Northwest Power and Conservation Council

February 24, 2011

MEMORANDUM

TO: Council Members

FROM: Paul Kline
Idaho Department of Fish and Game

SUBJECT: Idaho Sockeye Hatchery

On December 12, 2010, the Idaho Department of Fish and Game (IDFG) submitted to the Council as part of the Three-Step Review Process a master plan for the *Springfield Sockeye Hatchery Master Plan for the Snake River Sockeye Program*, as part of Project 2007-402-00, *Snake River Sockeye Captive Propagation*.

The master plan proposes to implement the next phase in the Snake River Sockeye Captive Broodstock Program by constructing the Springfield Hatchery near the town of Springfield in Bingham County, Idaho. The master plan addresses the needs as directed in the 2008 Federal Columbia River Power System (FCRPS) Biological Opinion (*Idaho et al. 2008*) and the 2008 Memorandum of Agreement (MOA) between the State of Idaho and the FCRPS Action Agencies.

The next phase of the Snake River Sockeye Captive Broodstock Program is to construct the hatchery, which will expand the juvenile-fish production component of the program to produce between 500,000 and 1 million full-term smolts annually for release in the Upper Salmon River Subbasin in the Sawtooth basin. This production is intended to build on the captive broodstock phase and respond to population re-colonization goals in Redfish, Pettit, and Alturas lakes.

At the Council Meeting in Boise, I will provide an update on where we are in the Council's three-step process.

851 S.W. Sixth Avenue, Suite 1100
Portland, Oregon 97204-1348
www.nwcouncil.org

Steve Crow
Executive Director

503-222-5161
800-452-5161
Fax: 503-820-2370

Step 1 Master Plan for IDFG Springfield Sockeye Hatchery Program

Paul Kline – IDFG, Jeff Heindel – IDFG
Tom Flagg – NOAA

Project Team

- D.J. Warren & Associates, Inc
  - Dan Warren – Project Manager
  - Dr. Lars Mobrand – Fisheries Scientist
  - Andy Appleby – Fisheries Scientist
  - Kevin Malone – Fisheries Scientist
  - Joan Nichol – Environmental Planner
- McMillen, LLC
  - Mort McMillen – Professional Engineer
  - Mark Riser – Professional Engineer

Presentation outline

1. Review current conservation program, background, and results

2. Review Master Plan document and expanded production program

3. Review new hatchery conceptual design, cost estimates, timelines, and next steps

4. Address questions in anticipation of an April decision

Step 1 Master Plan review

Current conservation program background and results

Snake River sockeye salmon characteristics

- Longest migration (about 900 miles)
- Highest elevation (about 6,500 ft.)
- Most southerly population

Snake River sockeye salmon population history

- Pre-western civilization - - up to 30,000 sockeye salmon returned to the Sawtooth Valley
- 1910 to 1934 Sunbeam Dam era – access to nursery lakes questionable
- Between 1953 and 1964, Redfish Lake sockeye returns monitored – high return 4,300

Early attempts to bolster the population

- Sockeye salmon fry from Babine Lake, British Columbia, were introduced into Alturas and Stanley Lakes (not Redfish Lake) in 1980-83.
- 1985 – 1989 IDFG trapped and spawned adults returning to the Sawtooth Valley – juveniles planted in Redfish Lake

Protection under the ESA

- In 1990, the Shoshone-Bannock Tribe of Idaho petitioned the NMFS to list Snake River Sockeye Salmon
- Prior to listing, (in May,1991) the IDFG collected Redfish Lake out-migrating smolts and the four anadromous adults that returned in August, 1991 to initiate the conservation program

Protection under the ESA

- In November, 1991, NMFS concluded that Snake River Sockeye Salmon met the criteria for an ESU (Evolutionarily Significant Unit) and the population was listed as endangered

Captive broodstock development

Founding contributors to the broodstock - -

- 16 wild sockeye (all that returned in '90s)
- several hundred out-migrating sockeye smolts
- 26 "residual" sockeye salmon

Conservation goals

- Near-term program goals –
  - avoid population extinction
  - conserve population genetic diversity
  - begin increasing numbers in the wild

