

Attachment A
**Power Point Presentation
for Public Meeting—March 15, 2004**

A comparison of the preferred alternative (five dam removal) for the Battle Creek Salmon and Steelhead Restoration Project and alternative B (eight dam removal) with respect to sediment transport.

Eagle Canyon



Inskip



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North Central Valley Office

Methods

- Reviewed existing Battle Creek literature.
 - Kondolf and Katzel 1989 report
 - Greimann 2001 hydrology report
 - Data appendices from a DWR report for fish ladder design
- Collected independent specialist recommendations.
 - Ellen Wohl- Fluvial Geomorphologist, Colorado State University
 - Charles Troendle- Hydrologist, SI International, Ft. Collins. CO
 - Sandra Ryan- Research Hydrologist/Geomorphologist, USDA FS, Laramie, WY.
 - Larry Schmidt- Hydrologist, Stream Research Center, Ft. Collins CO.
 - Scott McBain- Fluvial Geomorphologist, McBain and Trush, Inc. Arcata, CA.
- Combined existing literature with specialist's recommendations for a basic analysis of changes to *magnitude* and *duration* of a threshold event.

Kondolf and Katzel report

- Evaluated March 1989 event (7800 cfs at Coleman Hatchery) and documented sediment transport.
- Evaluated management practices of sediment sluicing through radial gates at dam locations.
- Found that “There do not appear to be any serious sediment imbalances (areas of persistent aggradation or degradation) in the Battle Creek system that demand immediate management or remediation”.

Other reports (hydrology information)

- Greimann report provided necessary hydrology information.
 - Discharge per unit area relationships
 - Flood frequency curves at dam sites using flow partitioning
- DWR data appendices provided diversion quantities at North Feeder, Eagle Canyon, and Inskip diversions used for this evaluation

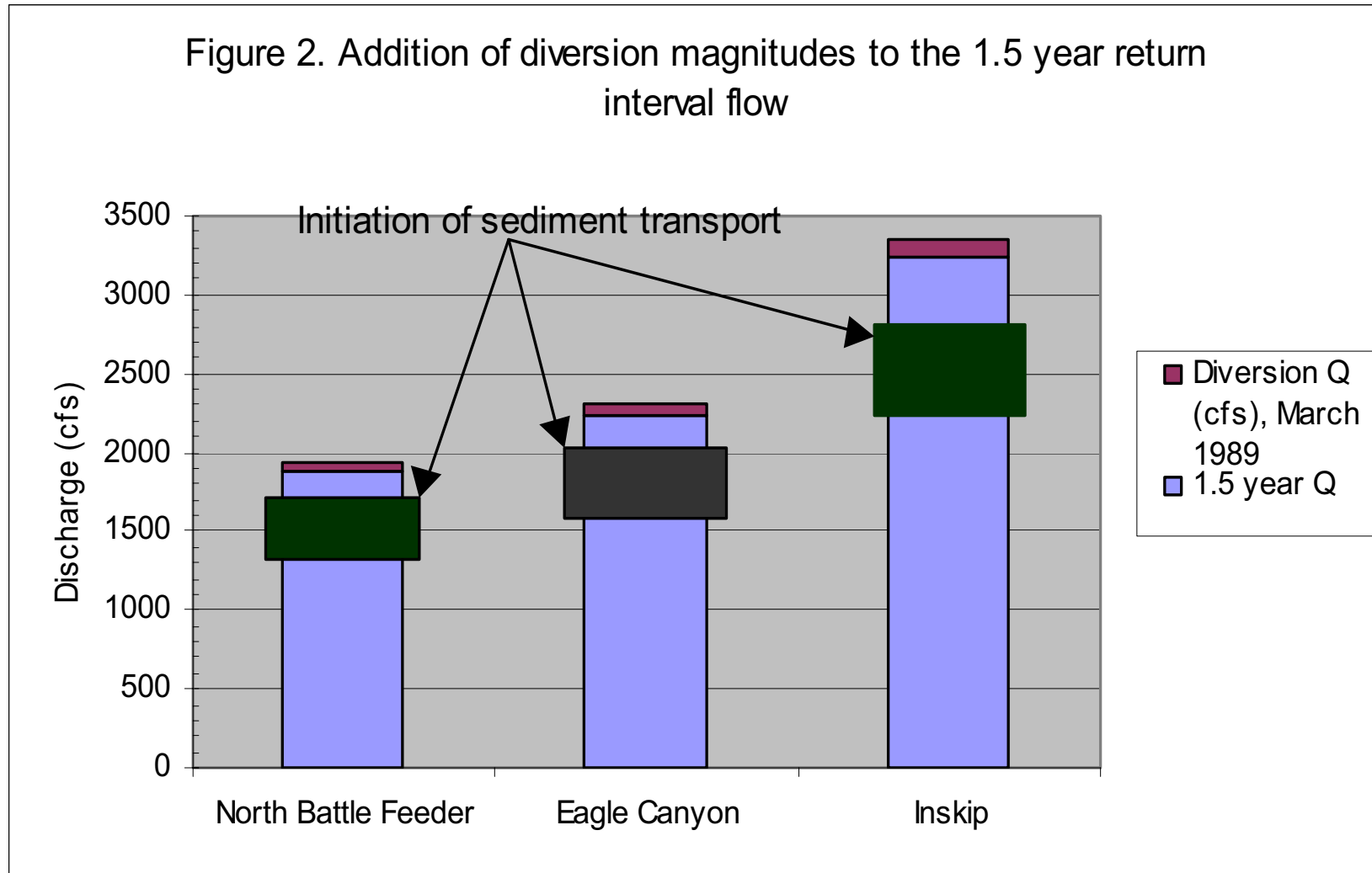
Specialist's recommendations regarding *duration* of a sediment transport event

- No definitive data specifying the necessary duration of a sediment transport event on Battle Creek.
- General agreement among the specialists that the appropriate temporal scale for evaluation of diversion impact is days (2-3) not hours.

