

NMFS Method (2009-2023) of Columbia River System Adult Conversion Rates

Documentation of Methods, Access via DART, and Next Steps...

Blane Bellerud (NMFS, West Coast Regional Office, Portland OR),
Russell Scranton (Bonneville Power Administration),
Jennifer L. Gosselin, Matt Carter, Susannah Iltis (UW CBR DART),
Kate Self (Northwest Power and Conservation Council), and
Brian Maschhoff (Salmonetics)

Background

- **Conversion Rates** are reported (e.g., **BiOp** reporting) and are an important salmon metric in the region
- Method first developed by **Charlie Paulsen** in early 2000's
(Paulsen Environmental Research)
- Method passed on to **Blane Bellerud** in 2008
(NMFS, West Coast Regional Office, Portland OR)
- UW CBR **DART** asked to help maintain the method in 2024, for continuation of the NMFS-Method of Conversion Rates

Outline

I. NMFS WRCO Methods of Conversion Rates

- Overview of methods
- Written documentation
- Historical data sets & estimates

II. Documentation, Data, and Estimates of Conversion Rates

- NMFS-Method (2009-2023)
- DART-Applied NMFS-Method (2009-present)
- Written documentation
- Data sets & estimates

III. Access to Estimates & Data Visualizations

- NPCC SPI, DART, OneFishTwoFish

IV. Potential Next steps & Discussion

- Improvements related to data and analysis
- Regional collaboration

I. NMFS West Coast Regional Office Methods of Conversion Rates

Blane Bellerud

OBJECTIVES FOR ESTIMATING ADULT UPSTREAM SURVIVAL

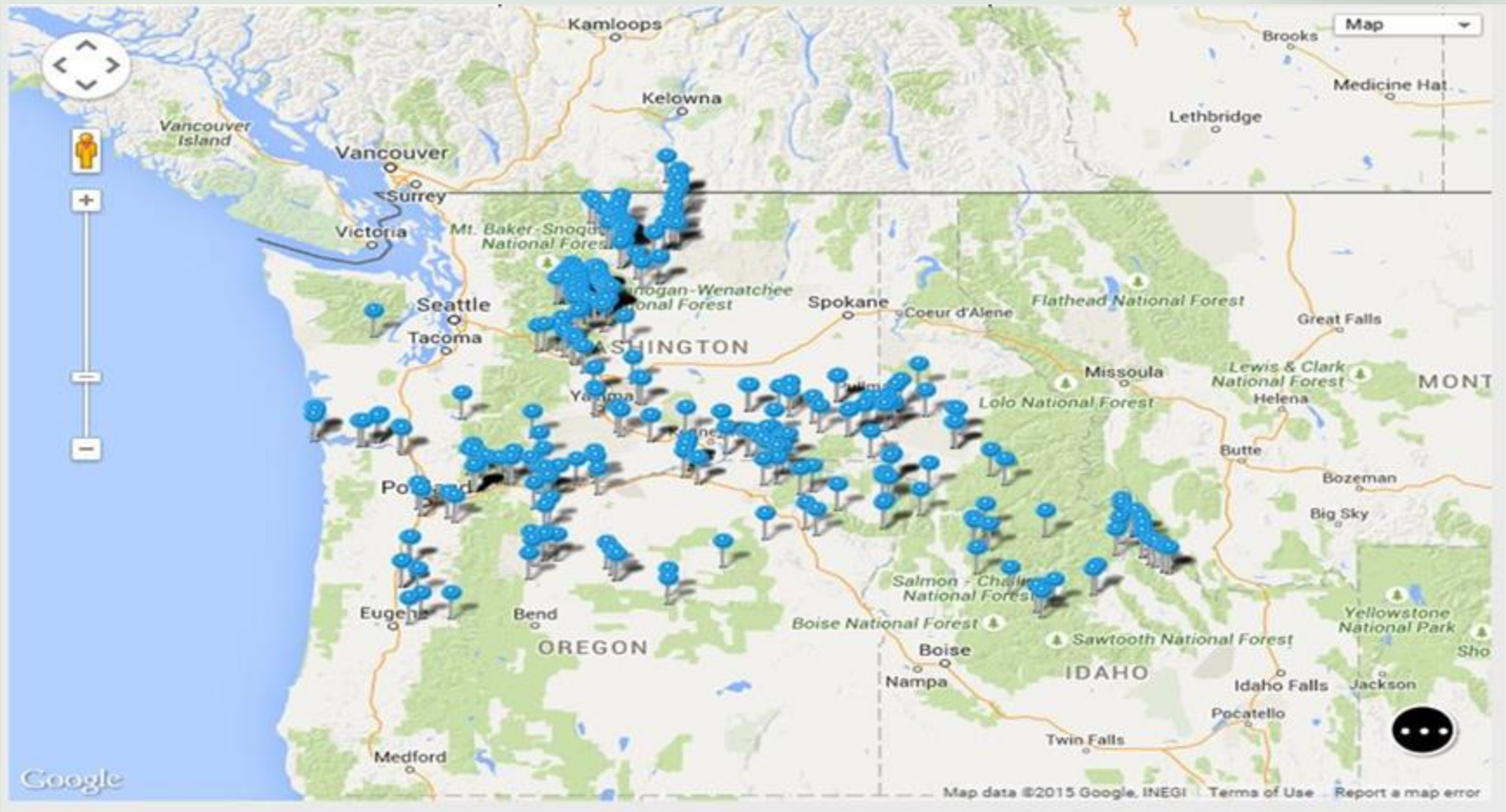
- Adaptive Management: Detect changes in adult upstream survival
- BiOp Adult upstream survival standards monitoring
- CRS BiOp analysis and baseline
- More detailed explorations of survival and

The Columbia basin has unique advantages for estimating upstream survival

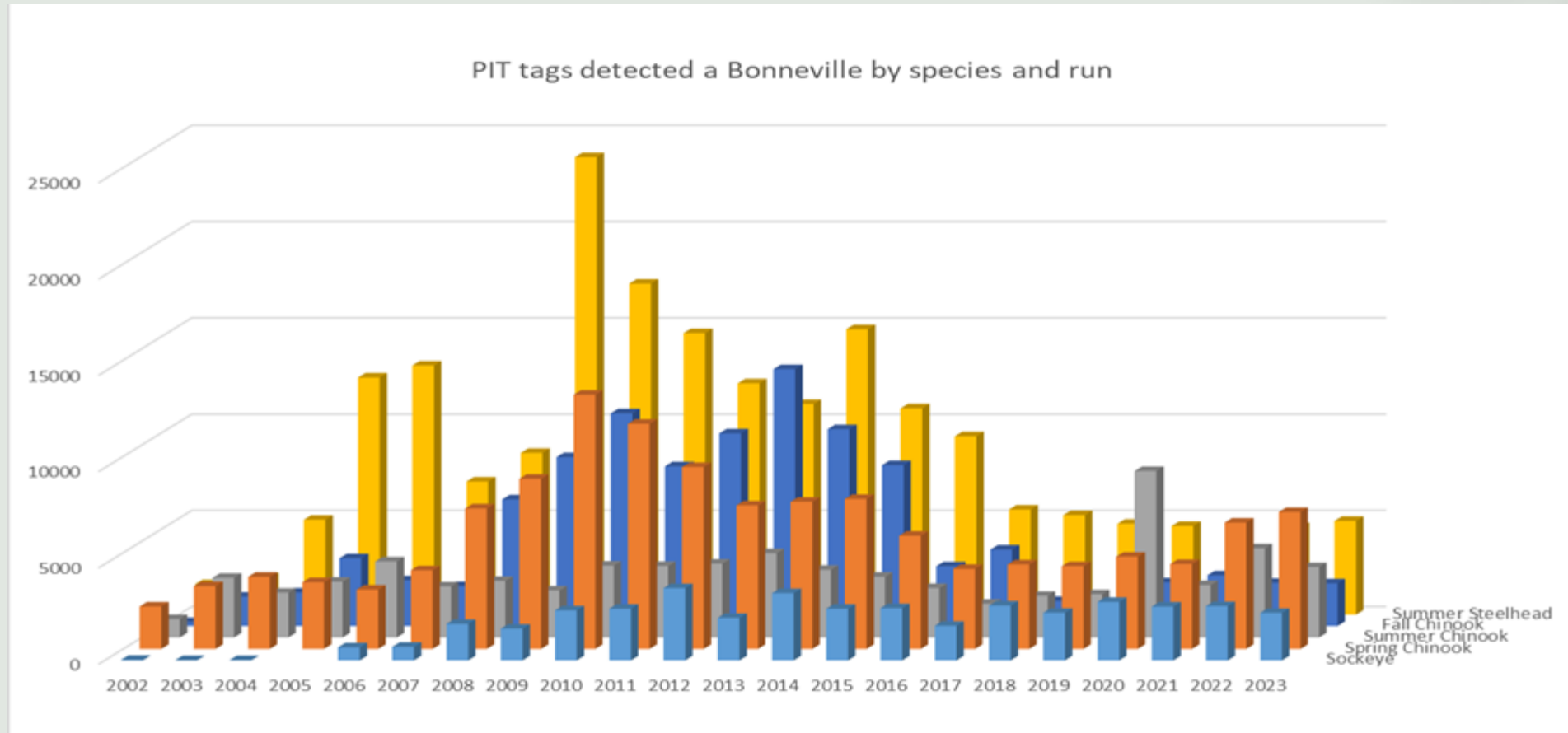
Series of high efficiency detectors (97-100%) along reaches of primary interest, BON to MCN, MCN to LGR, BON to LGR



