

Dams and Fish

*Understanding our impounded legacy in the
Penobscot River*

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Many to acknowledge...



Berlynnna Heres

Lisa Izzo

George Maynard

Alejandro Molina-Moctezuma

Daniel Stich

Dan Weaver

Kevin Job

Andrew O'Malley

Betsy Barber



Anadromous fish populations declines over the past two centuries

Four great threats to ecosystems

David Wilcove 2007 No Way Home

Habitat destruction

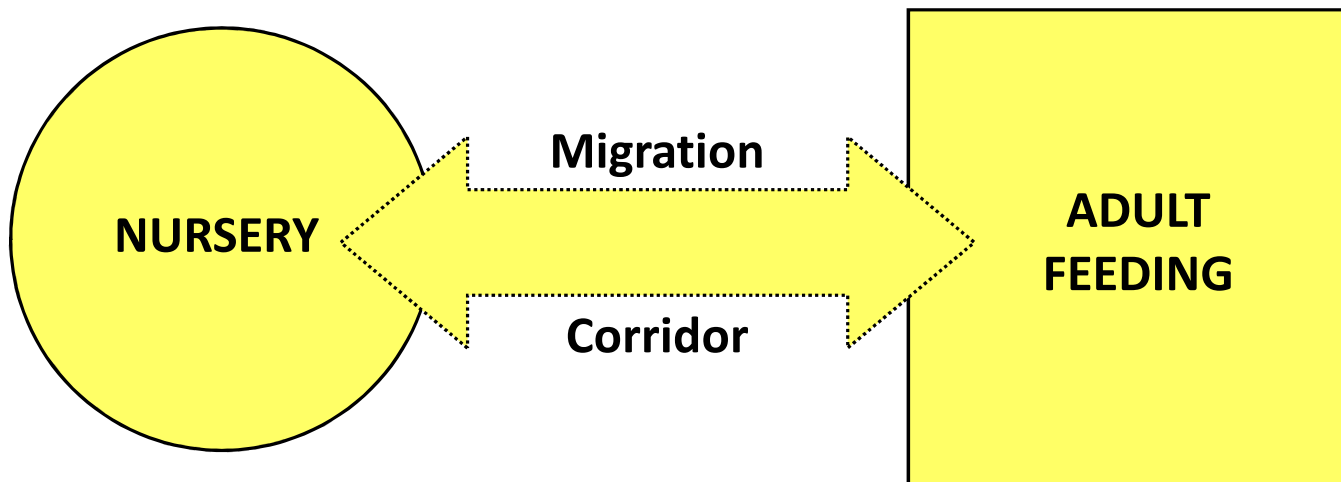
Overexploitation

Climate Change

Human created obstacles

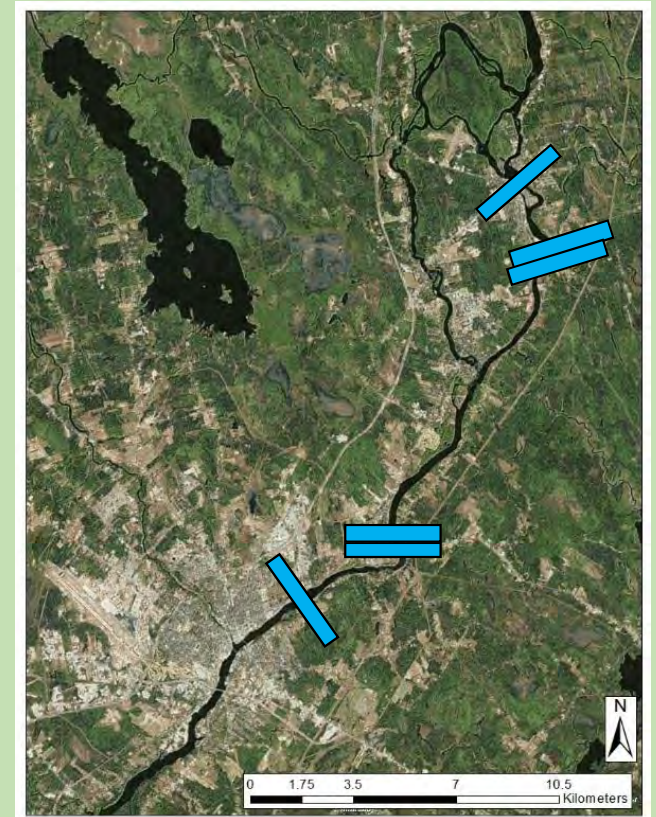


Migratory Animals



Dam Construction History

- **1830-1835:** Old Town/ Veazie wing dams
- **1876:** Bangor Waterworks (rkm 43)
- **1887:** Great Works Dam (rkm 60)
- **1912:** Milford Dam (rkm 62)
- **1913:** Veazie Dam (rkm 48)



