Jun 7th, 10:30 AM - 10:50 AM

Session A7 - Dam impact analysis on Atlantic salmon recovery in the Penobscot River, Maine

Julie Nieland
NOAA Fisheries Service, Julie.Nieland@noaa.gov

Science, Service, Stewardship

Penobscot River Dam Impact Analysis

Julie L. Nieland, Timothy F. Sheehan, Rory Saunders, Jeffrey S. Murphy, and Tara Trinko Lake

June 25, 2012

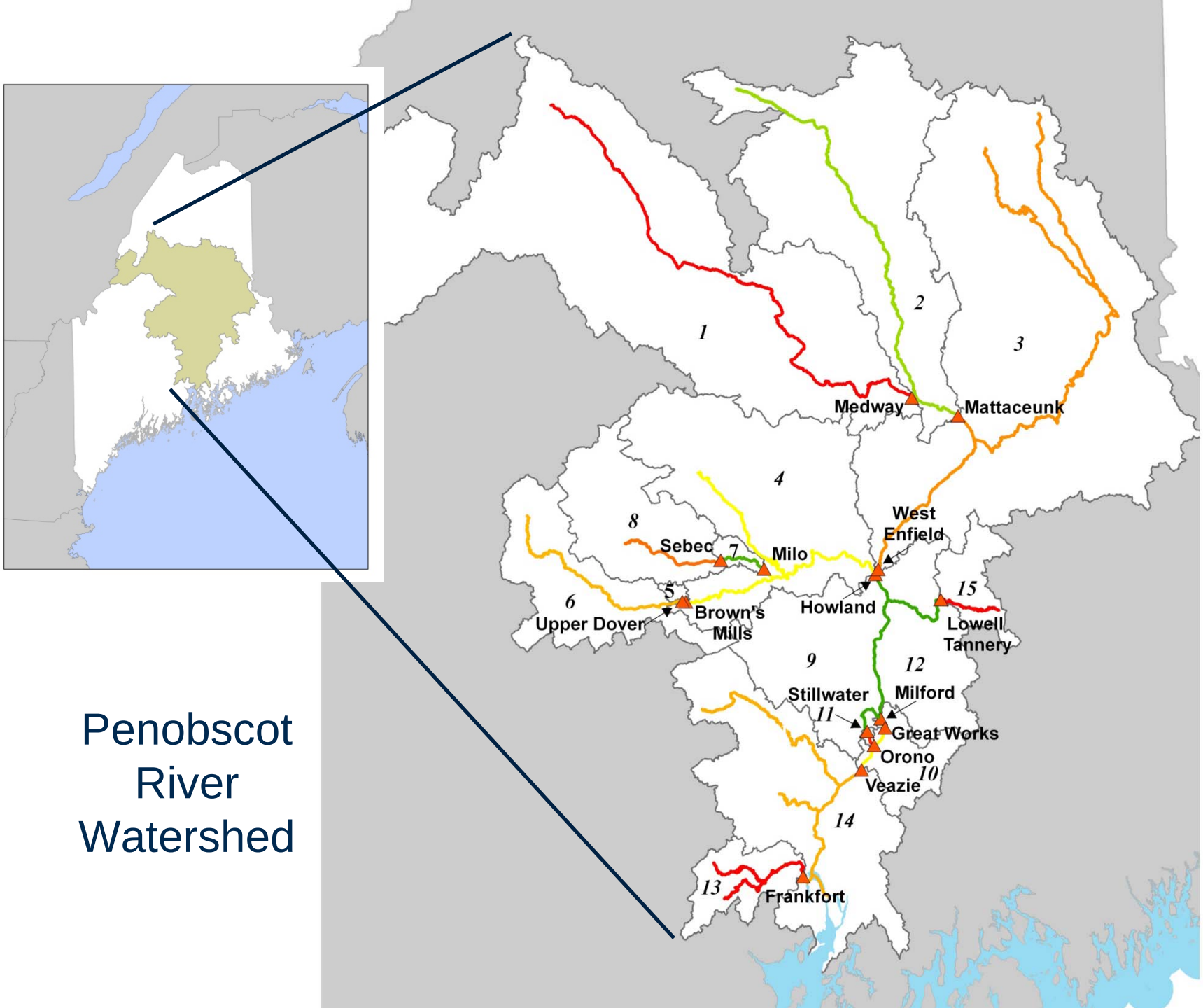
NOAA FISHERIES SERVICE

NOAA FISHERIES SERVICE

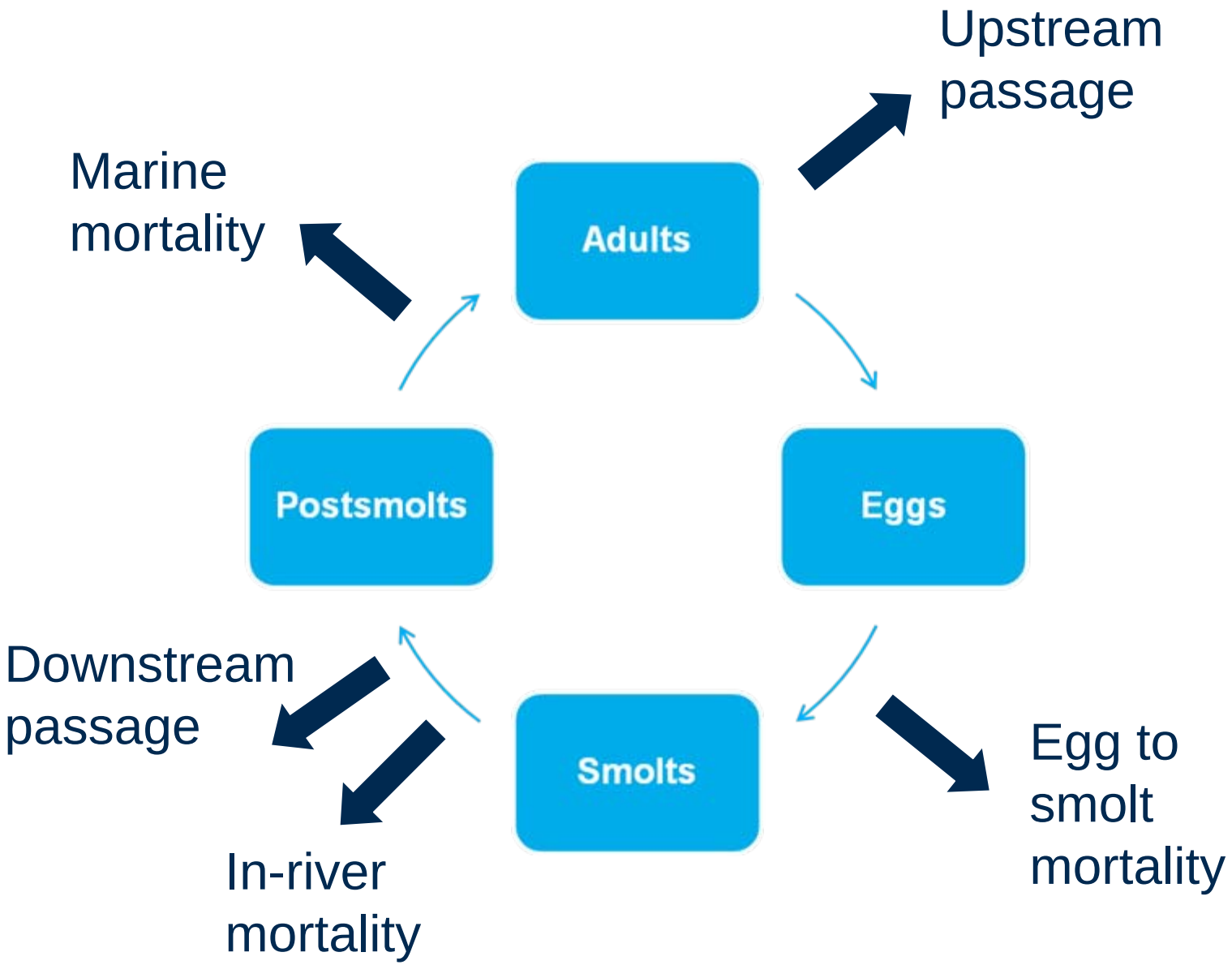
Atlantic Salmon and Dams

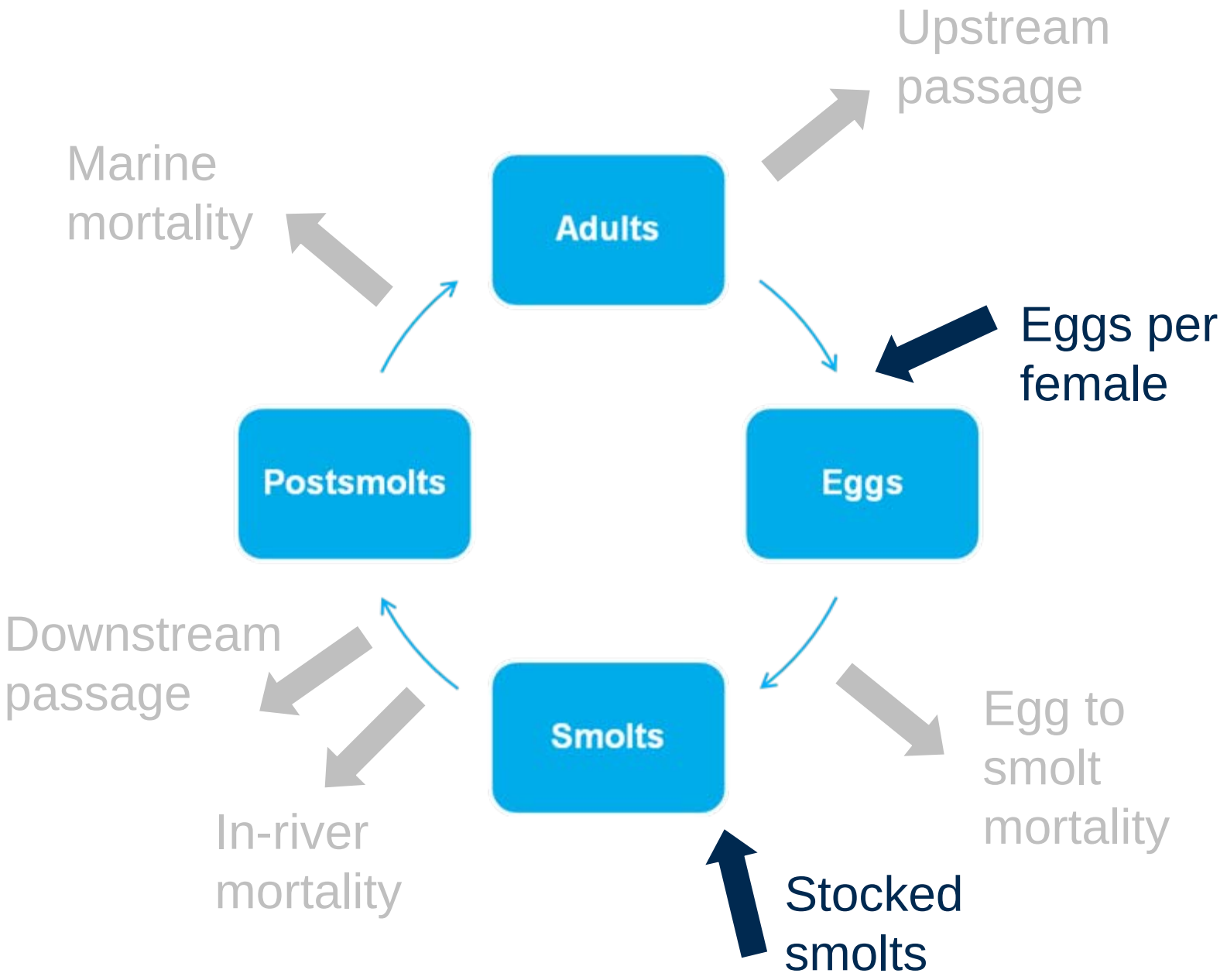
- Atlantic salmon in Maine are endangered.
- Dams have contributed to low abundance.
- We are modeling interactions of Atlantic salmon and dams in the Penobscot River.

