Issues, uncertainties, and research needs for juvenile lamprey passage

Matthew G. Mesa
U. S. Geological Survey
Columbia River Research Laboratory

U.S. Department of the Interior
U.S. Geological Survey


What passage issues will juvenile lampreys face during their downstream migration?
© Michael Durham / www.DurmPhoto.com
USGS

Water diversions and dams

USGS

Effectiveness of common fish screen materials to protect lamprey ammocoetes

USGS

*Nearly 80% of water diversions in the Pacific Northwest are unscreened & can pose a major risk to fish**

*FRIMA 2002-04 report

USGS

What about the other 20%?

Criteria for screen design, operation, and protection of fish largely from studies of salmonids

USGS

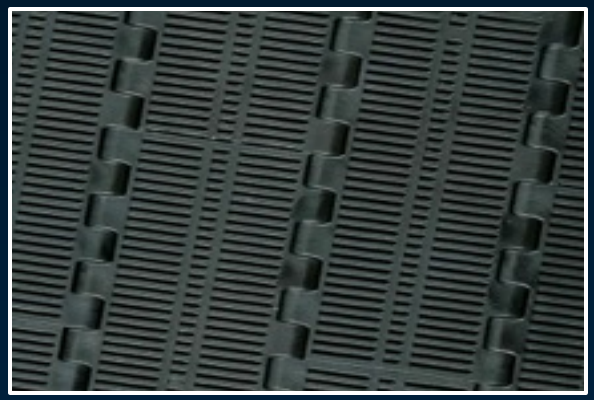
Goal

Develop criteria for design and operation of fish screens that minimize entrainment, injury, and mortality to lamprey

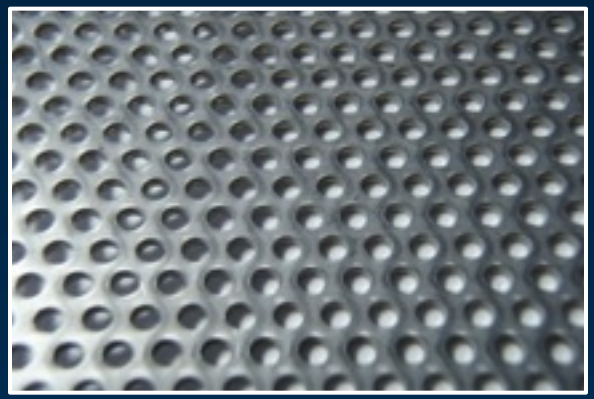
USGS

Screen types

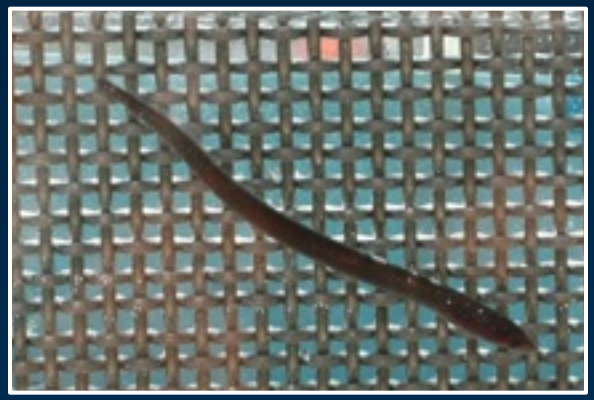
Profile bar (1.75 mm)



Intralox (1.7 mm)



Perf. plate (2.4 mm)



