

2018 Imnaha River Chinook Salmon and Bull Trout summaries

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Noteable Highlights/Data issues

- Bull trout detections in the Imnaha River were limited to detections after 1 March 2018.
- Chinook PIT tag detections are between 5/1/2018 and 10/1/2018.
- Imnaha Weir installation date: **11 June, 2018**.
 - A staff injury on June 11th precluded the ladder from being watered to allow fish passage.
 - The ladder was watered up on June 12th at about 10:00 a.m.
- On June 11th, 2018 we discovered that IR5 had not been uploading tag detections to PTAGIS since 5/26. Joseph contacted BioMark staff to help diagnose and fix the problem. All other tag detection sites were working correctly (e.g. IR4 & IML).
 - Last tag detected before IR5 went offline was on May 25th at 3:14 a.m.
 - IR5 was brought back online on June 13th and almost immediately started detecting Bull trout tags at 1:10 p.m.
 - The cause of the downtime was attributed to a faulty master controller.
- A tribal fishery occurred from xx-28 June, 2018.
- The new measuring board PIT tag reader was installed by BioMark in the Trap House on 6/26/18. A computer software glitch prevented active use of the new board on 6/28/18. Weir staff are continuing to hand scan for PIT tags. BioMark and FINS staff have resolved the software glitch, and the FINS staff are upgrading the RFID PIT tag client to allow for real time data collection. We anticipate using the new measuring board for real time PIT tag data collections on 12 July.
- Managers held a conference call @ 2:00 p.m Pacific Time on 7/3/2018 and revised the in-season natural Chinook estimate to 195 natural Chinook at the mouth of the Imnaha River. This revision changed the sliding scale from “Critical-0.5 MAT” to “0.5-Critical.”
- Bull Trout PIT tag: 3D9.1C2D90A52D was captured by weir staff on 6/5/2018 in the adult ladder before the antennas at IML were lowered into the ladder. IR5 was not functional on 6/5. We presume this fish passed upstream of IR5 prior to the weir installation.
- Chinook PIT tag 3DD.00777AEC3F was trapped on 6/22/18 and released back into the Imnaha River below IR3. First visit to IR4 = 6/20; second visit = 7/02.

Unique PIT-tag observations within the Imnaha Basin by species

Mark.Species	Origin	Unique_Tags
Bull Trout	Nat	189
Chinook	Hat	17
Chinook	Nat	54
Chinook	Unk	9

Unique PIT-tag observations by species, origin and release site

Mark.Species	Origin	Release.Site.Code	Unique_Tags
Bull Trout	Nat	IMNAHW	39
Bull Trout	Nat	IMNTRP	15
Bull Trout	Nat	SNAKE3	13
Bull Trout	Nat	SNAKE4	122
Chinook	Hat	IMNAHR	2
Chinook	Hat	IMNAHW	11
Chinook	Hat	LGRLDR	4
Chinook	Nat	IMNTRP	9
Chinook	Nat	LGRLDR	45
Chinook	Unk	BONAFF	9

