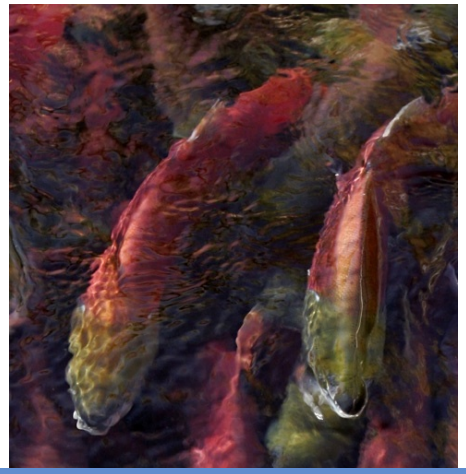



Okanagan River Restoration Initiative (ORRI)

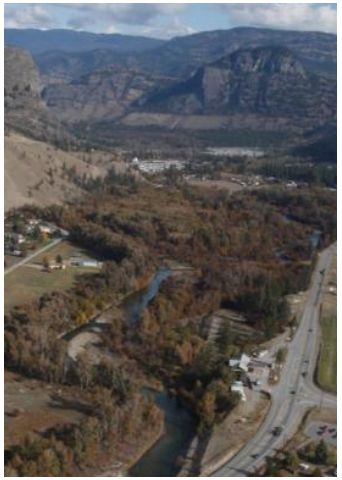
Vision & Partnership
ORRI Phase I and Phase II
ORRI Spawning Beds

