2020 Imnaha River Chinook Salmon and Bull Trout summaries

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Contents

Noteable Highlights/Data issues

Quick review of important events that occured during the 2020 trapping season.

- Imnaha Weir installation date: **Friday, June 12, 2020 at 13:30 hrs**.

- PIT tag detections for Bull Trout and Chinook Salmon were limited to detection events that occured on or after 3/1/2020.
- A tribal fishery occured below the weir and ended on *MONTH XX*, 2020.
- The measuring board PIT tag antenna was not functioning on 6/14 and 6/15. Therefore, 6 newly PIT tagged BT and 5 previously tagged (i.e., recaps) were not detected on IML antenna 9 which is node IMNAHWB0.
- 6/25/2020: Chute #1 (next to panel that doesn't open) was partially plugged with lodged sticks and rock. Chutes #2 and #3 were open but did contain rocks in the chutes, but unable to determine if rocks were impeding passage. All three chutes were cleared of rock and debris as of about 10 am on 6/25/2020.

PIT summaries below the weir site

Unique PIT-tag observations by species

Mark.Species	Origin	Unique_Tags
Bull Trout	W	216
Chinook	H	26
Chinook	U	15
Chinook	W	16

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

Mark.Species	Origin	rel_site	Unique_Tags
Bull Trout	W	IMNAHW	53
Bull Trout	W	IMNTRP	33
Bull Trout	W	SNAKE3	17
Bull Trout	W	SNAKE4	113
Chinook	H	IMNAHR	11
Chinook	H	IMNAHW	14
Chinook	H	SNKTRP	1
Chinook	U	BONAFF	15
Chinook	W	IMNTRP	12
Chinook	W	LGRRBR	1
Chinook	W	LGRRRR	2
Chinook	W	SNKTRP	1

Unique PIT-tag observations by species, SiteID and origin

Unexpanded PIT tag counts at Big Sheep Creek (BSC), and 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	IR1	W	132
Bull Trout	IR2	W	161
Bull Trout	BSC	W	12
Bull Trout	IR3	W	128
Bull Trout	IR4	W	28
Bull Trout	IML	W	46

Mark.Species	SiteID	Origin	Unique_Tags
Bull Trout	IMNAHW	W	49
Bull Trout	IR5	W	69
Chinook	IR1	H	24
Chinook	IR1	U	15
Chinook	IR1	W	16
Chinook	IR2	H	26
Chinook	IR2	U	15
Chinook	IR2	W	16
Chinook	BSC	U	1
Chinook	BSC	W	2
Chinook	IR3	H	20
Chinook	IR3	U	7
Chinook	IR3	W	8
Chinook	IR4	H	3
Chinook	IR4	W	2