Facilities and locations

1. Existing facilities:

   a) IDFG Eagle Fish Hatchery

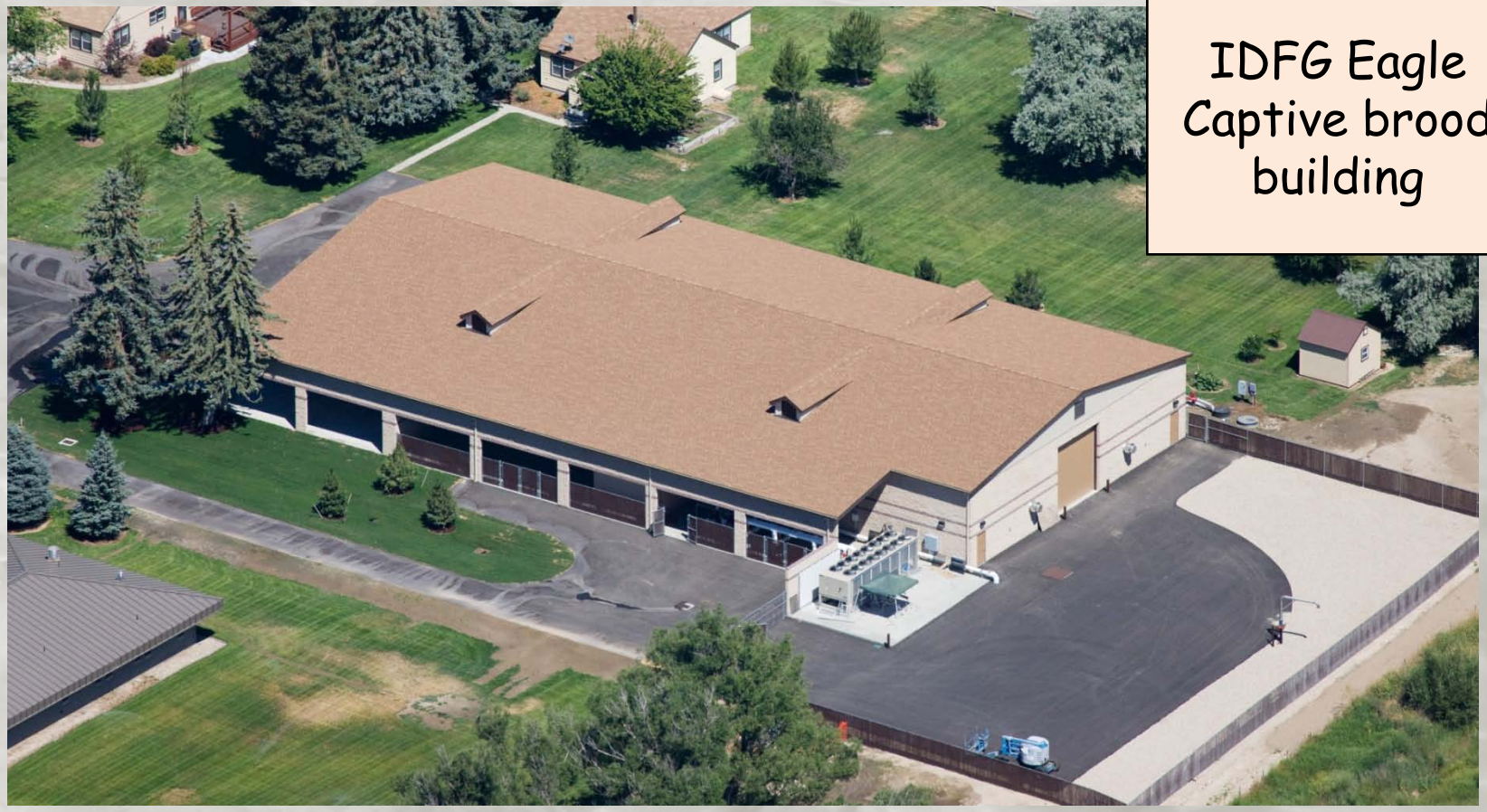
   b) IDFG Sawtooth Fish Hatchery

   c) NOAA Manchester Research Station

   d) NOAA Burley Creek Hatchery

   e) ODFW Oxbow Fish Hatchery

Facilities and locations



IDFG Eagle Captive brood building

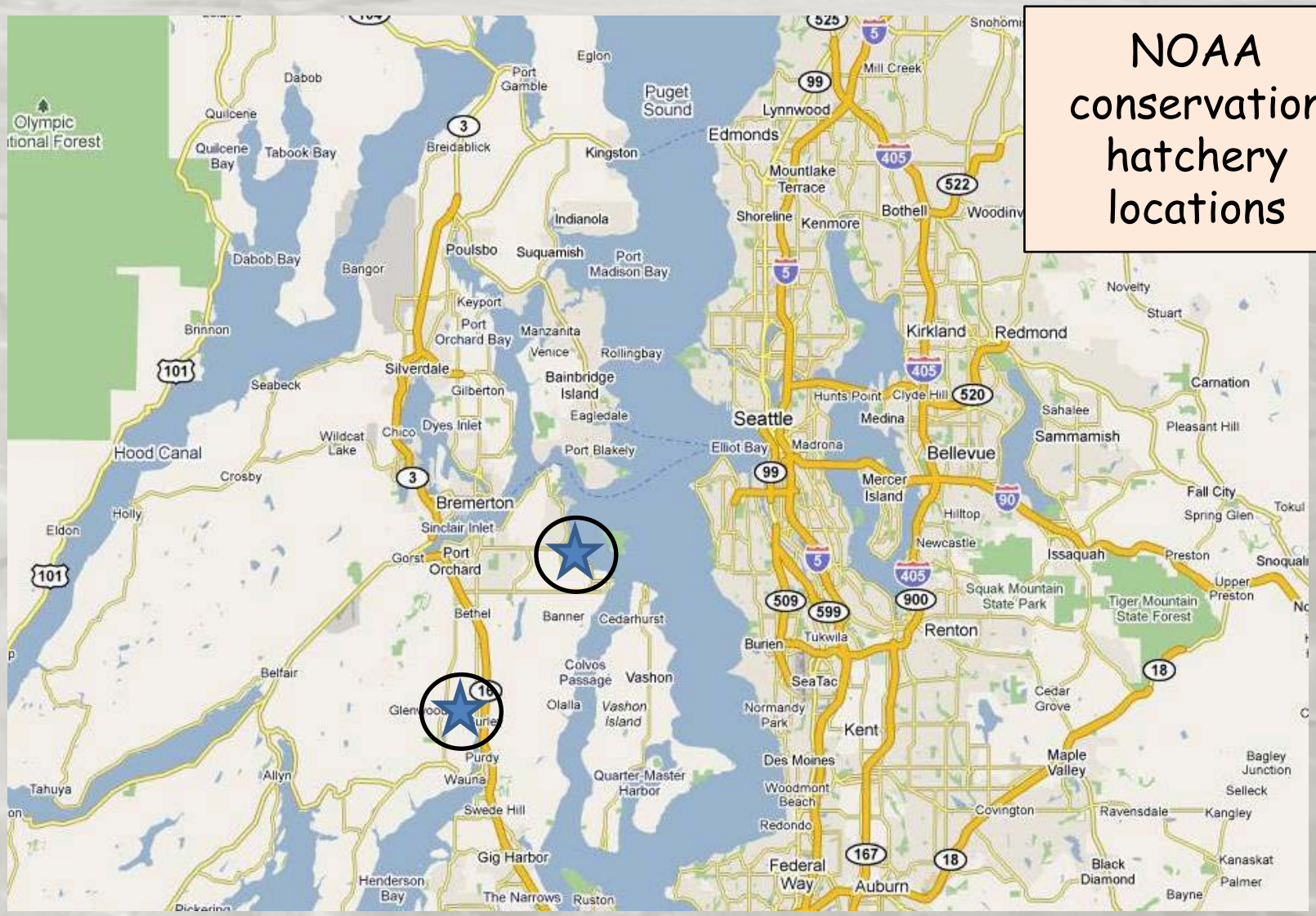
Facilities and locations

IDFG Eagle Captive brood building