PTAGIS database and Columbia Basin PIT tag network

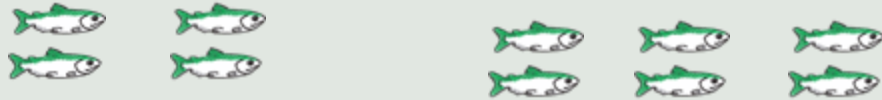


Large numbers of known origin PIT tagged adults arriving at Bonneville Dam every year



Methodology used in adult survival estimates

The “Binomial” method



#upstream / # downstream = conversion estimate

Conversion = survival x detection probability

Since ladder detectors are 97-100% efficient, conversion is a good estimate of survival

Key Assumption: All fish expected to arrive at upstream detector
(no turnoff- use fish of known origin)

Databases used for Estimates

- PTAGIS- data query, basic filtering, downloads
- Downloaded data entered into custom Access database, for further filtering, data assembly, and analysis
- Reporting by Excel Spreadsheet (legacy product)

Selecting data for analysis

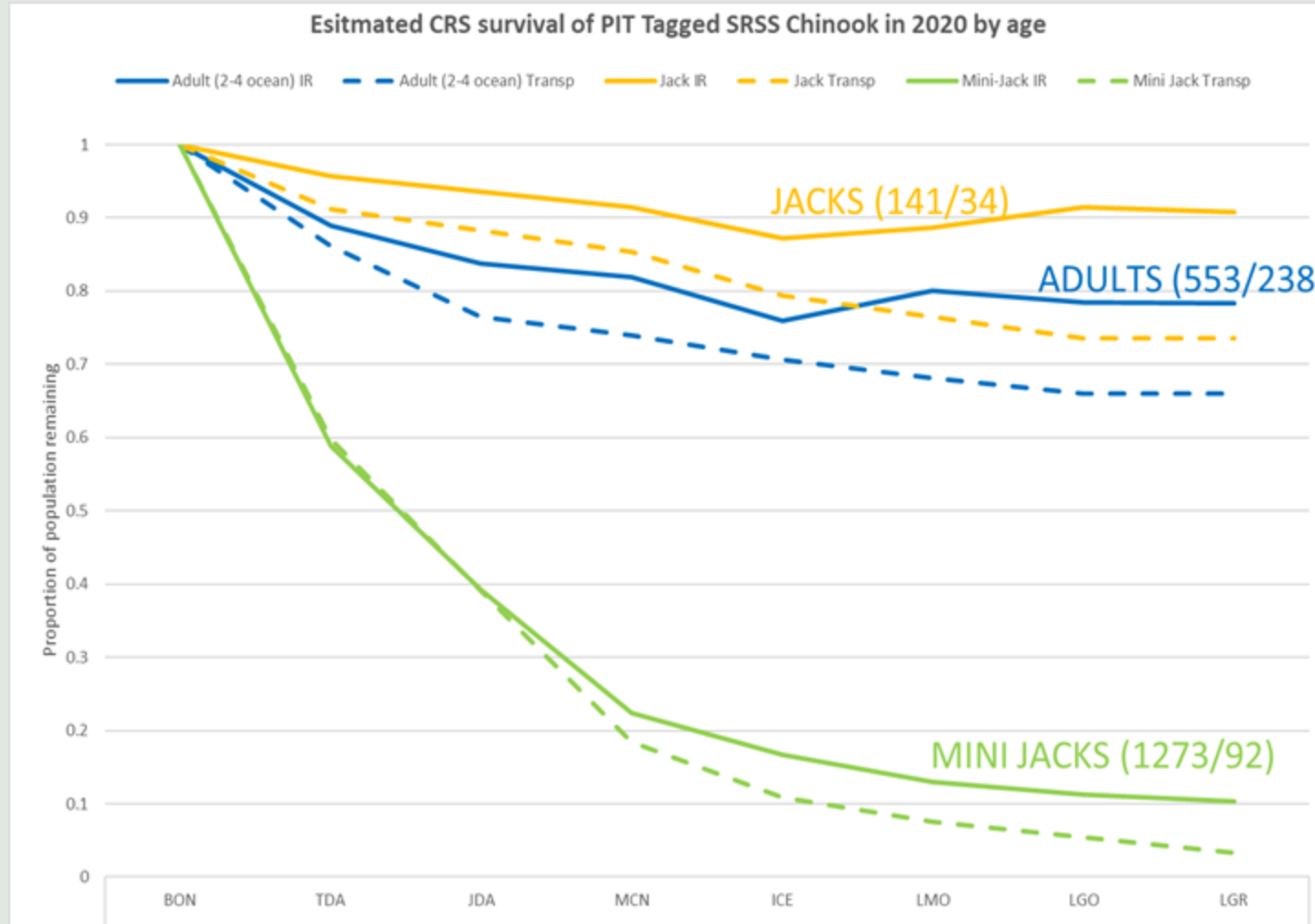
1. Query PTAGIS for a list of detections at Bonneville for a particular year for the species/ run of interest
2. Eliminate duplicates (Bonneville has 4 detectors, also potential fallback/re-ascensions)



Applying filters to data list (Microsoft Access)

1. Filter by age (mini-Jacks, Jacks, and adults)- PTAGIS metadata: “First Year”-“Migration Year” = ocean age. Adults >1 ocean year
2. Assign fish to ESU: PTAGIS metadata “release site” x custom access crosstalk table
3. Identify juvenile migration history (IR, Transp) from DART transport history files.

