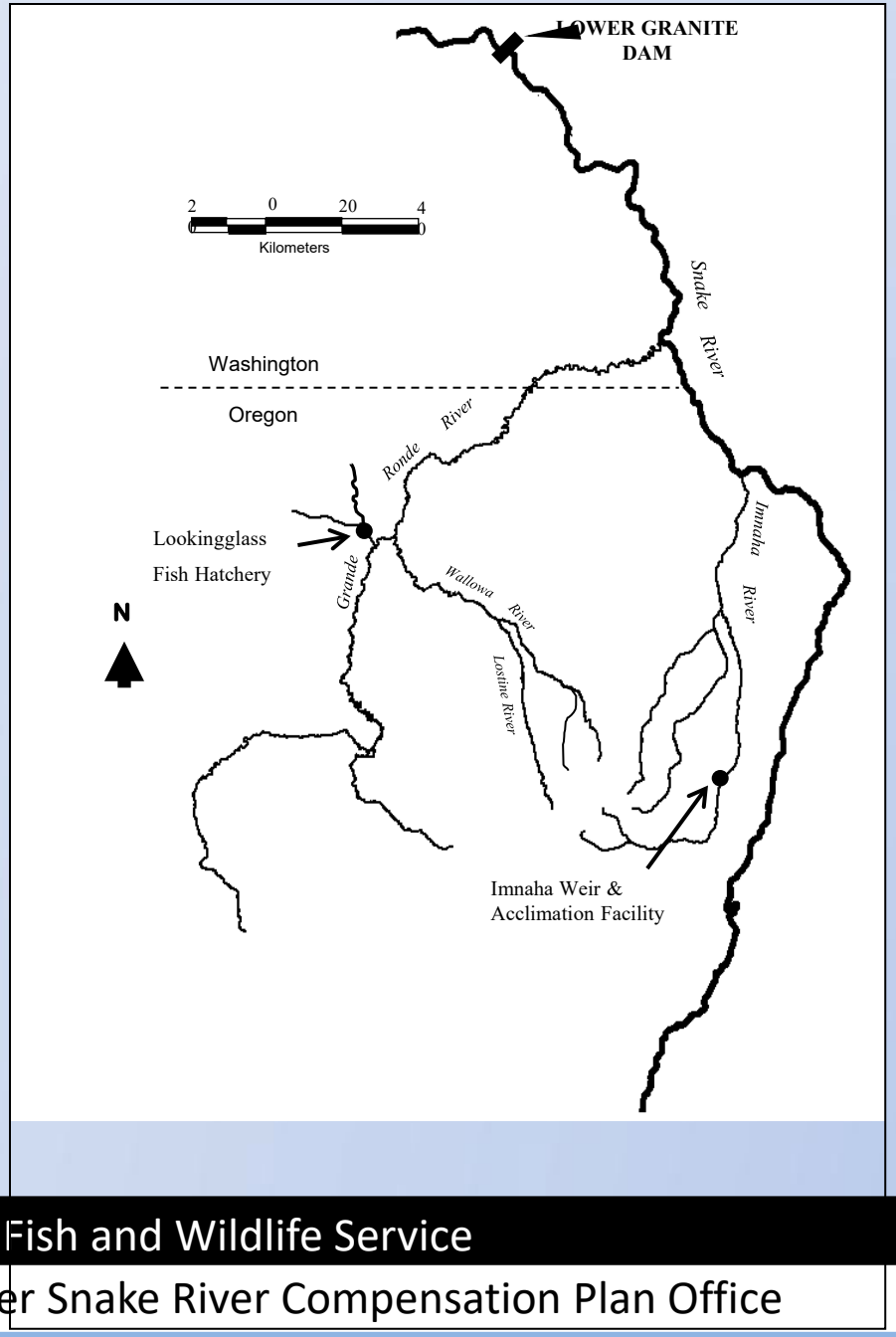
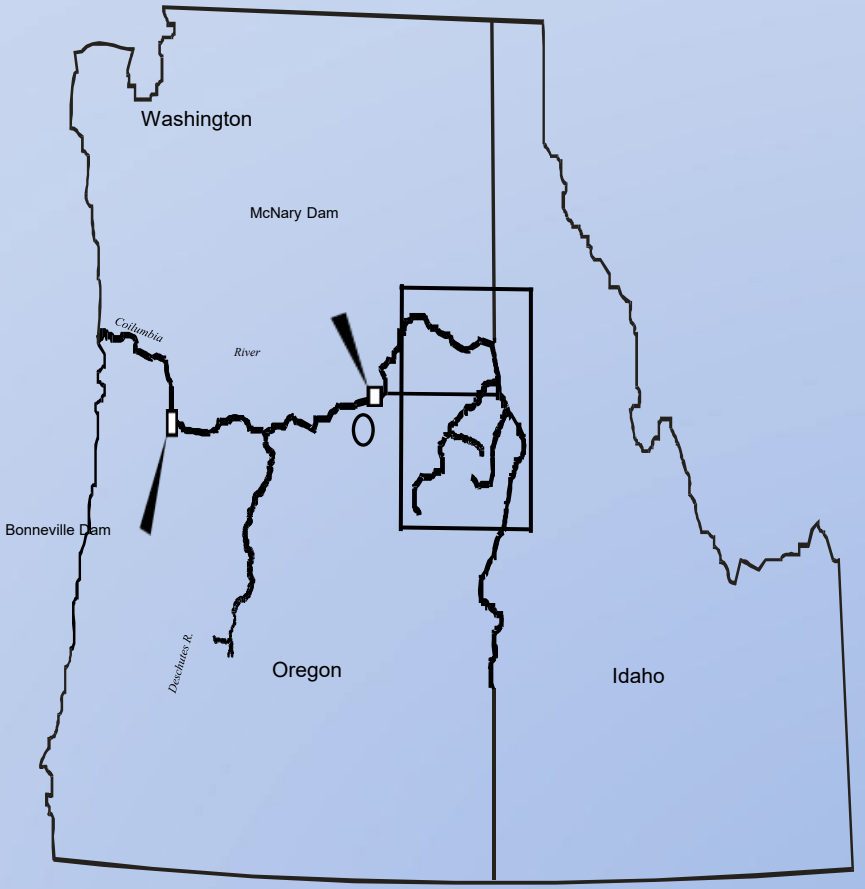
Imnaha River Weir Cooperative Evaluations 2017-2020





U.S. Fish and Wildlife Service

Lower Snake River Compensation Plan Office

Conserving America's Fisheries

U.S.

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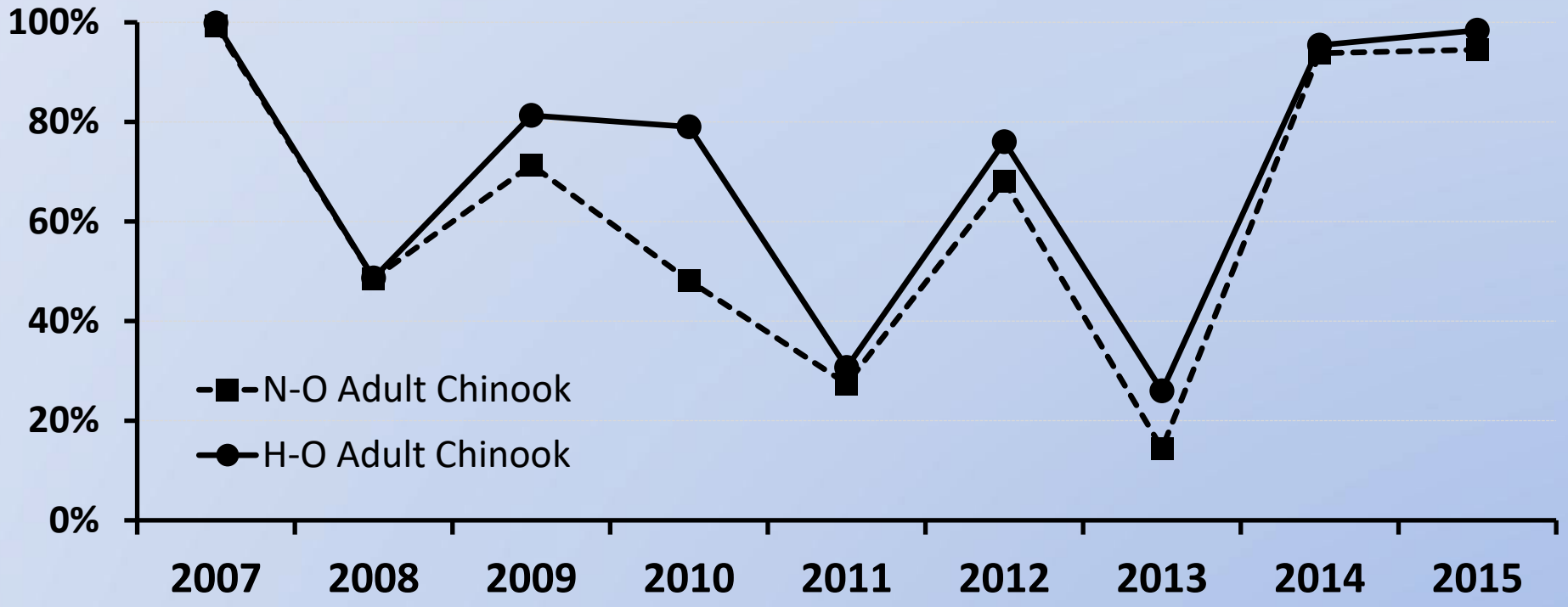
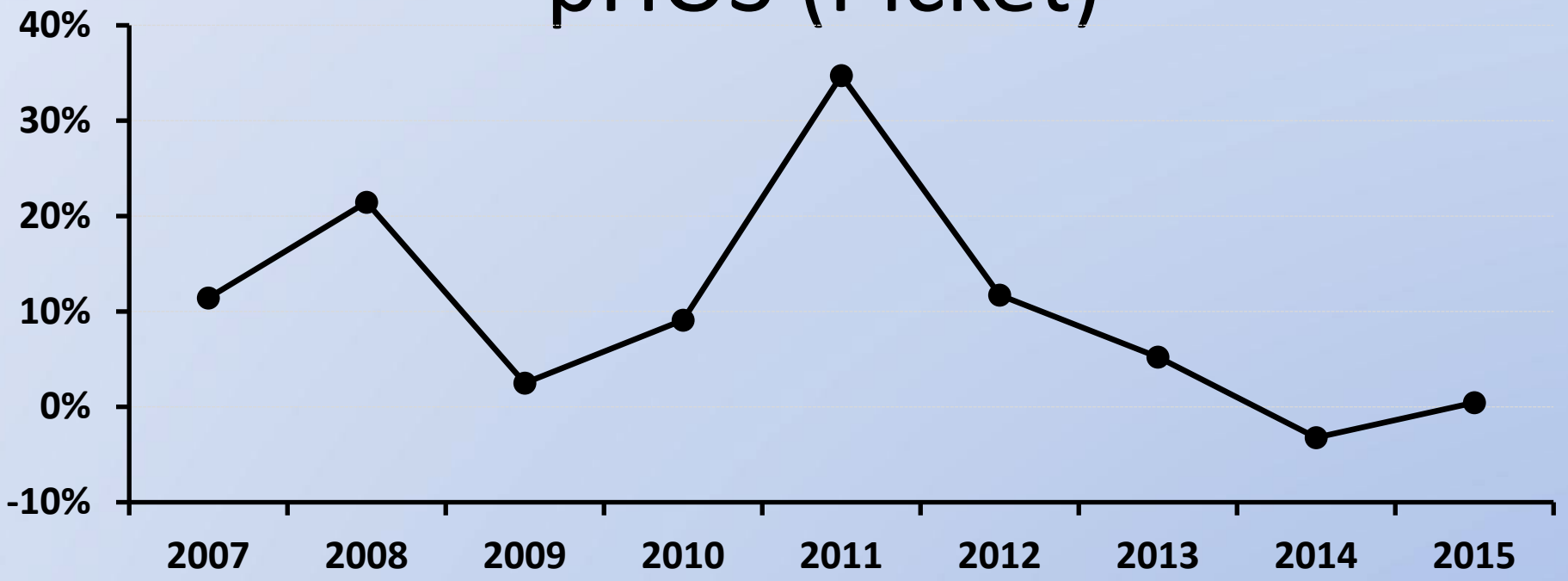
Weir Efficiency (Picket)



Estimates of efficiency, by origin, of the the Imnaha River Picket Weir. Figure/data from Jeff Yanke – ODFW (2016)

pHOS (Picket)



Estimates of the proportion of hatchery spawners (pHOS) above the Imnaha River Weir, expressed as a percentage of the sliding scale maximum criteria set on post-season returns (Yanke – ODFW, 2016)

New Weir

- Poor performance
- Safety
- HSRG/HRT/NOAA recommendations for new weir to manage pHOS and implement sliding scale.
- Permitting and Design 2008-2015
  - USFS special use
  - COE permitting
  - Archeological concerns
  - USFWS-ES, bull trout handling

U.S.

Low

U.S.

Low

Bi-OP Terms and Conditions

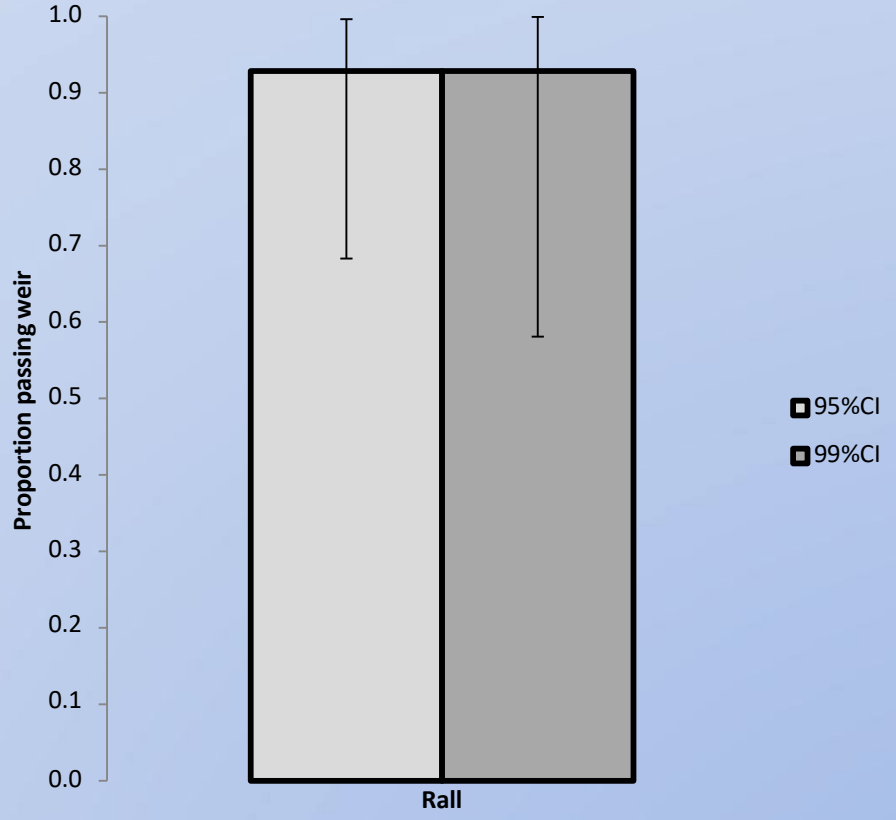
- Implement feasible sampling strategy for identifying impacts to bull trout during operations
  - Use existing PIT tagging (IPC et al.)
  - Assess passage and migration delays
  - LSRCP convened subject matter experts (Summer 2015).
    - NPT, ODFW, USFWS, Idaho Power Company, CTUIR.

