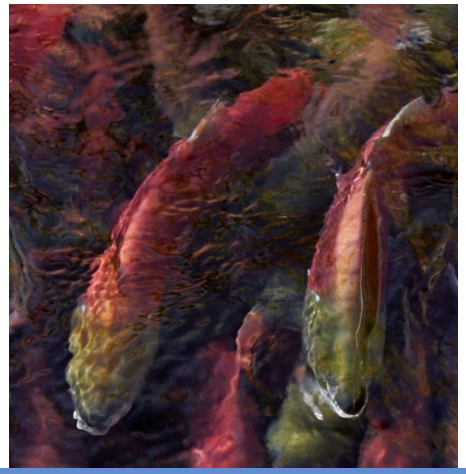



Okanagan River Restoration Initiative (ORRI)

Vision & Partnership
ORRI Phase I and Phase II
ORRI Spawning Beds

Zoe Eyjolfson, BSc.

AFS

March 22nd, 2018

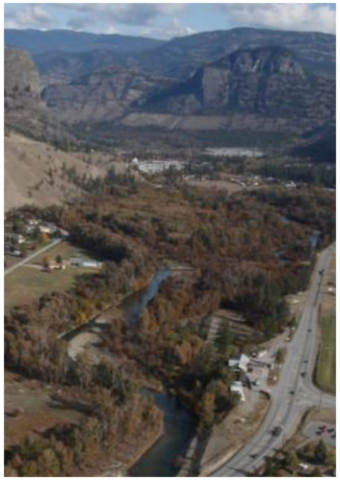
THE ISSUE

q̓awsitkʷ (OKANAGAN RIVER) - CANADA

- supports majority Columbia Sockeye
- 1 of BC most endangered River

HABITAT LOSS

- 84% River = channelized
- 50% River length = lost
- 90% Riparian vegetation = lost
- Instream diversity = lost
- Connection floodplain = lost
- Native species = declined
- Exotic species = allowed to colonized



NATURAL: 3 km

SEMI-NATURAL: 2 km

CHANNELIZED: 30 km

ORRI VISION

Returning sections of the channelized river back to more natural, complex and diverse conditions.

FROM SIMPLE

TO COMPLEX

ORRI PARTNERS

Direction & guidance from Steering Committee

syilx Okanagan Nation Alliance

British Columbia · Forests, Lands and Natural Resource Operations

Fisheries and Oceans Canada | Pêches et Océans Canada

Osoyoos Indian Band

En'owkin Centre

The Nature Trust of British Columbia

South Okanagan Similkameen Conservation Program

Newbury Hydraulics

CWS

Contribution of several Canadian & American funding agencies

Grant County PUBLIC UTILITY DISTRICT

P.U.D. Chelan County POWER

Douglas County P.U.D.

Habitat Conservation Trust Foundation

Fish & Wildlife Department Colville Tribes

TD Friends of the Environment Foundation

1% for the Planet

Canada

Okanagan College

TLC The Land Conservancy of British Columbia

Naramata Bench Wineries Association

One Wild Earth Photography

Okanagan Basin Water Board

Okanagan waterwise One valley. One water.