Differences in Survival by age

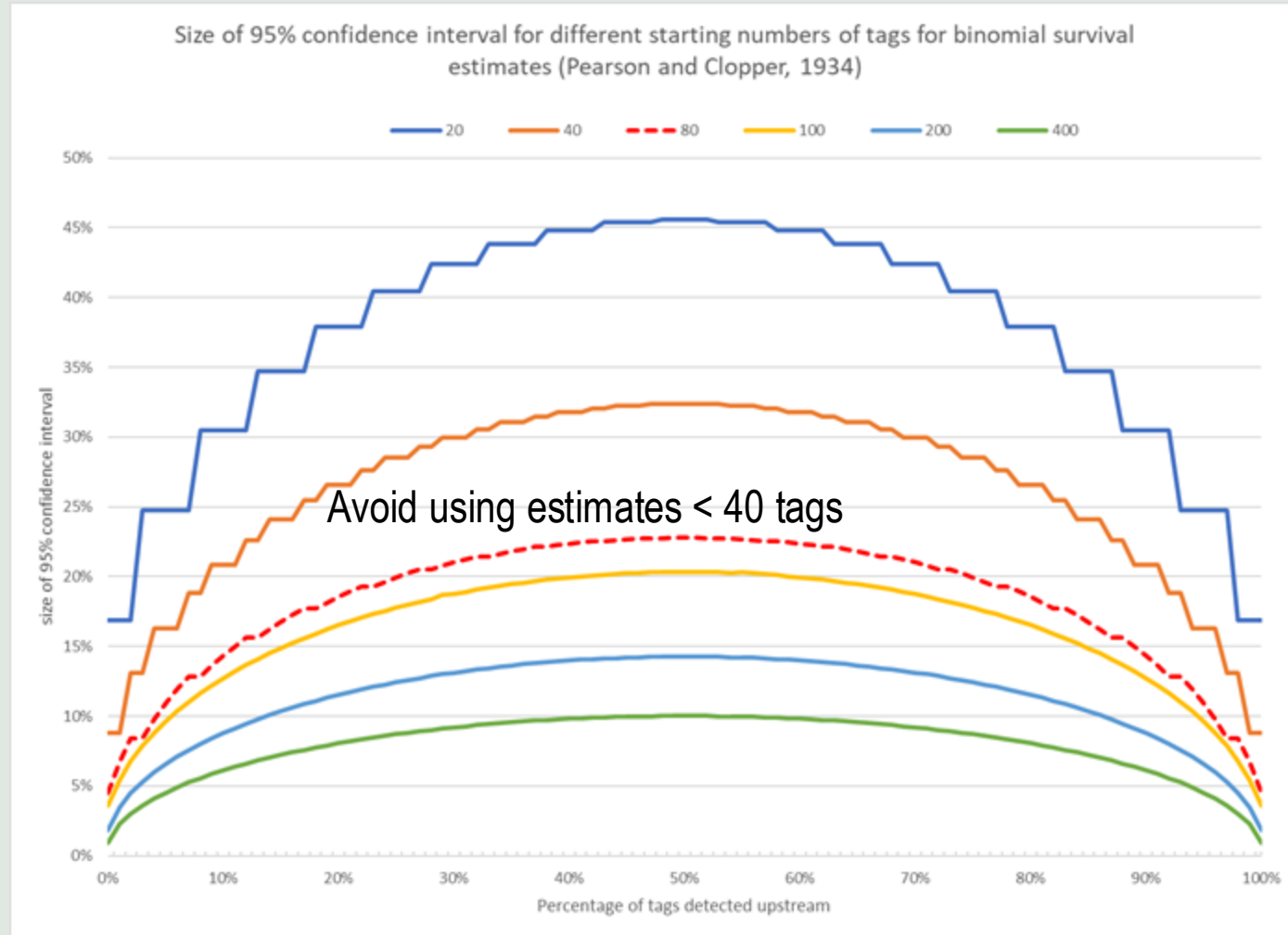


Not corrected for
harvest or straying

Conversion analysis

- Upload Bonneville tag list to PTAGIS, query for all observations in year they were observed at Bonneville
- Download list to Access database
- Using queries assemble a CRS trace for each PIT tag in Bonneville list (beware of duplicate observations at upstream dams). Compile traces into number of fish observed at each ladder
- Calculate reach survivals using binomial method

Sample Size considerations



Reporting ESU, DPS and Reaches

BON to LGR, BON to MCN, MCN to LGR

Snake River Spring/Summer Chinook (IR/TR)

Snake River Steelhead (IR/TR)

Snake River Fall Chinook (IR/TR)

Snake River Steelhead(IR/TR)

Snake River Sockeye

BON to MCN

Upper Columbia Spring Chinook

Upper Columbia Steelhead

Middle Columbia Steelhead

Reporting Spreadsheet

Snake River Spring Summer Chinook

SR Spring/Summer Chinook - Conversion Rate Estimates from Bonneville to McNary and Lower Granite Dams

7/23/2008

Red values represent changes from values used in the 2008 FCRPS BiOp

Based on PIT tag detections of known origin adults (excluding one ocean jacks) that migrated inriver or were transported as juveniles.

Adjusted conversion rates are calculated as $\frac{\# \text{ at MCN or LGR}}{\# \text{ at BON}} \div \frac{(\#11\text{-Harvest Rate})}{(\#11\text{-Stray Rate})}$

Adults (wild and hatchery) that migrated inriver as juveniles															
Year	PIT Tag Detections at BON and upstream redetections			Unadjusted Conversion Rate			Adjustment Estimates			Adjusted Conversion Rates			Adj. Conversion Rates		
	Number at BON	Redet. @ MCN*	Redet. @ LGR	BON to MCN (%)	MCN to LGR (%)	BON to LGR (%)	Zone 6 Harvest Rate*	Above MCN Harvest Rate*	Stray Rate	BON to MCN (%)	MCN to LGR (%)	BON to LGR (%)	BON to MCN (3rd root)	MCN to LGR (4th root)	BON to LGR (7th root)
2002*	1136	989	963	87.1%	84.8%	84.8%	11.4%	1.1%	2.0%	100.2%	98.4%	98.7%	100.1%	99.8%	99.8%
2003	913	774	749	84.8%	96.8%	82.0%	8.5%	0.7%	2.0%	94.6%	97.5%	92.2%	98.2%	99.4%	98.8%
2004	1774	1527	1481	86.1%	97.0%	83.5%	9.5%	1.6%	2.0%	97.1%	98.6%	95.7%	99.0%	99.6%	99.4%
2005	608	533	509	87.7%	95.5%	83.7%	6.8%	0.3%	2.0%	96.0%	95.8%	91.9%	98.6%	98.9%	98.8%
2006	267	213	198	79.8%	93.0%	74.2%	7.2%	0.8%	2.0%	87.7%	93.7%	82.2%	95.7%	98.4%	97.2%
2007	168	142	133	84.5%	93.7%	79.2%	8.4%	1.0%	2.0%	94.1%	94.6%	89.1%	98.0%	98.6%	98.4%
BiOp Avg				85.0%	93.4%	81.2%	8.6%	0.9%	2.0%	94.9%	96.4%	91.6%	98.3%	99.1%	98.7%
2008	1115	829	794	74.3%	95.8%	71.2%	14.7%	1.0%	2.0%	88.9%	96.7%	86.0%	96.2%	99.2%	97.9%
2009	916	711	659	77.6%	92.7%	71.9%	7.7%	0.8%	2.0%	85.8%	93.4%	80.2%	95.0%	98.3%	95.9%
2010	840	634	587	75.5%	92.6%	69.9%	14.9%	1.6%	2.0%	90.5%	94.1%	85.2%	96.7%	98.5%	97.7%
2011	1874	1363	1259	72.7%	92.4%	67.2%	8.7%	2.8%	2.0%	81.3%	95.0%	77.2%	93.3%	98.7%	96.4%
2012	1691	1352	1279	80.0%	94.6%	75.6%	10.8%	3.2%	2.0%	91.3%	97.7%	89.2%	97.0%	99.4%	98.4%
2013	719	612	560	85.1%	91.5%	77.9%	6.1%	0.9%	2.0%	92.5%	92.3%	85.4%	97.4%	98.0%	97.8%
2014	1649	1221	1169	74.0%	95.7%	70.9%	11.9%	1.8%	2.0%	85.8%	97.5%	83.6%	95.0%	99.4%	97.5%
2015	2210	2042	1737	92.4%	95.1%	78.6%	12.4%	2.1%	2.0%	107.6%	86.9%	93.5%	102.5%	96.5%	99.0%
2016	1143	894	836	78.2%	93.5%	73.1%	9.9%	2.1%	2.0%	88.6%	95.5%	84.6%	96.0%	98.9%	97.6%
2017	747	561	528	75.1%	94.1%	70.7%	7.9%	2.0%	2.0%	82.8%	94.1%	78.0%	93.9%	98.5%	96.5%
2018	525	387	350	73.7%	90.4%	66.7%	10.2%	1.1%	2.0%	83.8%	91.4%	76.6%	94.3%	97.8%	95.3%
2019	432	335	307	77.5%	91.6%	71.1%	6.8%	1.3%	2.0%	84.7%	92.8%	78.7%	94.6%	98.2%	96.6%
2020	330	278	265	84.2%	95.3%	80.3%	5.9%	1.4%	2.0%	91.4%	95.7%	88.3%	97.0%	99.2%	98.2%
2021	418	337	322	80.6%	95.5%	77.0%	6.3%	1.5%	2.0%	87.8%	97.0%	85.2%	95.8%	99.2%	97.7%
2022	864	685	644	79.3%	94.0%	74.5%	10.2%	2.3%	2.0%	90.1%	96.2%	86.7%	96.6%	99.0%	98.0%
2023															