Table 2. The number of Imnaha River bull trout PIT-tagged each year since 2006. In 2011, NPT staff started tagging bull trout caught in their screw trap, and in 2013 ODFW started tagging them at the Imnaha Satellite Facility (Idaho Power Company 2015).

Year	2006	2007	2008	2009	2010	2011	2012	2013	2014
Bull Trout Tagged	17	24	41	40	32	139	130	188	217

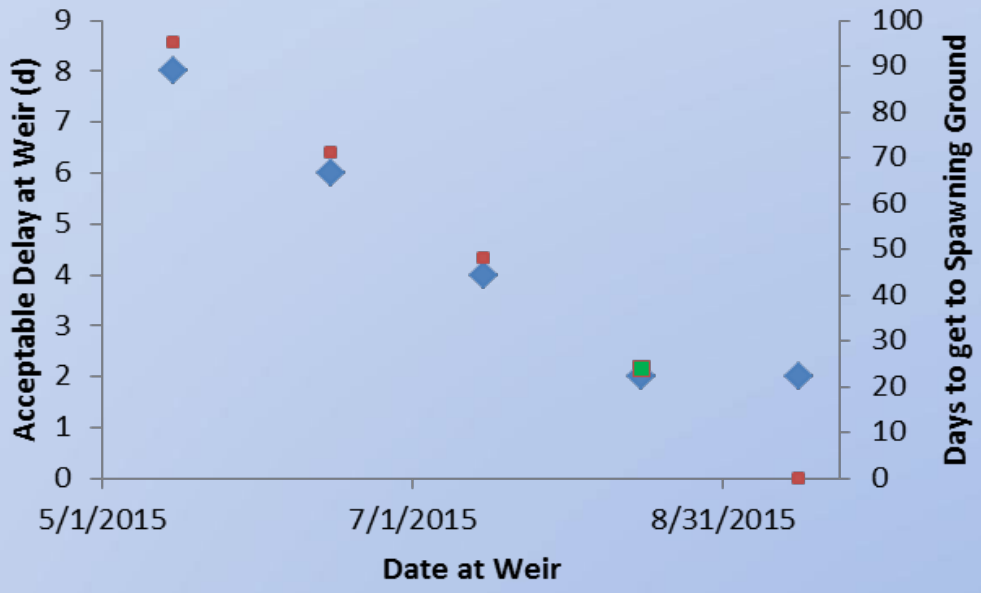
Expert Analysis - Criteria

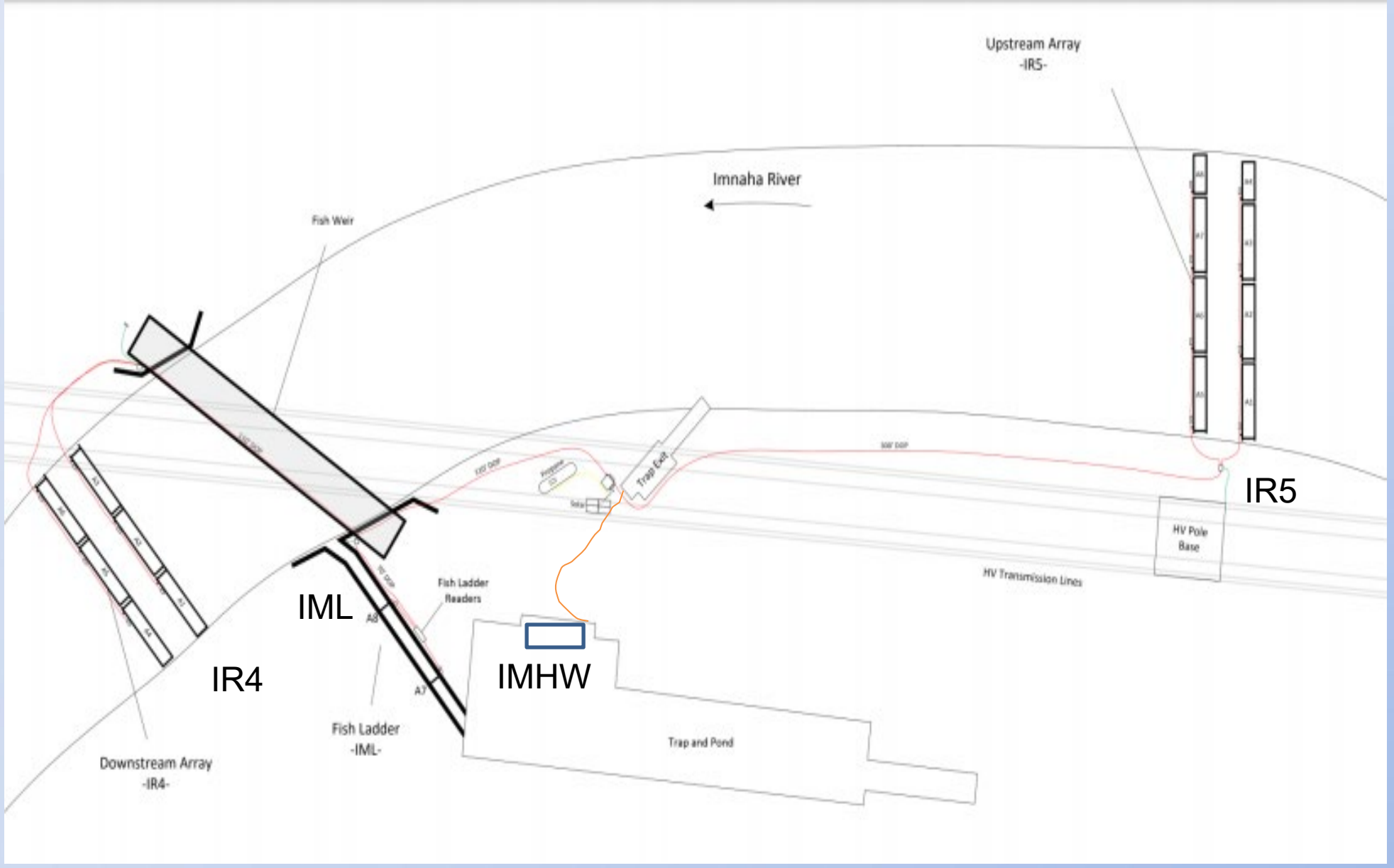
- Passage
  - 92.9% pass, 4 year running average.
  - Based predominantly on previous radio tag studies (n=14)



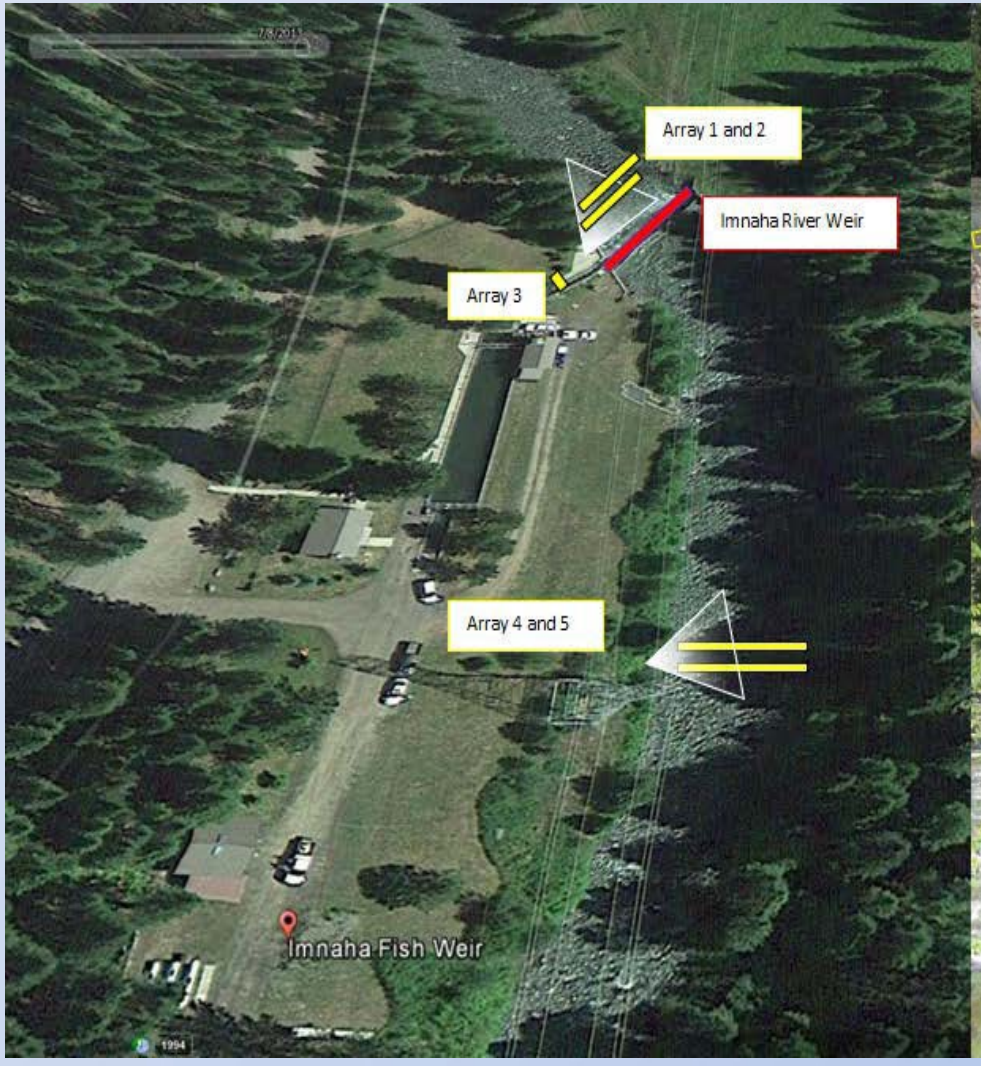
Expert Analysis - Criteria

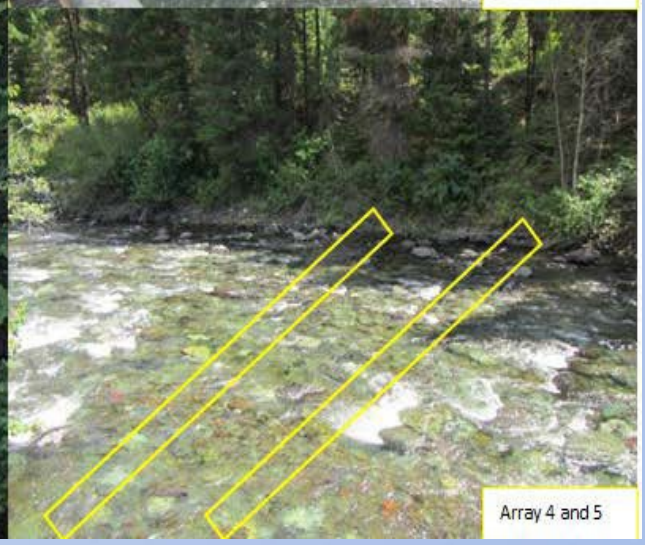
- Delay
  - May: median < 8 days
  - June: median < 6 days
  - July: median < 4 days
  - August: median < 2 days
  - September: < 2 days
  - No fish >8 days
- Based on PIT tags (n = 100s), past existing arrays in lower river.




Upstream Array
-IR5-
Imnaha River
Fish Weir
Trap Exit
IR5
HV Pole
Base
HV Transmission Lines
Fish Ladder
Readers
IML
IR4
IMHW
Fish Ladder
-IML-
Trap and Pond
Downstream Array
-IR4-

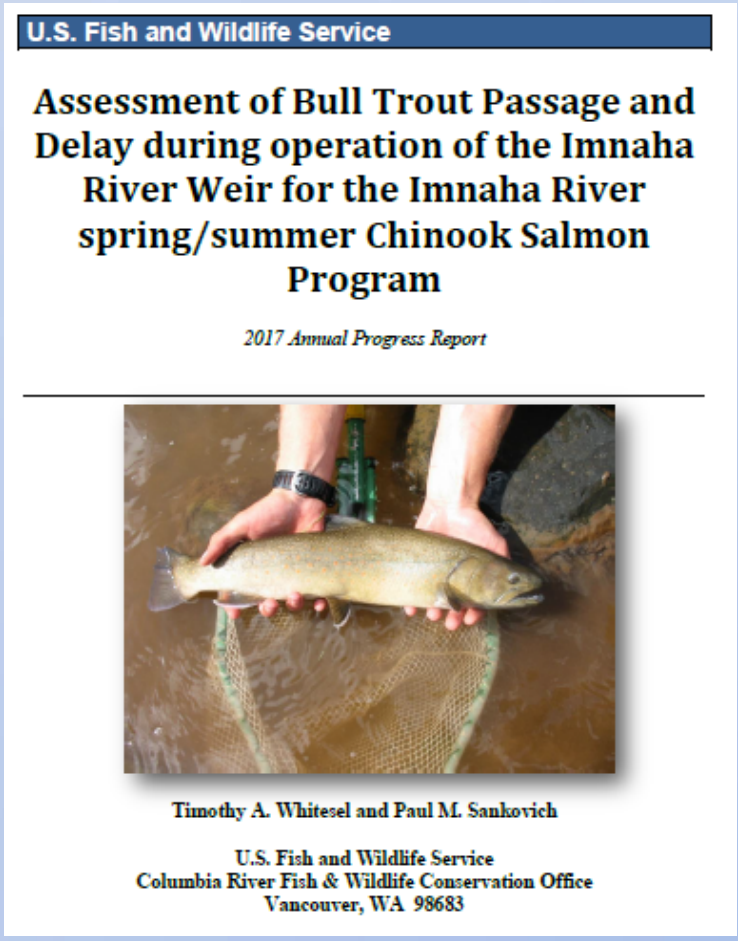
Imnaha River Weir PIT Arrays





2017

- Weir fished July 3 through September 10th
  - Chinook brood collections met, pNOB met
    - pHOS?
  - 143 tagged bull trout used for evaluation of passage and delay
- 92.3% bull trout estimated to pass
- Delay and detection issues……



U.S. Fish and Wildlife Service

Assessment of Bull Trout Passage and Delay during operation of the Imnaha River Weir for the Imnaha River spring/summer Chinook Salmon Program

2017 Annual Progress Report

Timothy A. Whitesel and Paul M. Sankovich

U.S. Fish and Wildlife Service
Columbia River Fish & Wildlife Conservation Office
Vancouver, WA 98683

2017 Bull Trout Delay

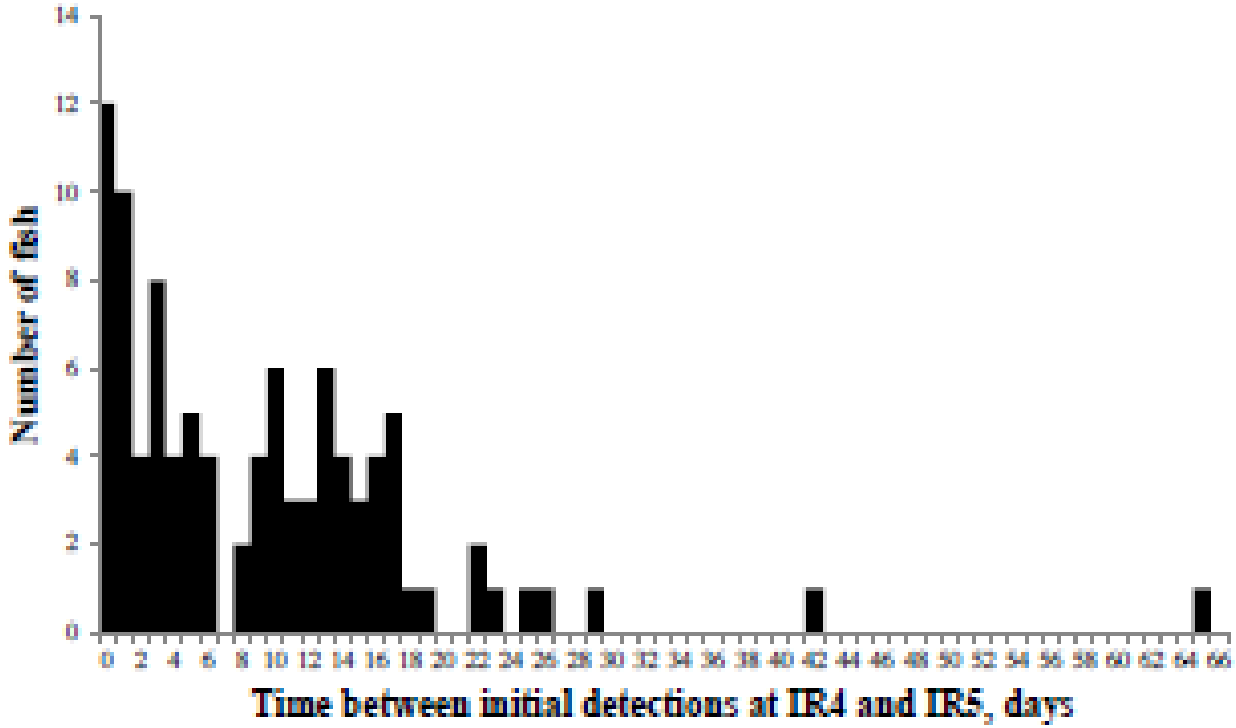


Figure 4. The number of days it took Bull Trout to move from IR4 to IR5. The number of days represents the time between the initial detection at IR4 and initial detection at IR5.

