

Skaha Lake Sockeye Salmon Re-Introduction Program



Presented by: Ryan Benson

2018 American Fisheries Society AGM

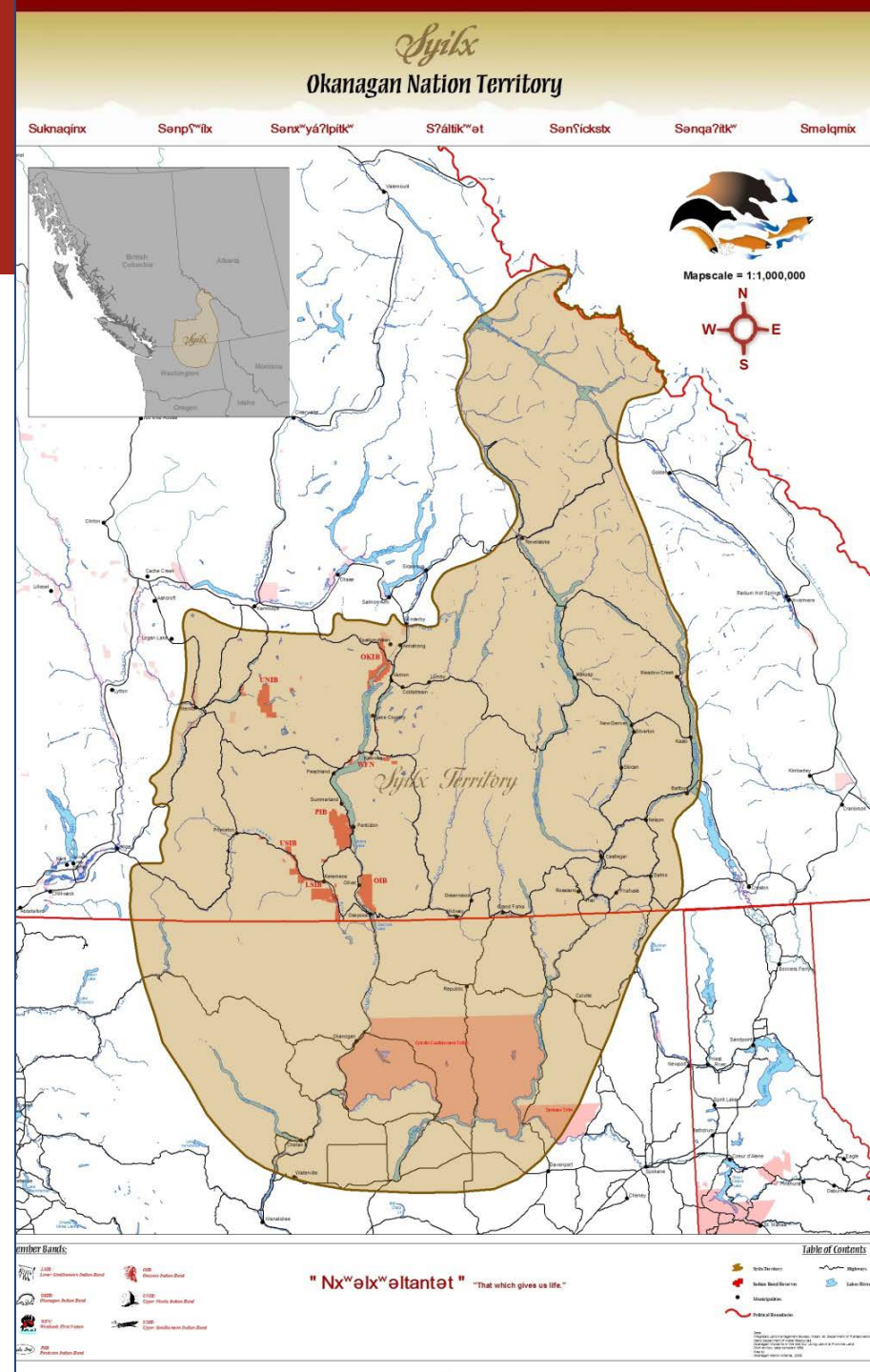
Kelowna, BC

Okanagan Nation Alliance

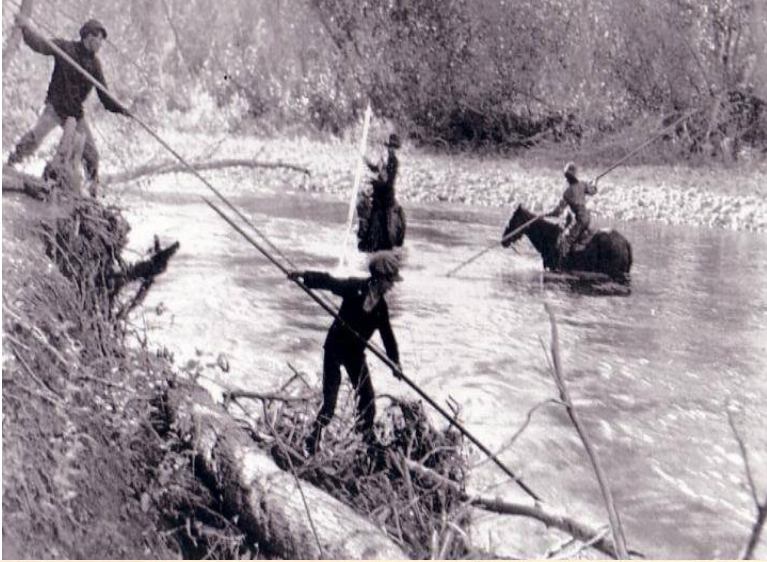
Seven member band communities:

1. Osoyoos Indian Band
2. Penticton Indian Band
3. Westbank First Nation
4. Okanagan Indian Band