Preliminary estimate

Adults (wild and hatchery) that were transported as juveniles															
Year	PIT Tag Detections at BON and upstream redetections			Unadjusted Conversion Rate			Adjustment Estimates			Adjusted Conversion Rates			Adj. Conversion Rates		
	Number at BON	Redet. @ MCN*	Redet. @ LGR	BON to MCN (%)	MCN to LGR (%)	BON to LGR (%)	Zone 6 Harvest Rate*	Above MCN Harvest Rate*	Stray Rate	BON to MCN (%)	MCN to LGR (%)	BON to LGR (%)	BON to MCN (3rd root)	MCN to LGR (4th root)	BON to LGR (7th root)
2002*	1142	901	863	78.9%	95.8%	75.6%	11.4%	1.1%	2.0%	90.8%	96.8%	87.9%	96.9%	99.2%	98.2%
2003	1196	952	903	79.6%	94.9%	75.5%	8.5%	0.7%	2.0%	88.8%	95.5%	84.8%	96.1%	98.9%	97.7%
2004	525	424	403	80.8%	95.0%	76.8%	9.5%	1.6%	2.0%	91.1%	96.6%	88.0%	96.9%	99.1%	98.2%
2005	502	416	403	82.9%	96.9%	80.3%	6.8%	0.3%	2.0%	90.7%	97.2%	88.2%	96.8%	99.3%	98.2%
2006	396	297	265	75.0%	89.2%	66.9%	7.2%	0.8%	2.0%	82.4%	89.9%	74.1%	93.8%	97.4%	95.8%
2007	416	341	314	82.0%	92.1%	75.5%	8.4%	1.0%	2.0%	91.3%	93.0%	84.9%	97.0%	98.2%	97.7%
BiOp Avg				79.6%	94.0%	75.1%	8.6%	0.9%	2.0%	89.2%	94.9%	84.7%	96.2%	98.7%	97.6%
2008	859	655	618	76.3%	94.4%	71.9%	14.7%	1.0%	2.0%	91.2%	95.3%	86.9%	97.0%	98.0%	98.0%
2009	357	287	270	80.4%	94.1%	75.6%	7.7%	0.9%	2.0%	88.9%	94.9%	84.4%	96.1%	98.7%	97.6%
2010	3487	2696	2524	77.3%	93.6%	72.4%	14.9%	1.6%	2.0%	92.7%	95.1%	88.2%	97.5%	98.8%	98.2%
2011	949	712	627	75.0%	88.1%	68.1%	8.7%	2.8%	2.0%	83.9%	90.6%	76.0%	94.3%	97.6%	96.1%
2012	453	350	298	77.3%	85.1%	65.8%	10.8%	3.2%	2.0%	88.2%	88.0%	77.8%	95.9%	98.8%	96.4%
2013	257	192	178	74.7%	92.7%	69.3%	6.1%	0.9%	2.0%	81.2%	93.6%	75.9%	93.3%	98.3%	95.1%
2014	409	291	276	71.1%	94.8%	67.5%	11.9%	1.8%	2.0%	82.4%	96.6%	79.6%	93.8%	99.1%	96.8%
2015	668	462	410	69.2%	88.7%	61.4%	12.4%	2.1%	2.0%	80.6%	90.6%	73.0%	93.0%	97.6%	95.6%
2016	289	230	213	79.6%	92.6%	73.7%	9.9%	2.1%	2.0%	90.1%	94.6%	85.3%	96.6%	98.6%	97.7%
2017	218	176	160	80.7%	90.9%	73.4%	7.9%	0.0%	2.0%	89.1%	90.9%	81.0%	96.2%	97.6%	97.0%
2018	228	160	149	70.2%	89.1%	65.4%	10.2%	1.1%	2.0%	79.7%	94.2%	75.1%	92.7%	98.5%	95.0%
2019	78	64	59	82.1%	92.2%	75.6%	6.8%	1.3%	2.0%	84.7%	92.8%	78.7%	94.6%	98.2%	96.6%
2020	151	114	106	75.5%	93.0%	70.2%	5.9%	1.4%	2.0%	91.4%	95.7%	88.3%	97.0%	99.2%	98.2%
2021	86	70	66	81.4%	94.3%	76.7%	6.3%	1.5%	2.0%	87.8%	97.0%	85.2%	95.8%	99.2%	97.7%
2022	126	103	99	81.7%	96.1%	78.6%	10.2%	2.3%	2.0%	90.1%	96.2%	86.7%	96.6%	99.0%	98.0%

CORRECTIONS

- Applied to raw survival/conversion estimate to account for known causes of mortality
- Harvest- Harvest % for BON to MCN and MCN to LGR reaches from TAC annual reports
- Straying- Standard percentage applied from study: *M.L. Keefer, C.A. Peery, J. Firehammer, and M.L. Moser. 2005 Straying Rates of known-origin adult Chinook salmon and steelhead within the Columbia River basin, 2000-2003. Technical Report 2005-5.*

Other issues

- A significant number of SR Steelhead do not cross LGR until the spring after the year they were observed at LGR (assigned spawn year - 1)
- Before 2010 and 2018-2020 insufficient PIT tagged SR Sockeye were observed to make a reliable estimate. UC Sockeye were used as surrogates

Limitations

- Survival estimate is an average for the entire migration period of the ESU/DPS
- Is the sample representative of the ESU/DPS? Some populations or portions of the run may be under/over represented
- Not enough tags to get a reliable estimate for small populations (use surrogates?)
- No plan to assure all groups of interest are tagged at rates to provide reliable adult survival estimates (we take what shows up)

Other methodologies/options

- Cormak, Jolly, Seber (CJS) methodology (currently used for juvenile estimates)
- UW CBR DART Conversion Rate tool
- PITTag Pro and SURPH software (UW CBR)




II. Documentation, Data, and Estimates of Conversion Rates:

1) NMFS-Method (2009-2023)

2) DART-Applied NMFS-Method (2009-present)

DART-Applied NMFS-Method

https://www.cbr.washington.edu/dart/query/dart_nmfs_conrate

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DART-Applied NMFS-Method for Conversion Rates in the Columbia River System

"NMFS-Method" was developed by the [NMFS West Coast Regional Office](#), Portland OR

Data Courtesy of [Pacific States Marine Fisheries Commission](#) and [Joint Staff Reports](#)

Select Download File Category

☒ PIT Tag Detections ☐ TAC Harvest Rates ☐ Stray Rates ☐ Applied Conversion Rates

Download file may be a single CSV or a ZIP file containing multiple CSV files.

Select ESU/DPS Population

Chinook Snake R Spring/Summer ESU

[Download File](#) [Reset](#) ☐ Generate Query Result Link Only [?](#)

Query Notes

- Please refer to the [GitHub Repo](#) for documentation on the NMFS-Method for Conversion Rates in the Columbia River System, the DART-Applied process, and the download files that are provided on this page as alternate access.

Questions? Requests? Contact: web@cbr.washington.edu

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GitHub repository <https://github.com/Columbia-Basin-Research-CBR/ConvRateTools>

The screenshot shows the GitHub interface for the repository 'ConvRateTools' by 'Columbia-Basin-Research-CBR'. The repository is public and has 0 stars, 0 forks, and 2 watchers. The main branch is 'main'. The repository contains three files: 'Methods', '.gitignore', and 'README.md'. The 'README.md' file is selected, showing its content. The content of the README is as follows:

This is a GitHub repository for Columbia River System conversion rate tools.

Currently, it serves as a temporary location to hold documentation on:

- The NMFS-Method (Bellerud) of estimating conversion rates, including files of historical data and estimates, as determined annually 2009-2023
- The DART-Applied NMFS-Method (2009-present), https://www.cbr.washington.edu/dart/query/dart_nmfs_conrate
- A placeholder for potential updates and expansions to the methods with feedback

Questions? Please contact Columbia Basin Research (web@cbr.washington.edu).

The right sidebar shows the 'About' section with the description: 'Salmon and steelhead conversion rate methods and online tools'. It also lists 'Readme', 'Activity', 'Custom properties', '0 stars', '2 watching', '0 forks', and 'Report repository'. The 'Releases' section shows 'No releases published' with a link to 'Create a new release'. The 'Packages' section shows 'No packages published' with a link to 'Publish your first package'. The 'Contributors' section shows 2 contributors.

Access to the NMFS Method & documentation, incl. historical (2009-2023) data, estimates, original files

<https://github.com/Columbia-Basin-Research-CBR/ConvRateTools/tree/main/Methods/NMFS-Method>

The screenshot shows the GitHub interface for the repository **Columbia-Basin-Research-CBR / ConvRateTools**. The left sidebar displays the file tree with the **Methods / NMFS-Method** directory selected. The main content area shows the commit history for this directory, with the most recent commit by **Jennifer Gosselin** titled "NMFS-Method Adult Survival and Take Estimates file for archiving" (commit 280ec98, 7 minutes ago). Below the commit list is a table summarizing the changes in the directory.