Zoe Eyjolfson **Qualified Professional Workshop** February 7th 2018

THE ISSUE

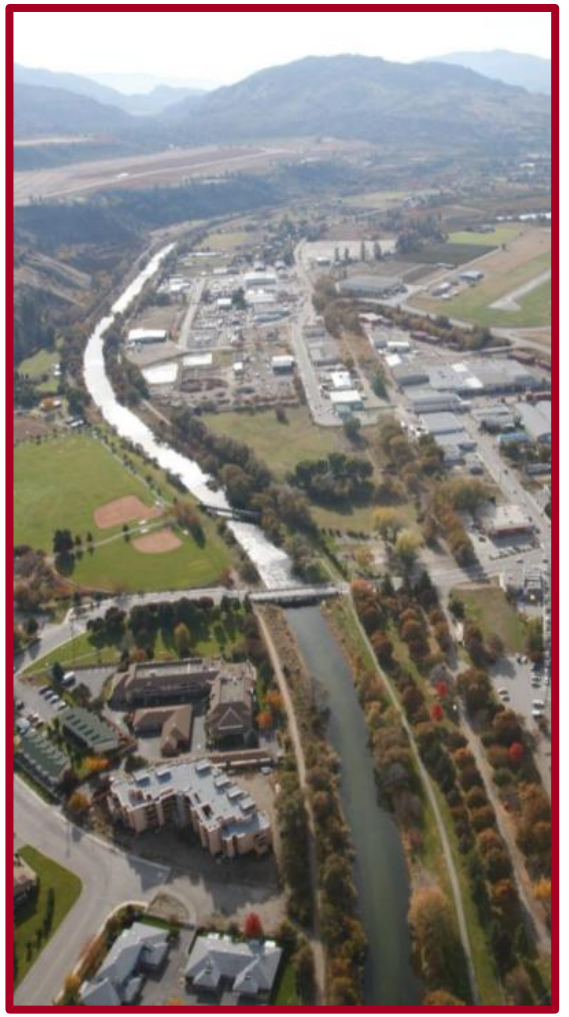
ɋawsitkʷ (OKANAGAN RIVER) - CANADA

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



NATURAL: 3 km

SEMI-NATURAL: 2 km



CHANNELIZED: 30 km

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

ORRI VISION

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

