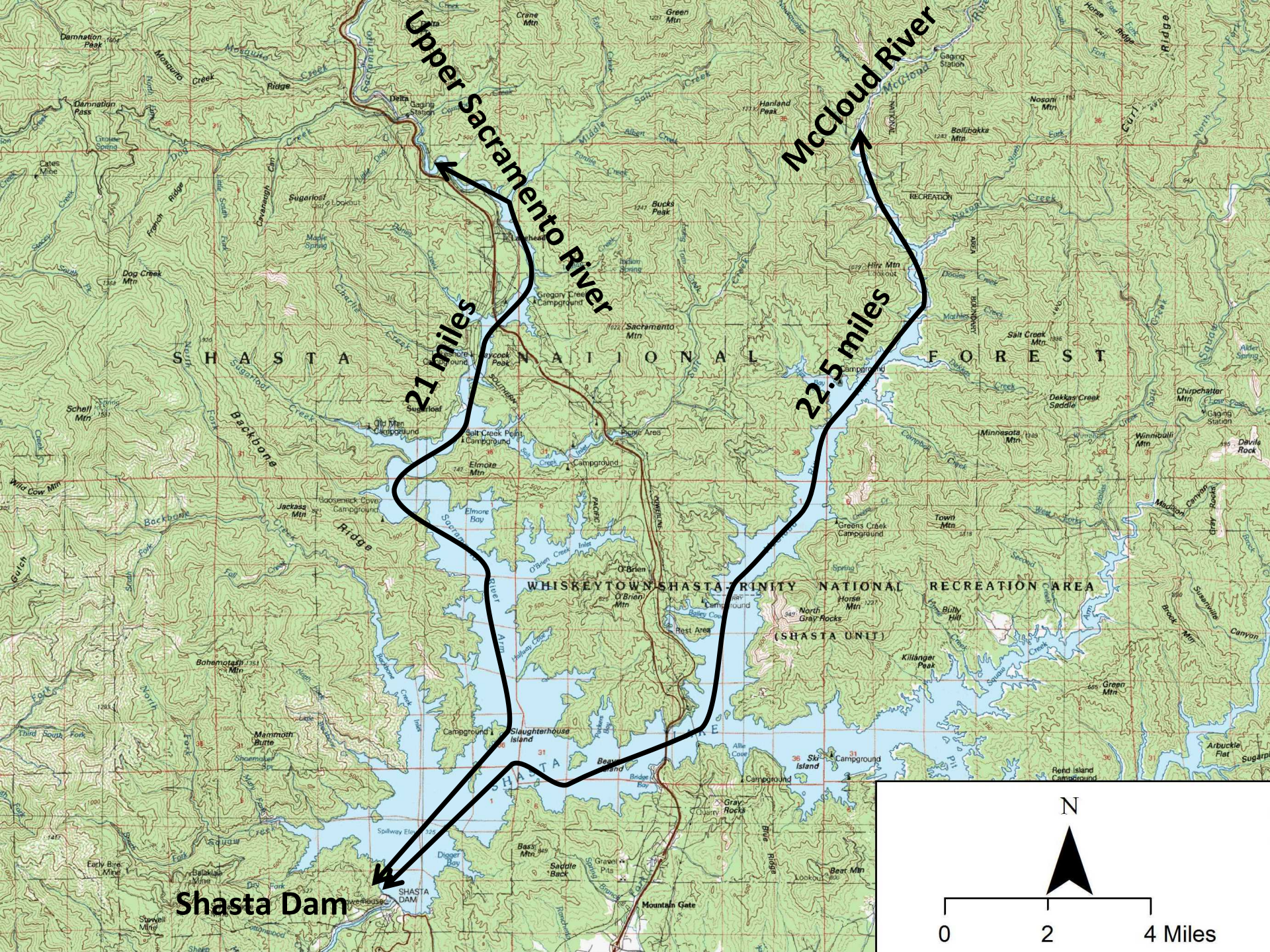
Reservoir Temps



Modeling by University of Nevada, Reno - funded by USBR

Hourly Flow at MSS Gage on the McCloud River





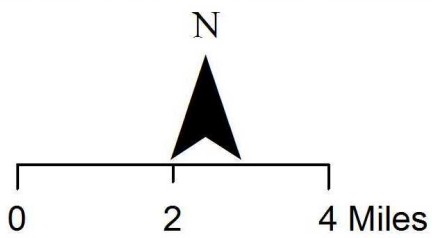
Upper Sacramento River

McCloud River

21 miles

22.5 miles

Shasta Dam



Solutions

