Review of fish passage at high-head dams

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Northwest Power and Conservation Council

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Today's topics

- Overview of the NPCC
- Columbia River Basin Fish and Wildlife Program
- Anadromous Fish Mitigation in Blocked Areas Strategy
- Staff white paper
  - Technical comment and next steps


Columbia River Basin
Corps of Engineers Dams
Dams owned by Others
Bureau of Reclamation Dams
Mica
Revelstoke
Arrow Lakes
Duncan
Kootenay Lake
Keenleyside
Canada
U.S.
Grand Coulee
Chief Joseph
Wells
Rocky Reach
Rock Island
Wanapum
Priest Rapids
Albeni Falls
Libby
Hungry Horse
Noxon
Pend Oreille Lake
Flathead Lake
Kerr
Little Goose
Lower Monumental
Lower Granite
Dworshak
Columbia R.
Seattle
WA
MT
Ice Harbor
The Dalles
Portland
Bonneville
McNary
John Day
Hells Canyon
Oxbow
Brownlee
ID
OR
Willamette R.
Boise Projects
Jackson Lake
Snake R.
CA
NV
N

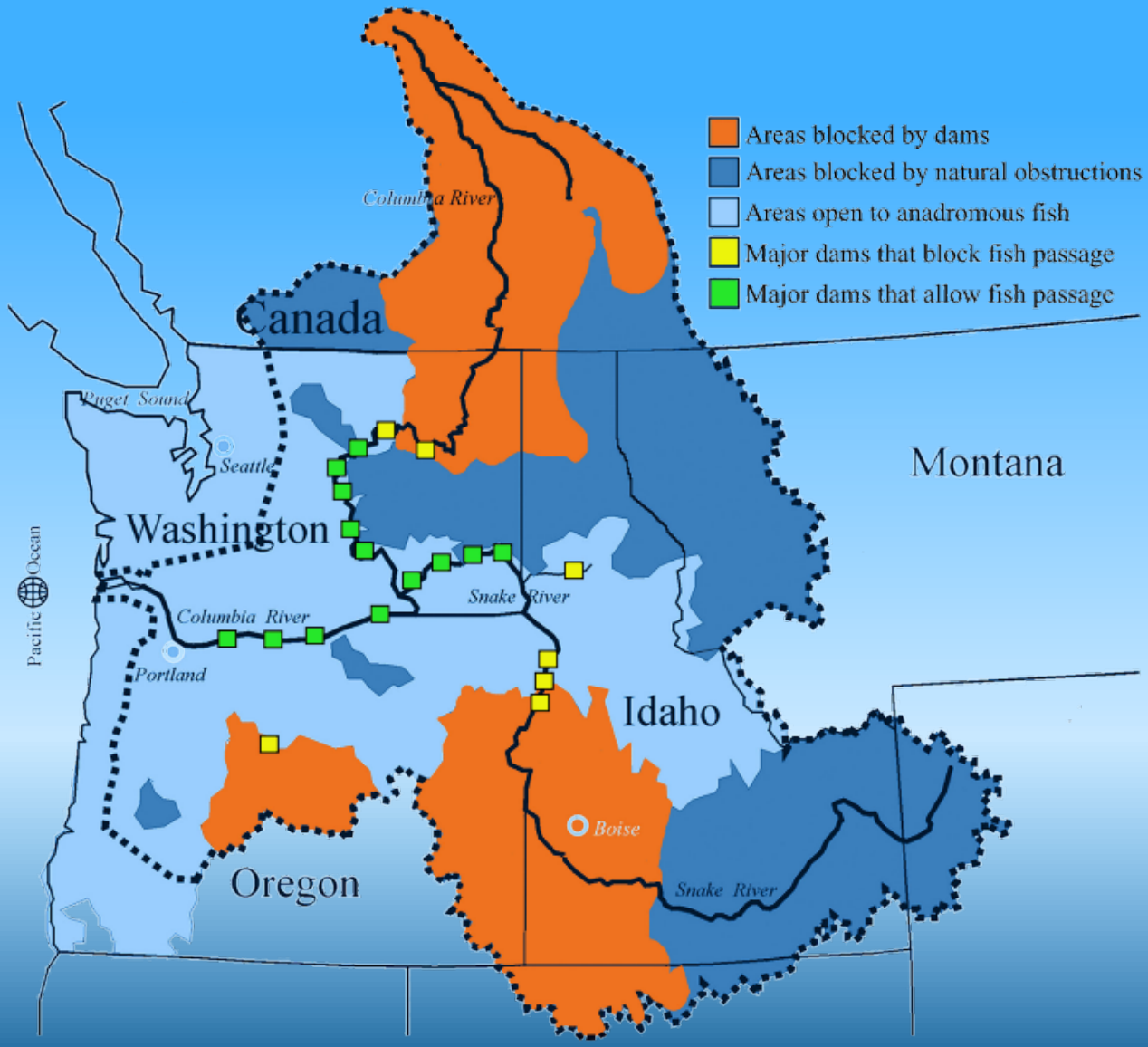
Council responsibilities

- Protect and enhance fish and wildlife affected by hydroelectric dams in the Columbia River Basin
- Assure an adequate, efficient, economical, and reliable power supply
- Inform and involve the public

Columbia River Basin Fish and Wildlife Program

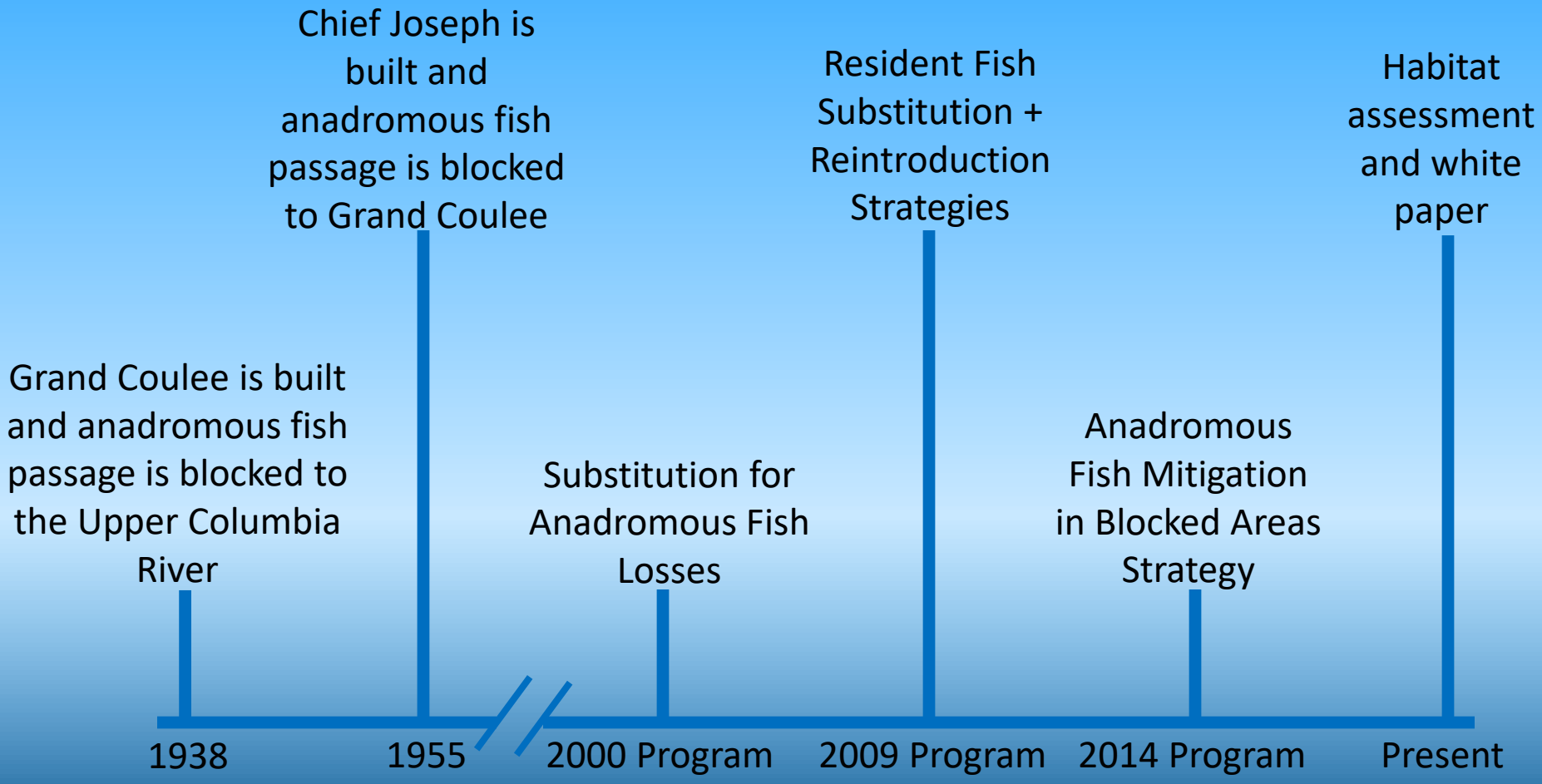
- First adopted in 1982
- Largest regional fish and wildlife mitigation program in the United States
- $300 million in FY 2016
- Review and revise at least every five years in a public process
- Becomes part of the NW Power Plan