5. Upper Nicola Band
6. Lower Similkameen Band
7. Upper Similkameen Band

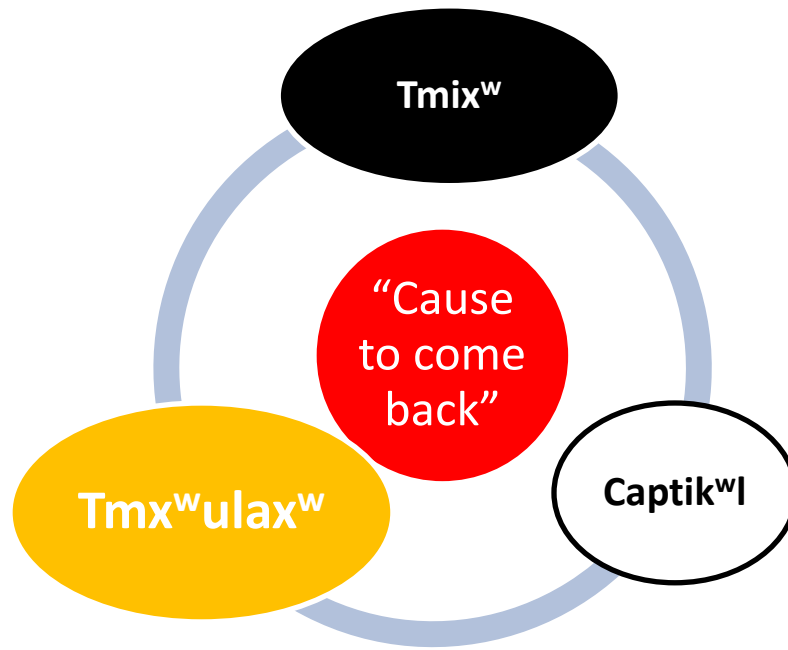
And the Colville Confederated Tribes (USA)



Salmon Integral to Okanagan Culture



Mission Statement - The conservation, protection, restoration, and enhancement of indigenous fisheries (anadromous and resident) and aquatic resources within Okanagan Nation Territory.



