

**Chief Joseph spring-Chinook M&E:
§10(j) and segregated program**

Current monitoring efforts

1. **PRD Run Escapement**
 - a) Run estimate
 - b) Run composition
 - c) Adult spatial distribution
1. **Environmental DNA (eDNA) monitoring**
 - a) Spatial distribution (adults)
 - b) Confirm successful spawning (juveniles)
2. **Visual Surveys (redd & carcass)**
 - a) Redd counts (spatial extent)
 - b) Carcass recoveries
3. **Juvenile mark-recapture (OBMEP electro-fishing)**
 - a) Confirm successful spawning
 - b) Juvenile population estimates

2023 Run Estimate to Okanogan

PIT tags

Okanogan Run Estimate (Provided by WDFW)¹

Origin	PITs	Estimated Fish	Proportion of Run
CJH Segregated	21	171	0.24
CJH Integrated (10j)	61	500	0.69
Natural Origin	6	51	0.07
Total	88	722	1.00

¹Based on PIT tags from Priest Rapids tagging effort

Trends

Spring-Chinook Okanogan Run Estimate
(provided by WDFW)

Based on Wells PITs (2014 – 2020) and Priest Rapids PITs (2021-2023)

Year	Hatchery Origin	Natural Origin	Unknown Origin	Run Estimate
2014	0	0	186	186
2015	0	0	204	204
2016	0	0	240	240
2017	0	0	653	653
2018	1401	73	0	1474
2019	518	14	0	532
2020	1592	55	0	1647
2021	2612	272	0	2884
2022	358	27	0	385
2023	671	51	0	722

¹Note: 2023 Hatchery Origin values comprised of

- 500 10j Integrated (Riverside acclimation pond)
- 171 CJH segregated

Does not include returns to CJH

2023 Run Estimate to Okanogan

PIT tags

Spring-Chinook removals at CJH (includes post-release mortality)

Origin	Total
CJH Segregated	466
CJH Integrated (10j)	2
Winthrop NFH	76
Leavenworth NFH	5
Natural Origin	1
	550

2023 Run Estimate to Okanogan

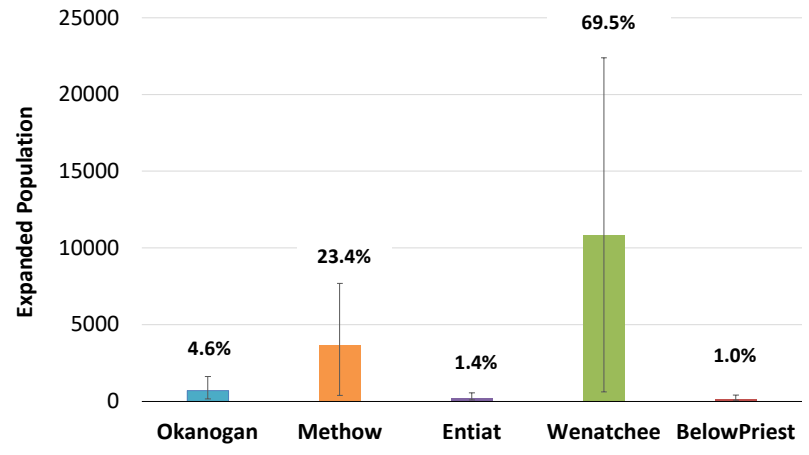
PIT tags

2023 end-of-season PIT estimate of Okanogan spring-Chinook to Bonneville and Wells Dam

	Brood Year	Age	PITs at BON	PITs at Wells	Mark rate	Expanded estimate to	Expanded estimate to
						BON	Wells
CJH Segregated	BY18	5	0	0	3.80%	0	0
	BY19	4	5	4	0.55%	917	734
	BY20	3	0	0	0.61%	0	0
	Total		5	4		917	734
Okanogan 10j / Riverside	BY18	5	0	0	19.27%	0	0
	BY19	4	8	6	1.93%	414	311
	BY20	3	0	0	2.14%	0	0
	Total		9	6		414	311

