OKANAGAN RIVER RESTORATION INITIATIVE - FAQ

Initiative background:

- The health of the *dawsitk*^w (Okanagan River) has been severely impacted by the channelization works that occurred in the mid-1950's. Only 16% (5 km) of the river remains in a natural (3 km) or semi-natural state (2 km). 84% (30 km) of the river has been channelized, straightened, narrowed and dyked.
- In an effort to regain the habitat quality and quantity that has been lost, the ORRI concept was conceived in 2000. ORRI is an ecosystem based collaborative approach assembling provincial (MoFLNRO), federal (DFO, EC), First Nations (ONA, CCT, OIB, PIB) and various local authorities and funders via a Steering Committee.

ORRI goals and benefits:

- The goal is to return portions of the channelized river back to more natural conditions. ORRI restoration works include:
 - Relocating dikes and reconnecting the river to its historic floodplains.
 - Re-establishing river meanders, lengthening the river channel and re-creating pool/riffle sequences.
 - o Creating nature-like habitat features, such as, spawning beds, rock riffles, side channels, wetland ponds, boulder clusters and gravel bars.
 - Replanting riparian vegetation.
- The long term purpose is to create more complex and diverse habitat for fish and wildlife (multi-species).





ORRI phases (constructed to date):

- Phase I: Re-connection of two isolated oxbows and historic floodplain (Oliver, 2009).
- Phase II: Re-connection of a natural side channel (Oliver, 2013).
- **VDS 13**: Modifying a vertical drop structure to enhance upstream spawning habitat (Oliver, 2013).
- Floodplain features: Creation of ponds for amphibians in Phase I reconnected floodplain (Oliver, 2014). ٠
- Beds No.1, 2 & 3: Creation of spawning beds for salmonids (Penticton, 2014 & 2015).

BEFORE Phase I (2008 orthophoto)



AFTER Phase I (2010 orthophoto)



BEORE Phase II and VDS 13 Phase (2012 orthophoto)



AFTER Phase II (2015 orthophoto)





Main monitoring highlights:

- Desired spawning-flow Froude numbers achieved during construction remained within the range preferred by salmon even after natural sediment transport processes during subsequent freshets.
- Pool and riffle habitats continue to dominate the restoration area, and the channel configuration is selfsustaining for spawning salmon needs even though there has been bed-load movement, gravel bar creation, and pool depth changes.
- During the 2011 freshet, the newly connected ORRI floodplain was inundated with water for 3-4 weeks; observed in just over 1/3 of the floodplain area.
- The number of fish habitat features, such as large woody debris, increased from natural transport and was sustained.
- Total coverage of all macrophyte species was reduced, the proportion of introduced invasive macrophyte species was reduced, and native macrophyte species diversity increased.
- Pre-treatment, no salmonids were documented during snorkel surveys; however, post-treatment snorkel surveys documented Rainbow Trout in all years.
- Sockeye and Chinook have been using the restoration features (pools and spawning beds). The proportion of salmon spawners selecting Phase I increased over the reference reach, and continued increase over pre-treatment conditions for Phase I.
- Sockeye low egg-incubation survival drastically improved in Phase I post-treatment with survival rates similar to those measured in the natural reaches of the *qawsitk*^w (Okanagan River).
- Successful planting and natural vegetation growth is occurring in the re-established floodplain.
- Key species at risk, like Yellow-breasted Chat and Great Basin Spadefoot have been using the reestablished floodplain.

ORRI Steering Committee:

- Okanagan Nation Alliance (ONA).
- British Columbia Ministry of Forests, Lands and Natural Resource Operations (MoFLNRO): Water Stewardship Division, Fish & Wildlife Division, and Ecosystem Division.
- Fisheries and Oceans Canada (DFO).
- Confederated Colville Tribes (CCT).
- Osoyoos Indian Ban (OIB) and Penticton Indian Band (PIB).
- The Nature Trust of British Columbia (NT).
- Canadian Wildlife Service of Environment Canada (CWS).
- Involved contractors, advisors and stakeholders, as warranted, including Mariposa Consulting, Newbury Hydraulics, ORWHFS, RDOS, Town of Oliver, City of Penticton, SOSCP, Friends of the Oxbows, etc.

ORRI - PHASE I: RECONNECTION OF TWO ISOLATED OXBOWS

Phase I specific renaturalization goals:

- Re-connecting the river to its historic meanders and re-gaining natural river habitat features for the benefits of sockeye salmon and other native fishes.
- Re-activating an historic floodplain and improving the riparian conditions for native birds, amphibians and other wildlife.
- This site is located on the *qawsitk*^w (Okanagan River) in Oliver and was specifically chosen based on channel gradient and connection to upstream productive habitats (natural river section).



Main design elements:

- 1.2 km of dyke set back re-connecting the river to 15,0000 m² of contiguous floodplain.
- 0.5 km of river re-meandered (dual channel) reconnecting 2 oxbows and creating pool/riffle sequences.
- 5 spawning beds, 2 riffles and 5 gravel bars created in-stream.
- 112 boulders clusters and 4 large woody debris placed.
- Riparian vegetation re-planted re-establishing the floodplain functions.

Timeline:

- **On-going**: Guidance from the ORRI Steering Committee, outreach activities and funding research.
- **2000-2007**: Preliminary river assessments & prioritization, property acquisition, conceptual designs.
- **2008:** Engineering design, permits, pre-treatment monitoring.
- 2008-2009 (winter): Setback dike construction.
- 2009 (summer): Instream construction works (river re-meanders and instream habitat features).
- 2009-2013: Riparian vegetation planting.
- **2013**: Modification of vertical drop structure #13 enhancing spawning habitat in the lower reach.
- 2014: Creation of habitat features for amphibians and reptiles (wetland ponds).
- 2009-2018: Effectiveness monitoring and adaptive management.

C OKANAGAN RIVER REFORE CONSTRUCTION CALE: NTS NETTLE VALLEY RAILWAY 1000 BADS 5 SPAWNING PLATFORMS

ORRI – PHASE I



BEFORE (2005)

IMMEDIATELY AFTER CONSTRUCTION (2009)



5-YEARS POST CONSTRUCTION (2014)

ORRI - PHASE II: RE-CONNECTION OF A NATURAL SIDE CHANNEL

Phase II specific renaturalization goals:

- Re-connecting the river to its historic river pathway (creating a side channel), immediately upstream of Phase I.
- The side channel provides good quality rearing habitat, for native fishes, especially for juvenile Rainbow Trout, Steelhead and Chinook. The connection to groundwater sources, abundant riparian vegetation coverage, and in-stream woody debris provide temperature refugia, shelter from predators and abundant food sources.

Main design elements:

- A 300 m long naturally vegetated side channel connected to groundwater.
- A backwatering rock riffle and an approach channel diverting water to the side channel.
- A gravel bar diverting debris from entering the approach channel.
- Spawning areas created in the river mainstem and at the entrance and exit of the side channel.
- Two bridge crossing the dike over the constructed channel.
- A concrete cap protecting an underground drainage pipe
- Two new small dikes portions maintaining flood protection of adjacent lands.

Timeline:

- **On-going**: Guidance from the ORRI Steering Committee and outreach activities.
- **2010-2012:** Engineering designs, permits and funding research.
- 2013: Construction works.
- **2014-2018:** Effectiveness monitoring and adaptive management.





ORRI – PHASE II



1-YEAR POST CONSTRUCTION (2014)



RECONNECTED SIDE CHANNEL



CREATED RIFFLE & APPROACH CHANNEL



SPAWNING AREAS

