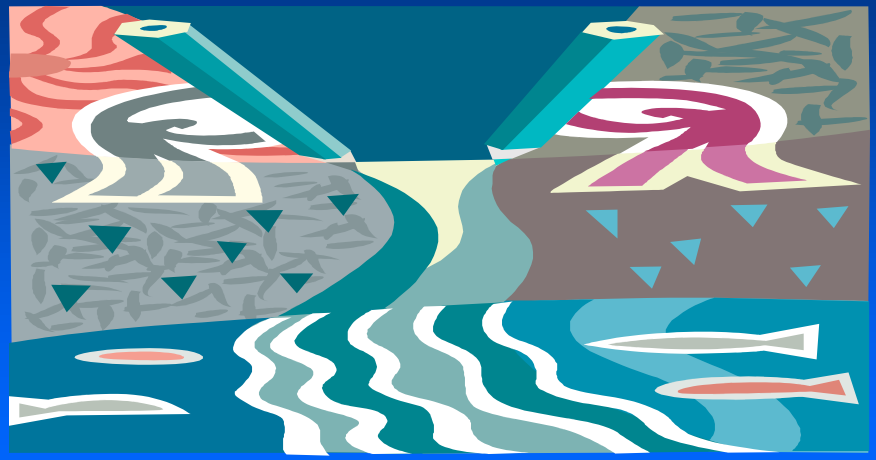
Cle Elum Dam Fish Passage

- Presented by David Fast

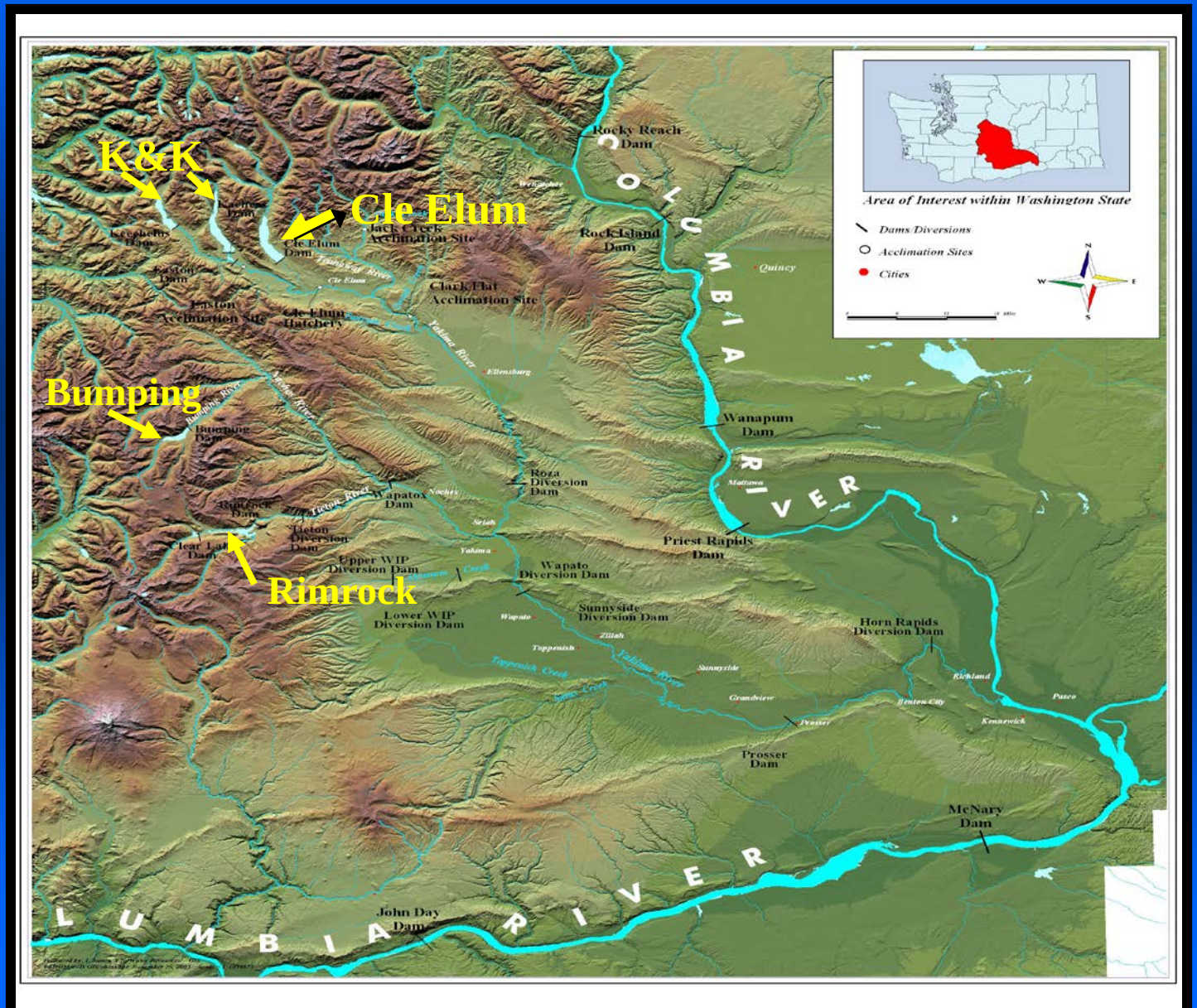
- **Cooperative Study**
- Bureau of Reclamation
- Yakama Nation
- WDFW
- NOAA Fisheries
- Forest Service

