

Larval / Juvenile Lamprey Updates



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Lamprey Species (*Yakima River Basin*)



Pacific Lamprey
(Anadromous Species)



Western Brook Lamprey
(Resident Species)



Western River Lamprey
(Anadromous Western Brook)



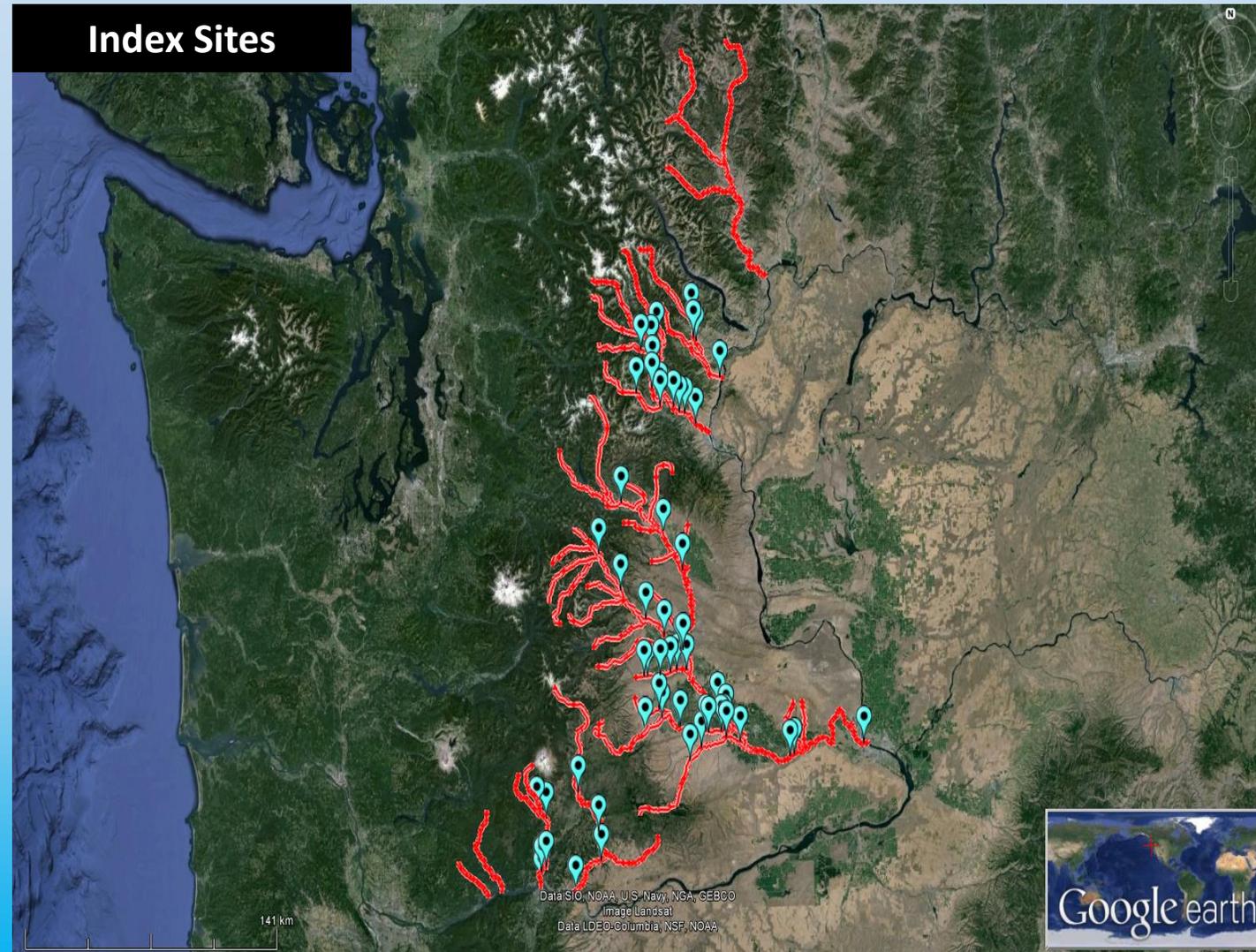
**Pacific Lamprey
Life Cycle**

Larval Stage Lamprey – “Ammocoete”



Larval Monitoring Efforts

- Electrofishing surveys (2009- Present)
- > 50 long term “index sites”
- Survey Subbasins:
 - Klickitat
 - Yakima
 - Wenatchee
 - Entiat
 - Methow
- **Areas you’re interested about?**
 - **Let us know!**



Larval Response to Adult Translocation Efforts

Adult Pacific Lamprey Translocation efforts are currently ongoing in Upper Columbia:

- **Yakima Subbasin (2012-Present)**

- Upper & Lower Yakima River (downstream and upstream of Roza Dam)
- Tributary Streams (Ahtanum, Satus and Toppenish)

- **Wenatchee Subbasin (2016-Present)**

- Upper & Lower Wenatchee River (downstream and upstream of Tumwater Dam)
- Tributary Streams (Icicle Creek)

- **Methow Subbasin (2015-Present)**

- Upper & Lower Methow River (downstream and upstream of Chewuch River confluence)
- Tributary Streams (Chewuch River)