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.
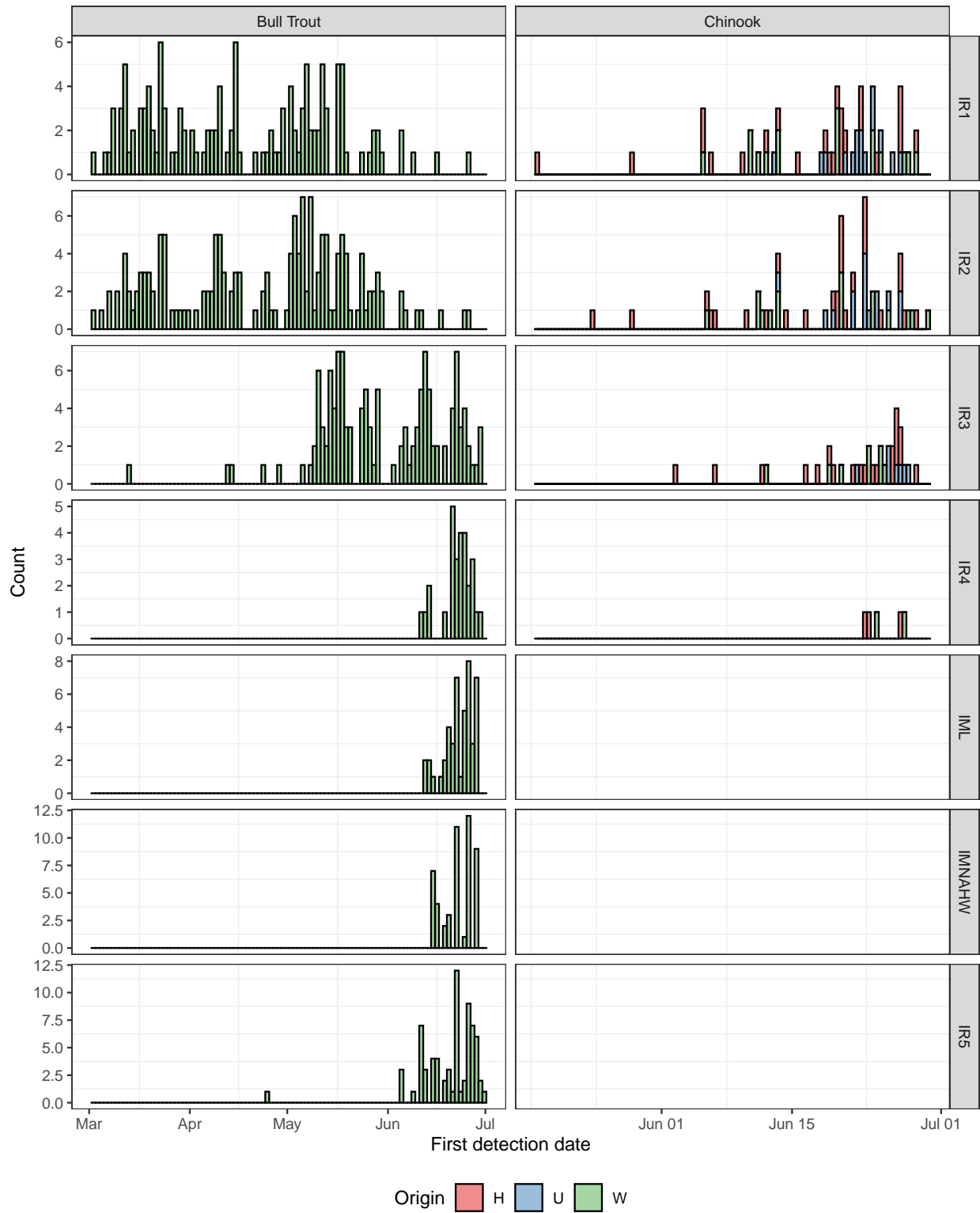
PIT tag detection efficiency calculations

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".

Table 4: Table continues below

Mark.Species	Node	tagsAtNode	estTagsAtNode	tagsLower95
Bull Trout	IR1	132	190	186.9
Bull Trout	IR2	161	190	184.3
Bull Trout	IR3B0	100	177	157.6
Bull Trout	IR3A0	58	182	156.9
Bull Trout	IR4B0	22	68	57.61
Bull Trout	IR4A0	20	64	56.75
Bull Trout	IMLB0	24	51	51
Bull Trout	IMLA0	22	51	51
Bull Trout	IMNAHWB0	18	49	49
Bull Trout	IMNAHWA0	21	50	46.47
Bull Trout	IR5B0	40	46	43.65
Bull Trout	IR5A0	38	46	43.65
Chinook	IR1	55	57	57
Chinook	IR2	57	57	57
Chinook	IR3B0	35	35	35
Chinook	IR3A0	15	35	35
Chinook	IR4B0	4	5	5
Chinook	IR4A0	5	5	5
Chinook	IMLB0	0	0	0
Chinook	IMLA0	0	0	0
Chinook	IMNAHWB0	0	0	0
Chinook	IMNAHWA0	0	0	0
Chinook	IR5B0	0	0	0
Chinook	IR5A0	0	0	0

tagsUpper95	detEff	detLower95	detUpper95	Conversion
193.1	0.6947	0.6833	0.7062	NA%
195.7	0.8474	0.822	0.8727	100%
196.4	0.565	0.503	0.6269	93%
207.1	0.3187	0.2748	0.3626	103%
78.39	0.3235	0.2741	0.373	37%
71.25	0.3125	0.2771	0.3479	94%
51	0.4706	0.4706	0.4706	80%
51	0.4314	0.4314	0.4314	100%
49	0.3673	0.3673	0.3673	96%
53.53	0.42	0.3904	0.4496	102%
48.35	0.8696	0.8251	0.914	92%
48.35	0.8261	0.7838	0.8683	100%
57	0.9649	0.9649	0.9649	NA%
57	1	1	1	100%
35	1	1	1	61%