Fish Passage Study Objectives

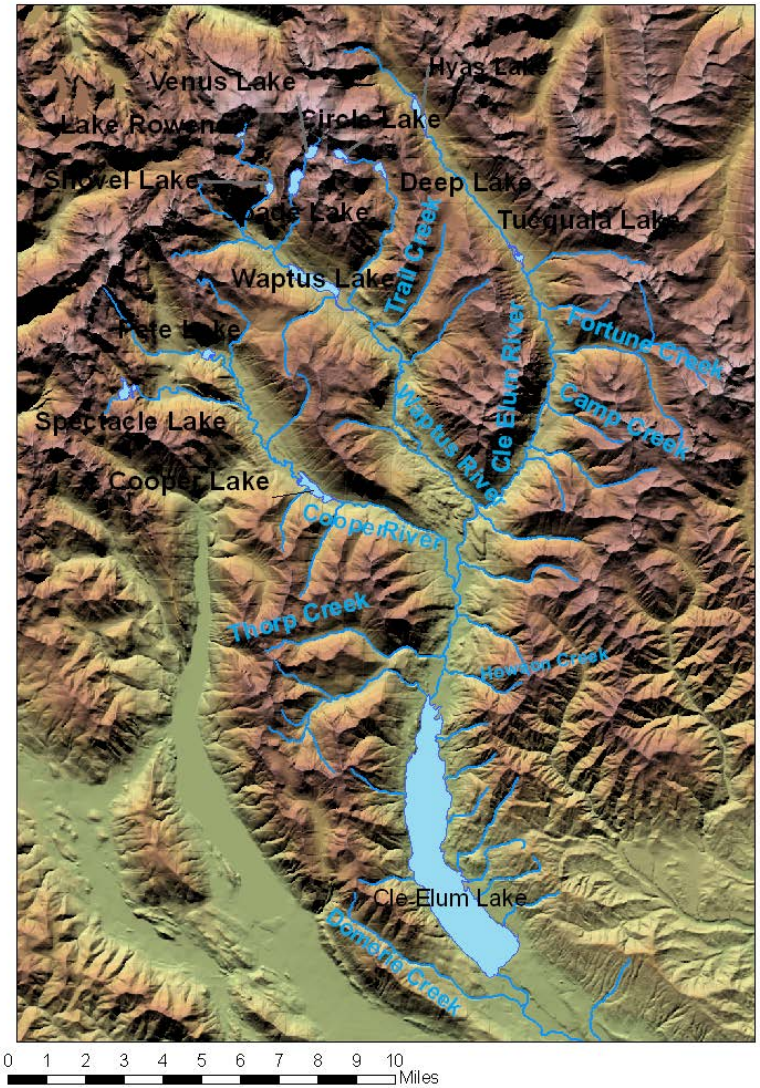
- Evaluate Production Potential of Species above Dams
- Determine Interim Smolt Outmigration Success using coho salmon as surrogate for all species
- Evaluate sources of Mortality
- Design Long Term Passage Solution
- Evaluate Adult Upstream Passage Options