Larval Response to Adult Translocation Efforts

Increase

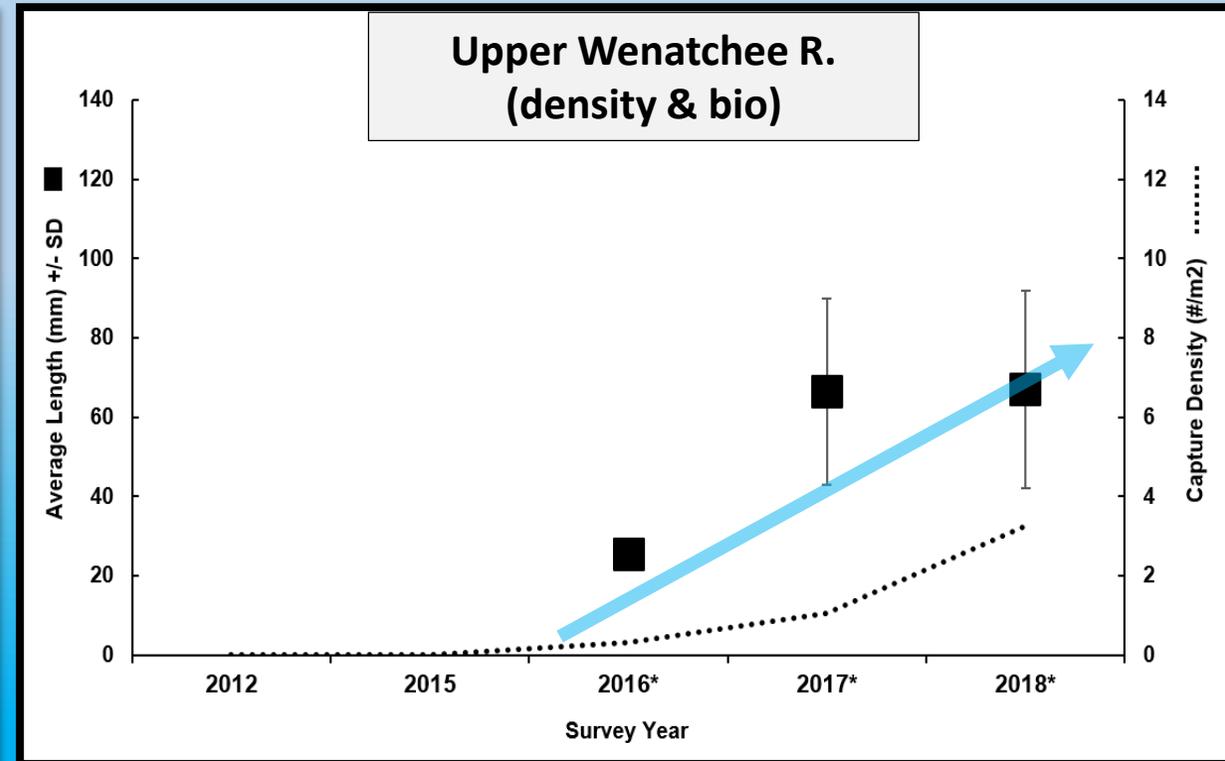
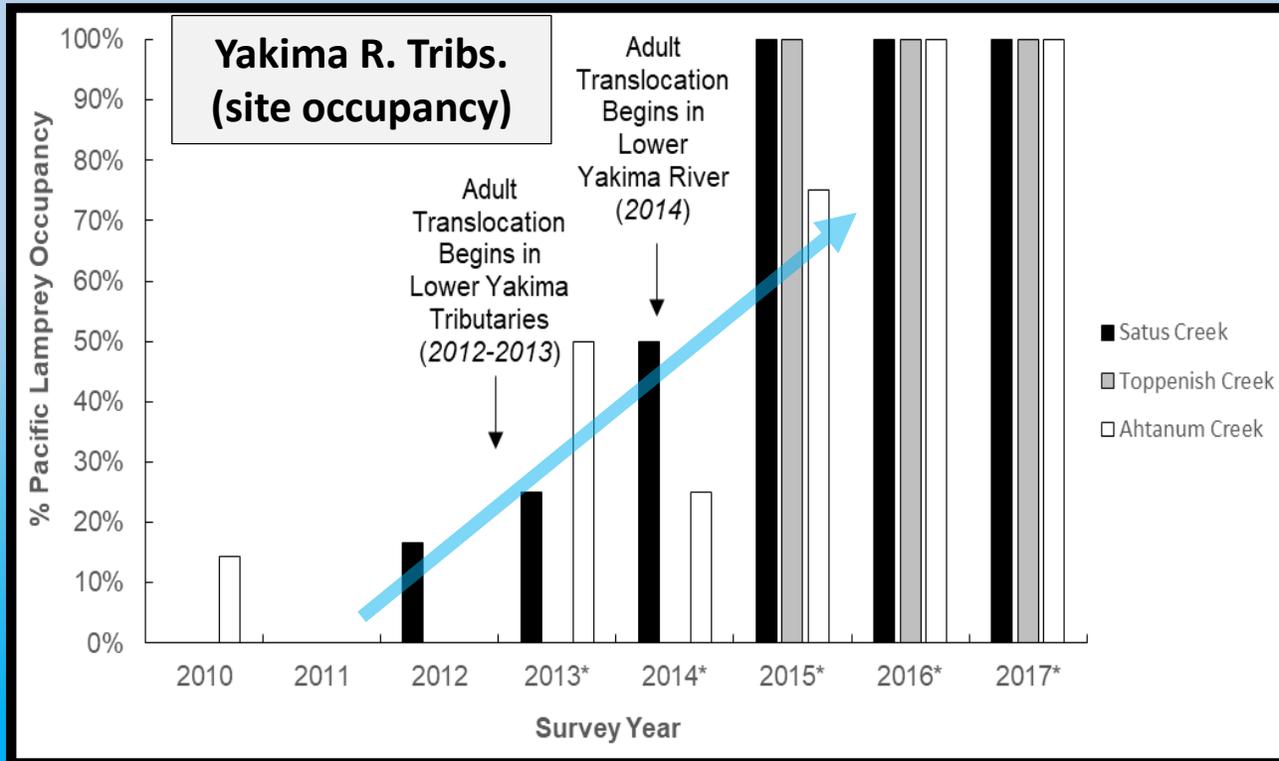