Passing without handling?

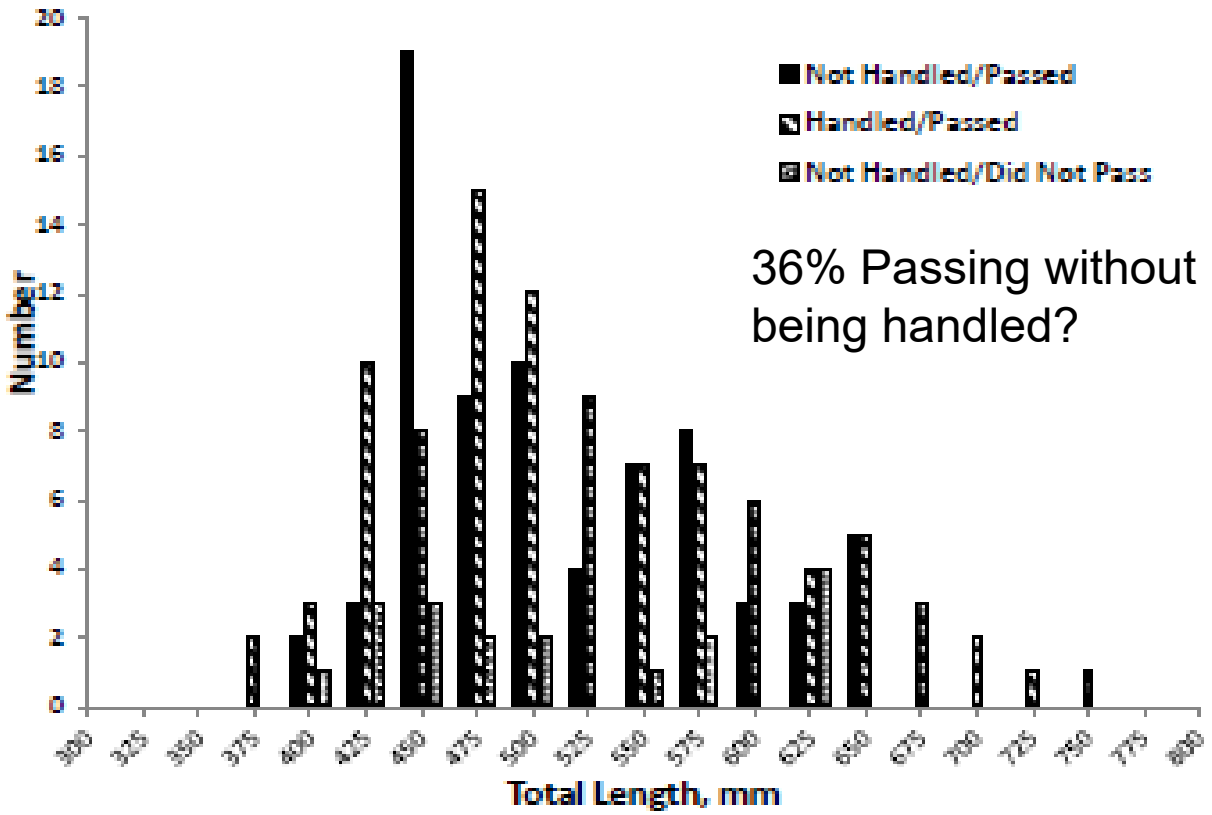


Figure 5. The size distribution of Bull Trout exhibiting various migratory behaviors (Passed *or* Did Not Pass *the weir*) and passage routes (*not trapped and therefore* Not Handled *or captured in the trap and therefore* Handled) at the Imnaha River weir (courtesy of R. Wilkinson, Idaho Power Company, personal communication).

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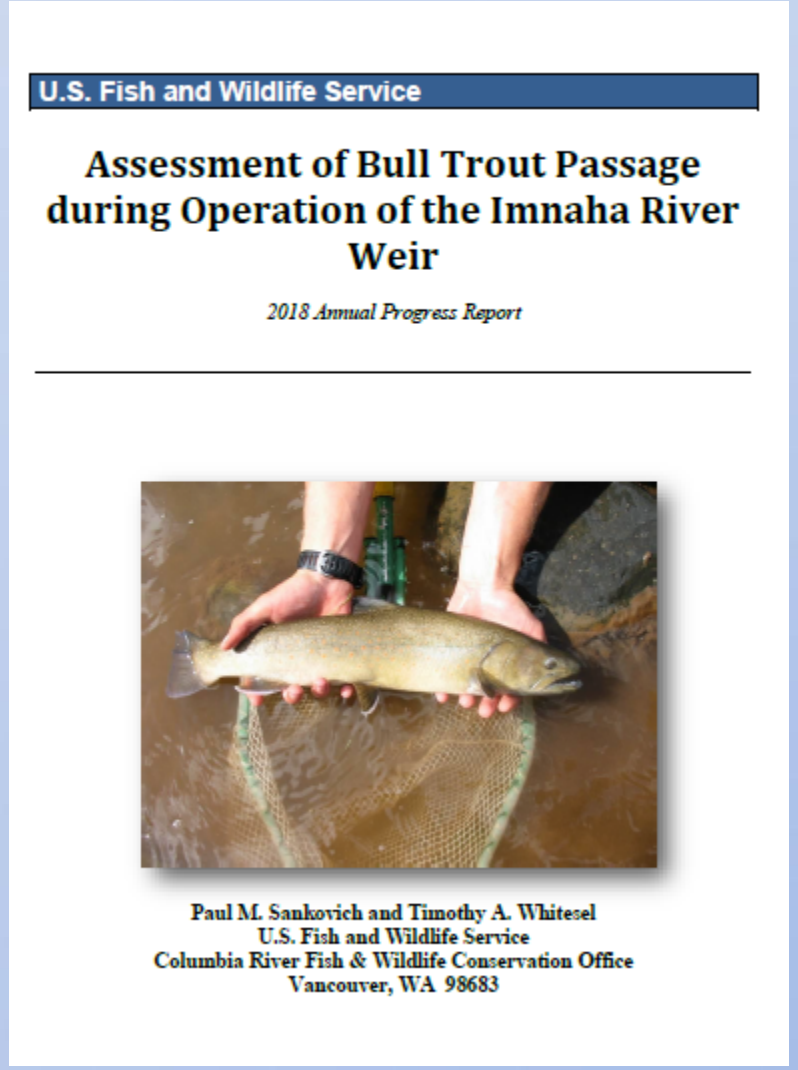
Lowe

2018

- Weir fished June 12th through September 7th
  - "Kick panels/clean chutes"
  - Chinook brood collections met and pNOB, pHOS met!!
    - 92% efficient for wild fish
    - 100% efficient for natural origin fish
  - 111 tagged bull trout used for evaluation of passage and delay
- 94.1% estimated to pass site (105)
- Delay and detection issues……

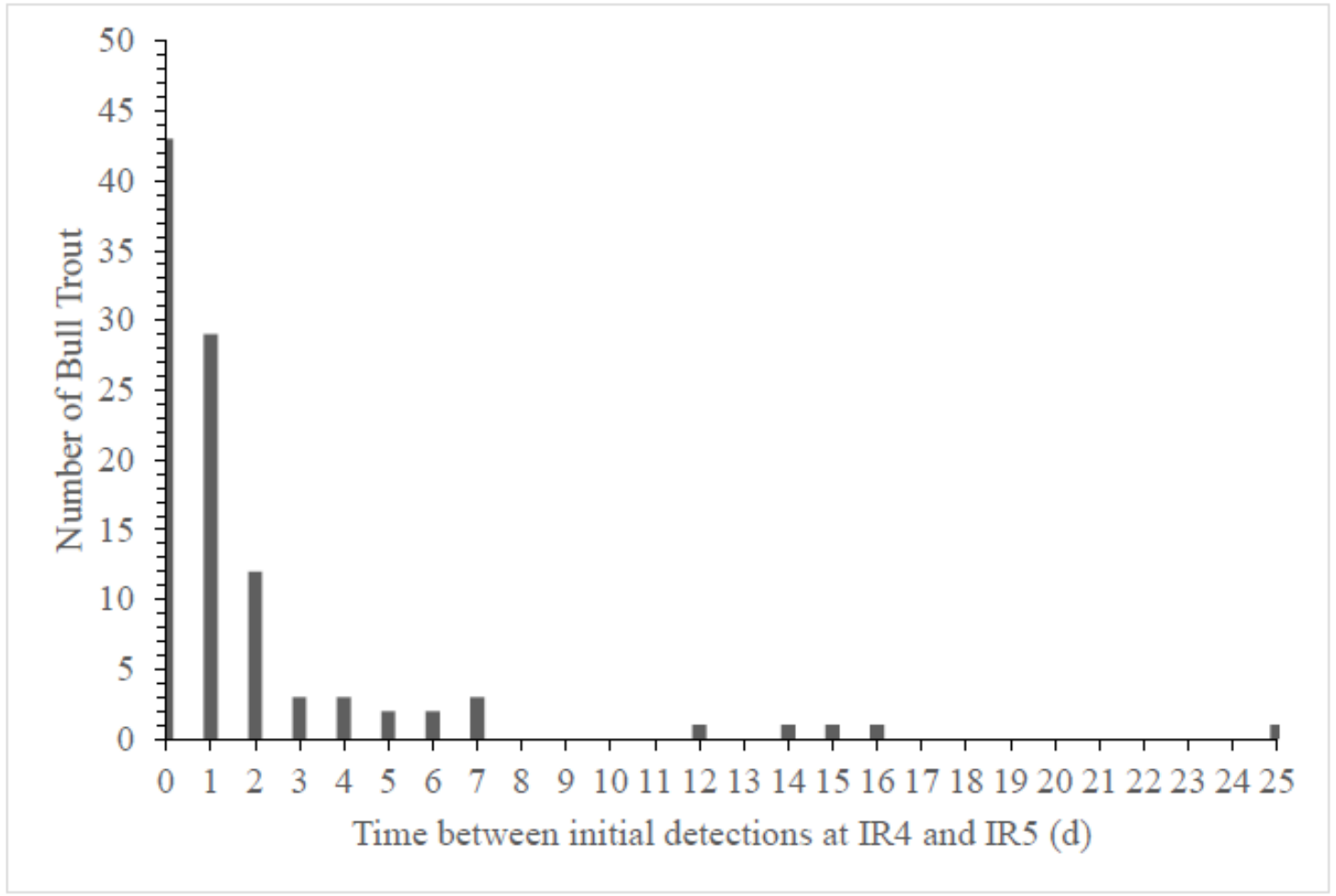


U.S. Fish and Wildlife Service

Assessment of Bull Trout Passage during Operation of the Imnaha River Weir

2018 Annual Progress Report

Paul M. Sankovich and Timothy A. Whitesel
U.S. Fish and Wildlife Service
Columbia River Fish & Wildlife Conservation Office
Vancouver, WA 98683