HNZ TOPFLIGHT

Pacific Salmon Foundation

J. Kevin Dunn Photography

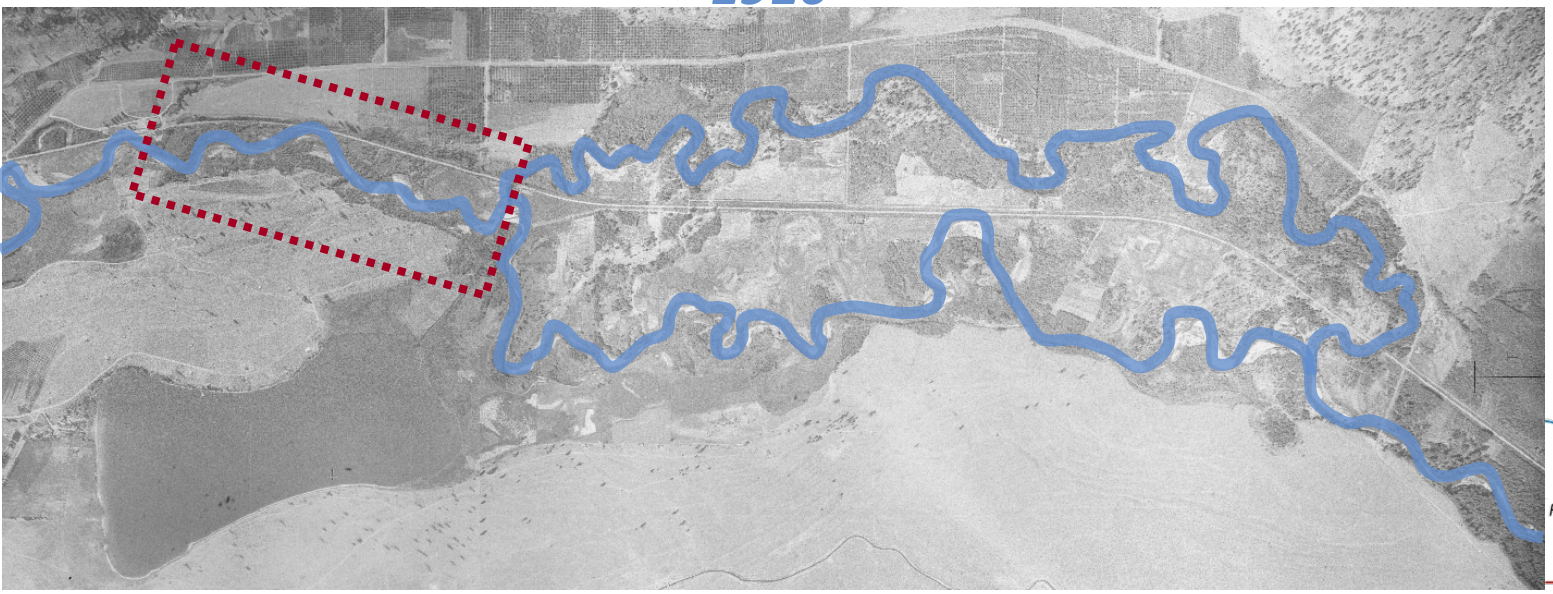
ORRI GOALS




- Ecosystem based (multiple species)
- Adaptively managed
- Collaborative approach (Steering Committee)
- TEK guidance; Late Chief Albert Saddleman story

- Best management practices, measured stream geometry, natural-like features
- Improved aquatic habitat, water quality & in-stream complexity