Specialist's recommendations regarding *magnitude* of a sediment transport event

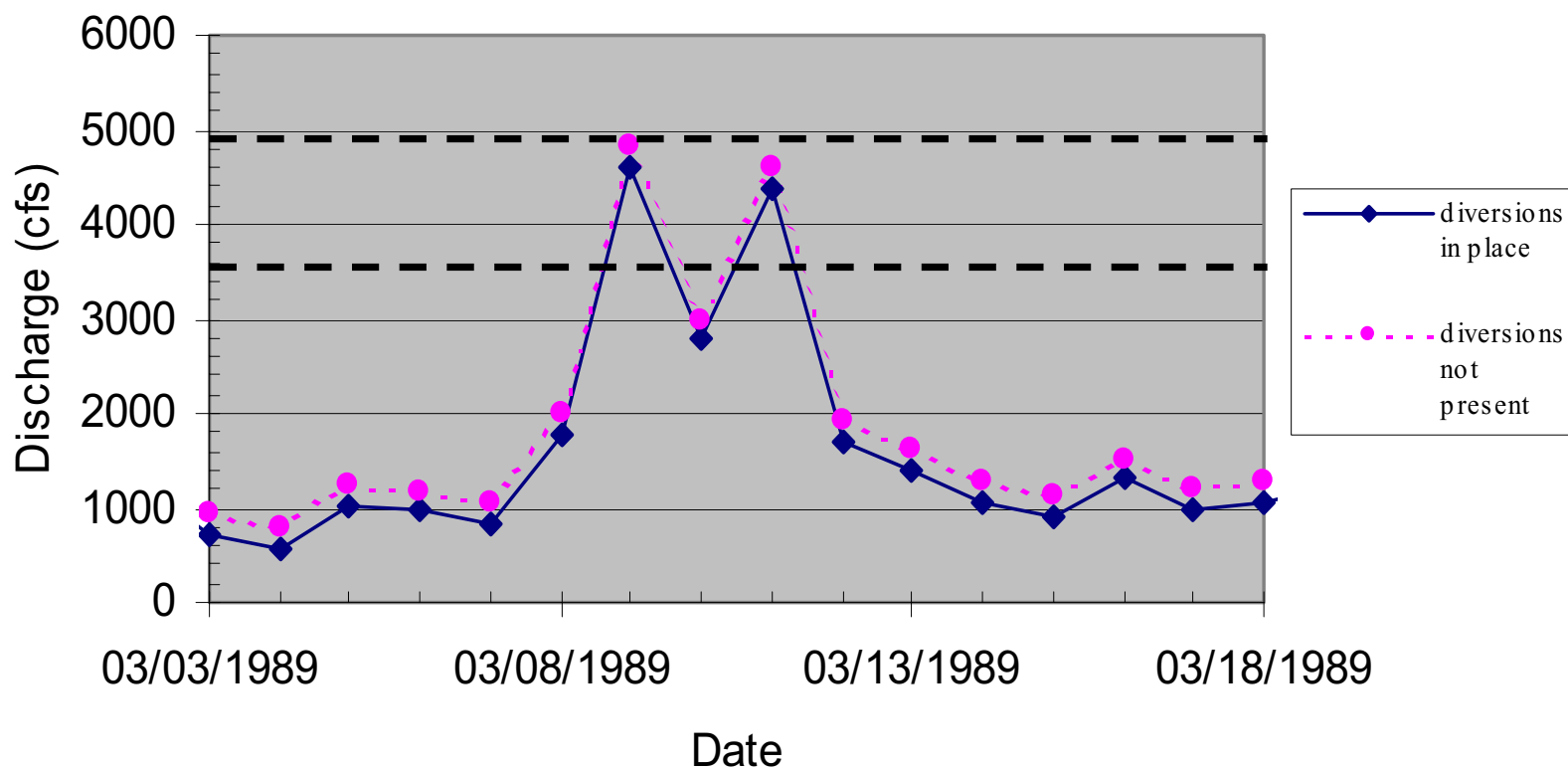
- A widely accepted concept in fluvial geomorphology is that the “bankfull” or 1.5 year return interval flood is most for sediment transport.
- New channel maintenance flow information suggests that noticeable bedload sediment transport initiates within a range of 0.6 – 0.8 of the 1.5 year return interval flow.

Affects of North Feeder, Eagle Canyon, And Inskip diversions on threshold event *magnitude*



Affects of North Feeder, Eagle Canyon, And Inskip diversions on threshold event *duration*

Figure 3. Comparison of mean daily discharge at the Coleman guage (USGS #11376550) with and without diversions in place



In summary

- Based on the findings of existing reports and further evaluation, removal of North Battle Feeder, Eagle Canyon, and Inskip Dams probably offers little benefit to the Battle Creek system's sediment transport characteristics.
- Both the Kondolf and Katzel (1989) and Greimann (2001) reports indicate that there is little impact to sediment transport processes due to the existing hydro-power project when all eight dams in question are present.
- There is remaining scientific uncertainty in sediment transport relationships and the affects of dam removal within the Battle Creek system. This uncertainty will be more fully addressed with robust studies called for in the Project adaptive management plan.