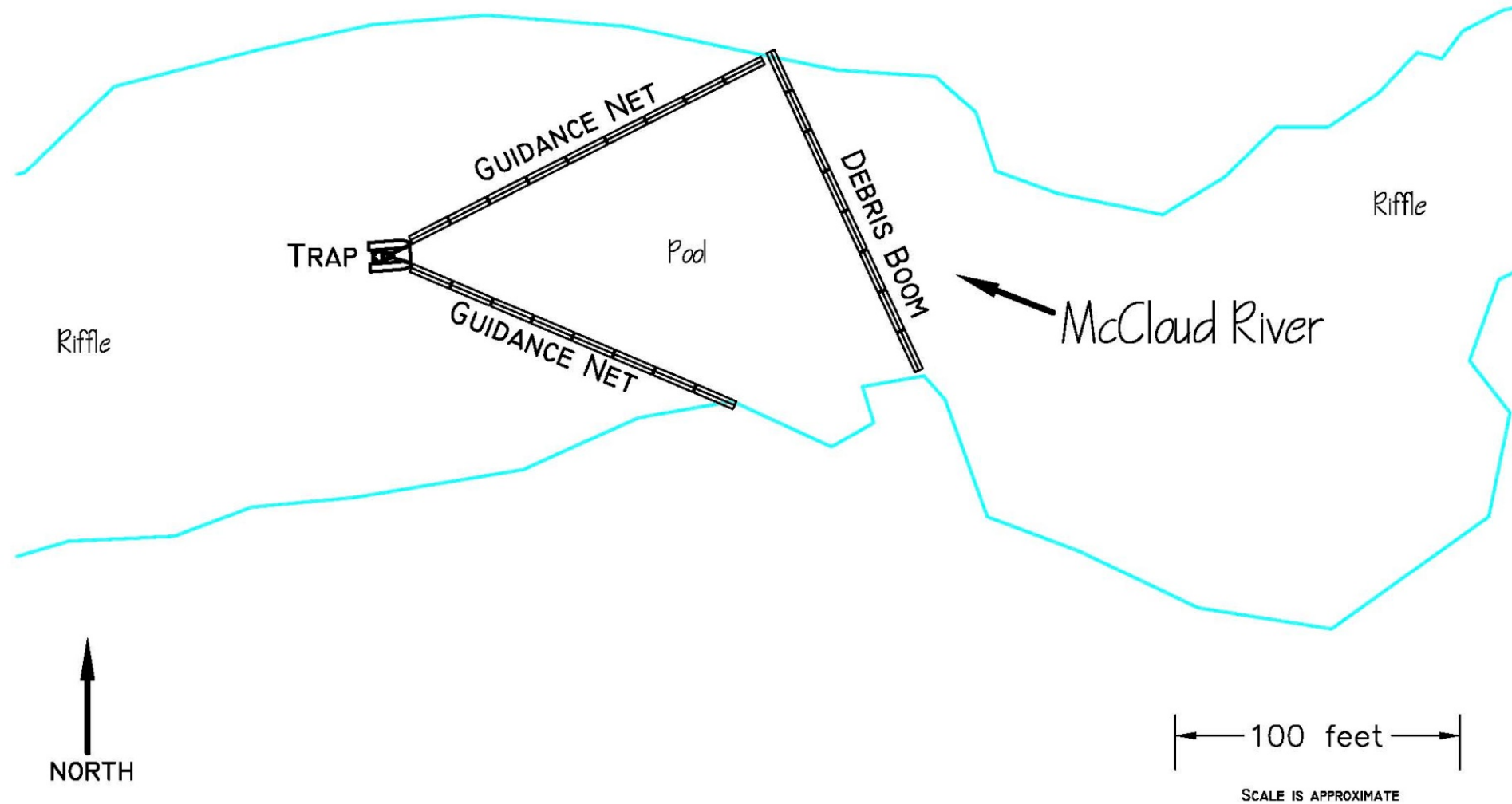
- Juvenile Collector Team of agency experts was assembled (CA, OR, WA)
- Team recommended for the pilot program we look at both In-River and Head-of-Reservoir locations
- Brainstormed design concepts which were developed into one basic concept for both locations