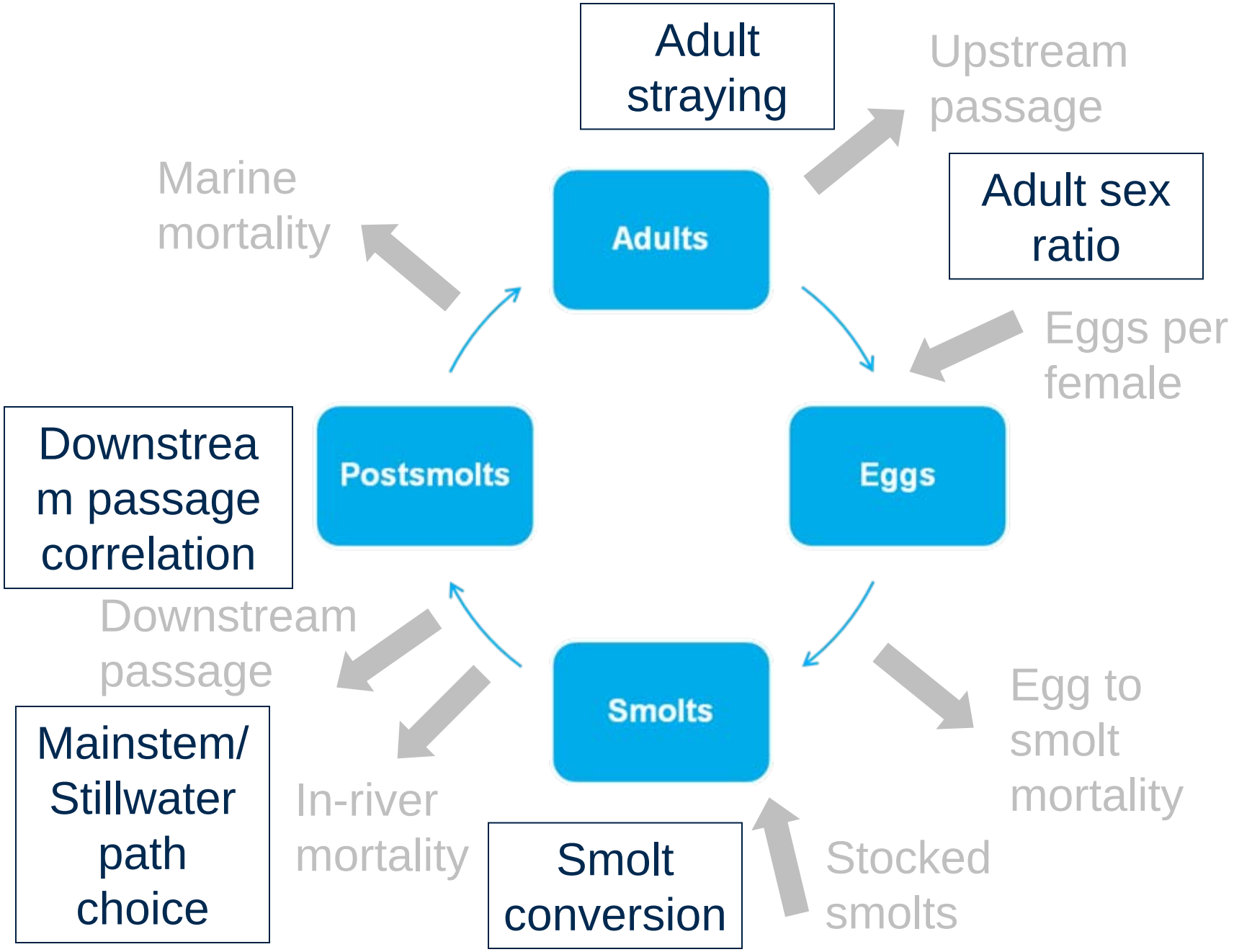
- The Penobscot is important for US salmon production and has multiple hydroelectric facilities.



Penobscot River Watershed


Upstream passage
Marine mortality
Adults
Postsmolts
Eggs
Downstream passage
Smolts
Egg to smolt mortality
In-river mortality


Upstream passage
Marine mortality
Adults
Eggs per female
Postsmolts
Eggs
Downstream passage
Smolts
Egg to smolt mortality
In-river mortality
Stocked smolts


Adult straying
Upstream passage
Adult sex ratio
Eggs per female
Eggs
Egg to smolt mortality
Stocked smolts
Smolt conversion
In-river mortality
Mainstem/ Stillwater path choice
Downstream passage
Downstrea m passage correlation
Postsmolts
Marine mortality
Adults
Smolts

