Pacific Lamprey:

Keeping a 450 Million Year Tradition Alive and Strong in the Upper Columbia

Presenter: Tyler Beals

Co-authors: Ralph Lampman and Sean Goudy

Yakama Nation Fisheries Pacific Lamprey Project (YNPLP)

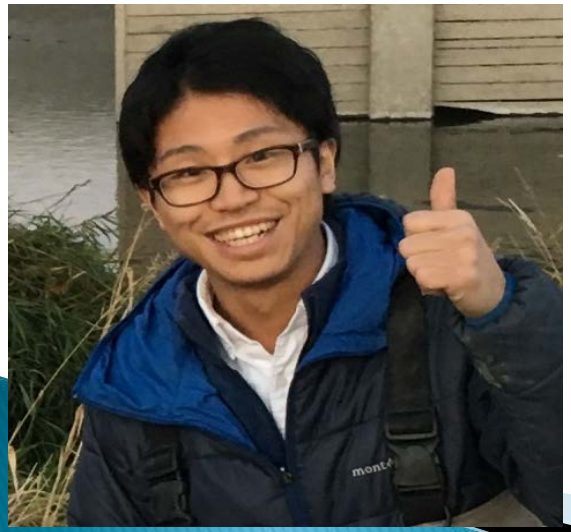
The Lamprey Team

Ralph Lampman

Sean Goudy

Dave'y Lumley

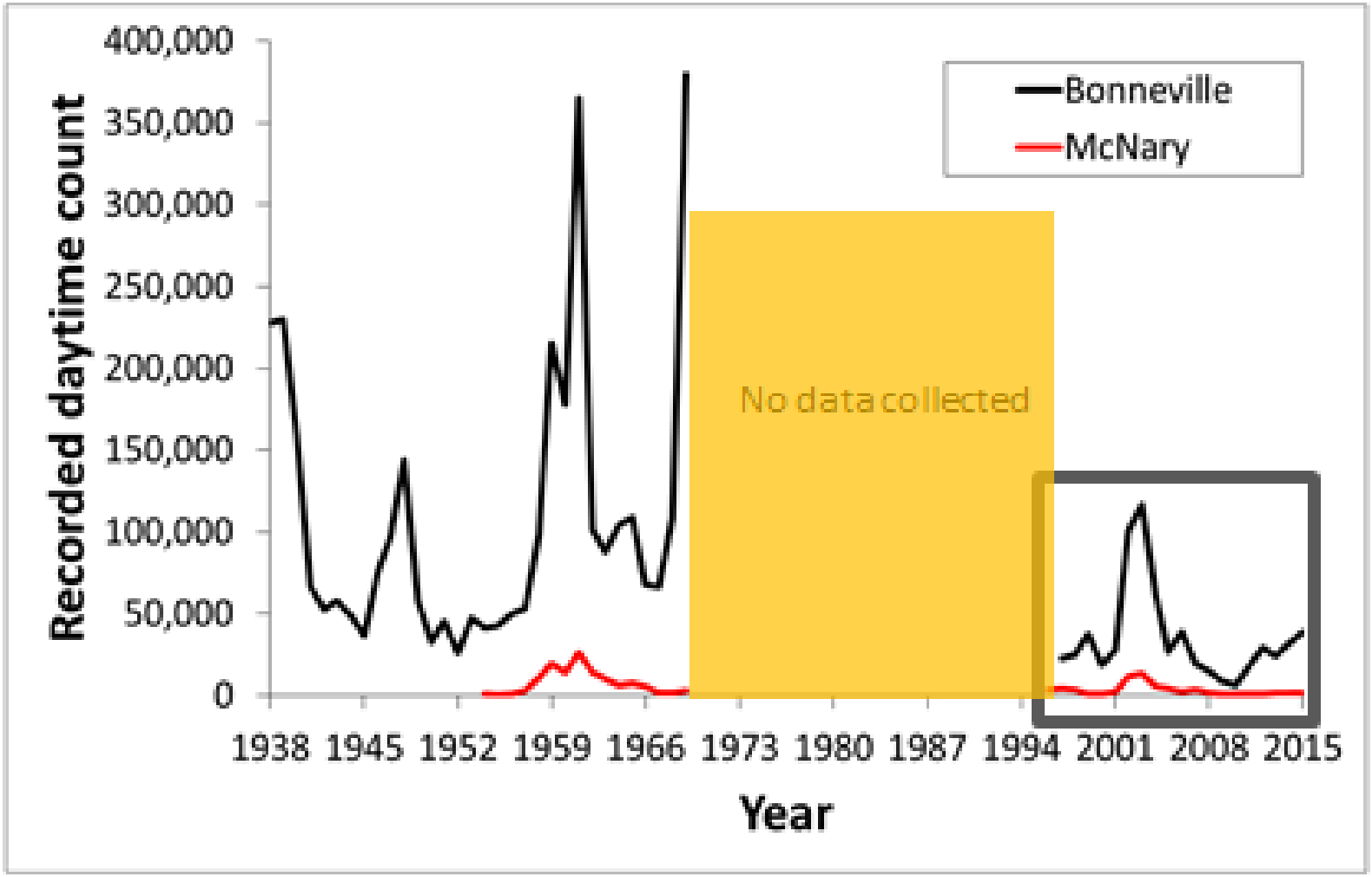
Hiroaki Arakawa



April Hull

Leona Wapato

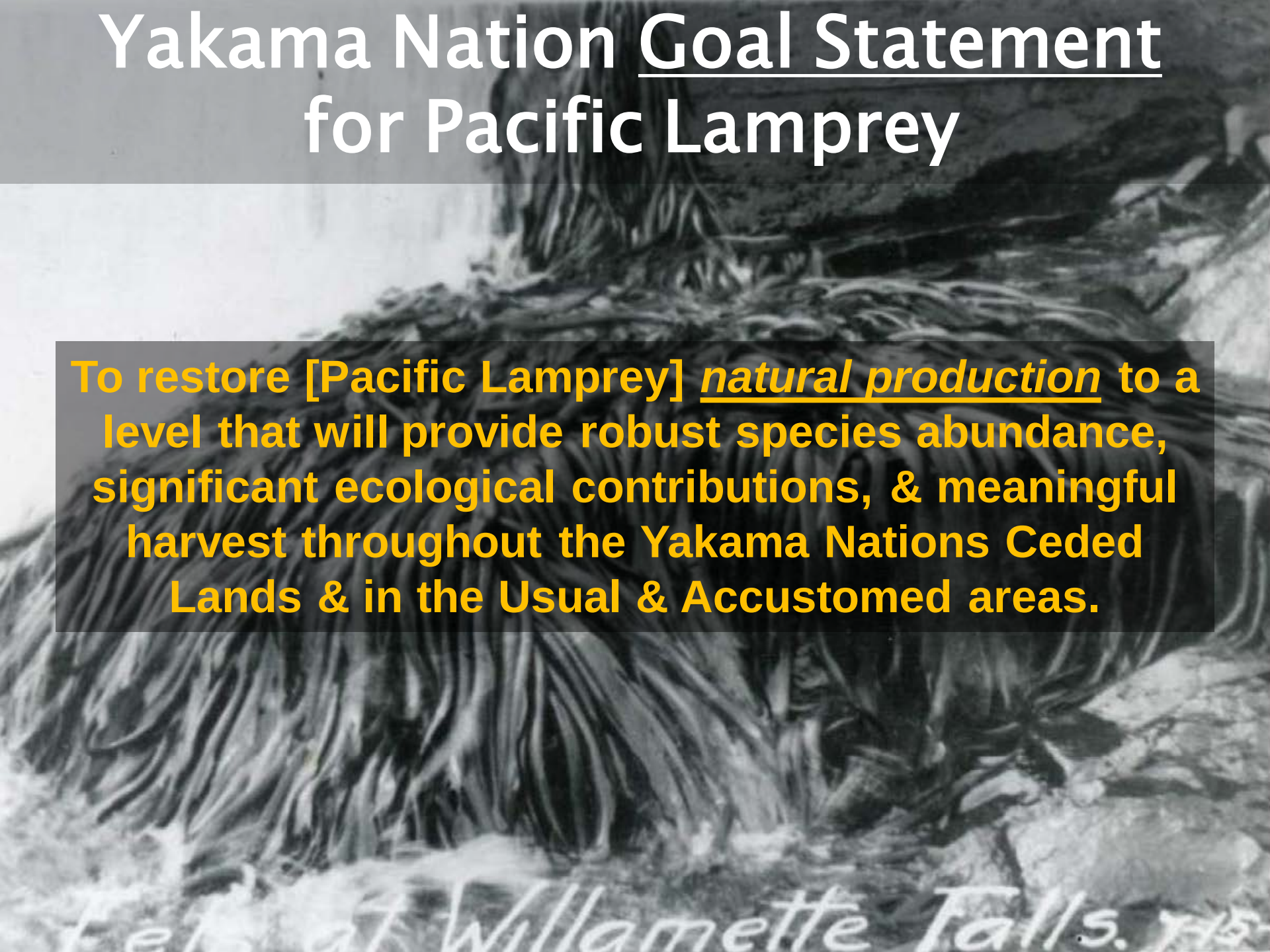
Pacific Lamprey Decline….