Dam removals in Maine



1995

1999

2008

2009

2010

2012

2013

Bangor Dam
Penobscot River

Edwards Dam
Kennebec River

Fort Halifax Dam
Sebasticook River

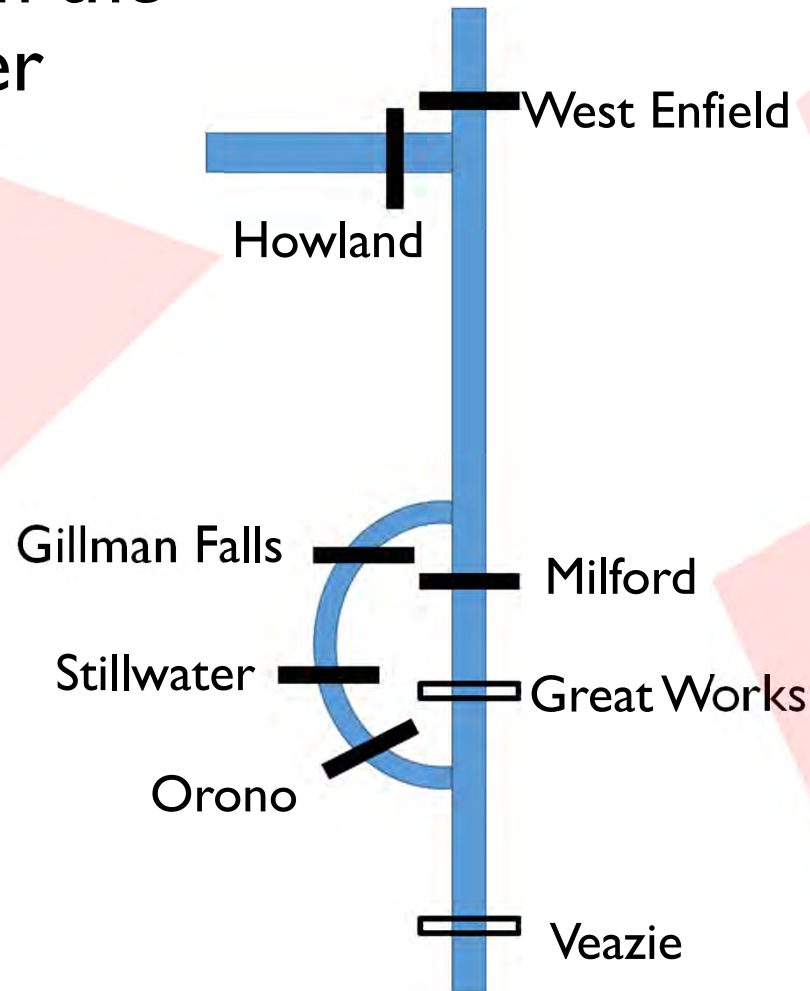
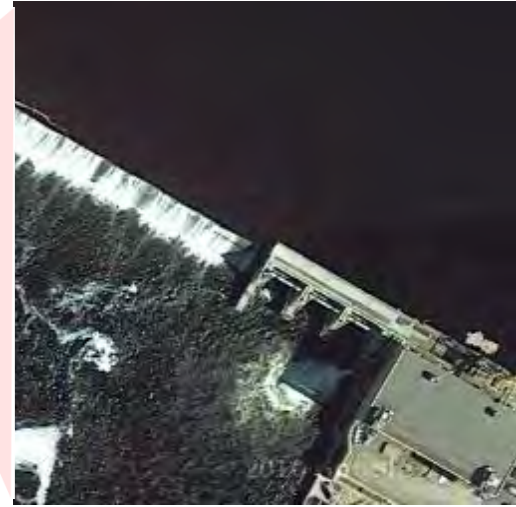
Mill and Meadow Dams
Sedgeunkedunk Stream