MORTALITY RELATED TO TEMPERATURE CHINOOK SALMON

Incubating Eggs and Larva



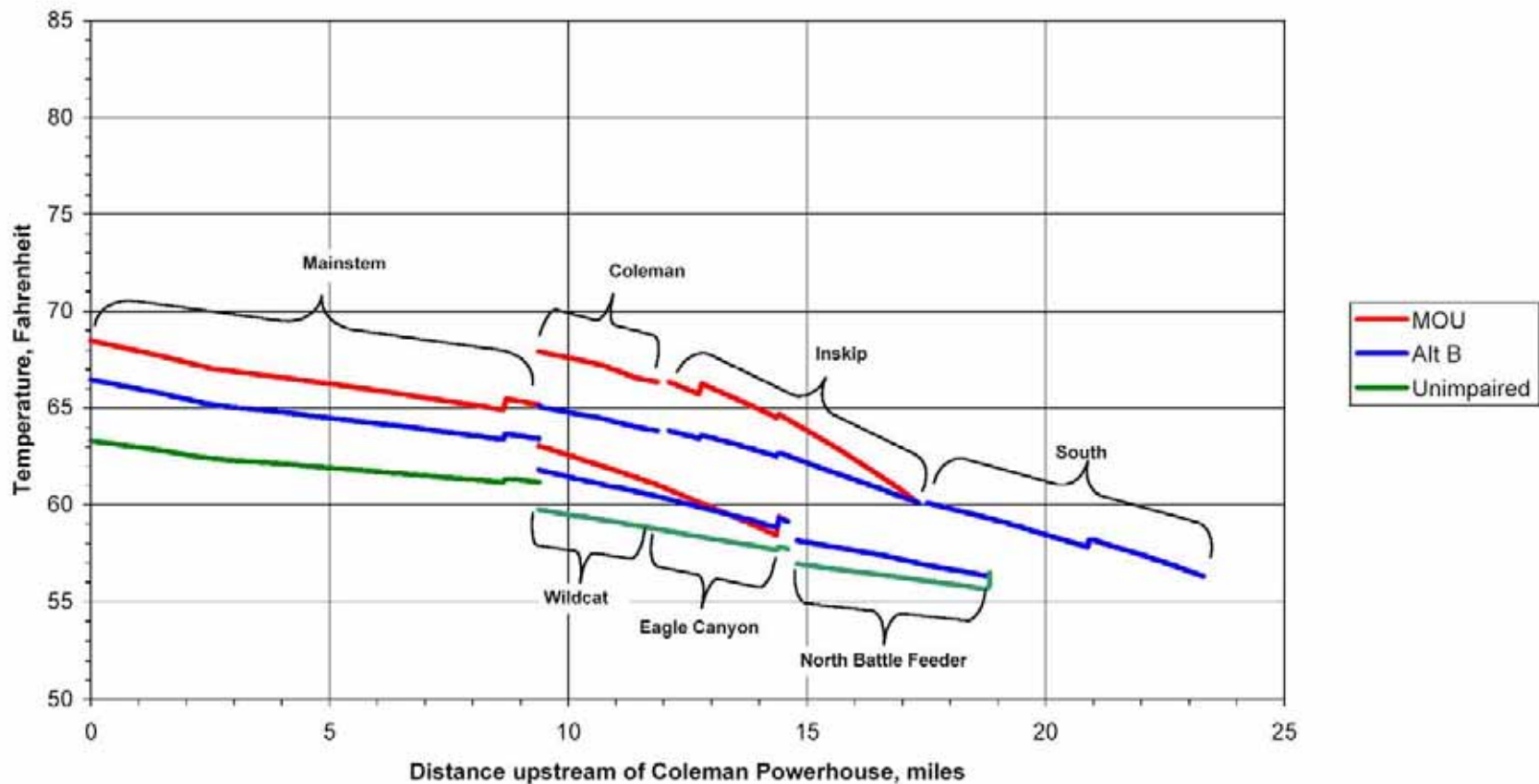
Fry and Fingerlings



Prespawning Adults



Battle Creek SNTMP
MOU, Alt B , Unimpaired Temperatures
Normal Condition
Daily Average Water Temperature Profile in June

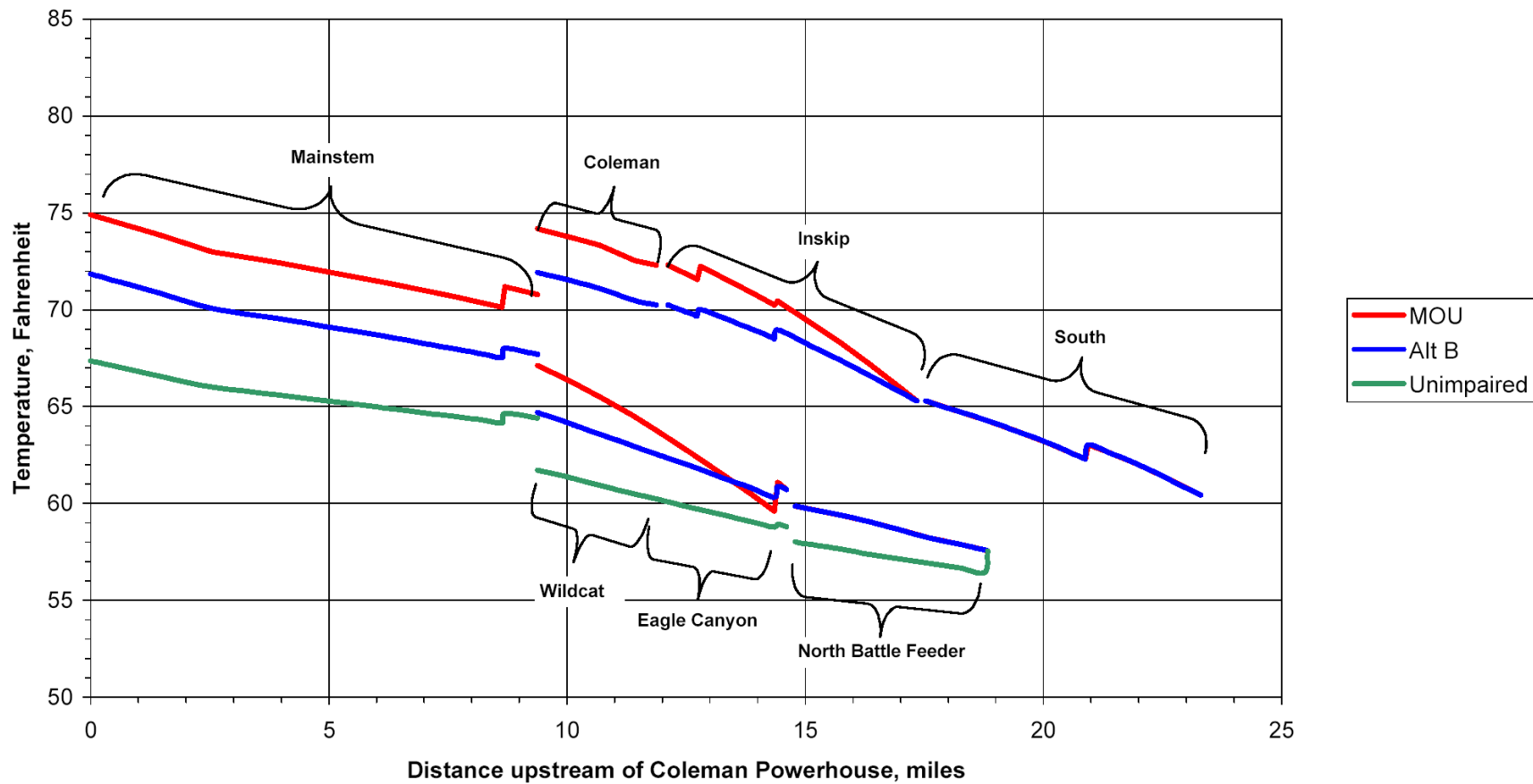


MOU Temp: SNTMP Alt 3

Alt B Temp: North Fork and Mainstem, SNTMP Alt 4; South Fork, SNTMP Alt 6. **Alt B Mainstem does not account for SF cooling.**

