Assessment of salmon hatchery fishways and barrier dams relative to adult Pacific Lamprey passage

are you passing them?

Joe Skalicky

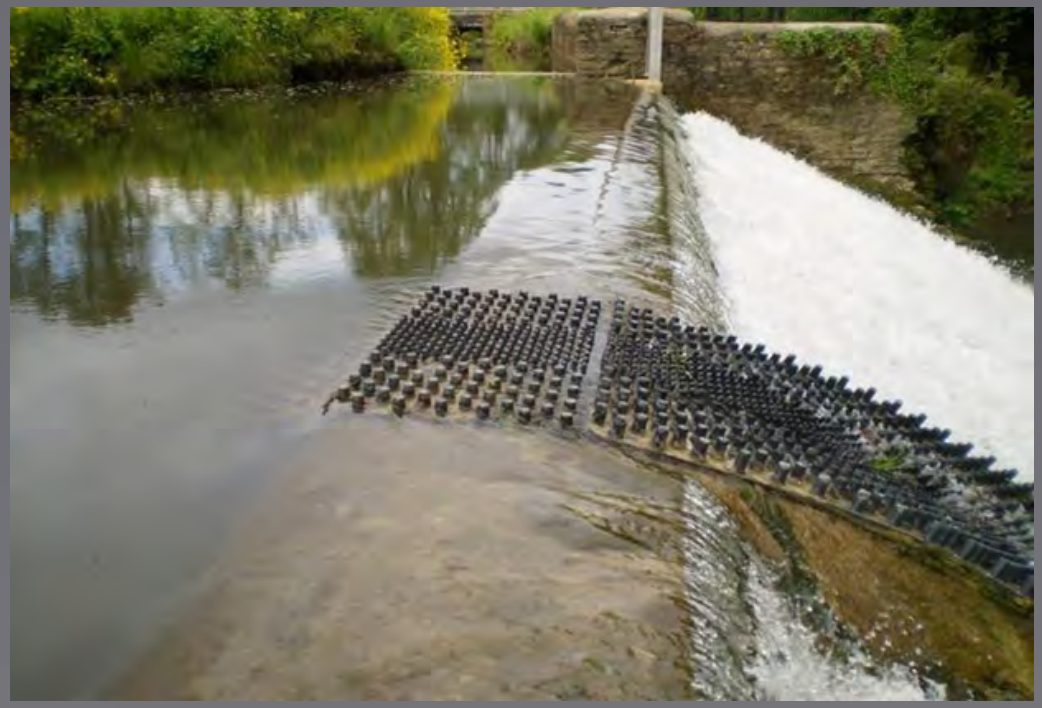
US Fish and Wildlife Service

2019 PACIFIC LAMPREY INFORMATION EXCHANGE, VANCOUVER, WA

Photo Credit: David Herasimtschuk

Objectives

1) Raise Awareness
2) Overview of hatcheries in PNW
3) Methods
4) Results
5) Case Study

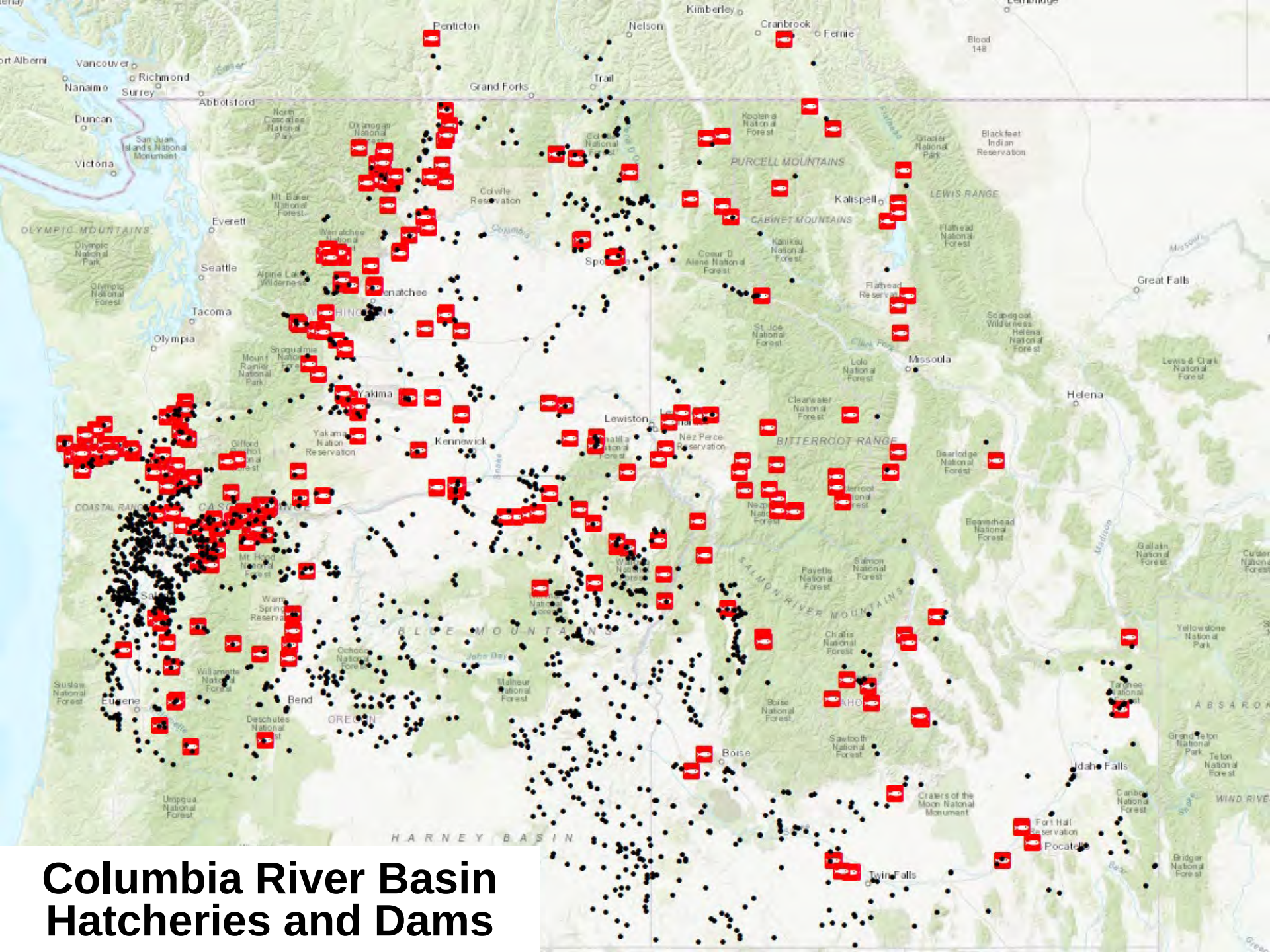


What’s going on here?