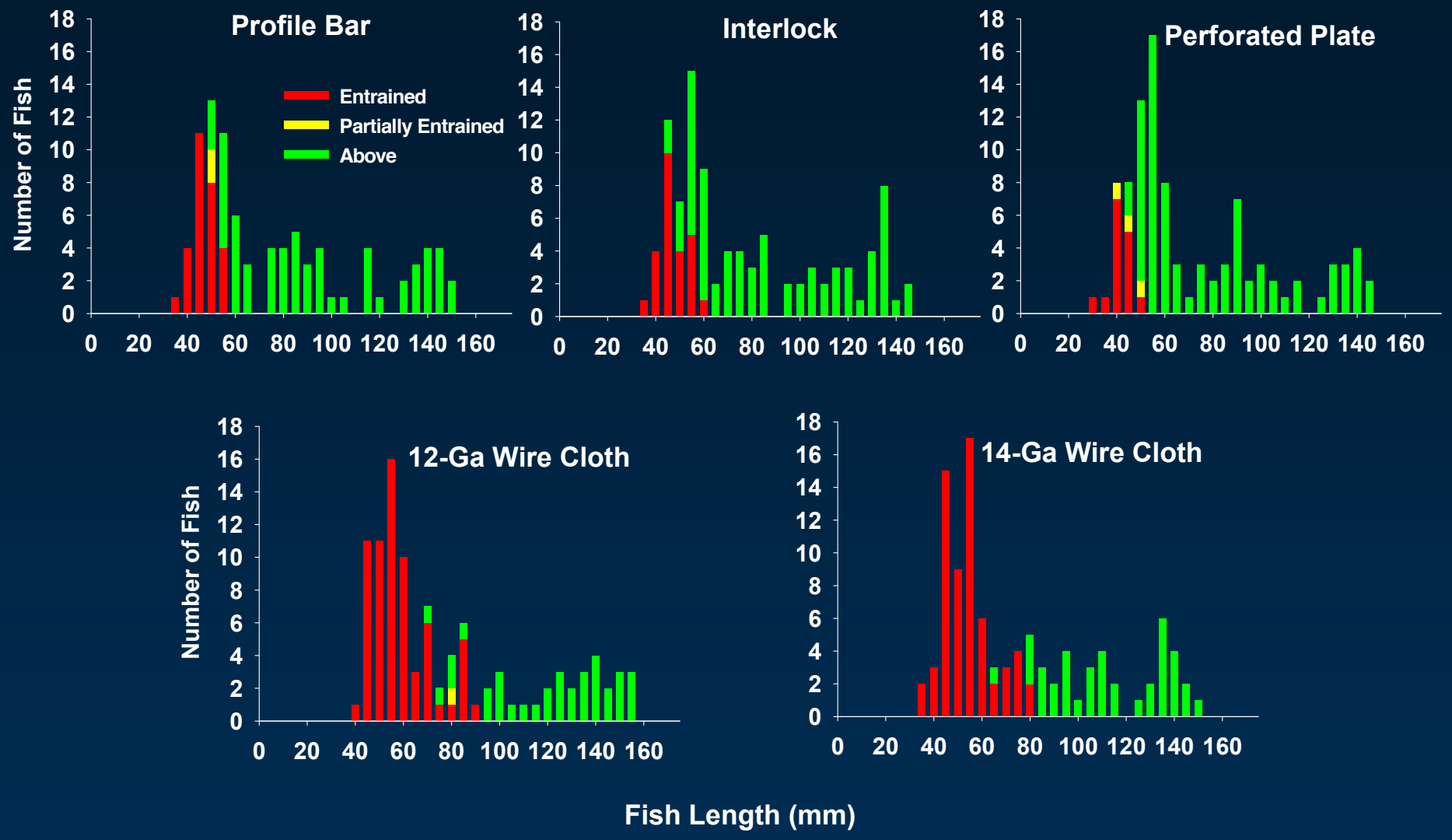
12 & 14 g woven wire

USGS

Methods

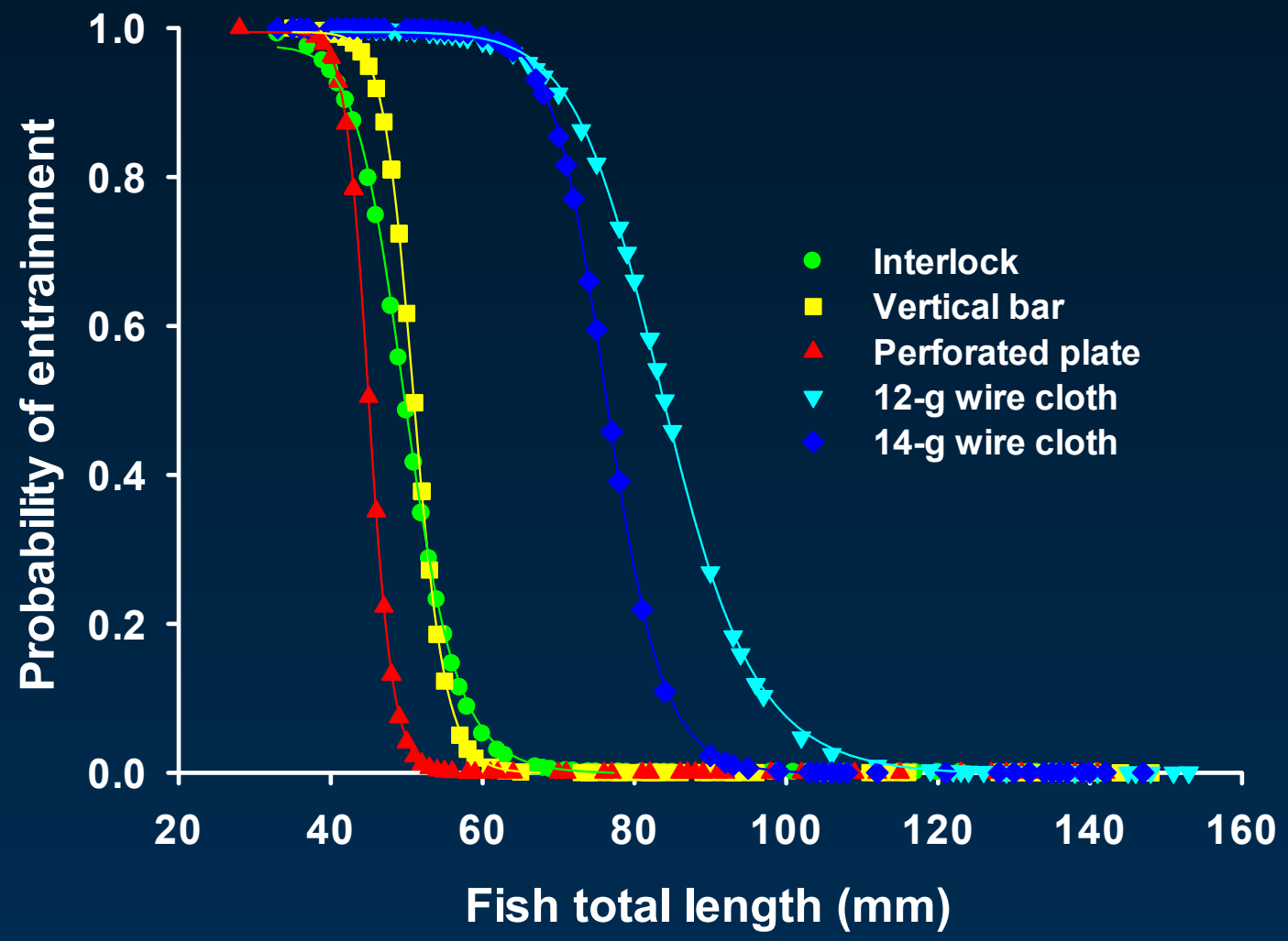
USGS

No. of fish entrained



USGS

Probability of entrainment



USGS

Summary

- Screens offered varying levels of protection
- Fish < 46 mm entrained by all screens
- Impingement common for all sizes of fish
- PP and IL performed the best
- Wire cloth screens performed the worst