Unimpaired: SNTMP Alt 6 (no facilities below Volta)

Battle Creek SNTMP
MOU, Alt B , Unimpaired Temperatures
Dry and Warm Extreme Condition
Daily Average Water Temperature Profile in June

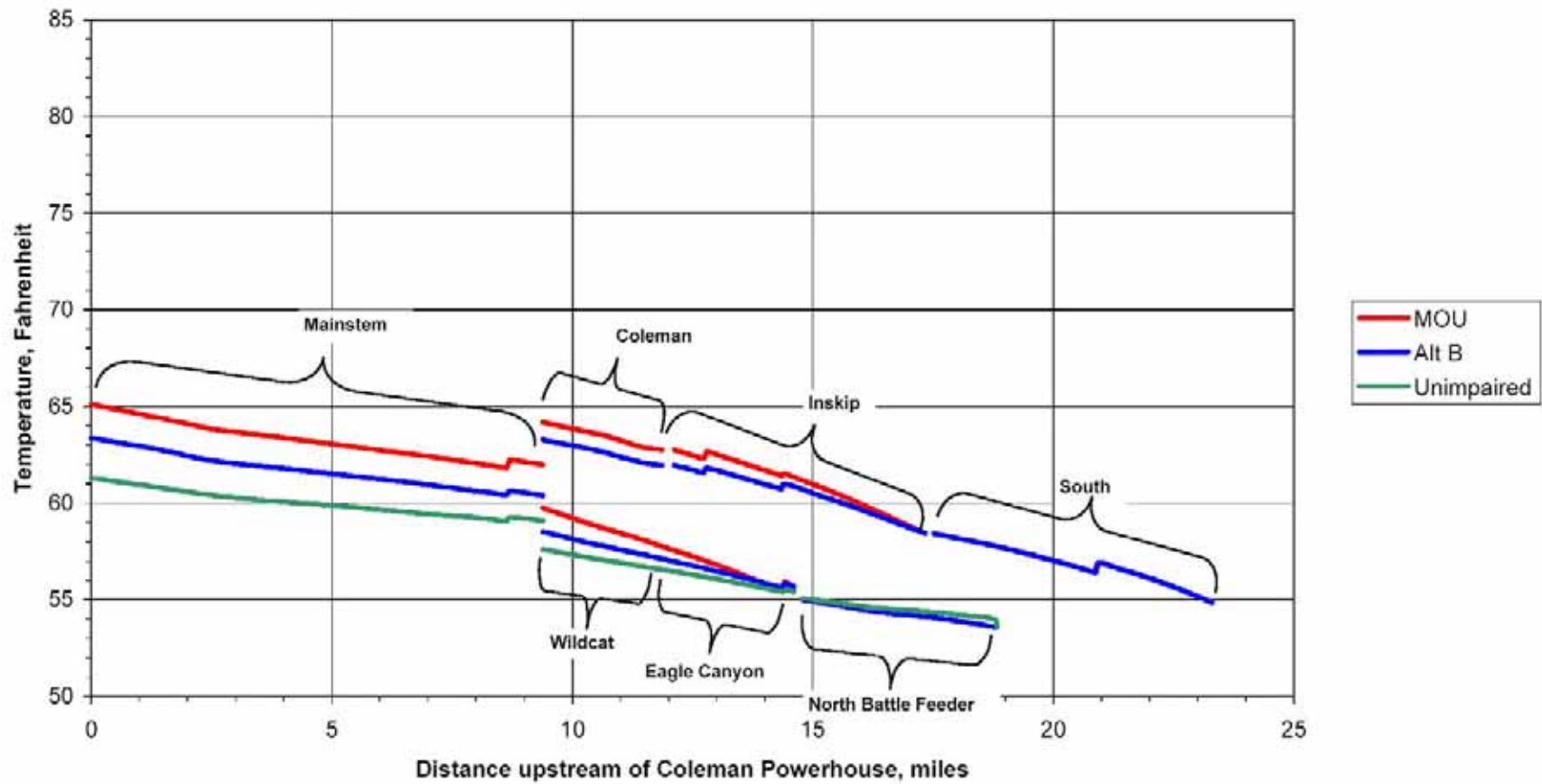


MOU Temp: SNTMP Alt 3

Alt B Temp: North Fork and Mainstem, SNTMP Alt 4; South Fork, SNTMP Alt 6. **Alt B Mainstem does not account for SF cooling.**

Unimpaired: SNTMP Alt 6 (no facilities below Volta)

Battle Creek SNTMP
MOU, Alt B , Unimpaired Temperatures
Normal Condition
Daily Average Water Temperature Profile in September



MOU Temp: SNTMP Alt 3

Alt B Temp: North Fork and Mainstem, SNTMP Alt 4; South Fork, SNTMP Alt 6. **Alt B Mainstem does not account for SF cooling.**

Unimpaired: SNTMP Alt 6 (no facilities below Volta)



COLD WATER

REFUGIA

**Table 4.5-4
Comparison of Temperatures in North Fork Battle Creek
Downstream of Eagle Canyon Springs
with Identical Water Releases from Eagle Canyon Diversion Dam and the Springs¹**

Predicted Temperatures Above Eagle Canyon Dam ²	With Eagle Canyon Diversion Dam	Without Eagle Canyon Diversion Dam
56°F	54.6°F	55.5°F
57°F	55.3°F	56.4°F
58°F	55.9°F	57.3°F
59°F	56.6°F	58.2°F

¹Derived using mass balance equation.

²PG&E 2001a[IM1].