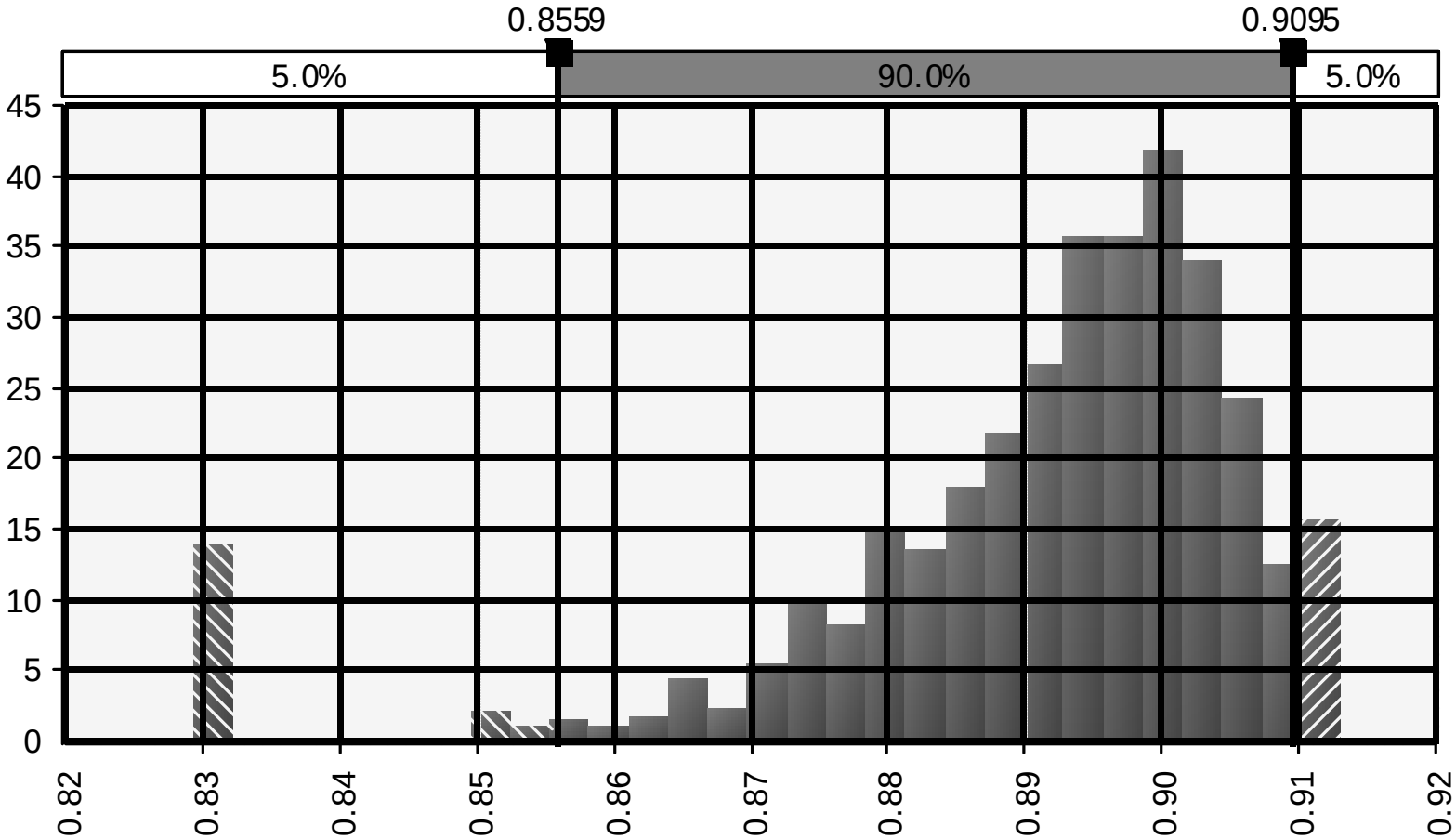
NOAA FISHERIES SERVICE

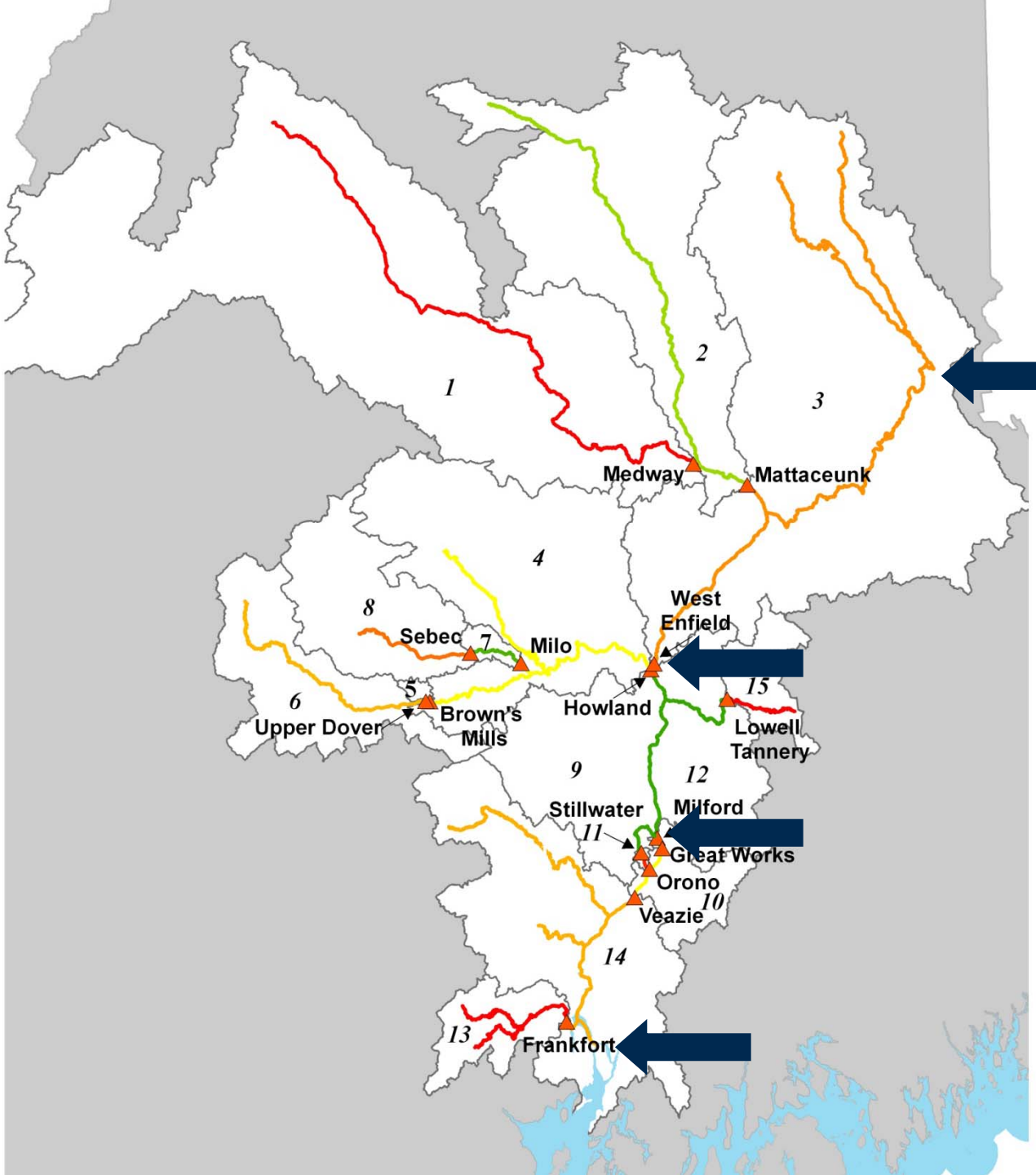
Data Inputs

- Data inputs were comprised of field data, literature reviews, and expert opinion.
- Downstream passage distributions at each hydro facility were developed by Alden Research Laboratory, Inc.

NOAA FISHERIES SERVICE

Distributions and Simulations





Migrate downstream through the Mattawamkeag.