Facilities and locations

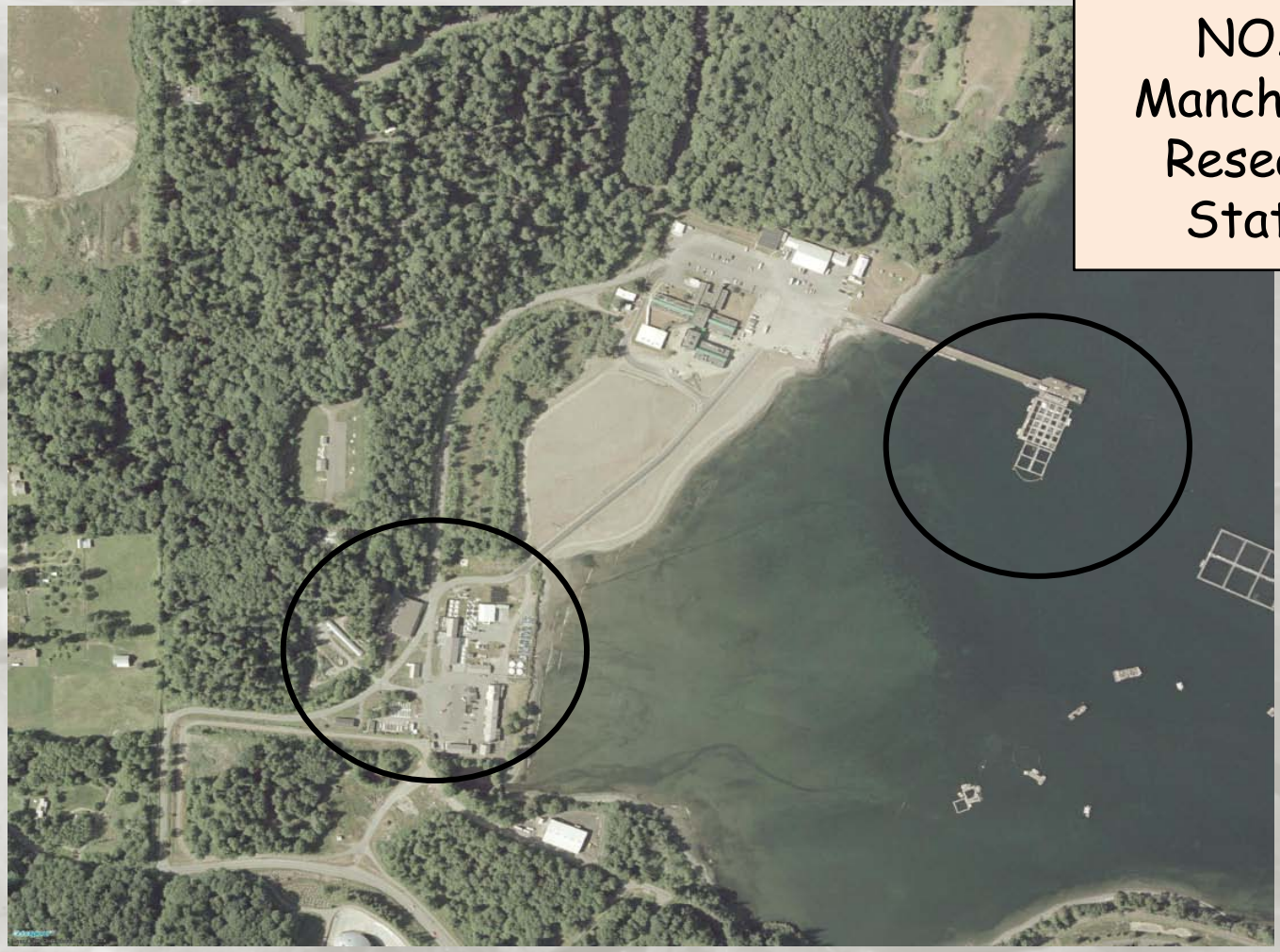
IDFG
Sawtooth Fish
Hatchery

Facilities and locations



NOAA conservation hatchery locations

Facilities and locations



NOAA Manchester Research Station

Facilities and locations

NOAA Manchester Research Station
seawater rearing

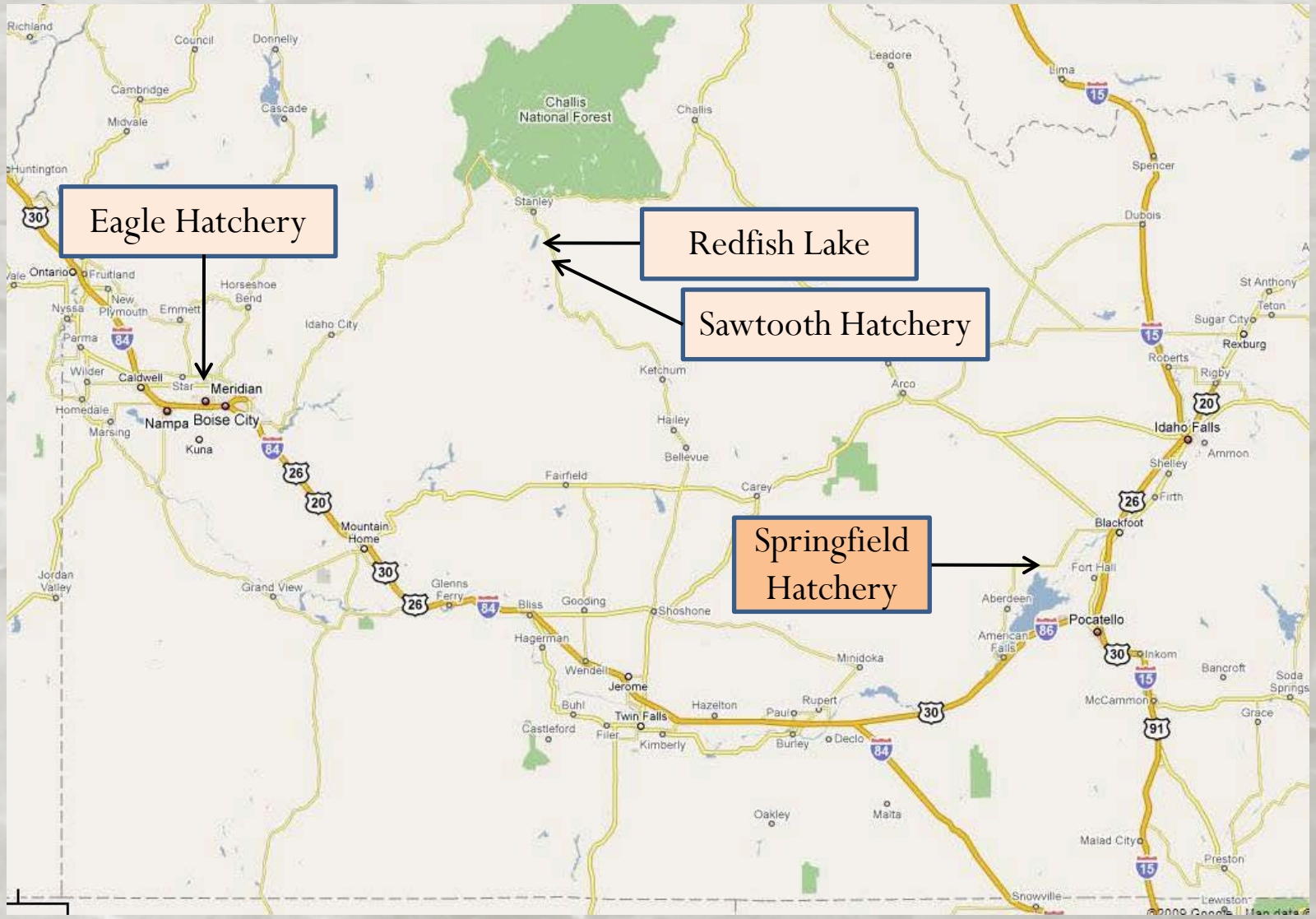
Facilities and locations

NOAA Burley Creek Hatchery
freshwater rearing

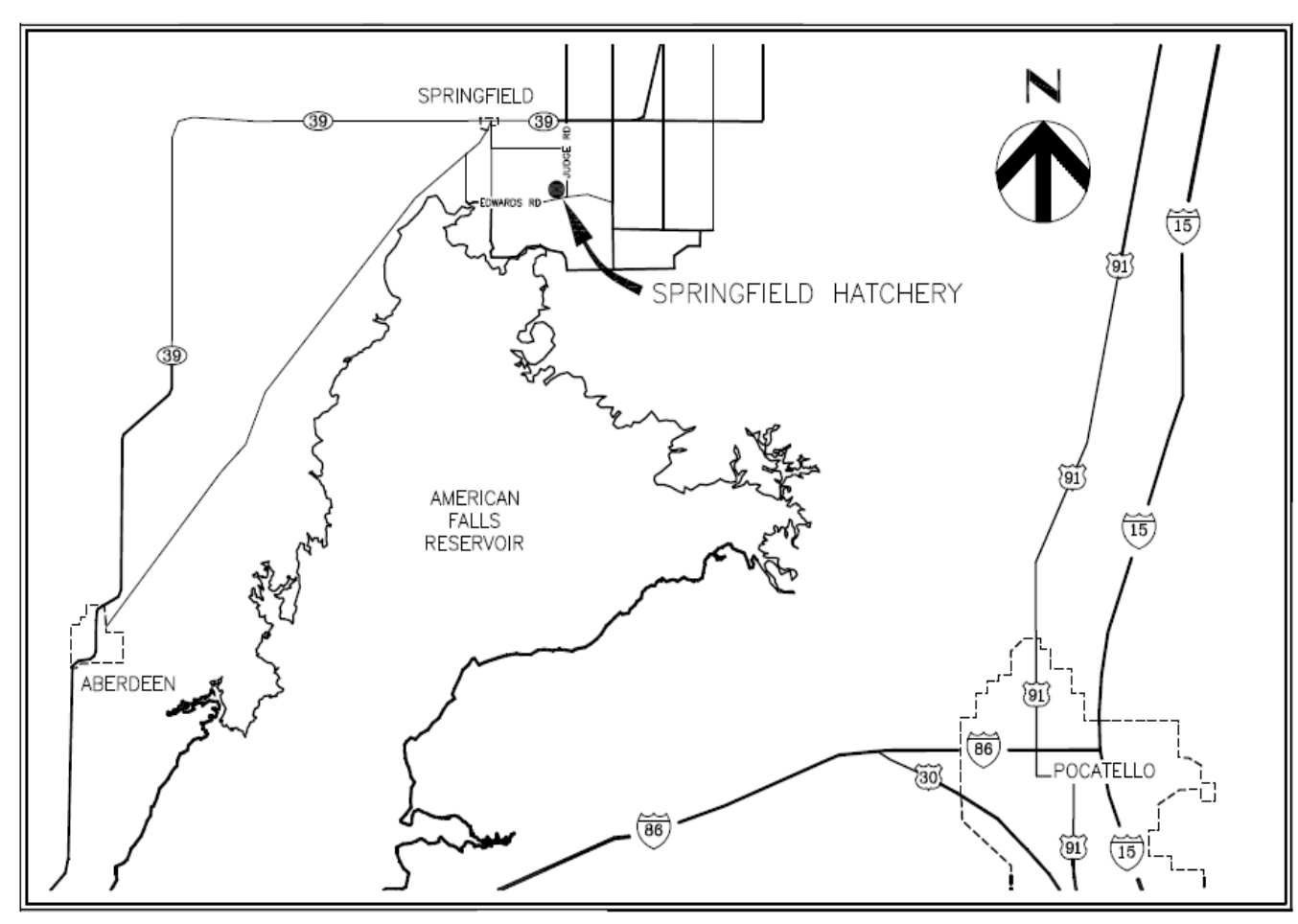