Incubating Eggs and Larva

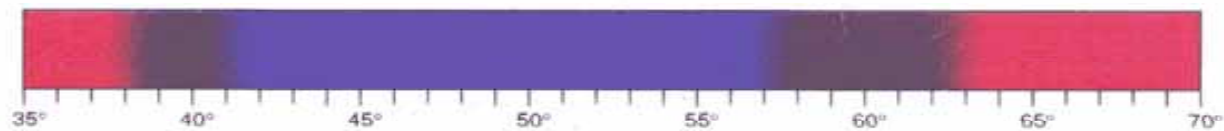
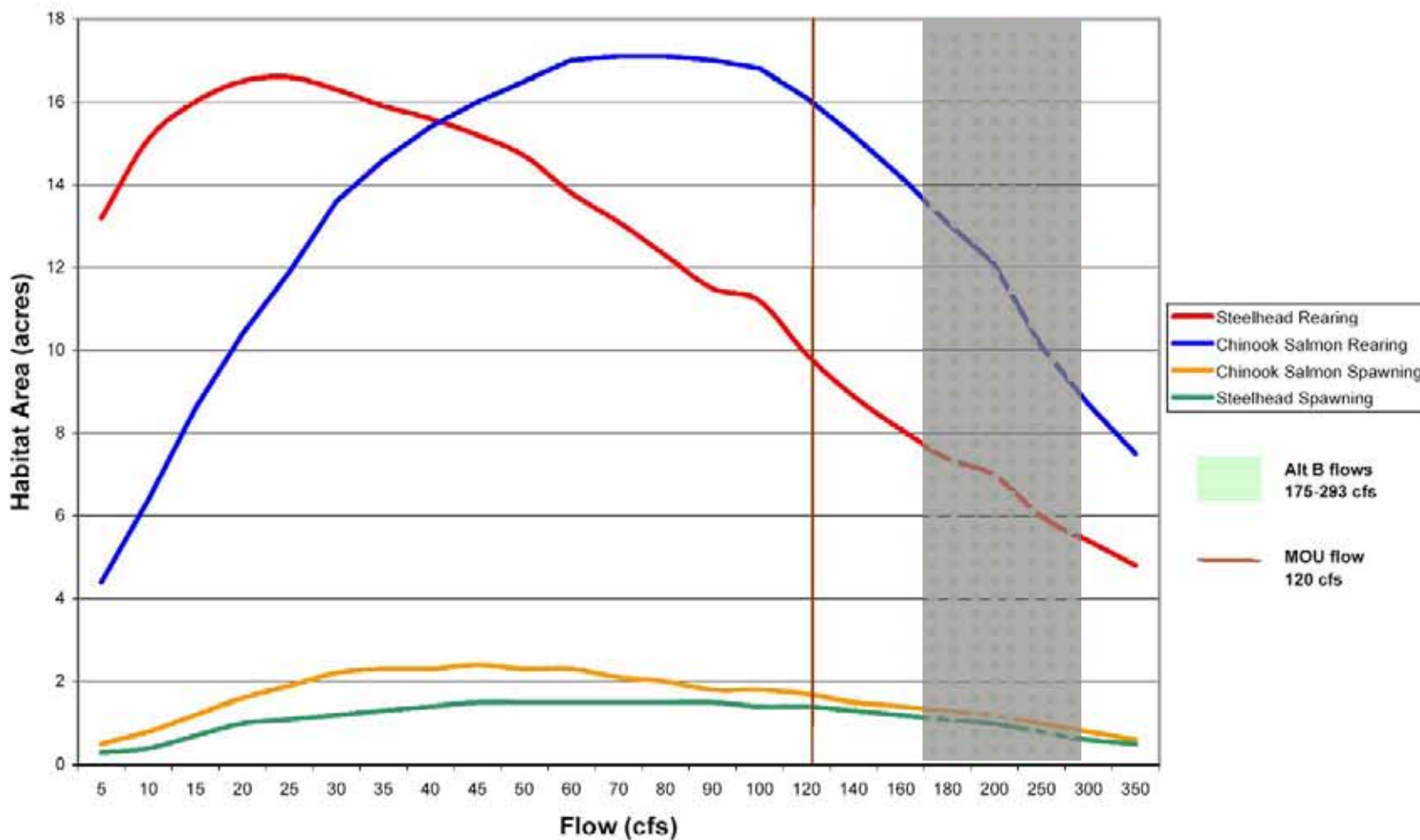


Figure P-1, Mainstem

MOU and Alt B Flow/Habitat Curves June - Sep, Normal Year (1989)