UW Data Access Realtime, March 2, 2016

Cultural Importance

Yakama Nation Goal Statement for Pacific Lamprey

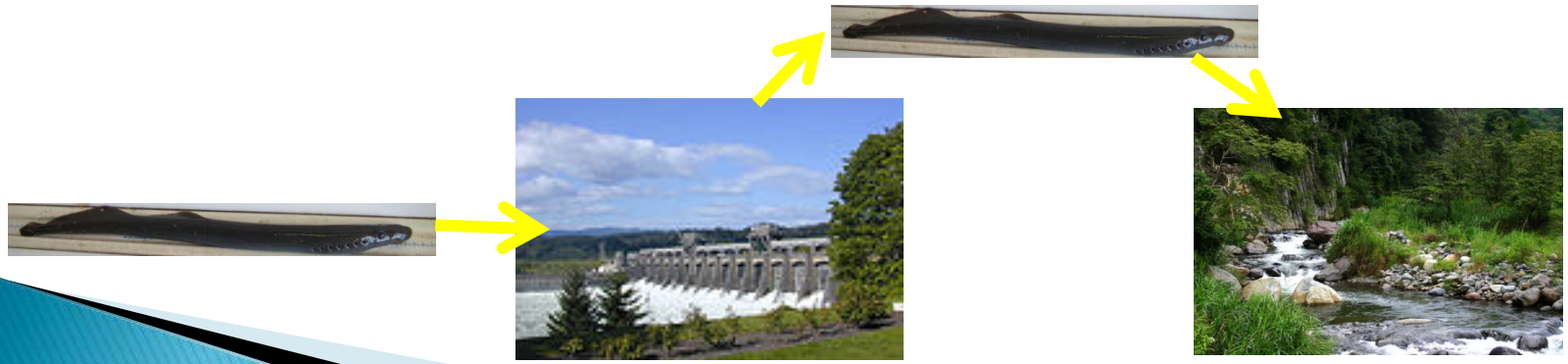


To restore [Pacific Lamprey] *natural production* to a level that will provide robust species abundance, significant ecological contributions, & meaningful harvest throughout the Yakama Nations Ceded Lands & in the Usual & Accustomed areas.


Females Lay
~100,000 Eggs!

Adult Translocation/Reintroduction

- Subbasins where adult translocation has occurred
  - Yakima Subbasin – Primary Focus
    - 2012–2016
  - Wenatchee Subbasin
  - Methow Subbasin