tagsUpper95	detEff	detLower95	detUpper95	Conversion
35	0.4286	0.4286	0.4286	100%
5	0.8	0.8	0.8	14%
5	1	1	1	100%
0	NA	NA	NA	0%
0	NA	NA	NA	NaN%
0	NA	NA	NA	NaN%
0	NA	NA	NA	NaN%
0	NA	NA	NA	NaN%
0	NA	NA	NA	NaN%

Efficiency at the site level

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

Table 6: Table continues below

Mark.Species	SiteID	tagsAtSite	estTagsAtSite	tagsLower95	tagsUpper95
Bull Trout	IR1	132	190	186.9	193.1
Bull Trout	IR2	161	190	184.3	195.7
Bull Trout	IR3	128	174	153	195
Bull Trout	IR4	28	74	59.89	88.11
Bull Trout	IML	24	53	48.49	57.51
Bull Trout	IMNAHW	21	55	46.57	63.43
Bull Trout	IR5	45	45	45	45
Chinook	IR1	55	57	57	57
Chinook	IR2	57	57	57	57
Chinook	IR3	35	35	35	35
Chinook	IR4	5	5	5	5
Chinook	IML	0	0	0	0
Chinook	IMNAHW	0	0	0	0
Chinook	IR5	0	0	0	0

detEff	detLower95	detUpper95	Conversion
0.6947	0.6833	0.7062	NA%
0.8474	0.822	0.8727	100%
0.7356	0.647	0.8243	92%
0.3784	0.3062	0.4505	43%
0.4528	0.4143	0.4913	72%
0.3818	0.3233	0.4403	104%
1	1	1	82%
0.9649	0.9649	0.9649	NA%
1	1	1	100%
1	1	1	61%
1	1	1	14%
NA	NA	NA	0%
NA	NA	NA	NaN%
NA	NA	NA	NaN%

Summaries focused on the Weir

New tags vs Recaps at IMNAHW

Mark.Species	New	Recap	Total
Bull Trout	21	28	49

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	45
Bull Trout	Panels Closed	IMNAHW	48
Bull Trout	Panels Closed	IR4	26
Bull Trout	Panels Closed	IR5	53
Bull Trout	Panels Open	IML	1
Bull Trout	Panels Open	IMNAHW	1
Bull Trout	Panels Open	IR4	2
Bull Trout	Panels Open	IR5	16
Chinook	Panels Closed	IR4	5

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 2019) 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	16
Bull Trout	Handled	Panels Open	1
Bull Trout	IML obs = F	Panels Closed	12
Bull Trout	IML obs = F	Panels Open	15
Bull Trout	IML obs = T	Panels Closed	1

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 2019.
* **Passed**: Detected at IR5.
* **Trapped**: Handled at IMNAHW, but no subsequent detection at IR5.
* **Trapped: Obs Below Weir**: Handled at IMNAHW & detected at IR4>IMNAHW

Mark.Species	Origin	TagStatus	Unique_Tags
Bull Trout	W	Attempted Ladder	2
Bull Trout	W	Last obs: BSC	7
Bull Trout	W	Last obs: IR1	4
Bull Trout	W	Last obs: IR2	32
Bull Trout	W	Last obs: IR3	84
Bull Trout	W	Last Obs: IR4	9
Bull Trout	W	Passed	53
Bull Trout	W	Passed: <12-June	16
Bull Trout	W	Trapped	8
Chinook	H	Last obs: IR2	6
Chinook	H	Last obs: IR3	17
Chinook	H	Last Obs: IR4	3
Chinook	U	Last obs: BSC	1
Chinook	U	Last obs: IR2	7
Chinook	U	Last obs: IR3	7
Chinook	W	Last obs: BSC	2
Chinook	W	Last obs: IR2	6
Chinook	W	Last obs: IR3	6
Chinook	W	Last Obs: IR4	2