Juvenile Collection

Main Design Objectives

- Pilot-scale effort
- Efficient in collecting fish
- Low mortality/predation
- Safe for operators and public
- Easy to operate and maintain
- Low impact on environment and operations
- Passive – use fish behavior
- Movable and removable
- Flexible, versatile, and adaptable (to other reservoirs)

IN-RIVER COLLECTION SYSTEM CONCEPT





Potential In-River
Collection Site

Shasta Lake
McCloud River Arm



HEAD-OF-RESERVOIR COLLECTION SYSTEM CONCEPT

DEBRIS BOOM

GUIDANCE NET

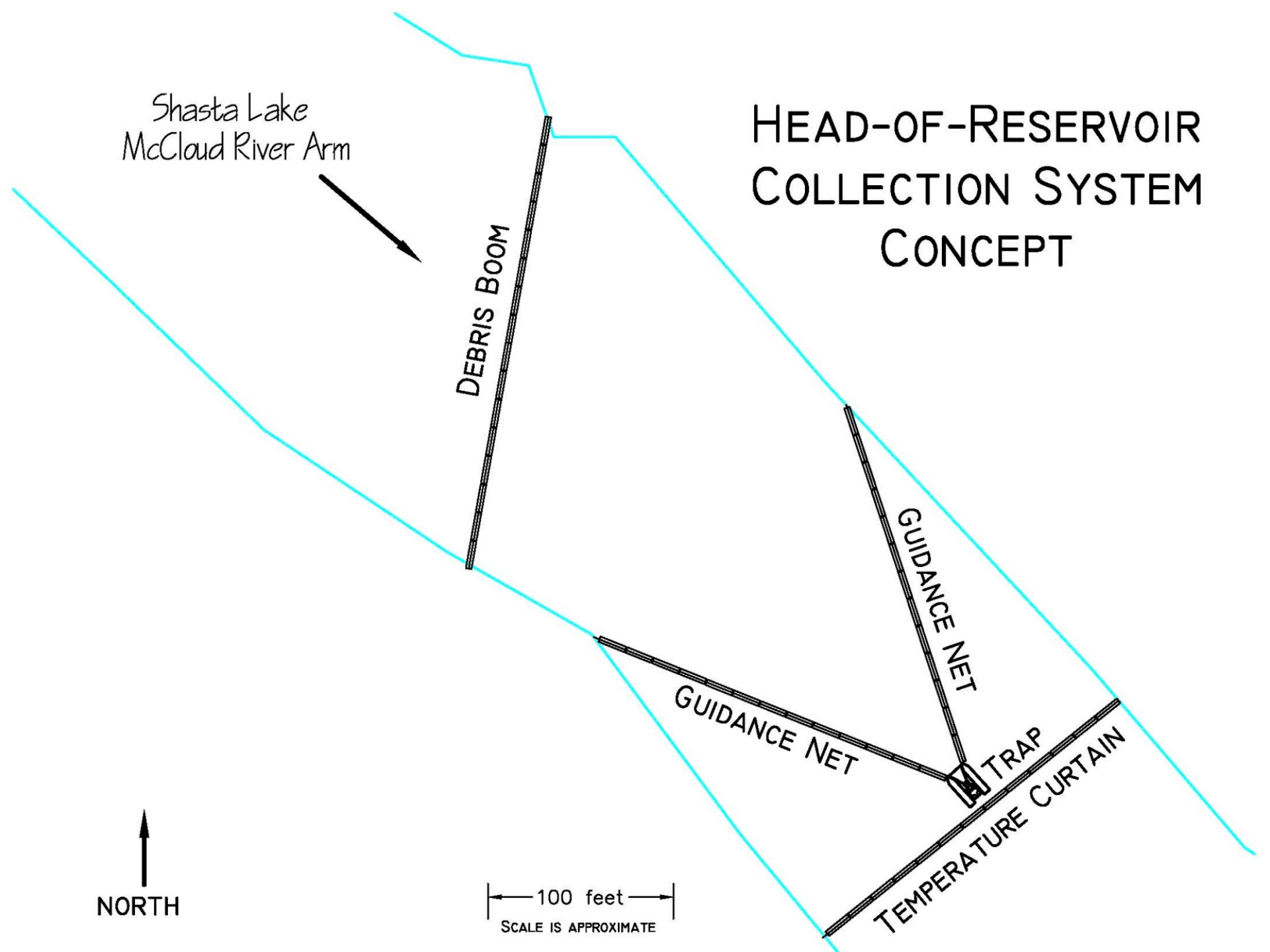
GUIDANCE NET

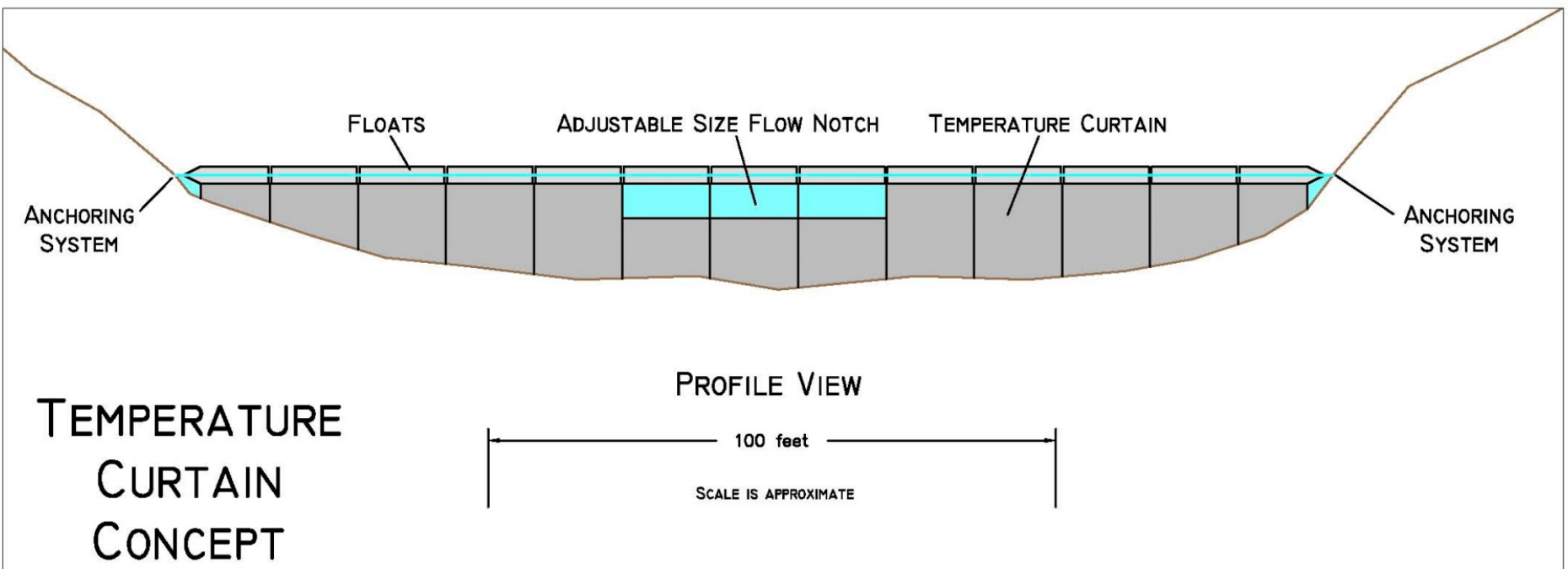
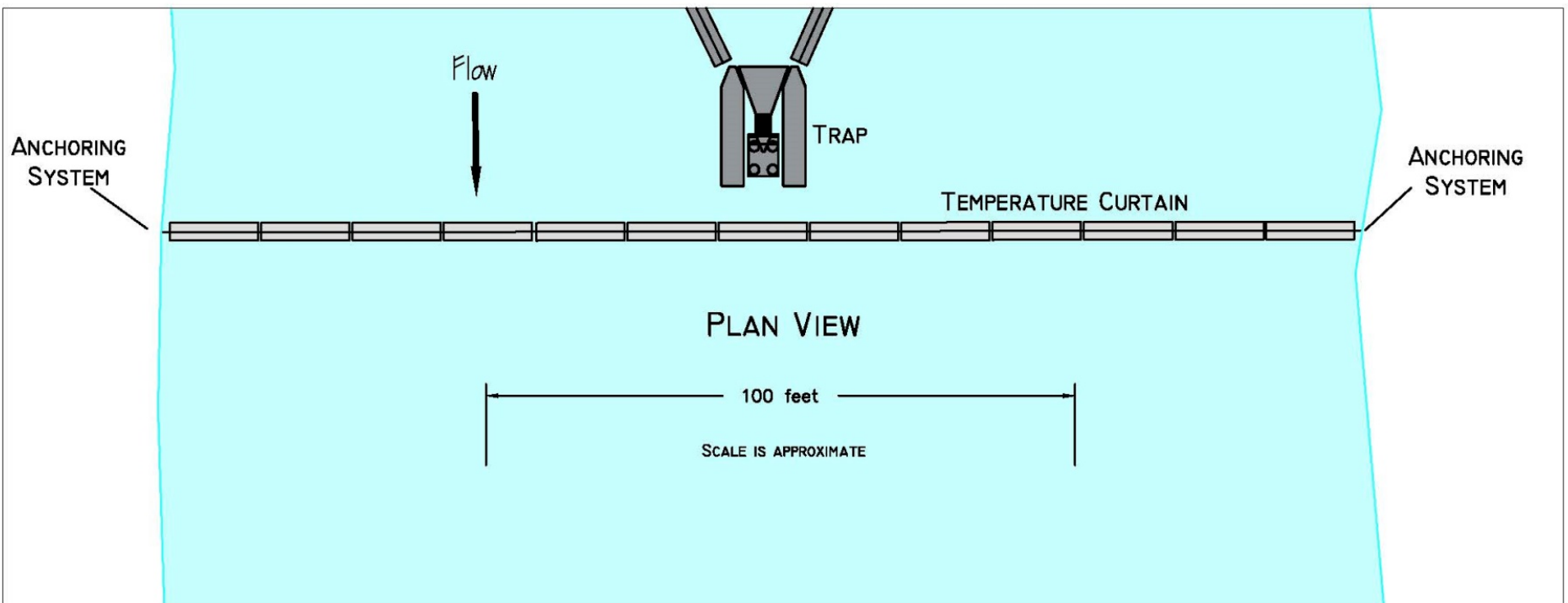
TRAP