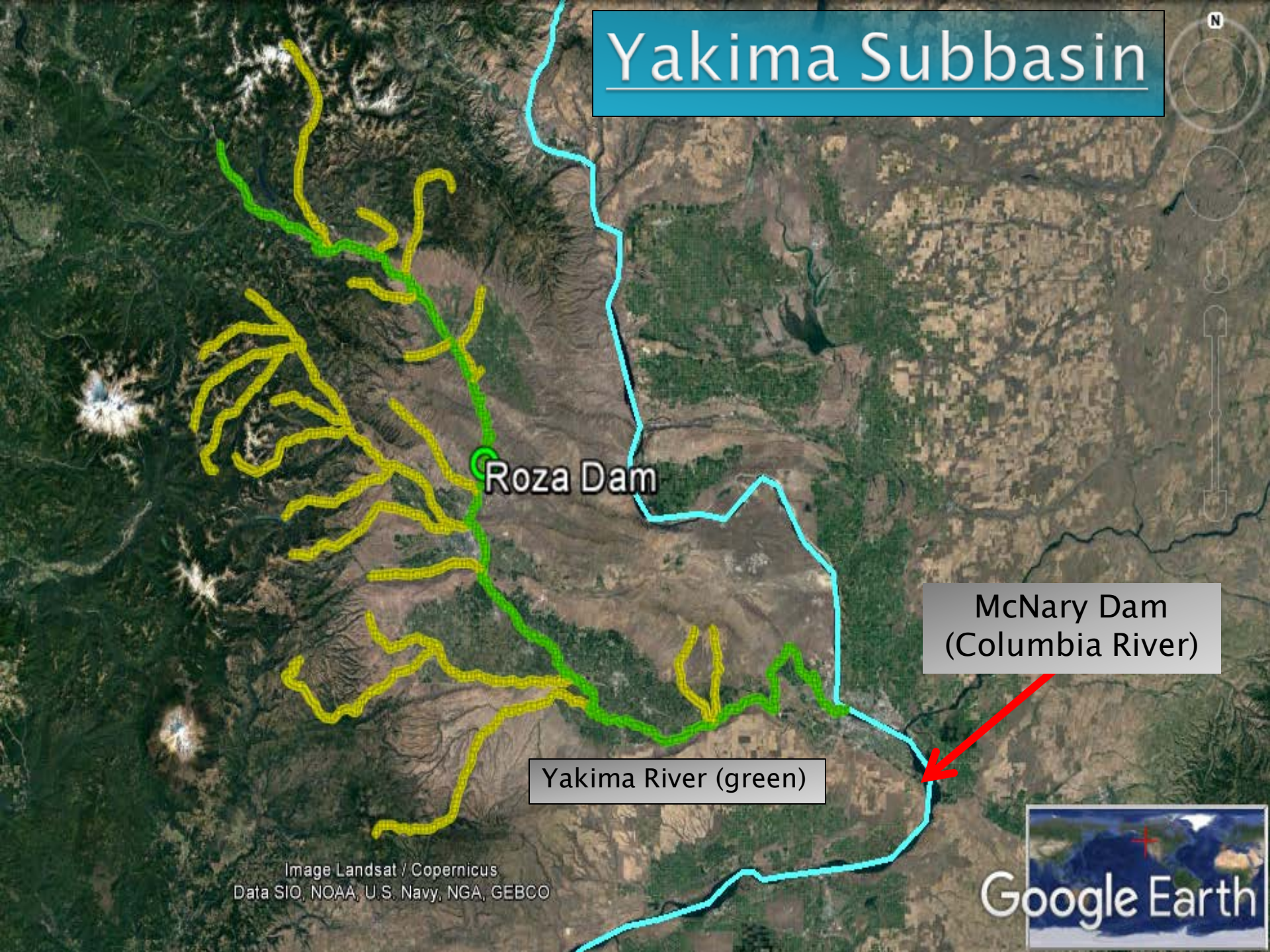


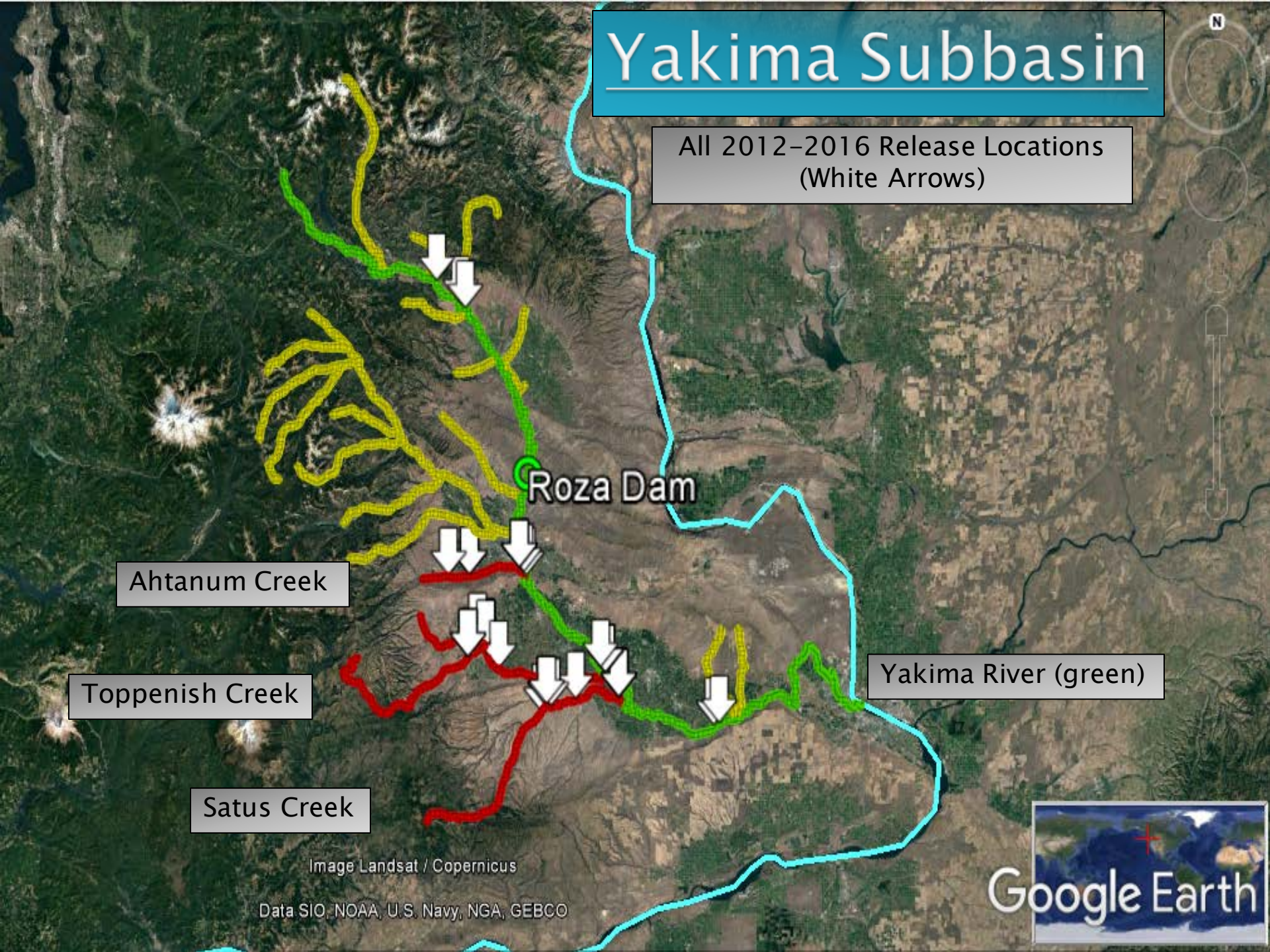
Adult Translocation/Reintroduction

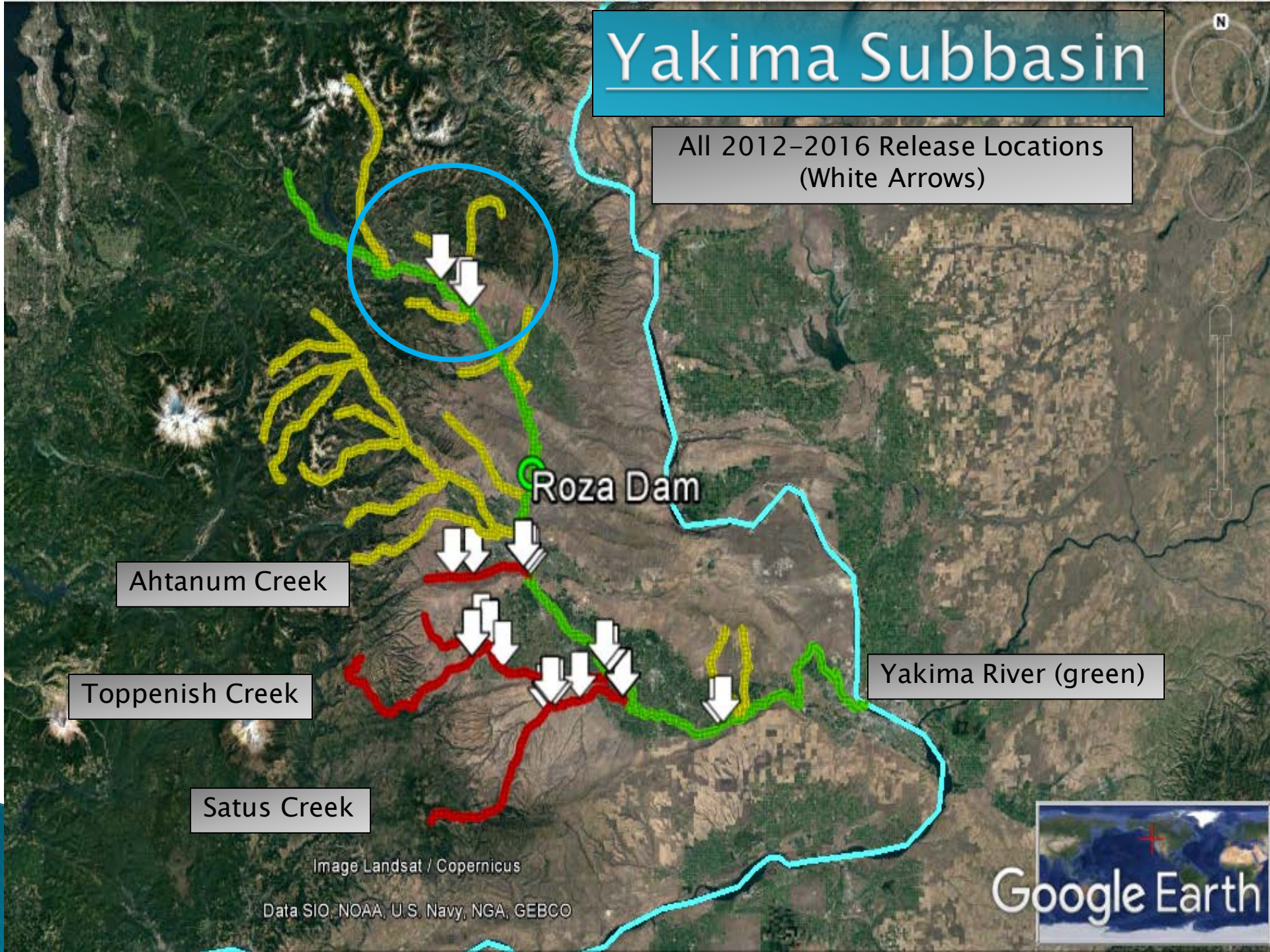
PVC traps – adult collection from lower Columbia Dams.