Name	Last commit message	Last commit date
..		
0 Written documentation	updated written documentation for NMFS-Method, Bellerud 2024	52 minutes ago
1 Presentation	updated folder names	yesterday
2 Excel files of PIT data	NMFS-Method Adult Survival and Take Estimates file for archiving	7 minutes ago
3 Conversion rate estimates	NMFS-Method Adult Survival and Take Estimates file for archiving	7 minutes ago

DART-Applied NMFS-Method GitHub repository

<https://github.com/Columbia-Basin-Research-CBR/ConvRateTools/tree/main/Methods/DART-Applied%20NMFS-Method>

The screenshot shows the GitHub interface for the repository 'ConvRateTools' by 'Columbia-Basin-Research-CBR'. The path is 'Methods / DART-Applied NMFS-Method'. A recent commit by Jennifer Gosselin is shown, updating written documentation for DART-Applied NMFS-Method v.1.0. Below the commit, a table lists the files and folders in the directory.

Name	Last commit message	Last commit date
..		
Data and estimates	updated data & estimates files for DART-applied NMFS-method	1 hour ago
Written documentation	updated written documentation for DART-Applied NMFS-Method v.1.0	1 hour ago
.DS_Store	updated folder names	yesterday

DART-Applied NMFS-Method

- Written documentation of steps of replicating NMFS-Method
 - includes references to specific tables and reports for what rates are used
- Some updates to the method:
 - Incorporating the **DART ESU filter**
 - (**DART Transportation filter** already used in NMFS/Blane's Method)
 - Drawing directly from **TAC reports' harvest estimates**
 - Some slight differences in PIT data and harvest rates (data used in each year vs. latest data currently)
- Versioning of method through GitHub repo & DART documentation

III. Access to Conversion Rates Estimates & Data Visualizations (incl. work in progress & to be developed)

Access to Estimates & Data Visualizations

- Already planned and in development:
 - Northwest Power and Conservation Council Strategy Performance Indicators
- In development and planning on how to integrate with existing tools:
 - DART
 - OneFishTwoFish

Strategy Performance Indicators (SPIs)

Strategy Performance Indicators

Mainstem Hydrosystem Flow and Passage

- Daily average flows and water temperatures downstream of McNary Dam in reference to flow and spawning temperature needs for Columbia River White Sturgeon. E3-4 [\(Show Data\)](#)
- Number of wild female adult White Sturgeon with acoustic tags detected at or above RKM 246 of the Kootenai River (preferred spawning habitat). WS1-1, WS4-1 [\(Show Data\)](#)
- Annual adult salmon and steelhead survival in select Columbia and Snake River reaches. S4-1 [\(Show Data\)](#)

Snake River

Species

Spring/Summer Chinook

Reach

Bonneville Dam to McNary Dam

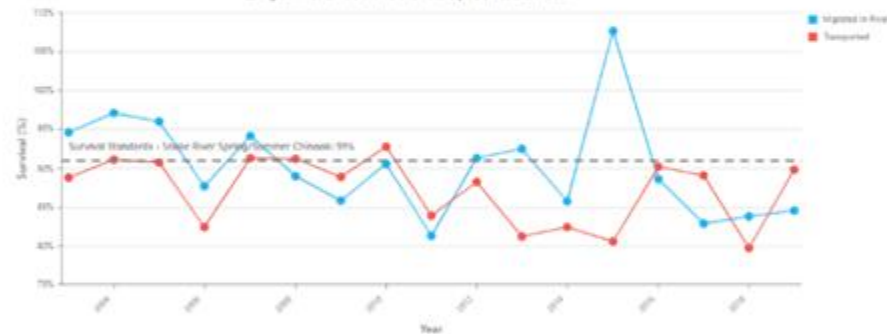
Outmigration

Sum

Display Graph

Adult Reach Survival - Snake River

Spring/Summer Chinook - Wild and Hatchery - BDN to McN - Sum



Program Tracker



Updated tools for the F&W Program, with stories, infographics, interactive maps of hatcheries, fish screens, lands, and more

Adult Reach Survival

Snake River

- Spring/Summer Chinook
- Steelhead
- Fall Chinook
- Sockeye (in development)

Upper Columbia

- Spring Chinook
- Steelhead

Middle Columbia

- Steelhead

Ability to explore data, export charts, and download tables

Upper Columbia

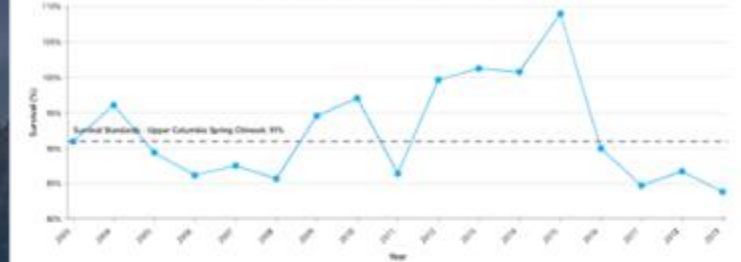
Species

Spring Chinook

Display Graph

Adult Reach Survival - Upper Columbia

Spring Chinook - Hatchery - BDN to McN - Migrated in River



Notes

Middle Columbia

Adult Reach Survival - Middle Columbia

Steelhead - Hatchery - BDN to McN - Migrated in River



Check out the Council's Program Tracker here! →



Northwest **Power** and
Conservation Council

<https://www.nwcouncil.org/fish-and-wildlife/program-tracker/>

DART Conversion Rate query interface

https://www.cbr.washington.edu/dart/query/pitadult_conrate

Data attribution

Select Reach, Species, Run, Rear type, etc.

Exclude/Include:
Upstream detections

Exclude/Include:
Chinook mini-jacks
Release sites below project
Transported juvenile fish

Therefore, customized user selections before hitting SUBMIT

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Home / Columbia River DART (Data Access in Real Time)

DART PIT Tag Adult Returns Conversion Rate

Data Courtesy of Pacific States Marine Fisheries Commission #

PIT Tag Adult Return Queries

Graphics&Text Detail by Observation Year Detail by Release Year Basin Summary **Conversion Rate** Fallback

Mean Travel Times Historical Run Timing

Conversion Rate (CR) CR Species, Run, Rear Type Comparison CR Reach Comparison CR Transport Comparison

Select Conversion Reach, Species, Run, Rear Type

Bonneville to John Day Dam	1-Chinook	1-Spring	W-Wild
Bonneville to McNary	2-Coho	2-Summer	H-Hatchery
Bonneville to Ice Harbor	3-Steelhead	3-Fall	U-Unknown
Bonneville to Lower Monumental	4-Sockeye	4-Winter	All
Bonneville to Little Goose		5-Unknown	
Bonneville to Lower Granite		All	

Select Release Location

Snake Basin LGR and above (Snake)

Set Month Range

Start January End December

The month range is inclusive; it is based on the detection date at the first project in the conversion reach. To view only one month, select the same month from both menus.

Detections Upstream of Upper Project

☐ Exclude ☒ Include

Include any upstream detection when there is no detection at the selected Upper Project.

Chinook Minijacks

☒ Exclude ☐ Include

This option only applies to Chinook; it is ignored for all other species. Minijack criteria as implemented by DART: observed in the same year as release and less than 300mm (~12 inches) at tagging.

Release Sites below Upper Project

☒ Exclude ☐ Include

Exclude individual release sites within the Release Basin with river KM below the selected Upper Project of the Conversion Reach.