➢**Use PP or IL**

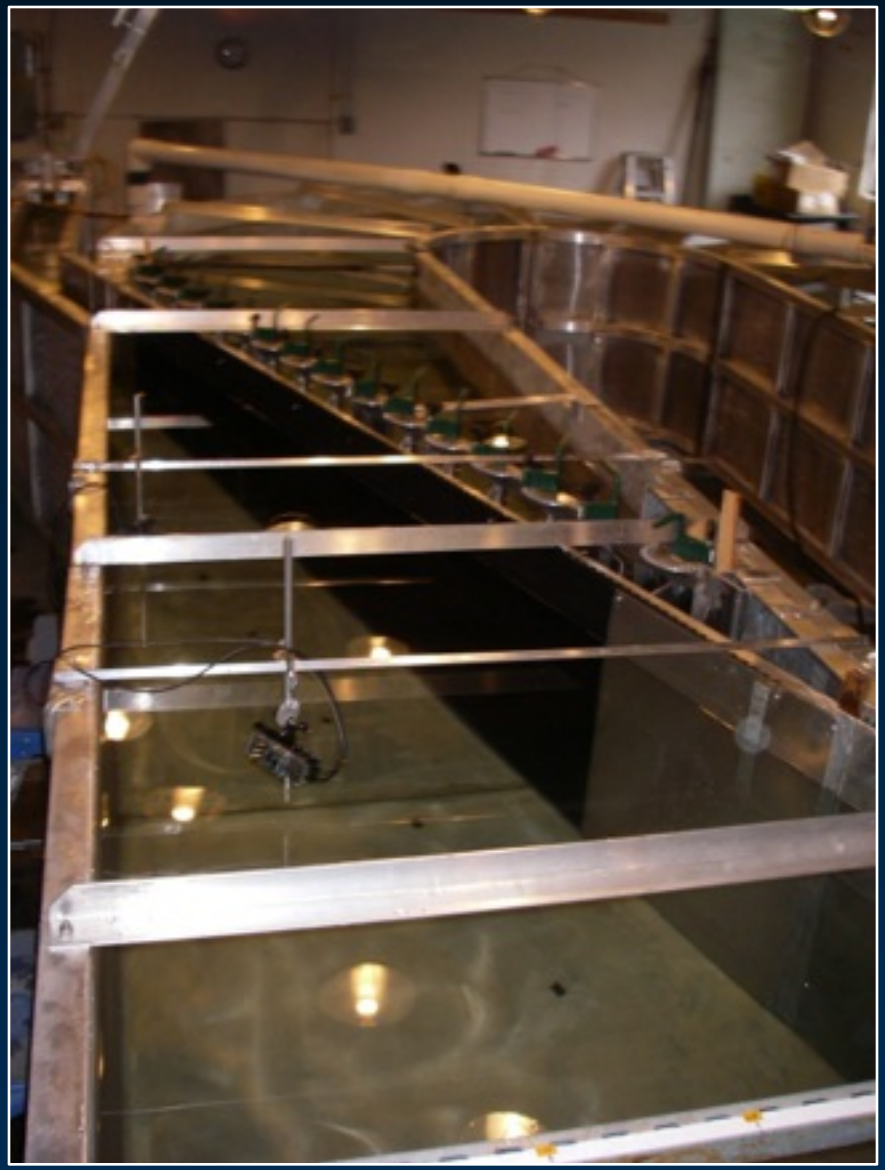
➢**Replace wire cloth screens**

USGS

Current and future research

- UPSCALE
- Test APPROACH & SWEEPING velocities
- Test different screen types
  - Vertical, rotary drum, etc.
  - Cleaning structures
- Field studies
  - Entrainment