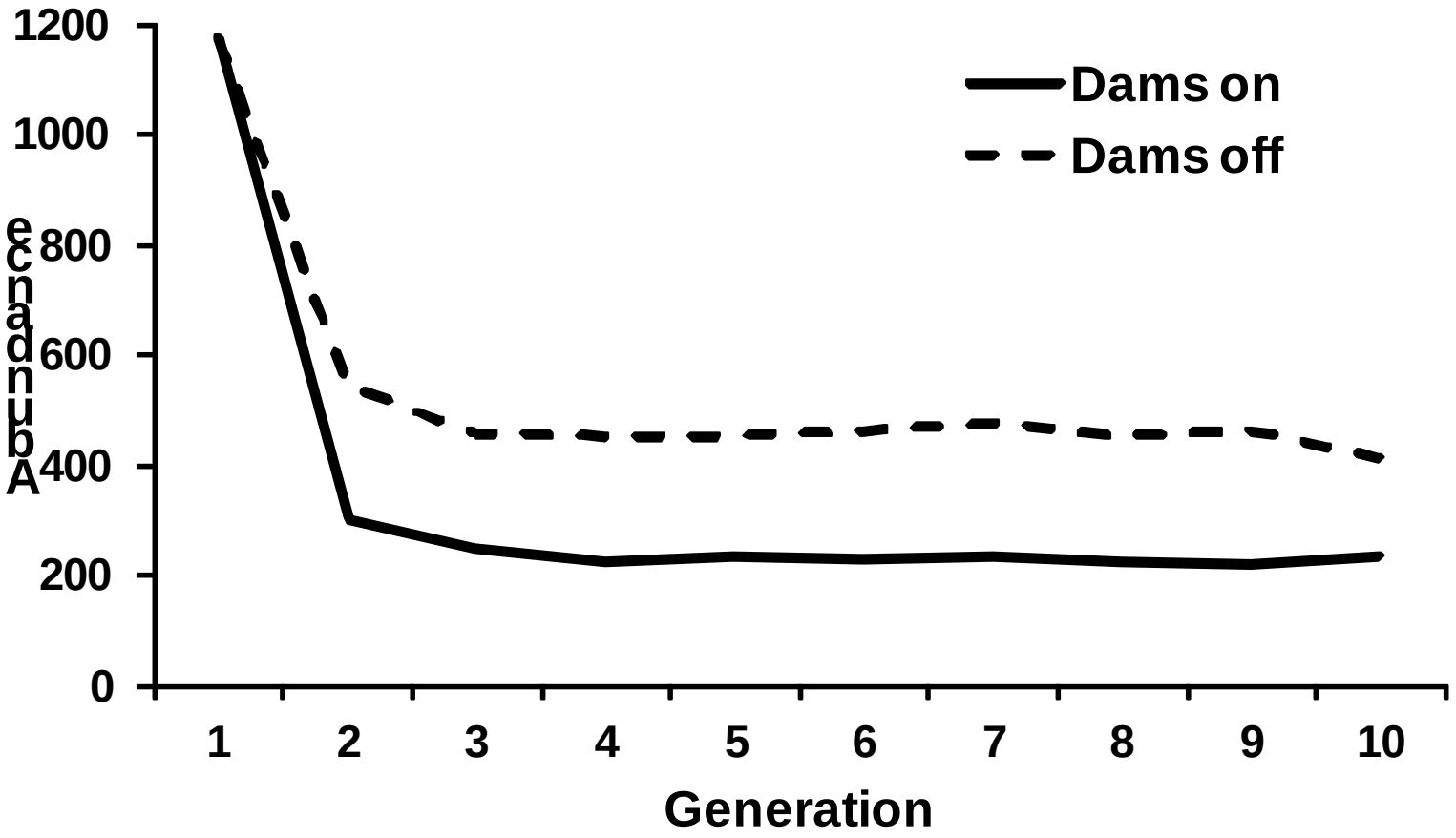
Attempt to pass West Enfield. Migrate downstream.

Choose to go through the Mainstem or the Stillwater Branch.

Made it to Verona Island.