Unique PIT-tag observations by species, SiteID and origin

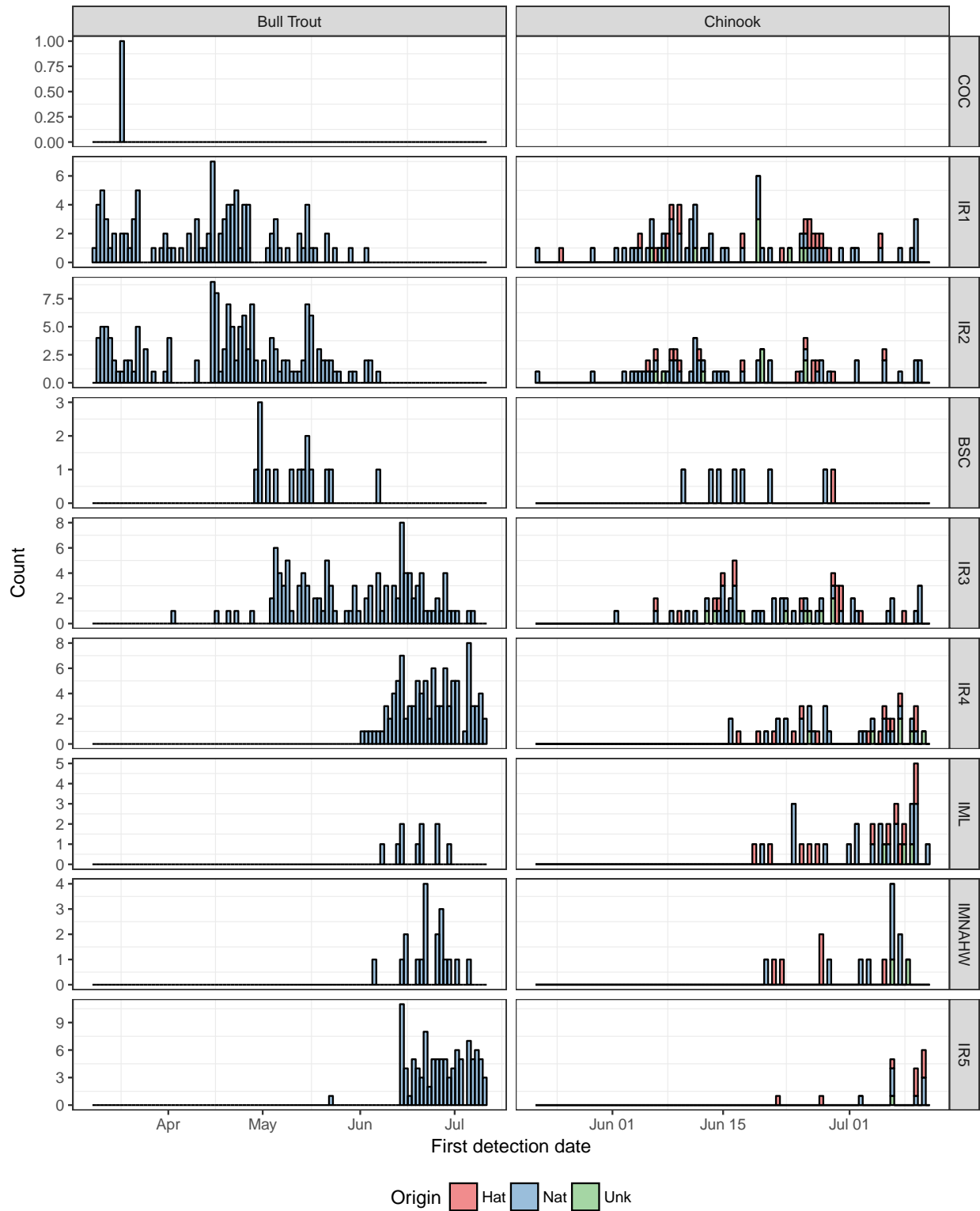
Unexpanded PIT tag counts at Big Sheep Creek (BSC), Cow Creek (COC), the mainstem PIT tag interrogation sites (IR1-IR5), the Imnaha adult ladder (IML), and the Imnaha facility trap house (IMNAHW).

Mark.Species	SiteID	Origin	Unique_Tags
Bull Trout	COC	Nat	1
Bull Trout	IR1	Nat	101
Bull Trout	IR2	Nat	151
Bull Trout	BSC	Nat	15
Bull Trout	IR3	Nat	114
Bull Trout	IR4	Nat	103
Bull Trout	IML	Nat	10
Bull Trout	IMNAHW	Nat	19
Bull Trout	IR5	Nat	103
Chinook	IR1	Hat	17
Chinook	IR1	Nat	53
Chinook	IR1	Unk	9
Chinook	IR2	Hat	14
Chinook	IR2	Nat	48
Chinook	IR2	Unk	8
Chinook	BSC	Hat	1
Chinook	BSC	Nat	7
Chinook	IR3	Hat	16
Chinook	IR3	Nat	42
Chinook	IR3	Unk	9
Chinook	IR4	Hat	14
Chinook	IR4	Nat	26
Chinook	IR4	Unk	6
Chinook	IML	Hat	12
Chinook	IML	Nat	20
Chinook	IML	Unk	3
Chinook	IMNAHW	Hat	5
Chinook	IMNAHW	Nat	9
Chinook	IMNAHW	Unk	2
Chinook	IR5	Hat	9
Chinook	IR5	Nat	8