Winterport Dam
Marsh Stream

Great Works Dam
Penobscot River

Veazie Dam
Penobscot River

Connectivity on the Penobscot River

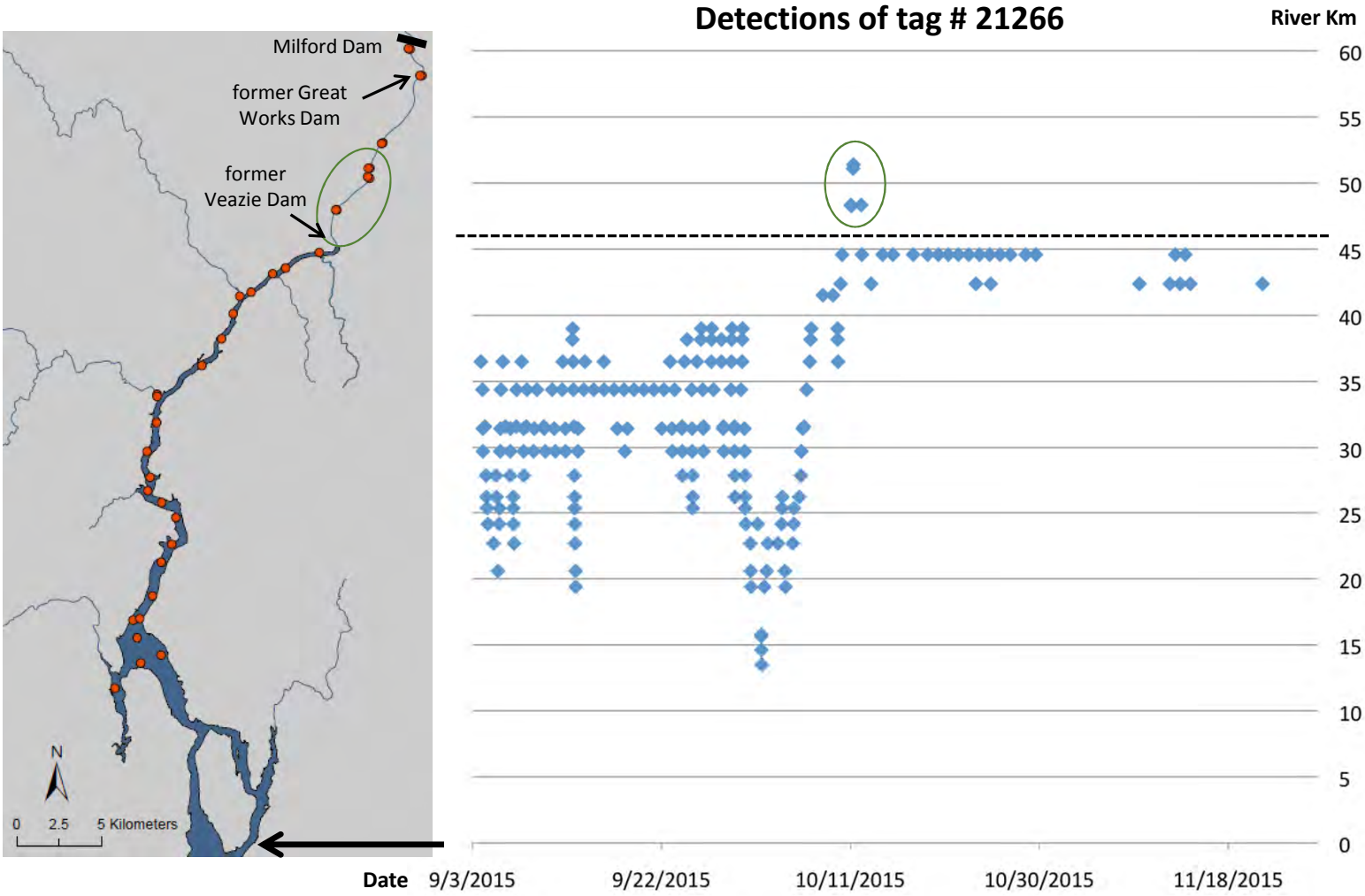