FROM SIMPLE

TO COMPLEX

Okanagan Nation Alliance

British Columbia · Forests, Lands and Natural Resource Operations ·

Canada

Osoyoos Indian Band

Fish & Wildlife Department Colville Tribes

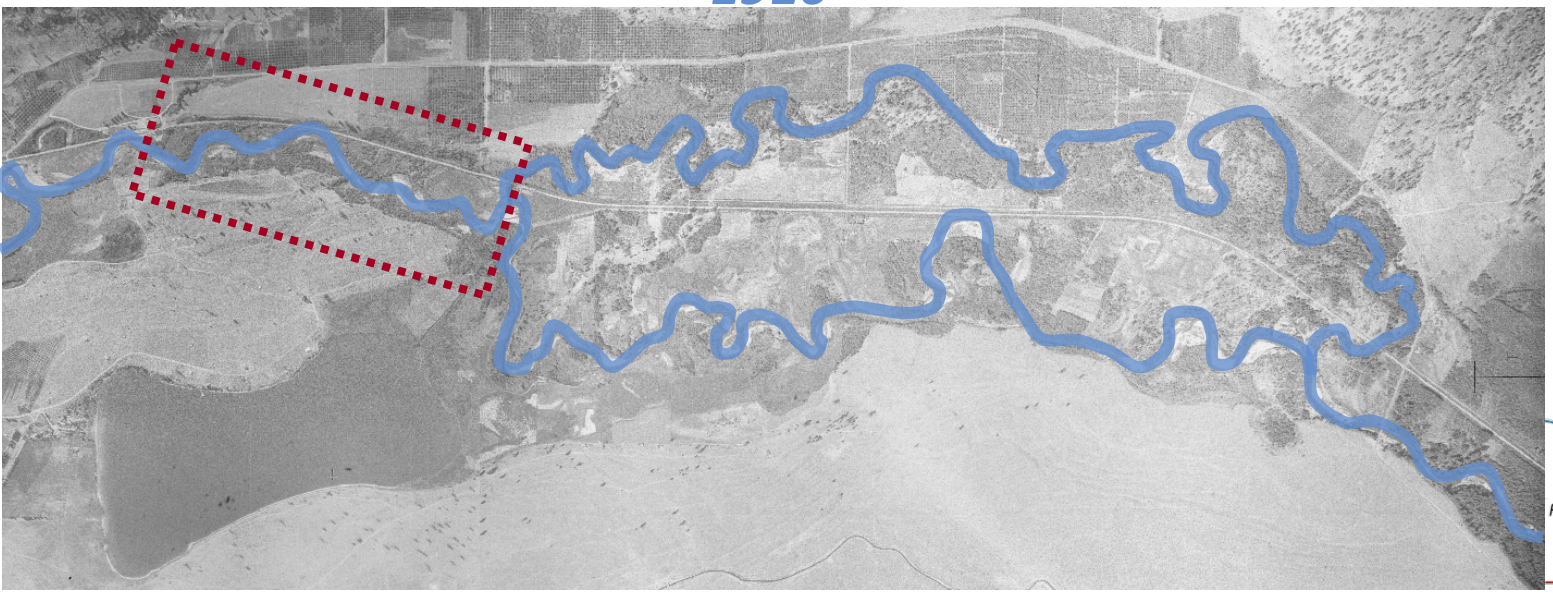
ORRI GOALS




- 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

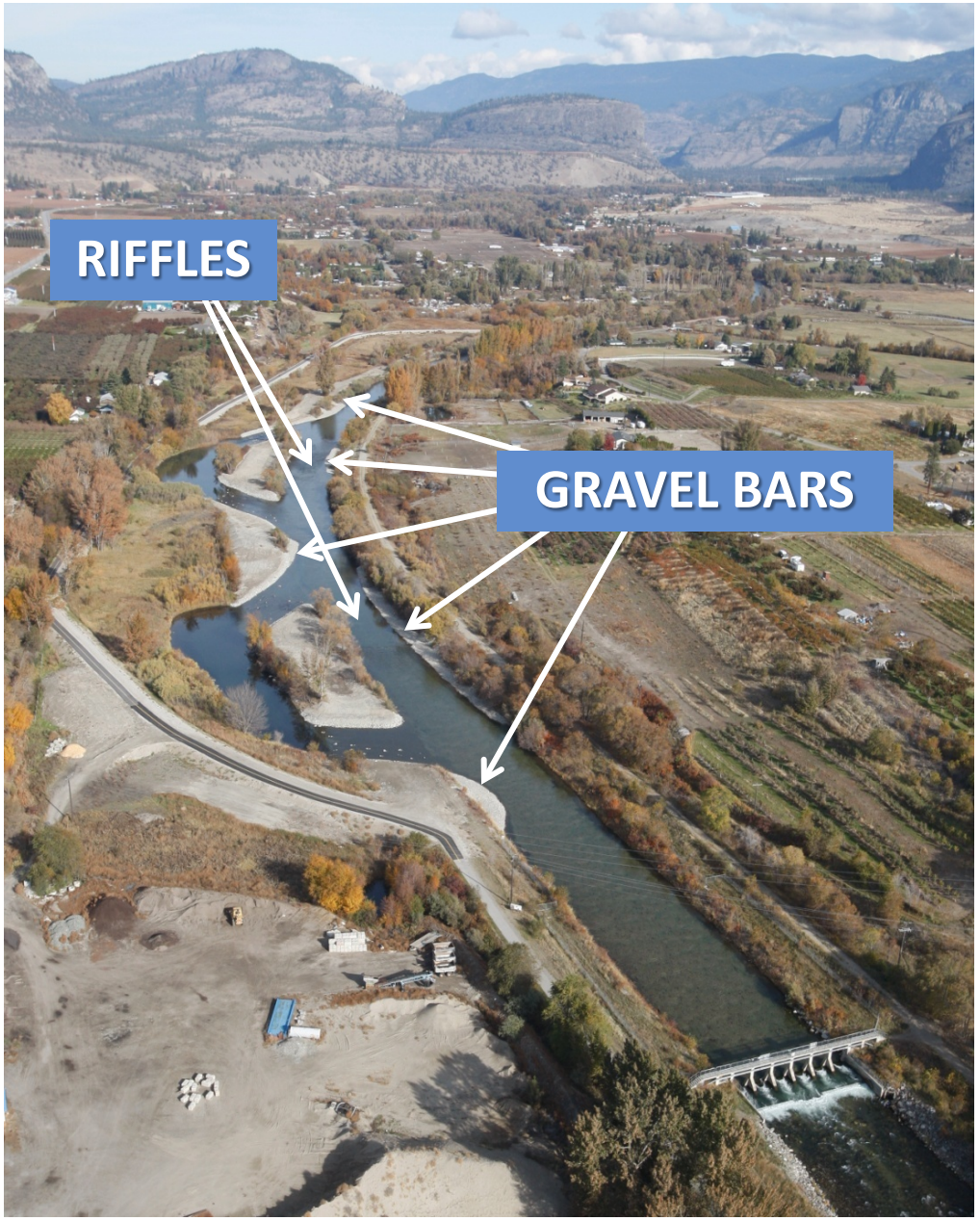
RIFFLES (2)