- Improved riparian habitat, floodplain connection
- Increased flood capacity, stable stream channel
- Enhanced aesthetic and human use

PHASE I & PHASE II



ORRI – PHASE I

DUAL CHANNEL

- 1.2 km dyke set back
- 0.5 km river re-meandered
- 2 old oxbows reconnected
- split flows (50-50)

ORRI – PHASE I

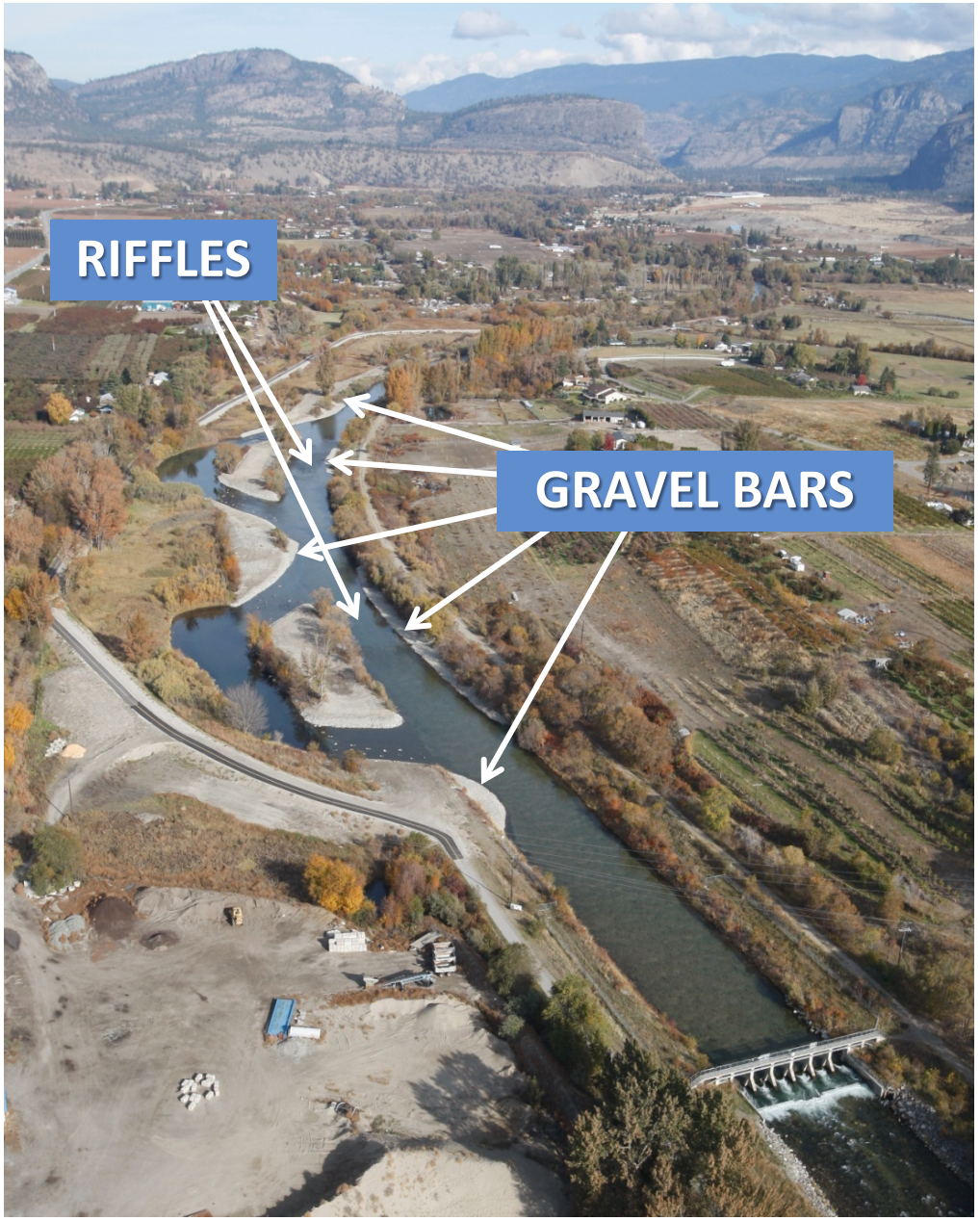
RIFFLES (2)

