Snake River Fall Chinook
Lyons Ferry Hatchery

Derek Gloyn, WDFW
Acknowledgments
• Lyons Ferry Hatchery Complex, WDFW Snake River Lab, WDFW Fish Management, Tribal Co-Managers, Irrigon Hatchery, and Idaho Power Company
Mitigation Goal:

- Hatchery mitigation was for 48% loss through the dams and the loss of spawning habitat due to the inundation by the 4 lower Snake dams (adult equivalents = 13,300 + 5,000), with the remaining 52% (14,400) expected to be self-sustaining.

- It was also assumed that 54,900 fish would be harvested below the project area.

- Mitigation was to be accomplished by the annual release of 9,160,000 hatchery-reared subyearling smolts with an assumed SAR of 0.2%.
Management Objectives

- Meet the LSRCP mitigation goal.
- Restore and maintain fisheries (long-term goal – 34,400 hatchery and natural fish).
- Restore and maintain the natural population
- Minimize impacts of the hatchery fish on the natural population.
- Coordinate actions with other basin managers
Management Objectives (additional or amended)

• Monitor the status and trends of natural Chinook population where LSRCP fish might have effects

• Program is compliant with ESA (HGMP’s, FMEP’s)

• Program is compliant with WDFW Hatchery Policies to protect and recover wild stocks
M & E Objectives

- Determine if the program is meeting its mitigation goals.
- Monitor production, productivity, and life history characteristics of both the hatchery and natural components of the population.
- Evaluate hatchery rearing strategies so that we can maximize adult returns.
- Provide Hatchery and Natural Origin monitoring data for ESA recovery efforts.
Brief Program History

• Egg Bank program from 1976-1983.

• Hatchery production began in 1984.

• Original goal was 9.16 million sub-yearlings to return 18,300 adults.

• Broodstock collection at IHD and LFH, switched to LGR and LFH in 1994.
Brief Program History

- Expansion of program in 1996 with FCAP for acclimation and release above LGR.
- Program always included plans to provide 1.3 M eggs for IPC mitigation as part of HCA.
- US v OR – constrains production over broad periods of time (10 yr blocks)
Lyons Ferry Hatchery

Collected broodstock are held and spawned here (Rkm 95 on Snake River), eggs hatched, and juveniles reared through the subyearling and yearling life stage before being marked and transferred to FCAP facilities, trucked to sites for direct release and released on site.

Marking follows US v OR agreement.

Well water-constant 11°C (52°F).

37 Raceways and 1 lake used for rearing.

Annual egg goal = 4.4 mil
<table>
<thead>
<tr>
<th>Priority</th>
<th>Rearing Facility</th>
<th>Number</th>
<th>Age</th>
<th>Release Location(s)</th>
<th>Marking</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lyons Ferry</td>
<td>450,000</td>
<td>1+</td>
<td>On station</td>
<td>225K AdCWT 225K CWT</td>
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<tr>
<td>2</td>
<td>Lyons Ferry</td>
<td>150,000</td>
<td>1+</td>
<td>Pittsburg Landing</td>
<td>70K AdCWT 80K CW only</td>
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<tr>
<td>3</td>
<td>Lyons Ferry</td>
<td>150,000</td>
<td>1+</td>
<td>Big Canyon</td>
<td>70K AdCWT 80K CW only</td>
</tr>
<tr>
<td>4</td>
<td>Lyons Ferry</td>
<td>150,000</td>
<td>1+</td>
<td>Captain John Rapids</td>
<td>70K AdCWT 80K CW only</td>
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<tr>
<td>5</td>
<td>Lyons Ferry</td>
<td>200,000</td>
<td>0+</td>
<td>On station</td>
<td>200K AdCWT</td>
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<tr>
<td>6</td>
<td>Lyons Ferry</td>
<td>500,000</td>
<td>0+</td>
<td>Captain John Rapids</td>
<td>100K AdCWT 100K CW only 300K Unmarked</td>
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<tr>
<td>7</td>
<td>Lyons Ferry</td>
<td>500,000</td>
<td>0+</td>
<td>Big Canyon</td>
<td>100K AdCWT 100K CW only 300K Unmarked</td>
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<tr>
<td>8</td>
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<td>Pittsburg Landing</td>
<td>100K AdCWT 100K CW only</td>
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<td>9</td>
<td>Oxbow</td>
<td>200,000</td>
<td>0+</td>
<td>Hells Canyon Dam</td>
<td>200K AdCWT</td>
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<td>10</td>
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<td>0+</td>
<td>Pittsburg Landing</td>
<td>200K Unmarked</td>
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<tr>
<td>11</td>
<td>Lyons Ferry</td>
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<td>0+</td>
<td>Direct stream evaluation Near Captain John Rapids</td>
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<tr>
<td>12</td>
<td>DNFH/Umatilla</td>
<td>250,000</td>
<td>0+</td>
<td>Transportation Study^</td>
<td>250K PIT Tag only</td>
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<tr>
<td>13</td>
<td>Irrigon³</td>
<td>200,000</td>
<td>0+</td>
<td>Grande Ronde River</td>
<td>200K AdCWT</td>
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<tr>
<td>14</td>
<td>DNFH/Umatilla</td>
<td>78,000</td>
<td>0+</td>
<td>Transportation Study^</td>
<td>78K PIT tag only</td>
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<td>15</td>
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<td>0+</td>
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<td>16</td>
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<tr>
<td>17</td>
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<td>600,000</td>
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<tr>
<td>TOTAL</td>
<td>Yearlings</td>
<td></td>
<td></td>
<td></td>
<td>900,000</td>
</tr>
<tr>
<td></td>
<td>Subyearlings</td>
<td></td>
<td></td>
<td></td>
<td>3,528,000 (of which 328,000 are for Transportation Study)</td>
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Adaptations Over Time