Shortnose
sturgeon





Fall 2015 upstream movements



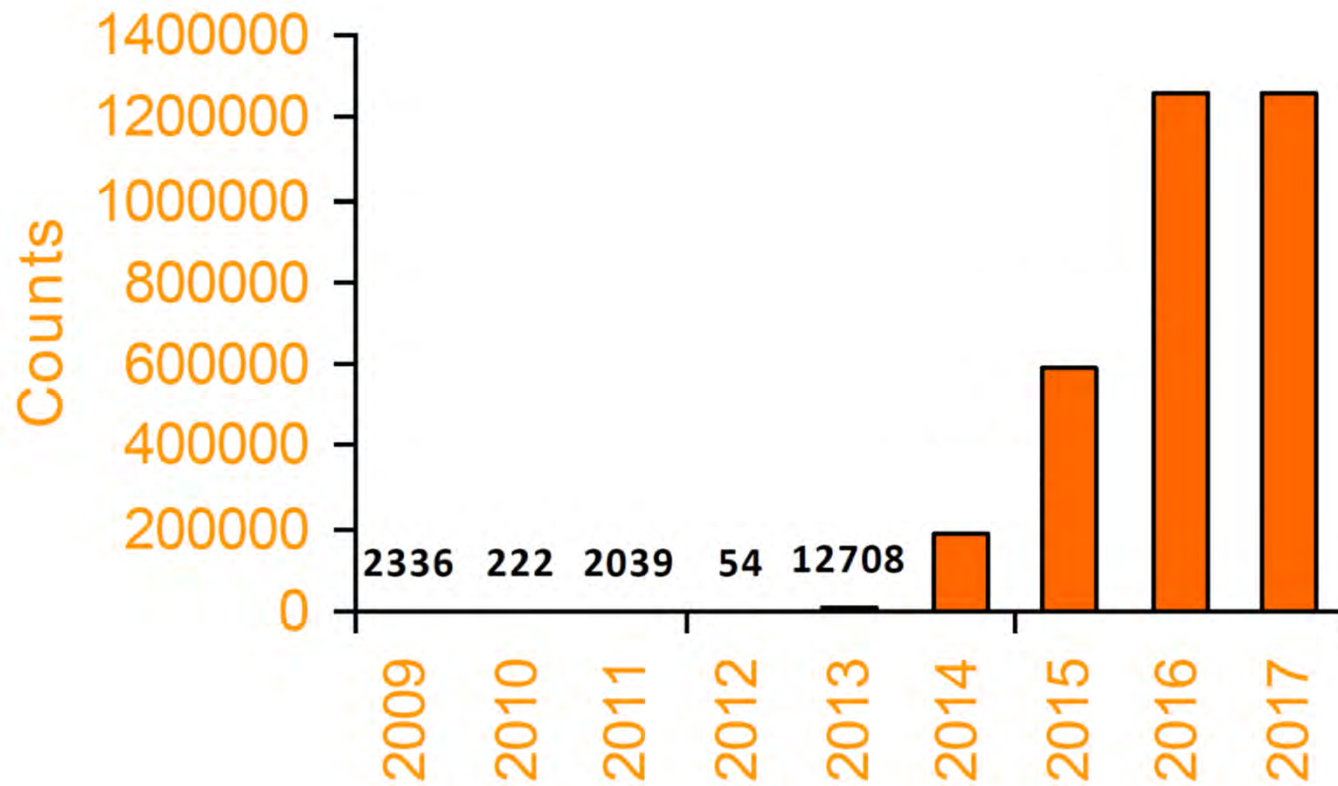
Alewife and
Blueback
herring



River Herring