Larval Site Occupancy and Distribution

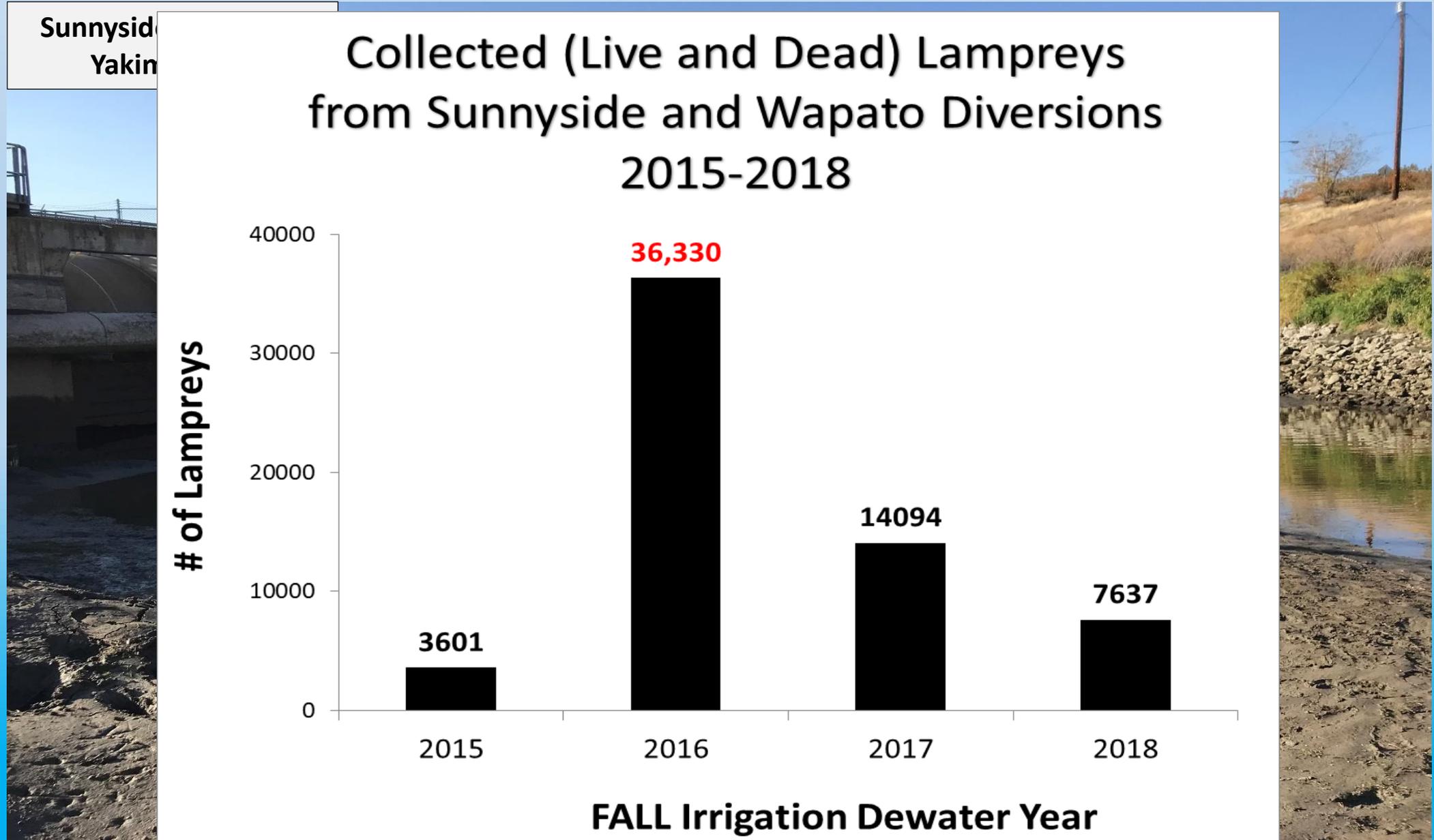
Increase



Larval Density and Biomass

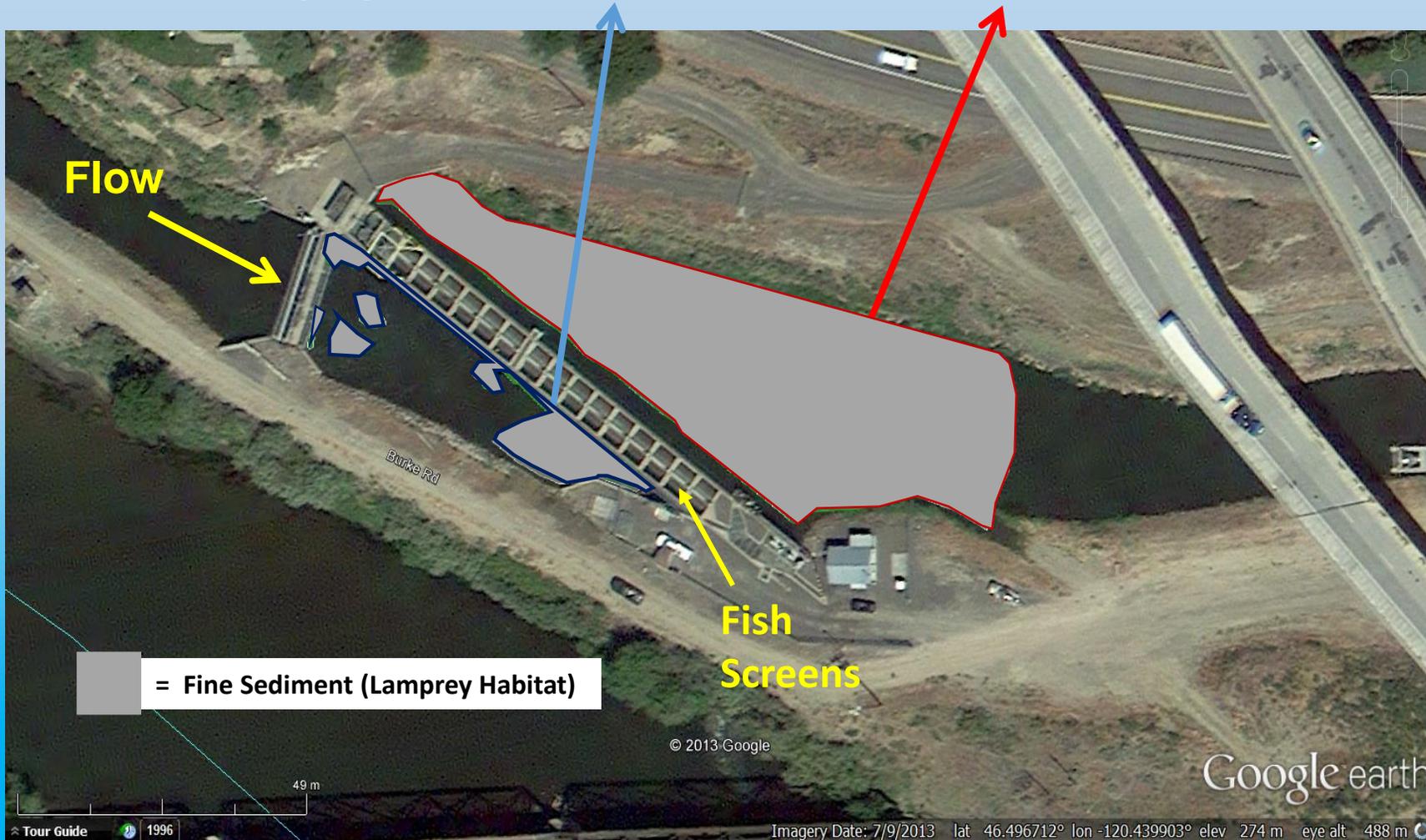


Larval Lamprey Entrainment in Irrigation Diversions



Lamprey # vs. Sediment Distribution

	Upstream Fish Screens	Downstream Fish Screens	
# of Lamprey	236 (19.6%)	970 (80.4%)	Fall, 2013
Habitat (m ²)	223 (9.0%)	2261 (91.0%)	Sunnyside Diversion, Yakima River



FVES – Flow Velocity Enhancement System

- **Increase Sweeping velocity in front of the fish screens**
 - Encourage lamprey to use the bypass and avoid passing through screens.