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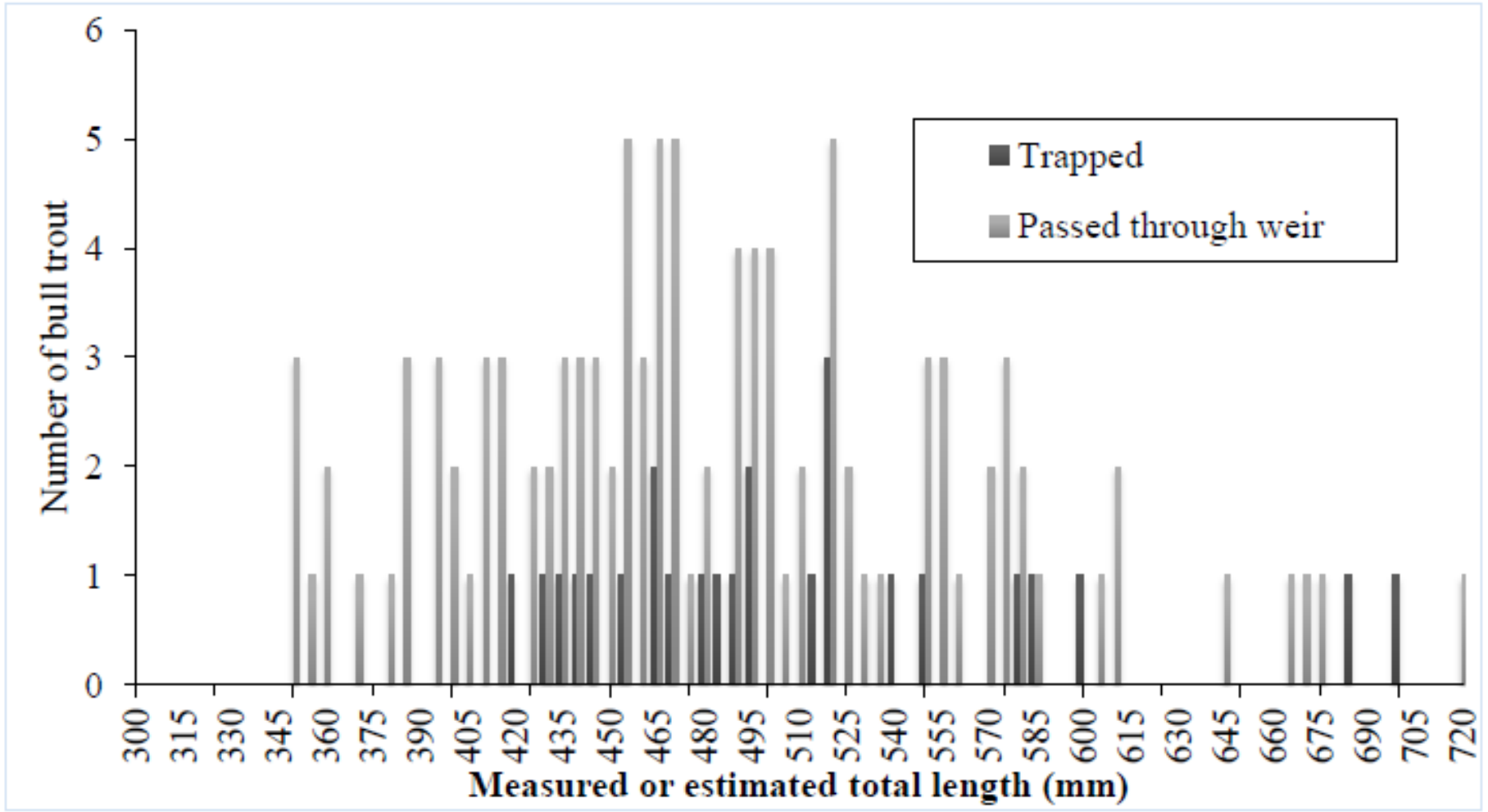
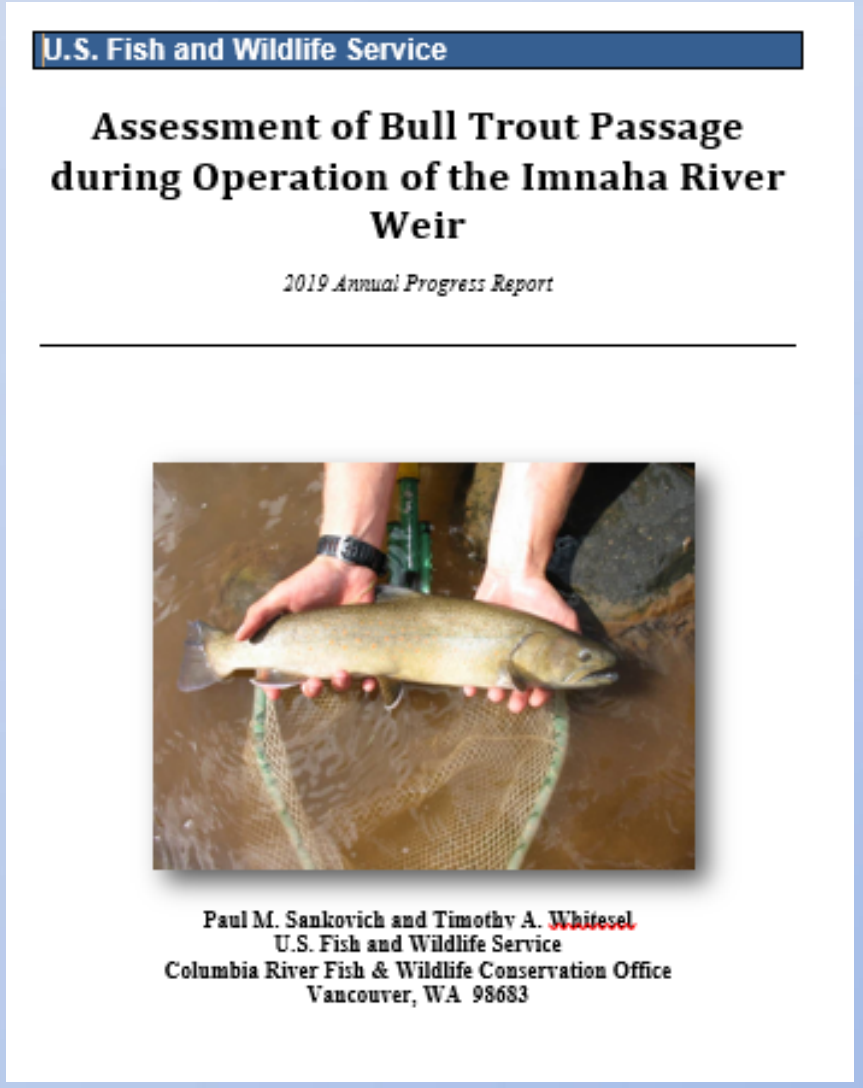


Figure 5. Length frequency distribution of Bull Trout that were trapped and released above or passed through the Imnaha River weir in 2018.

2019

- Weir fished June 21 through September 11th
  - “Kick panels, clean chutes”
  - Chinook brood collections met and pNOB, pHOS met!!
  - 107 bull trout used in analysis
- 94.4% estimated to pass site (101)
- Delay and detection issues
- Fish using chutes, “Are they injuring themselves?”
  - Addresses Take in Permitting

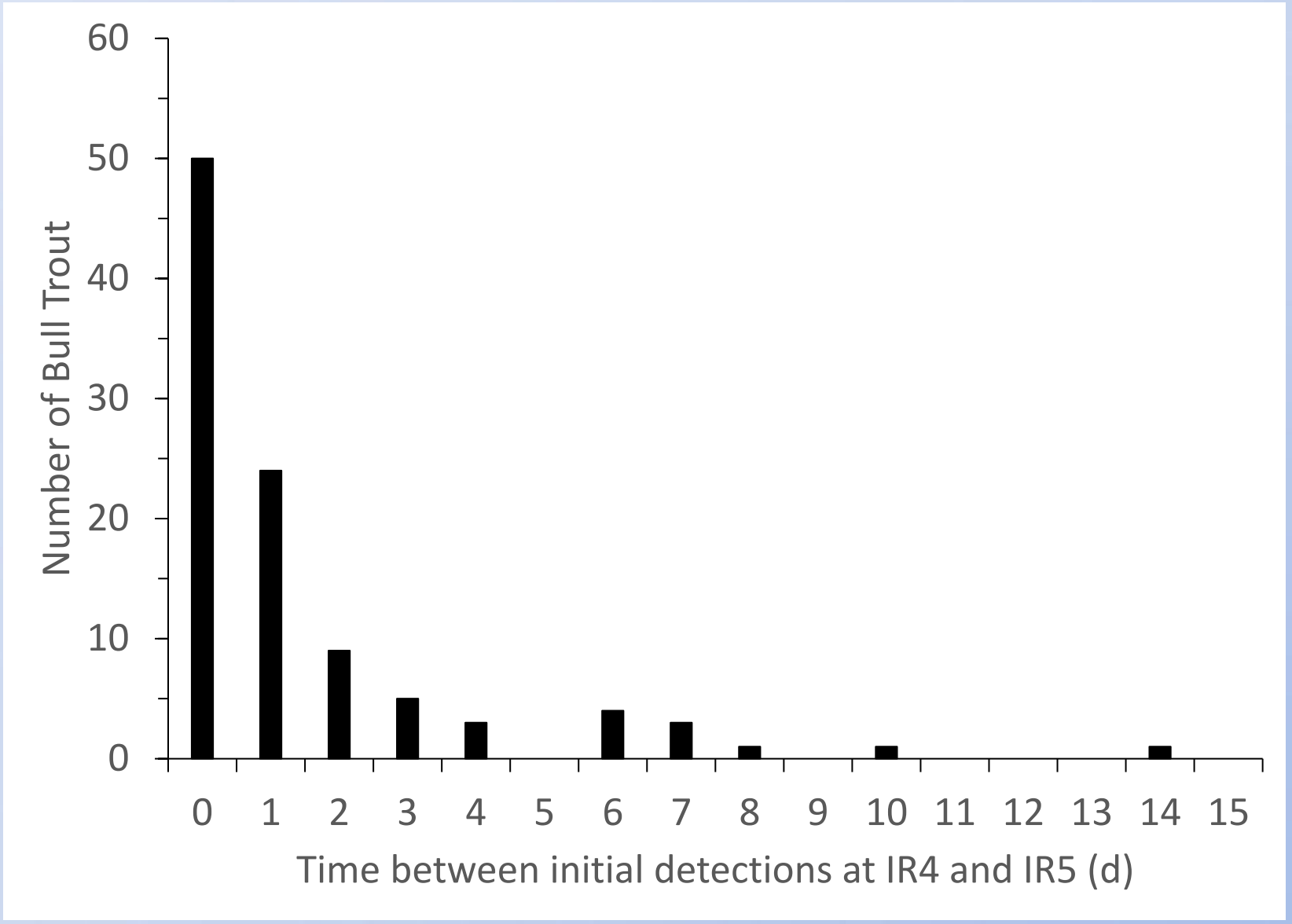


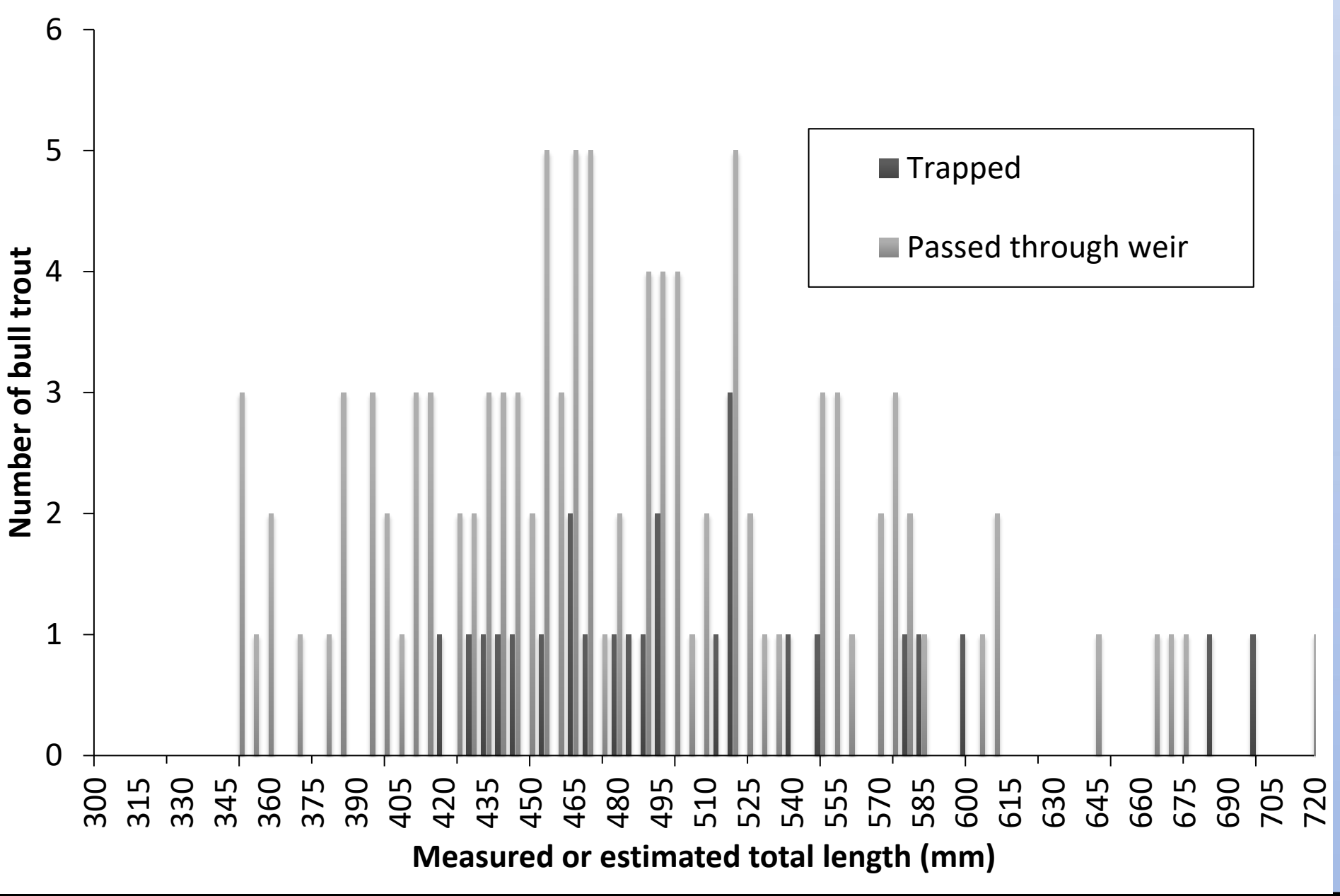
U.S. Fish and Wildlife Service

Assessment of Bull Trout Passage during Operation of the Imnaha River Weir

2019 Annual Progress Report

Paul M. Sankovich and Timothy A. Whitesel
U.S. Fish and Wildlife Service
Columbia River Fish & Wildlife Conservation Office
Vancouver, WA 98683


60
50
40
30
20
10
0
Number of Bull Trout
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
Time between initial detections at IR4 and IR5 (d)

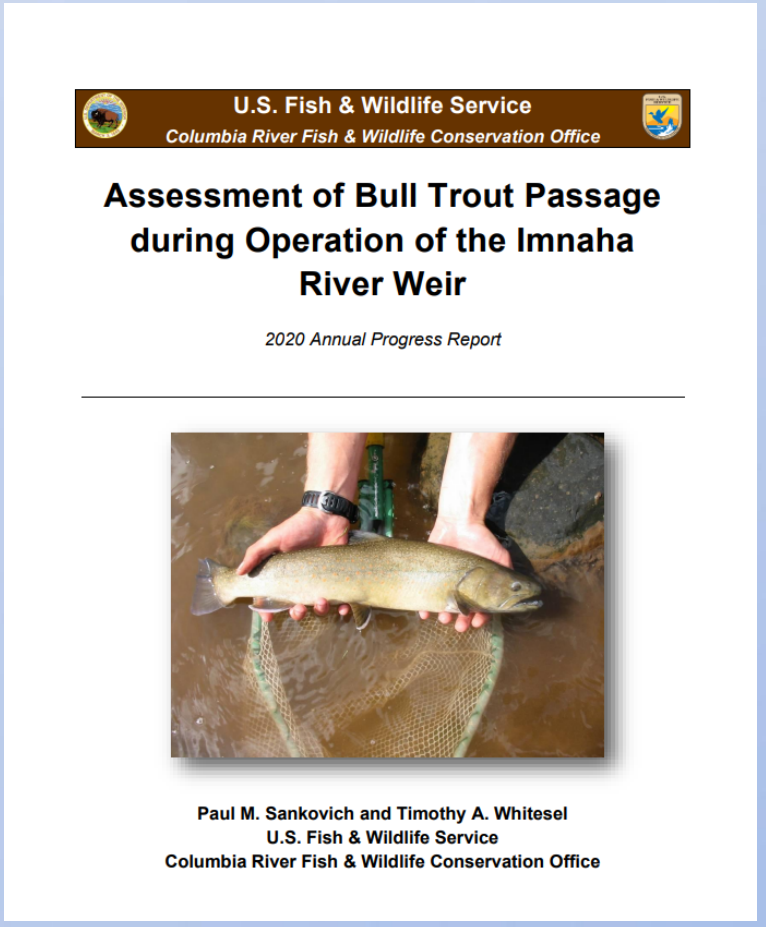

Number of bull trout
0
1
2
3
4
5
6
300
315
330
345
360
375
390
405
420
435
450
465
480
495
510
525
540
555
570
585
600
615
630
645
660
675
690
705
720
Measured or estimated total length (mm)
Trapped
Passed through weir


07/10/2019 18:17:19


07/11/2019 16:16:04

2020

- Weir fished June 12 through September 10th
  - "Kick panels, clean chutes"
  - Chinook brood collections met.
  - 147 bull trout used in analysis
- 91.9% estimated to pass site (136/147)
- Delay and detection issues