- v-shaped
- spilt flows
- pool/riffle sequence

GRAVEL BARS (5)

low flows

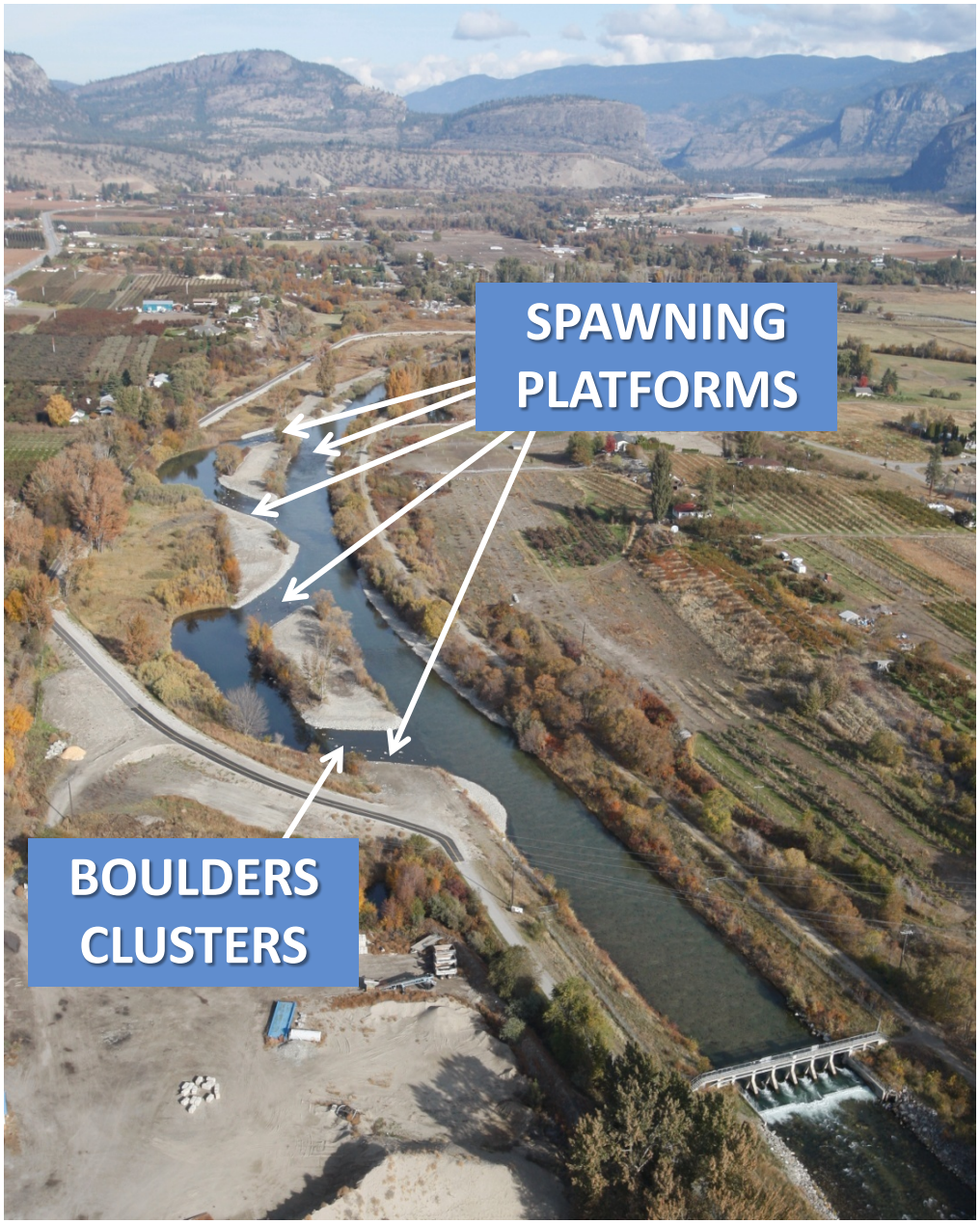
- ↑ water depth
- ↓ egg loss



ORRI – PHASE I

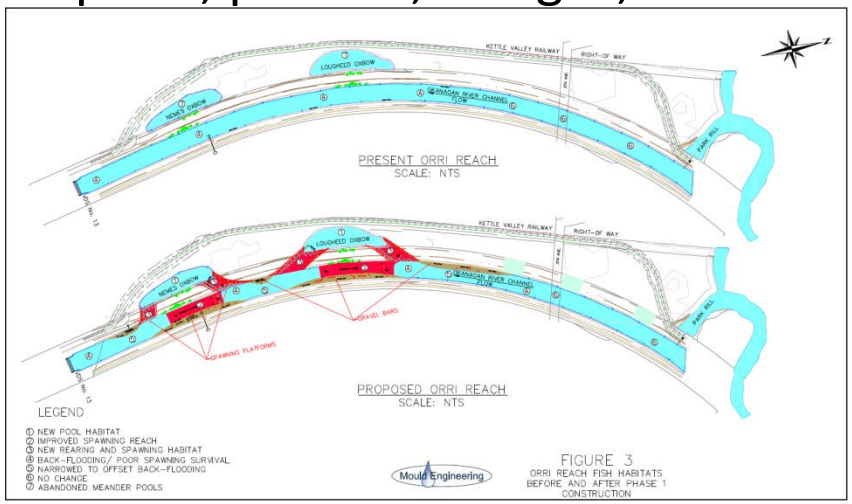
SPAWNING PLATFORMS (5)

- Mainstem riffle, entrances, exits
- Froude Number ≅ 0.3
- 25-75mm gravel size
- Boulder clusters (trout)