Facilities and locations

ODFG Oxbow Fish Hatchery

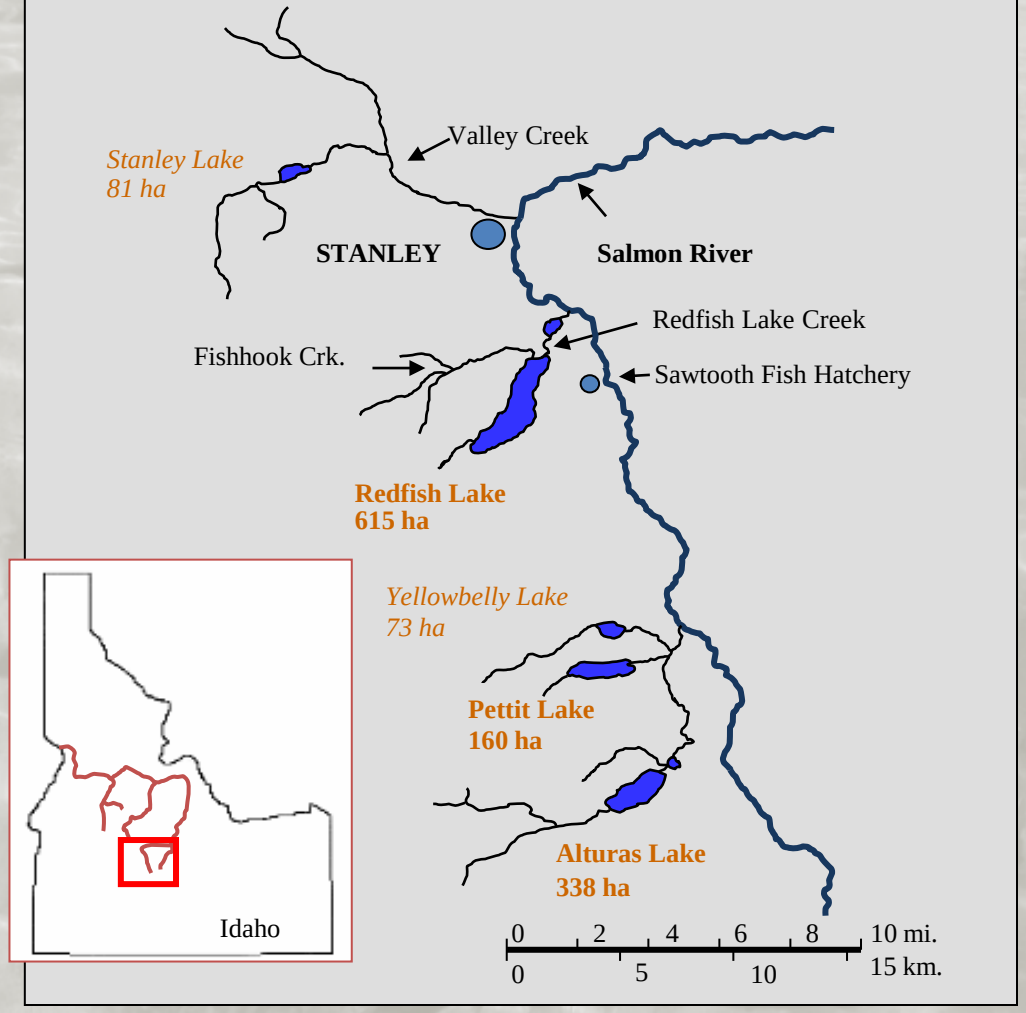
Facilities and locations



Facilities and locations



Facilities and locations



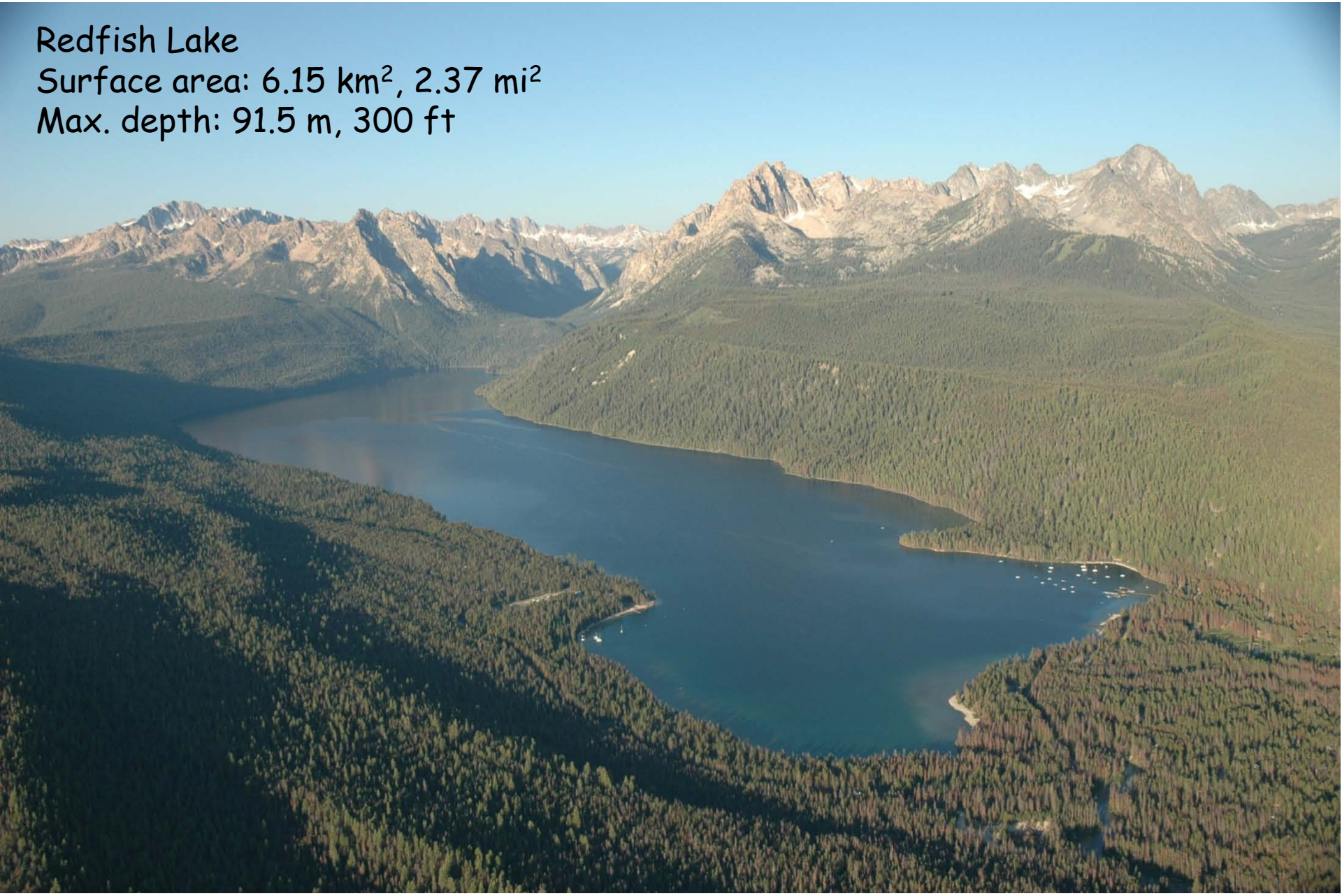


Photo courtesy Shoshone-Bannock Tribes

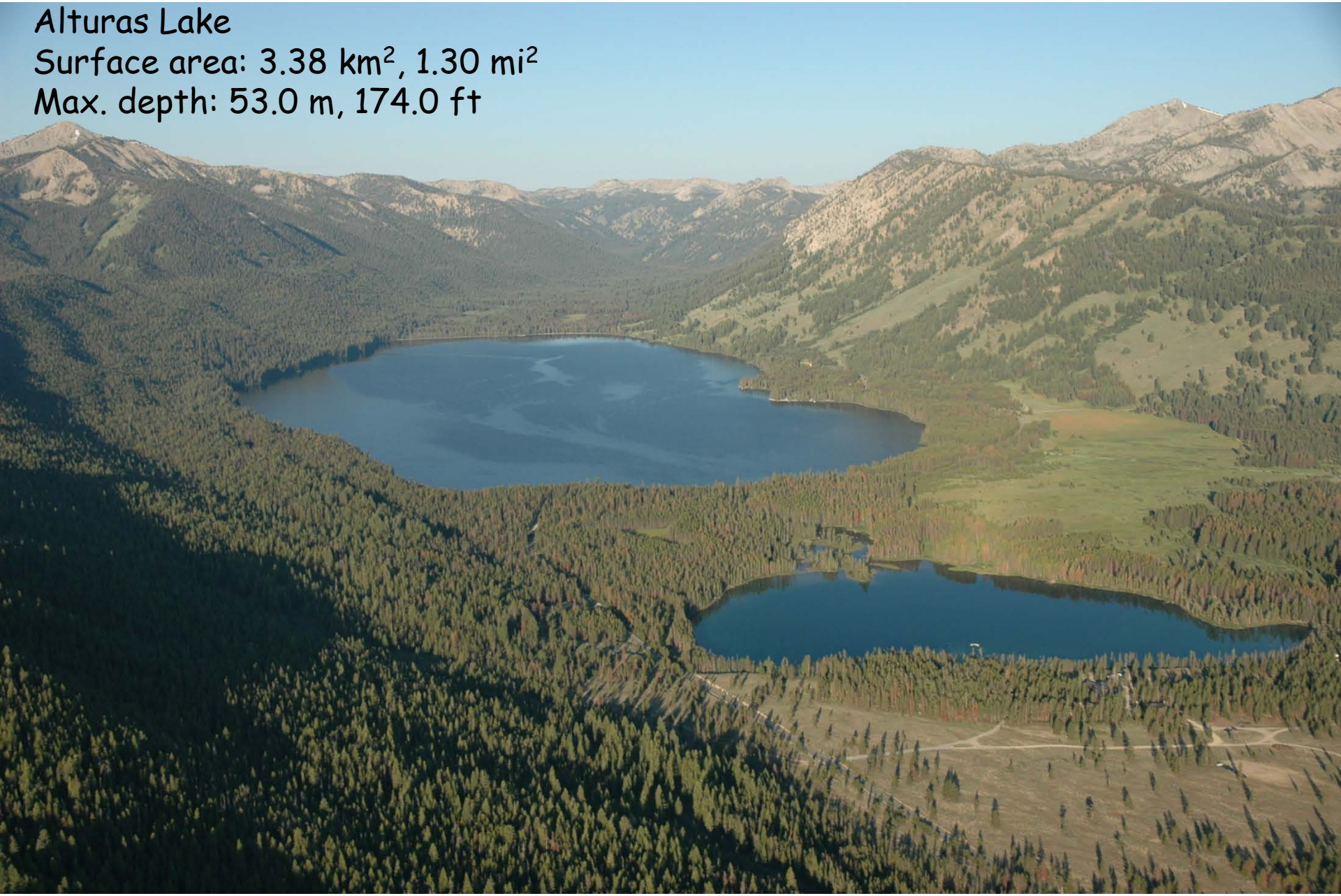


Photo courtesy Shoshone-Bannock Tribes

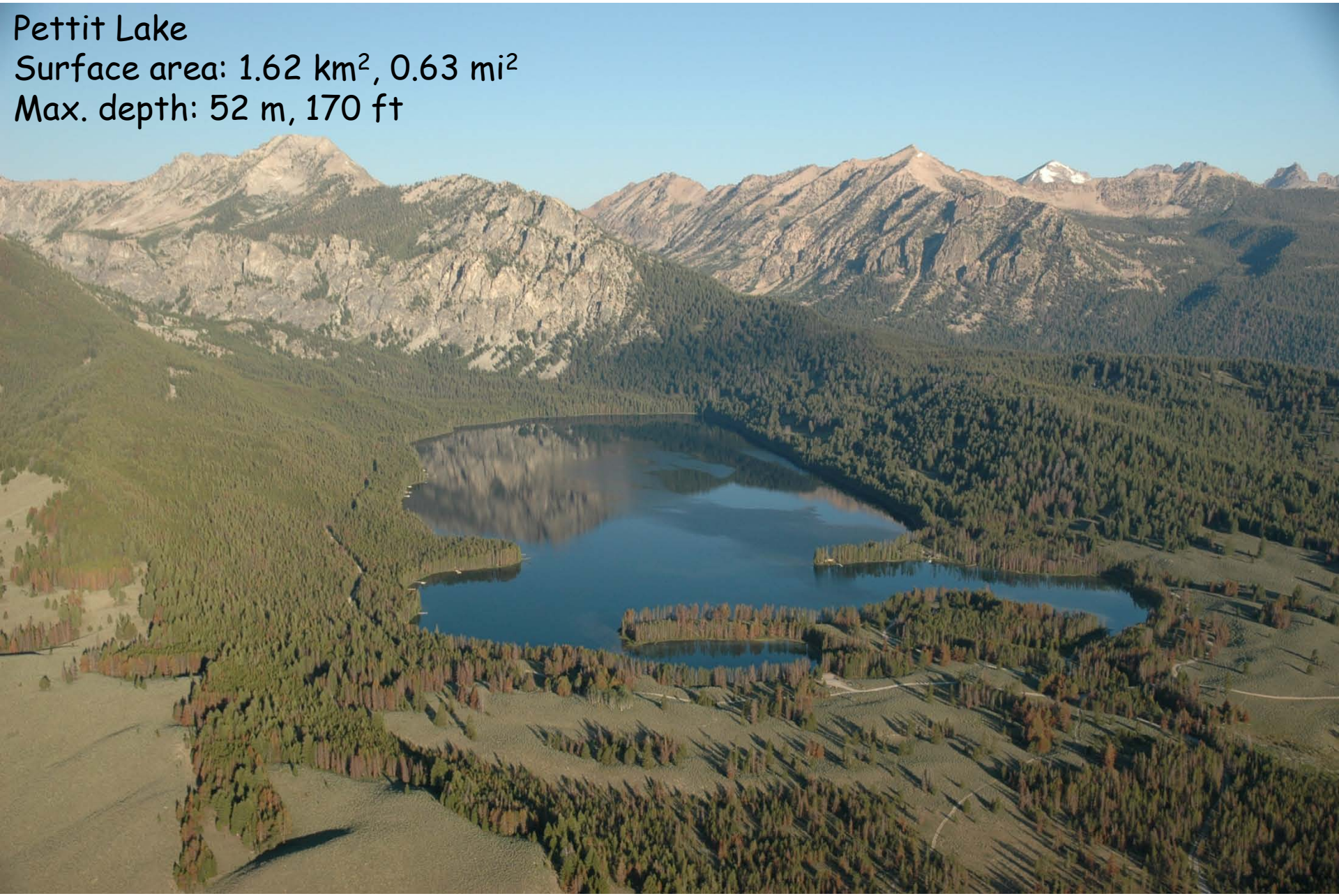
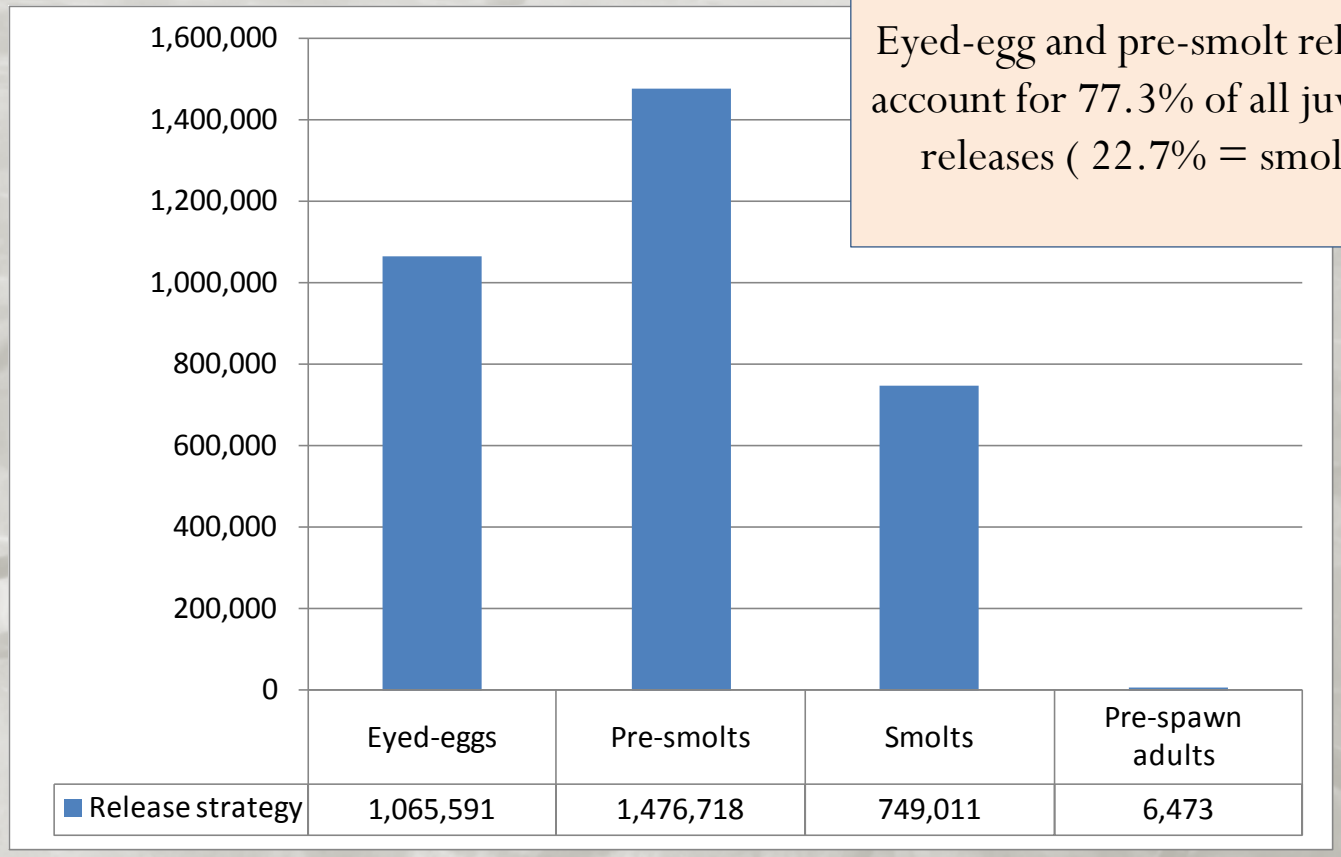