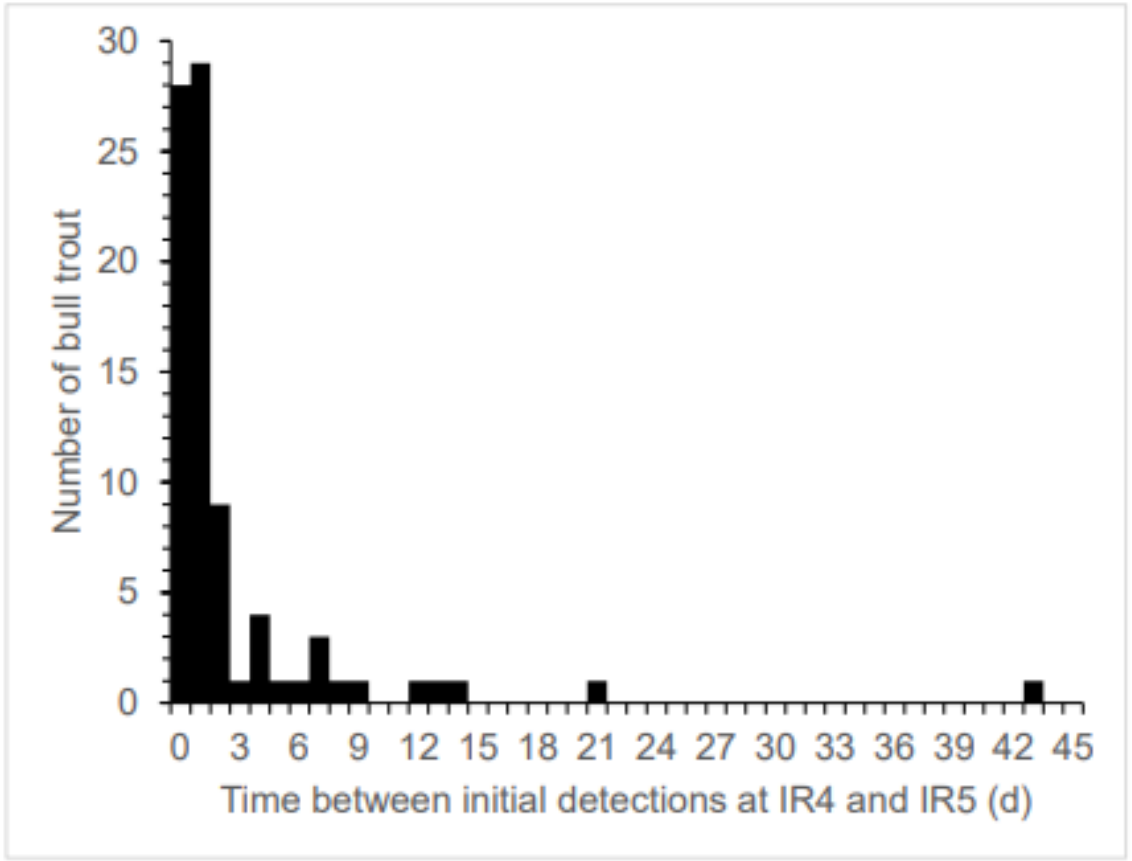


U.S. Fish & Wildlife Service
Columbia River Fish & Wildlife Conservation Office

Assessment of Bull Trout Passage during Operation of the Imnaha River Weir

2020 Annual Progress Report

Paul M. Sankovich and Timothy A. Whitesel
U.S. Fish & Wildlife Service
Columbia River Fish & Wildlife Conservation Office



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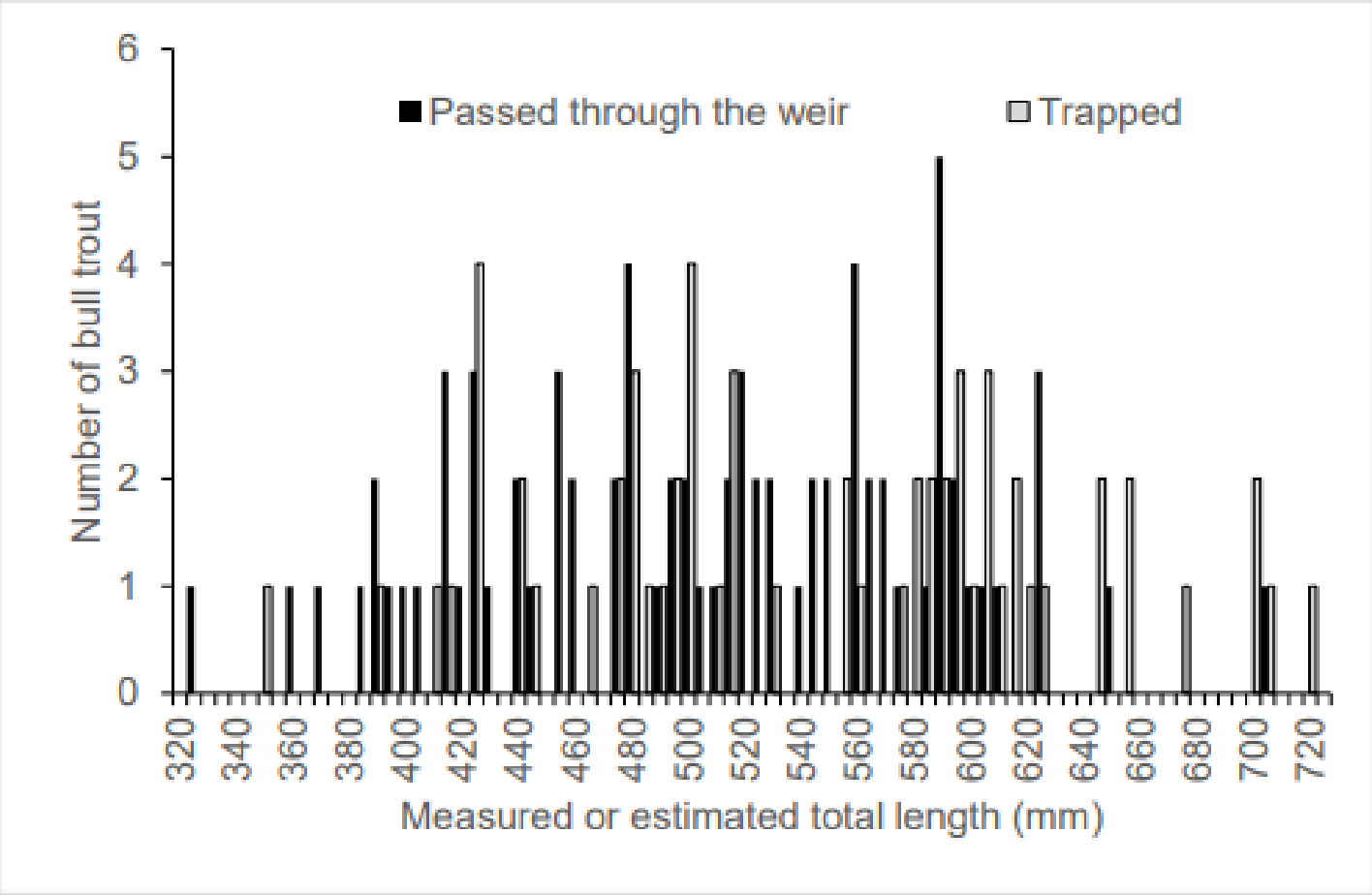
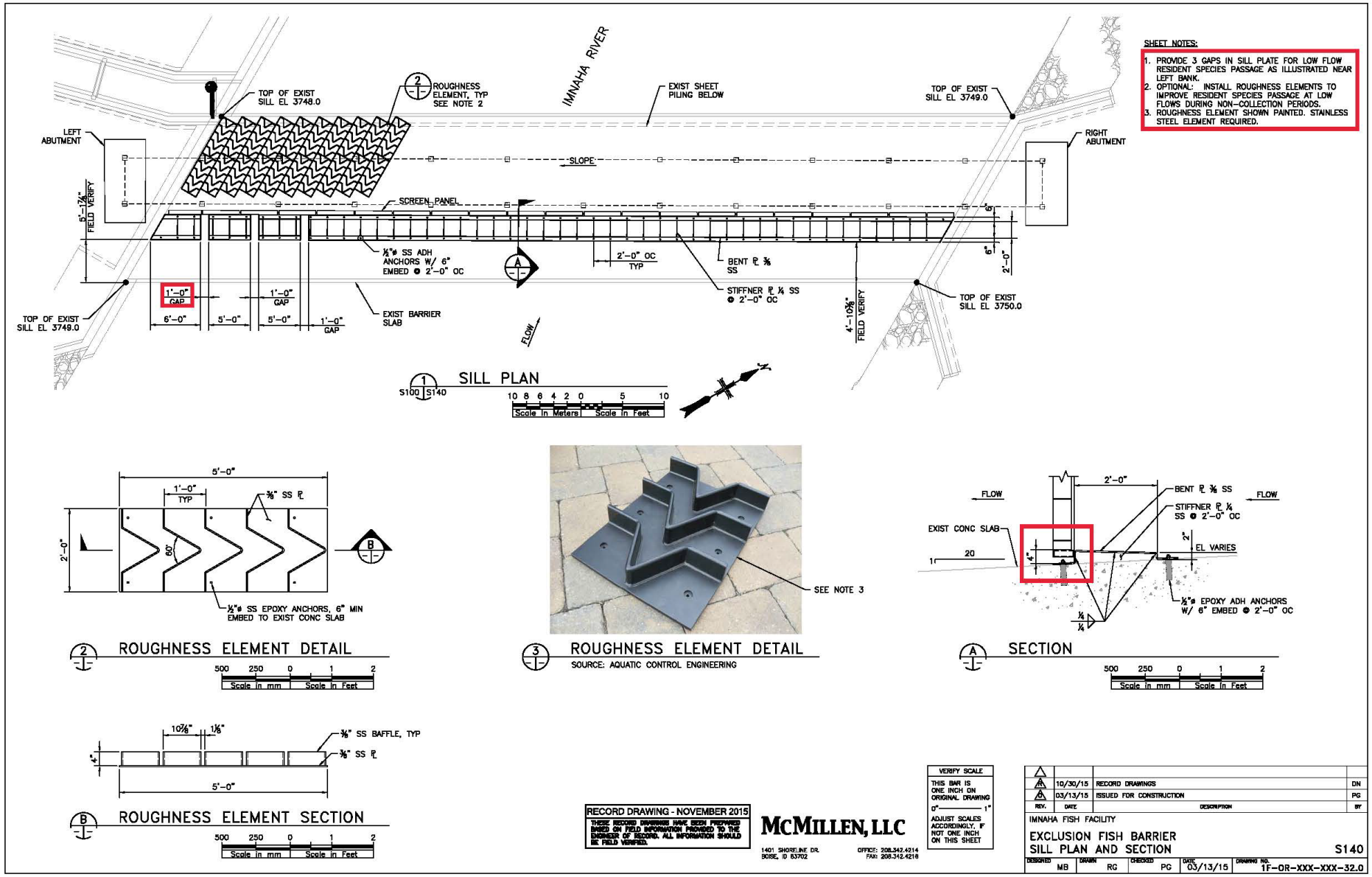


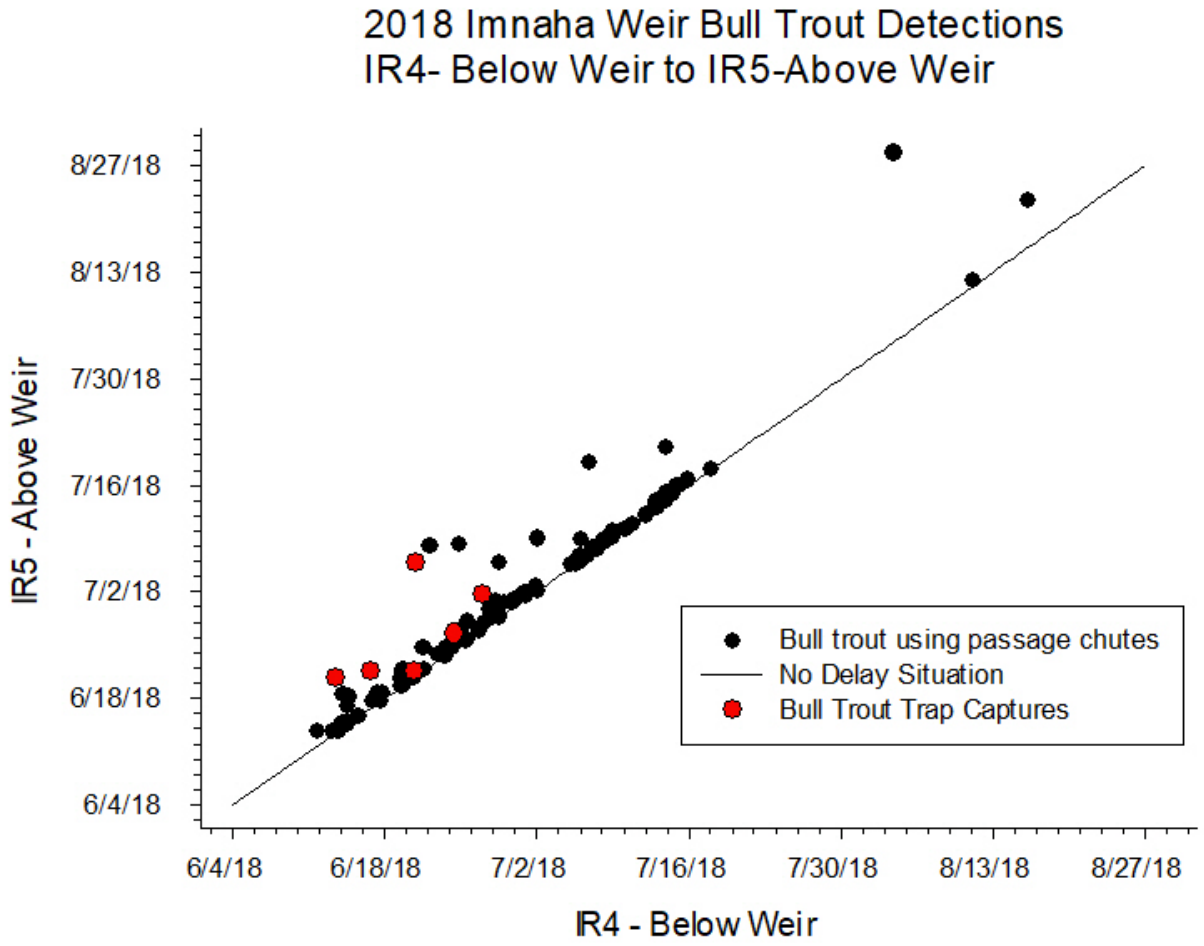
Figure 5. Length frequency distribution of Bull Trout that were trapped and released above or passed through the Imnaha River weir in 2020.