Damon Goodman – Van Arsdale, CA

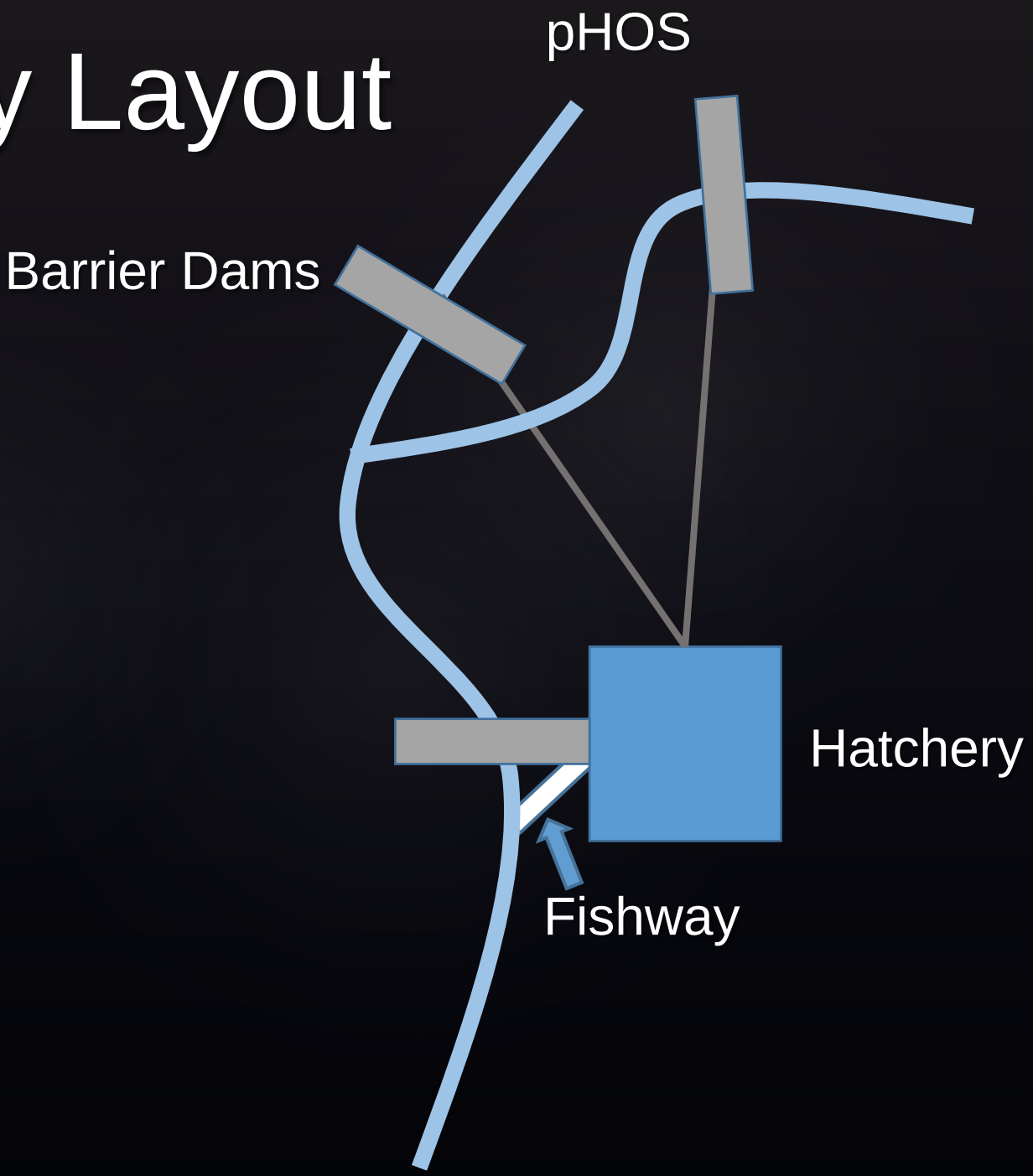
Hatcheries in the PNW

- Late 1800s first hatcheries went in Oregon and Washington
- Today there are 160+
- Fish Passage Criteria?
- Lamprey – Nuisance!