Background: Okanagan Sockeye

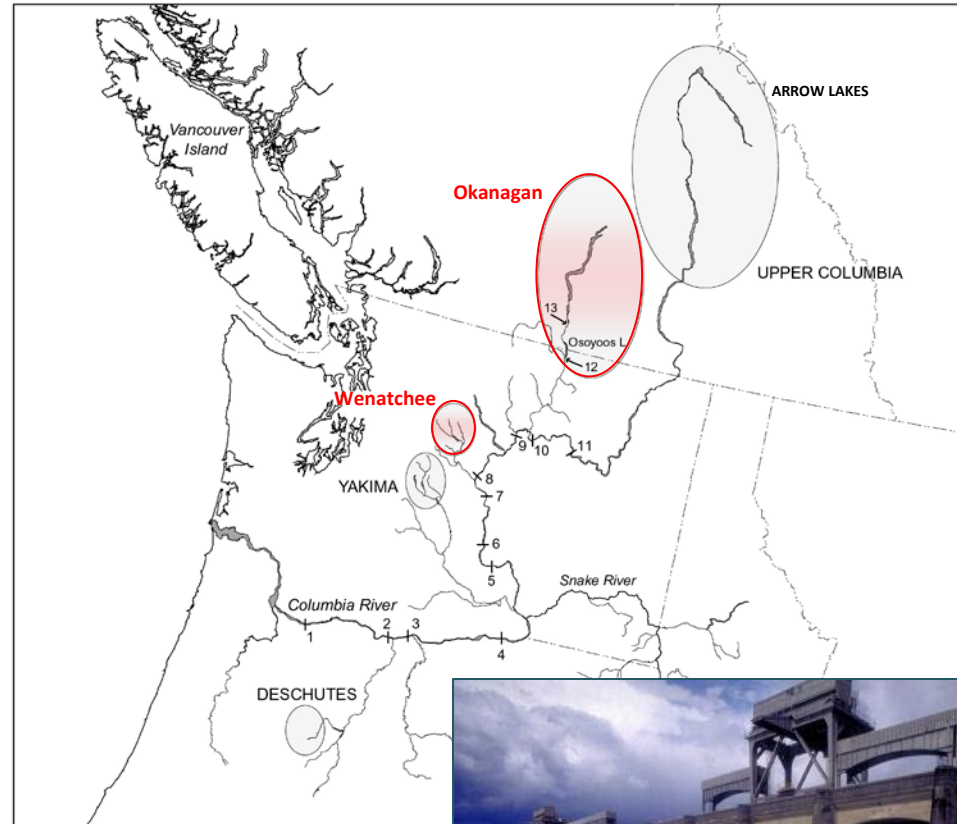
- Okanagan Sockeye population is one of three remaining Columbia River stocks
- Mid 90's less than 3,000; by 2010 via restoration returns over 200,000
- Okanagan run now makes up 70-90% of all Columbia river Sockeye



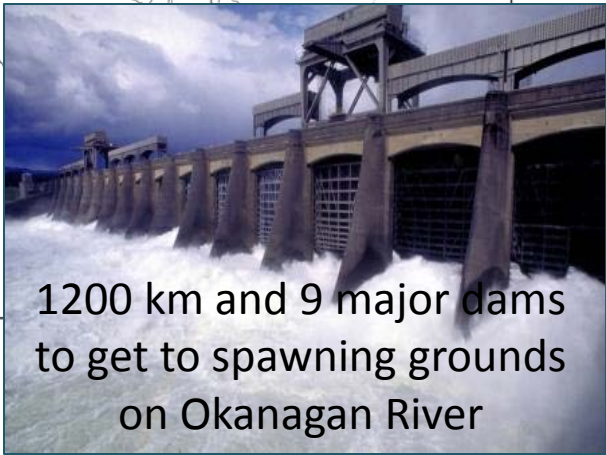
Columbia River sub-basins historically accessible to sockeye



Columbia River sub-basins with present day viable sockeye populations



COLUMBIA RIVER DAM SITES	
1 Bonneville	7 Rock Island
2 The Dalles	8 Rocky Reach
3 John Day	9 Wells
4 McNary	10 Chief Joseph
5 Priest Rapids	11 Grand Coulee
6 Wanapum	12 Zosel
	13 McIntyre