Tag status: last detection at IR4/IR5/IML/IMNAHW on or after weir installat
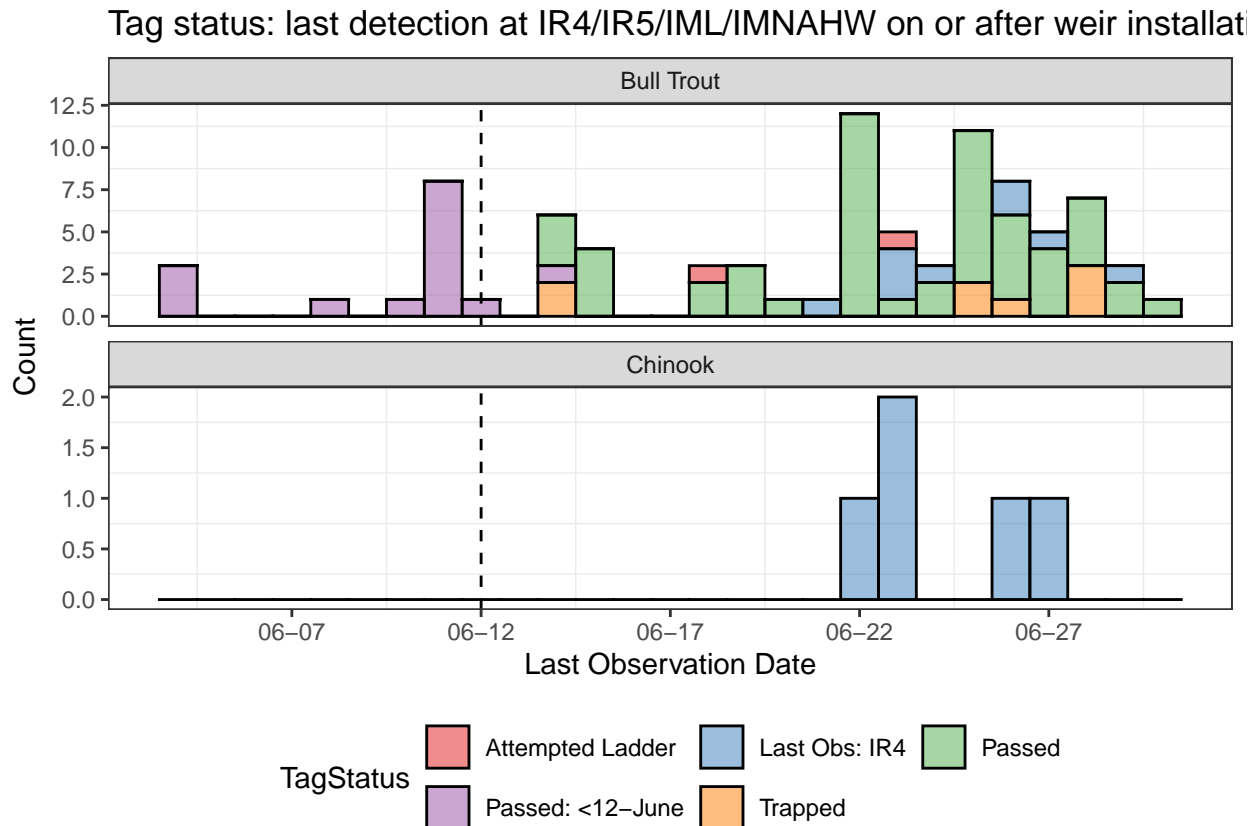
Tag Status = Last observed at IR4 just below the weir

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. The *fl_last* represents that last recorded fork length (mm), either at tagging or as a recapture. For Chinook salmon, lengths less than 350 mm were assumed to be lengths from juvenile tagging events and were set to NA.