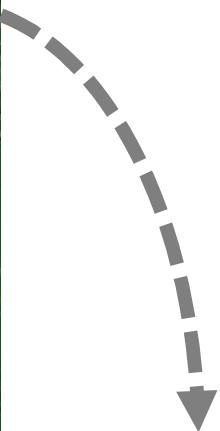
Alewife returns to Milford Dam



Atlantic
salmon



Release & Recapture

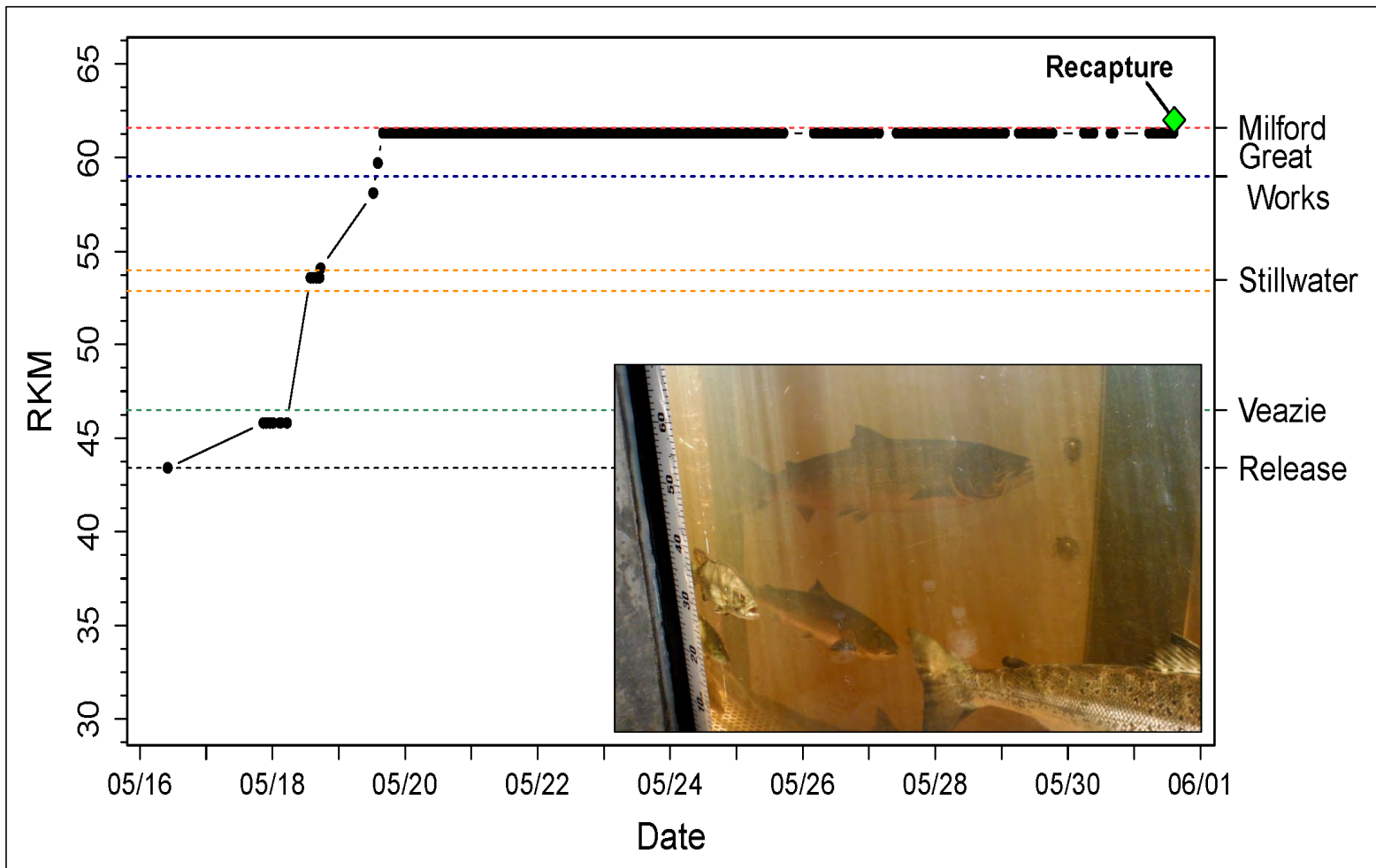