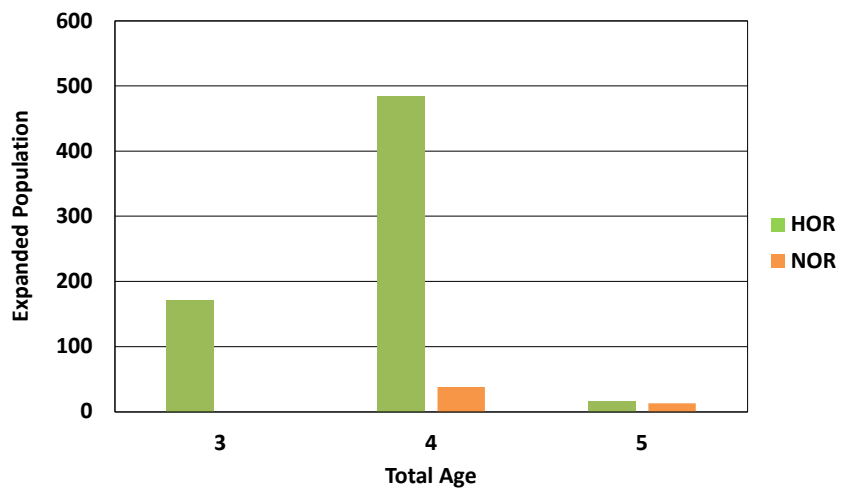
Adult PIT tagging

PRD Run Escapement Estimates

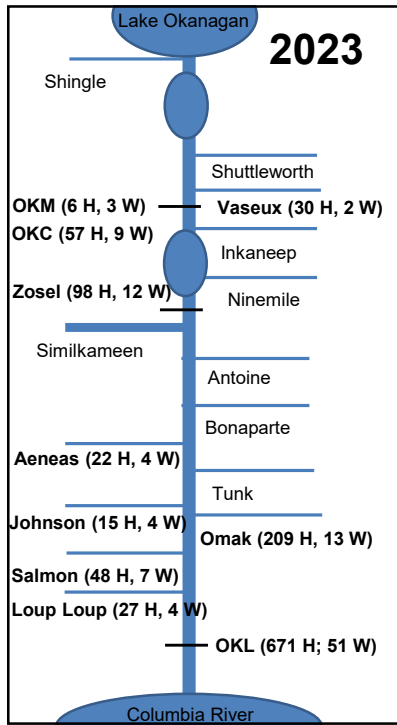
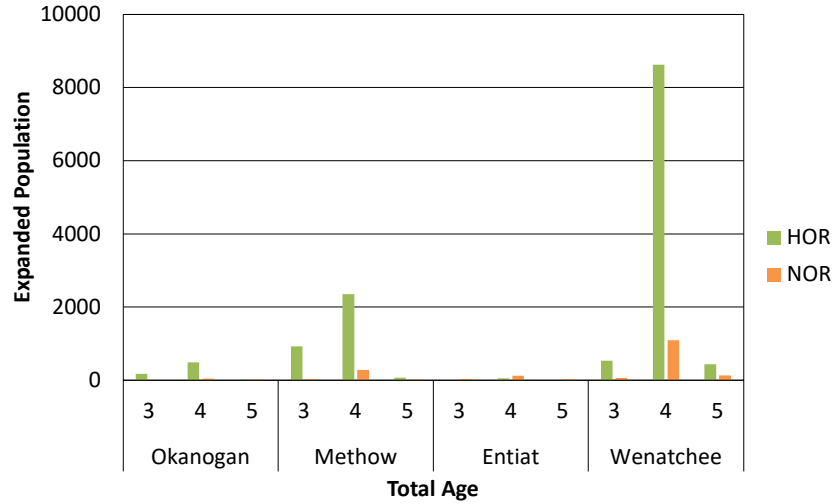