Columbia River Basin Hatcheries and Dams

Hatchery Layout



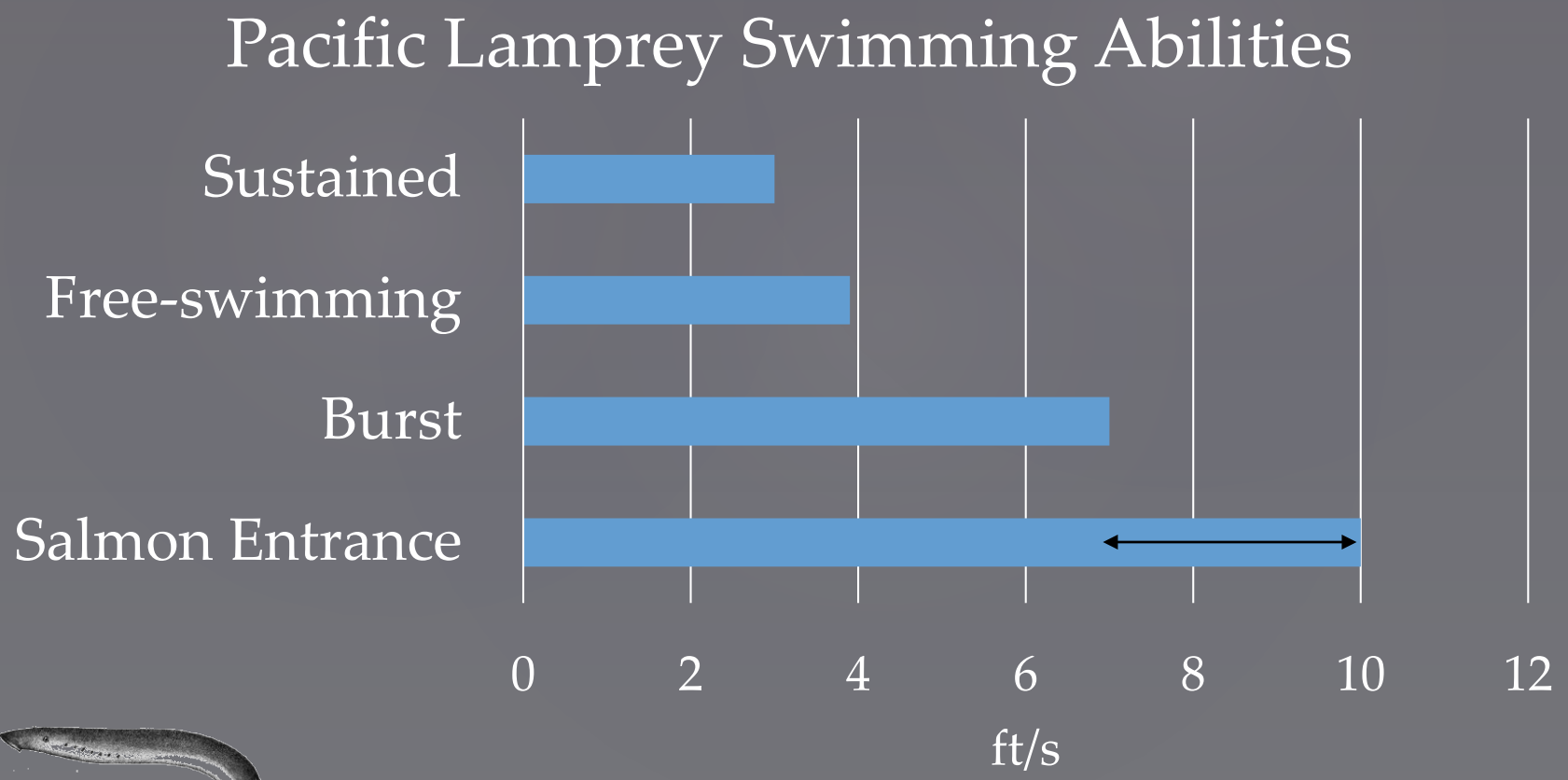
CRFWCO Lamprey Passage History

- 2011 – Hatchery Review Team Recommends passage assessment for Bull Trout and Pacific Lamprey at Warm Springs N.F.H.
- 2012 – 4/6 lamprey observed in the fishway were dead
- 2013 Fishway & barrier dam assessment
- 2017 – LPS installed

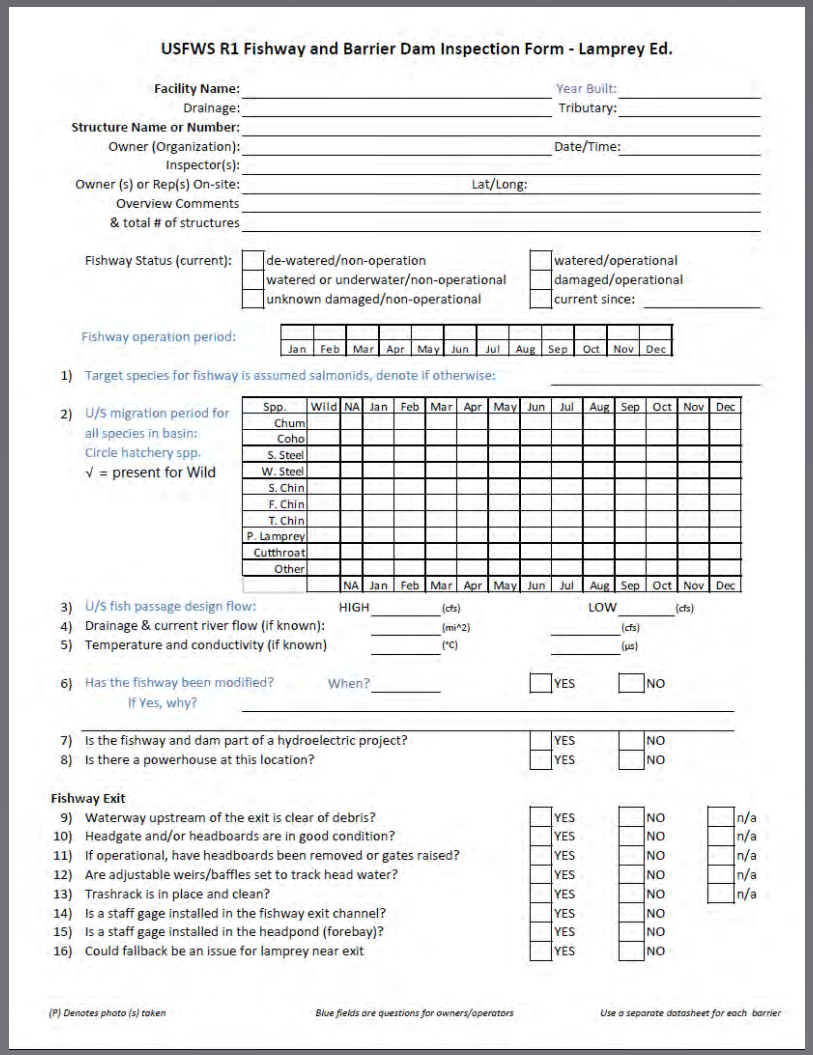
Generalized Process

1. Scoping
2. COORDINATION
3. Assessment - Physical
4. COORDINATION
5. Assessment - Biological
6. COORDINATION
7. Remediation
8. COORDINATION
9. MONITORING
10. Etc.

Pacific Lamprey Technical Workgroup. 2017. Practical guidelines for incorporating adult Pacific lamprey passage at fishways.



Pacific Lamprey Fishway and Barrier Dam Inspection Form



USFWS R1 Fishway and Barrier Dam Inspection Form - Lamprey Ed.

Facility Name: _____ Year Built: _____
Drainage: _____ Tributary: _____
Structure Name or Number: _____
Owner (Organization): _____ Date/Time: _____
Inspector(s): _____
Owner (s) or Rep(s) On-site: _____ Lat/Long: _____
Overview Comments _____
& total # of structures _____

Fishway Status (current):
- ☐ de-watered/non-operation
- ☐ watered or underwater/non-operational
- ☐ unknown damaged/non-operational
- ☐ watered/operational
- ☐ damaged/operational
- ☐ current since: _____

Fishway operation period:

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

1) Target species for fishway is assumed salmonids, denote if otherwise: _____

2) U/S migration period for all species in basin: Circle hatchery spp. √ = present for Wild

Spp.	Wild	NA	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Chum														
Coho														
S. Steel														
W. Steel														
S. Chin														
F. Chin														
T. Chin														
P. Lamprey														
Cutthroat														
Other														
		NA	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

3) U/S fish passage design flow: HIGH _____ (cfs) LOW _____ (cfs)
4) Drainage & current river flow (if known): _____ (mi^2) _____ (cfs)
5) Temperature and conductivity (if known) _____ (°C) _____ (µs)