A Columbia River ecosystem that sustains an **abundant**, **productive**, and **diverse community** of fish and wildlife, supported by **mitigation** across the basin for the adverse effects to fish and wildlife caused by the **development and operation of the hydrosystem**.


Areas blocked by dams
Areas blocked by natural obstructions
Areas open to anadromous fish
Major dams that block fish passage
Major dams that allow fish passage
Columbia River
Canada
Puget Sound
Seattle
Washington
Montana
Pacific Ocean
Snake River
Columbia River
Portland
Idaho
Boise
Oregon
Snake River

Anadromous Fish Mitigation in Blocked Areas Strategy

Investigate reintroduction of anadromous fish above Chief Joseph and Grand Coulee dams to mainstem reaches and tributaries in the United States.


Grand Coulee is built and anadromous fish passage is blocked to the Upper Columbia River
1938
Chief Joseph is built and anadromous fish passage is blocked to Grand Coulee
1955
Substitution for Anadromous Fish Losses
2000 Program
Resident Fish Substitution + Reintroduction Strategies
2009 Program
Anadromous Fish Mitigation in Blocked Areas Strategy
2014 Program
Habitat assessment and white paper
Present

Phased science-based approach

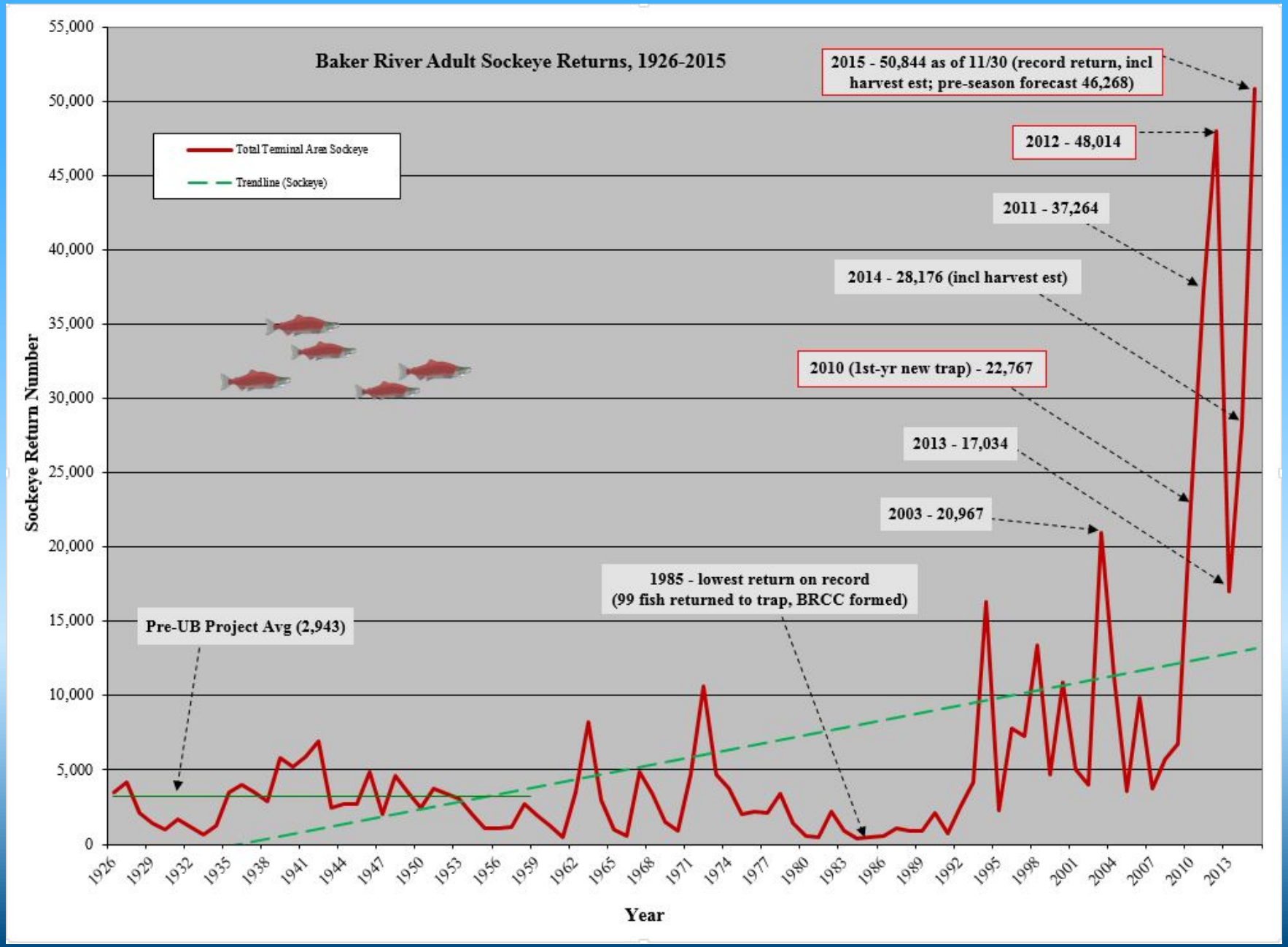
The Council, in collaboration with other relevant entities, will decide whether to move forward between each phase

- Phase I:
  - Evaluate passage studies
  - Assess habitat above Chief Joseph and Grand Coulee
  - Continue regional dialogue
- Phase II:
  - Design
  - Test
  - Conduct further studies
- Phase III:
  - Implement reintroduction
  - Becomes a permanent part of the program

Review of fish passage studies at high-head dams

Grand Coulee Dam, Columbia River, Washington

Baker River adult sockeye, Washington


Baker River Adult Sockeye Returns, 1926-2015
Total Terminal Area Sockeye
Trendline (Sockeye)
2015 - 50,844 as of 11/30 (record return, incl harvest est; pre-season forecast 46,268)
2012 - 48,014
2011 - 37,264
2014 - 28,176 (incl harvest est)
2010 (1st-yr new trap) - 22,767
2013 - 17,034
2003 - 20,967
1985 - lowest return on record (99 fish returned to trap, BRCC formed)
Pre-UB Project Avg (2,943)
Sockeye Return Number
Year
55,000
50,000
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
1926
1929
1932
1935
1938
1941
1944
1947
1950
1953
1956
1959
1962
1965
1968
1971
1974
1977
1980
1983
1986
1989
1992
1995
1998
2001
2004
2007
2010
2013