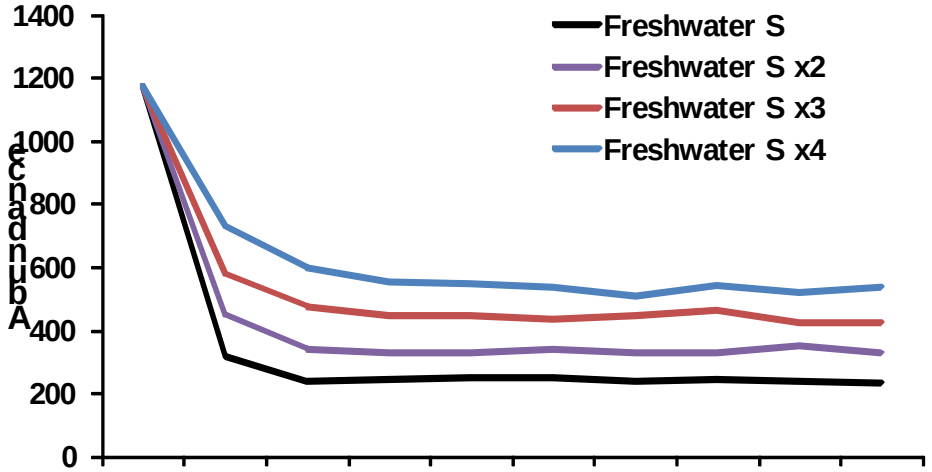
NOAA FISHERIES SERVICE

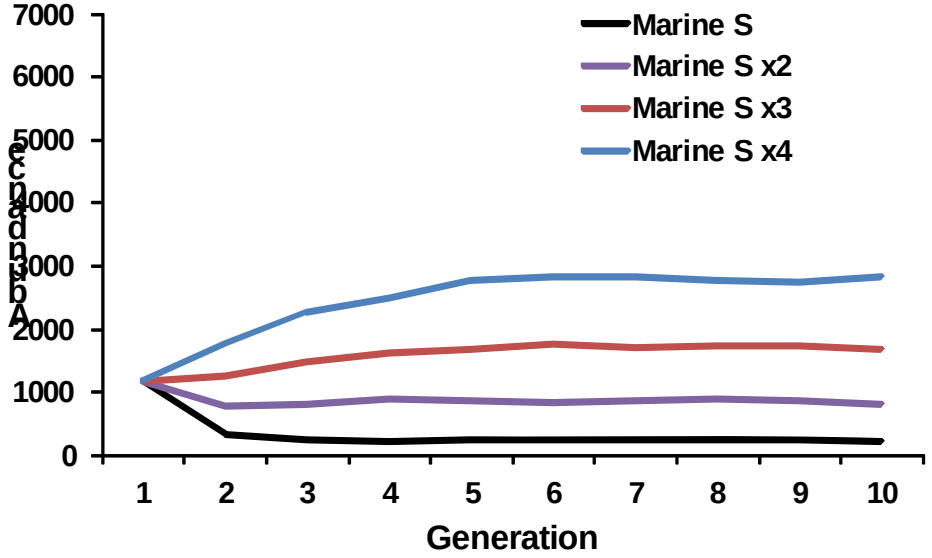
Results – Abundance

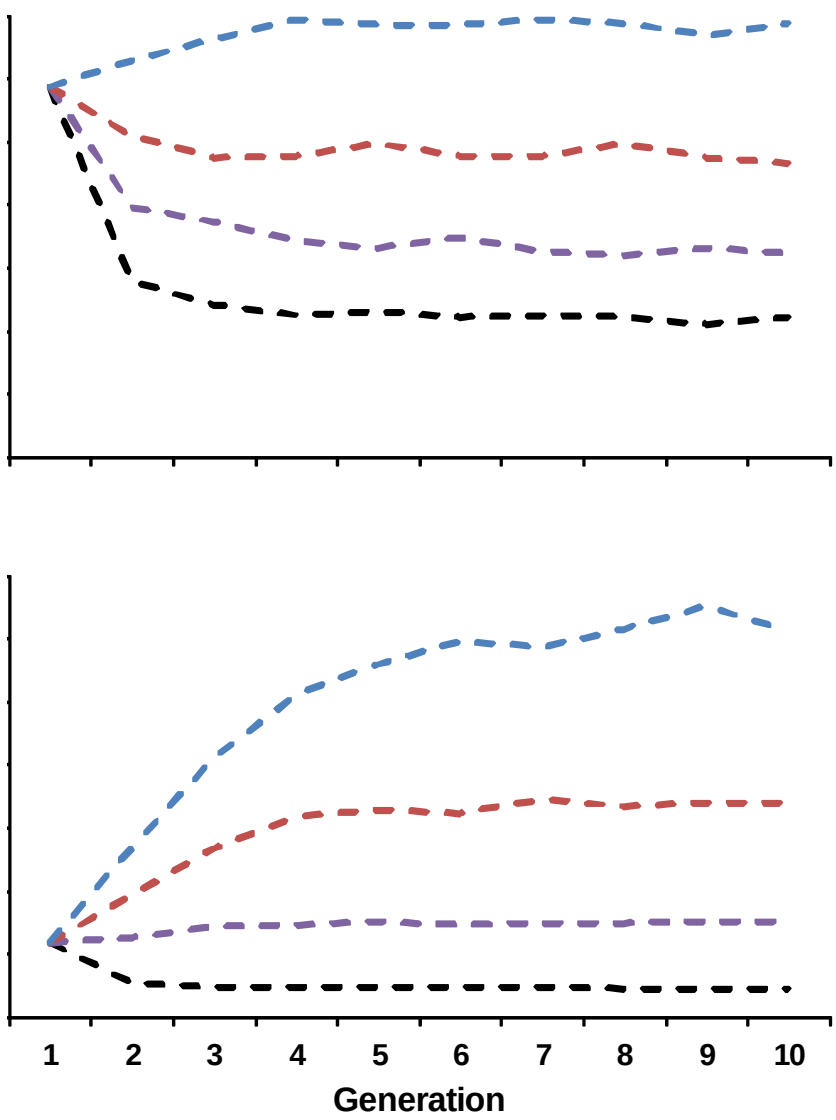


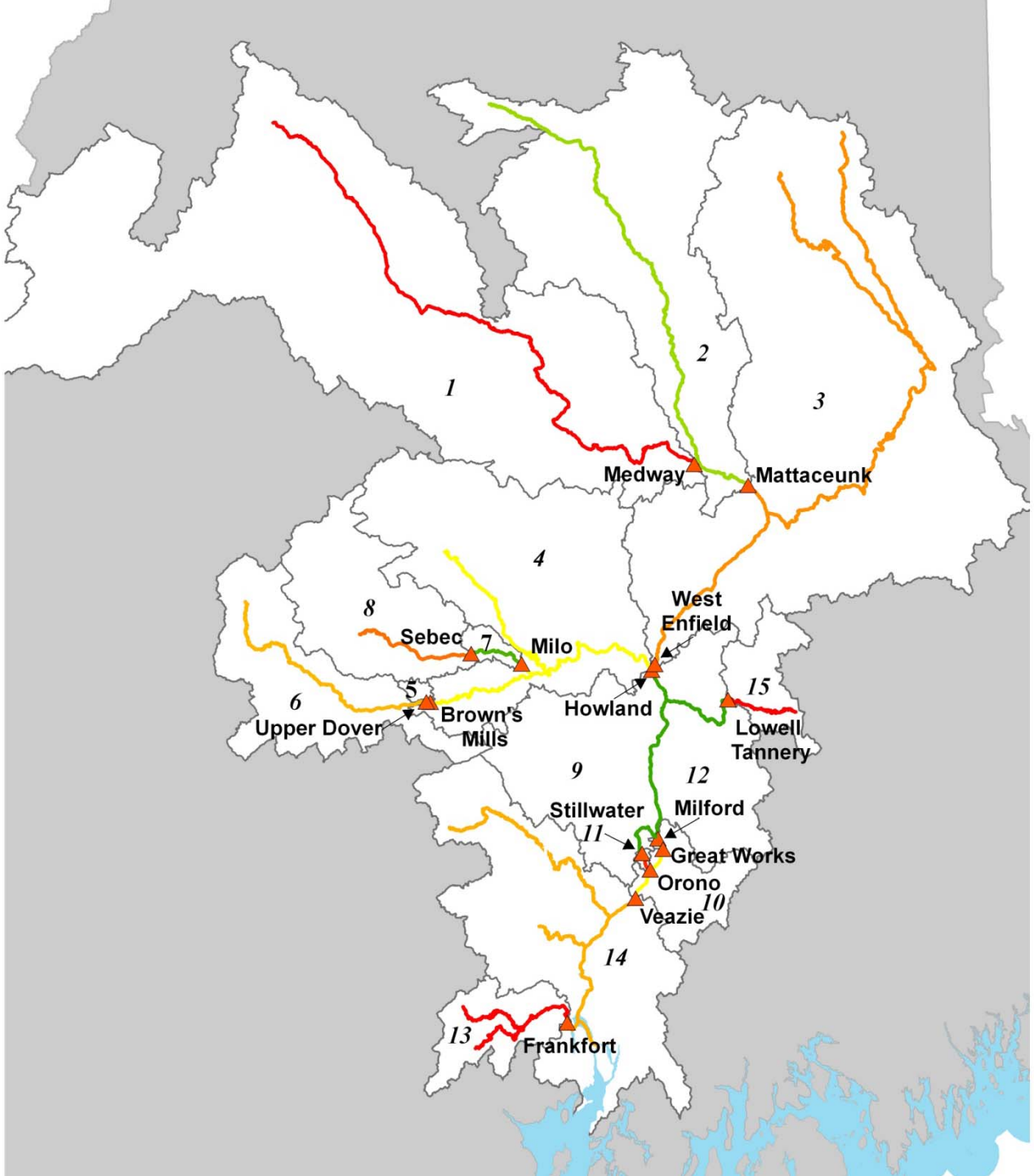
Dams On

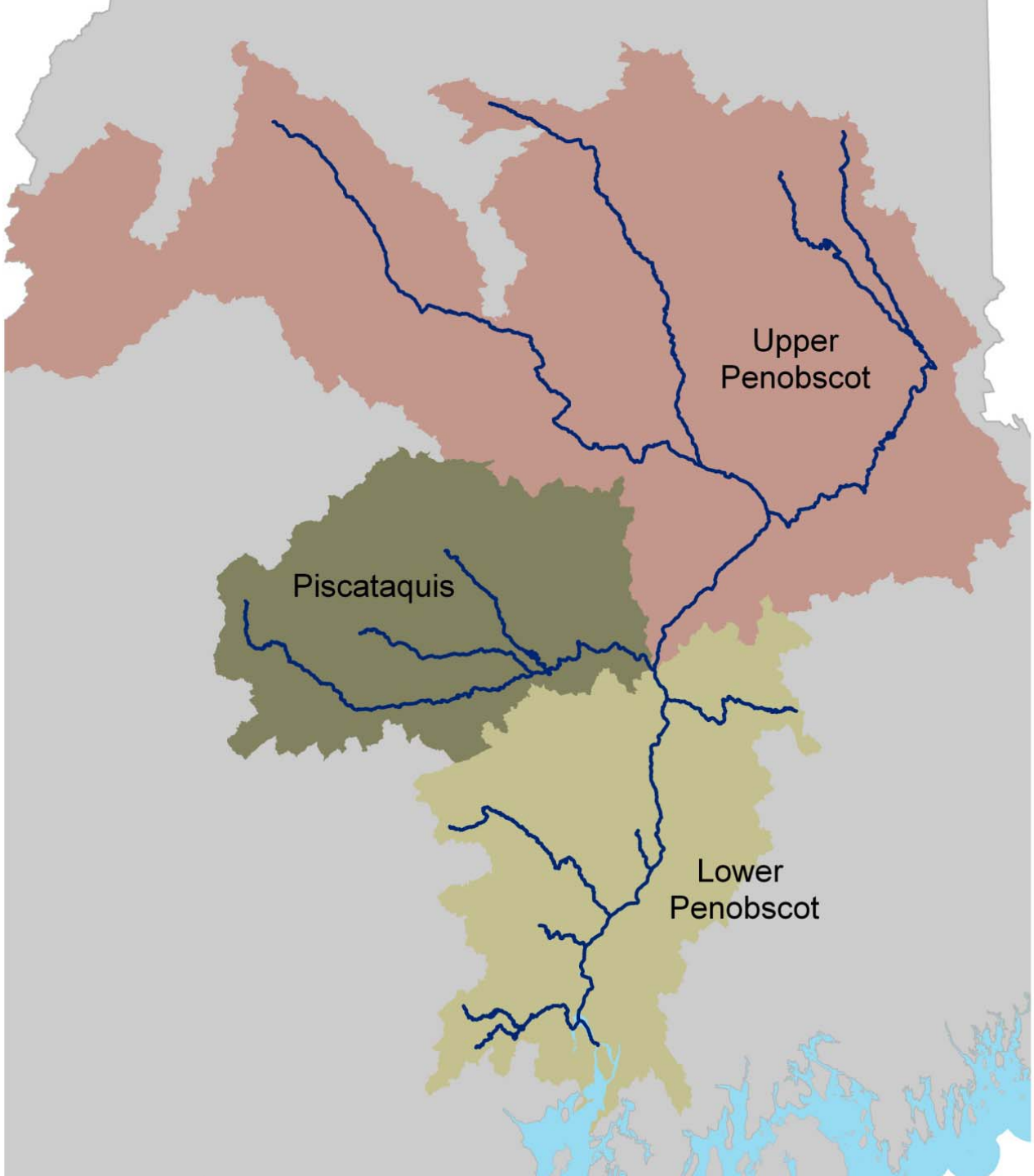
Dams Off





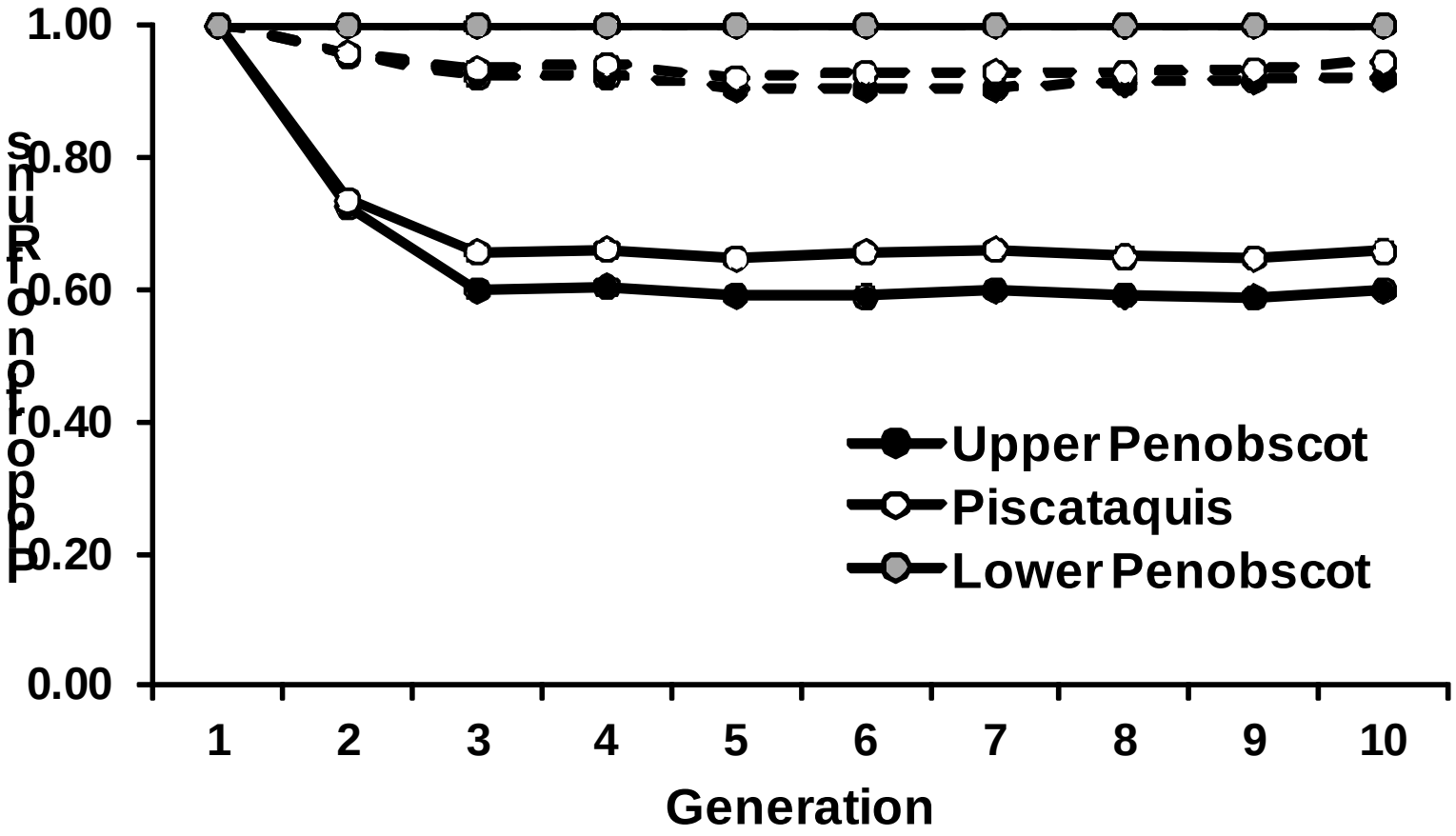



1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
Medway
Mattaceunk
West Enfield
Milo
Sebec
Howland
Brown's Mills
Upper Dover
Lowell Tannery
Stillwater
Milford