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

GRAVEL BARS (5)

low flows

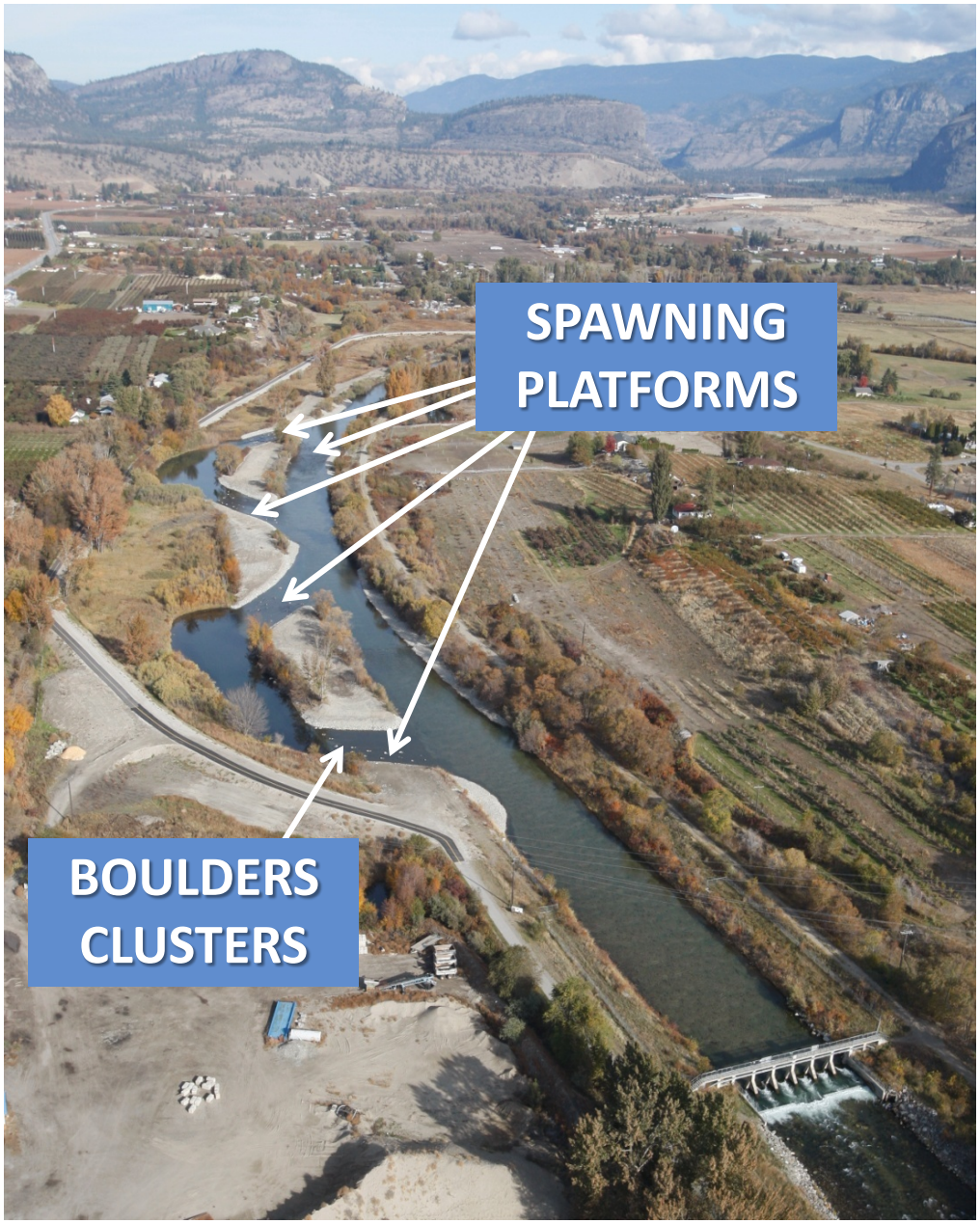
- ↑ water depth
- ↓ egg loss



ORRI – PHASE I

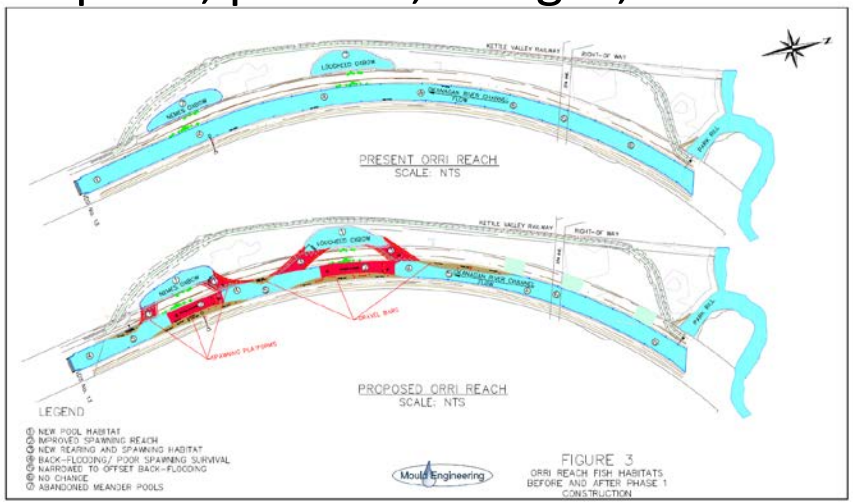
SPAWNING PLATFORMS (5)