ORRI – PHASE I

2000-2008
plans, permits, designs, funds



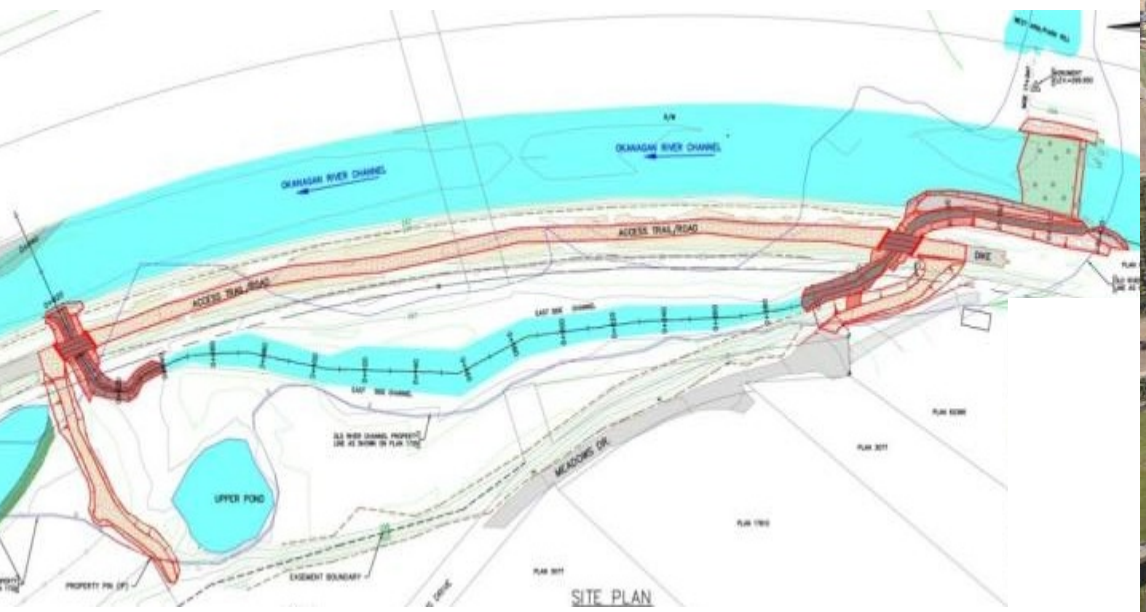
2008-2009 construction works

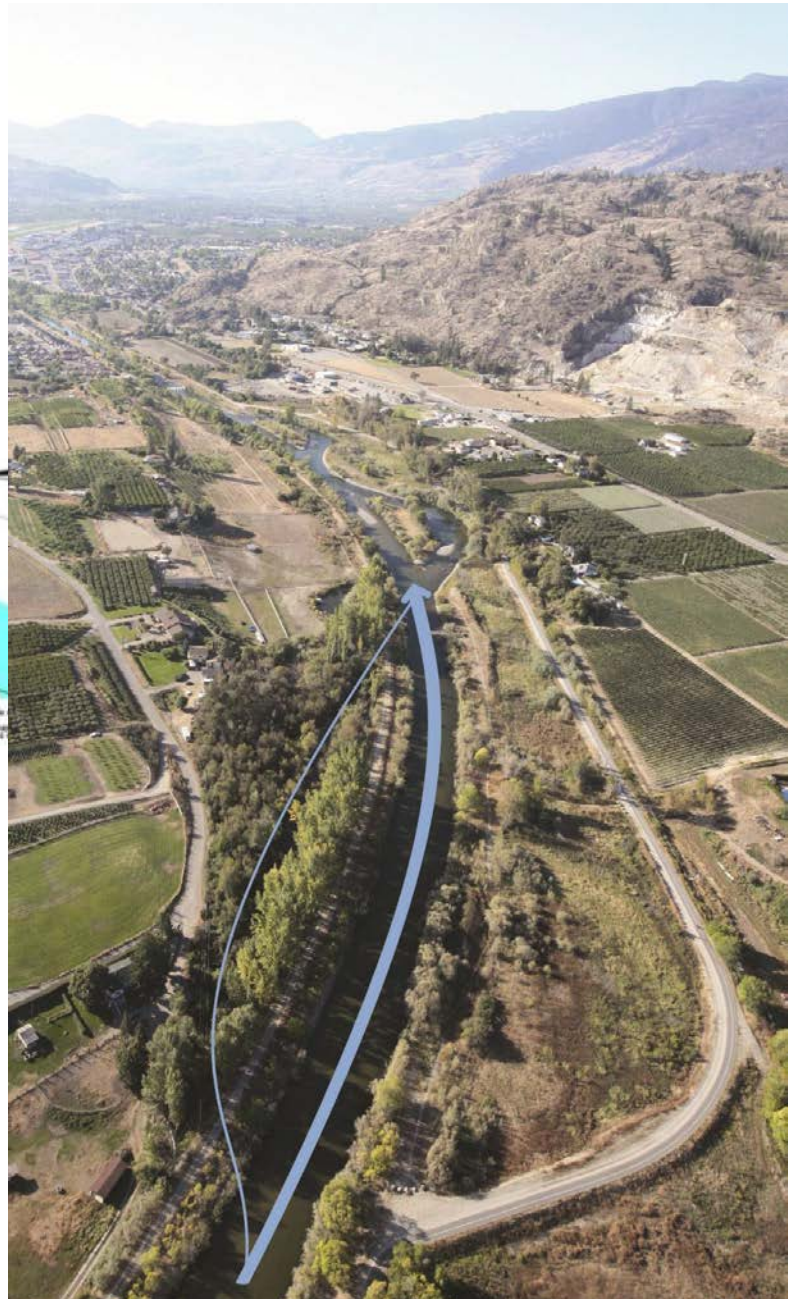
2009-2018
monitoring & adaptive management

ON-GOING outreach

ORRI – PHASE II

Reconnection of small natural side channel
(historic river pathway)
immediately upstream Phase I