Great Works
Orono
Veazie
Frankfort


Upper
Penobscot
Piscataquis
Lower
Penobscot

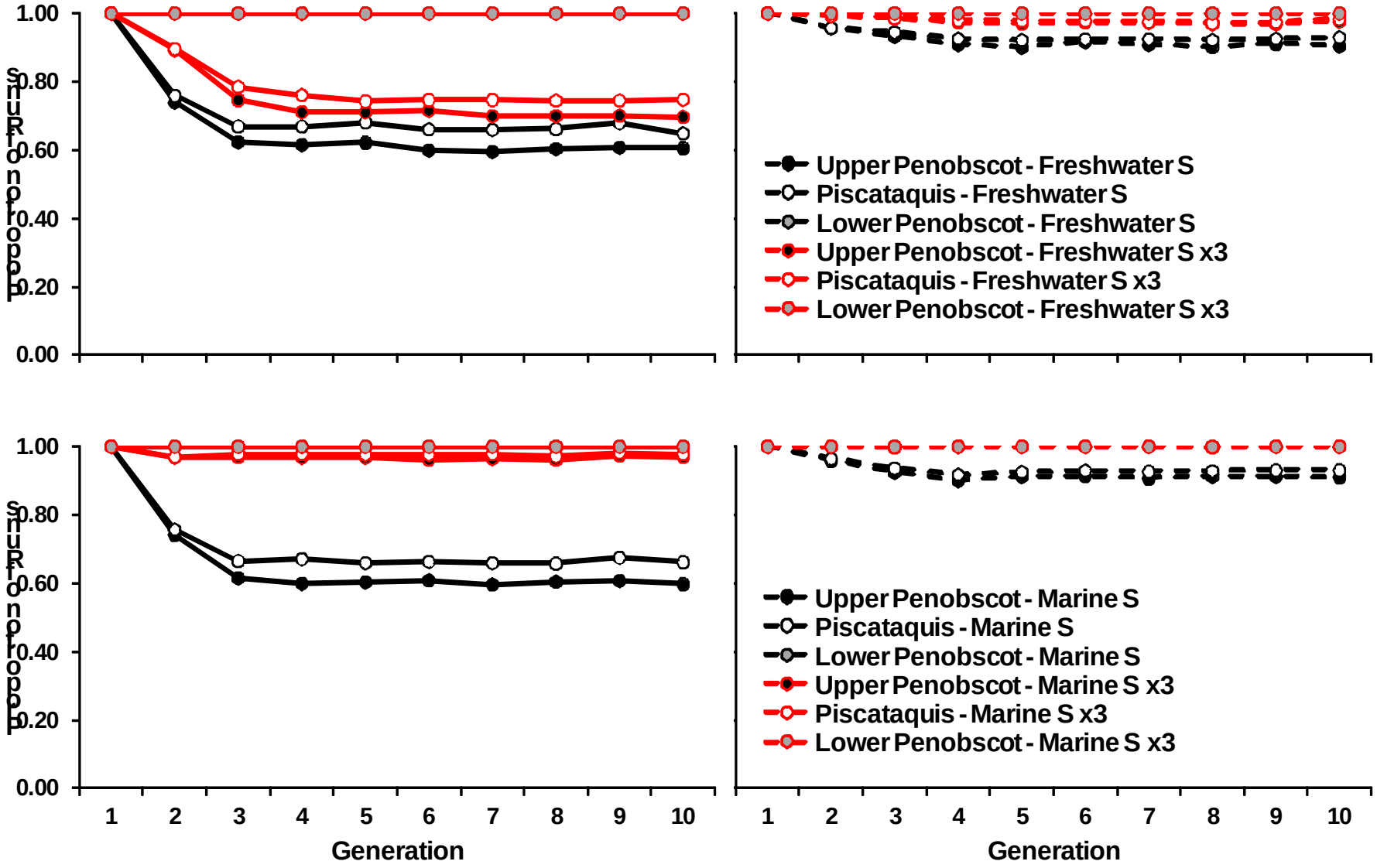
NOAA FISHERIES SERVICE

Results – Distribution



Dams On

Dams Off



NOAA FISHERIES SERVICE

Conclusions & Next Steps

- The model is flexible enough to incorporate changes for future analyses.
- The model can be used to simulate the impacts of individual dams or groups of dams in the Penobscot River.
  - Dams vs. no dams.
  - Passage standards for hydro facilities.
  - Dams vs. marine survival.
  - Evaluate stocking locations.

NOAA FISHERIES SERVICE

Acknowledgments

DEPARTMENT OF Marine Resources STATE OF MAINE

ALDEN Solving flow problems since 1894

U.S. FISH & WILDLIFE SERVICE

Upstream Passage Expert Panel

USGS science for a changing world

NOAA FISHERIES SERVICE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

1865 THE UNIVERSITY OF MAINE

Northeast Fisheries Science Center

Northeast Regional Office

Restoration Center