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



ORRI – PHASE I

2000-2008
plans, permits, designs, funds



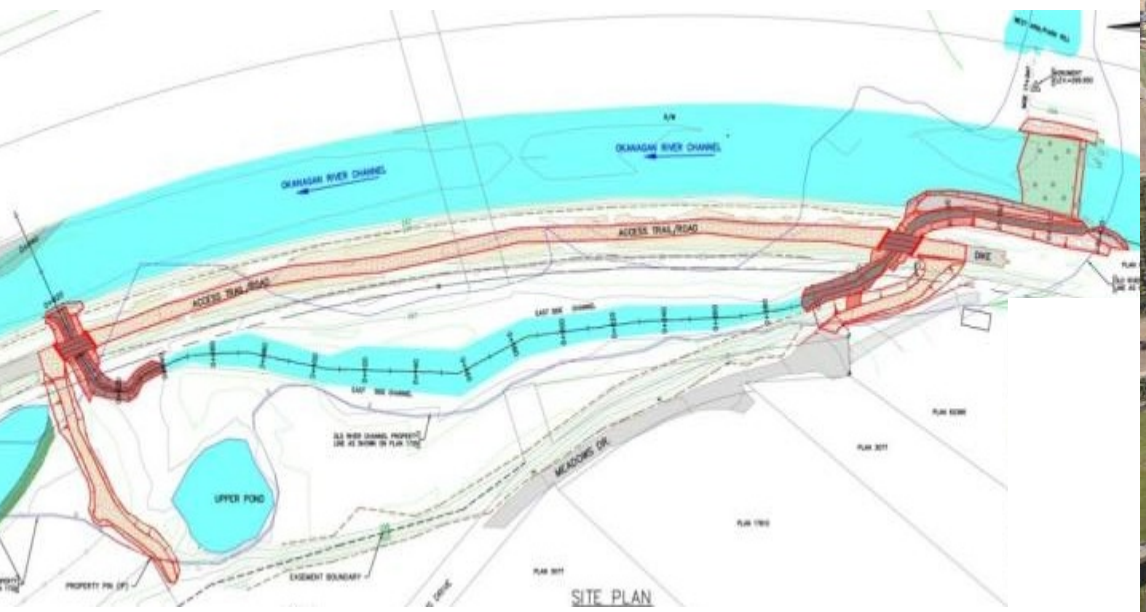
2008-2009 construction works

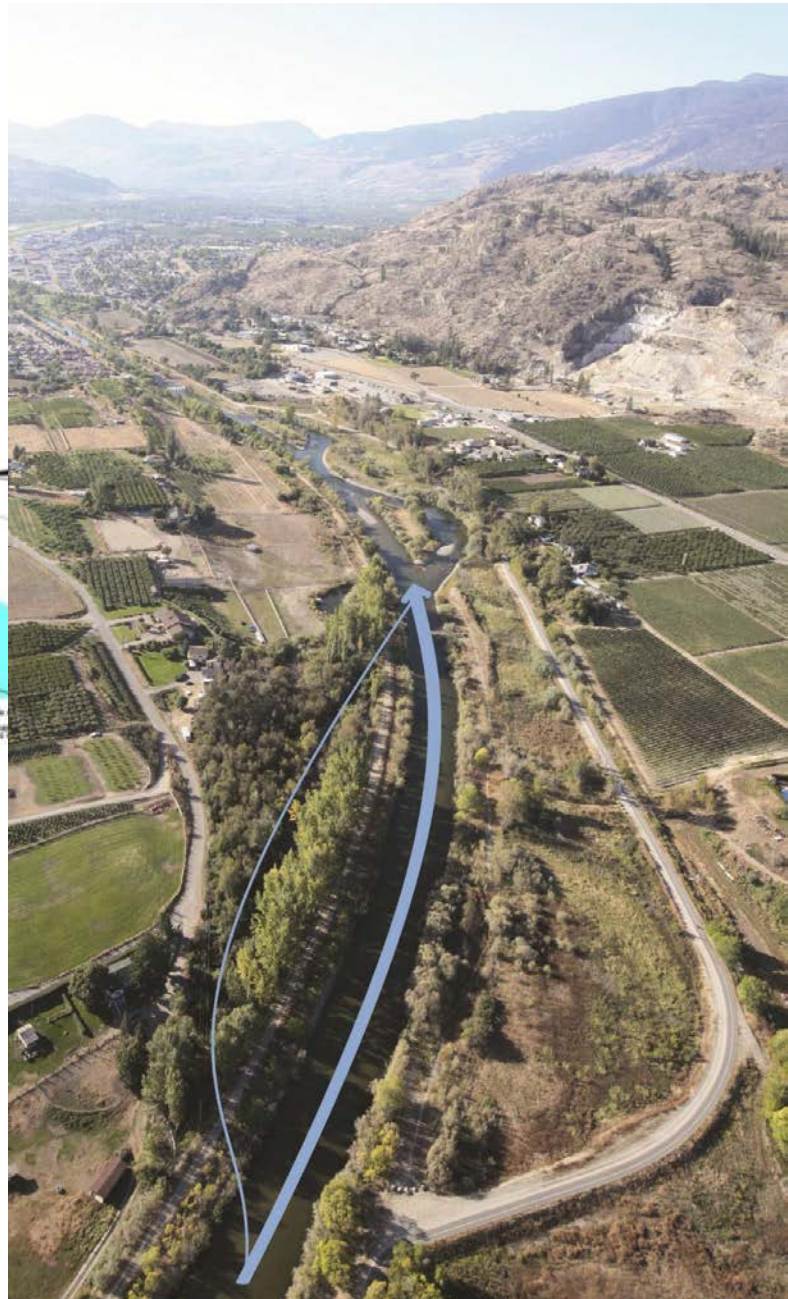
2009-2018
monitoring & adaptive management