- **Natural Solutions, A Dam Site Better – Helena, MT.**

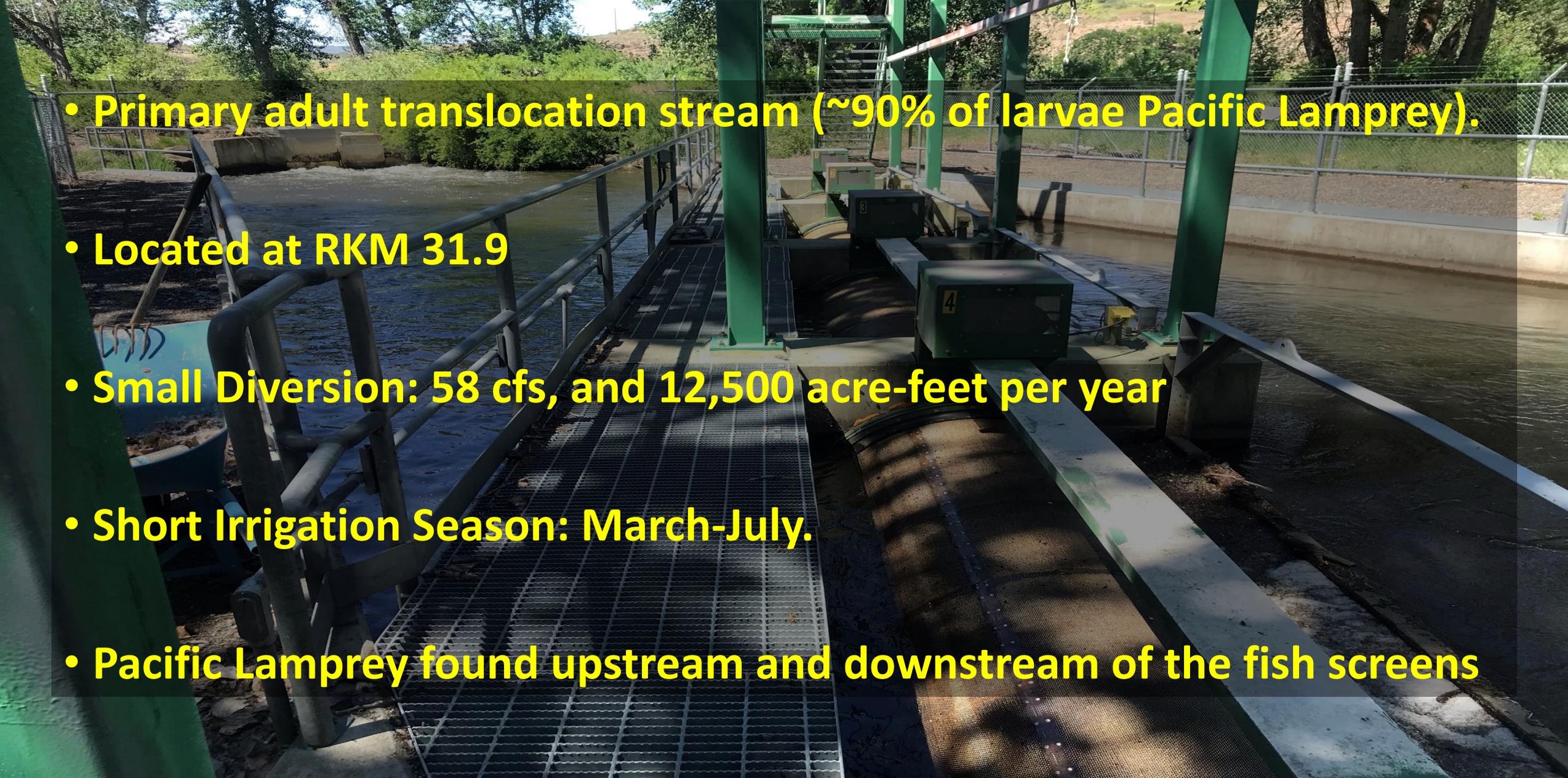
- Flow Velocity Enhancement System
- VENTURI PUMP designed to direct flow.



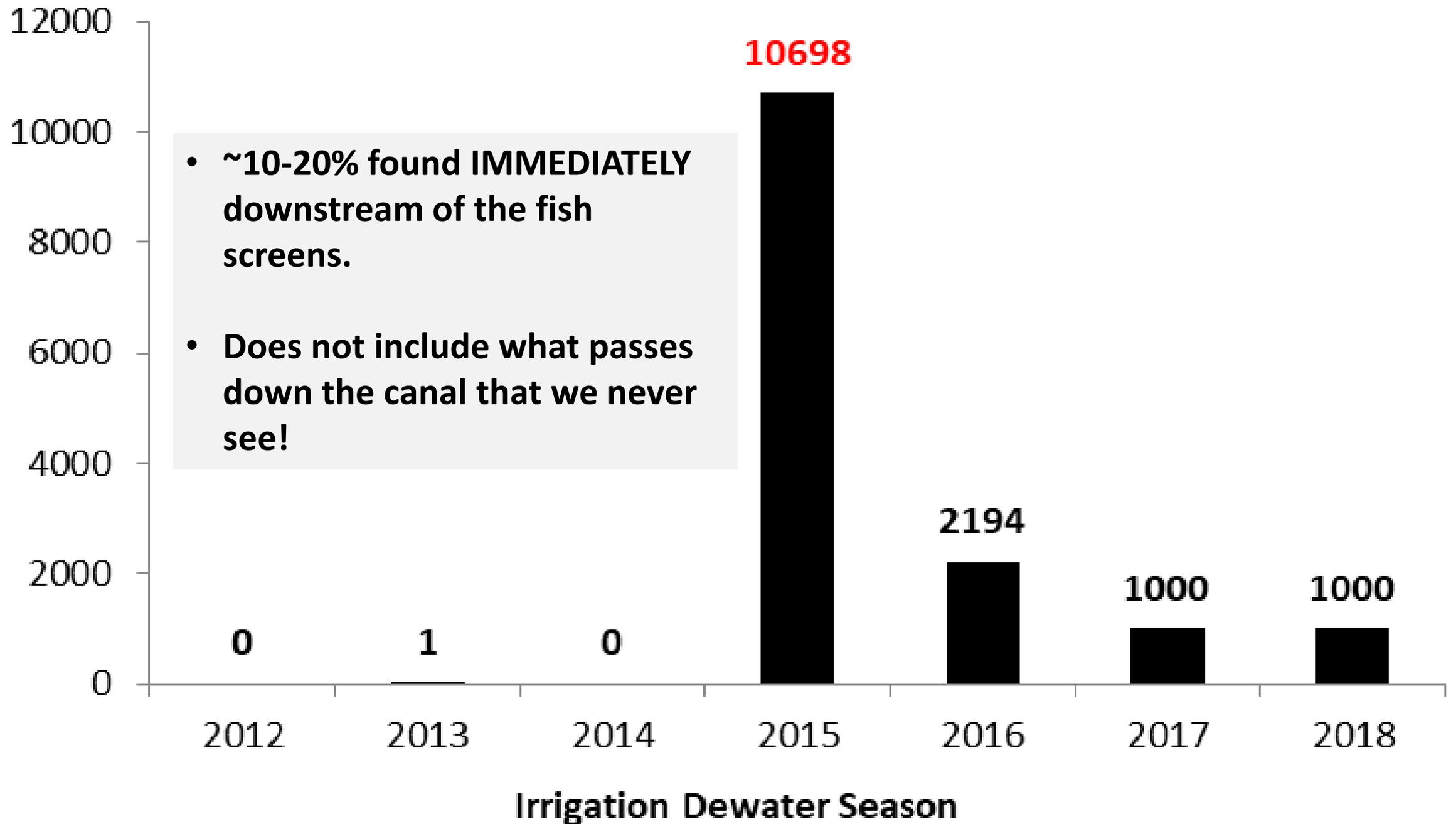
- **Northwest Power and Conservation Council Approved Pilot Project**