Radio Tagging of Adult Salmon

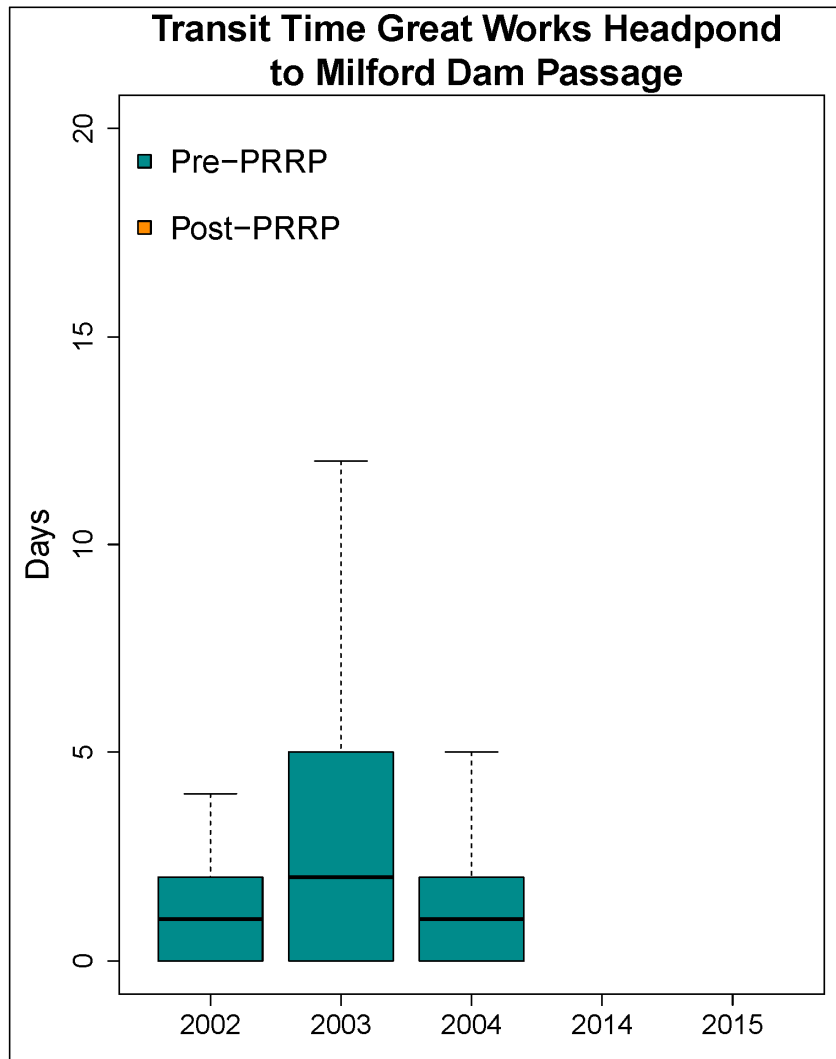


Delays at Milford Dam



2015

Milford Dam Passage & Delays



2002 – 2004 (Pre-PRRP)