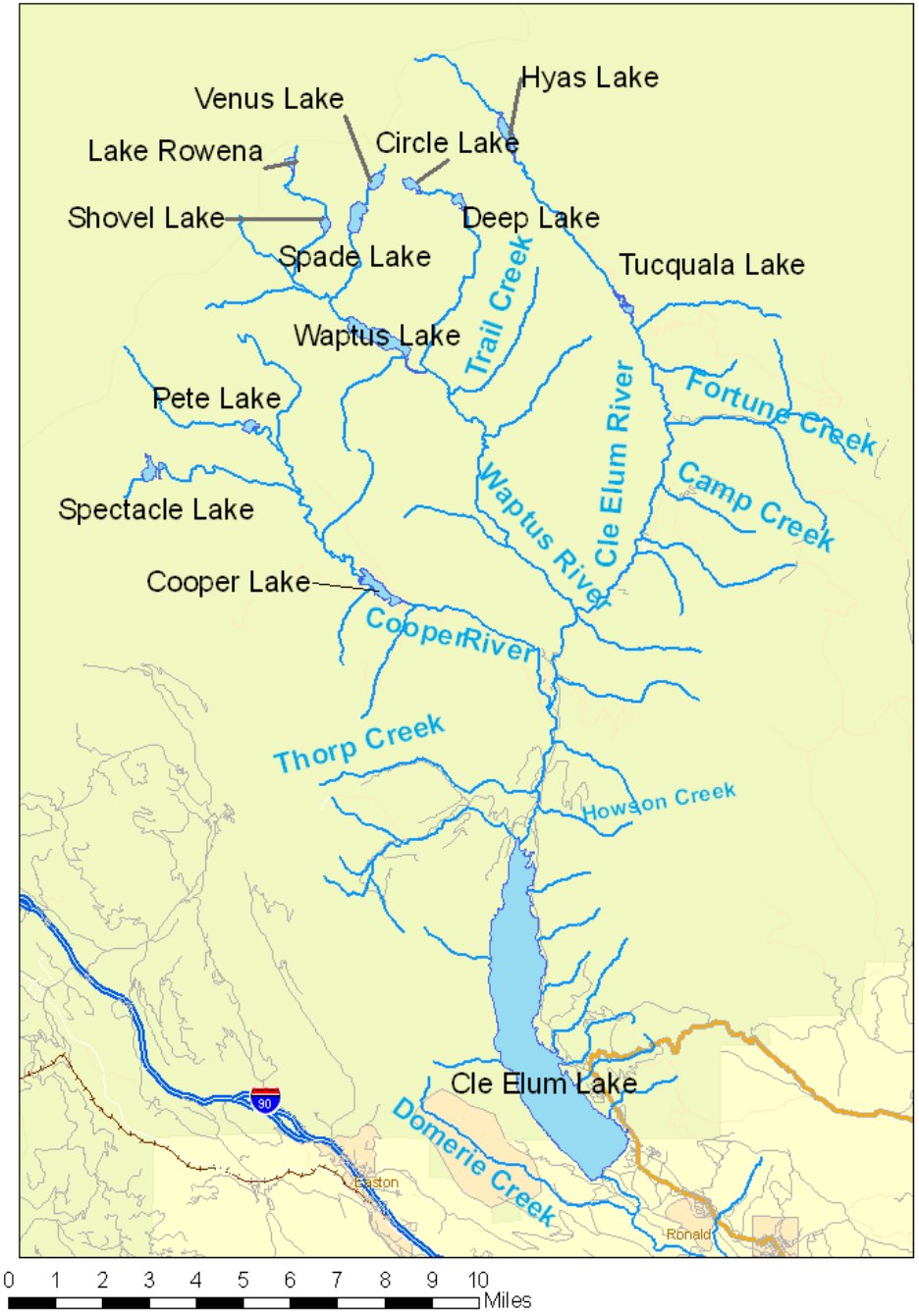


Yakima Basin Irrigation Storage Reservoirs



Lake Cle Elum and Watershed




Hyas Lake
Venus Lake
Circle Lake
Lake Rowena
Shovel Lake
Deep Lake
Spade Lake
Tucquala Lake
Trail Creek
Waptus Lake
Cle Elum River
Fortune Creek
Pete Lake
Camp Creek
Waptus River
Spectacle Lake
Cooper Lake
Cooper River
Thorp Creek
Howson Creek
Cle Elum Lake
Domerie Creek
Easton
Ronald
90
0 1 2 3 4 5 6 7 8 9 10
Miles

Potential Anadromous Fish Reintroduction

- Coho Salmon
- Sockeye Salmon
- Steelhead
- Spring Chinook
- Also could help Bull Trout movement

Coho Salmon Potential

- **Used Two Methods to estimate coho smolt production**

1. **Available Spawning Habitat Approach**
   From 248,250 to 568,500 total smolts

2. **Juvenile Overwintering Habitat Approach**
   From 23,995 to 95,975 smolts

***From Preliminary Report by Steve Grabowski, BOR**

Sockeye Salmon Potential

- Sockeye juveniles use lake for rearing
- Four methods used to evaluate sockeye production potential
  1. Smolts per Lake Surface Area
  2. Euphotic Volume Method
  3. Spawners per Hectare
  4. Available Spawning Habitat