ON-GOING outreach

ORRI – PHASE II

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





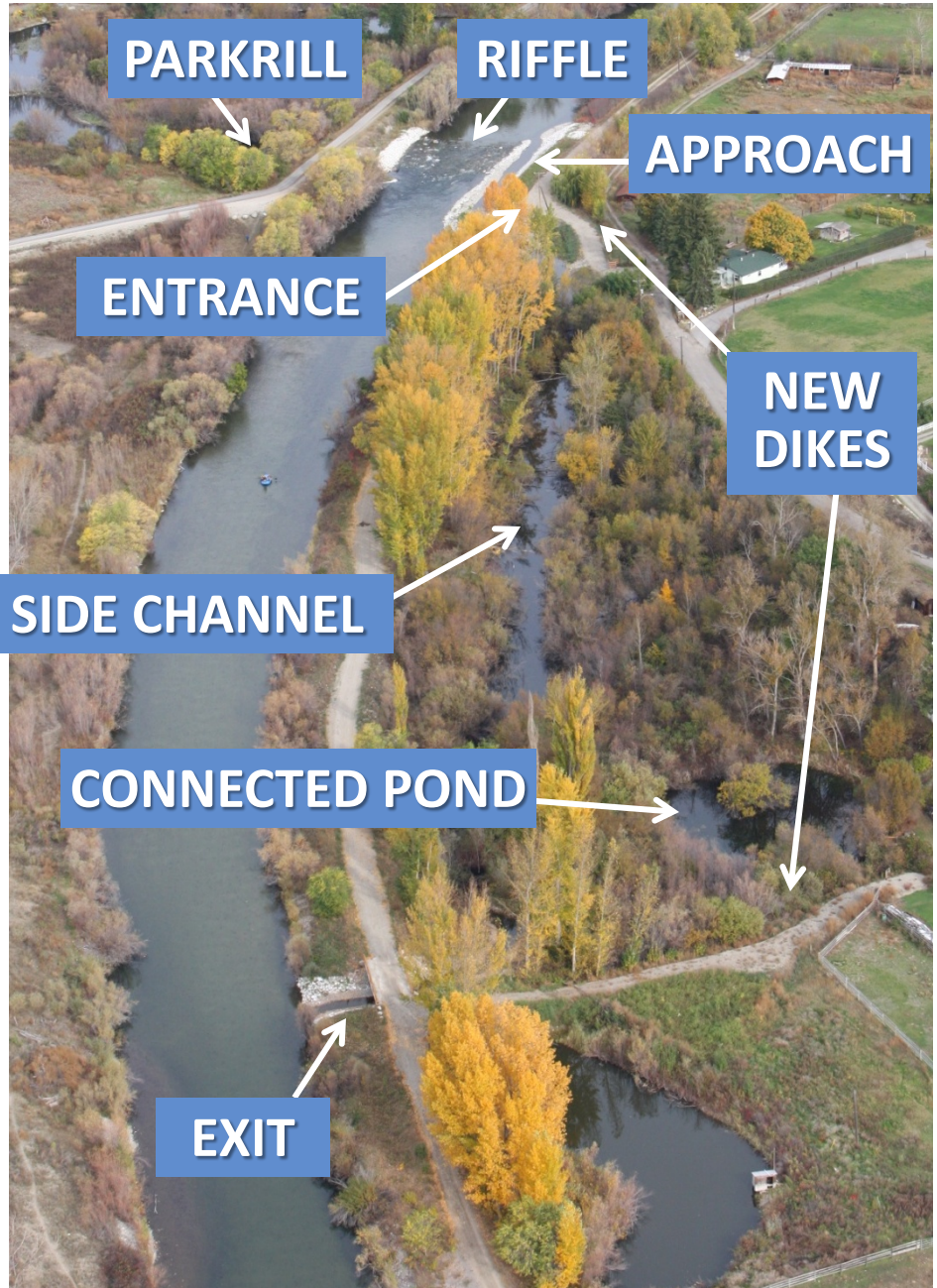
ORRI – PHASE II

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

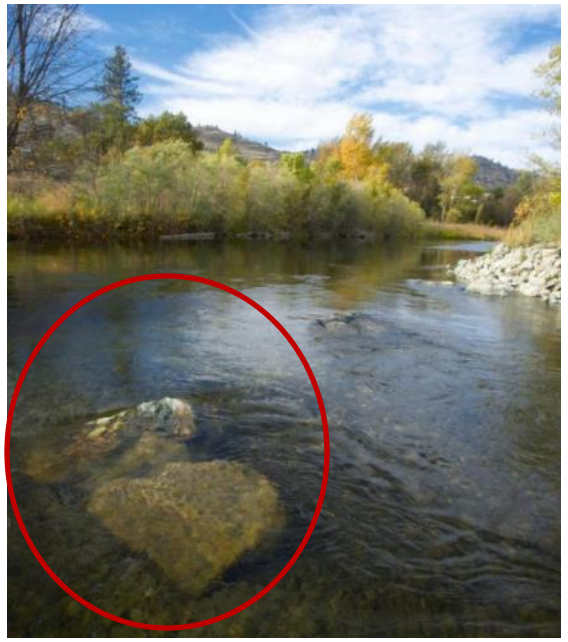
CROSS SECTION DIMENSIONS