- PIT study by D. Gorsky
- Milford fishway = Denil

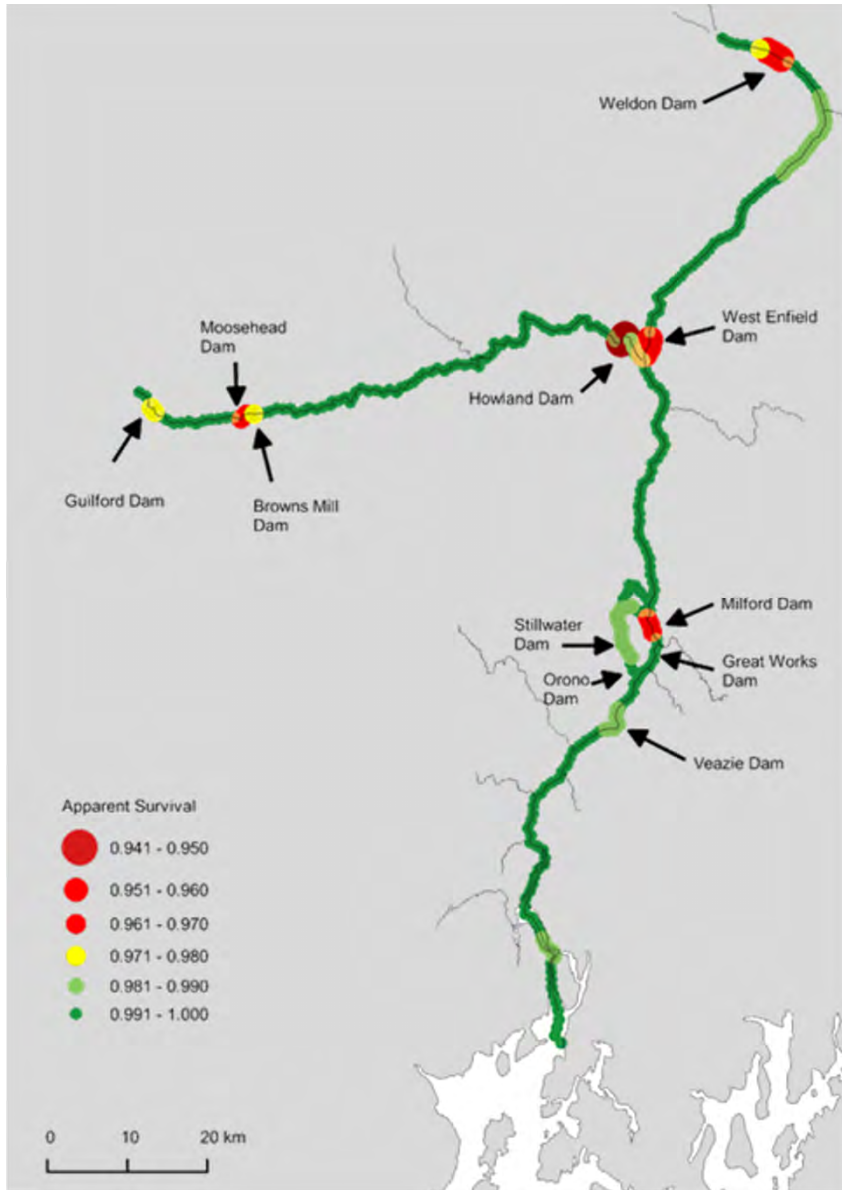
2014 – 2015 (Post-PRRP)

- Current radio telemetry study
- Milford fishway = Fish Lift

Impact of Dams on Survival

-Surgical implantation of acoustic tag in Atlantic salmon smolt



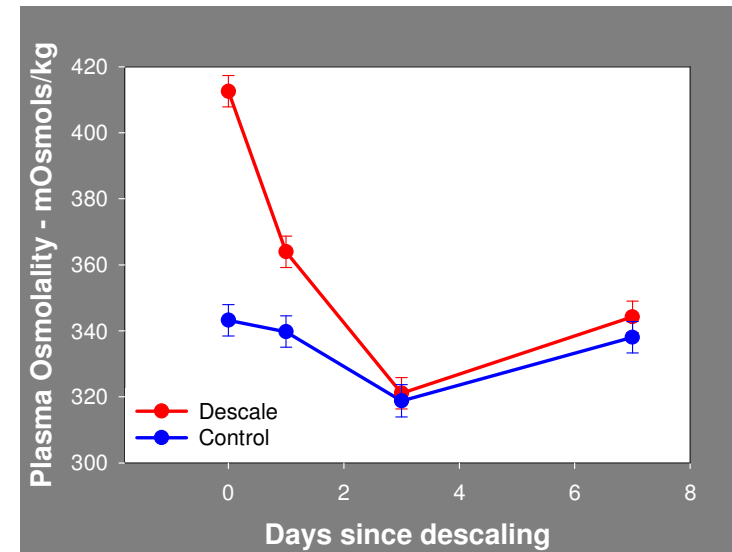
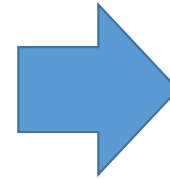
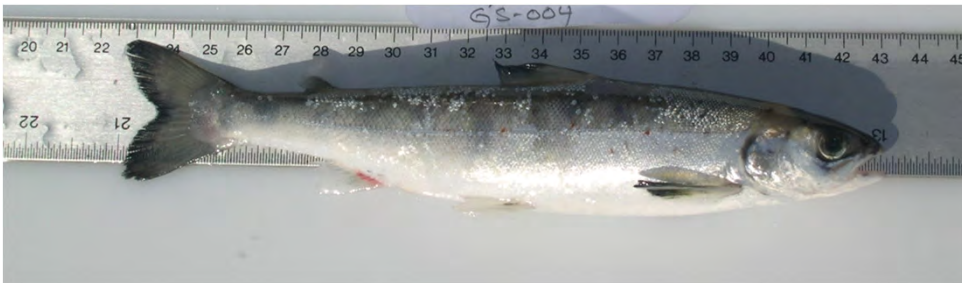