Upper Baker Dam Fish Collector, Baker River, Washington

Factors to consider

- What is the end goal?
  - A self-sustaining population?
  - Cultural, biological, or economic benefits?
- Take into consideration:
  - Habitat suitability
  - Debris load
  - Availability of fish

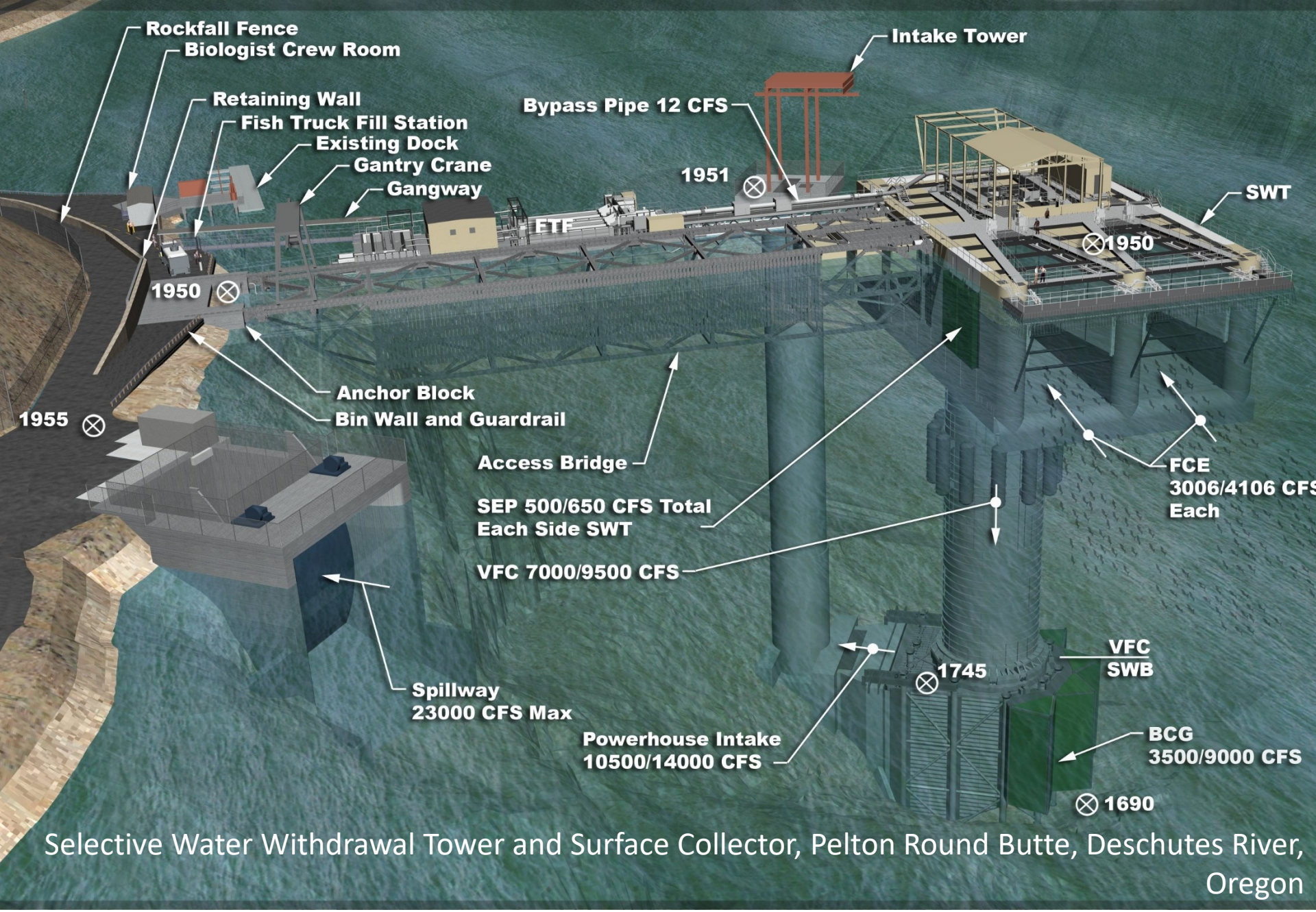
Factors to consider

- Where should the collector be located?
  - Various options