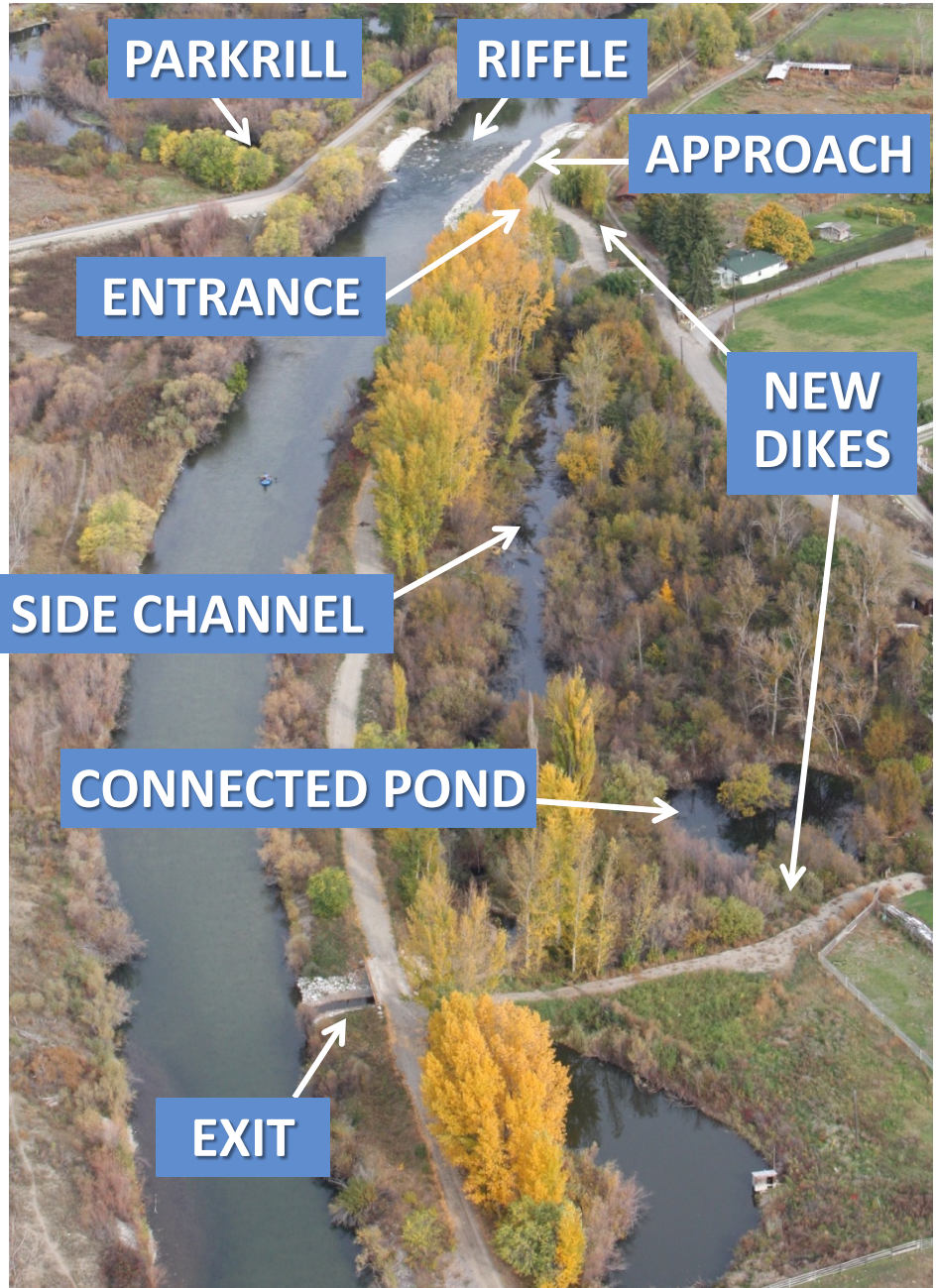
ORRI – PHASE II

BACKWATER RIFFLE

- allowing water to enter side channel (2-5% flow of mainstem river)
- no impact at Parkrill outlet
- bank stabilization
- approach channel (spawning gravel) with gravel bar diverting debris

SIDE CHANNEL

- naturally vegetated (historic pathway)
- spawning gravel at entrance & exit
- protection cap for underground pipe
- 2 bridges on the existing dike
- 2 new small dikes (flood control)



ORRI – PHASE II

2010-2012

plans, designs, funds, outreach (OG)

2013 construction

2014-2018 monitoring, adaptive management

PHASE I & II – HIGHLIGHTS

NATURAL SEDIMENT TRANSPORT PROCESS

channel is self-sustaining with
bedload movement, gravel bar creation & pool depth changes

POOL AND RIFFLE HABITATS

diversity of fish habitats &
features increased overtime

SUBSTRATE COMPOSITION

spawning substrate gravel sizes
changed (becoming more diverse);
spawning areas naturally created

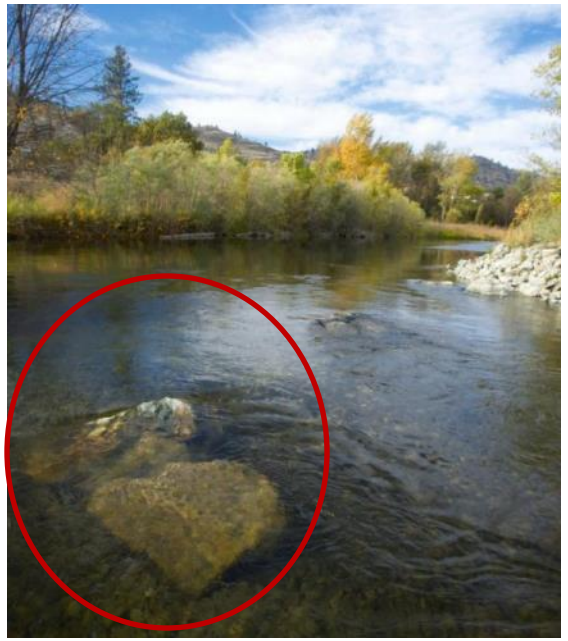
CROSS SECTION DIMENSIONS

spawning depths, velocities & Froude number
remained within the range preferred

ORRI – HIGHLIGHTS

HABITAT FEATURES

- LWD increased overtime (natural transport)
- boulders are loss overtime (embedded in gravel); no trout observed