Photo courtesy Shoshone-Bannock Tribes

Conservation program results

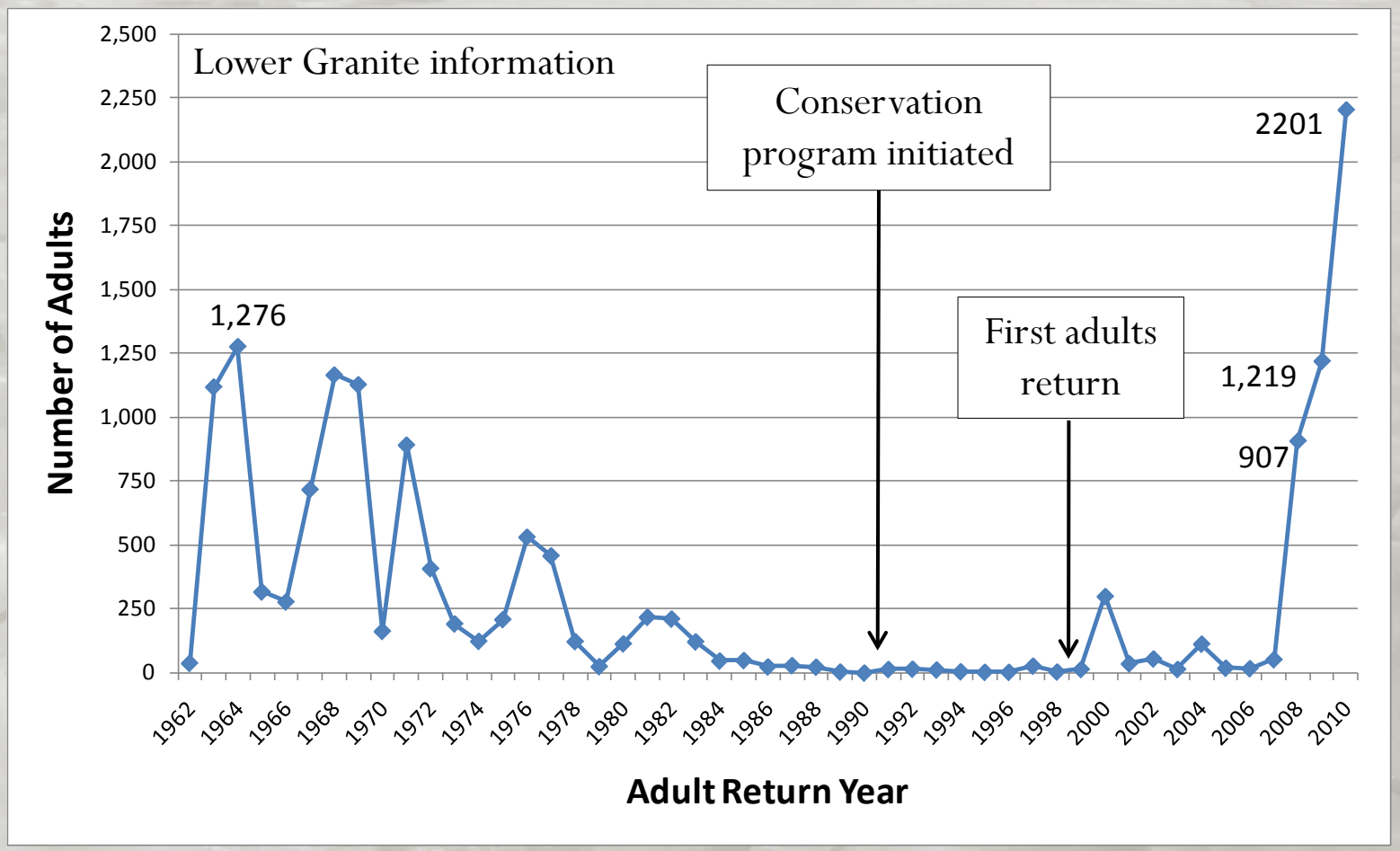
- First hatchery-produced adults out-planted in 1993
- First hatchery-produced juveniles planted in 1994
- First hatchery-produced anadromous adults back in 1999

Conservation program results



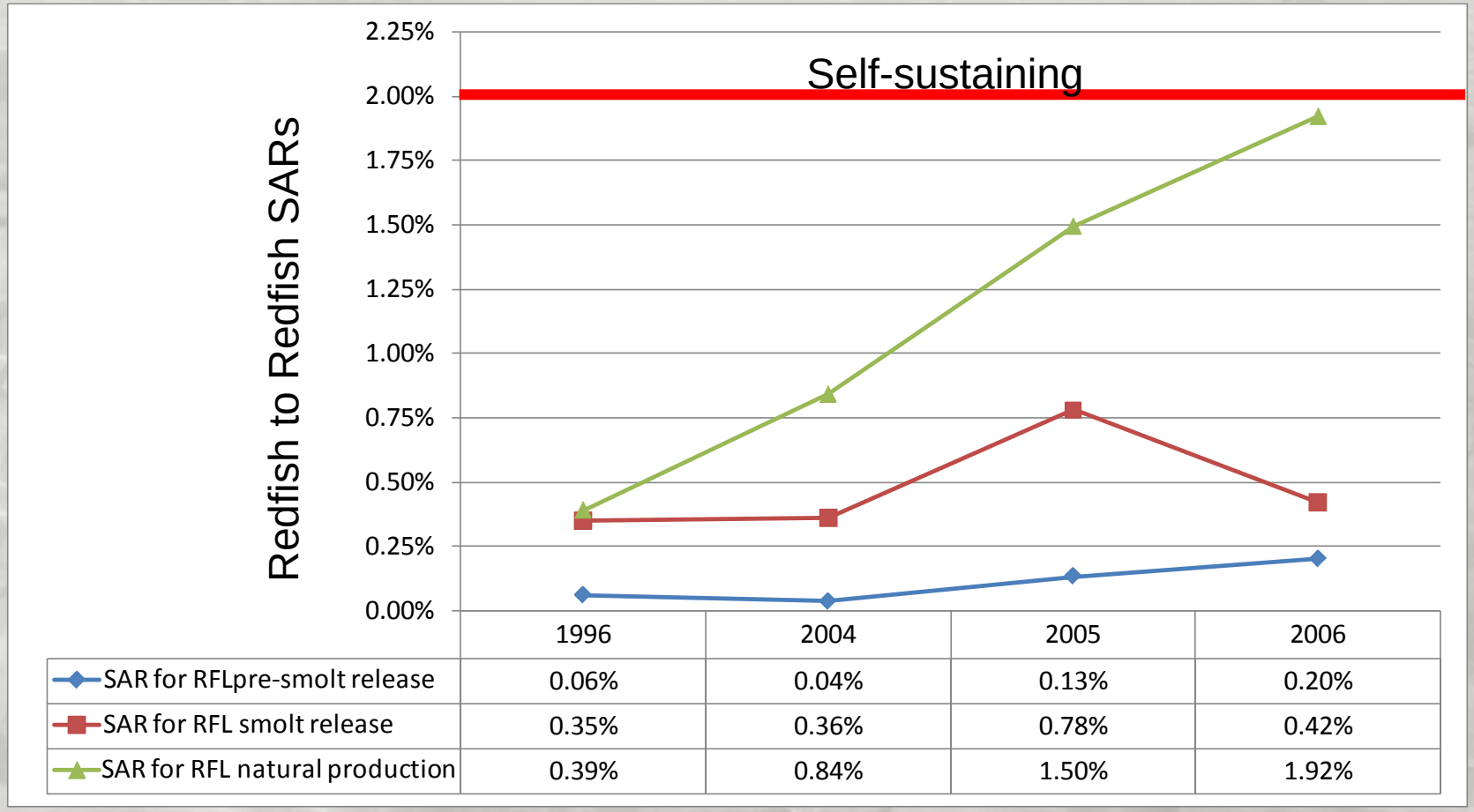
Eyed-egg and pre-smolt releases account for 77.3% of all juvenile releases (22.7% = smolts)

