BEYOND THE CRASH –
Evolving Conservation
Strategies for Lake
Sammamish Kokanee

Science Seminar
November 2019
Water and Land Resources Division
Late-Run Kokanee - Total Estimated Spawner Abundance

Estimated Spawner Abundance

Year

0 2,000 4,000 6,000 8,000 10,000 12,000 14,000 16,000 18,000

MAJOR FRY-TO-ADULT MORTALITY RATES

THE CRASH
Late-Run Kokanee - Estimated Spawner Recruitment Rate

- Estimated Spawner Recruitment Rate
- Year
- Line indicating recruitment rate of 1.
- Recruitment rate (ALL Streams plus Supplementation Program take)
Late-Run Kokanee - Estimated Spawner Recruitment Rate

Year

Estimated Spawner Recruitment Rate

-160 -140 -120 -100 -80 -60 -40 -20 0 20 40 60 80 100 120 140

-160 -140 -120 -100 -80 -60 -40 -20 0 20 40 60 80 100 120 140

Line indicating recruitment rate of 1.

Recruitment rate (ALL Streams plus Supplementation Program take)
AND.....A hard look at our own hatchery supplementation practices.....

ARE WE CONTRIBUTING TO OR EXACERBATING LAKE PROBLEMS?
Evolving Conservation Strategies for Lake Sammamish Kokanee

Two Primary Goals ......

1) Address **HIGH RISK** of population **ABUNDANCE** and **GENETIC “BOTTLENECKS”**

2) Maximum **ADAPTIVE MANAGEMENT** flexibility
Evolving Conservation Strategies for Lake Sammamish Kokanee

Synthesis of ......

Conservation Supplementation Plan for Lake Sammamish Late-run (Winter-run) Kokanee

Lake Sammamish Kokanee Work Group
Supplementation Technical Working Group

December 18, 2013 Draft

NOAA – Northwest Fisheries Science Center
INTEGRATED HATCHERY SUPPLEMENTATION STRATEGIES

- Emulate natural production
- Decrease ↓ take for hatchery supplementation
- Increase ↑ proportion of natural production
- Deliberate, intensively-monitored tactics with fewer eggs

Photo – Roger Tabor
CRYOBANKING
<table>
<thead>
<tr>
<th>Location and Date:</th>
<th>11/14/19</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target Species:</td>
<td>LK Sammamish Kokanee</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Name</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ebright</td>
<td>Webster Lk</td>
</tr>
<tr>
<td>Laughing Jacobs</td>
<td>Lake Whatcom Kokanee</td>
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<tr>
<td>Lewis</td>
<td>Baker sockeye</td>
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<tr>
<td>Bear Kokanee</td>
<td>Crooked</td>
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<tr>
<td>Bear Sockey</td>
<td>Olsens</td>
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<tr>
<td>Issaquah Early Kokanee</td>
<td>Siwash</td>
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<tr>
<td>Issaquah Sockey</td>
<td>Umbrella</td>
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<tr>
<td>Burton</td>
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<tr>
<td>Caribou</td>
<td>Chain Lake</td>
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<tr>
<td>Chelan Sockey</td>
<td>Christina</td>
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<tr>
<td>Deer</td>
<td>Drimmie</td>
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<tr>
<td>Halfway</td>
<td>Hellsgate</td>
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<tr>
<td>Hill</td>
<td>Keenleyside</td>
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<tr>
<td>Keenleyside</td>
<td>Lake Pend O Reille</td>
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<tr>
<td>Lincoln</td>
<td>Meadow</td>
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<tr>
<td>Mosquito</td>
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<td>Nespelem</td>
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<tr>
<td>Norns</td>
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<td>Palmer Lk</td>
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<tr>
<td>Redfish</td>
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<td>San Poil</td>
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<td>Swawilla</td>
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<tr>
<td>Upper Lk FDR</td>
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<tr>
<td>Wenat Sockeye</td>
<td></td>
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</table>

**RAPID GENETICS ANALYSIS**

- Place a piece of fin tissue, about this size in grid

**Note:** The table includes a grid of samples, each marked with an 'X' indicating the presence of specific species or locations.
1. UNFED FRY (Volitional release)
2. UNFED FRY
(Non-volitional release)
3. EXTENDED REARING
(Private property; Ebright Creek)
4. EXTENDED REARING (Issaquah Hatchery; Lewis Creek)
CAPTIVE BROODSTOCK
STRATEGIES TO ADDRESS KNOWLEDGE GAPS
### Target Pathogens

- Epizootic haematopoietic necrosis virus
- Infectious haematopoietic necrosis virus
- Viral haemorrhagic septicemia virus
- Infectious Pancreatic Necrosis virus
- Spring Viraemia of Carp virus
- *Oncorhynchus masou* virus
- Aeromonas salmicida
- Yersinia ruckeri
- Piscirickettsia salmonis
- Renibacterium salmoninarum
- Parvicapsula minibicornis
- Tetracapsula bryosalmonae
- Ceratomyxa shasta
FISH DISEASE ANALYSIS (2)

- eDNA sampling targeting Myxosporean parasites
FISH ASSEMBLAGE

- Compare 2002-2003 and 2019 analyses
POPULATION LEVEL GENETICS ANALYSIS

- WDFW Molecular Genetics Lab
- All samples 1999-2019
- Year-to-year heterozygosity (diversity)
- Trend in allele frequency (“good” mutations)
- Rationale and guidance for using cryobanked samples
Evolving Conservation Strategies for Lake Sammamish Kokanee

Future Adaptive Management

1) Manage for optimal cohort abundance
Contributing Adult Abundance - Subsequent Adult Recruitment

- Y-axis: Subsequent Adult Recruitment
- X-axis: Contributing Adult Abundance (from all cohorts)

The graph shows a scatter plot with data points representing the relationship between contributing adult abundance and subsequent adult recruitment.
Future Adaptive Management......

1) Manage for optimal cohort abundance

2) If interested in long-term kokanee ecology, we may need to understand perch ecology even better!
Conservation Partners include:

- Trout Unlimited
- USFWS
- WDFW
- Washington State Parks
- Snoqualmie Tribe
- City of Sammamish
- City of Issaquah
- City of Bellevue
- City of Redmond
- Long Live the Kings
- LightHawk
- USGS Western Fisheries Science Center
- Wally Pereyra, Gary Mahn and Mary Ellen Stone, William Hoag
- Friends of Issaquah Salmon Hatchery
- Friends of Lake Sammamish State Park
- Friends of Pine Lake
- Save Lake Sammamish
- Charleston Place HOA
- Meadowbrook Pointe HOA
- and many others
Thank you.

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Water and Land Resources Division
King County Department of Natural Resources and Parks