HABITAT REFUGE

Phase II side channel acted as a water quality refuge during a high turbidity event

ORRI – HIGHLIGHTS

SOCKEYE

- 2-3 times more spawners counted in Phase I (relative to run size)
- ORRI site highly attractive for spawning (site selected in priority over other available areas)
- the created spawning beds are used and have been naturally augmented
- low egg incubation survival drastically improved (rates similar to rates found in natural reach)

ORRI – HIGHLIGHTS

RAINBOW TROUT / CHINOOK

- no salmonids documented pre-treatment but trout documented post-treatment (snorkel surveys)
- no Chinook documented pre-treatment but observed using Phase I restored features
- trout observed in Phase II side channel (spring)

MACROPHYTES

- total coverage of all macrophytes reduced
- proportion of introduced invasive species reduced (Eurasian Watermilfoil)
- diversity of native macrophytes increased

INVERTEBRATES

- increased diversity & richness

ORRI – ADAPTIVE MANAGEMENT

PHASE I

- monitoring changes & manage if needed
- scoping floodplain improvements

PHASE II

- gravel deposited in approach channel creating blockage (high freshet years)
- scoping options to increase flow in side channel and reduce deposition in approach
- monitoring beaver activity & impact

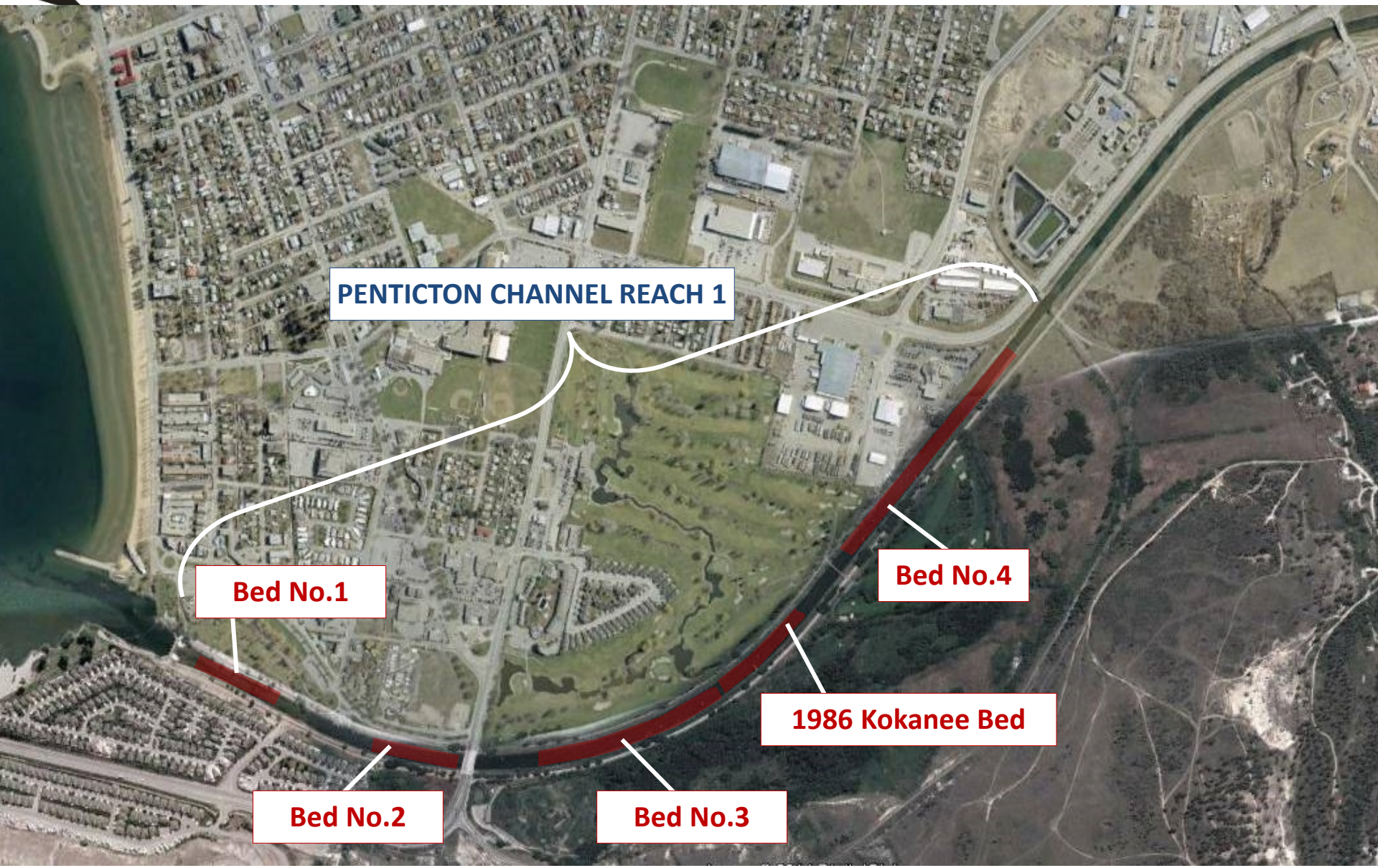
SPAWNING BEDS in PENTICTION

1909 NATURAL RIVER & FEATURES

1950's HABITAT LOST

2014-NOW SPAWNING BEDS

SPAWNING BEDS in PENTICTION



SPAWNING BEDS in PENTICTION