Species	Origin	n
Bull Trout	W	9
Chinook	H	3
Chinook	W	2

TagID	Species	fl_last	Release.Site	IR4_min	IR4_max
3DD.007775CFB5	Bull Trout	403	SNAKE4	2020-06-21	2020-06-21
3DD.007771A6D8	Bull Trout	405	SNAKE3	2020-06-23	2020-06-23
3DD.0077725D55	Bull Trout	506	SNAKE4	2020-06-22	2020-06-23
3DD.007794E889	Bull Trout	360	SNAKE4	2020-06-24	2020-06-24
3DD.0077921DDD	Bull Trout	422	SNAKE3	2020-06-23	2020-06-24
3DD.00778CE331	Bull Trout	440	SNAKE4	2020-06-26	2020-06-26
3DD.0077720A4C	Bull Trout	480	IMNTRP	2020-06-26	2020-06-26
3DD.0077729012	Bull Trout	435	IMNAHW	2020-06-27	2020-06-27
3DD.007791A590	Bull Trout	430	SNAKE4	2020-06-29	2020-06-29
3DD.0077B80F25	Chinook	NA	IMNAHR	2020-06-22	2020-06-23
3DD.0077AF03A2	Chinook	NA	IMNAHW	2020-06-23	2020-06-23
3DD.0077AF7DAF	Chinook	NA	IMNAHW	2020-06-26	2020-06-26
3DD.00779E022E	Chinook	NA	IMNTRP	2020-06-26	2020-06-27
3DD.00779D2655	Chinook	NA	IMNTRP	2020-06-23	2020-06-28

Tag Status = "Passed"

List of PIT tags detected at IR5 were assigned a tag status of passed.

Species	Origin	n
Bull Trout	W	53

TagID	Species	fl_last	Release.Site	IR5_min	IR5_max
3DD.007775B9FA	Bull Trout	642	IMNAHW	2020-06-14	2020-06-14
3DD.00779220E1	Bull Trout	589	IMNAHW	2020-06-14	2020-06-14
3DD.00779487B4	Bull Trout	635	IMNAHW	2020-06-14	2020-06-14
3DD.0077945045	Bull Trout	584	IMNAHW	2020-06-15	2020-06-15
3DD.00778C979B	Bull Trout	625	IMNAHW	2020-06-15	2020-06-15
3D9.1C2DE24DF8	Bull Trout	630	SNAKE4	2020-06-15	2020-06-15
3DD.007791C5ED	Bull Trout	475	SNAKE4	2020-06-15	2020-06-15
3DD.0077723173	Bull Trout	680	SNAKE4	2020-06-18	2020-06-18
3DD.0077946F34	Bull Trout	630	IMNAHW	2020-06-18	2020-06-18
3DD.0077953153	Bull Trout	545	IMNAHW	2020-06-19	2020-06-19
3DD.007794253E	Bull Trout	510	IMNAHW	2020-06-19	2020-06-19