- ~ \$41,000 for a pilot project for the FVES System

Planned Study Site: Bachelor-Hatton Diversion – Ahtanum Creek

- 
- **Primary adult translocation stream (~90% of larvae Pacific Lamprey).**
 - **Located at RKM 31.9**
 - **Small Diversion: 58 cfs, and 12,500 acre-feet per year**
 - **Short Irrigation Season: March-July.**
 - **Pacific Lamprey found upstream and downstream of the fish screens**

of Captured Lampreys



How to monitor effectiveness of the FVES system?

- **Install PIT Tag arrays in downstream canal, and bypass**
 - Taggable Lamprey Size: ≥ 70 mm (with 8 mm FDX Pit Tags)
 - Is this possible? Need advise/help.
- **VIE Tags –**
 - Different colors before, during, and after FVES operation
 - Taggable Lamprey Size: ≥ 15 mm +
- **Plankton nets (to capture movements of smaller larvae).**

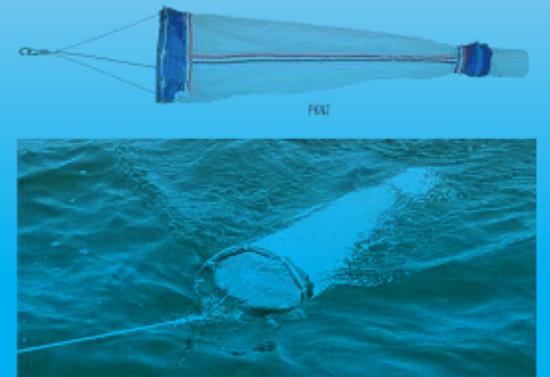
VIE tags



8 mm Pico PIT tags



Plankton Nets



Juvenile Pacific Lamprey – “Macrophthalmia”