Mark.Species	SiteID	Origin	Unique_Tags
Chinook	IR5	Unk	1

Unique PIT-tag observations within the Imnaha Basin by species, origin and arrival date

First detection dates of unexpanded Bull Trout and Chinook salmon PIT tags at tributary (COC, BSC) and mainstem (IR1-IR5, IML, IMNAHW) PIT tag interrogation sites. Site are organized from downstream to upstream with the most downstream interrogation site (COC) in the top two panels.



PIT tag detection efficiency at the node level

Detection efficiencies at the node level (i.e., upstream and downstream antenna grous) and conversion rates for Bull Trout and Chinook Salmon detected at IR1-IR5, IML, and IMNAHW. Detections in the trap house from the measuring board PIT reader will be labeled “IMNAHWB0”.

Mark.Species	Node	Unique_Tags	Marks	Recaps	det_eff	Conversion
Bull Trout	IR1	101	175	98	0.56	NA%
Bull Trout	IR2	151	148	124	0.84	100%
Bull Trout	IR3B0	88	132	72	0.55	90%
Bull Trout	IR3A0	59	111	38	0.34	107%
Bull Trout	IR4B0	78	110	77	0.7	65%
Bull Trout	IR4A0	99	96	85	0.89	100%
Bull Trout	IMLB0	10	95	9	0.09	94%
Bull Trout	IMLA0	6	95	6	0.06	90%
Bull Trout	IMNAHWB0	8	92	5	0.05	155%
Bull Trout	IR5B0	86	87	81	0.93	63%
Bull Trout	IR5A0	87	0	0	NA	NaN%
Chinook	IR1	79	80	79	0.99	NA%
Chinook	IR2	70	67	57	0.85	103%
Chinook	IR3B0	65	66	64	0.97	81%
Chinook	IR3A0	53	46	33	0.72	110%
Chinook	IR4B0	46	45	45	1	62%
Chinook	IR4A0	43	35	33	0.94	99%
Chinook	IMLB0	33	30	28	0.93	78%
Chinook	IMLA0	27	27	24	0.89	86%
Chinook	IMNAHWB0	16	18	7	0.39	135%
Chinook	IR5B0	16	17	15	0.88	44%
Chinook	IR5A0	17	0	0	NA	NaN%

PIT tag detection efficiency at the site level

Detection efficiencies and conversion rates at the site level. See the Node level estimates above for an efficiency estimate at IR5B0.

Mark.Species	Node	Unique_Tags	Marks	Recaps	det_eff	Conversion
Bull Trout	IR1	101	175	98	0.56	NA%
Bull Trout	IR2	151	148	124	0.84	100%
Bull Trout	IR3	114	132	98	0.74	85%
Bull Trout	IR4	103	96	88	0.92	73%
Bull Trout	IML	10	95	9	0.09	94%
Bull Trout	IMNAHW	8	92	5	0.05	139%
Chinook	IR1	79	80	79	0.99	NA%
Chinook	IR2	70	67	57	0.85	103%
Chinook	IR3	67	66	66	1	81%
Chinook	IR4	46	45	45	1	69%
Chinook	IML	35	30	30	1	76%
Chinook	IMNAHW	16	18	7	0.39	118%

Unique PIT-tag observations at the Imnaha Weir by trap status (based on observation date at weir sites (IR4, IML, IMNAHW, IR5))