TagID	Species	fl_last	Release.Site	IR5_min	IR5_max
3DD.007791CF12	Bull Trout	480	IMNAHW	2020-06-19	2020-06-19
3DD.007792C1EC	Bull Trout	432	SNAKE3	2020-06-20	2020-06-20
3DD.007791292D	Bull Trout	520	IMNAHW	2020-06-22	2020-06-22
3DD.007775F65A	Bull Trout	570	IMNAHW	2020-06-22	2020-06-22
3D9.1C2DE27C79	Bull Trout	690	SNAKE4	2020-06-22	2020-06-22
3DD.0077945101	Bull Trout	425	SNAKE4	2020-06-22	2020-06-22
3DD.0077941CE2	Bull Trout	565	IMNAHW	2020-06-22	2020-06-22
3DD.007794678F	Bull Trout	485	SNAKE4	2020-06-22	2020-06-22
3DD.0077952C7D	Bull Trout	490	SNAKE4	2020-06-22	2020-06-22
3DD.0077956A6B	Bull Trout	520	IMNAHW	2020-06-22	2020-06-22
3DD.007794B579	Bull Trout	490	IMNAHW	2020-06-22	2020-06-22
3DD.0077911A9B	Bull Trout	490	IMNAHW	2020-06-22	2020-06-22
3DD.0077724360	Bull Trout	565	IMNAHW	2020-06-22	2020-06-22
3DD.007794700E	Bull Trout	465	IMNAHW	2020-06-22	2020-06-22
3DD.007794AE26	Bull Trout	588	IMNAHW	2020-06-23	2020-06-23
3DD.0077923A34	Bull Trout	505	IMNAHW	2020-06-24	2020-06-24
3DD.0077728510	Bull Trout	442	IMNTRP	2020-06-24	2020-06-24
3DD.0077954373	Bull Trout	414	IMNAHW	2020-06-25	2020-06-25
3DD.007793E07B	Bull Trout	560	IMNAHW	2020-06-25	2020-06-25
3D9.1C2DE28B38	Bull Trout	705	SNAKE4	2020-06-25	2020-06-25
3DD.00779530A9	Bull Trout	690	IMNAHW	2020-06-25	2020-06-25
3DD.0077937718	Bull Trout	608	IMNAHW	2020-06-25	2020-06-25
3DD.007793DF6B	Bull Trout	545	IMNAHW	2020-06-25	2020-06-25
3DD.007791C030	Bull Trout	496	SNAKE4	2020-06-25	2020-06-25
3DD.0077947F8C	Bull Trout	375	SNAKE4	2020-06-25	2020-06-25
3DD.0077750322	Bull Trout	240	IMNTRP	2020-06-25	2020-06-25
3DD.007794E38F	Bull Trout	535	SNAKE4	2020-06-26	2020-06-26
3DD.007791C618	Bull Trout	392	SNAKE4	2020-06-26	2020-06-26
3DD.00777219D6	Bull Trout	562	IMNAHW	2020-06-26	2020-06-26
3DD.007775F5BC	Bull Trout	395	SNAKE4	2020-06-26	2020-06-26
3DD.00779471B2	Bull Trout	465	IMNAHW	2020-06-26	2020-06-26
3DD.007772C91B	Bull Trout	344	SNAKE4	2020-06-27	2020-06-27
3DD.0077924099	Bull Trout	507	SNAKE3	2020-06-27	2020-06-27
3DD.0077941254	Bull Trout	538	IMNAHW	2020-06-27	2020-06-27
3DD.007772860B	Bull Trout	344	SNAKE4	2020-06-27	2020-06-27
3DD.0077942A58	Bull Trout	463	IMNAHW	2020-06-28	2020-06-28
3DD.0077910521	Bull Trout	447	IMNAHW	2020-06-28	2020-06-28
3DD.0077951E58	Bull Trout	593	SNAKE4	2020-06-28	2020-06-28
3D9.1C2DE228FC	Bull Trout	590	SNAKE4	2020-06-28	2020-06-28
3DD.007793FE24	Bull Trout	526	IMNAHW	2020-06-29	2020-06-29
3DD.007791C00F	Bull Trout	444	SNAKE4	2020-06-29	2020-06-29
3DD.00778C5775	Bull Trout	567	IMNAHW	2020-06-30	2020-06-30