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

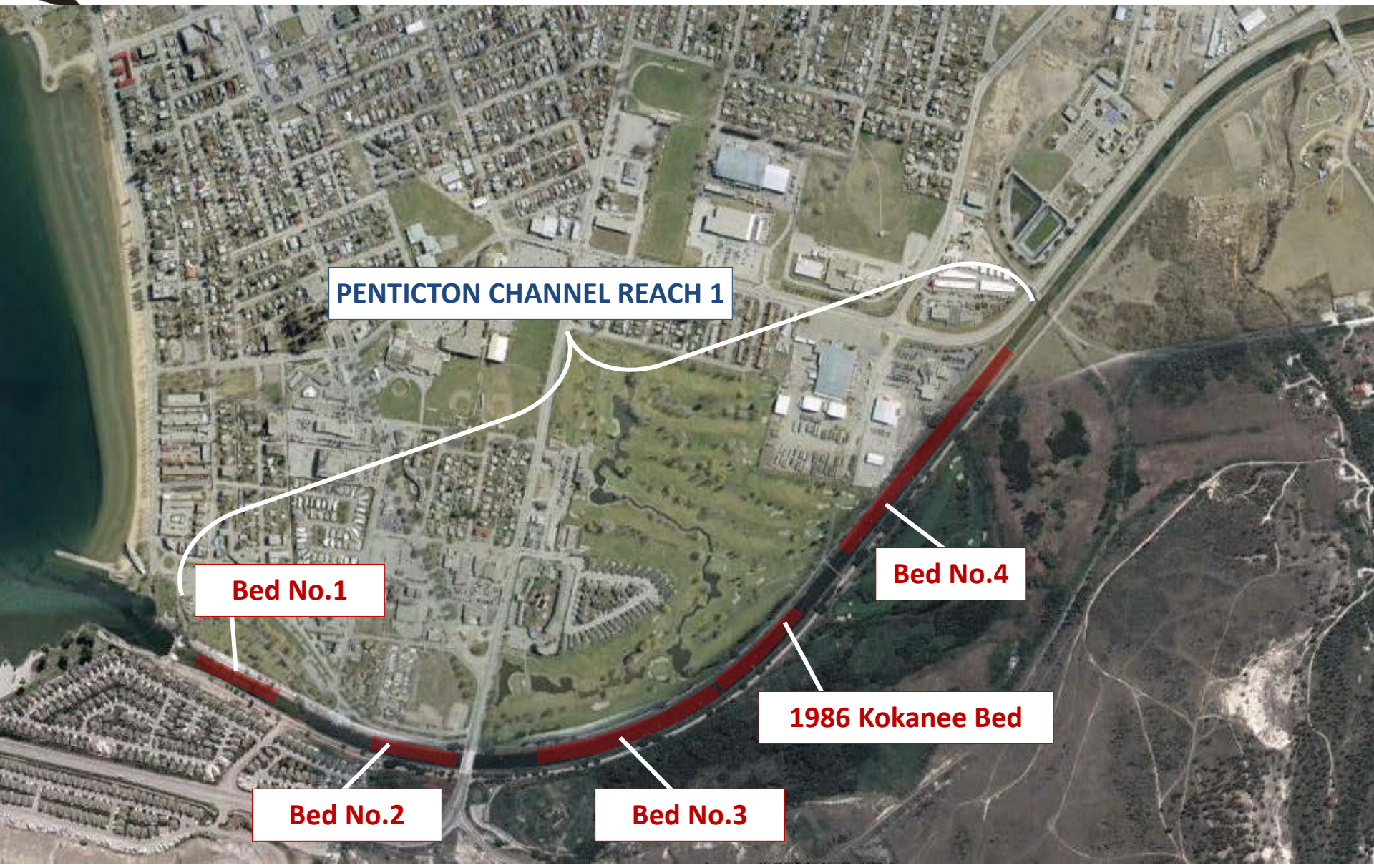
SPAWNING BEDS in PENTICTION

1909 NATURAL RIVER & FEATURES

1950's HABITAT LOST

2014-NOW SPAWNING BEDS

SPAWNING BEDS in PENTICTION



SPAWNING BEDS in PENTICTION

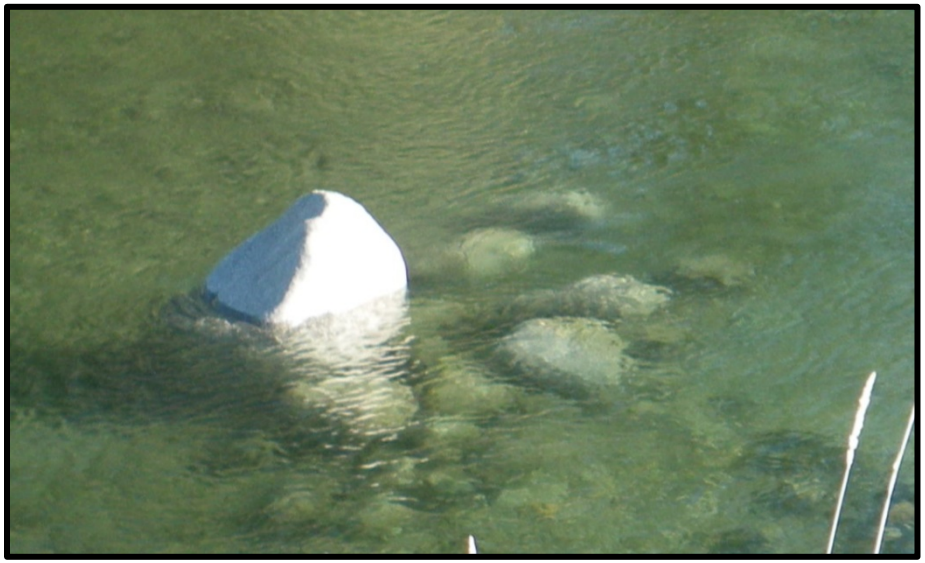