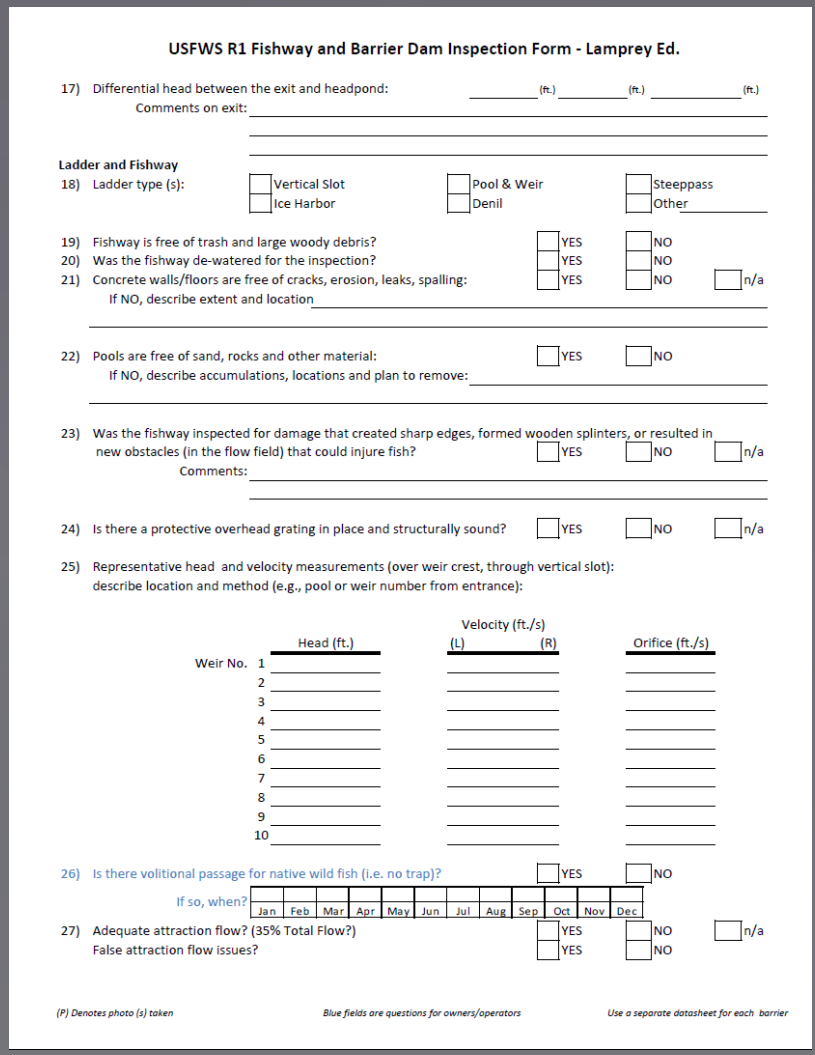
6) Has the fishway been modified? When? _____ ☐ YES ☐ NO
If Yes, why? _____

7) Is the fishway and dam part of a hydroelectric project? ☐ YES ☐ NO
8) Is there a powerhouse at this location? ☐ YES ☐ NO

Fishway Exit

9) Waterway upstream of the exit is clear of debris? ☐ YES ☐ NO ☐ n/a
10) Headgate and/or headboards are in good condition? ☐ YES ☐ NO ☐ n/a
11) If operational, have headboards been removed or gates raised? ☐ YES ☐ NO ☐ n/a
12) Are adjustable weirs/baffles set to track head water? ☐ YES ☐ NO ☐ n/a
13) Trashrack is in place and clean? ☐ YES ☐ NO ☐ n/a
14) Is a staff gage installed in the fishway exit channel? ☐ YES ☐ NO
15) Is a staff gage installed in the headpond (forebay)? ☐ YES ☐ NO
16) Could fallback be an issue for lamprey near exit ☐ YES ☐ NO

(P) Denotes photo (s) taken *Blue fields are questions for owners/operators* *Use a separate datasheet for each barrier*



USFWS R1 Fishway and Barrier Dam Inspection Form - Lamprey Ed.

17) Differential head between the exit and headpond: _____ (ft.) _____ (ft.) _____ (ft.)
Comments on exit: _____

Ladder and Fishway

18) Ladder type (s): ☐ Vertical Slot ☐ Pool & Weir ☐ Steeppass ☐ Ice Harbor ☐ Denil ☐ Other _____

19) Fishway is free of trash and large woody debris? ☐ YES ☐ NO
20) Was the fishway de-watered for the inspection? ☐ YES ☐ NO
21) Concrete walls/floors are free of cracks, erosion, leaks, spalling: ☐ YES ☐ NO ☐ n/a
If NO, describe extent and location _____

22) Pools are free of sand, rocks and other material: ☐ YES ☐ NO
If NO, describe accumulations, locations and plan to remove: _____

23) Was the fishway inspected for damage that created sharp edges, formed wooden splinters, or resulted in new obstacles (in the flow field) that could injure fish? ☐ YES ☐ NO ☐ n/a
Comments: _____

24) Is there a protective overhead grating in place and structurally sound? ☐ YES ☐ NO ☐ n/a

25) Representative head and velocity measurements (over weir crest, through vertical slot): describe location and method (e.g., pool or weir number from entrance):

	Head (ft.)	Velocity (ft./s) (L)	(R)	Orifice (ft./s)
Weir No. 1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

26) Is there volitional passage for native wild fish (i.e. no trap)? ☐ YES ☐ NO
If so, when?

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

27) Adequate attraction flow? (35% Total Flow?) ☐ YES ☐ NO ☐ n/a
False attraction flow issues? ☐ YES ☐ NO

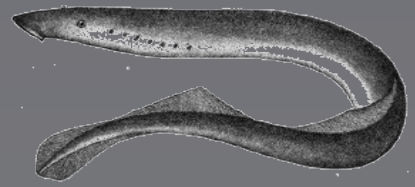
(P) Denotes photo (s) taken *Blue fields are questions for owners/operators* *Use a separate datasheet for each barrier*