PIT tags

Okanogan Spring Chinook Age Structure



Upper Columbia Spring Chinook Age Structure

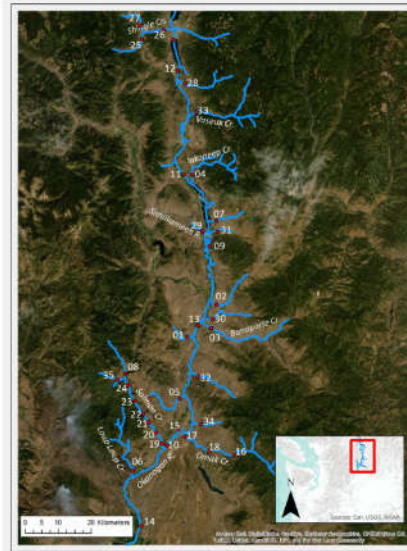


Adult spring-Chinook returns to tributaries (last detections)

- ← Conceptual diagram of Okanogan Basin
 - (n) indicates estimated adult spring-Chinook based on PIT expansions (for WDFW PRD tag group)
 - 70% are 10j returns, with 7% wild returns

eDNA – Evidence of successful reproduction

- Early detection, especially those tributaries that receive little visual survey effort
- 27 sites in tributaries
- 8 sites in mainstem Okanogan
- *Need for adding sites in Lake Okanogan tributaries*



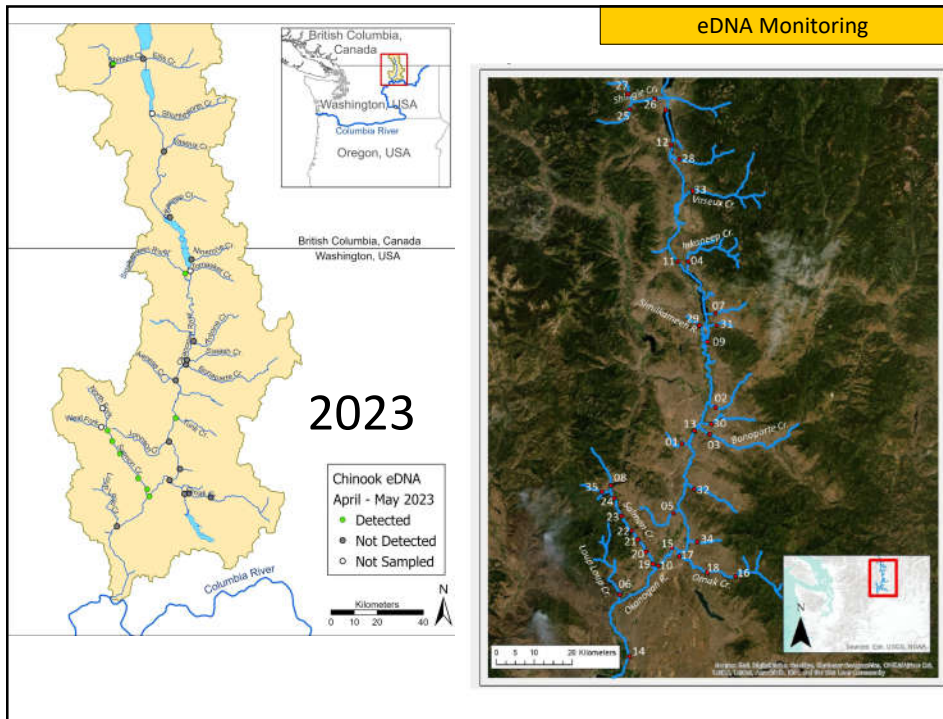
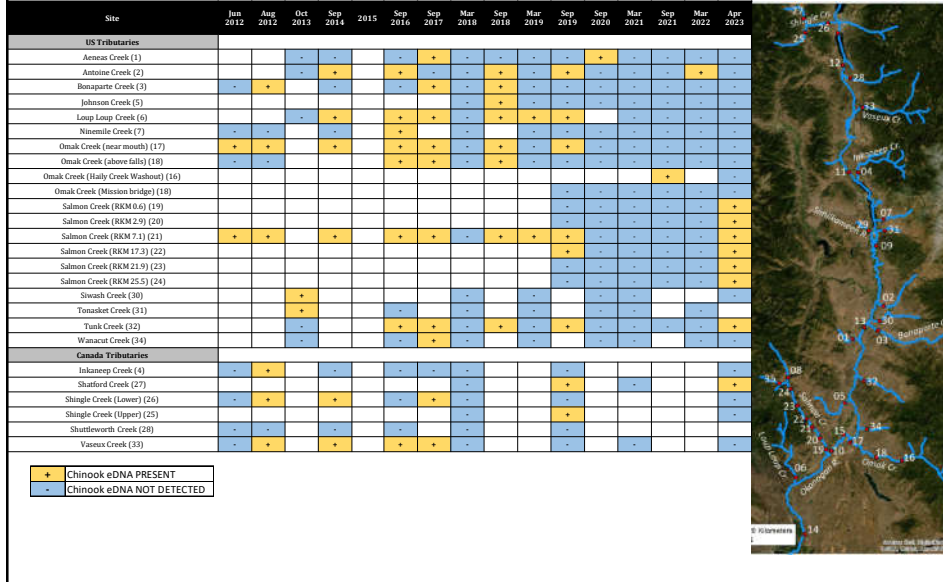
Chinook eDNA – Mainstem and Tributaries of the US Okanoga