RAISED GRAVEL BEDS (3)

- 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:

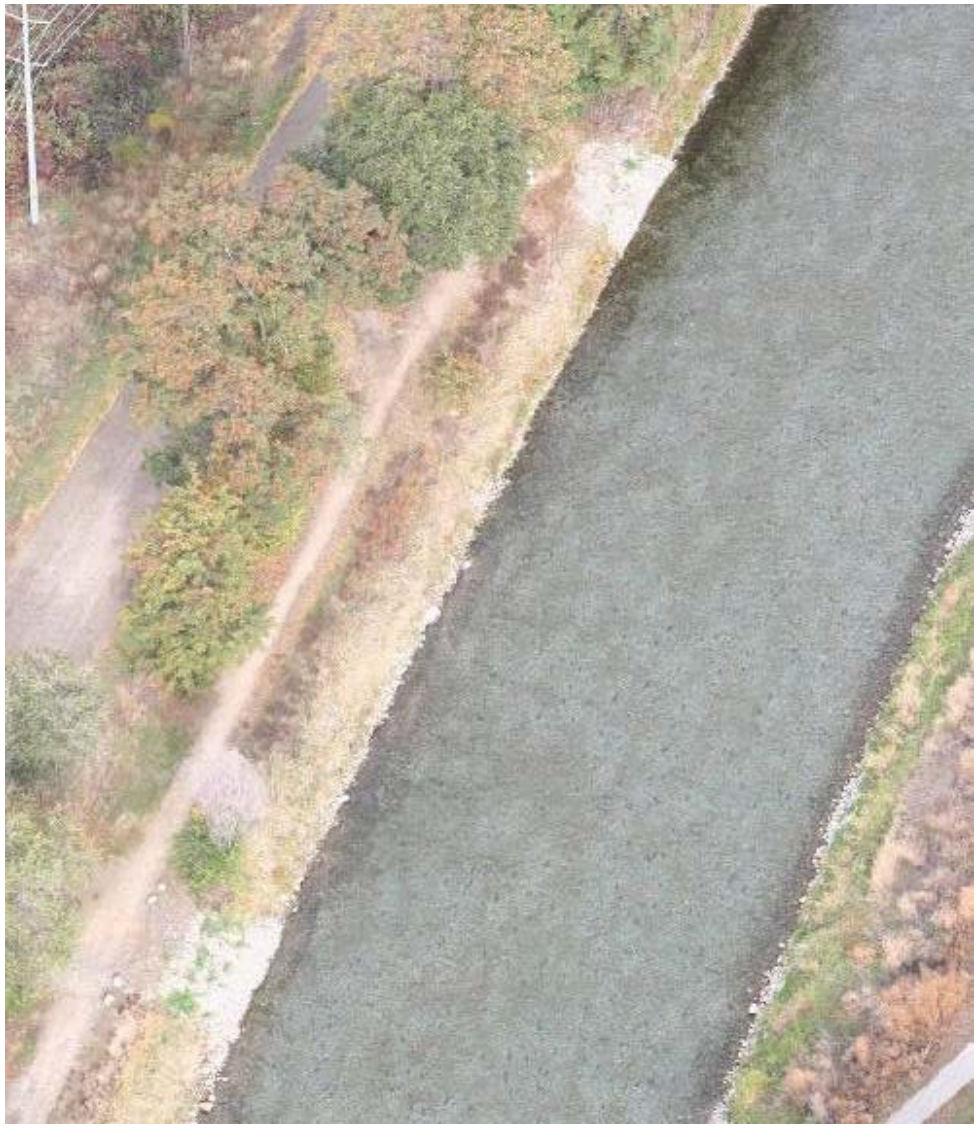
2014 Beds No.1 & No.2 (SK, CH)

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

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