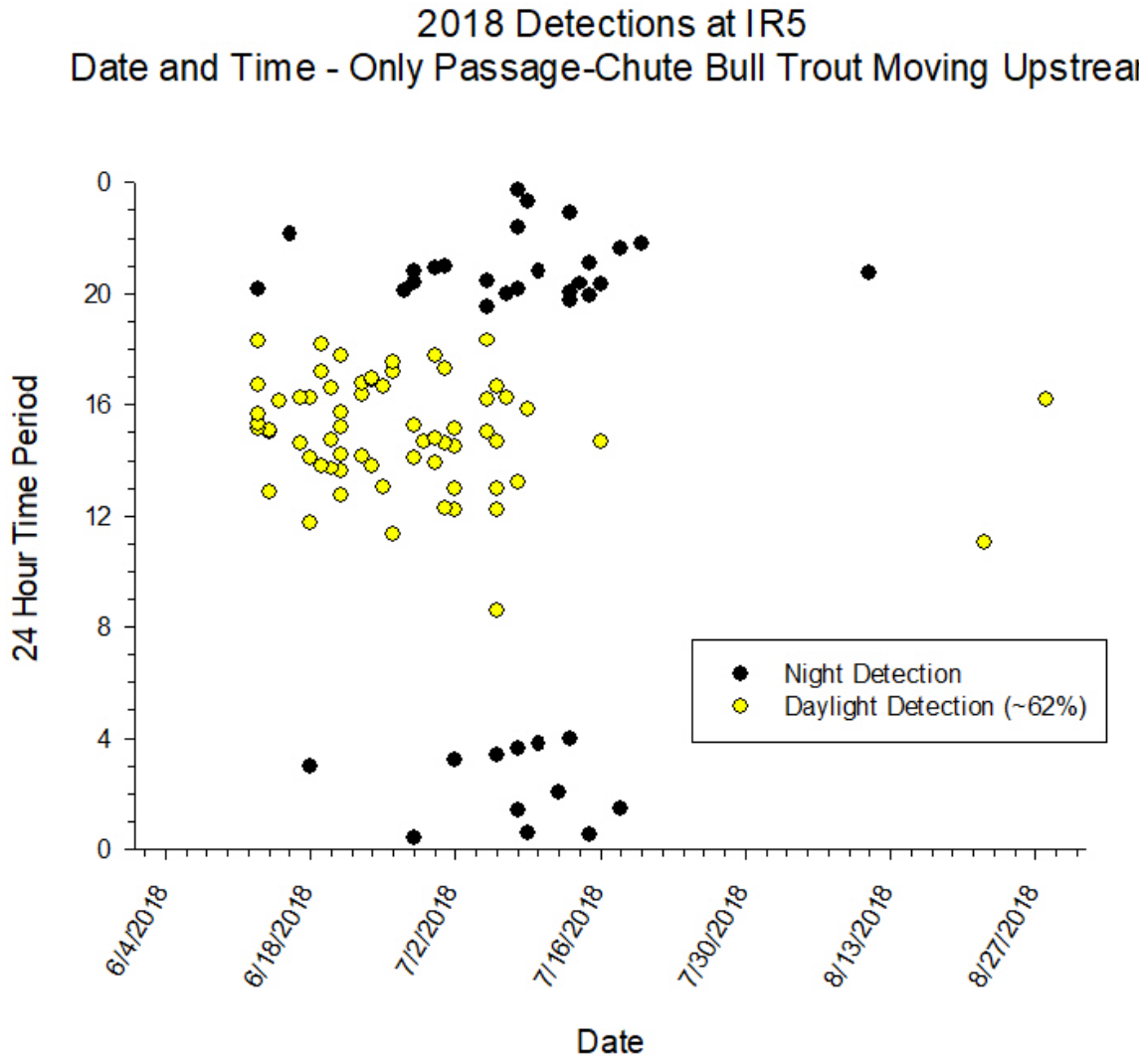
Summary

- Clean passage chutes!
- 91.4% 4 year average
  - Some did not pass weir consistently
- Take Home
  - Passage criteria was essential
  - Delay criteria informative to adaptive management
  - Limited handling desirable… trade offs.
  - Passage chutes are integral.
  - Staff training/knowledge key to success.

Thanks to all USFWS, NPT, ODFW, CTUIR, IPC and LSRCP staff involved in small work group from 2015-2020.

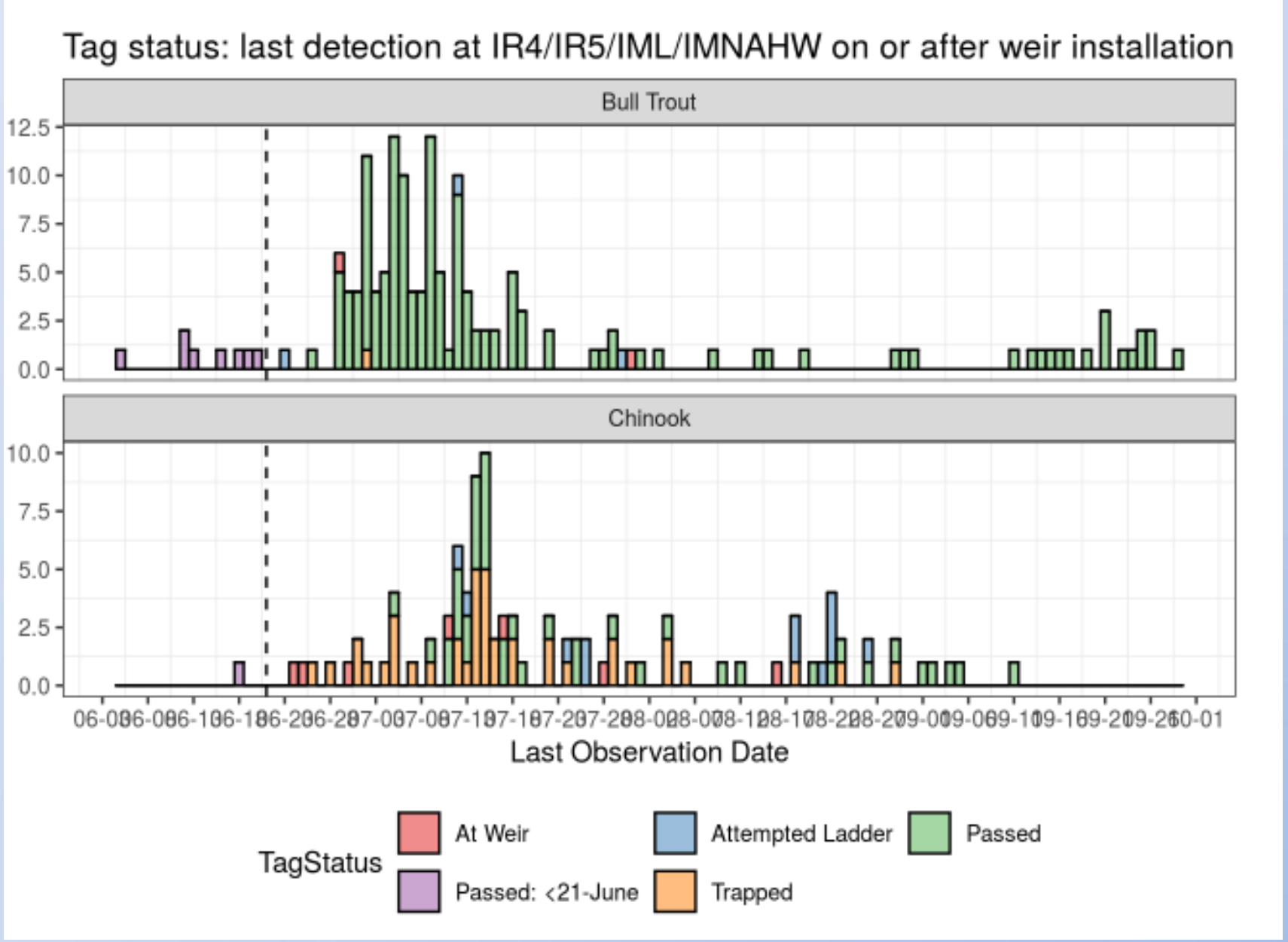

SHEET NOTES:
1. PROVIDE 3 GAPS IN SILL PLATE FOR LOW FLOW RESIDENT SPECIES PASSAGE AS ILLUSTRATED NEAR LEFT BANK.
2. OPTIONAL: INSTALL ROUGHNESS ELEMENTS TO IMPROVE RESIDENT SPECIES PASSAGE AT LOW FLOWS DURING NON-COLLECTION PERIODS.
3. ROUGHNESS ELEMENT SHOWN PAINTED. STAINLESS STEEL ELEMENT REQUIRED.
IMNAHA RIVER
TOP OF EXIST SILL EL 3748.0
ROUGHNESS ELEMENT, TYP SEE NOTE 2
EXIST SHEET PILING BELOW
TOP OF EXIST SILL EL 3749.0
LEFT ABUTMENT
RIGHT ABUTMENT
SLOPE
SCREEN PANEL
½"ø SS ADH ANCHORS W/ 6" EMBED @ 2'-0" OC
2'-0" OC TYP
BENT PL ⅜ SS
STIFFNER PL ¼ SS @ 2'-0" OC
EXIST BARRIER SLAB
TOP OF EXIST SILL EL 3750.0
FLOW
1'-0" GAP
6'-0"
5'-0"
SILL PLAN
S100 S140
Scale in Meters
Scale in Feet
5'-0"
1'-0" TYP
⅜" SS PL
2'-0"
60°
½"ø SS EPOXY ANCHORS, 6" MIN EMBED TO EXIST CONC SLAB
ROUGHNESS ELEMENT DETAIL
SEE NOTE 3
ROUGHNESS ELEMENT DETAIL
SOURCE: AQUATIC CONTROL ENGINEERING
EXIST CONC SLAB
EL VARIES
½"ø EPOXY ADH ANCHORS W/ 6" EMBED @ 2'-0" OC
SECTION
Scale in mm
Scale in Feet
⅜" SS BAFFLE, TYP
⅜" SS PL
ROUGHNESS ELEMENT SECTION
RECORD DRAWING - NOVEMBER 2015
McMILLEN, LLC
VERIFY SCALE
ADJUST SCALES ACCORDINGLY, IF NOT ONE INCH ON THIS SHEET
10/30/15 RECORD DRAWINGS
03/13/15 ISSUED FOR CONSTRUCTION
IMNAHA FISH FACILITY
EXCLUSION FISH BARRIER
SILL PLAN AND SECTION
S140
DESIGNED MB
DRAWN RG
CHECKED PG
DATE 03/13/15
DRAWING NO. 1F-DR-XXX-XXX-32.0
SHEET 32 OF 35


2018 Imnaha Weir Bull Trout Detections
IR4- Below Weir to IR5-Above Weir
IR5 - Above Weir
8/27/18
8/13/18
7/30/18
7/16/18
7/2/18
6/18/18
6/4/18
6/4/18
6/18/18
7/2/18
7/16/18
7/30/18
8/13/18
8/27/18
IR4 - Below Weir
Bull trout using passage chutes
No Delay Situation
Bull Trout Trap Captures


2018 Detections at IR5
Date and Time - Only Passage-Chute Bull Trout Moving Upstream
24 Hour Time Period
0
20
16
12
8
4
0
6/4/2018
6/18/2018
7/2/2018
7/16/2018
7/30/2018
8/13/2018
8/27/2018
Date
Night Detection
Daylight Detection (~62%)

Shiny App

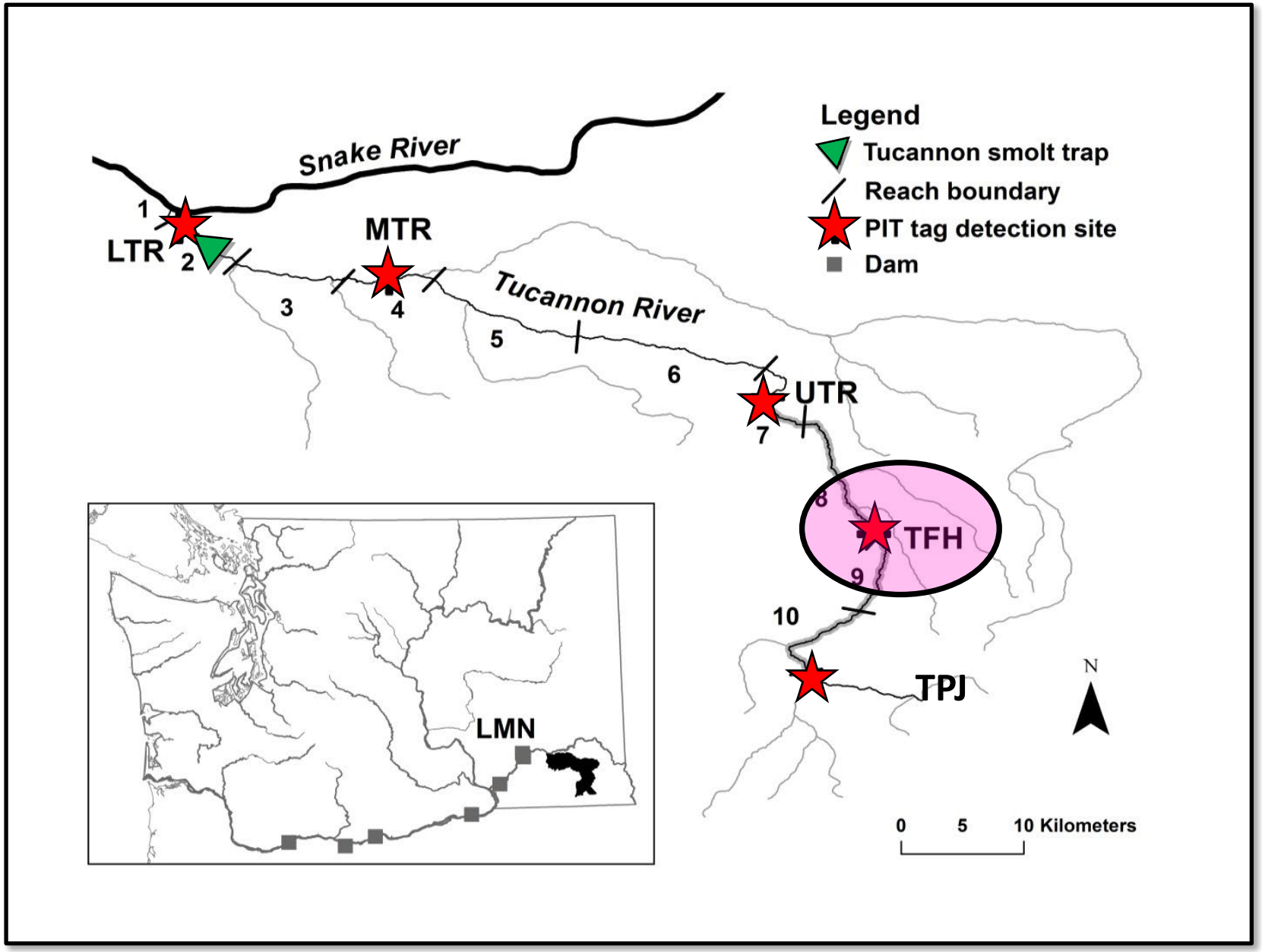
[2019 Summary]


Tag status: last detection at IR4/IR5/IML/IMNAHW on or after weir installation
Bull Trout
12.5
10.0
7.5
5.0
2.5
0.0
Chinook
10.0
7.5
5.0
2.5
0.0
Last Observation Date
TagStatus
At Weir
Attempted Ladder
Passed
Passed: <21-June
Trapped