  - One or multiple needed?
- Take into consideration:
  - Environmental factors
  - Fish migration behavior and timing
  - Hydraulic conditions
  - Life history in the reservoir and at collection
- Ideally, all studies done at all potential sites

Factors to consider

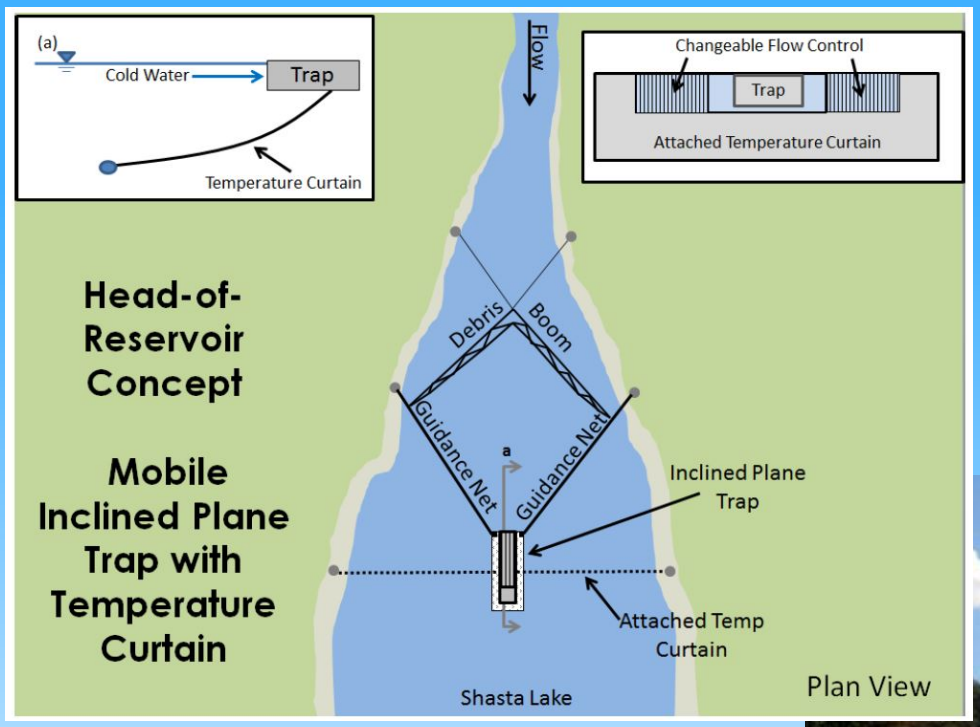
- What type of fish passage?
  - Each will be unique
  - Take time to consider what is best
- Not one size fits all