TEMPERATURE CURTAIN



100 feet
SCALE IS APPROXIMATE

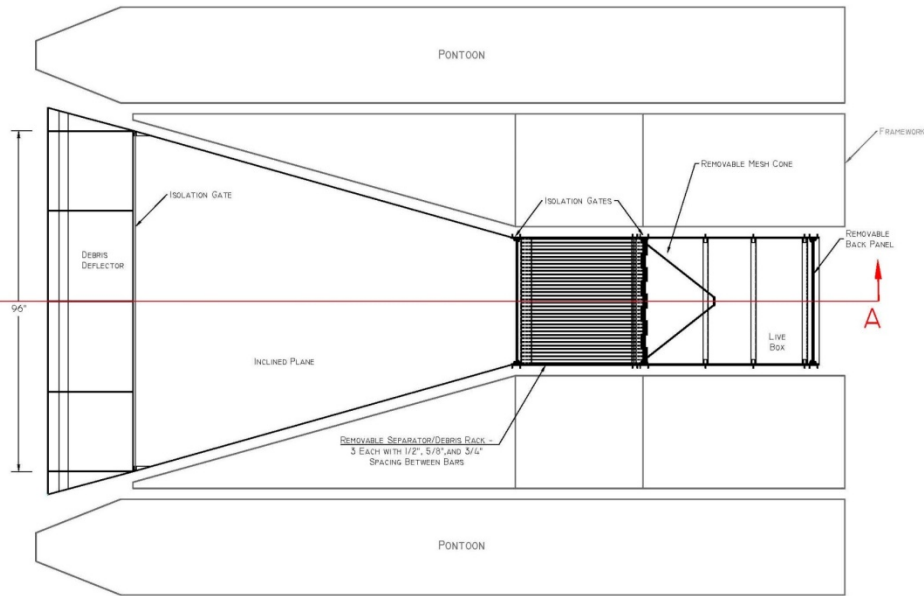




Examples of HOR Collection Sites



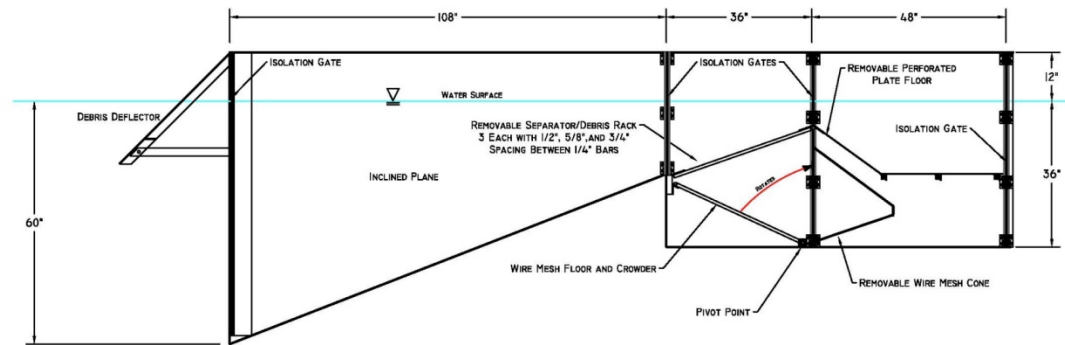
HEAD-OF-RESERVOIR TRAP PLAN VIEW



PONTOONS AND FRAMEWORK DETAILS TO BE DESIGNED BY CONTRACTOR

Trap Concept

HEAD-OF-RESERVOIR TRAP PROFILE VIEW (A - A)



Future Work

- DWR 5-year juvenile collection system agreement with Reclamation last week
 - Design and fabrication by Fall 2018 (In-River & HOR)
 - Three-year study
 - Fish
 - Debris
 - Water temperature
 - Flow
 - Efficacy of moving collection system
 - Adaptively manage – modify collection systems as needed
 - Identify and evaluate long-term passage options, including volitional passage
 - Final report and recommendations for permanent facilities by Fall 2022