Mark.Species	TrapStatus	SiteID	Unique_tags
Bull Trout	Panels Closed	IML	9
Bull Trout	Panels Closed	IMNAHW	18
Bull Trout	Panels Closed	IR4	92
Bull Trout	Panels Closed	IR5	102
Bull Trout	Panels Open	IML	1
Bull Trout	Panels Open	IMNAHW	1
Bull Trout	Panels Open	IR4	11
Bull Trout	Panels Open	IR5	1
Chinook	Panels Closed	IML	35
Chinook	Panels Closed	IMNAHW	16
Chinook	Panels Closed	IR4	46
Chinook	Panels Closed	IR5	18

Passage routes of PIT-tagged fish successfully reaching and being detected at IR5

This summary is limited to previously tagged fish (i.e., not tagged at IMNAHW in 2018) detected at IR5.

Passage Route descriptions:

- * *Handled*: Processed in the trap house (IMNAHW) followed by a detection at IR5.
- * *IML obs = F* : Not detected at IML (F = False).
- * *IML obs = T*: Detected at IML (T = True).

Trap Status descriptions

- * *No obs at IR4*: no PIT tag observation at IR4.
- * *Panels Closed*: Indicates that the weir was fully operational.
- * *Panels Open*: Separates out detections at IR5 before the weir was operational.

Mark.Species	PassageRoute	TrapStatus	Unique_tags
Bull Trout	Handled	Panels Closed	5
Bull Trout	Handled 6/5/18	Panels Open	1
Bull Trout	IML obs = F	Panels Closed	84
Bull Trout	IML obs = F	Panels Open	11
Bull Trout	IML obs = T	Panels Closed	2
Bull Trout	IML obs = T	Panels Open	1
Chinook	Handled	Panels Closed	7
Chinook	IML obs = T	Panels Closed	11

Unique PIT-tag observations by tag status

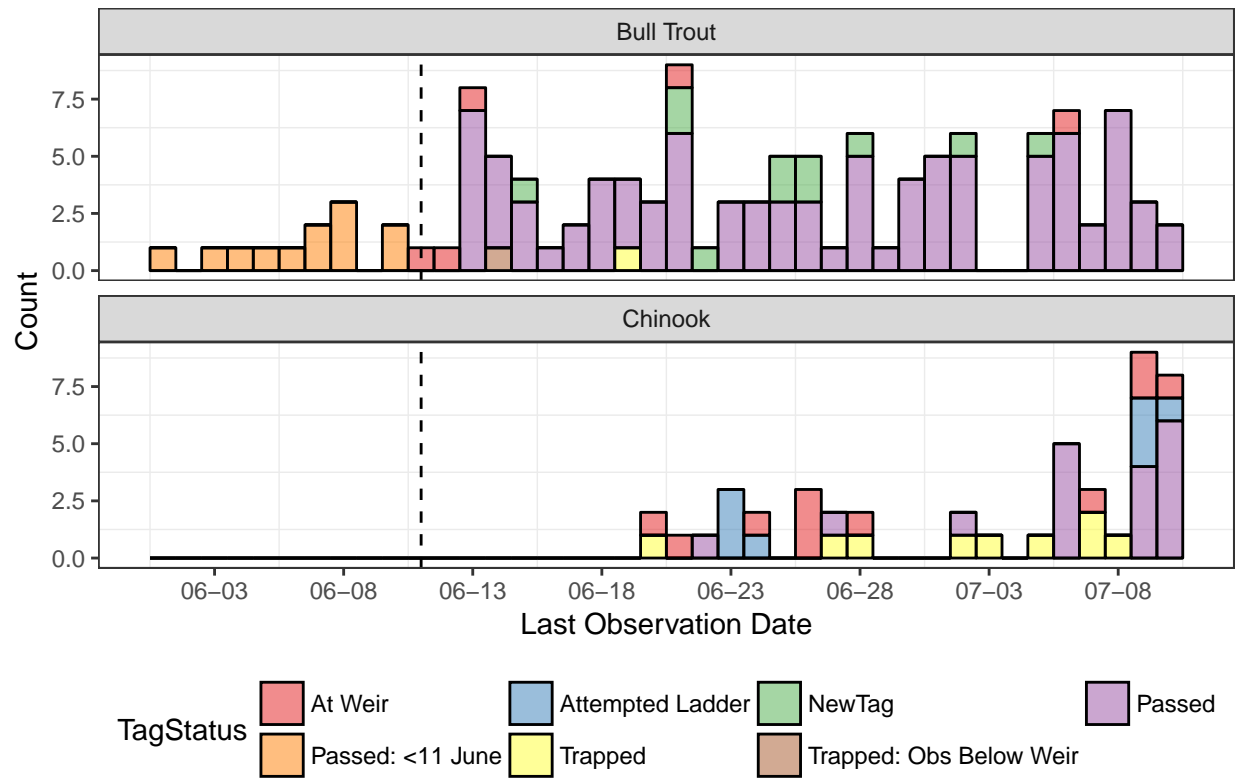
Tag status descriptions:

- * *At Weir*: Observed at IR4 but not IML, IMNAHW, or IR5.
- * *Attempted Ladder*: Detected at IML, but not detected at IMNAHW.
- * *Last obs: BSC*: Observed at Big Sheep Creek.
- * *Last obs: IR1/IR2/IR3*: Observed at IR1, IR2, or IR3, respectively.
- * *NewTag*: Bull Trout tagged at IMNAHW in 2018.
- * *Passed*: Detected at IR5.
- * *Trapped*: Handled at IMNAHW, but no subsequent detection IR5.

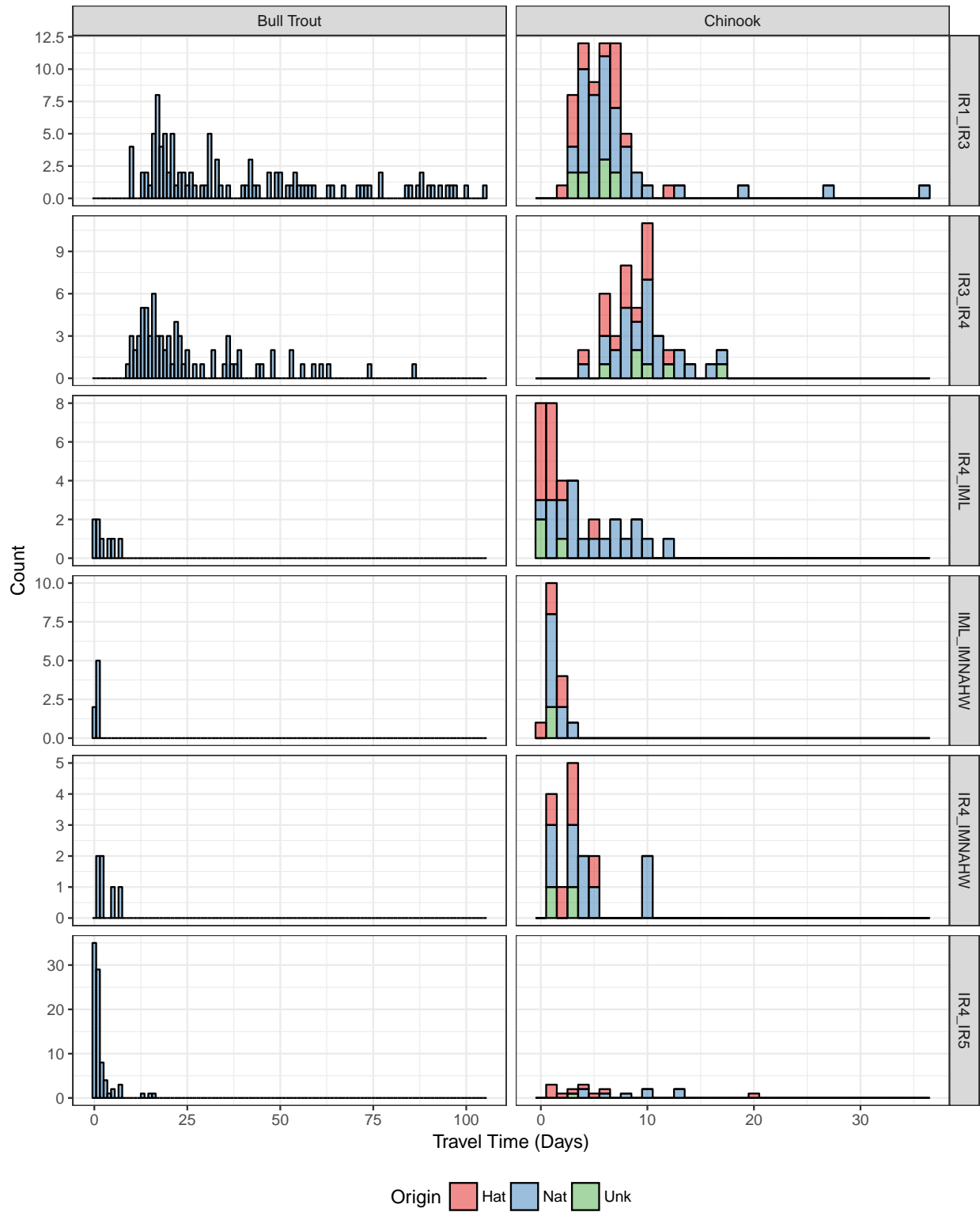
* *Trapped: Obs Below Weir:* Handled at IMNAHW & detected at IR4>IMNAHW