Site	Jun 2012	Aug 2012	Oct 2013	Sep 2014	2015	Sep 2016	Sep 2017	Mar 2018	Sep 2018	Mar 2019	Sep 2019	Sep 2020	Mar 2021	Sep 2021	Mar 2022	Apr 2023
Anneas Creek (1)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Antoine Creek (2)	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-
Bonaparte Creek (3)	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Filkaneep Creek (4)	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Inkanseep Creek (5)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Loup Loup Creek (6)	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-
Ninemile Creek (7)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
North Fork Salmon Creek (8)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Okanogan River (at Oroville Boat Launch) (9)	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-
Okanogan River (above Salmon Cr.) (10)	+	-	-	+	-	-	-	-	-	-	-	-	-	-	-	+
Okanogan River (at Inkanseep Cr.) (11)	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Okanogan River (at Loup Loup Cr.) (16)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-
Okanogan River (at Shuttlesworth Cr.) (12)	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-
Okanogan River (near Bonaparte Cr.) (13)	+	-	-	+	-	-	-	-	-	-	-	-	-	-	-	+
Okanogan River (near mouth) (14)	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
Okanogan River (Brooks Tract Offshoot) (15)	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	+
Omak Creek (above falls) (18)	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-
Omak Creek (Haily Creek Washout) (16)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Omak Creek (near mouth) (17)	+	+	-	+	-	-	-	-	-	-	-	-	-	-	-	-
Salmon Creek (19-24)	+	+	-	+	-	-	-	-	-	-	-	-	-	-	-	+
Shattuck Creek (27)	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-
Shingle Creek (lower) (26)	+	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-
Shingle Creek (upper) (25)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Shuttlesworth Creek (28)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Similkameen River (29)	-	-	-	+	+	-	-	-	-	-	-	-	-	-	-	+
Sivash Creek (30)	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-
Tonsilet Creek (31)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trunk Creek (32)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
Vauxes Creek (33)	+	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-
Wanaut Creek (34)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
West Fork Salmon Creek (35)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