Conservation program results



Conservation program results

Redfish Lake information



	1996	2004	2005	2006
SAR for RFLpre-smolt release	0.06%	0.04%	0.13%	0.20%
SAR for RFL smolt release	0.35%	0.36%	0.78%	0.42%
SAR for RFL natural production	0.39%	0.84%	1.50%	1.92%

Example: 0.10% = 1 adult back for every thousand smolts out
1.00% = 10 adults back for every thousand smolts out

Conservation program results

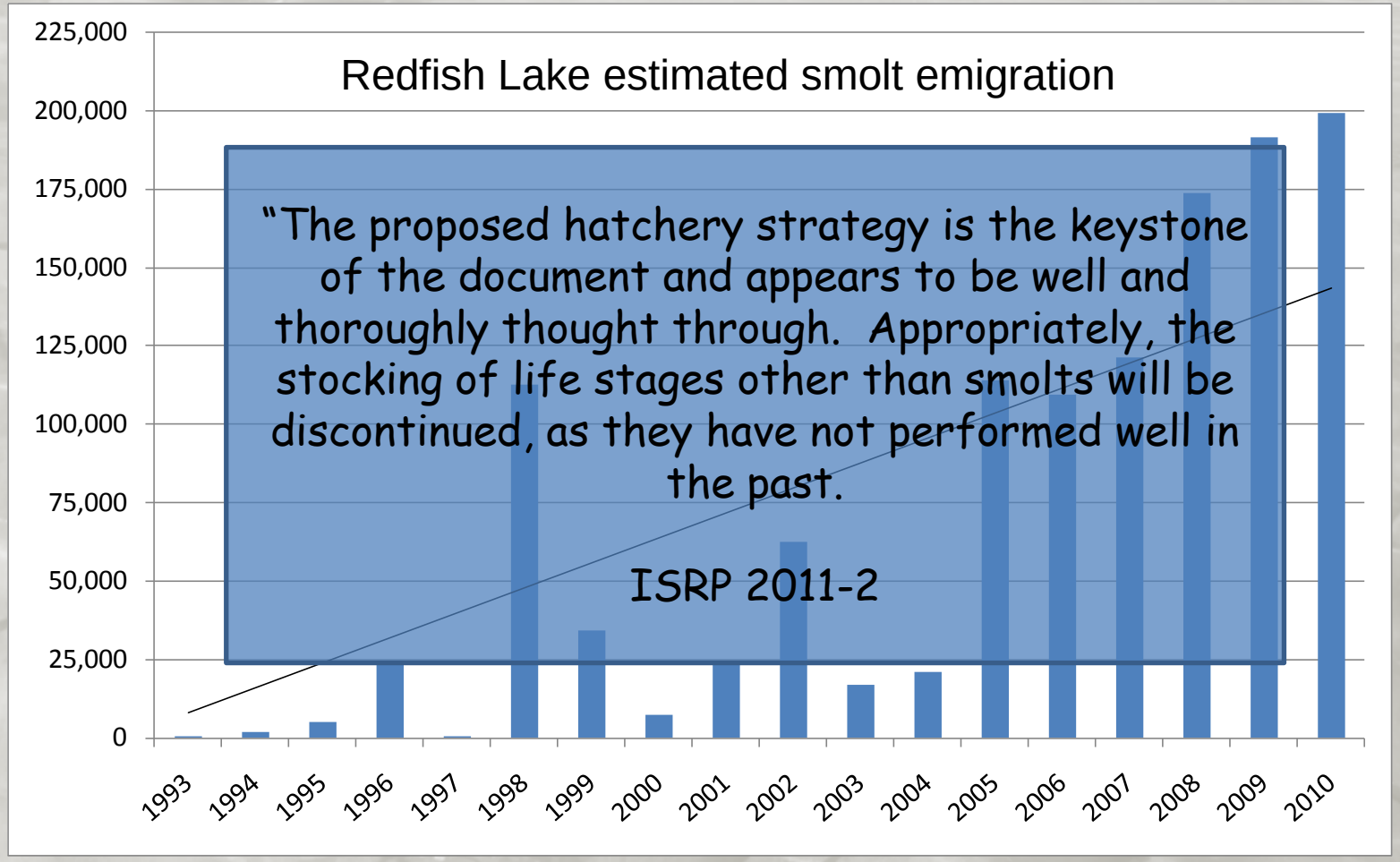
Redfish Lake information

	BROOD YEAR			
ESTIMATED EMIGRATION BY STRATEGY	1996	2004	2005	2006
Estimated RFL emigration from pre-smolt releases	152,322/28,435	39,870/17,185	61,804/14,256	62,015/17,304
Estimated RFL emigration from smolt releases	81,615	86,052	101,676	150,395
Estimated RFL emigration from natural production	2,799	6,065	5,280	6,237

	BROOD YEAR			
ESTIMATED RETURNS BY STRATEGY	1996	2004	2005	2006
Estimated adult returns to RFL from pre-smolt releases	42	6	19	34
Estimated adult returns to RFL from smolt releases	186	307	790	628
Estimated adult returns to RFL from natural production	10	51	79	120

316,011 Pre-smolts planted → 101 adults back → .03% SAR
419,738 Smolts planted → 1,911 adults back → .46% SAR
20,381 Natural smolts produced in lake → 260 adults back → 1.28% SAR

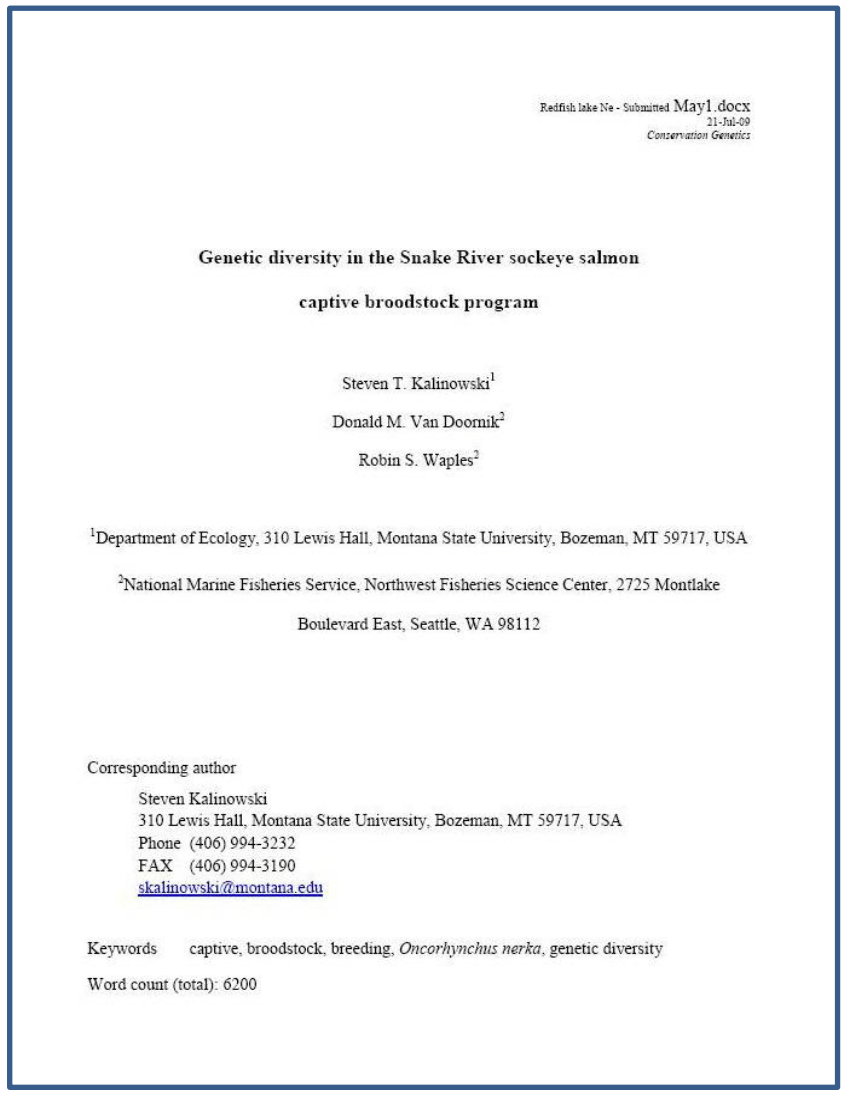
Conservation program results



Conservation program results

- In summary, after nearly 20 years of implementation, the program has successfully met its primary conservation objectives by:
  - Applying state-of-the art fish husbandry techniques
  - Using genetic tools to develop inbreeding avoidance spawning designs
  - Maximizing effective population size and population genetic diversity
  - Maximizing the numbers of breeders per generation
  - Managing genetic risks (inbreeding, domestication selection)
  - Conserving the adaptive capacity of the population
  - Comprehensive m&e and adaptive management

Conservation program results



Redfish lake Ne - Submitted May1.docx
21-Jul-09
Conservation Genetics

Genetic diversity in the Snake River sockeye salmon captive broodstock program

Steven T. Kalinowski[1]

Donald M. Van Doornik[2]

Robin S. Waples[2]

[1]Department of Ecology, 310 Lewis Hall, Montana State University, Bozeman, MT 59717, USA

[2]National Marine Fisheries Service, Northwest Fisheries Science Center, 2725 Montlake Boulevard East, Seattle, WA 98112

Corresponding author

Steven Kalinowski
310 Lewis Hall, Montana State University, Bozeman, MT 59717, USA
Phone (406) 994-3232
FAX (406) 994-3190
skalinowski@montana.edu

Keywords captive, broodstock, breeding, *Oncorhynchus nerka*, genetic diversity

Word count (total): 6200

Genetic diversity in Snake River sockeye salmon captive broodstock program

Steven Kalinowski
Don Van Doornik
Robin Waples

…the Redfish Lake sockeye population has retained more genetic diversity than many other captive populations propagated in captivity to prevent extinction (93%)

Step 1 Master Plan review

Master Plan document and the expanded production program

Setting the stage – transitioning to the expanded program

- Support for program expansion is firmly in place in:
  - The 2008 FCRPS BiOp (RPA Action 42)
  - The Idaho Fish Accord
  - And supported through the AMIP –

"This species….is effectively managed under ongoing contingency actions….(that) include continuation of the safety-net hatchery program (and) further expansion of the sockeye program (up to 1 million fish released as smolts)……."