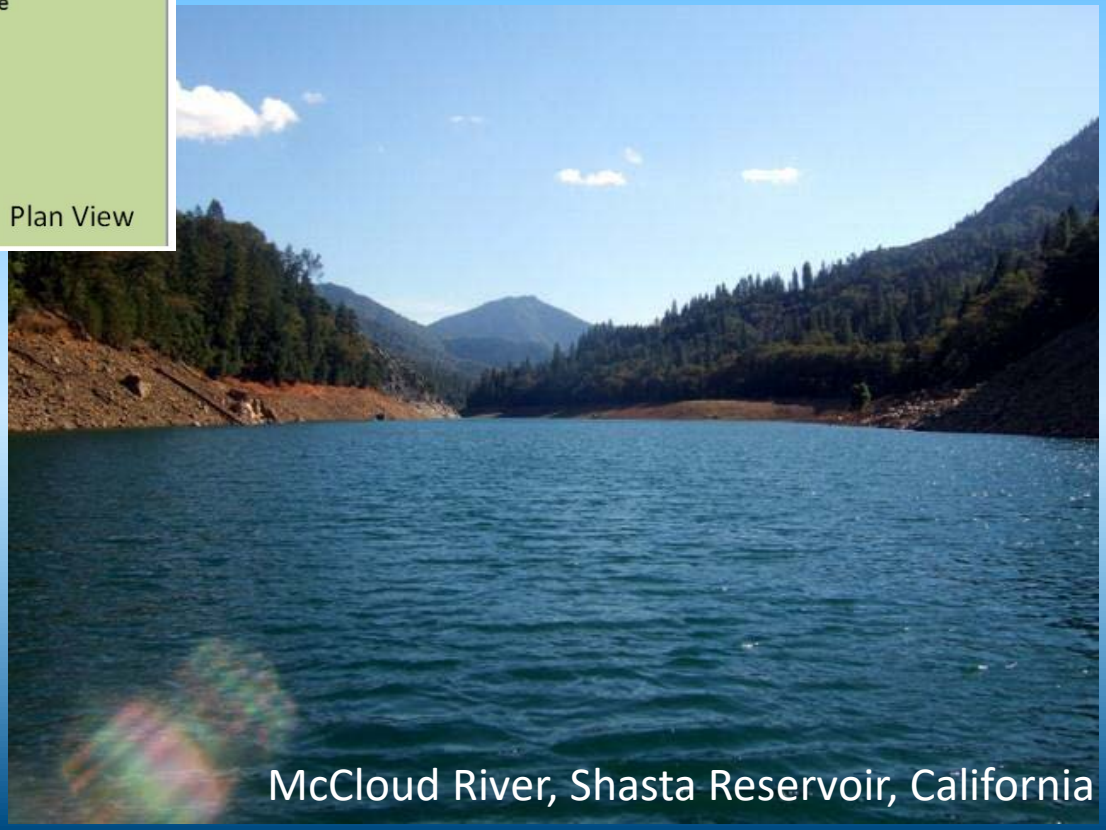
Pelton-Round Butte Fish Collector, Deschutes River, Oregon



Selective Water Withdrawal Tower and Surface Collector, Pelton Round Butte, Deschutes River, Oregon

Swift Dam Fish Collector, Lewis River, Washington


(a)
Cold Water
Trap
Temperature Curtain
Changeable Flow Control
Trap
Attached Temperature Curtain
Flow
Head-of-Reservoir Concept
Mobile Inclined Plane Trap with Temperature Curtain
Debris Boom
Guidance Net
Guidance Net
a
Inclined Plane Trap
Attached Temp Curtain
Shasta Lake
Plan View