**~ 3-7 Years Old
(~110 mm – 200 mm)**



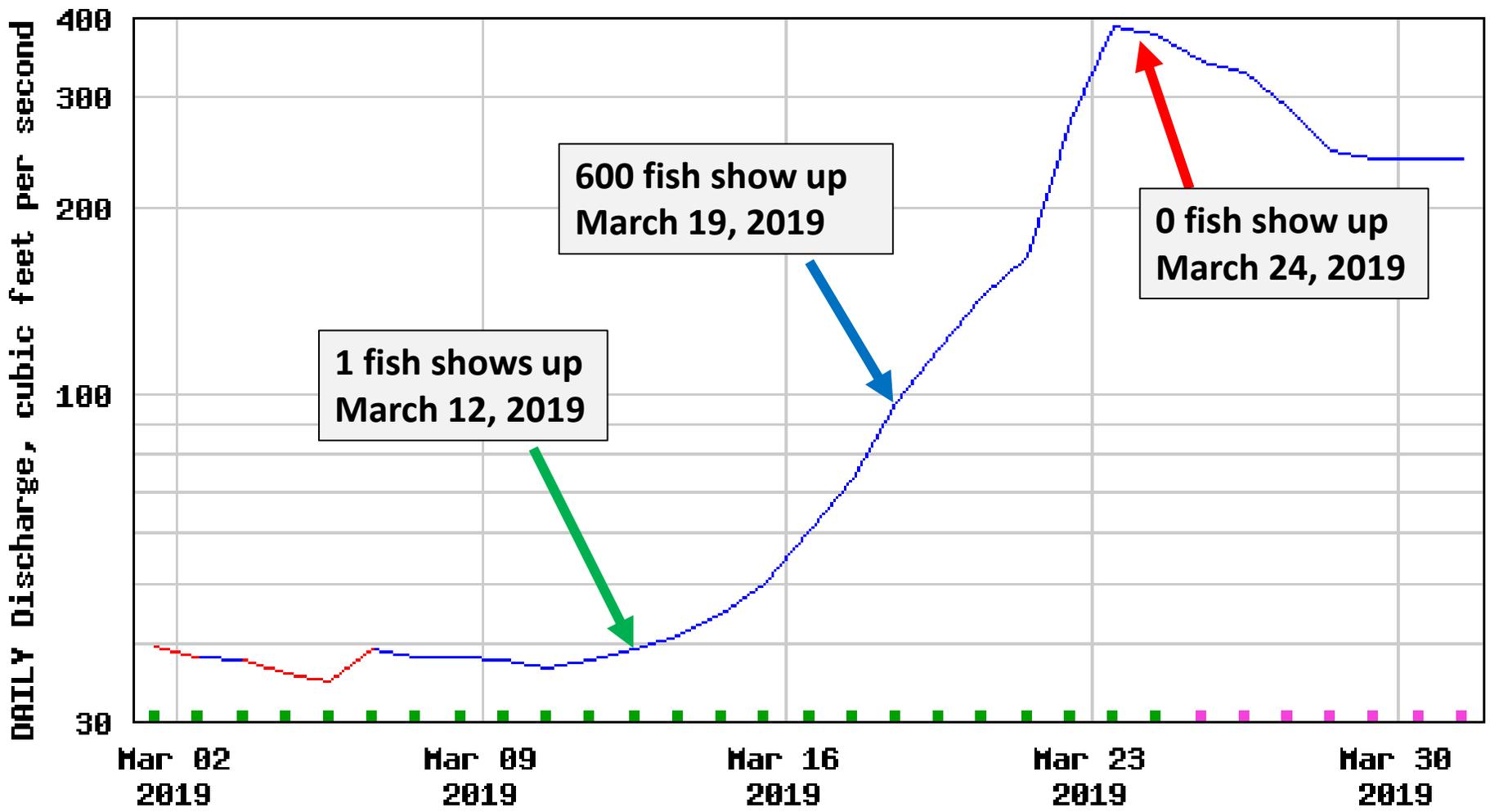
Juvenile Migration from Yakima Subbasin

- ~ Increasing numbers of juveniles captured at tributary screw traps.
- **Primary migration in Late Winter/Spring**
- ~ **1,000+ juveniles at Upper and Lower Toppenish Creek screw traps so far in 2019**
 - Peak in Late Feb/March.
- ~ **10,000 juveniles entered Chandler Bypass Monitoring Facility so far in 2019 (Lower Yakima River).**
 - Peak in April and early June.



**~600 Juveniles
Toppenish Creek
Upper Screw Trap
(Harrah Road)**

USGS 12506000 TOPPENISH CREEK NEAR FORT SIMCOE, WA



— Daily mean discharge █ Period of approved data
— Estimated daily mean discharge █ Period of provisional data

Triggers for Migration

- Increasing trends in flow

- Increasing trends in turbidity

Juvenile Genetic (Fin Clip) Collection

- Collection of genetic samples (fin clips) from hundreds of migrating juveniles and larvae.
- Provide valuable information on origin, age, etc. (based on parentage analysis from translocated adults).