Step 1 Master Plan review

- All Step 1 objectives addressed including:
  - Describing consistency with the Council's eight scientific principles
  - Describing consistency with the Council's Artificial Production Policies and Strategies
  - Developing a HGMP
  - Considering Alternatives to proposed action
  - Developing conceptual facility design and cost estimates

Step 1 Master Plan review

- Biological goals defined
  - Increase the number of anadromous adults spawning naturally in system lakes
  - Achieve draft Recovery Plan goals of:
    - 1,000 Redfish Lake natural spawners
    - 500 Pettit Lake natural spawners
    - 500 Alturas Lake natural spawners

Step 1 Master Plan review

- Conservation and harvest goals
  - Ensure long-term persistence of a healthy and harvestable population of sockeye salmon
  - Protect genetic resources using appropriate broodstock management techniques
  - Build the program to transition to an integrated supplementation program when appropriate triggers met

Step 1 Master Plan review

- Springfield Hatchery will contribute significantly by:
  - Establishing a self-sustaining anadromous broodstock which will reduce the reliance on the captive broodstock
  - Increase population fitness and reduce the risks associated with domestication selection
  - Provide adults to out-plant to lakes to increase natural spawning and juvenile production

Step 1 Master Plan review

- Phased approach to developing hatchery strategies proposed:
  - As the production of anadromous adults increases as a result of increased smolt production (e.g., meeting biological obj) –
  - Reduce reliance on safety net programs and transition program to a more conventional conservation-type supplementation program

Step 1 Master Plan review

- Phased approach
  - Phase I: Captive broodstock phase (already in progress
  - Phase II: Re-colonization phase
  - Phase III: Local Adaptation phase

Step 1 Master Plan review

- Phase I: Captive broodstock phase (already in progress
  - Maintain current captive broodstock effort and duplicate captive broodstock facilities (IDFG & NOAA) until trigger met
  - Continue to address need to maintain population genetic diversity and to guard against catastrophic loss (Eagle and NOAA broodstock programs both operate)

Step 1 Master Plan review

- Phase II: Re-colonization phase
  - Initiate with development of expanded smolt program at Springfield Hatchery
  - Generate anadromous adult returns sufficient to meet broodstock and escapement objectives to lakes
  - Maintain RFL (Eagle Hatchery) program pNOB at 10%
  - Phase out NOAA safety net entirely

Step 1 Master Plan review

- Phase II: Re-colonization phase
  - Average abundance objectives:
    - 522 natural-origin adult returns
    - 1,150 hatchery-origin adults to meet broodstock needs
    - 3,312 hatchery-origin adults to meet RFL escapement objectives
    - hatchery-origin adults available for out-planting to Pettit Lake when HOR escapement > 3,800 (discussed later)
    - RFL program pNOB = 10%
    - RFL program pHOS = n/a at this time
    - Total natural-origin adult returns = 522
    - Total hatchery-origin adult returns = 4,462

Step 1 Master Plan review

- Phase III: Local adaptation phase
  - Transition Eagle Hatchery program to integrated conservation program
  - Generate anadromous adult returns (hatchery- and natural-origin) sufficient to meet broodstock and escapement objectives to lakes

Step 1 Master Plan review

- Phase III: Local adaptation phase (cont'd)
  - Average abundance objectives:
    - 1,122 natural-origin adult returns
    - 692 hatchery-origin adults to meet broodstock needs
    - 269 hatchery-origin adults to meet RFL escapement obj.
    - Hatchery-origin adults available to continue Pettit lake program (up to 500)
    - RFL program PNI > 0.67
    - RFL program pNob = 35%
    - RFL program pHOS < 16% (not to exceed 30%)
    - Total natural-origin adult returns = 1,122
    - Total hatchery-origin adult returns = 5,626

Step 1 Master Plan review

- Primary program triggers
  - Trigger 1: When 5-yr running average return of anadromous adults > 1,000, begin to phase out NOAA safety net program
  - Trigger 2: When 5-yr running average return of anadromous adults > 2,150, Eagle Hatchery captive brood production terminated
  - Trigger 3: When 5-yr running average return of natural-origin adults > 750, initiate Phase III

Step 1 Master Plan review

- Primary program triggers
  - Anadromous hatchery-origin adults to be released to Pettit Lake when combined anadromous adult returns (hatchery- and natural-origin) exceed 3,800 fish.

Run-Size	Hatchery Broodstock			Natural Escapement Targets		
HOR + NOR	No. HOR	pNOB (10%)	Total	Redfish Lake	Pettit Lake	Alturas Lake
1,150	1,035	115	1,150	0	0	0
1,500	1,035	115	1,150	350	0	0
2,000	1,035	115	1,150	850	0	0
2,500	1,035	115	1,150	1,350	0	0
3,000	1,035	115	1,150	1,850	0	0
3,500	1,035	115	1,150	2,350	0	0
4,000	1,035	115	1,150	2,850	0	0
4,500	1,035	115	1,150	3,350	0	0
5,000	1,035	115	1,150	3,800	50	0
5,500	1,035	115	1,150	3,850	500	0
6,000	1,035	115	1,150	4,000	850	0
6,500	1,035	115	1,150	4,200	1,150	0
7,000	1,035	115	1,150	4,400	1,450	0

Step 1 Master Plan review

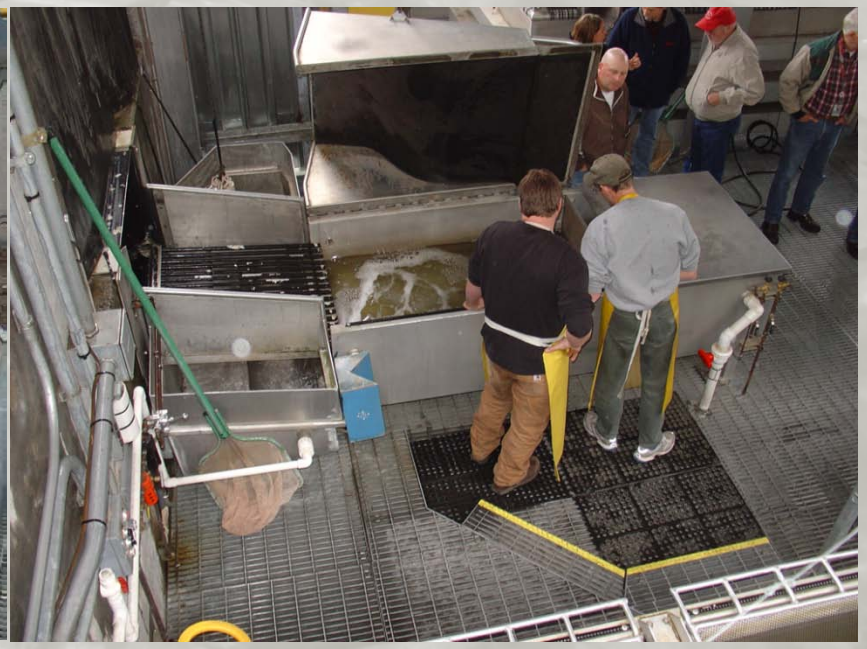
- Monitoring and evaluation programs
  - Largely in place and ongoing
  - General areas of emphasis include:
    - Genetic monitoring and broodstock selection
    - Developing reintroduction strategy recommendations
    - Implementing marking/tagging programs
    - Monitoring life cycle survival and harvest

Step 1 Master Plan review

- Monitoring and evaluation programs

Step 1 Master Plan review

- Monitoring and evaluation programs
  - Recently expanded to include evaluation of adult trap and haul



Step 1 Master Plan review

- Monitoring and evaluation programs
  - Recently expanded to include a collaborative project with NOAA examining juvenile sockeye migratory drop-out between headwater nursery lakes and Lower Granite Dam