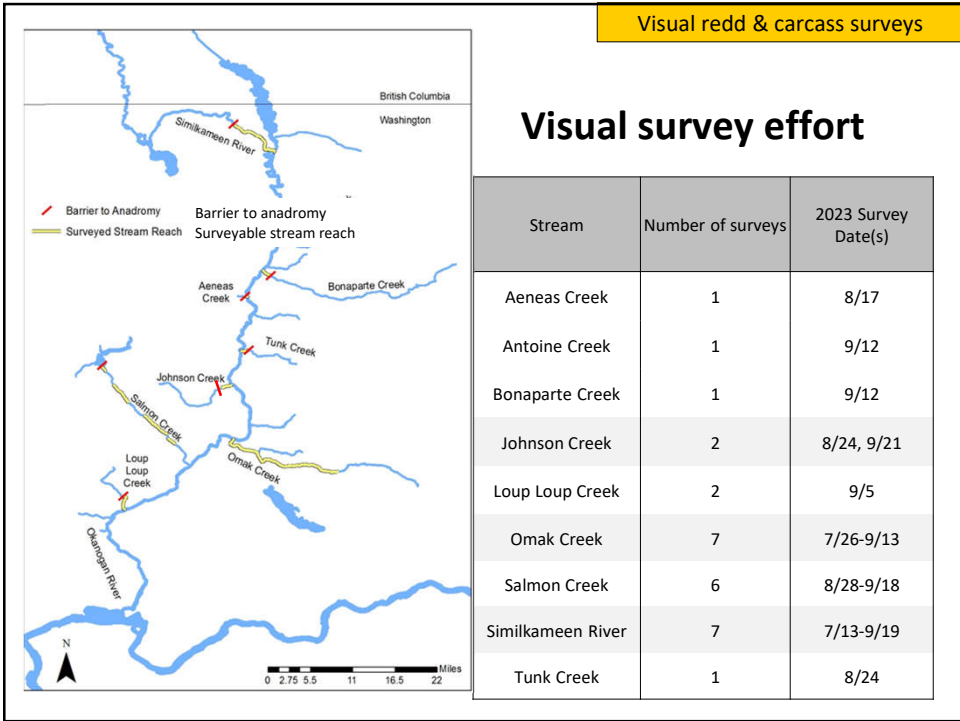
+ Chinook eDNA PRESENT
 - Chinook eDNA NOT DETECTED



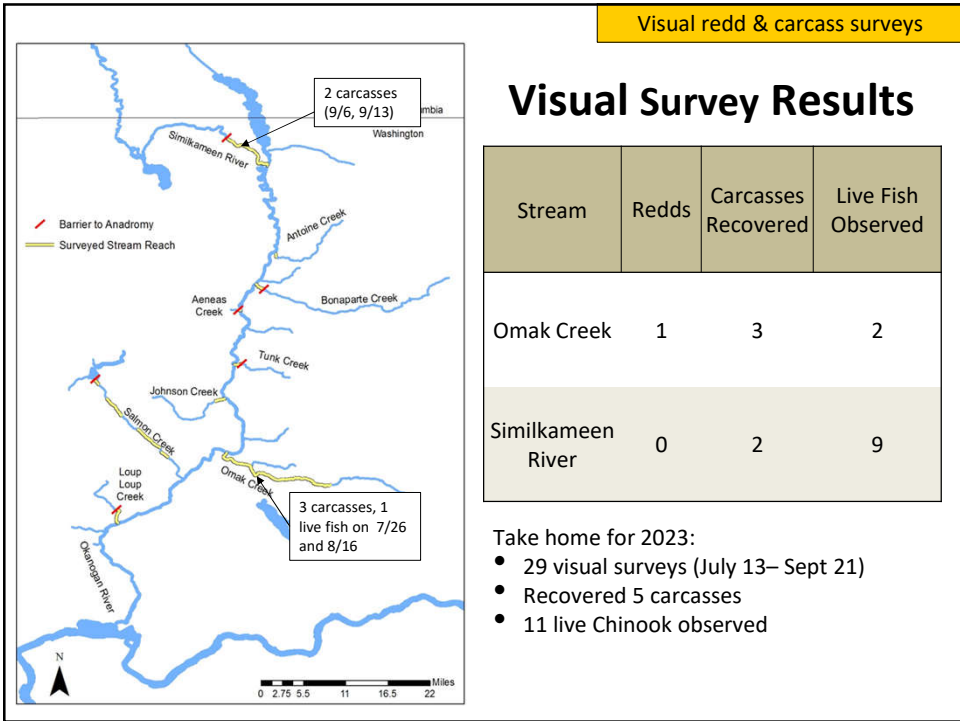
Chinook eDNA – Tributaries of the Okanogan in the US and CANADA