1200 km and 9 major dams to get to spawning grounds on Okanagan River

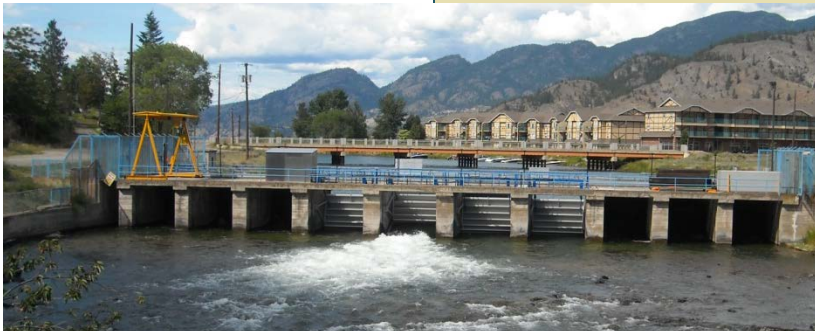
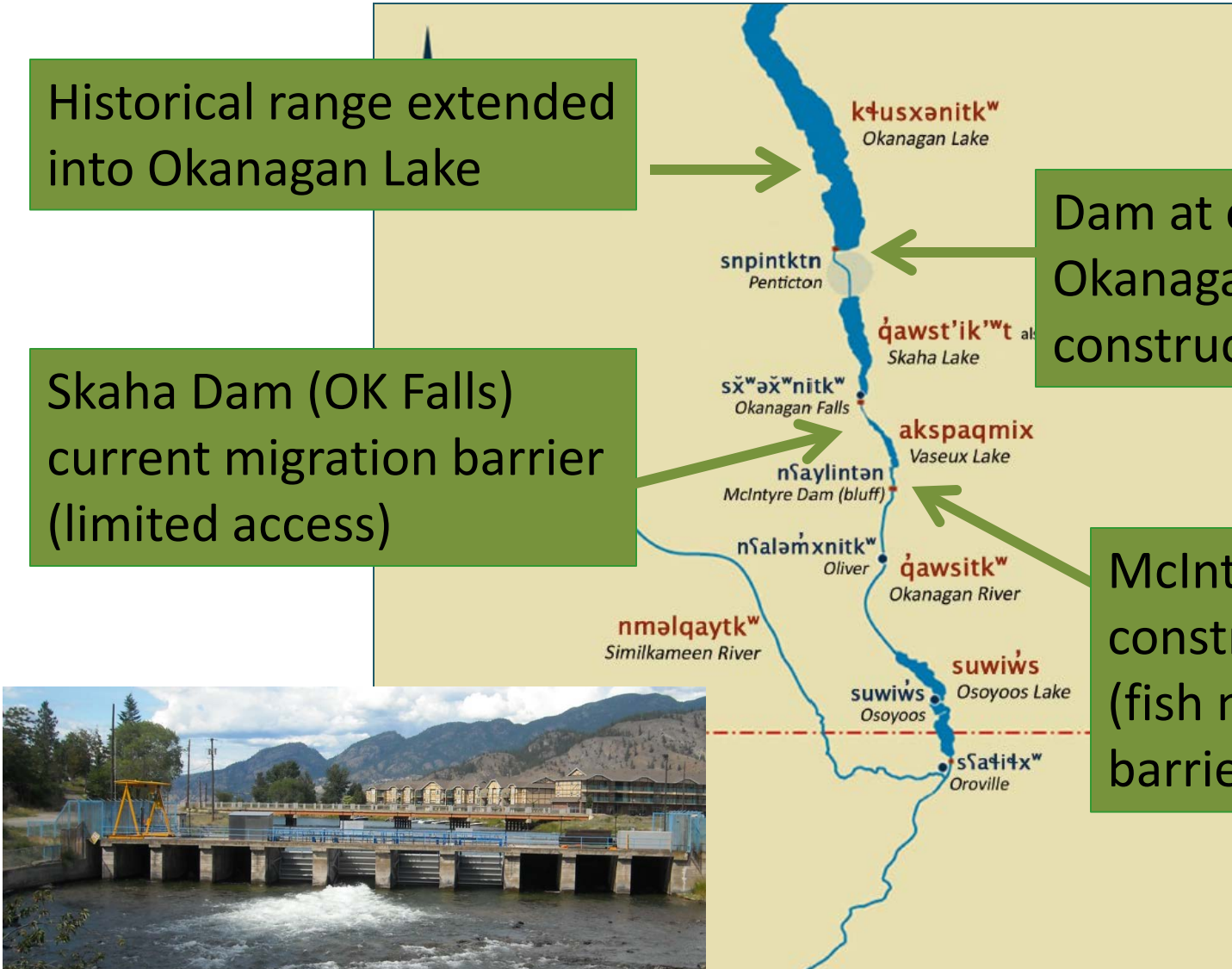
Historical Range of Okanagan Sockeye

Historical range extended into Okanagan Lake

Skaha Dam (OK Falls) current migration barrier (limited access)

Dam at outlet of Okanagan Lake constructed in 1914

McIntyre Dam constructed in 1954 (fish migration barrier until 2009)