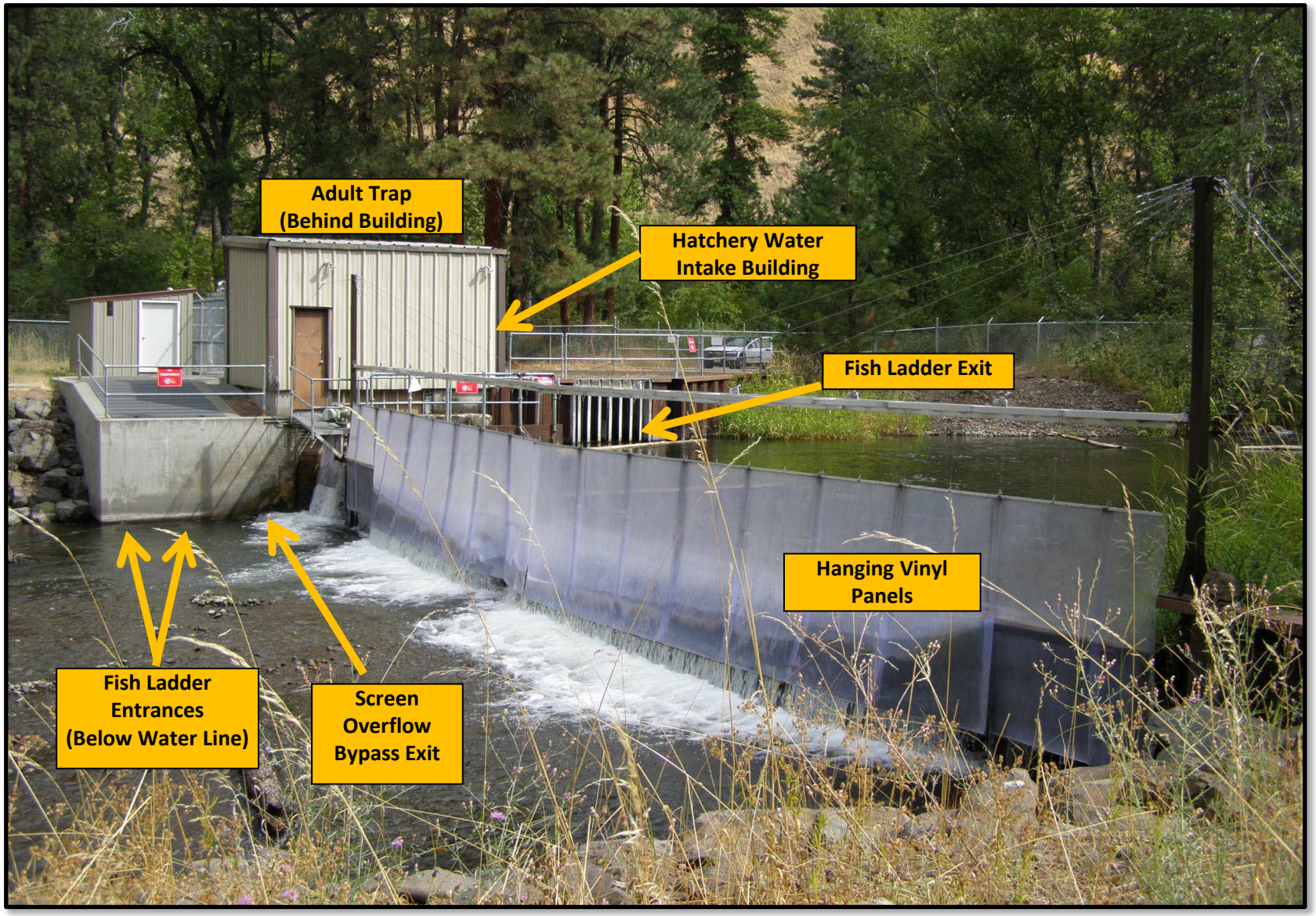
Assessment of Bull Trout Passage at the Tucannon River Adult Weir/Trap

Joe Bumgarner **Rod Engle**

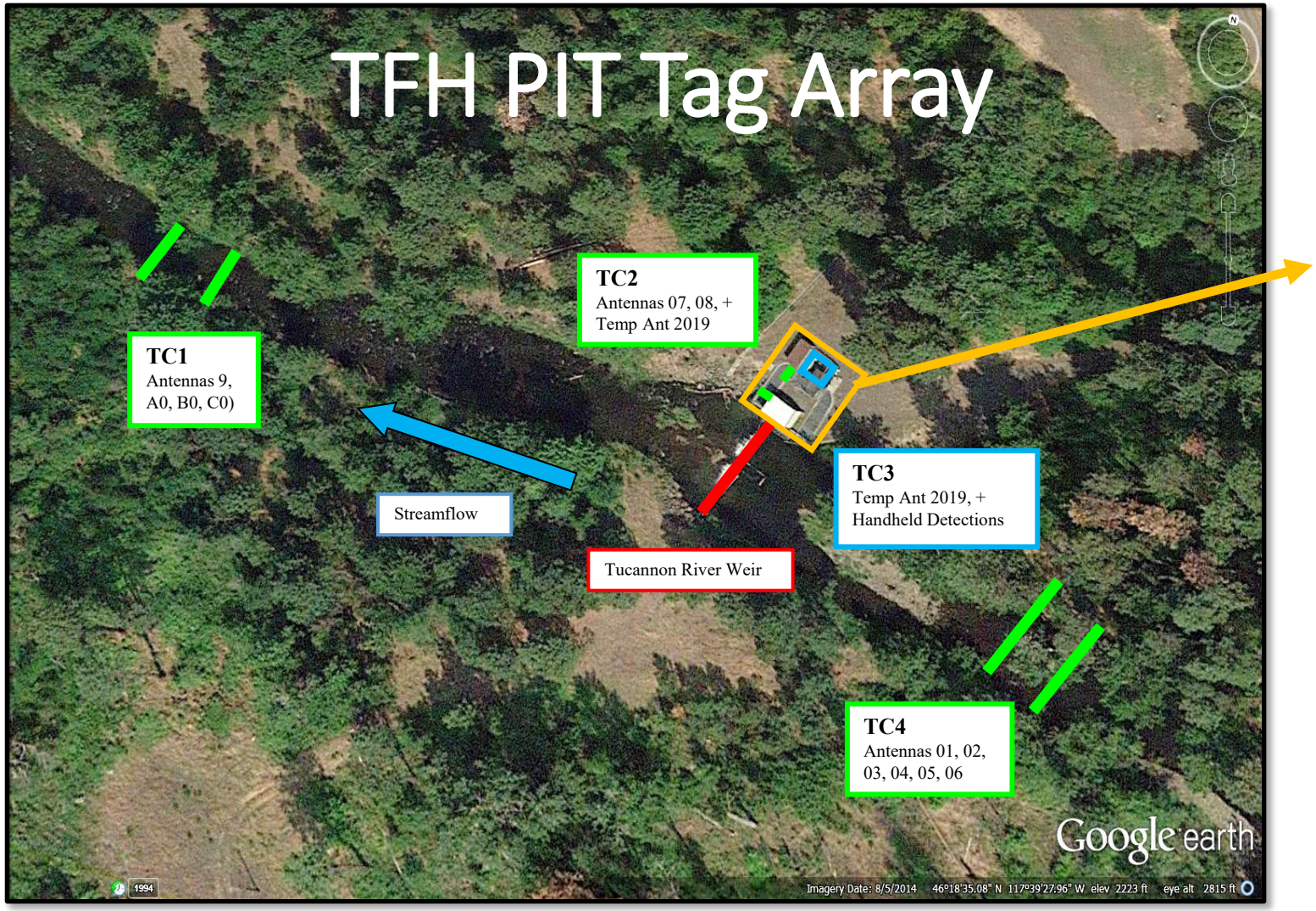
Tucannon River Basin PIT Tag Arrays

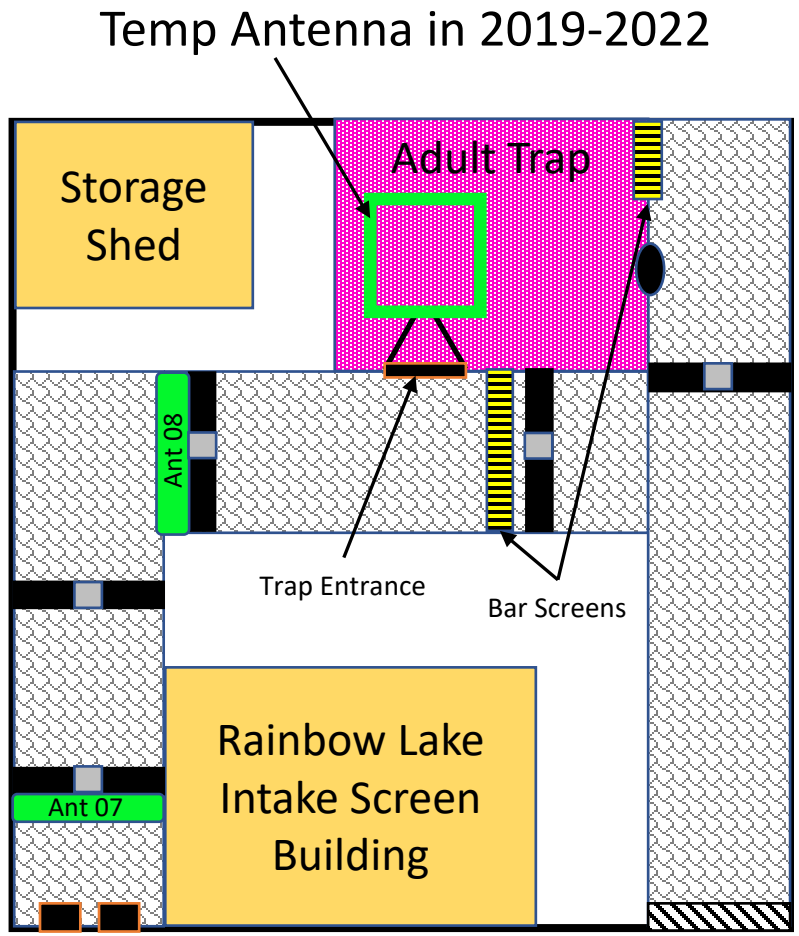


Tucannon Fish Hatchery Adult Weir/Trap



Tucannon Fish Hatchery Adult Weir/Trap





Today's Presentation

- **Passage Conversion**
  Percent of bull trout detected downstream that convert upstream of dam.
- **Passage Delay**
  Time it takes fish to move upstream past the dam.
- **Trap Escapement**
  Have we fixed the escapement problem identified in 2019?