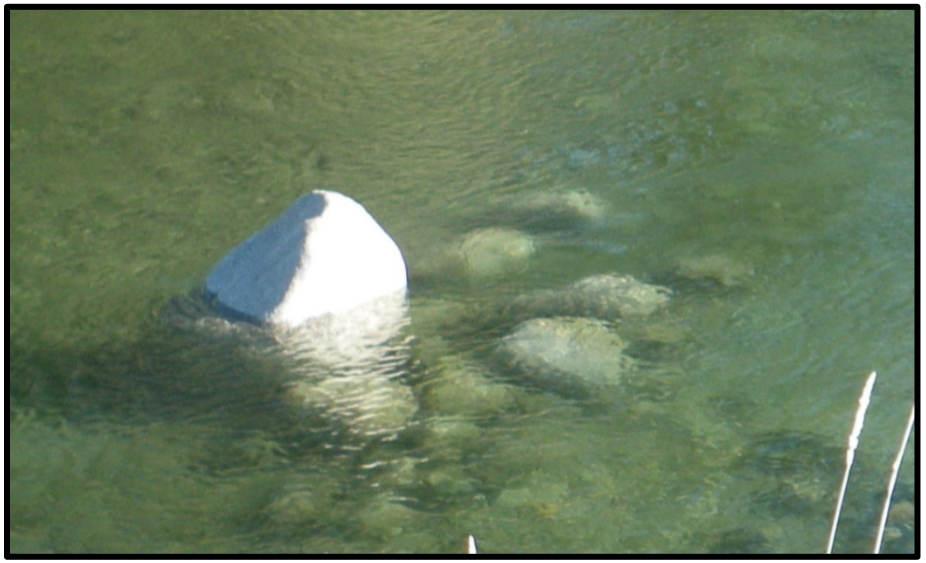
RAISED GRAVEL BEDS (3)

- gravel placed directly over existing bed
- entire width of the channel
- platform immerged at all flows
- improved hydraulic conditions (spawning)
- gravel size for Sockeye, Kokanee, Chinook

SPAWNING BEDS in PENTICTION

BOULDER CLUSTERS (10)

- 3-6 larges boulders/cluster
- various configurations
- preventing foot entrapment
- hydraulics, food & cover for juvenile salmonids & Burbot



SPAWNING BEDS in PENTICTION

Construction works:

2014 Beds No.1 & No.2 (SK, CH)

2015 Bed No.3 (SK, KO)

2018-2020 Bed No.4 + KO bed

ONGOING

monitoring & adaptive management

HIGHLIGHTS - SPAWNING BEDS

- Beds utilized by targeted Sockeye & Kokanee, immediately after construction.
- Sockeye utilized all beds close to maximal capacity in 2014 & 2016, but not in 2015 & 2017 (very low sockeye return).
- Kokanee utilized Bed No.3 close to maximal capacity every year.
- Beds provided designed hydraulics conditions during spawning.
- Spawning habitat is still limited.
- Juvenile trout observed downstream boulder cluster.
- Eurasian Watermilfoil reduced in the restored reach.
- Beds stable overtime (high freshet flows).

THANK YOU - LIM LIMPT

Ks p'el'k'stim

"Balancing indigenous knowledge and western science to manage, protect and restore indigenous fisheries resources and aquatic habitat with the Okanagan Territory"

syilx Okanagan Nation Alliance

For more info: Camille Rivard-Sirois
ONA Fisheries Department
crivard@syilx.org; 1-866-662-9609 #303