Adult Lamprey holding tanks at Prosser Hatchery, WA


WESTCOTT
04/14/2014


Yakima Subbasin
Roza Dam
McNary Dam
(Columbia River)
Yakima River (green)
Image Landsat / Copernicus
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Google Earth


Yakima Subbasin
All 2012-2016 Release Locations
(White Arrows)
Roza Dam
Ahtanum Creek
Toppenish Creek
Satus Creek
Yakima River (green)
Image Landsat / Copernicus
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Google Earth


Yakima Subbasin
All 2012-2016 Release Locations
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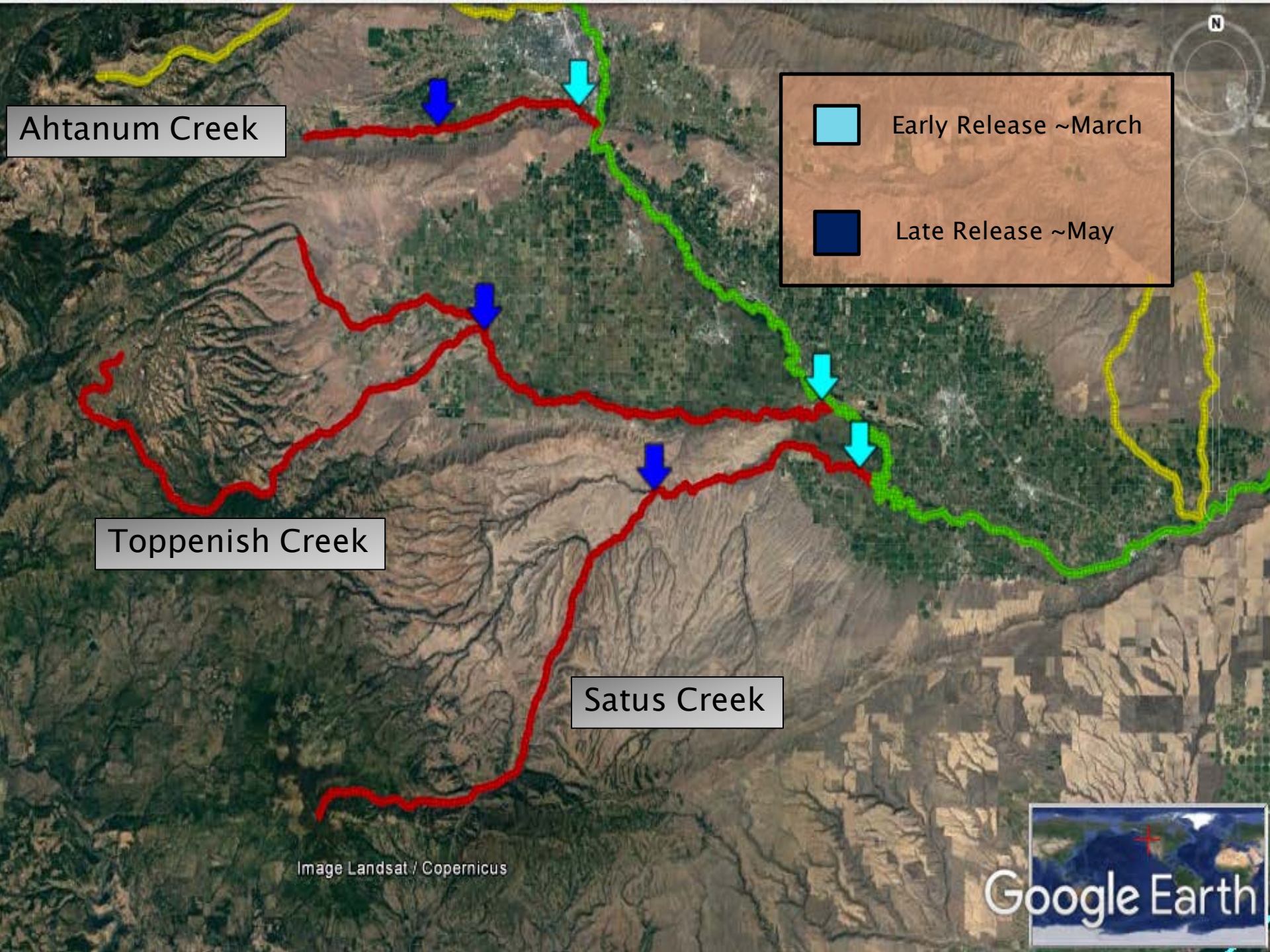
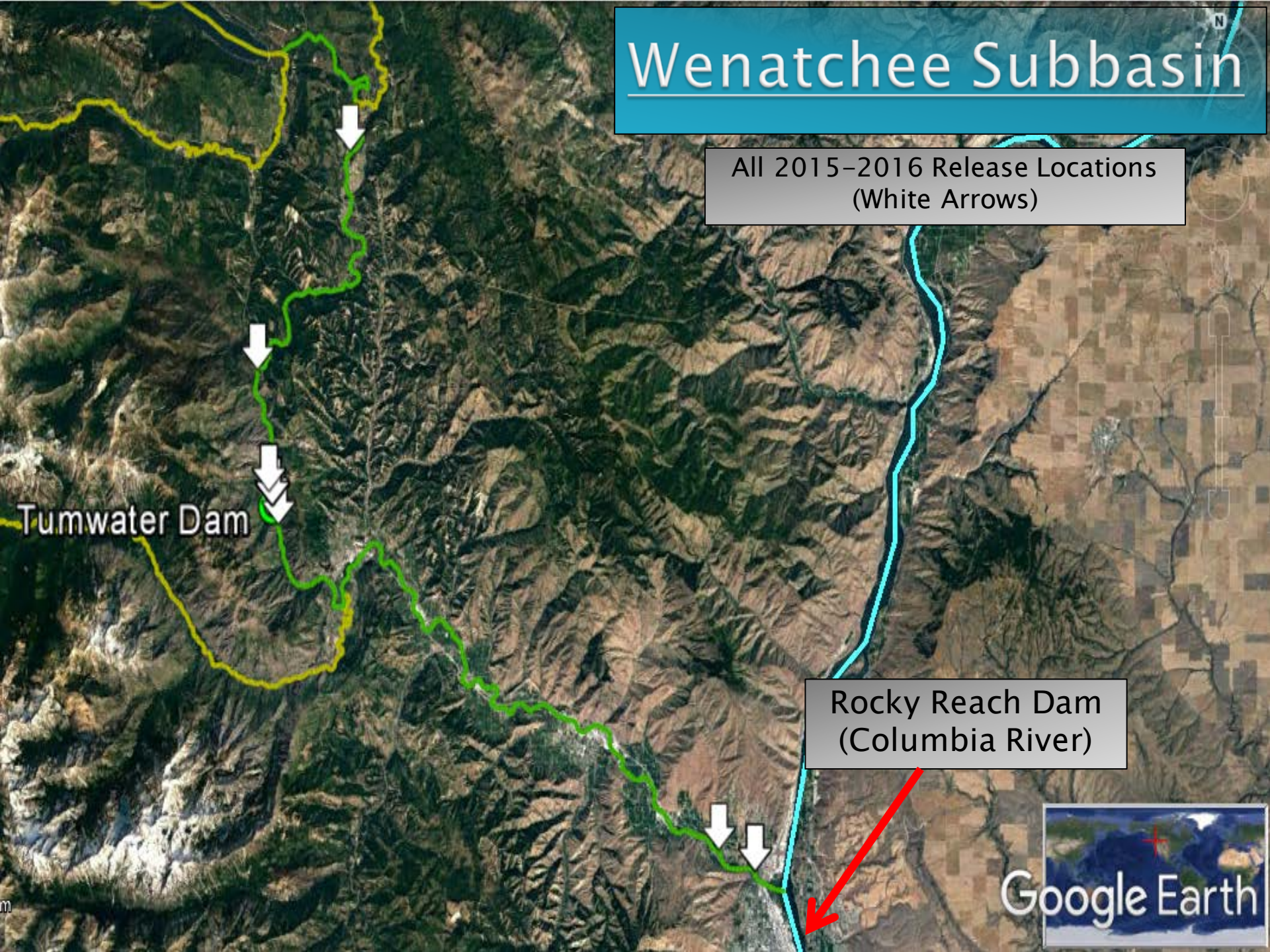
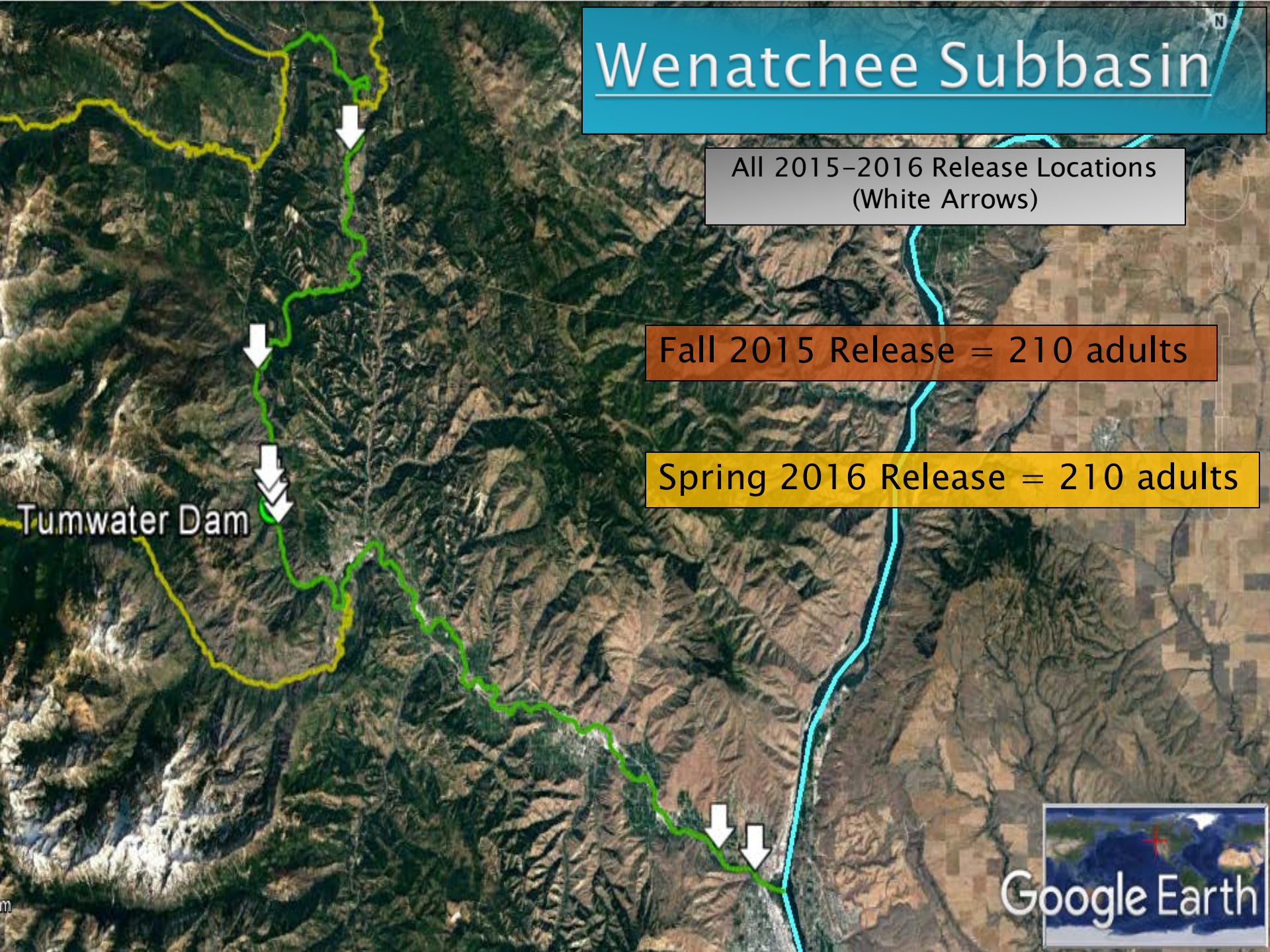
Roza Dam
Ahtanum Creek
Toppenish Creek
Satus Creek
Yakima River (green)
Image Landsat / Copernicus
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Google Earth