Transported Fish

☒ Exclude (In-river fish only) ☐ Include (in-river and transport) ☐ Only Transport

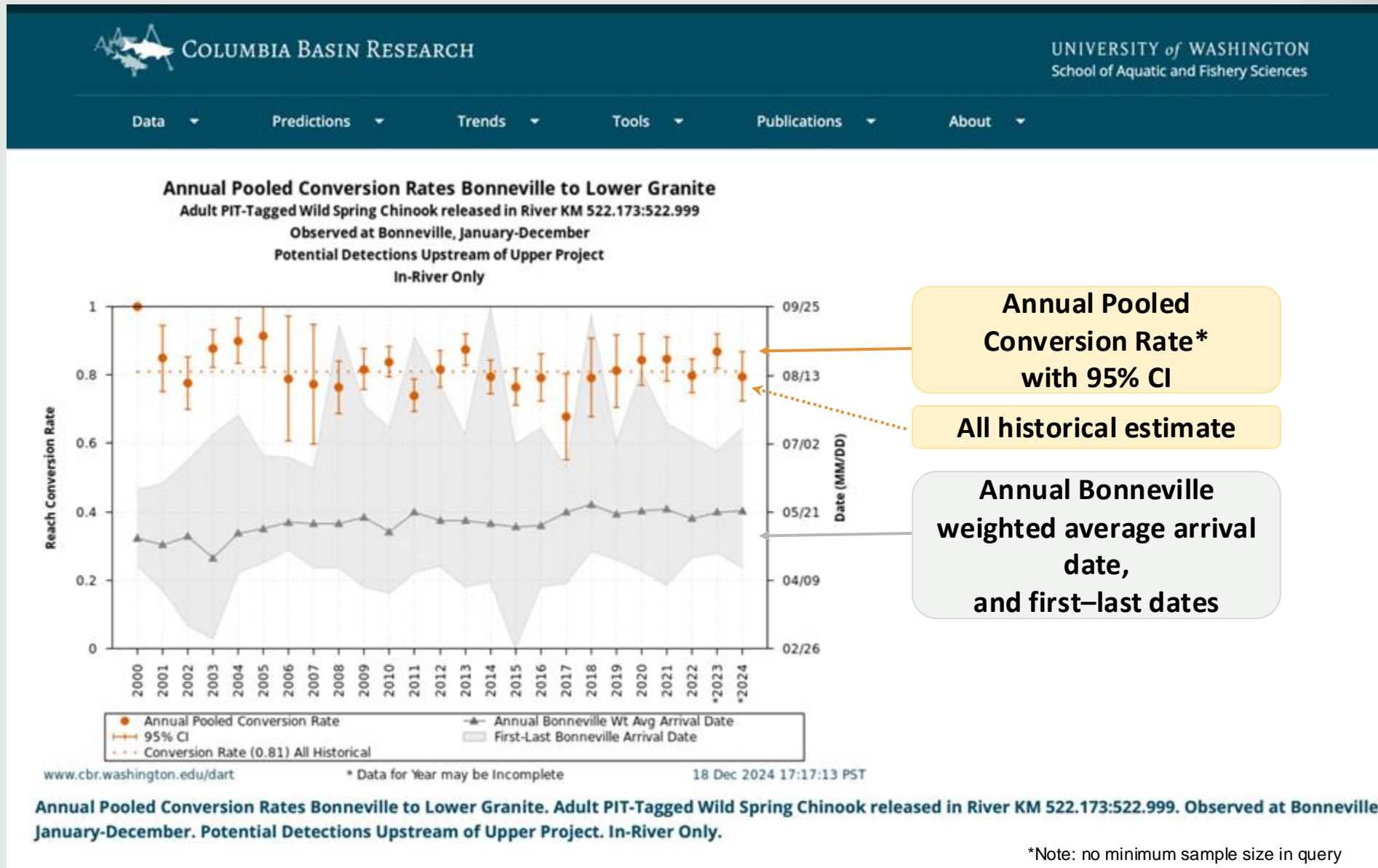
Exclude Transported fish as determined by the DART Transportation filter.

Set Summary Sort Order

☒ Observation Year ☐ Release Site

Submit Query Reset


Example of DART Conversion Rates graphical output



DART Conversion Rates outputs include data tables

(Example screenshots)

Data table for release site, RKM, date, sample size, etc.:

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Detection Probabilities at multiple locations for Adult PIT-Tagged Chinook released in Snake Basin (above LWG) Detection probabilities are provided as general information and are not specific to Conversion Rate query-specified population.

Columbia River DART
PIT Tag Adult Returns Conversion Rate
Conversion Rates for Bonneville to Lower Granite
Adult PIT-Tagged Wild Spring Chinook Released in River KM 522.173:522.999
Observed at Bonneville, January-December
In-River Only
Potential Detections Upstream of Upper Project
PIT Tag Data Courtesy of Pacific States Marine Fisheries Commission

Observation Year	Release Site	Release KM	SpRRT	Bonneville Weighted Avg Arrival Date	Bonneville Median Arrival Date	Bonneville Observations	Lower Granite Observations	Conversion Rate	Additional Detection Types	Special Conditions	View
2024 *	BEARVC	522.303.319.170.009	11W	05/27	05/28	3	3	1.00			Detection Details
2024 *	BIG2C	522.303.319.029.059	11W	05/27	05/27	1	0	0.00			Detection Details
2024 *	BIG2CT	522.303.319.029.011	11W	05/31	05/31	17	12	0.71			Detection Details
2024 *	CAPEHC	522.303.319.170.010.002	11W	05/11	05/11	1	1	1.00			Detection Details
2024 *	CATHEC	522.271.232.049	11W	05/06	05/07	7	7	1.00			Detection

Detection Details:

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Home / Columbia River DART (Data Access in Real Time)

[< Previous back](#) [> Query page](#) [< All Years Summary by Release Site](#) [< All Years Summary by Year](#) [Download TagData](#)

Columbia River DART
Adult PIT-Tagged Wild Spring Chinook
Released at BEARVC, River KM 522.173:522.999
Detection Details for Release Site BEARVC for Bonneville to Lower Granite
Observed at Bonneville, January-December 2024, Conversion Rate Data Incomplete
Potential Detections Upstream of Upper Project
Detection Details Sorted by Bonneville Detection Date

Fish #	Obs Year	Release Site	Release KM	SpRRT	Tag ID	Length (mm)	Release Date (YYYY-MM-DD)	Juvenile Last Detection (Site - YYYY-MM-DD)	Bonneville Adult First Detection (YYYY-MM-DD Mmmmm)	Lower Granite Adult First Detection (YYYY-MM-DD Mmmmm)	Additional Detection Type	Conversion Reach Travel Time (Days)	Special Conditions	Conversion Rate
1	2024	BEARVC	522.303.319.170.009	11W	300.003058944	67	2021-08-03	LMN - 2022-05-30	2024-05-19 16:40:33	2024-06-08 09:37:14		19.71		Y
2	2024	BEARVC	522.303.319.170.007	11W	300.003060781	69	2021-08-09	BNC - 2021-08-10	2024-05-28 09:59:19	2024-06-14 09:53:40		17.00		Y
3	2024	BEARVC	522.303.319.170.009	11W	300.003069342	71	2022-07-23	BCN - 2023-05-11	2024-06-04 12:34:23	2024-06-14 09:16:52		9.96		Y
2024	BEARVC			11W	Unique PIT-Tagged Fish Observed				#fish: 3 min: 2024-05-19 max: 2024-06-04 mean: 2024-06-27 median: 2024-05-28	#fish: 3 min: 2024-06-08 max: 2024-06-14 mean: 2024-06-12 median: 2024-06-14		#fish: 3 AM: 15.52 HM: 14.22		1.00

Notes for Adult PIT-Tagged Wild Spring Chinook Released in River KM 522.173:522.999 Observed at Bonneville, January-December 2024, Conversion Rate Data Incomplete

DART Conversion Rate query tool includes comparisons:

Species, Run,
Rear Type
Comparison

DART PIT Tag Adult Returns Conversion Rate Species, Run, Rear Type Comparison

Data Courtesy of [Pacific States Marine Fisheries Commission](#)

PIT Tag Adult Return Queries

Graphics&Text Detail by Observation Year Detail by Release Year Basin Summary **Conversion Rate** Fallback Mean Travel Times Historical Run Timing

Conversion Rate (CR) CR Species, Run, Rear Type Comparison CR Reach Comparison CR Transport Comparison

Select (A) Species, Run, Rear Type

1-Chinook 1-Spring W-Wild

Compare to (B) Species, Run, Rear Type

1-Chinook 1-Spring W-Wild

Set Comparison Shared Settings

Select Conversion Reach

Bonneville to Lower Granite

Select Release Location

Snake Basin LGR and above (Snake)

Set Month Range

Start January End December

The month range is inclusive; it is based on the detection date at the first project in the conversion reach. To view only one month, select the same month from both menus.

Detections Upstream of Upper Project

☐ Exclude ☒ Include

Conversion Rate (CR) CR Species, Run, Rear Type Comparison CR Reach Comparison CR Transport Comparison

Select (A) Conversion Reach

Bonneville to Lower Granite

Compare to (B) Conversion Reach

Bonneville to McNary

Reach
Comparison

Conversion Rate (CR) CR Species, Run, Rear Type Comparison CR Reach Comparison CR Transport Comparison

Set Comparison Shared Settings

Select Conversion Reach

Bonneville to Lower Granite

Select Species, Run, Rear Type

1-Chinook 1-Spring W-Wild

Select Release Location

Snake Basin LGR and above (Snake)

Set Month Range

Start January End December

The month range is inclusive; it is based on the detection date at the first project in the conversion reach. To view only one month, select the same month from both menus.