Key Assessment Tools

Total Station

Velocity Meter

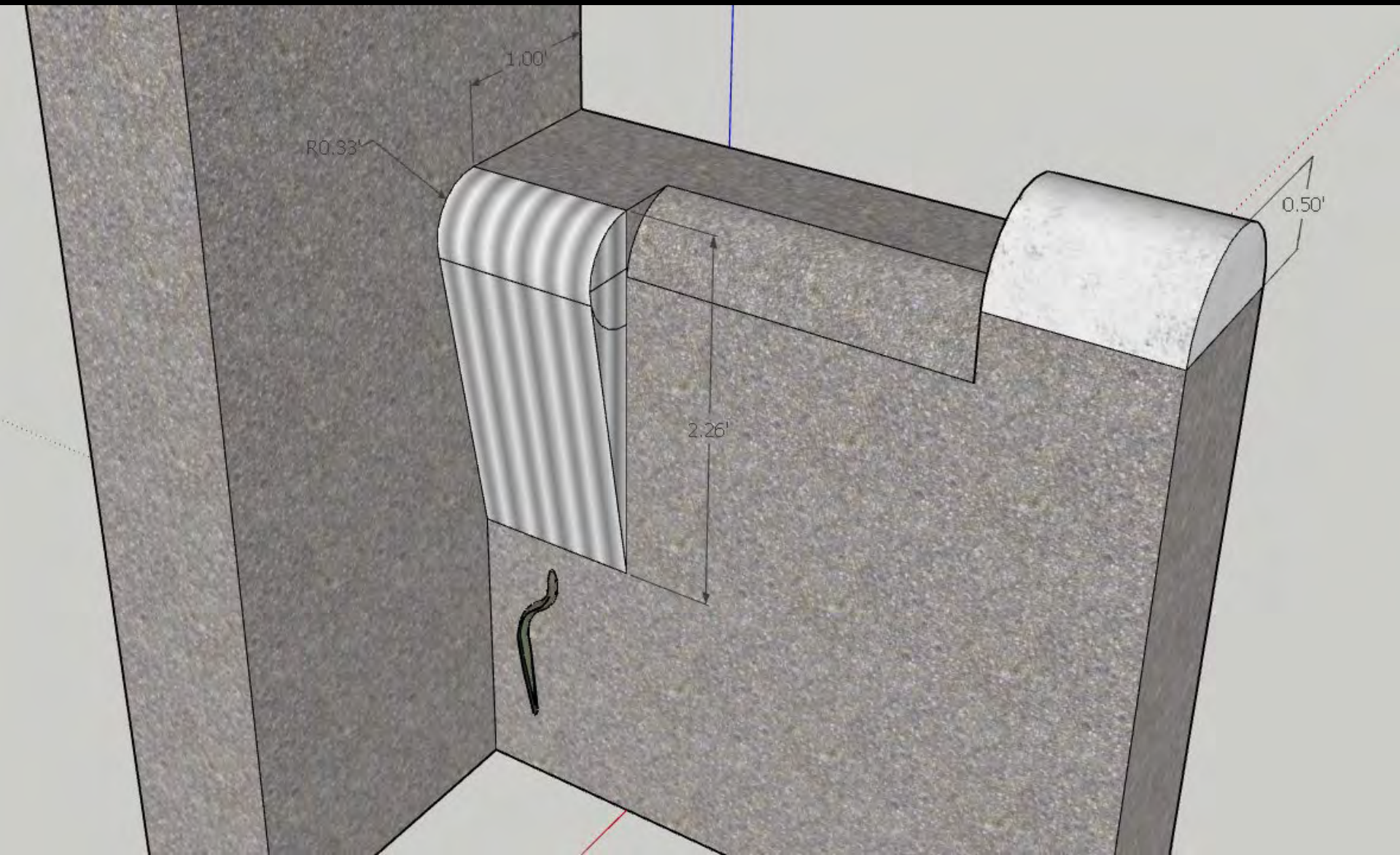
Camera



Results:

Why rounded corners matter

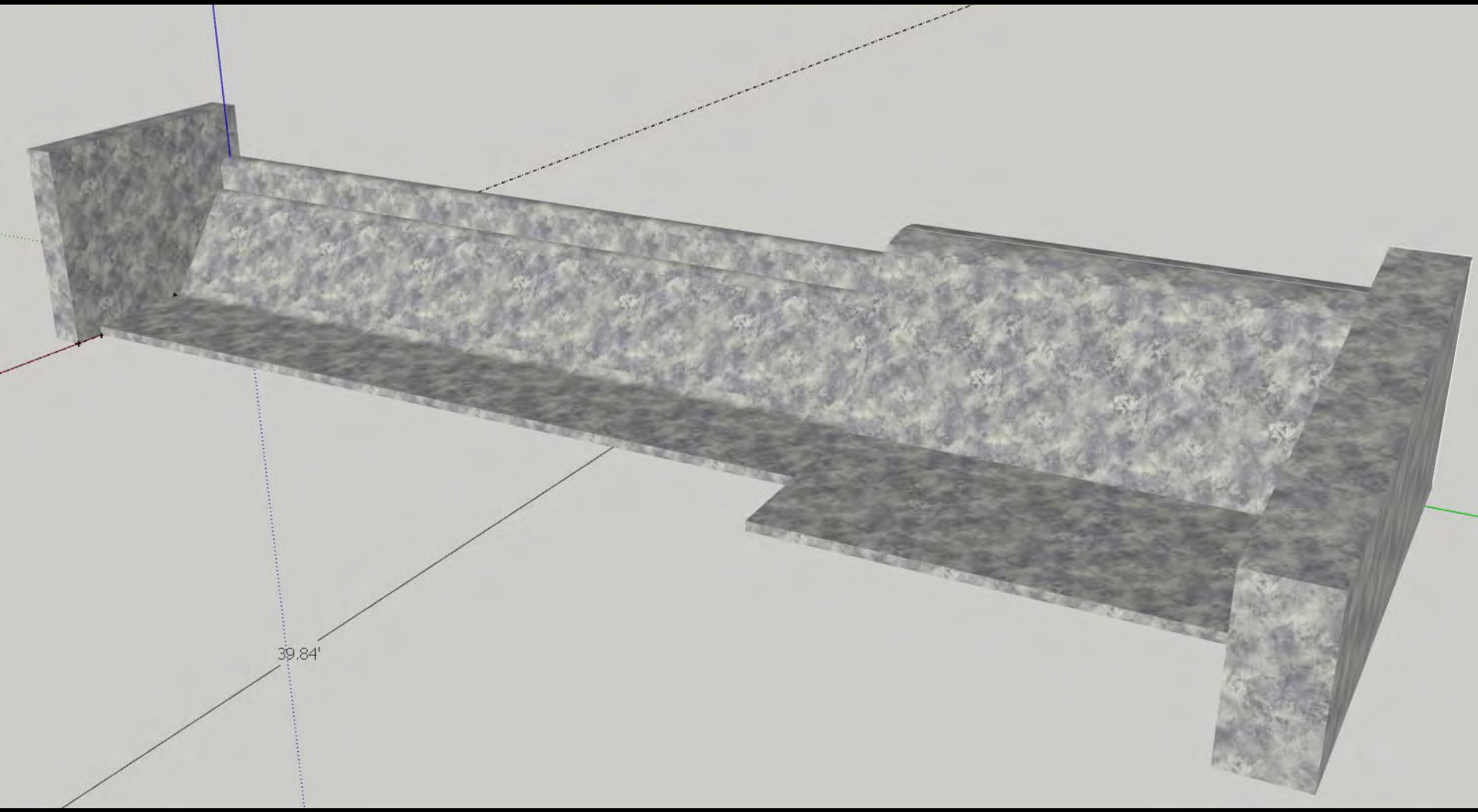
Fishways – 90° 0ptions

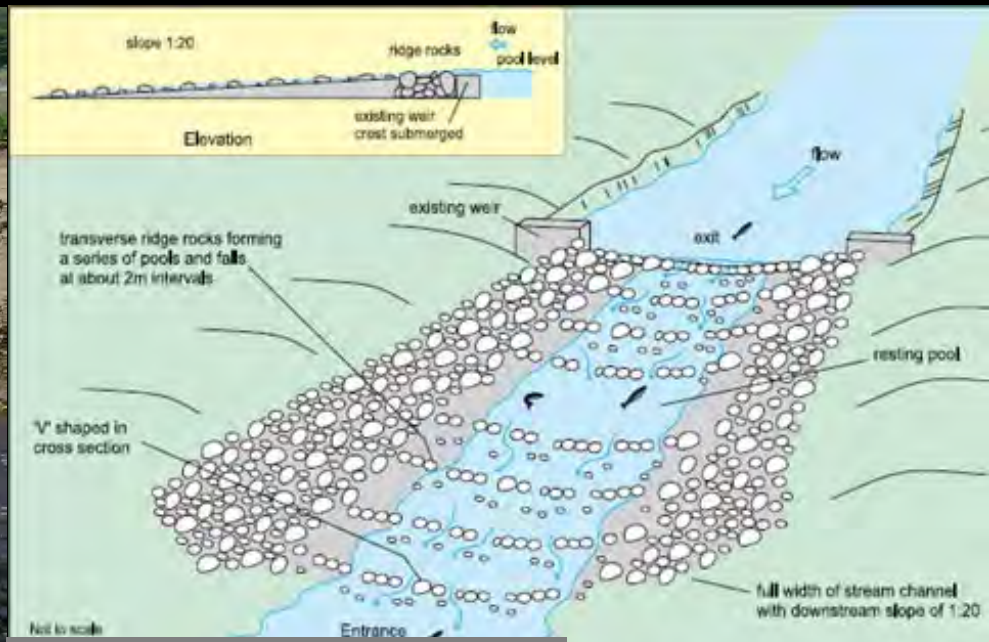



>0.7”

PIT Antennas

Fishway Exits


39.84'