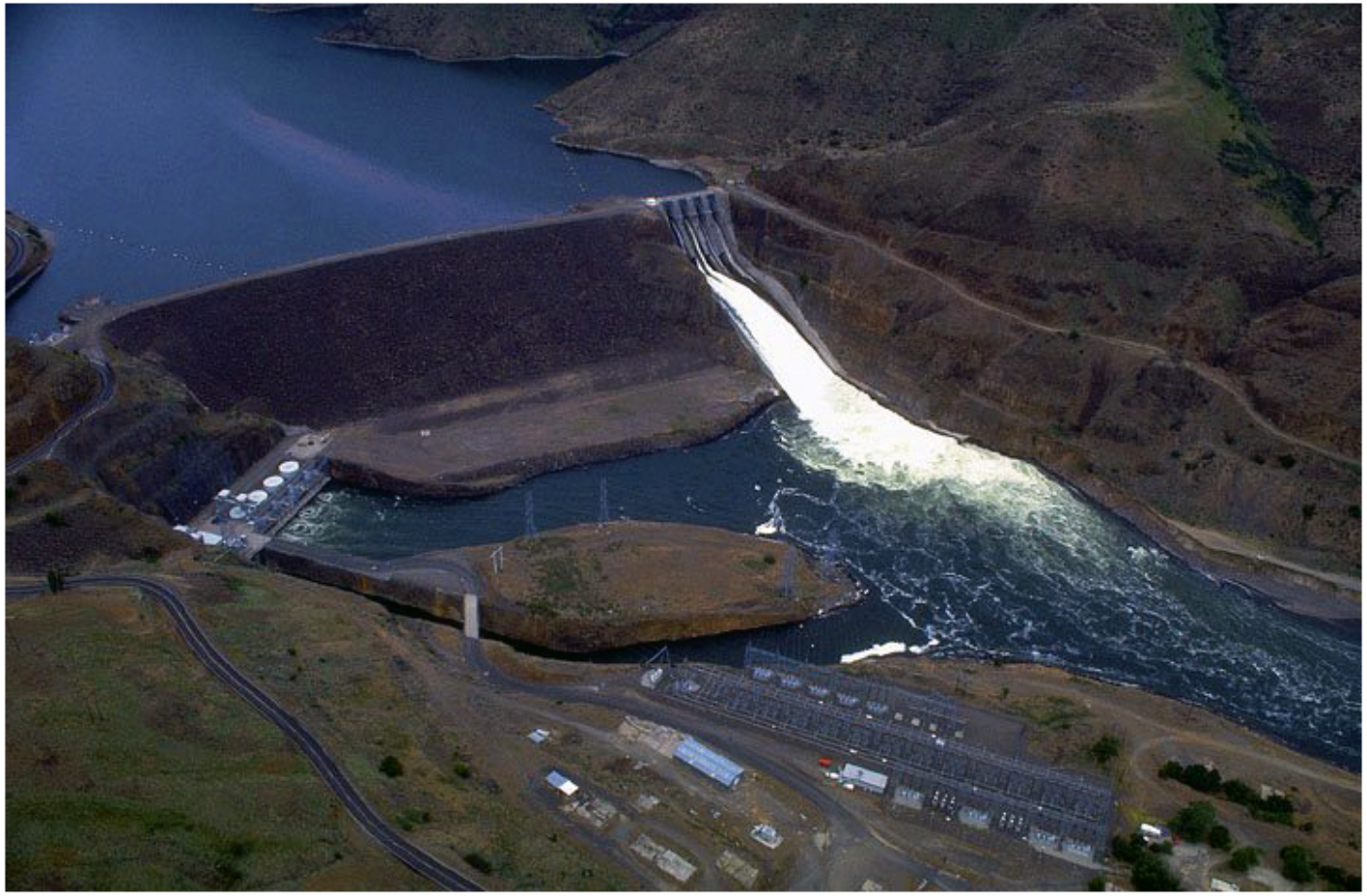

McCloud River, Shasta Reservoir, California

Emerging technologies

Washougal Fish Hatchery, Washougal River, Washington

5 key concepts in planning for high-head fish passage

- Allow adequate time for evaluations



Brownlee Dam, Snake River, Idaho

Swift Reservoir and Dam, Lewis River, Washington

5 key concepts in planning for high-head fish passage

- Allow adequate time for evaluations
- Learn but do not compare

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- Understand the differences

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- Learn but do not compare
- Understand the differences
- Stay up to date

5 key concepts in planning for high-head fish passage

- Allow adequate time for evaluations
- Learn but do not compare
- Understand the differences
- Stay up to date
- Collaborate

Pelton-Round Butte Surface Collector, Lake Billy Chinook, Oregon

Technical feedback

- Major points:
  - Expand
  - Standardize goals and performance criteria
  - Key concepts
  - Include photos and diagrams, make costs current

Questions?

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Helix conduit structure


RESEARCH BARGE
NATURAL SOLUTIONS ... A DAM SITE - BETTER