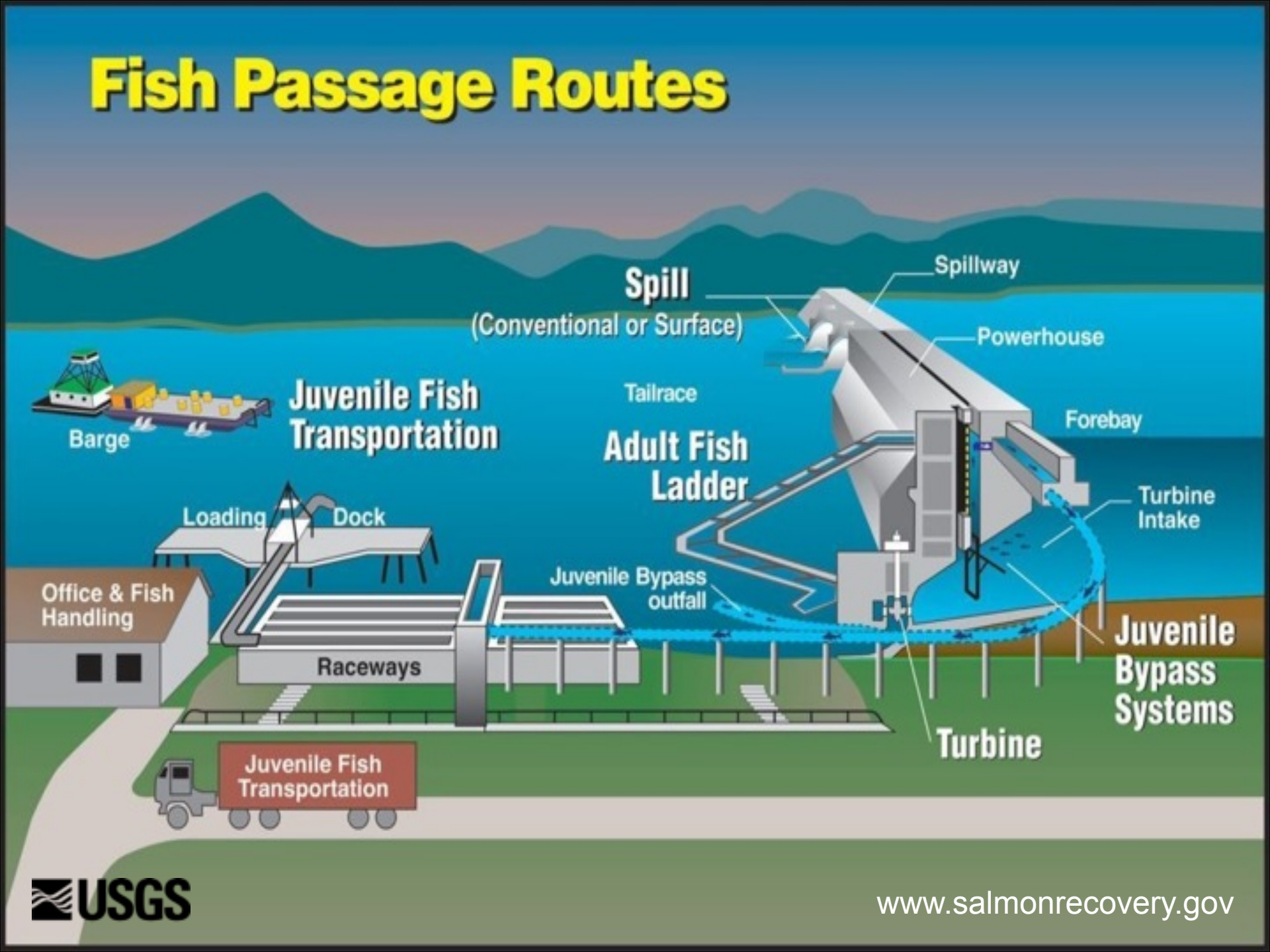
USGS



USGS


© Michael Durham / www.DurmPhoto.com

Fish Passage Routes



USGS

www.salmonrecovery.gov

Dam passage issues

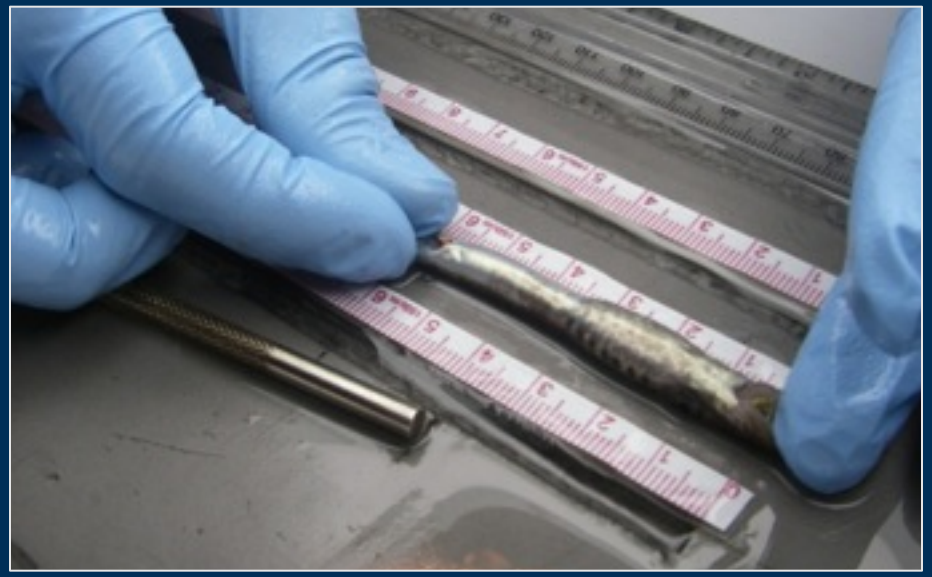
- ➢ Dam approach distribution
- ➢ Route of passage
- ➢ Guidance?
- ➢ Diel and seasonal passage characteristics
- ➢ Post-passage condition
- ➢ SAR's
- ➢ Technologies for monitoring