Detections Upstream of Upper Project

☐ Exclude ☒ Include

Include any upstream detection when there is no detection at the selected Upper Project.

Transport
Comparison

Thus lots of customized user selections for access to data, visualizations, and comparison in DART Conversion Rates query

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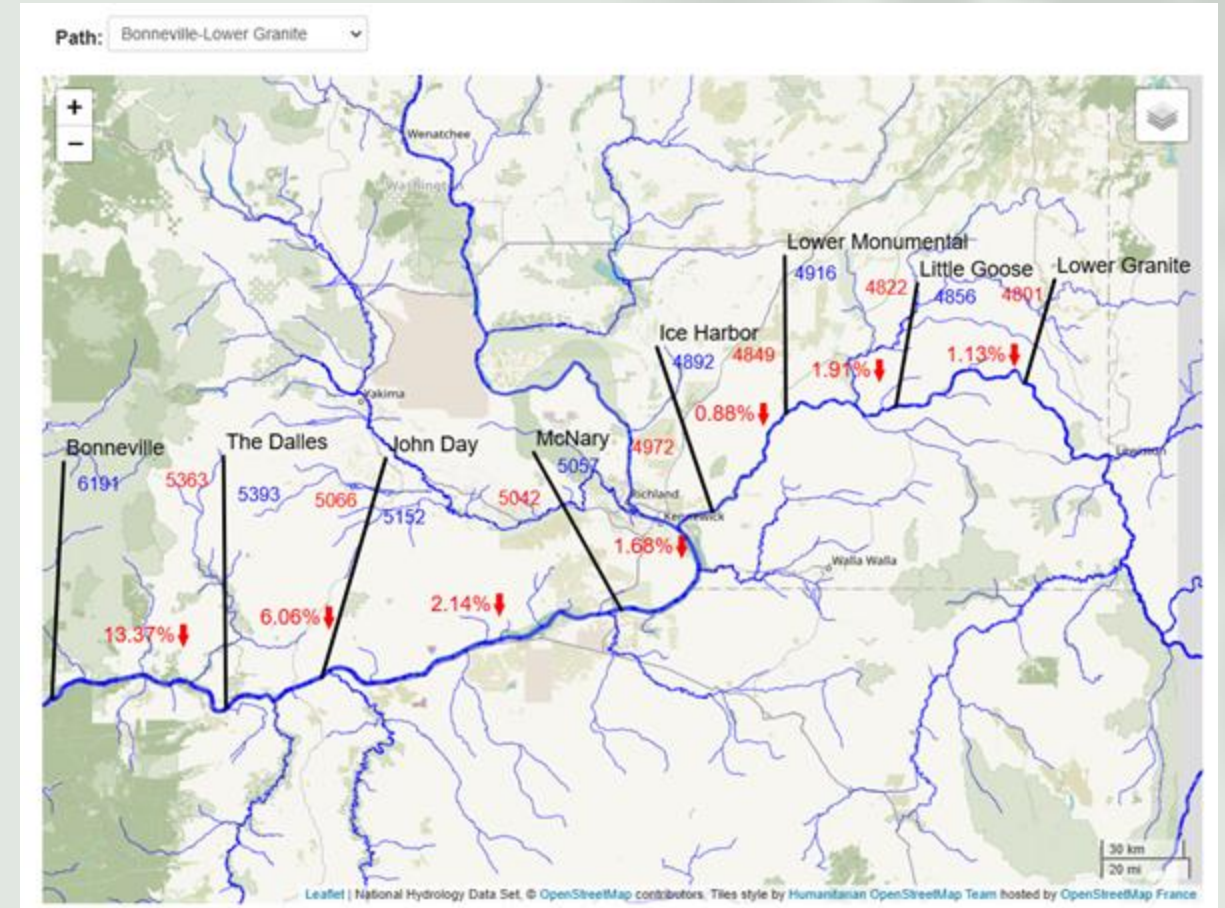
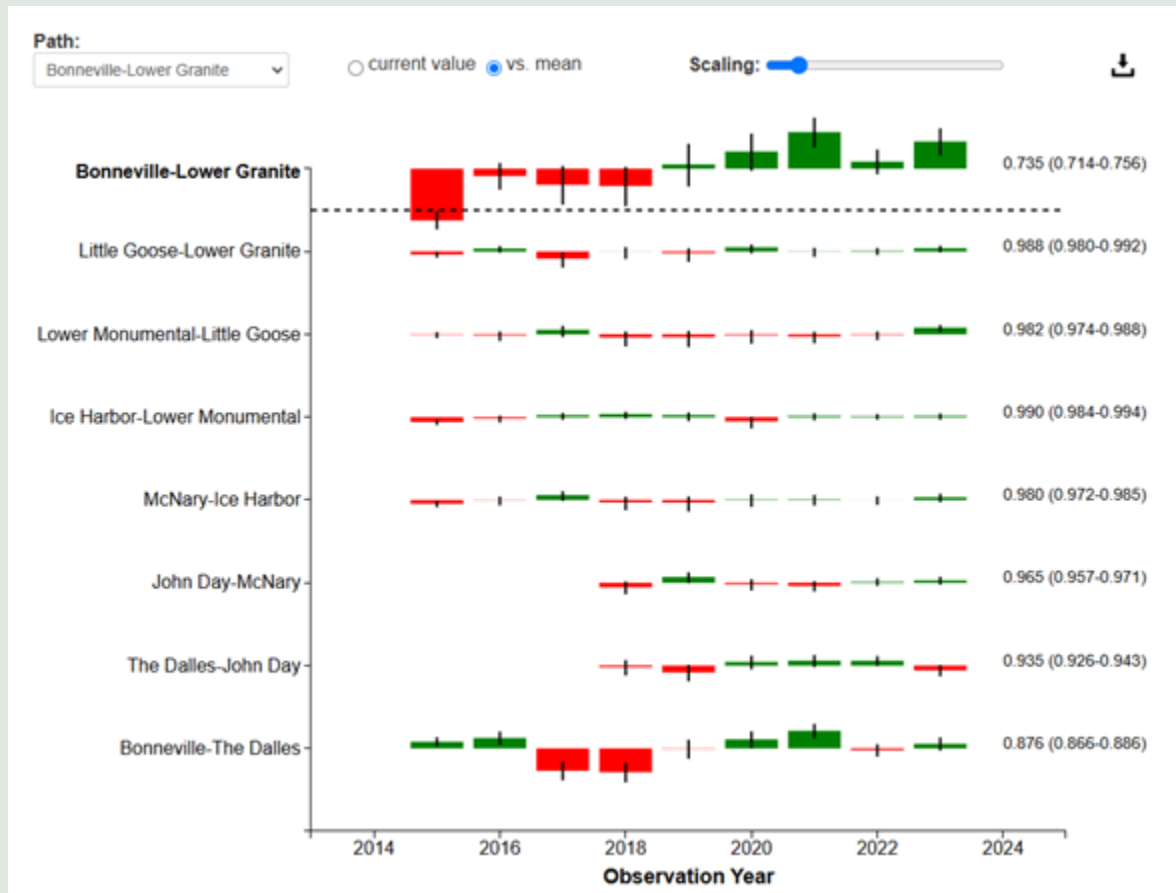
Analysis and Visualization Concepts

- Summary Performance (Zoom Out)
 - Adult Salmonid Reach Conversion/Loss Rates
 - <https://www.onefishtwofish.net/viz/ConversionRate3.html>
 - Annual conversion rate summary comparisons across reaches and years
 - Data from DART
- Detailed Fish-Level Analysis (Zoom In)
 - Adult Salmonid FCRPS Reach Conversion and Delay
 - <https://salmonetics.shinyapps.io/ConversionRate/>
 - Intra-annual analysis of conversion rate and delay at fish level
 - Correlations with environmental covariates (e.g. flow, spill, temperature)
 - Data from PTAGIS