Visual redd & carcass surveys



Visual redd & carcass surveys



Carcass recoveries

Recovery Date	Recovery Site	Run	Origin	Release Location
Aug 16	Omak Creek	Spring	Hatchery	Riverside Pond
Aug 16	Omak Creek	Spring	Hatchery	Winthrop NFH
Aug 16	Omak Creek	Spring	Hatchery	Winthrop NFH
Sept 6	Similkameen River	Summer	Hatchery	Entiat NFH
Sept 13	Similkameen River	Summer	Hatchery	N/A

OBMEP Tributary Surveys

- Tributary mark-recapture (electro-fishing) effort to determine outmigrant and population estimates for steelhead
- Occasionally encounter spring-Chinook
- Most suitable USA tributaries
- Several CAN tributaries surveyed by coordination with ONA

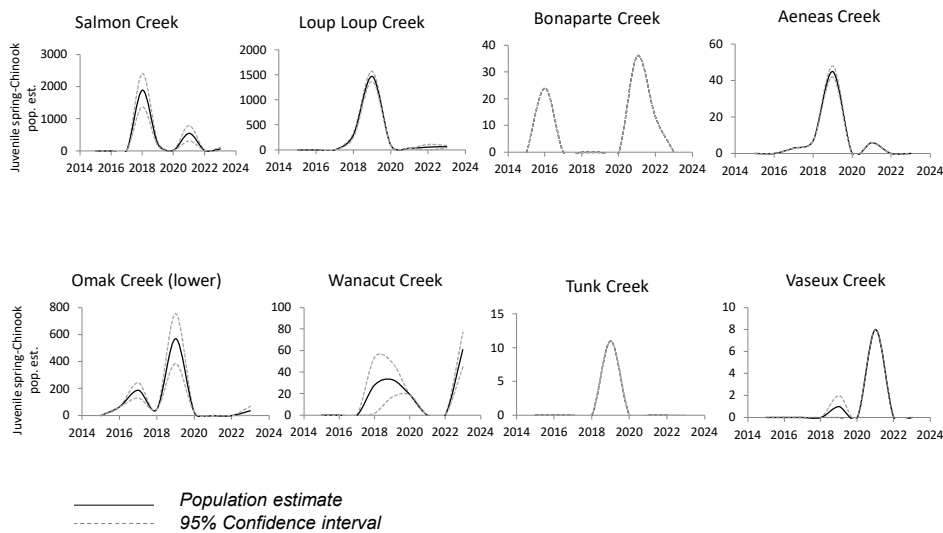


OBMEP Tributary Surveys

Stream	Mark-Recapture Pop. Est. (±95% CI)
Salmon Cr	61 ± 56
Lower Omak Cr	36 ± 33
Upper Omak Cr	0
Loup Loup Cr	66 ± 24
Ninemile Cr	0
Bonaparte Cr	0
Tonasket Cr	0
Tunk Cr	0
Aeneas Cr	0
Wanacut Cr	61 ± 16
Johnson Cr	Not Sampled
Antoine Cr	0
Wildhorse Sp Cr	Not Sampled
Shingle Cr	No Data Available
Inkaneep Cr	No Data Available
Shuttleworth Cr	No Data Available
Vaseux Cr	No Data Available



OBMEP Tributary in-stream population estimates



Juvenile outmigration estimates

Year	Population	Dominant Tributary
2019	1,059 ± 327	Salmon Creek
2020	1,212 ± 176	Loup Loup Creek
2021	89 ± 36	Loup Loup Creek
2022	541 ± 222	Salmon Creek
2023	63 ± 54	Loup Loup Creek

**95% confidence interval*

Take home

- Increasing trends in Adults (PITs) from 2014 to 2021, drop in 2022 and then an increase in 2023
- Very few redds or carcasses in tributaries during visual surveys with some detections in lower Omak Creek
- Juveniles present/successful reproduction – esp. 2018/2019 and 2021
- Salmon Creek, Loup Loup and Omak Creek still the most common tributaries utilized- consistent trend for the past 6 years