3-27-19 Chandler Naivos collected 3/26 + 3/27 End @ 1017	Prosser Hatch Prosser, WA		1011	1012	1013	1014	1015	1016	1017	1018	1019	1020
												
		B							3-27-19 End	3-28-19 start		3-28-19 end
3-28-19 Chandler Naivos collected 3/28 Start @ 1018 End @ 1020	Prosser Hatch Prosser, WA		L: 129	L: 132	L: 125	L: 145	L: 151	L: 138	L: 157	L: 140	L: 146	L: 158
			Ad (E) L	Ad (E) L	Ad (E) L	Ad (E) L	Ad E (D)	Ad E (D)	Ad E (D)	Ad (E) L	Ad (E) L	Ad (E) L
			PIT DFBC1	PIT DFB81	PIT DFBC4	PIT DFB94	PIT DFB8D	PIT DFB83	PIT DFBA0	PIT NO PT.	PIT NO PT.	PIT NO PT.

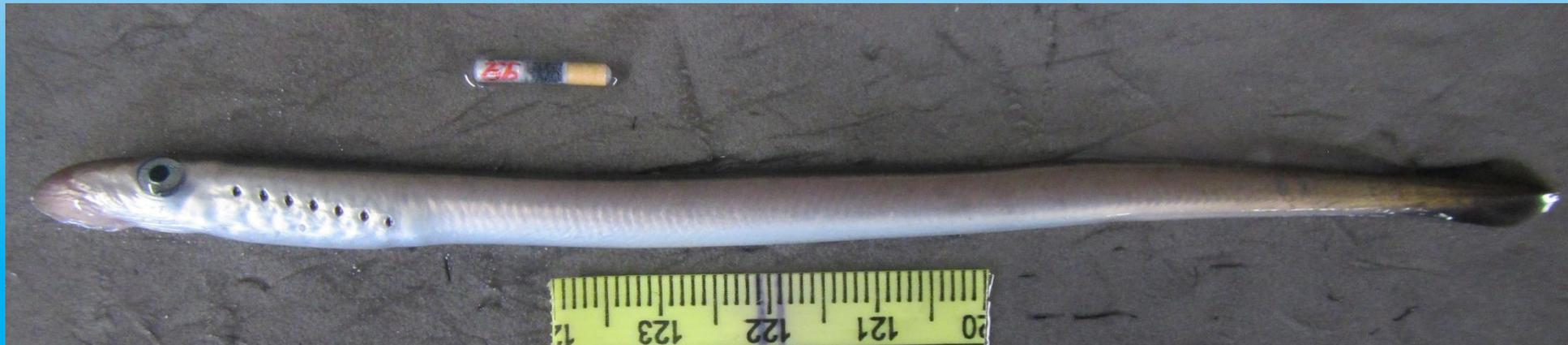
Juvenile PIT Tagging

- Pit Tag (8mm FDX tags) hundreds of juveniles in 2018 and 2019
- Tagged Juveniles will help understand:
 - Screw trap efficiency
 - Entrainment Rates (Sunnyside and Chandler canals)
 - Migration Rates



Acoustic Telemetry Project

- **Partnership Study:**
 - USGS, Yakama Nation, BOR and Pacific Northwest National Laboratory (PNNL)
- **3-Year Pilot Project**
- **Experimental acoustic tag developed by PNNL.**
 - 12 mm, 0.08 grams
- **Lamprey \geq 140 mm (current standard)**