OneFishTwoFish

Adult Salmonid Reach Conversion/Loss Rates

Example: annual conversion rate relative to mean



Example: map display of reach conversion rates

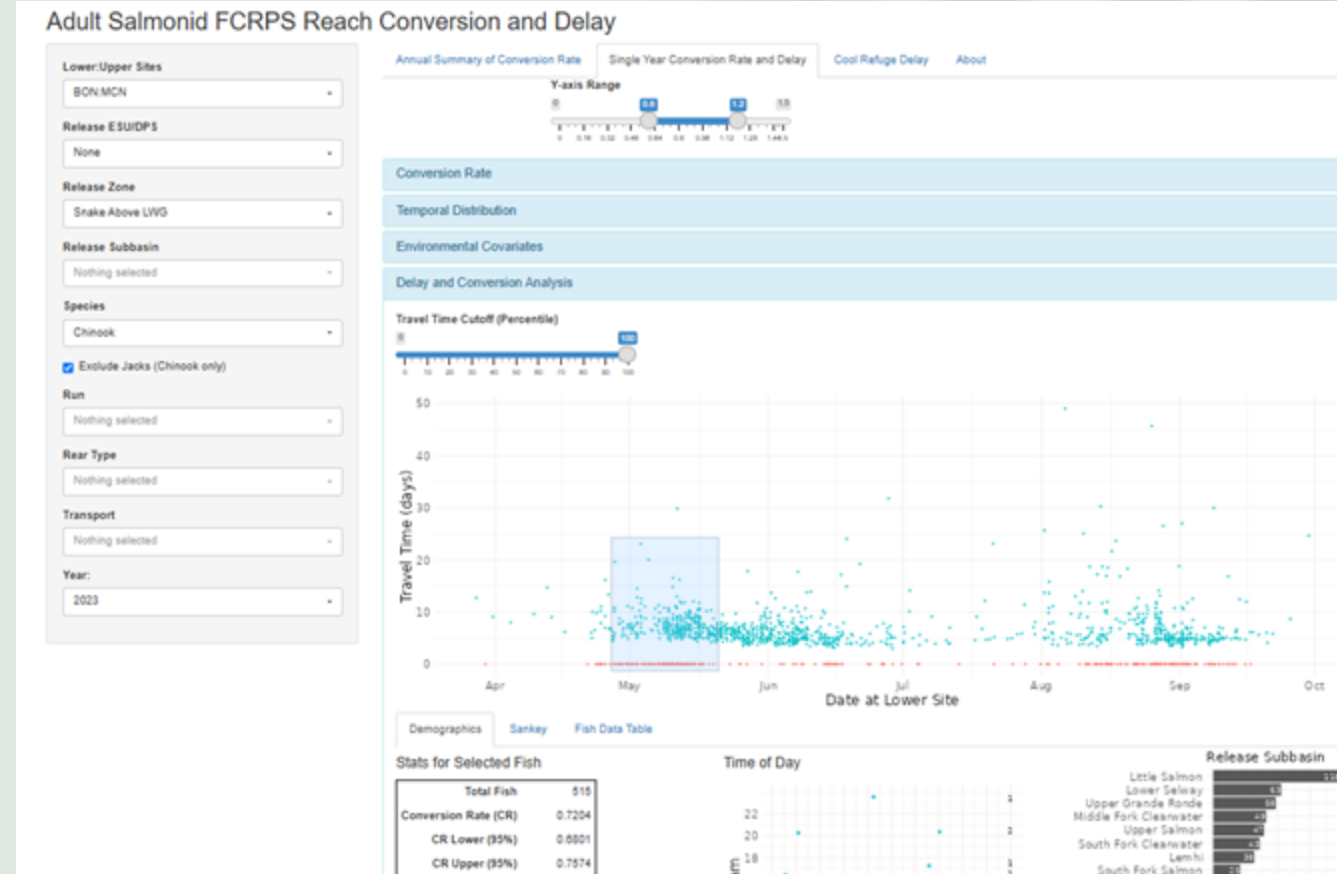
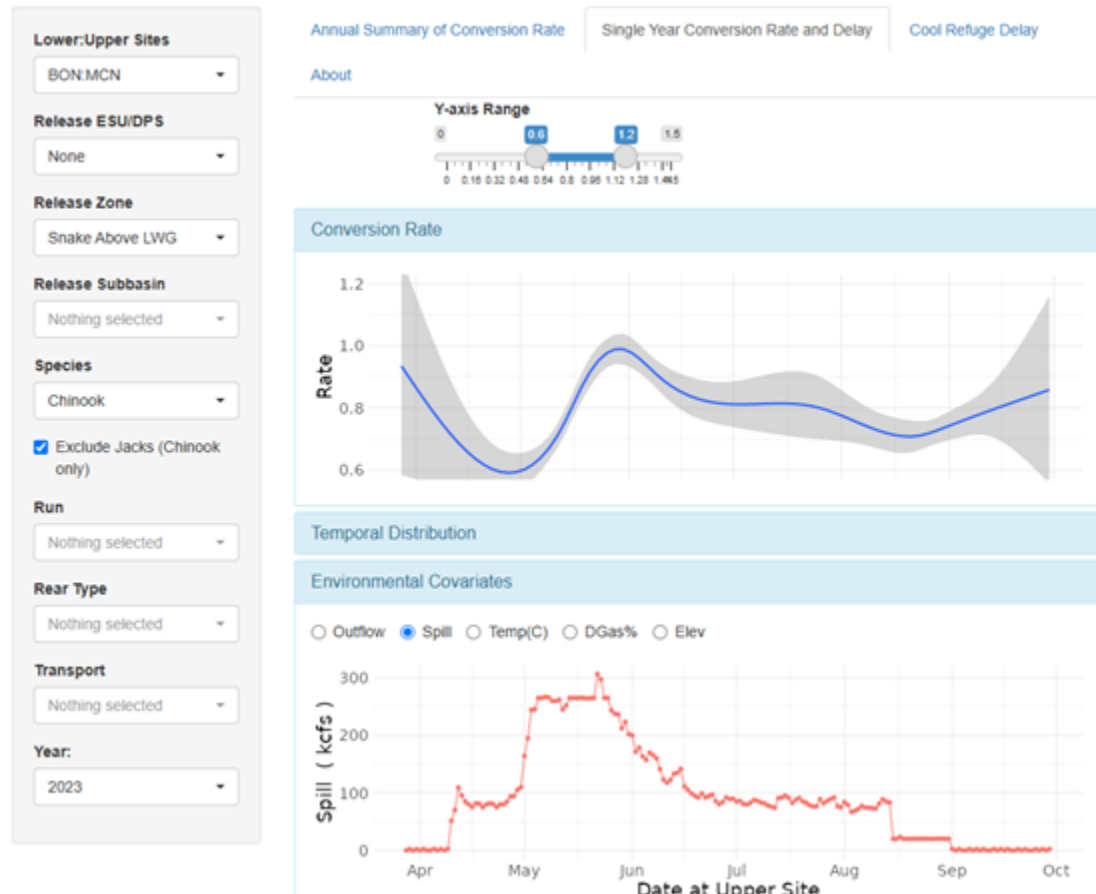
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Adult Salmonid FCRPS Reach Conversion and Delay

Example:

- conversion rate seasonal variation
- spill

Adult Salmonid FCRPS Reach Conversion and Delay



Example:

- fate of individual fish (conversion, transit time)
- summary statistics for selected time period

IV. Possible Next Steps...

Data and Methods

Regional Collaboration

Possible next steps: Refinement of methods & tools

- **Data**

- **Update stray rates** to more recent years' estimates from reports/papers
- Breakdown ESU/DPS estimates: **population, rear-type, passage-type, smaller reaches**, etc.
- Compile **covariate data**: appropriately matched to salmon data and with mechanisms

- **Analysis**

- Apply a **CJS model** instead of binomial method
- Include **covariates** in conversion rate models
- Incorporate any updated **models of harvest rates**
- Refine **models of stray rates** for better estimates

- **Data visualization tools**

- DART
- OneFishTwoFish

Next steps depend on feedback from action agencies and regional co-managers

Possible next steps: regional collaboration

- Respond to FPOM's interest in conversion rates.
 - Identify who to respond to from FPOM
 - Learn about what can be improved in current methods
- Additional meetings or forums for discussions
 - Identify who could coordinate these meetings and process
 - Learn about regional needs related to conversion rates and integrated online tools for centrally located resources
- Aiming to assist Action Agencies and regional, State, and Tribal co-managers

Acknowledgments

PTAGIS



- PTAGIS for making the data available
- Everyone conducting PIT tagging operations in Columbia River Basin



- Charlie Paulsen for developing and sharing the original method
- Northwest Fisheries Science Center for assisting Blane Bellerud
- Melanie Chen (CBR) for assistance with documentation



- Action agencies (USACE & BPA) and NOAA for your interest and input



- BPA for funding UW CBR DART & OneFishTwoFish