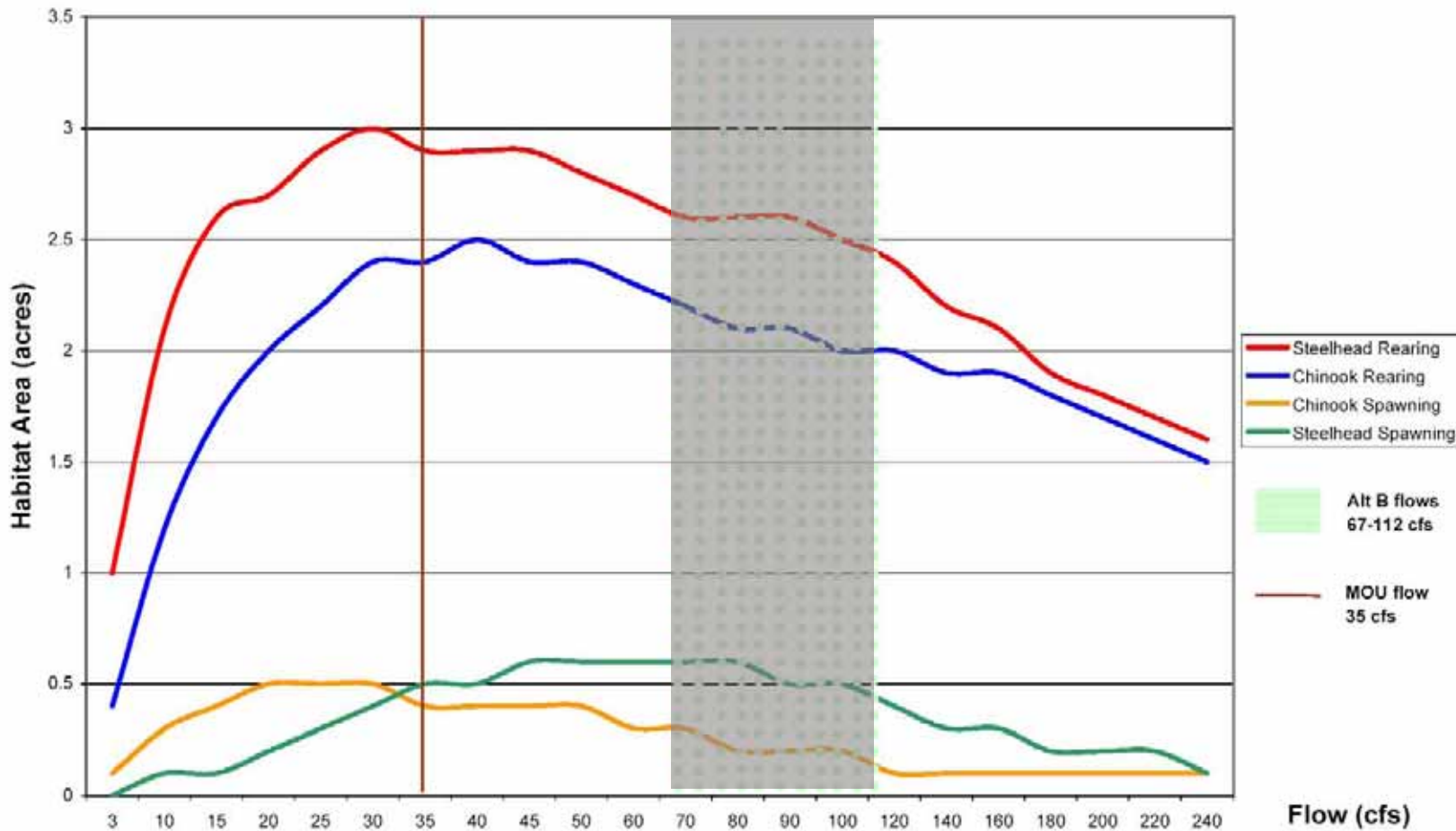
Mainstem Battle Creek Above Coleman PH



MOU flow: summer minimum flow release plus applicable inflow.

Alt B flow: high and low monthly average flow in WY 1989, RMI/Navigant monthly flow model.

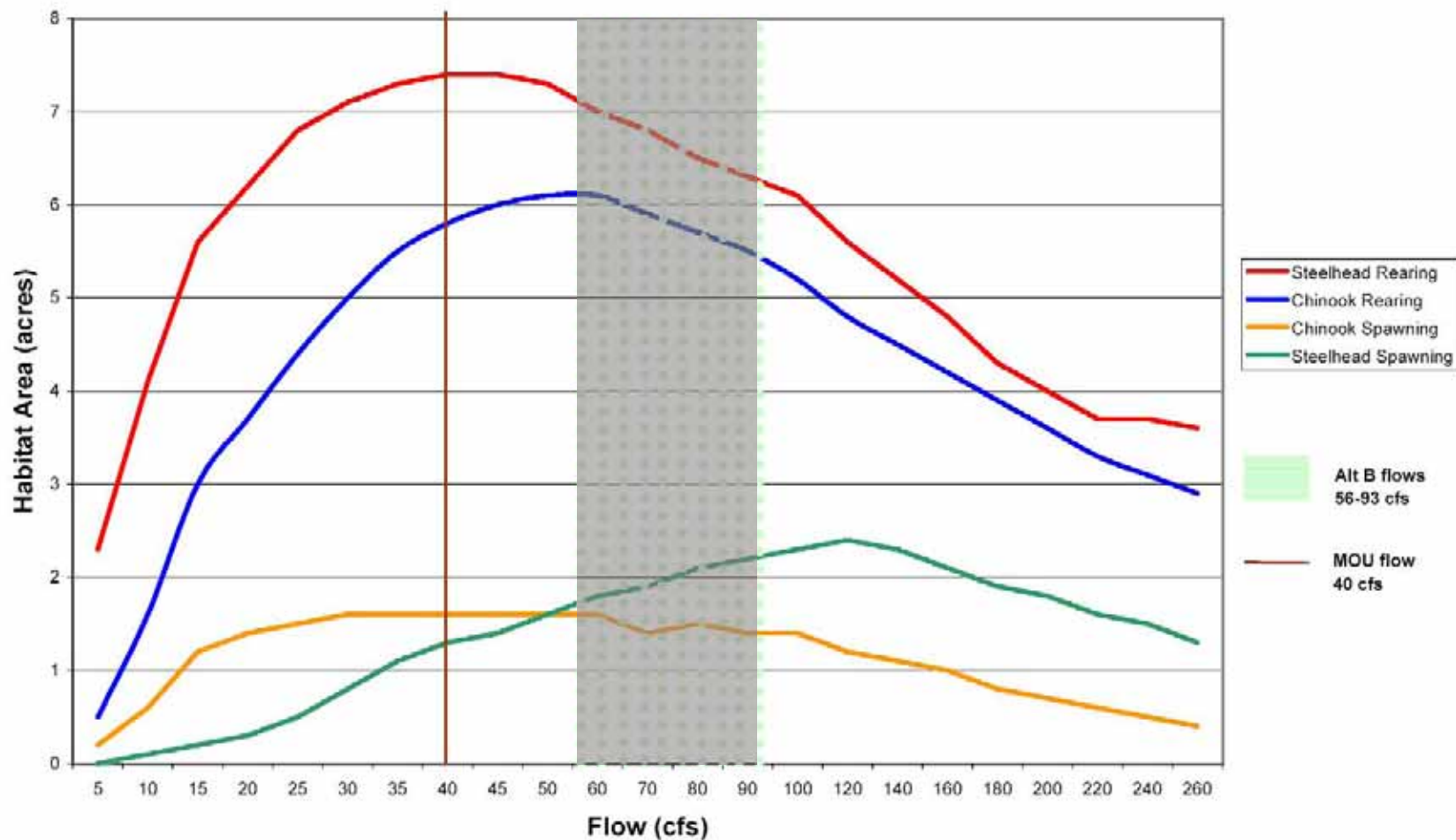
Figure P-3, Eagle Canyon **MOU and Alt B Flow/Habitat Curves**
June - Sep, Normal Year (1989)
 North Fork Battle Creek, Eagle Canyon Reach



MOU flow: summer minimum flow release plus applicable inflow.
 Alt B flow: high and low monthly average flow in WY 1989, RMI/Navigant monthly flow model.