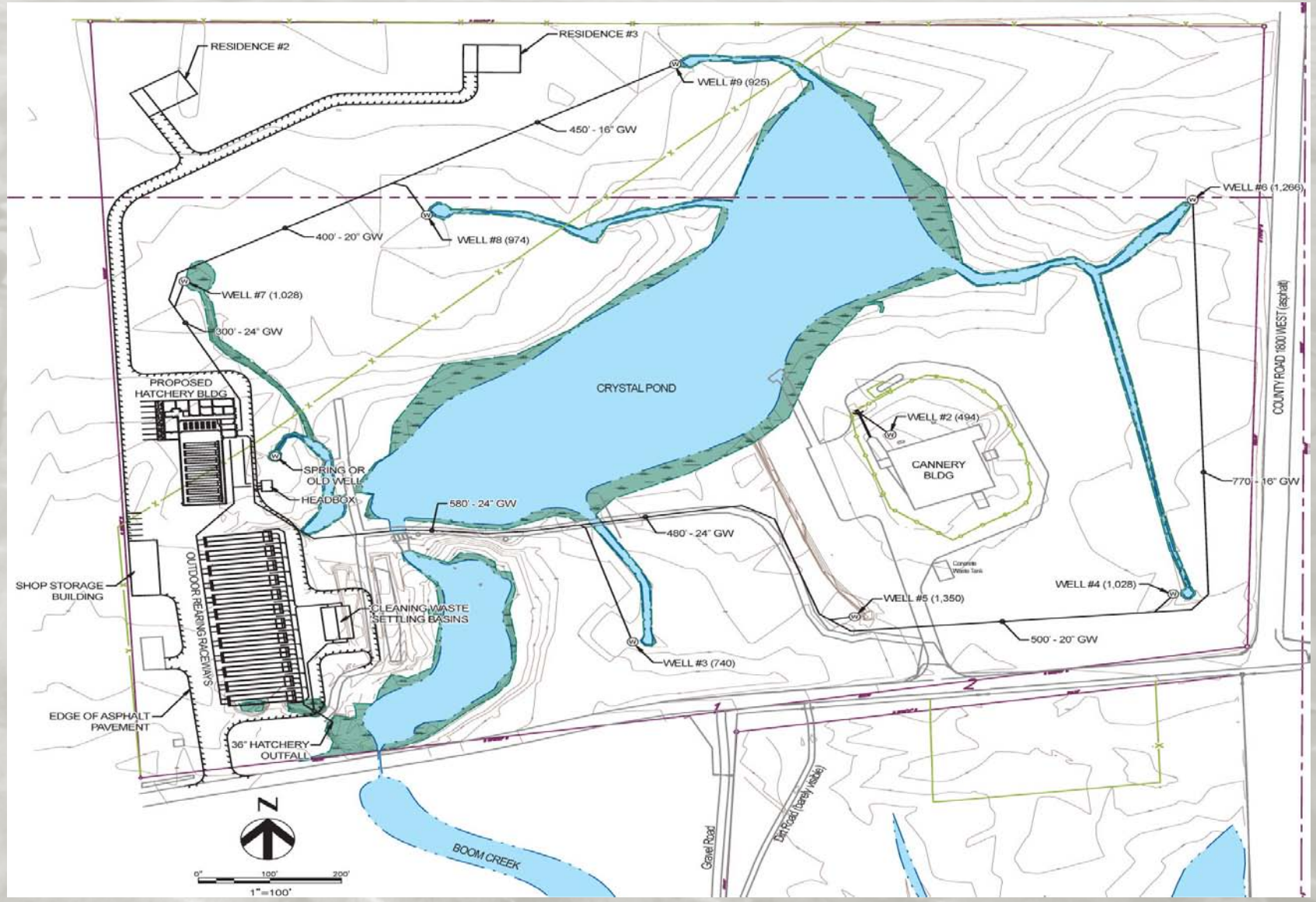
Step 1 Master Plan review

New hatchery conceptual design, cost estimates, timelines, and next steps

Step 1 Master Plan review

- Overview of hatchery site
  - 72 acre parcel owned by IDFG
  - Existing (abandoned) hatchery previously operated as a private trout farm
  - 50 cfs water right
  - Nine artesian wells approx. 250 ft deep
  - Water temp – constant 10.2 C

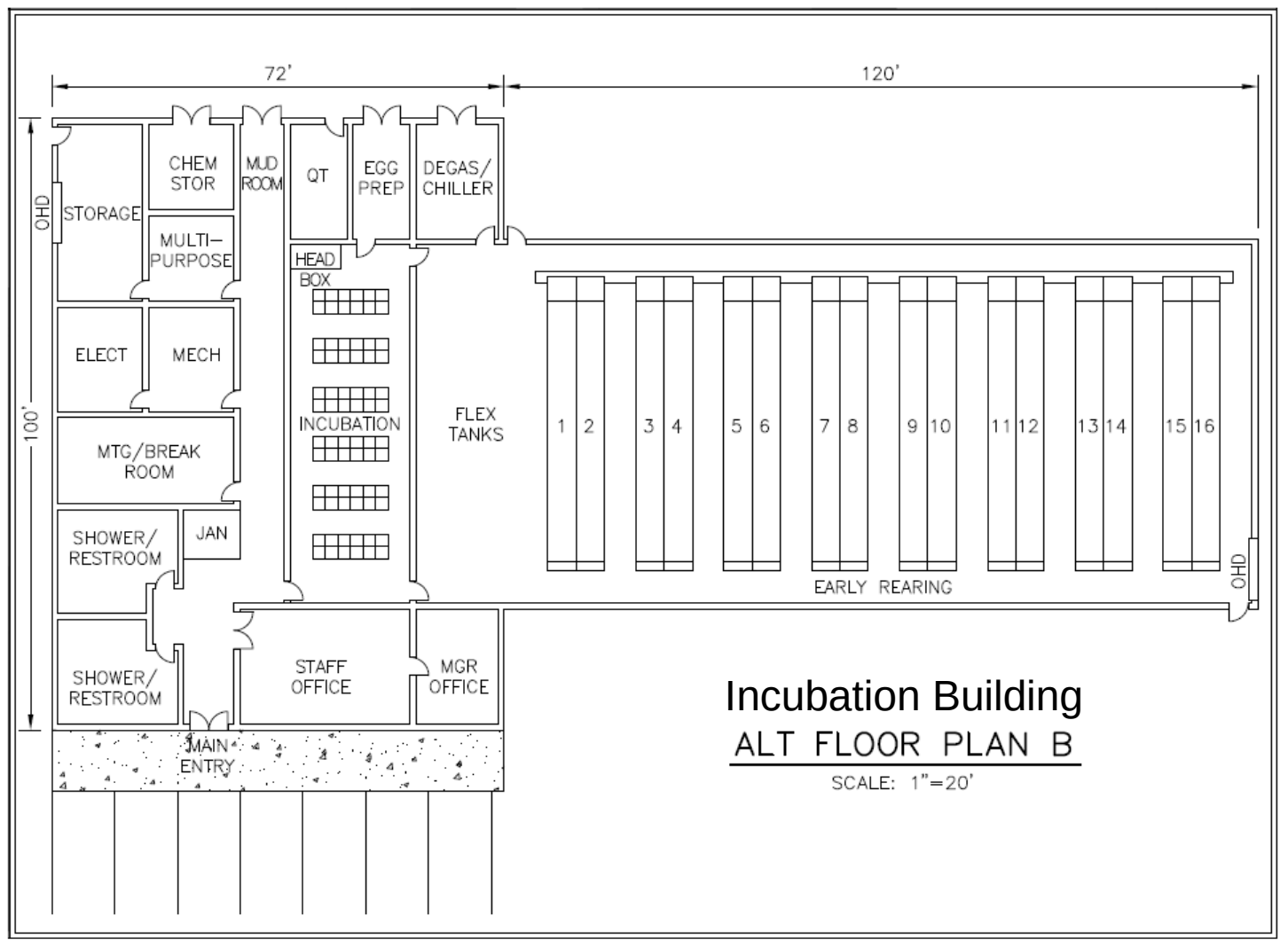
Step 1 Master Plan review



Step 1 Master Plan review

- Add pumps at 6 wells
- 13,620 square feet hatchery/office
- 2,830 square feet shop/storage
- Three new staff residences
- Degassing head box
- Chilled water system
- 16 early rearing troughs
- 24 production raceways
- Effluent treatment
- Site work and utilities

Step 1 Master Plan review



Step 1 Master Plan review

Program Area	Estimated Cost	Occurrence	Level of Certainty
Planning & Design Step 1 *	$298,405	One Time	Contract to develop Step 1 Master Plan
Planning & Design Step 2 **	$500,000	One Time	Placeholder (less than concept)
Planning & Design Step 3 ***	$400,000	One Time	Placeholder (less than concept)
Construction	$13,579,928	One Time	Concept (+/- 35% to 50%) (escalated to 2012 dollars)
Capital Equipment	$218,249	One Time	Concept (+/- 35% to 50%) (escalated to 2013 dollars)
Environmental Compliance Step 2 (Permitting, EA, Other)	$136,733	One Time	Concept (+/- 35% to 50%) Completed during Step 2 (2011 dollars)
Land Purchases, Leases & Easements ****	$4,750,000	One Time	Expenditure complete
Annual Operations & Maintenance / Springfield Hatchery Programs	$769,795	Annual	Concept (+/- 35%) (escalated to 2013 dollars)
Monitoring & Evaluation *****	$286,998	Annual	Concept (+/- 35%) (escalated to 2014 dollars)

Notes and Assumptions:
* Shows the actual contract figure for completion of a Step 1 Master Plan
** Shows an estimated placeholder cost estimate based on the conceptual construction cost
*** Shows an estimated placeholder cost estimate based on the conceptual construction cost
**** Land cost, $1.96 million; remainder to a trust fund totaling $2.79 million; IDFG to offset loss of Springfield site as a resident (trout) fish production facility for Idaho
***** Monitoring and Evaluation includes annual tagging costs of over ~$125,000
Budget figures assume that work would proceed on the timeline shown in Figure 8-1

Step 1 Master Plan review

- Preliminary cost analysis:
  - From the prior page (Step 1 estimates)
    - Planning and design/env. compliance = $1,335,138
    - Construction and capital equipment = $13,798,177
  - From the Idaho Accord
    - Planning and design/env. Compliance = $1,000,000
    - Construction and capital equipment = $8,500,000
  - Remember – costing very preliminary and includes +- 25% contingency factor

Step 1 Master Plan review

Program Area	Occurrence	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020
Planning and Design Step 1	One Time		■	■								
Planning and Design Step 2 (and Environmental Compliance)	One Time			■	■							
Planning and Design Step 3 (Final Design)	One Time				■							
Construction	One Time				■	■						
Capital Equipment	One Time					■						
Land Purchases, Leases and Easements	One Time	■										
Annual Operations and Maintenance	Annual											
Monitoring and Evaluation	Annual											

Notes & Assumptions:

Assumes proposed Step 2 and Step 3 funding is available on this schedule
Assumes a design/build or modified design/build approach is utilized between Step 2 and Step 3
Assumes construction starting in early 2012 (one year schedule is dependent on a Spring 2012 construction start)
Assumes all proposed facilities and improvements are built in one construction season (during FY 2012 and early FY 2013)
Assumes no major environmental compliance issues are identified beyond what is described in Section 3.3.10
O&M expenditures will likely start during the last phases of construction (FY 2013) allowing for training and handoff of new facilities and equipment
M&E expenditures will likely start after the last phases of construction (FY 2014)

Step 1 Master Plan review

- Next steps and milestones
  - Action item to approve Step 1 – April Council meeting
  - Plan to pursue combined Step 2 and 3 review process (completion in late 2011)
  - Plan to address six major areas of questioning identified by the ISRP in their Step 1 review
  - Construction Spring 2012 (at the earliest)

Step 1 Master Plan review

- Aggressive Biological timeline
  - Facility complete and receives eggs 12/2012
  - First full-term smolts emigrate in May 2014
  - First age-4 adults return in August 2016

- Conservative Biological timeline
  - All dates move one-year forward, first adults return in 2017

Step 1 Master Plan review

Questions