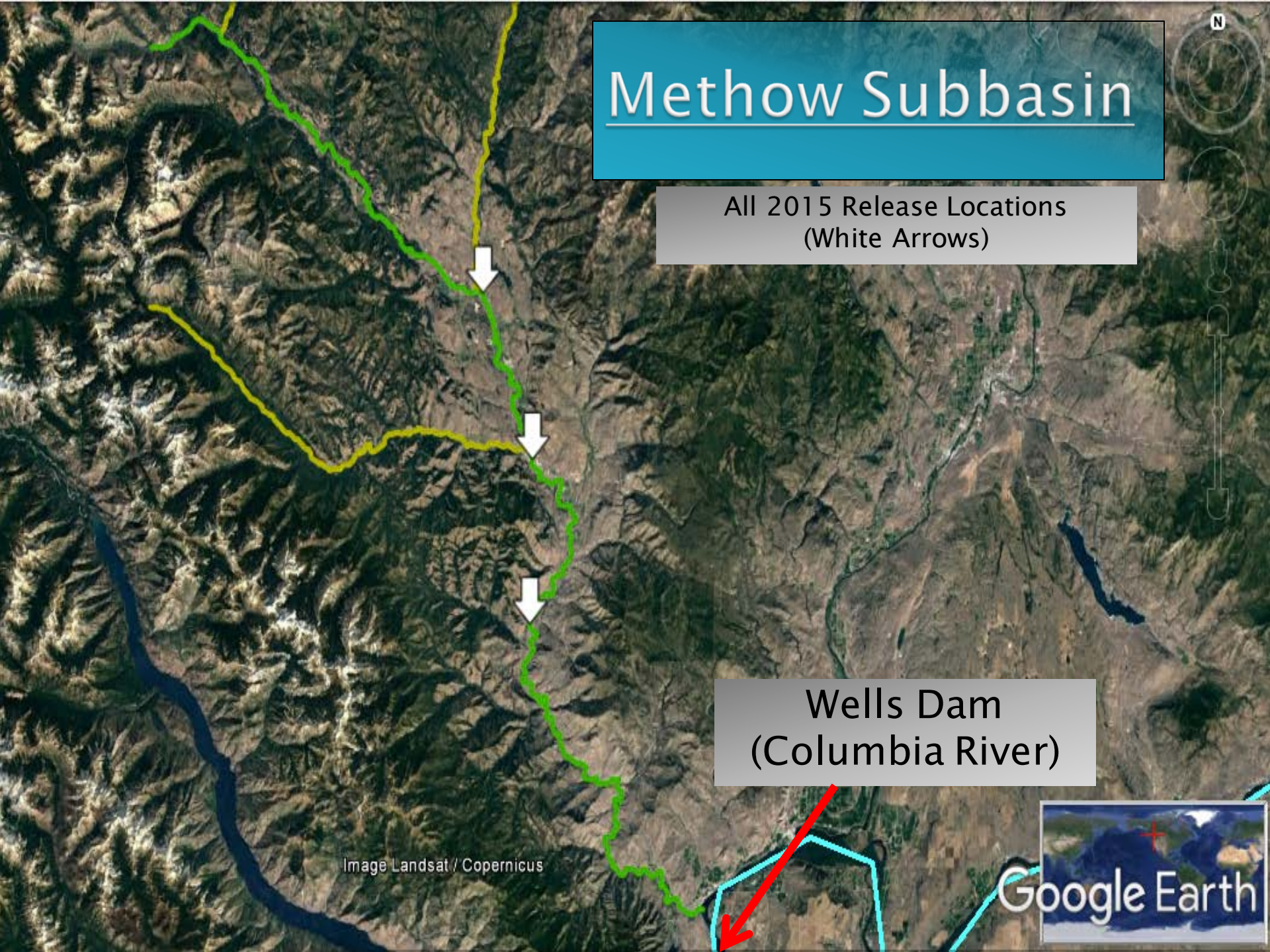
Subbasin		Lower Yakima			Upper Yakima
	Stream	Satus	Toppenish	Ahtanum	Yakima	Yakima
Year	2011-2012	15	-	-	-	-
	2012-2013	46	45	46	-	-
	2013-2014	92	78	85	4	-
	2014-2015	209	219	201	39	102
	2015-2016	117	128	130	72	-
	Total	**479**	**470**	**462**	**115**	**102**