Acoustic Telemetry Project

- **Project Year 1 (May, 2018) Highlights:**

- Released 96 acoustically tagged juveniles
- 95.6% of fish detected
- Successfully tracked migrating lamprey from Wapato Dam (Yakima R.) to Bonneville Dam (Columbia R.).
- **30-35 miles/day average travel speed**
- **8.0-9.6 Days to Travel ~300 river miles between Wapato Dam and Bonneville Dam.**



Acoustic Telemetry Project

- **Project Year 2 (May-June, 2019)**

- Released ~ 130 acoustic tagged juveniles
- “Late” start in the year (lower water flows)
- Low detections compared to 2018 (still analyzing data)

- **Project Year 3 (March?, 2020)**

- Up to 300 tags (depending on available funding).
- Hope to start earlier in the year (~March during peak migration).
- Test migration in different flow conditions.

“Best” Juvenile Holding Conditions

- **Fast water turn-over rate (≤ 10 min based on our experience)**
- **Rocks (cover) in holding containers are important!**
- **Colder the water temperatures, the better! We try to stick to <18 C for long term (>3 day) holding.**

Floating Perforated 5 Gallon Buckets (w/ Inlet Hose): ~ 5 Minute Turnover Rate



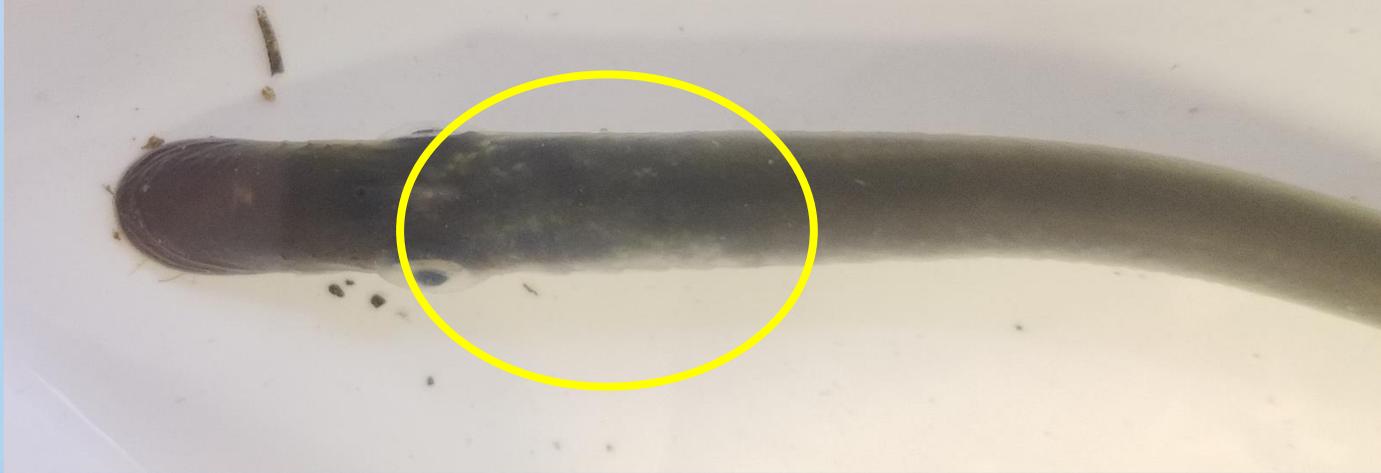
10 Gallon Aquariums: ~ 5 Minute Turnover Rate





Stressed fish = potential for fungus growth

Light Fungus Growth

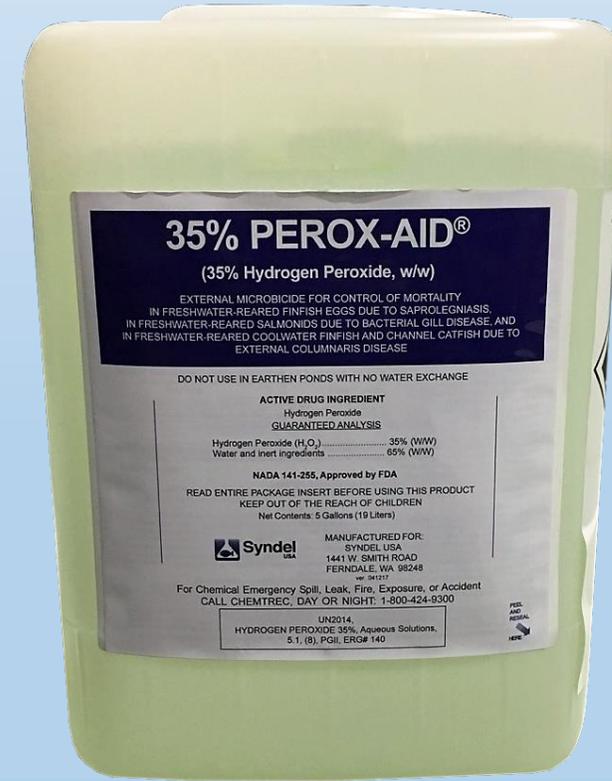


Heavy Fungus Growth



Treatment for Fungus

- 125 mg/L Hydrogen Peroxide (using 35% Perox-aid®)
- 1 treatment per day, 1 hour long.
- 2-3 consecutive treatments
- 4-6 treatments total to “remove” fungus.
- In the process of testing other forms of treatment (formalin and salt).



Before Treatment



**After (4) Treatments
125 mg/L H₂O₂**



Questions?

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