USGS

To fully understand the passage characteristics—and life history—of juvenile lampreys will require effective tagging technology and protocols

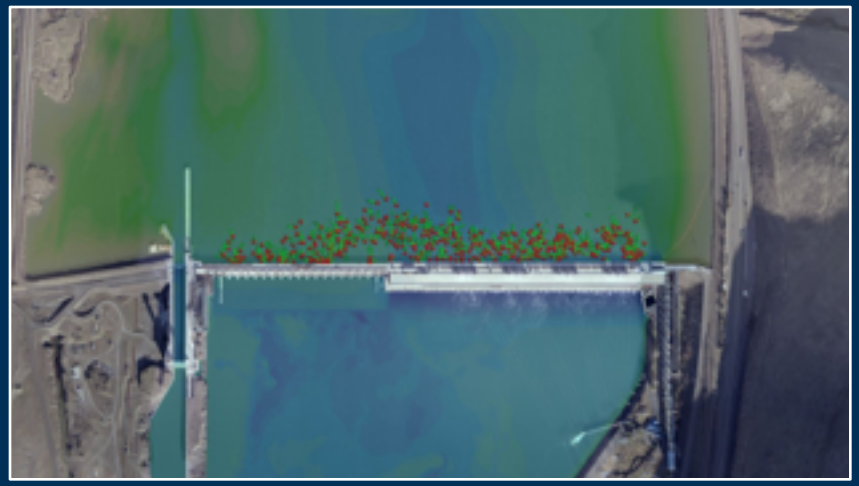
[redacted]

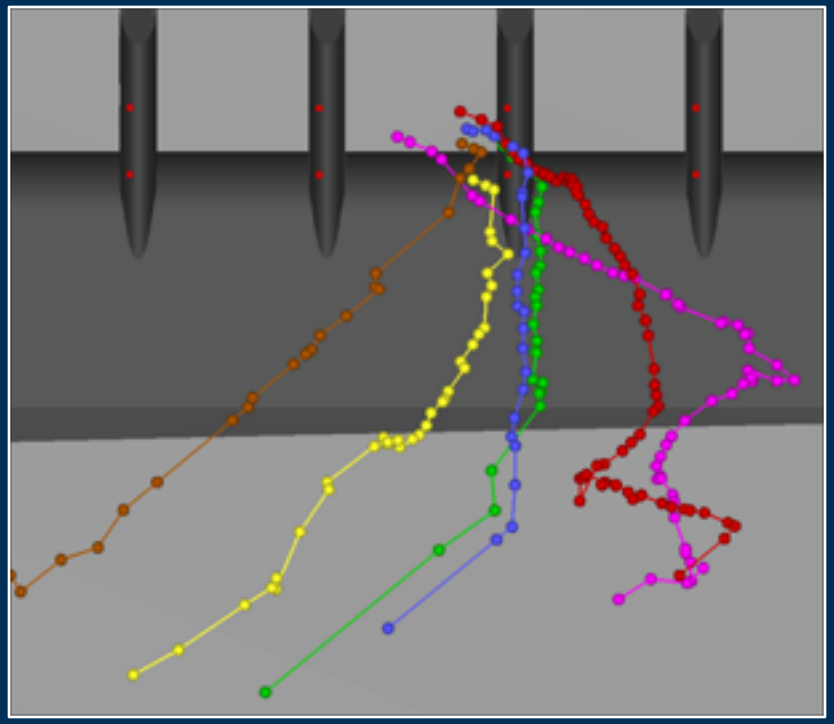
PIT tagging



USGS

JSATS tagging





Photos courtesy of PNNL

Future research

- **Mark/recapture studies using PIT-tagged fish**

  - ✓ General passage characteristics at dams
  - ✓ Travel & migration timing
  - ✓ Disease status (fungus)
  - ✓ Growth rates
  - ✓ Adult homing & migrations
  - ✓ Support genetics work
  - ✓ Passage of undisturbed adults

- **JSATS studies**

  - ✓ Dam approach behavior
  - ✓ Specific routes of passage
  - ✓ Travel time
  - ✓ Survival

USGS

Thanks