- From Preliminary Report by Steve Grabowski

Sockeye Salmon Potential

Lake Surface Area	1,514,250 smolts
Euphotic Volume	1,627,715 smolts
Spawners per Hectare	788,940 smolts
Available Spawning Habitat	379,926 – 741,852

* From Preliminary Report by Steve Grabowski, BOR

Coho Reintroduction Research

- 2005 Plan (Revised Due to Low Water)
- Coho used as research fish
- Release 10,000 PIT tagged coho from Net Pens ~one half mile from dam
- Release 1000 below dam for comparison
- Release 1000 directly into outlet flume (this was the only goal accomplished)

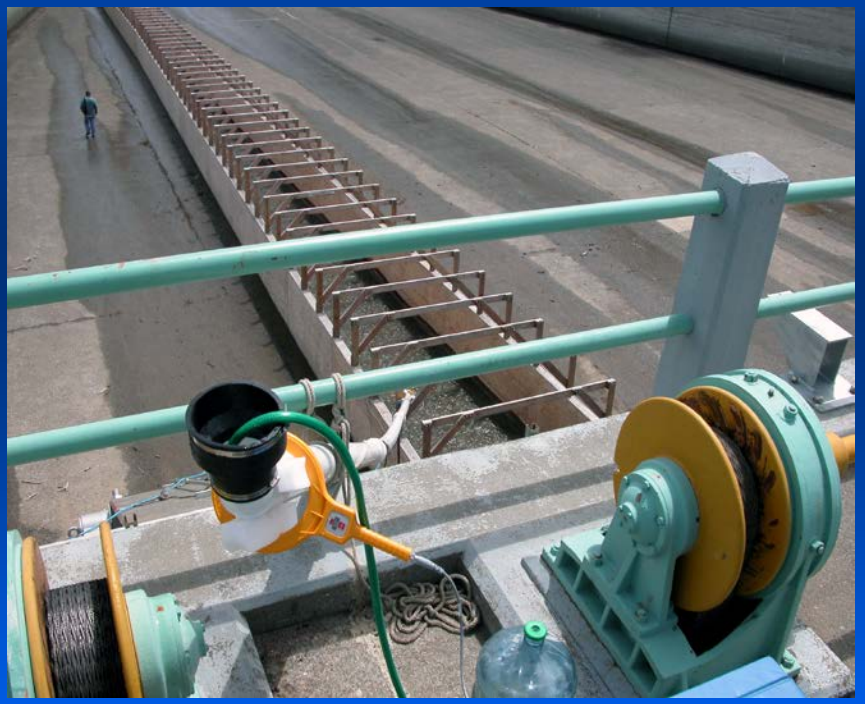
Sockeye Reintroduction Plan

- Release adults in reservoir to monitor location and timing of spawning
- Release smolts (when available) to monitor outmigration success and survival
- Collect returning adults at Roza Dam as brood stock

Releasing PIT Tagged Test Fish

- PIT Tagged Coho Salmon into Flume

Release Pipe Into Flume



Fish Flume Down Face of Dam

Outfall of Flume into River

Preliminary Results of Flume Tests

- Study Done over Two Days
- Total of 1831 Tagged Fish Released
- Releases of from 1 to 61 Fish per Group
- Detections for Upstream and Downstream PIT Tag Detectors Recorded Separately
- Total Combined Detections Calculated

*Results Provided by Sean Casey from BioMark

Cle Elum Fish Tag Detection Test
Day 1 and 2 Combined

Group	Total # of Fish	Misses on Upstream Antenna	Read % on Upstream Antenna	Misses on Downstream Antenna	Read % on Downstream Antenna	Misses on Both Antennas	Combined Upstream and Downstream Read %
Single	736	40	94.57	53	92.80	11	98.51
Groups of 5	272	28	89.71	40	85.29	7	97.43
Groups of 10	280	76	72.86	74	73.57	23	91.79
Groups of 15	280	103	63.21	80	71.43	31	88.93
Groups of 20	99	49	50.51	49	50.51	28	71.72
Groups of 25	103	46	55.34	45	56.31	20	80.58
Groups of 61	61	40	34.43	41	32.79	30	50.82
Overall	1831	382	79.14	382	79.14	150	91.81

Preliminary Conclusions

- Detection Accuracy Over 98% for Single Fish
- Detection Accuracy High (>91%) for Groups of 10 or less
- Detection Accuracy Decreases with Increasing Number of Fish per Group
- Overall Detection Remains Over 80% for Groups of 25