Figure P-5, Inskip

MOU and Alt B Flow/Habitat Curves June - Sep, Normal Year (1989) South Fork Battle Creek, Inskip Reach

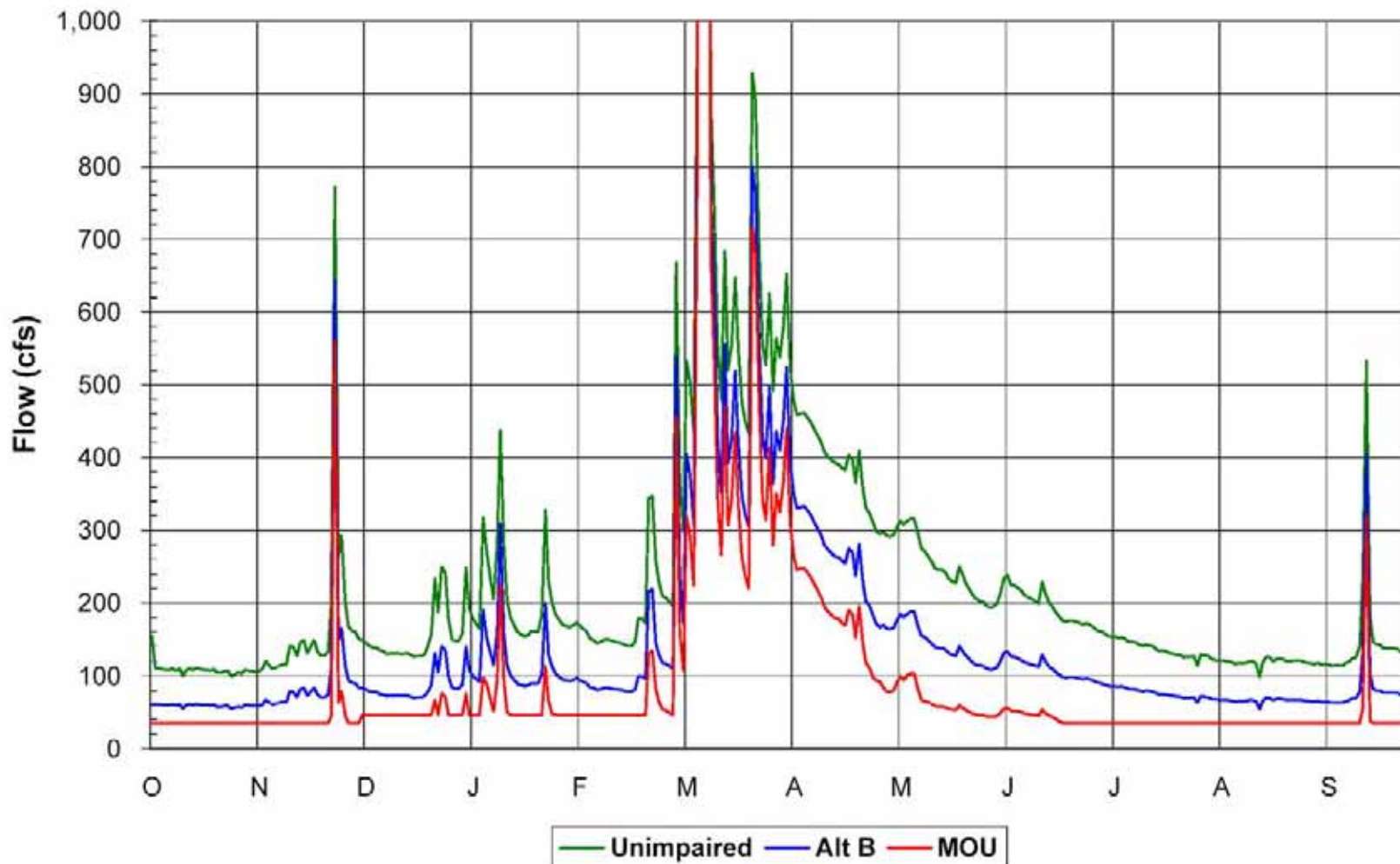


MOU flow: summer minimum flow release plus applicable inflow.
 Alt B flow: high and low monthly average flow in WY 1989, RMI/Navigant monthly flow model.

Figure H-3, Eagle Canyon

Water Year 1989

North Fork Battle Creek at Eagle Canyon



All flows from RMI/Navigant flow model, modified to use historic daily data from USGS 11376550. Unimpaired and Alt B flows are equal for SF Battle Creek.