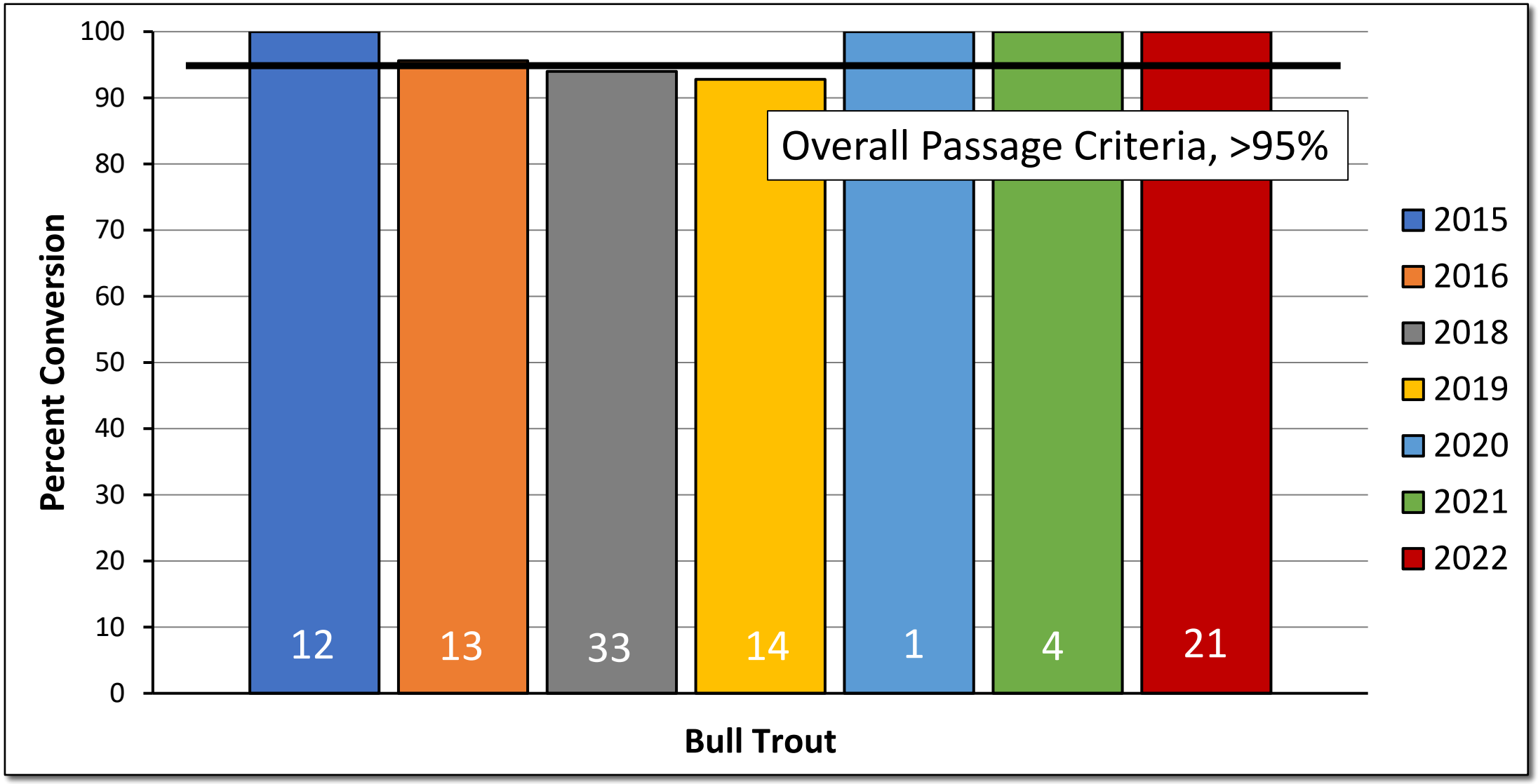
Previously PIT Tagged Bull Trout

Year	BT
2015	12
2016	13
2017	46
2018	33
2019	14
2020	1
2021	4
2022	21

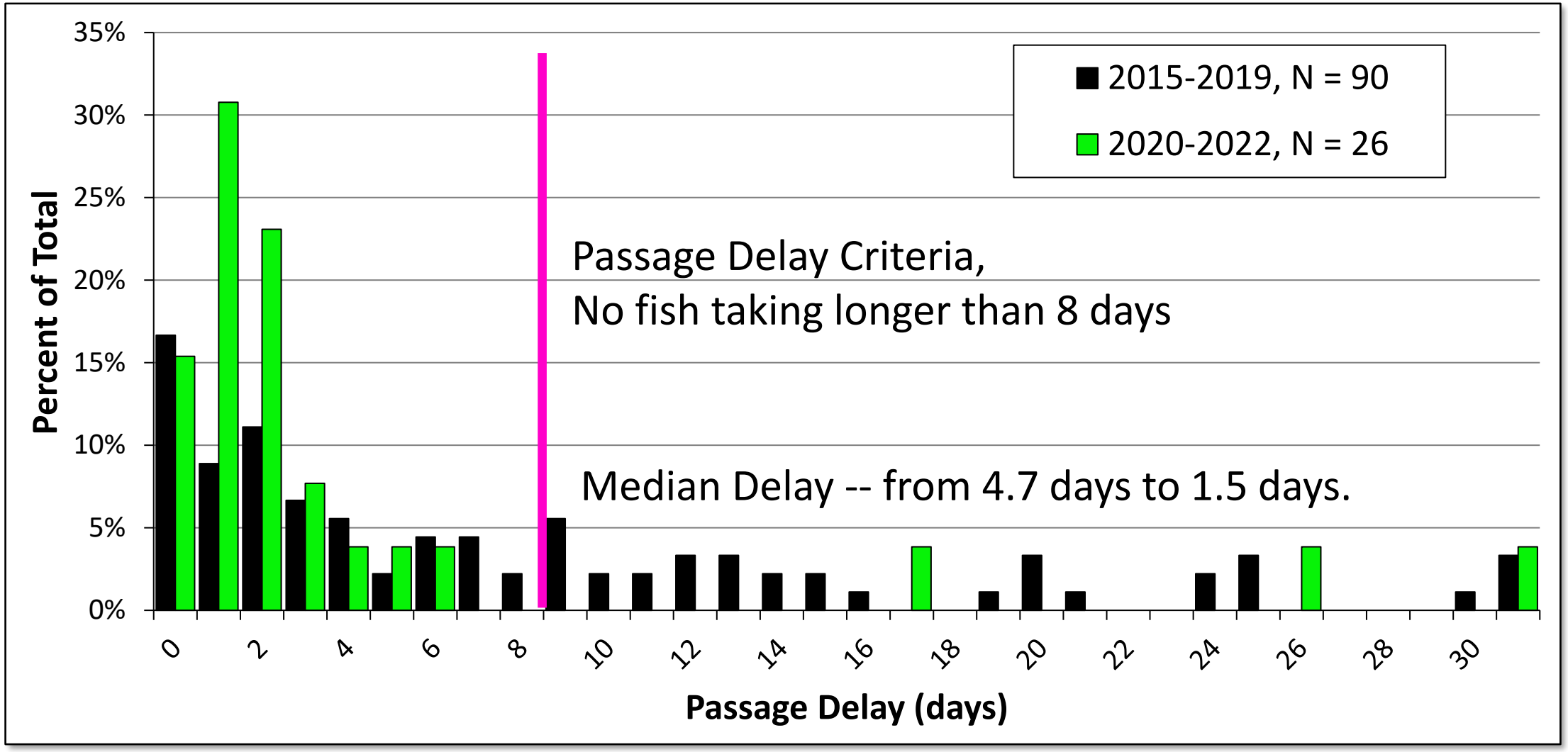
Tucannon Bull Trout

- **Passage Criteria**
  - *Conversion Rate*
    - Five-year average of at least 95%, with no less than 75% in any given year
  - *Passage Delay Rate*
    - Median passage time from first detection downstream to either 1) capture in the adult trap, or 2) detection immediately upstream of no longer than 8 days for May, 6 days for June, 4 days for July and 2 days for August and September, with no individual taking longer than 8 days in any month.

Conversion


Percent Conversion
100
90
80
70
60
50
40
30
20
10
0
Overall Passage Criteria, >95%
12
13
33
14
1
4
21
Bull Trout
2015
2016
2018
2019
2020
2021
2022

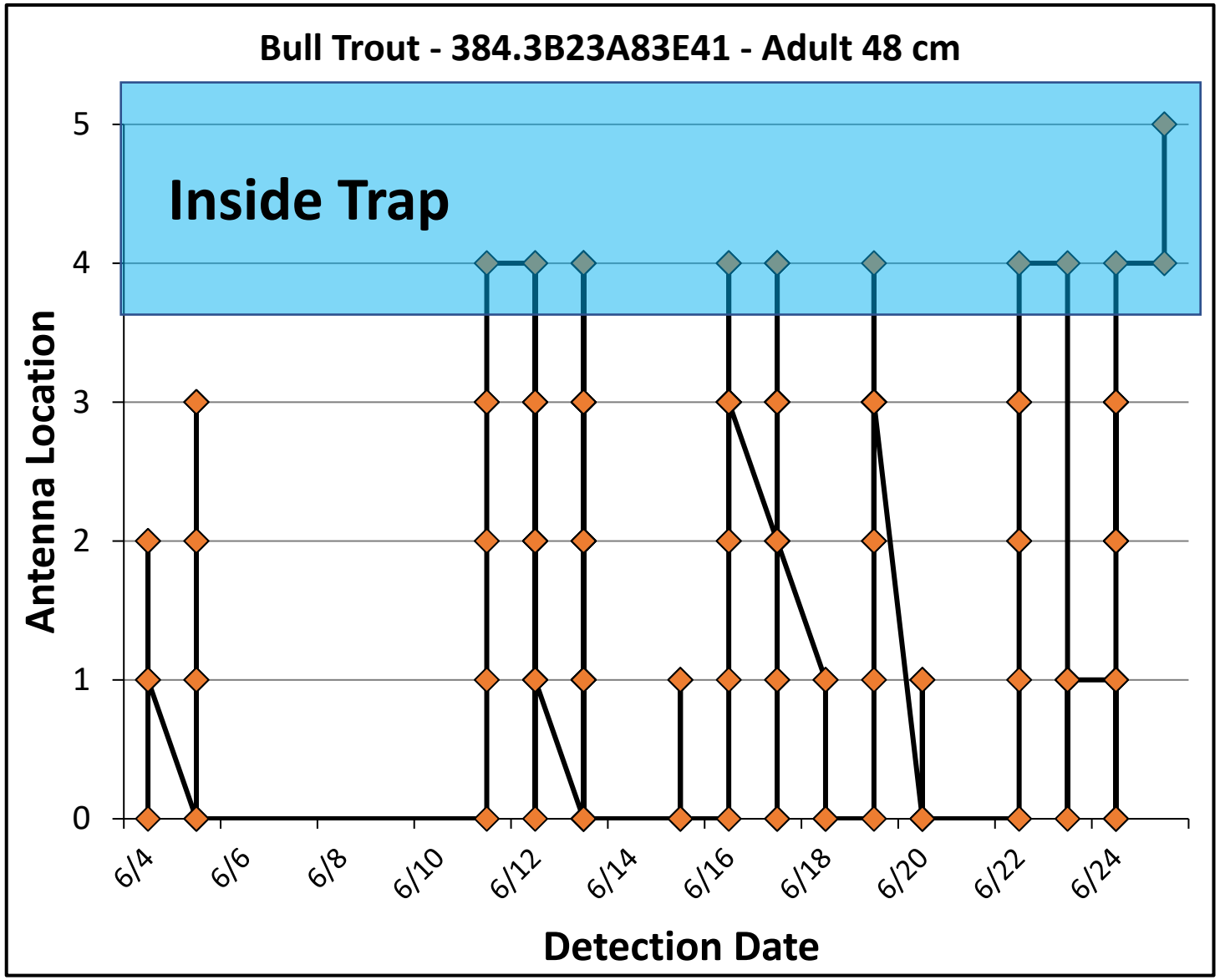
Passage Delay



Trap Escapement 2019

Y-Axis Legend

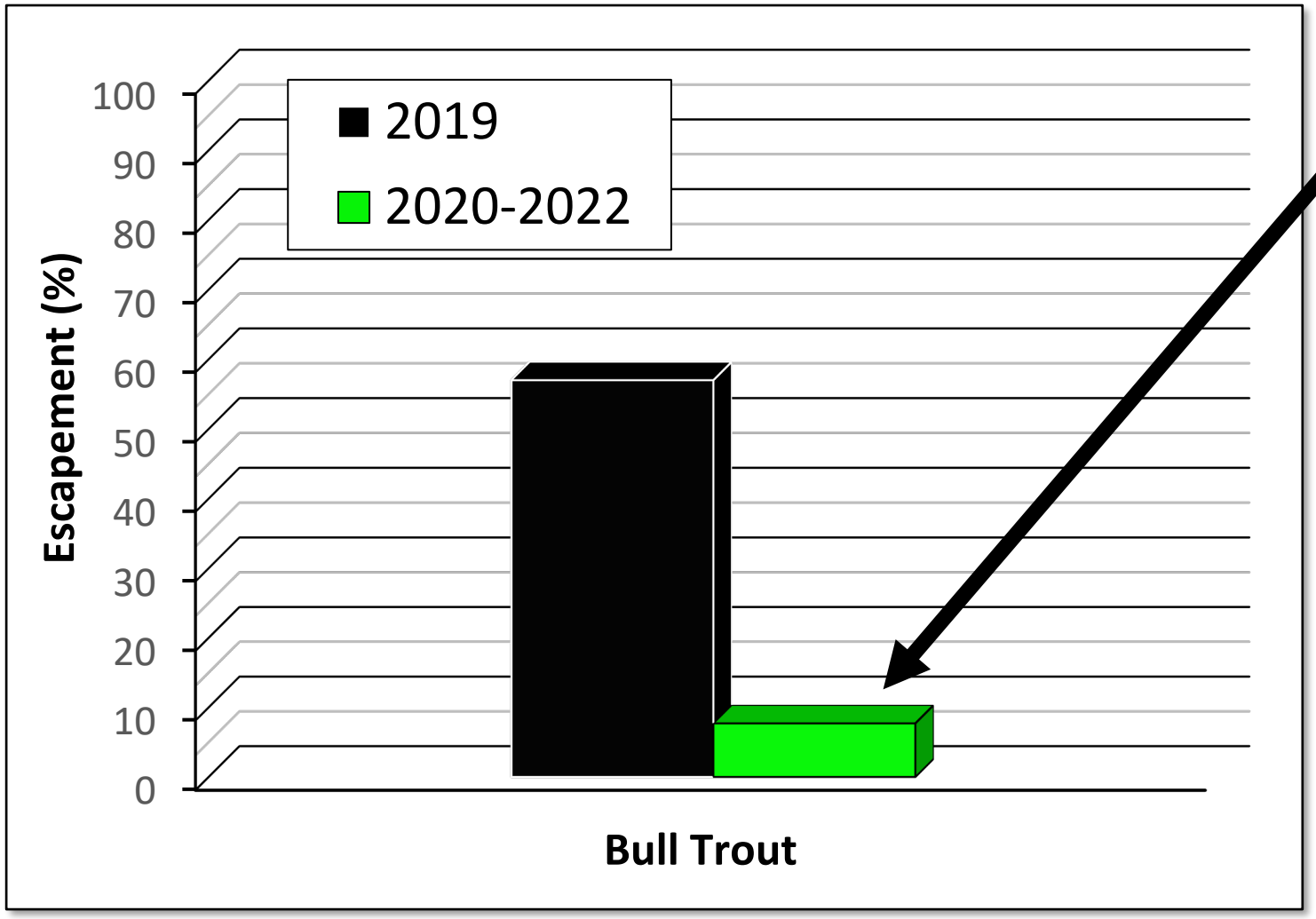
5 = Trap Capture
4 = Trap Antenna
3 = Upper Ladder
2 = Lower Ladder
1 = Downstream Upper Row
0 = Downstream Lower Row



Old Trap Fyke

New Trap Fyke

Trap Escapement Rates



2 of 26 fish

Entered trap at nearly the same time late in the afternoon 5/16/22.

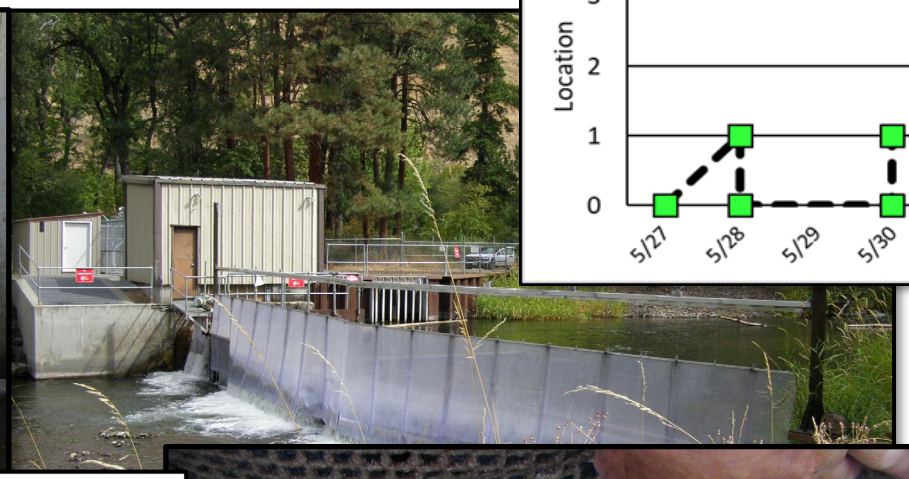
Exited the trap within an hour of each other early in the morning on 5/17/22

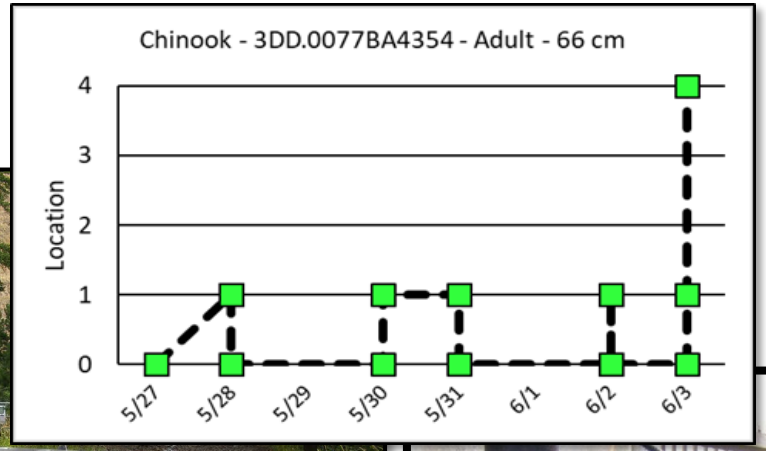
Bar(s) got stuck in up position for a short time??

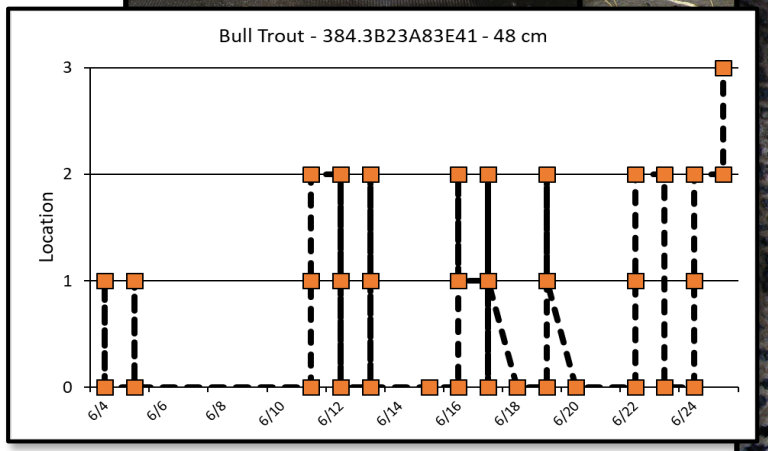
Conclusions:

- **Overall Conversion Rates** ***
    - Bull Trout conversions have remained similar each study year(>95%).
    - Increased conversion of spring Chinook and steelhead compared to previous years – critical in years of low returns.
- **Passage Delay Rates** 
    - Some Bull Trout still taking longer than 8 Days, but passage delay of fish (all species – SH, SPCH) has decreased since the trap fyke was changed.
- **The new trap fyke has nearly eliminated escapement**

Questions




Chinook - 3DD.0077BA4354 - Adult - 66 cm
Location
4
3
2
1
0
5/27
5/28
5/29
5/30
5/31
6/1
6/2
6/3


Bull Trout - 384.3B23A83E41 - 48 cm
Location
3
2
1
0
6/4
6/6
6/8
6/10
6/12
6/14
6/16
6/18
6/20
6/22
6/24