Sockeye Reintro Program Overview



- Initiated in 1990's
- COBTWG (Canadian Okanagan Basin Technical Working Group)
- Three-year risk assessment completed in 2003
- 12 Year Experimental Reintroduction Program (2004-2016) into Skaha Lake
- Adaptive management framework
- Funded by Grant and Chelan County Public Utility District (Columbia hydro mitigation)
- Extensive Monitoring
- Analysis of fish passage into Skaha
- A step-wise approach prior to Okanagan Lake



Fisheries and Oceans
Canada

Pêches et Océans
Canada

Program Overview: Key Questions



Key questions include (not limited to):

- **What impacts will Sockeye have on existing kokanee stocks?**
- **What components of the food web and physical environment most strongly control the production of Sockeye and kokanee?**
- What are the effects on the existing Osoyoos Sockeye population?
- Learn for Okanagan Lake

How are Sockeye Reintroduced?



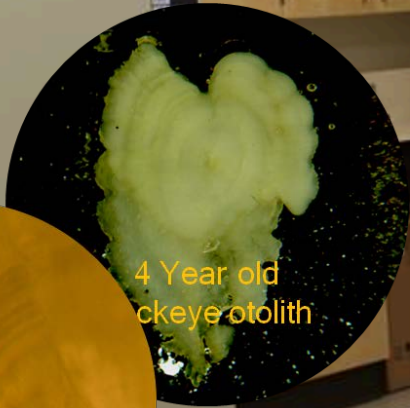
- Eggs (500,000 - 5 million) taken from broodstock collected on spawning grounds near Oliver and raised to fry in hatchery
- Fry released in Penticton Channel the following spring