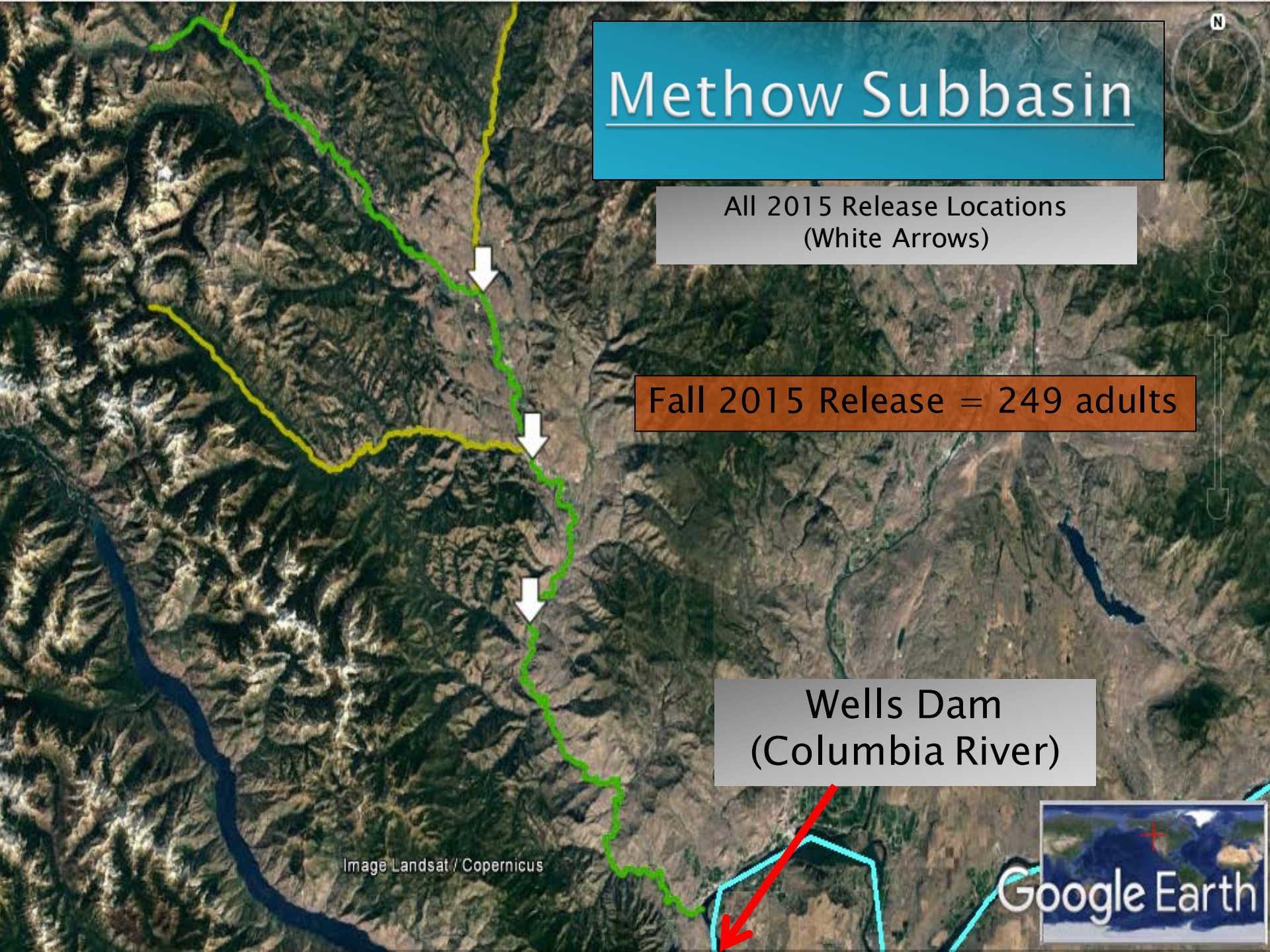
- = 1,628 Adult Pacific Lamprey
  - 1,526 into Lower Yakima
  - 102 into Upper Yakima (upstream of Roza Dam)


Ahtanum Creek
Toppenish Creek
Satus Creek
Early Release ~March
Late Release ~May
Image Landsat / Copernicus
Google Earth


Wenatchee Subbasin
All 2015-2016 Release Locations
(White Arrows)
Tumwater Dam
Rocky Reach Dam
(Columbia River)
Google Earth


Wenatchee Subbasin
All 2015-2016 Release Locations
(White Arrows)
Fall 2015 Release = 210 adults
Spring 2016 Release = 210 adults
Tumwater Dam
Google Earth


Methow Subbasin
All 2015 Release Locations
(White Arrows)
Wells Dam
(Columbia River)
Image Landsat / Copernicus
Google Earth


Methow Subbasin
All 2015 Release Locations
(White Arrows)
Fall 2015 Release = 249 adults
Wells Dam
(Columbia River)
Image Landsat / Copernicus
Google Earth

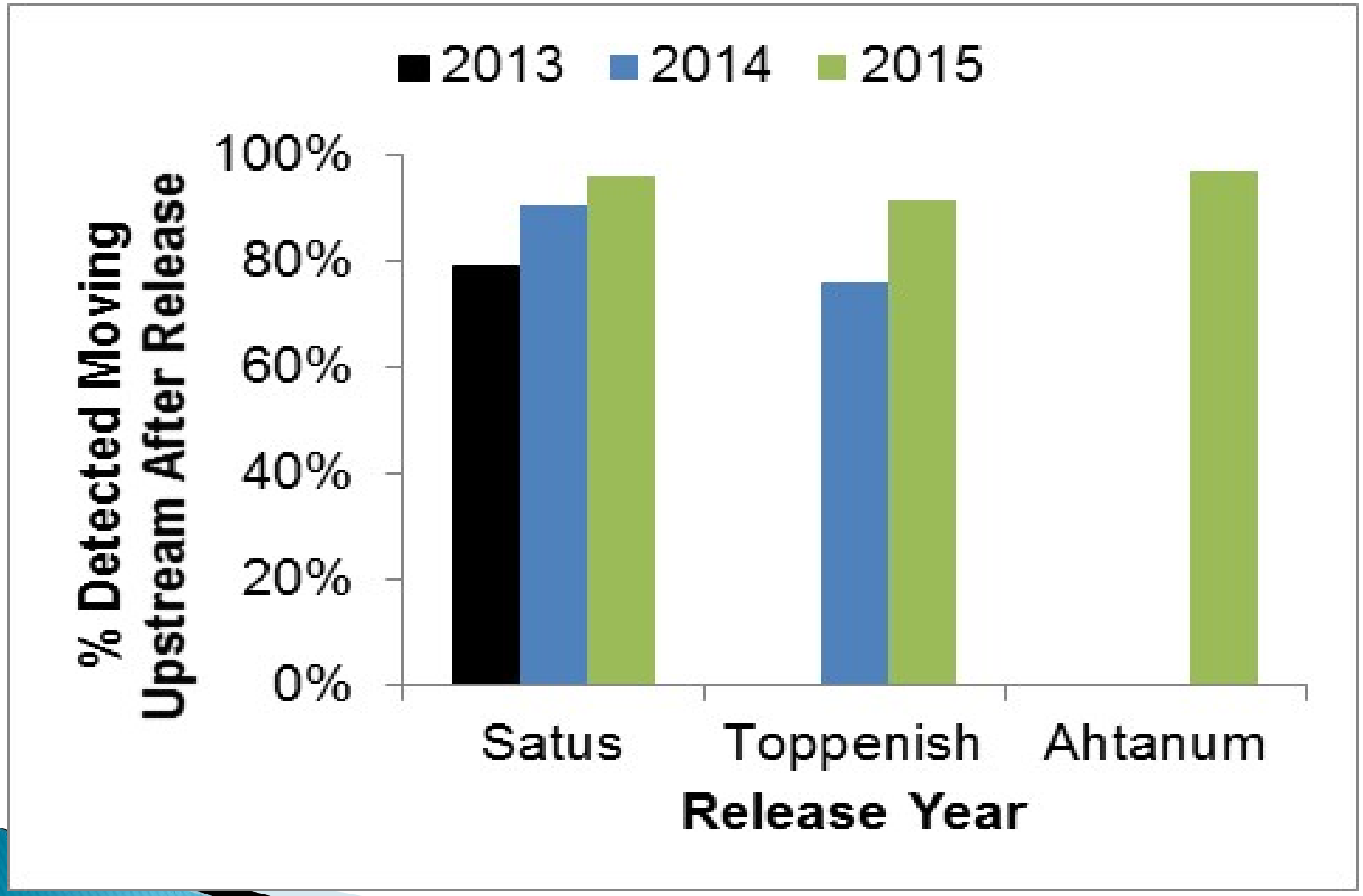
Results: PBT (Parentage-Based Tagging)