Thorncraft and Harris 2000

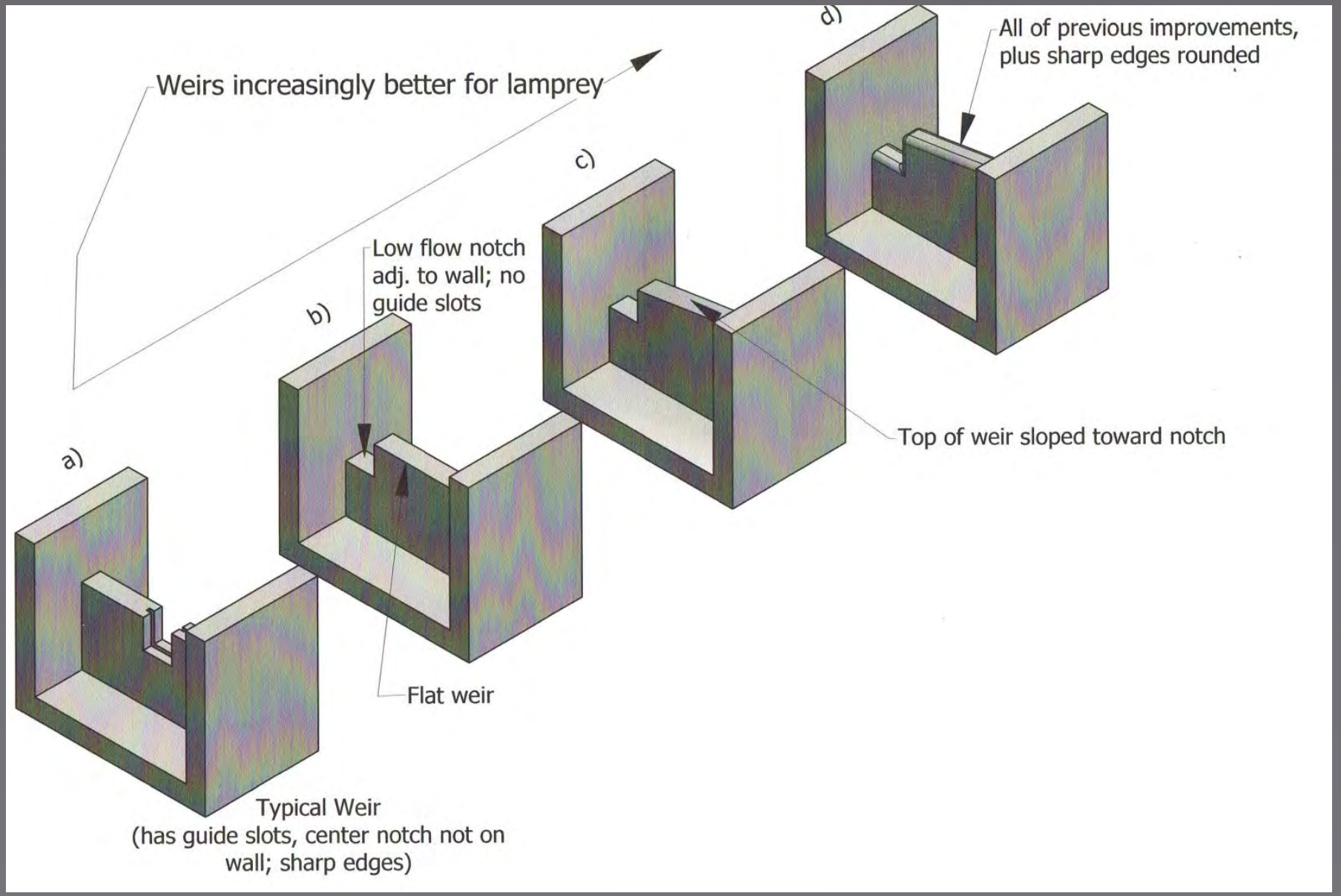
t of a full-width rock-ramp fishway

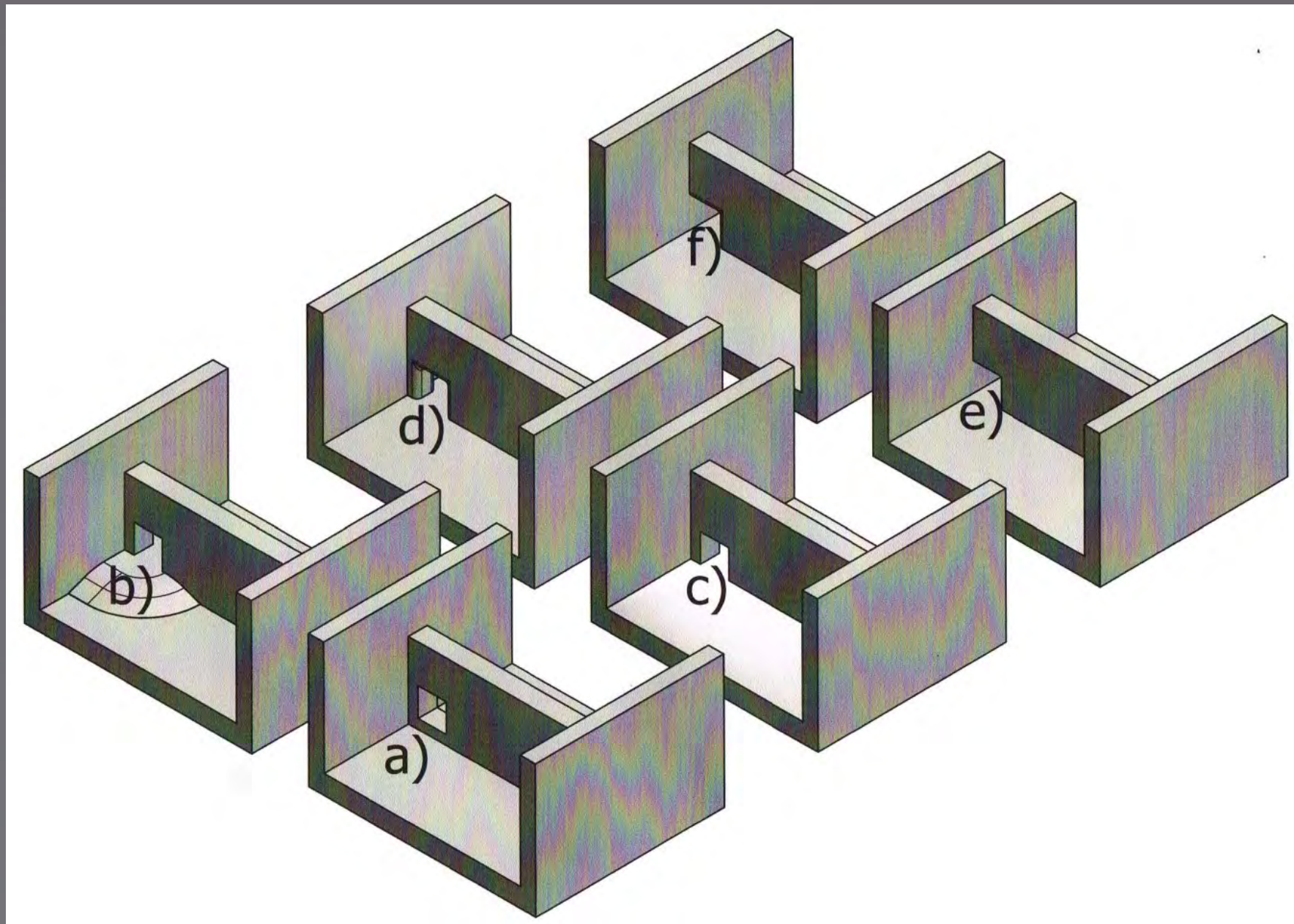
Simple Ramps & Wetted Walls

Ann Gray– Willamette Falls

Restoring Passage: Recent Experiments

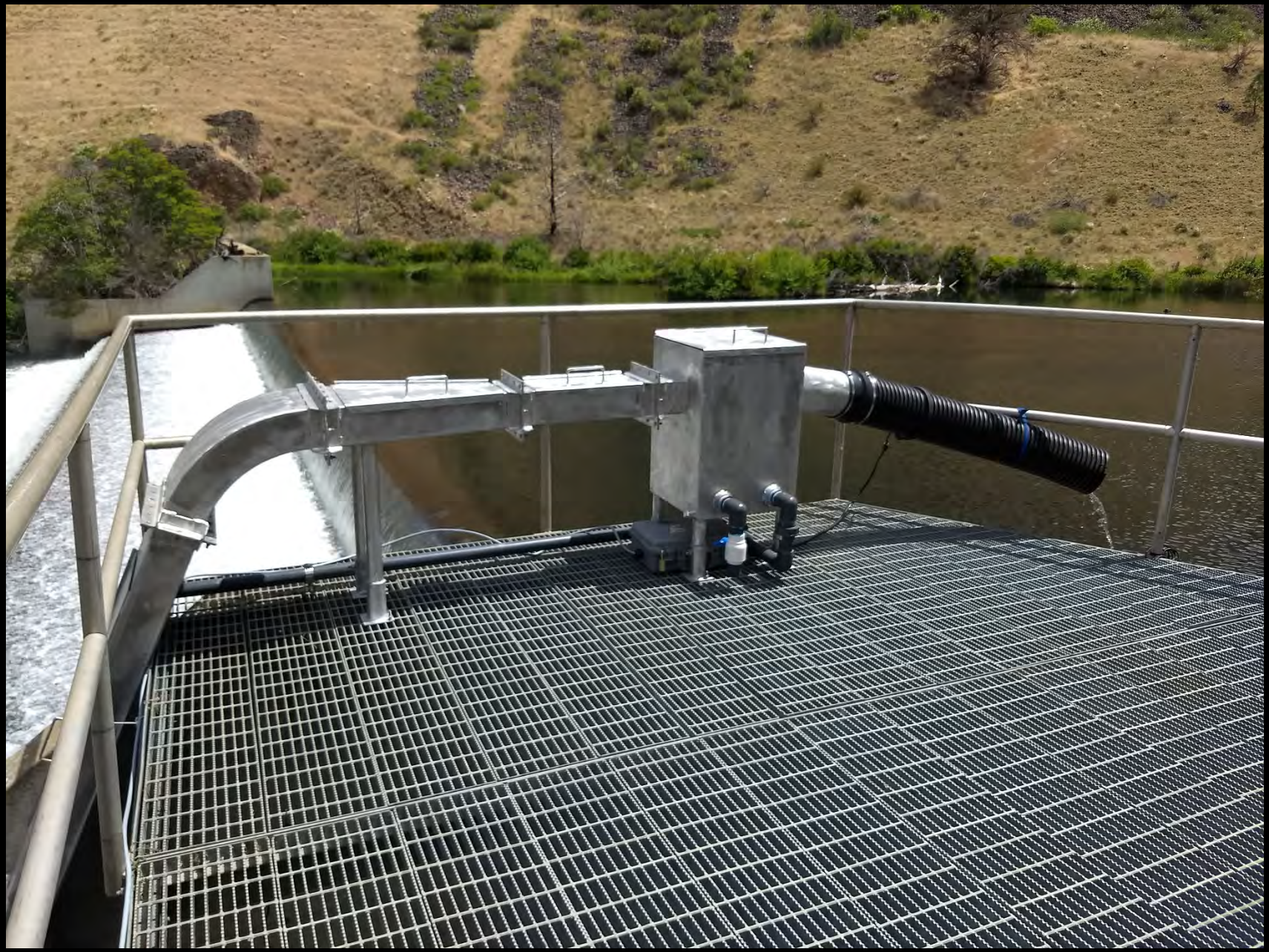
Van Arsdale Dam- lamprey passage tube
Damon Goodman and Stewart Reid
Photo : M. Macor- The Chronicle