• Broodstock Collection

• Fish Health

• Predation

• Transfers/Releases
Adult fall Chinook Trapping @ Lyons Ferry + Strays

- Snake River Fall Chinook
- Strays

First year trapping at LFH in addition to IHD

Last year fish trapped @ IHD

Number of Fish

Brood Year
Adult fall Chinook Trapping @ LGR + Strays

Number of Fish

Snake River Fall Chinook  Strays
Disposition of Trapped fall Chinook at LFH (1984-2012 Run Years)

- Spawned: 47%
- Returned to Snake River: 11%
- Pre-Spawn Mortality: 20%
- Killed for Data: 22%
Age Composition of Spawned Snake River fall Chinook

- Unk. age
- 0-salt
- 1-salt
- 2-salt
- 3-salt
- 4-salt

Spawning Protocol:
- Brood stock Past
- Brood stock Recent
- Newest Protocol

Bar chart showing the age composition of spawned snake River fall Chinook.
Spawn Timing
BY 1984 – BY 2012

Peak
Fecundity over time

- Average over the last 10 years (\'03-12) = 3,573
- Previous average (\'84-\'93 ) = 4,146
Snake River fall Chinook @ LFH
Egg to Release Survival

- Green Egg to Smolt - YRL
- Green Egg to Smolt - Sub
- Eyed Egg to Release - YRL
- Eyed Egg to Release - Sub

Survival

- Green Egg to Smolt Goal = 80%

Brood Year
Adaptations Over Time

- Broodstock Collection
- Fish Health
- Predation
- Transfers/Releases
Fish Health - Bacterial Kidney Disease (BKD)

• In the Past: Broodstock at LGR were injected with erythromycin and oxytetracycline, and then at monthly intervals.

• Present: All injections discontinued

• All females in the yearling program and eyed egg transfers to Oregon and Idaho will continue to be tested for BKD via ELISA.
  – Four categories for the BKD – ELISA optical densities
    • Below-low, Low, Moderate, and High
Fish Health – BKD

• In the Past: The yearling program was given a prophylactic feed treatment (Aquamycin) to further reduce the incidence of an outbreak.

• Present: Prophylactic feed treatment discontinued.
Fish Health - Bacterial Gill Disease (BGD)

• In the Past: High incidence of BGD
  • Did not know water chemistry/quality, high densities, food quality, feeding regimes, cleaning regimes, flows, etc.

• Present: No outbreaks since 2008
  • Better understand of water chemistry/quality, low densities, improvements in food quality and feeding regimes, improved cleaning, higher turnover rates.
Adaptations Over Time

- Broodstock Collection
- Fish Health
- Predation
- Transfers/Releases
Predation

- Netting over all rearing vessels
- Trapping
Adaptations Over Time

- Broodstock Collection
- Fish Health
- Predation
- Transfers/Releases
LFH Snake River stock fall Chinook Transfers (eggs + pre-smolts)

Number of Fish

Release Year

Transportation Study Complete -345,000
LFH Snake River stock fall Chinook Releases

Number of Fish

- Sub-yearlings
- Yearlings

Release Year

- 83 85 87 89 91 93 95 97 99 01 03 05 07 09 11
Adaptations in response to identified problems

• Drastic reduction in using 0-salt and 1-salt fish in broodstock.

• Reduced densities in response to BGD, as well as improved fish culture practices, and raceway modifications.

• Put bird netting over all major rearing vessels
Critical Data Gaps w/in Hatchery

• CWT and evaluate sub-yearlings in adult ponds due to ponds being split in 2009.
• Continue PIT tagging on-station sub-yearlings in order to account for adult returns.
• Continue with Parental Based Tagging (PBT)
• Radio telemetry study to address LF yearling fall back at LGR and fidelity of FCAP sub-yearlings to their acclimation site.
Questions?