- **Parentage Based Tagging (PBT) – CRITFC**

Results: PBT (Parentage-Based Tagging)

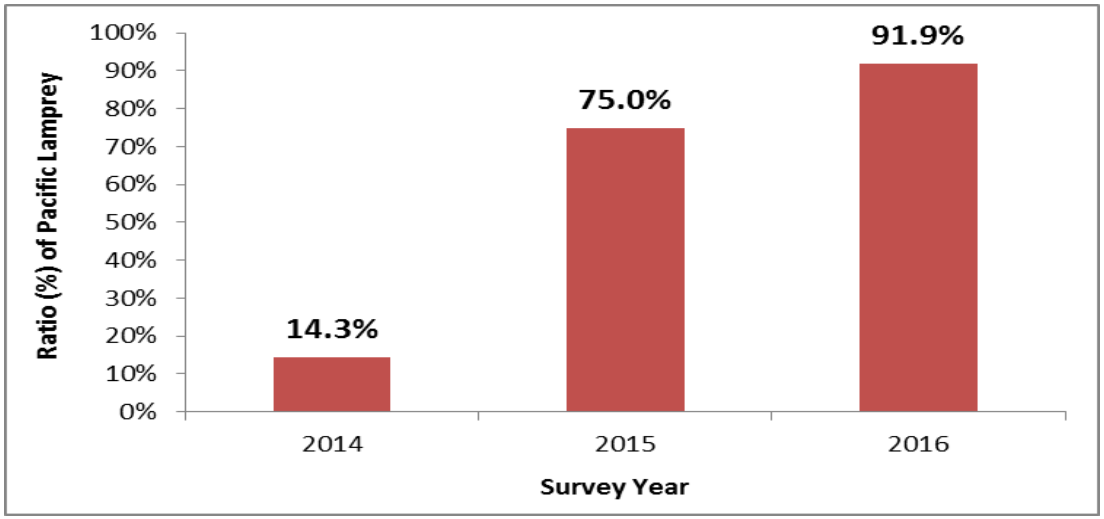
Broodstock Year	# Total	# of Female	# of Male	# of Unknown	# with Pit Tags	# with Genetic Tags	Female Ratio	Pit Tag Ratio	Genetic Tag Ratio
2011-2012	15	9	6	-	14	15	60.0%	93.3%	100.0%
2012-2013	141	27	110	4	124	*135	19.7%	87.9%	95.7%
2013-2014	264	111	144	9	213	*250	43.5%	80.7%	94.7%
2014-2015	770	201	492	77	564	753	29.0%	73.2%	97.8%
2015-2016	906	227	352	317	612	872	39.2%	67.5%	96.2%
Total	**2096**	**575**	**1104**	**407**	**1527**	**2025**	**34.2%**	**72.9%**	**96.6%**

Results: Stream Fidelity (Stray Ratio)

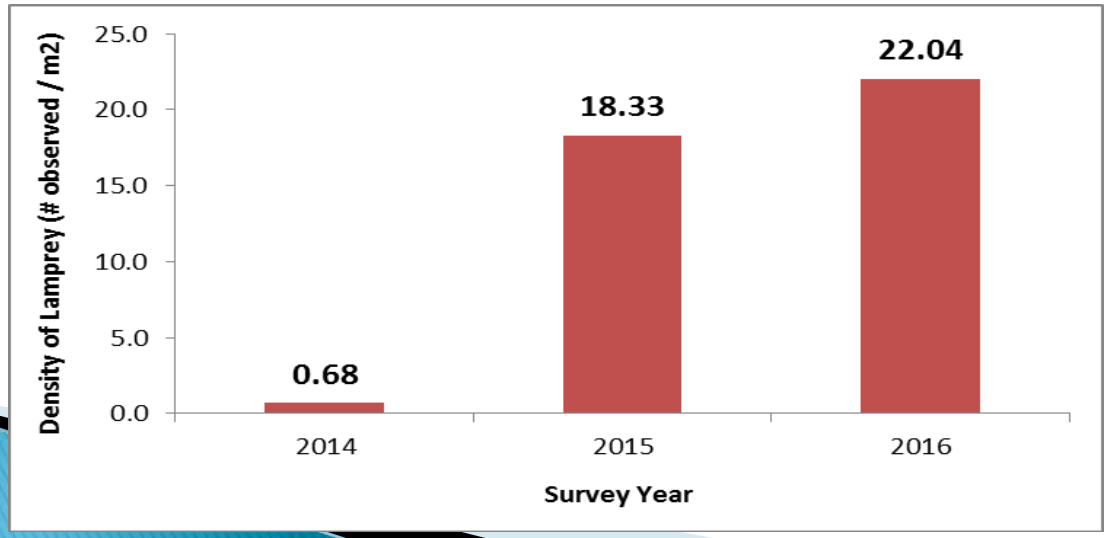


Results: Electrofishing

Satus Creek 2014-2016



Increase in the ratio of Pacific Lamprey (from identified lamprey >50 mm)



Increase in the density of observed lamprey (all species) from observed totals / m2 of survey (#/m2)

Results: Screw Traps

Benefits: Why Should We Care?

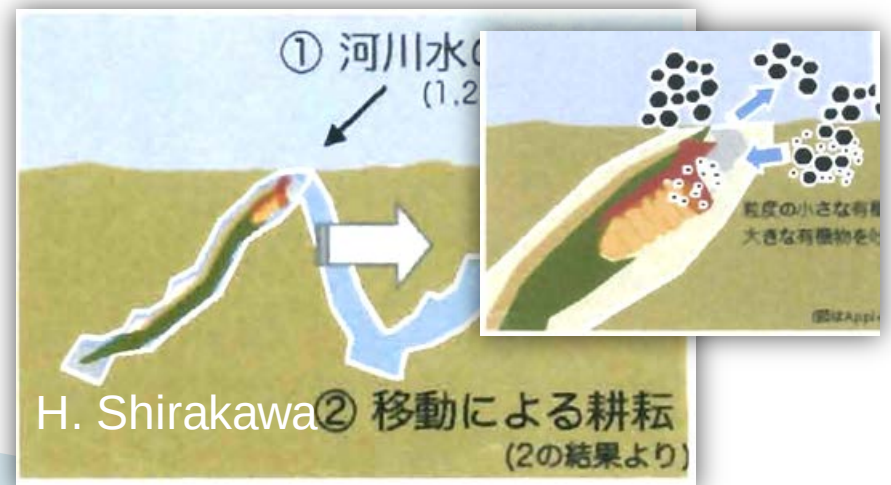
Action to <u>Avoid Extinction</u>

~ 90% All Collected Lamprey Used For Adult Translocation

Food for Numerous Species

Buffer for Salmon Predation

"Farmer of the Underwater World"



Benefits: Research

Larvae (Artificial Propagation)

~ 5 % of collected adults go towards art. prop

Outplanting

- Supplement Translocation efforts
- "Test Run" in select Yakima River side channels

Entrainment studies

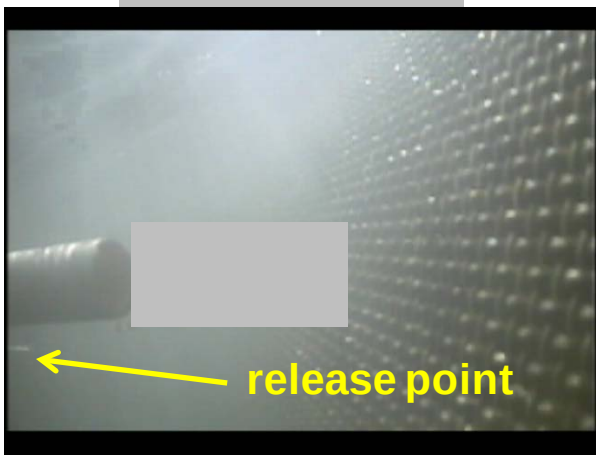
- YNF/ USGS

Rearing studies

- Food types for larvae, rearing densities, length of time in fresh water
  - Umatilla Tribe, YNF, USGS