Weirs increasingly better for lamprey
a)
b)
c)
d)
Low flow notch adj. to wall; no guide slots
Flat weir
Top of weir sloped toward notch
All of previous improvements, plus sharp edges rounded
Typical Weir
(has guide slots, center notch not on wall; sharp edges)


f)
d)
e)
b)
c)
a)

New Methods: Lamprey Tiles

Case Study: Warm Springs N.F.H.



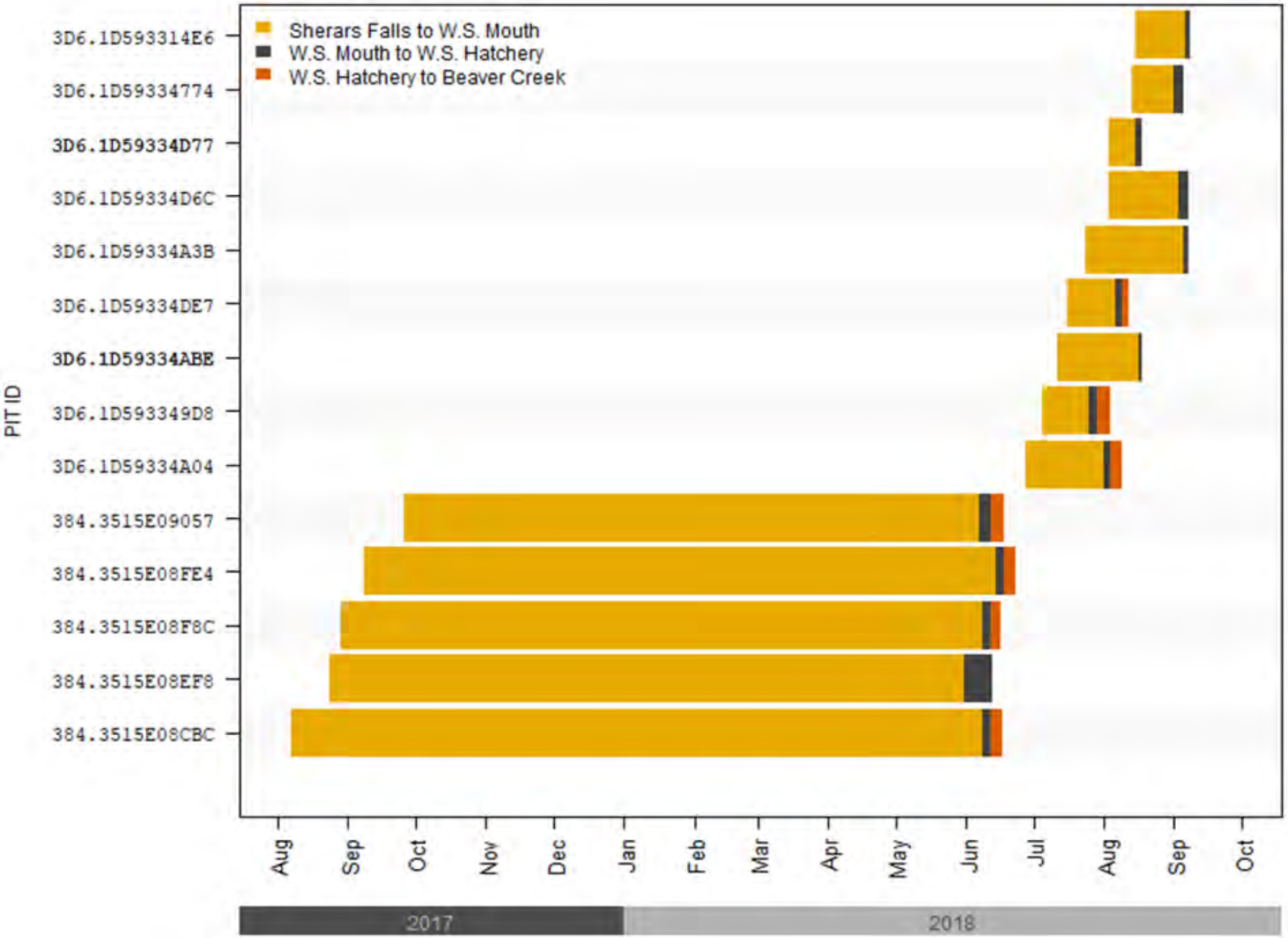
Lamprey Detection & Enumeration

$35 + $12

$11

$27

$85 + R code =


Sherars Falls to W.S. Mouth
W.S. Mouth to W.S. Hatchery
W.S. Hatchery to Beaver Creek
PIT ID
3D6.1D593314E6
3D6.1D59334774
3D6.1D59334D77
3D6.1D59334D6C
3D6.1D59334A3B
3D6.1D59334DE7
3D6.1D59334ABE
3D6.1D593349D8
3D6.1D59334A04
384.3515E09057
384.3515E08FE4
384.3515E08F8C
384.3515E08EF8
384.3515E08CBC
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
2017
2018

Assessment of salmon hatchery fishways and barrier dams relative to adult Pacific Lamprey passage

are you passing them?

Joe Skalicky

US Fish and Wildlife Service

2019 PACIFIC LAMPREY INFORMATION EXCHANGE, VANCOUVER, WA

Photo Credit: David Herasimtschuk