Mark.Species	Origin	TagStatus	Unique_Tags
Bull Trout	Nat	At Weir	5
Bull Trout	Nat	Last obs: BSC	10
Bull Trout	Nat	Last obs: IR1	3
Bull Trout	Nat	Last obs: IR2	17
Bull Trout	Nat	Last obs: IR3	37
Bull Trout	Nat	NewTag	11
Bull Trout	Nat	Passed	91
Bull Trout	Nat	Passed: <11 June	13
Bull Trout	Nat	Trapped	1
Bull Trout	Nat	Trapped: Obs Below Weir	1
Chinook	Hat	At Weir	2
Chinook	Hat	Attempted Ladder	1
Chinook	Hat	Last obs: BSC	1
Chinook	Hat	Last obs: IR3	2
Chinook	Hat	Passed	9
Chinook	Hat	Trapped	2
Chinook	Nat	At Weir	6
Chinook	Nat	Attempted Ladder	6
Chinook	Nat	Last obs: BSC	6
Chinook	Nat	Last obs: IR2	6
Chinook	Nat	Last obs: IR3	16
Chinook	Nat	Passed	8
Chinook	Nat	Trapped	6
Chinook	Unk	At Weir	3
Chinook	Unk	Attempted Ladder	1
Chinook	Unk	Last obs: IR3	3
Chinook	Unk	Passed	1
Chinook	Unk	Trapped	1

Tag status: last detection at IR4/IR5/IML/IMNAHW after 5/31/18



Travel time between sites



Tag Status = “Last Obs: IR3”

Summary of tags last observed at IR3.

Mark.Species	Origin	n
Bull Trout	Nat	37
Chinook	Hat	2
Chinook	Nat	16
Chinook	Unk	3

Tag Status = “At Weir”

Fish assigned a tag status of “At Weir” have been detected at IR4 but have not been detected at IML, handled in the trap (IMNAHW), or detected at IR5. IR4_min and IR4_max are the first and last detection dates at IR4, respectively.