Nation Owned Hatchery in Penticton



Virology and Aging Lab



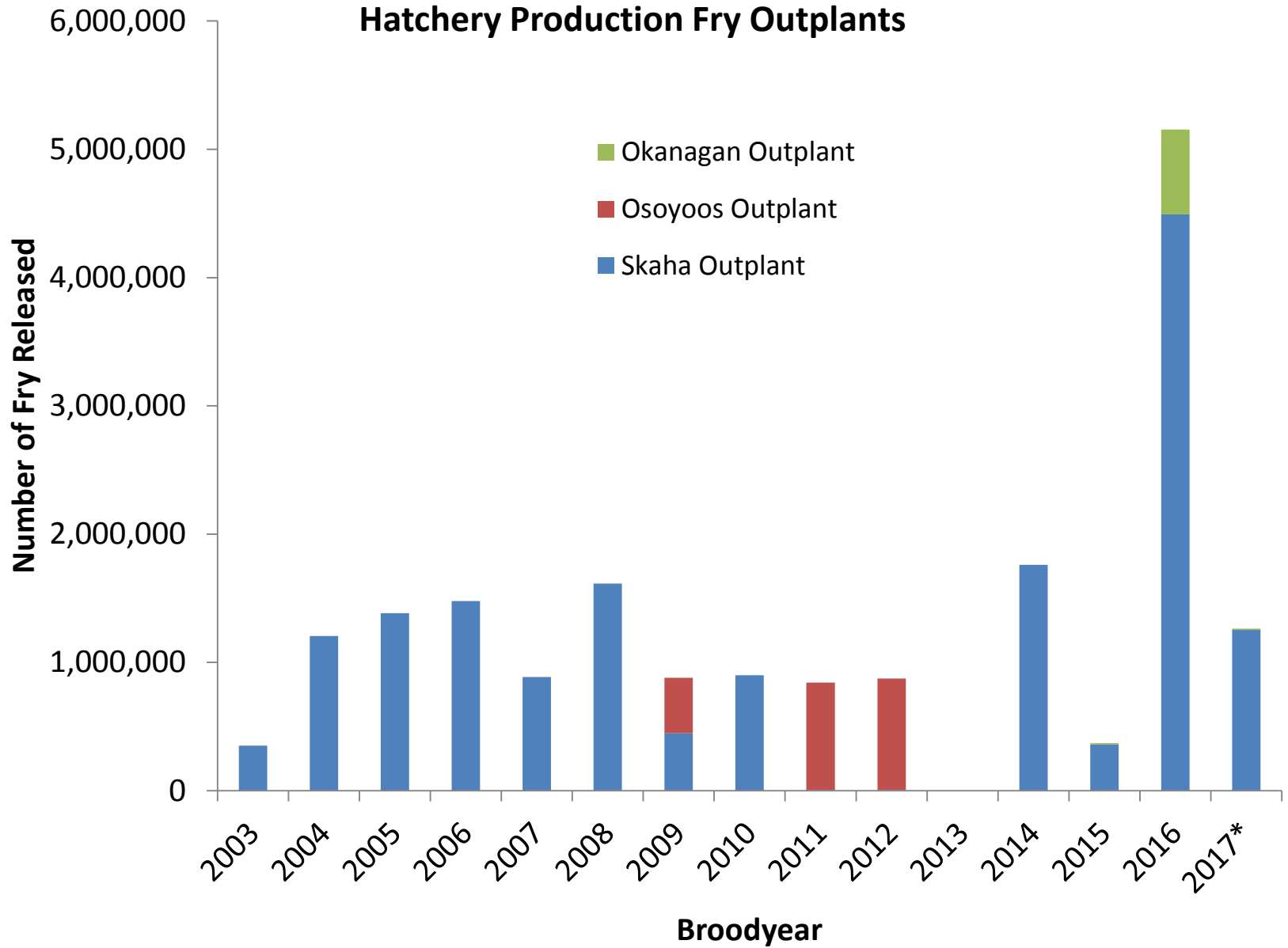
4 Year old
ckeye otolith



Thermally marked
otolith (H3,3)



Hatchery Production Fry Outplants



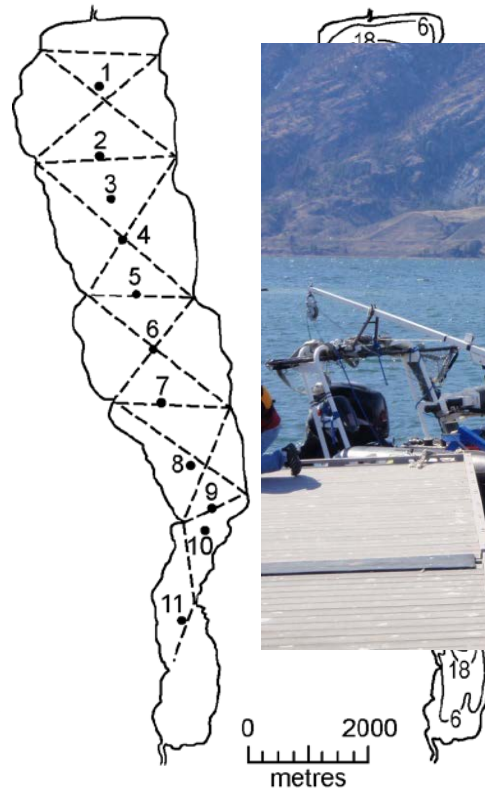
Skaha Lake Natural Production

Brood Year	Natural Sockeye Escapement (est)	Egg deposition (million)	Natural Smolts
2011	9,426	19.3	430,000
2012	8,273	12.9	114,000
2013	6,840	17.6	309,000
2014	20,916	45.4	1,043,000
2015	1,632	1.7	30,000
2016	4,016	4.5	81,000
2017	3,000-5,000	3.1 – 5.2	TBD

Monitoring and Evaluation

Intensive monitoring:

- Water chemistry
- Temperature
- Oxygen
- Phytoplankton
- Zooplankton
- Mysis shrimp
- Acoustic Trawl Survey (SK and KO)



Okanagan Lake Program

- DFO has approved long-term hatchery Sockeye outplants, contingent on an M&E program
 - CSAS review is available
 - M&E program is in progress
- Spring outplants of 9,994 (2016) and 660,000 (2017).
 - Minimum 10,000 ceremonial (2018)
- CRITFC/ ONA/ DFO-funded winter ATS surveys 2017 & 2018.



Summary of Program Results to Date

- At tested treatment levels (176-2,009 fry/ha), Sockeye outplanting **does not influence growth and survival of the resident kokanee** population in Skaha Lake
- Lake **food web driven by Mysis shrimp**, which consume 2-3x as much zooplankton as all fish combined
- **Possible hatchery effect on Sockeye fry** - hatchery origin fry are larger but do not survive as well as wild origin fry
- Skaha hatchery **smolt-to-adult survival is equal or better** than the natural Sockeye population
- **No disease outbreaks** recorded in hatchery stock
- **Majority of Sockeye imprinting on Skaha Lake, Penticton Channel** (low straying)
- ***Spawning habitat is the limiting factor for Sockeye production*** in Skaha Lake, therefore recommend habitat enhancement and restoration

Lim Limp't (Thank You)