Travel time between sites
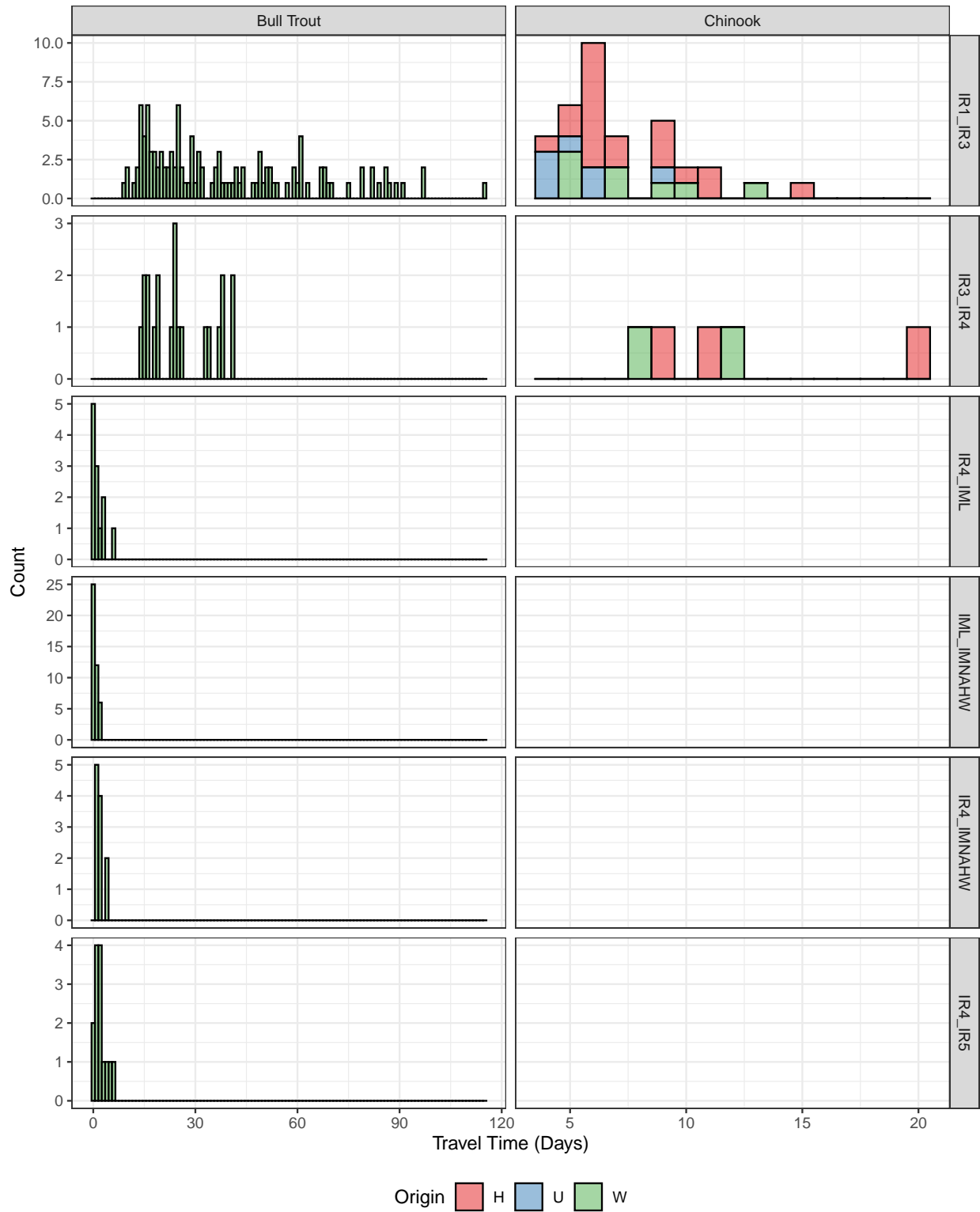
Tag Status = "Last Obs: IR3"

Summary of tags last observed at IR3. Some of these tags will "drop-out" before reaching the weir site (IR4/IML/IR5).

Mark.Species	t_rear_type	n
Bull Trout	W	84
Chinook	H	17
Chinook	U	7
Chinook	W	6

Source Data

The complete PIT-tag histories for Chinook Salmon and Bull trout detected during 2020 in the Imnaha River Basin were downloaded as two seperate files. The Chinook detections were downloaded from the Columbia River DART website DART. The Bull Trout detections are the result of running a "Complete Tag History" parameterized on the PTAGIS website and set-up to run and save automatically at 7:00 a.m. and 2:00 p.m. each day. The Bull trout detections are stored within the "*feldhauj/2020BullTroutCompleteTagHistory.csv*" filepath. We are then using an R-script to download and combine the files from the DART website and the PTAGIS ftp server 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 Bull Trout Complete Tag History report:

- *Query:* All PIT-tagged Bull trout detected in the Imnaha River Basin.

- *Event Date:* Between 3/1/2020 and 12/31/2020. For this report, limited to dates after 31 March.
- *Event Sites:* IR1, IR2, IR3, IR4, IR5, IML, IMNAHW, BSC, IMNAHR
- *Mark Species:* Bull Trout
- *Event Type:* Observation, Recapture, Recovery

Output Files:

Some very brief meta data descriptions for two output files processed with R scripts. For more details on these files, contact Joseph Feldhaus (Joseph.Feldhaus@state.or.us) or Ryan Kinzer (ryank@nezperce.org).

- *PITcleanr_2020_chs_bull.xlsx*: The complete tag histories from the Chinook DART detections and the PTAGIS Bull Trout detections 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 6/22/2020) 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.