Mark.Species	Origin	n
Bull Trout	Nat	5
Chinook	Hat	2
Chinook	Nat	6
Chinook	Unk	3

TagID	Mark.Species	Origin	IR4_min	IR4_max
3D9.1C2DE1998D	Bull Trout	Nat	2018-06-11	2018-06-11
3D9.1C2DE16C44	Bull Trout	Nat	2018-06-12	2018-06-12
3DD.007775C608	Bull Trout	Nat	2018-06-13	2018-06-13
3DD.00777268AE	Bull Trout	Nat	2018-06-21	2018-06-22
3DD.007775A33E	Bull Trout	Nat	2018-07-06	2018-07-06
3DD.0077600913	Chinook	Nat	2018-06-20	2018-06-20
3DD.007768E7CE	Chinook	Hat	2018-06-21	2018-06-25
3DD.00775E6F32	Chinook	Nat	2018-06-25	2018-06-26
3DD.0077BA43DD	Chinook	Unk	2018-06-26	2018-06-26
3DD.00775F4E6B	Chinook	Nat	2018-06-27	2018-06-28
3DD.0077BA559F	Chinook	Unk	2018-07-07	2018-07-07
3DD.00775EBECB	Chinook	Nat	2018-06-26	2018-07-09
3DD.0077BA8FD5	Chinook	Unk	2018-07-10	2018-07-10
3DD.00776012FF	Chinook	Nat	2018-07-09	2018-07-10
3DD.0077601181	Chinook	Hat	2018-07-09	2018-07-10
3DD.00775FFCF7	Chinook	Nat	2018-06-24	2018-07-10

Source Data

The complete PIT-tag histories for Chinook Salmon and Bull trout detected during 2018 in the Imnaha River Basin were downloaded as two separate files located on the PTAGIS ftp server. The files are the result of running “Complete Tag History” queries that were parameterized on the PTAGIS website and set-up to run and save automatically at 6:00 a.m. and 12:00 p.m. each day. The first file contains Chinook Salmon PIT-tag detections and is stored at the “*feldhauj/2018_Imnaha_CompleteTagHistory.csv*” file path within the ftp server. The second file contains Bull trout detections and is stored within the

“*ркинзер/Imnaha_Bull_Complete_Tag_History.csv*” filepath. We are then using an R-script to download the files from the PTAGIS ftp server and combine them into a single file. Once the file is combined all Chinook Salmon and Bull trout tag detections are processed using the R package PITcleanR. The final dataset provides a simplified tag history with the first and last detection dates at each PIT-tag detection node (i.e., a single spanning array or antenna) and information regarding upstream and downstream movements and a more general migration direction.

Creating the PTAGIS Chinook Complete Tag History report:

- *Tag list #1:* Static Tag list for all Chinook tagged in 2018 and released at BONAFF or LGRLDR.
- *Tag list #2:* Static Tag list for Chinook released into the Imnaha River for MY2015-2017 and detected at a mainstem adult ladder interrogatoin site in 2018.
- *Event Date:* Between 5/1/2018 and 10/1/2018
- *Event Sites:* IR1, IR2, IR3, IR4, IR5, IML, IMNAHW, BSC, IMNAHR
- *Mark Species:* Chinook
- *Event Type:* Observation, Recapture, Recovery

Creating the PTAGIS Bull Trout Complete Tag History report:

- **Query:** All PIT-tagged Bull trout detected in the Imnaha River Basin in 2018.
- *Event Date:* Between 1/1/2018 and 10/1/2018
- *Event Sites:* IR1, IR2, IR3, IR4, IR5, IML, IMNAHW, COC, BSC, IMNAHR
- *Mark Species:* Bull Trout
- *Event Type:* Observation, Recapture, Recovery

Output Files:

- *PITcleanr_2018_chs_bull.xlsx:* The complete tag histories from 2018_Imnaha_ComploeteTagHistory.csv and Imnanha_Bull_Complete_Tag_Histories.csv combined into a single file and processed with the PITcleanr R-package.
- *detect_hist.xlsx:* A pivot table style summary. (This description is not complete JF 7/6/18) Each row = a unique PIT tag code. Columns correspond to first detection dates at IR1-IR5, IML, and IMNAHW. This file contains the Trap Status, TagPath, Passage Route, and TagStatus fields. Trap status references the dates the weir was operating. TagPath is a character string representing detections at PIT tag observations sites. TagStatus represents the last known location of the tag and whether the tag has arrived at the weir, has attempted the ladder (i.e., detected at IML), passed the weir (i.e., detected at IR5), or has been trapped (i.e., detected at IMNAHW). The tag pathway describes the passage route through the weir.