Benefits: Research

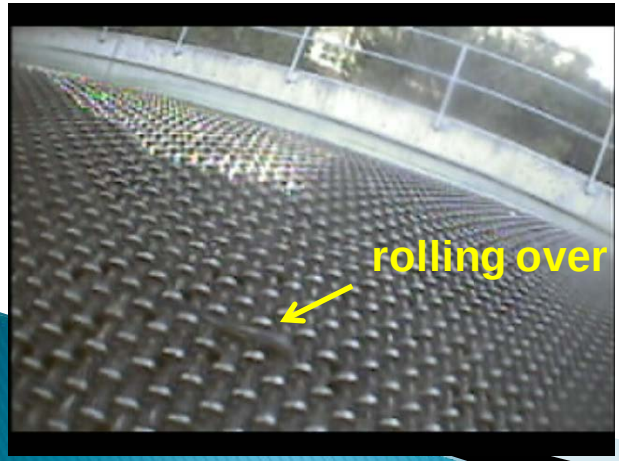
6. Unseen



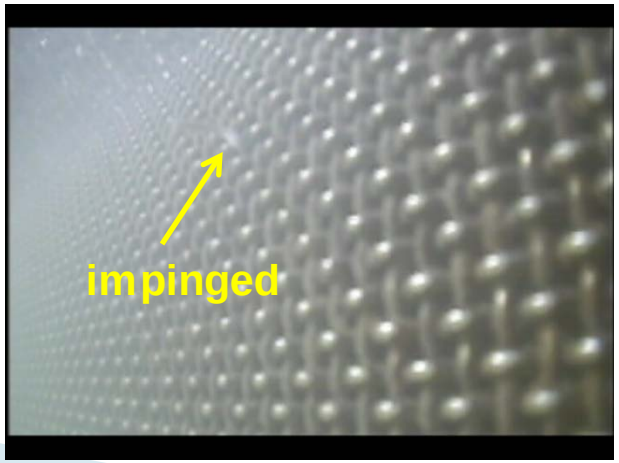
1. Escaped

2. Averted

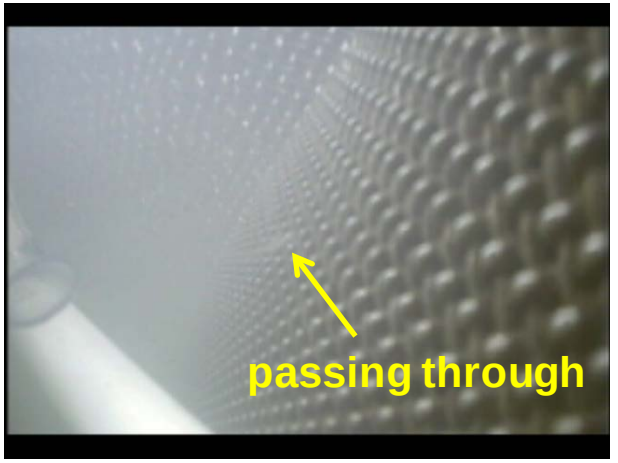
3. Rolled



4. Impinged

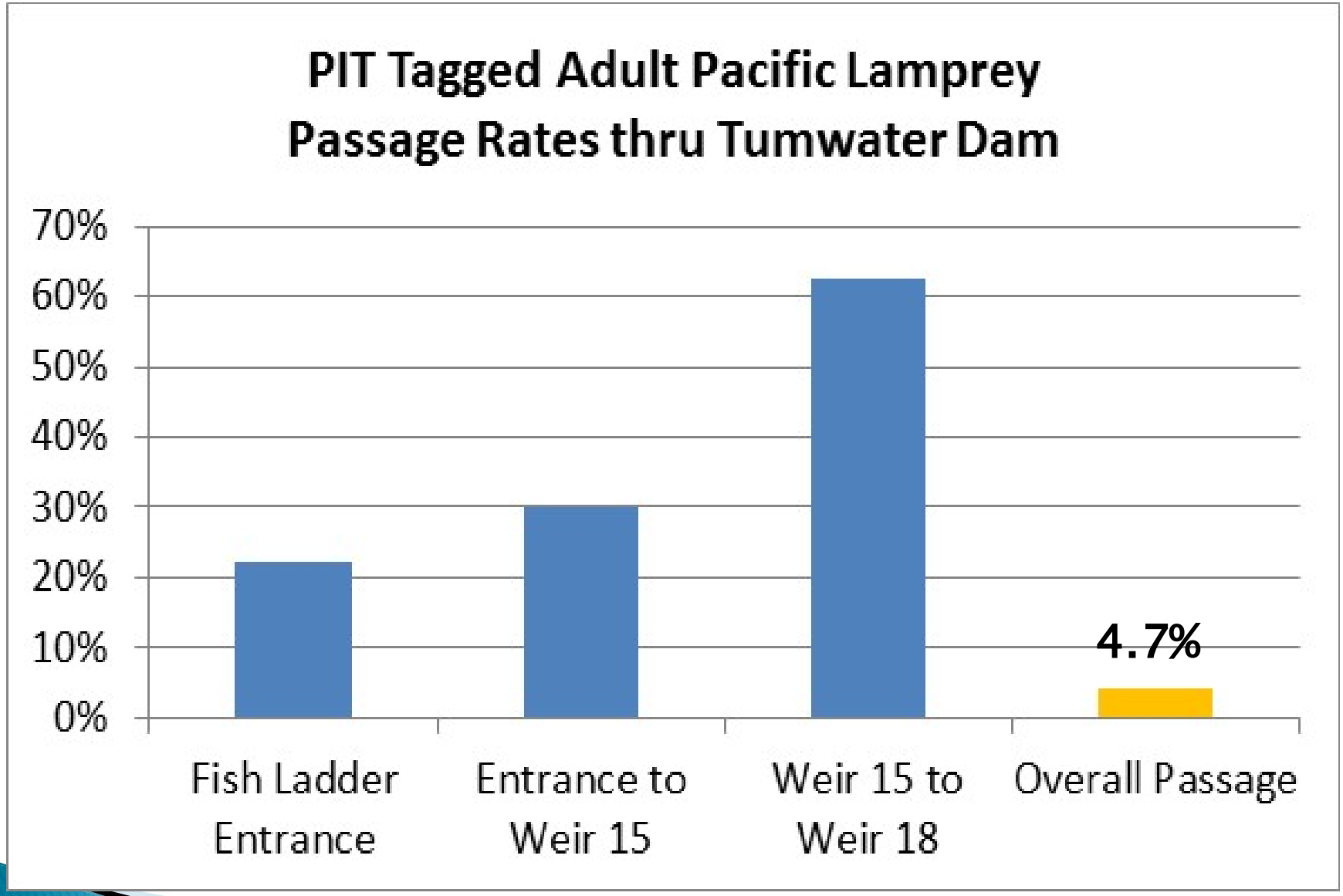


5. Passed



Benefits: Research

- **Adult Pacific Lamprey**
- **Selective placement of adults to learn**
  - 1) Dam Passage Rates
  - 2) Migration Patters (stream and spawning preference)


PIT Tagged Adult Pacific Lamprey
Passage Rates thru Tumwater Dam
70%
60%
50%
40%
30%
20%
10%
0%
4.7%
Fish Ladder Entrance
Entrance to Weir 15
Weir 15 to Weir 18
Overall Passage

In Summary

- Lamprey face ***many*** risks in ALL life stages

- **Bottom Line**: If we didn't have larval, or adult lamprey in our systems (increased numbers from translocation efforts), it would be extremely difficult to identify, assess and resolve any problems adult lamprey face.

- **We understand** that mainstem (Columbia) dam adult passage is still a major issue, the solution for which costs **enormous money and time.**

We have a choice!

- Option 1: Do nothing “Status Quo”
  - Letting what’s happening continue to happen

- Option 2: We can has a proactive approach; developing solutions within each of our subbasins and watersheds (in order of feasibility) to keep this 450 million year tradition **alive and strong**

Implement and Test Potential Solutions

- Installation and monitoring of wetted wall LPS(s) (Lamprey Passage Structures) at Prosser Dam; Yakima River
- Reduced Dewatering Rates in Irrigation Diversions
- Monitoring juvenile and larval passage through irrigation diversions with pit tag array installation.