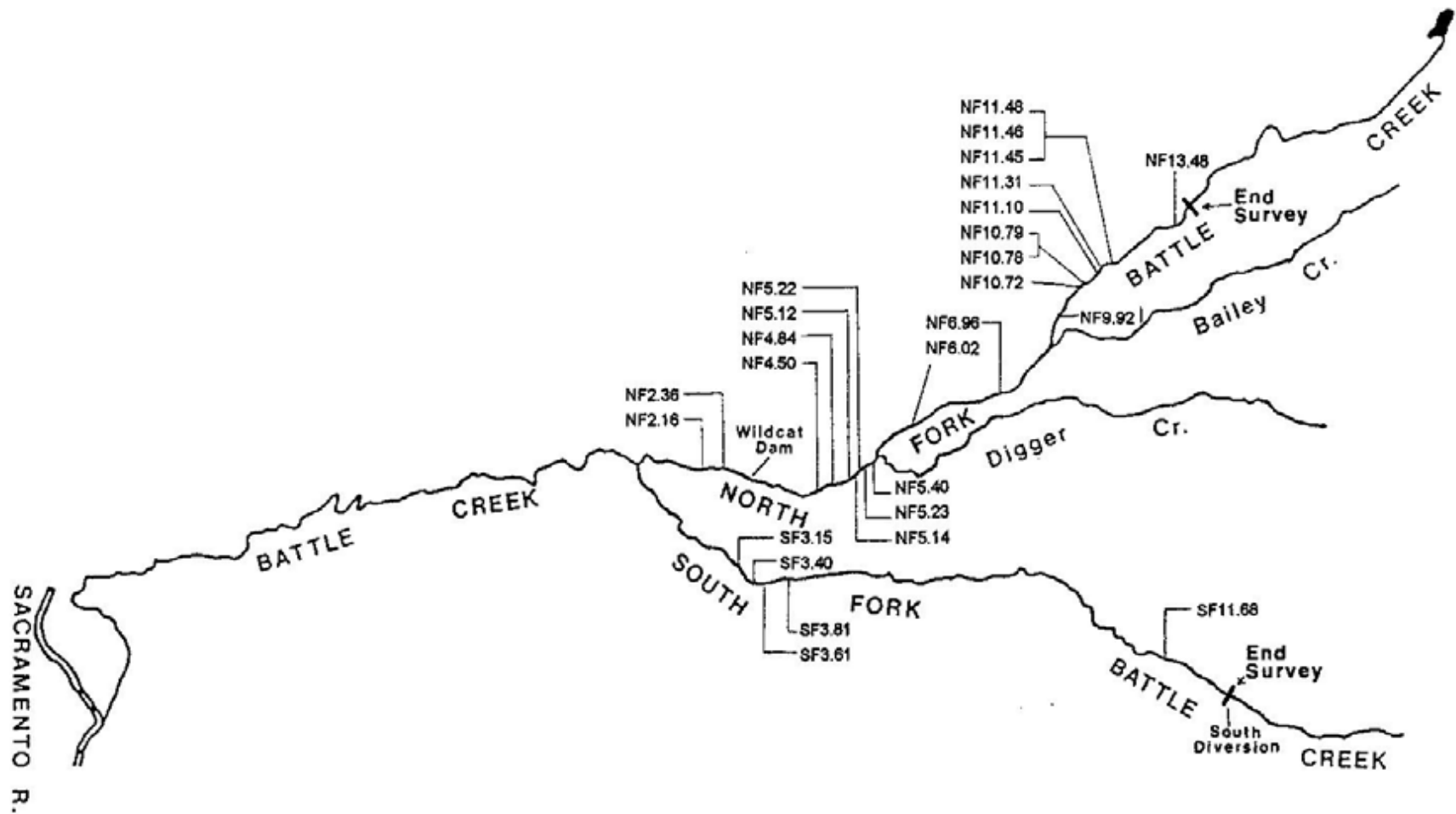
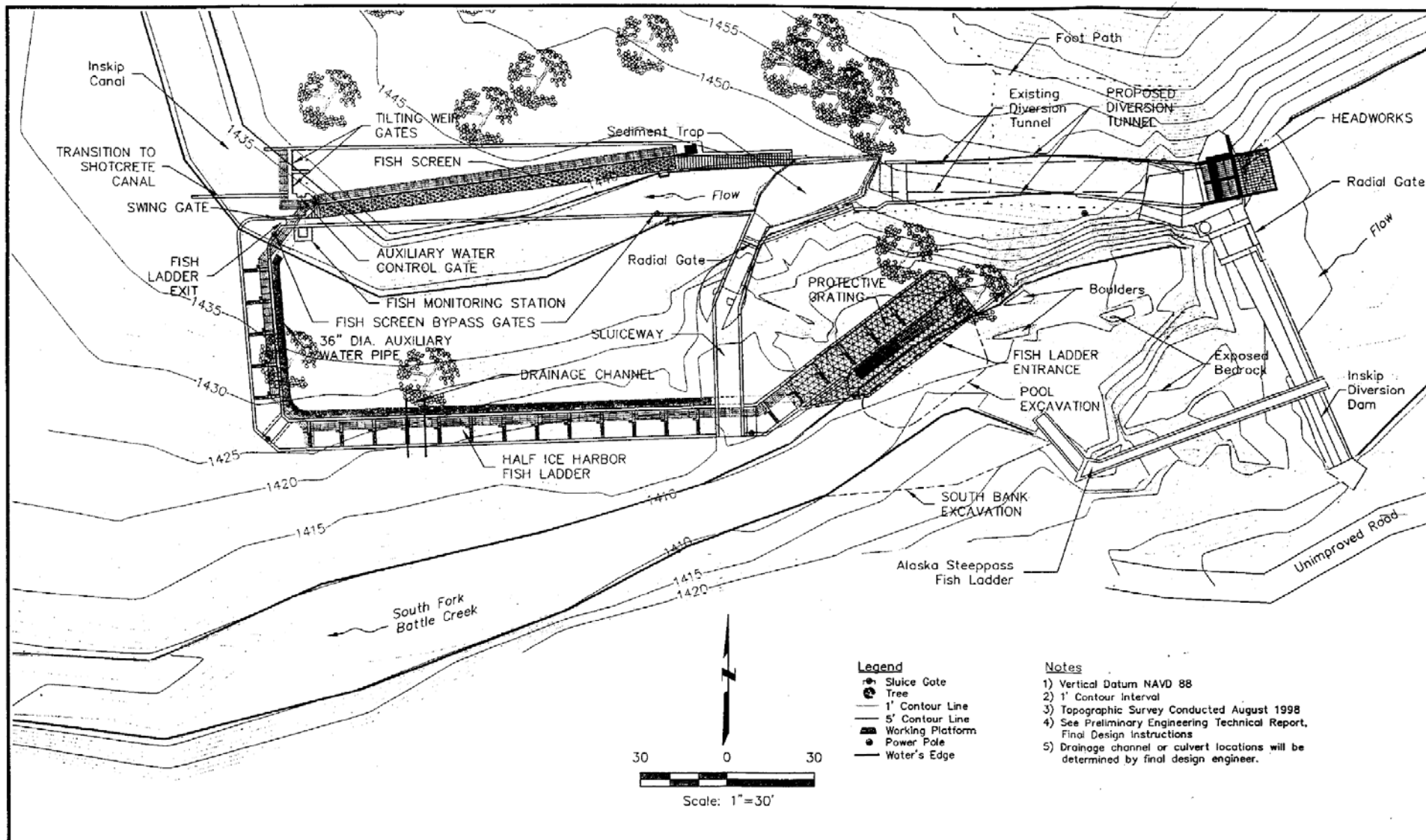


Figure 2 Location (ID number) of potential barriers surveyed in Battle Creek, California, 1988-1990.



INSKIP DIVERSION
South Fork Battle Creek near Manton, California

Site Plan

STATE OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES
REVENUE DIVISION
Revision Date: May 18, 2000

DRAWING :
Inskip3g.dwg
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