Atlantic salmon smolt losses at dams in the Penobscot River

Sometimes rides are not gentle



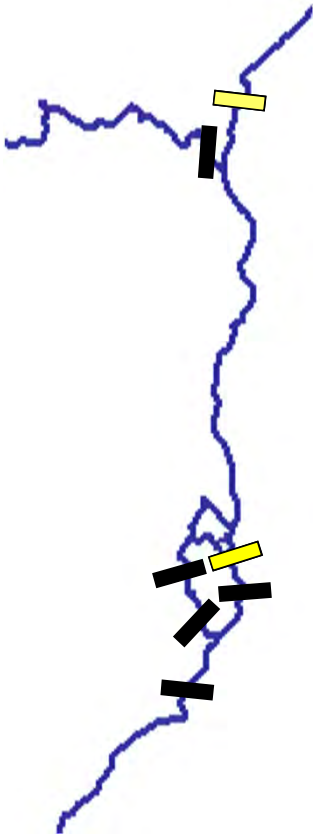
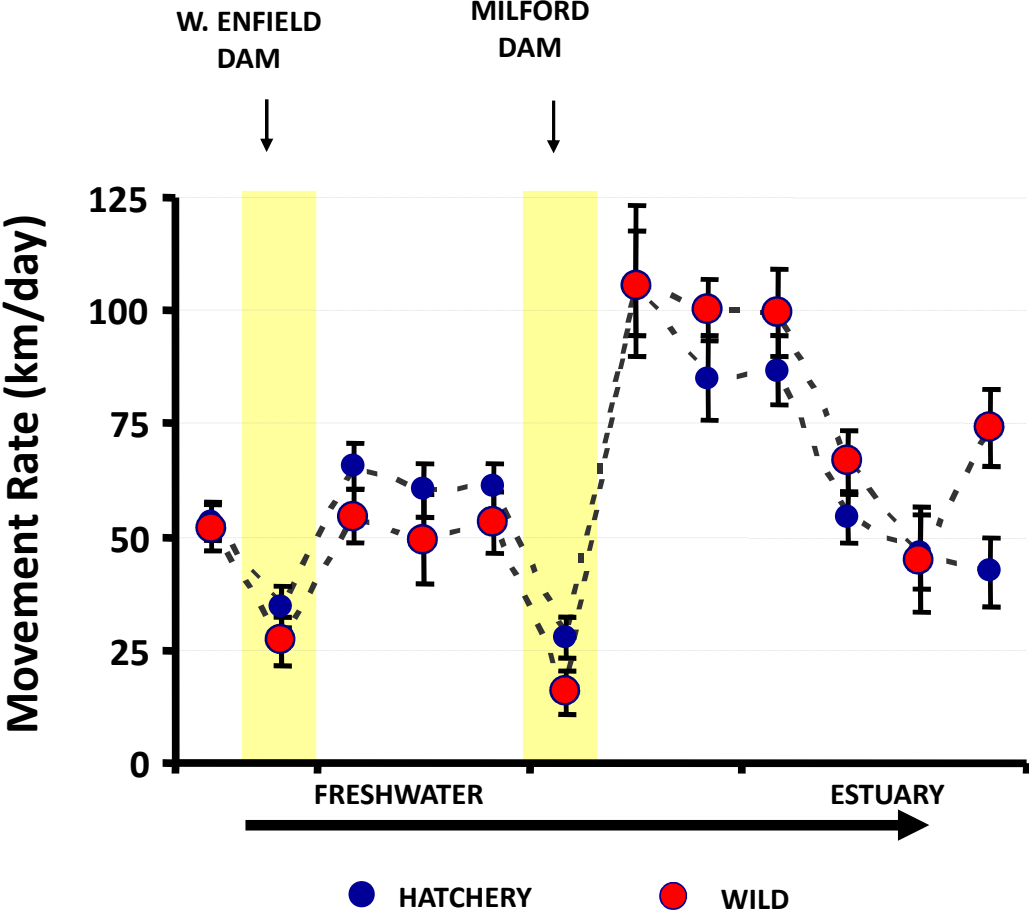
Descaling injuries



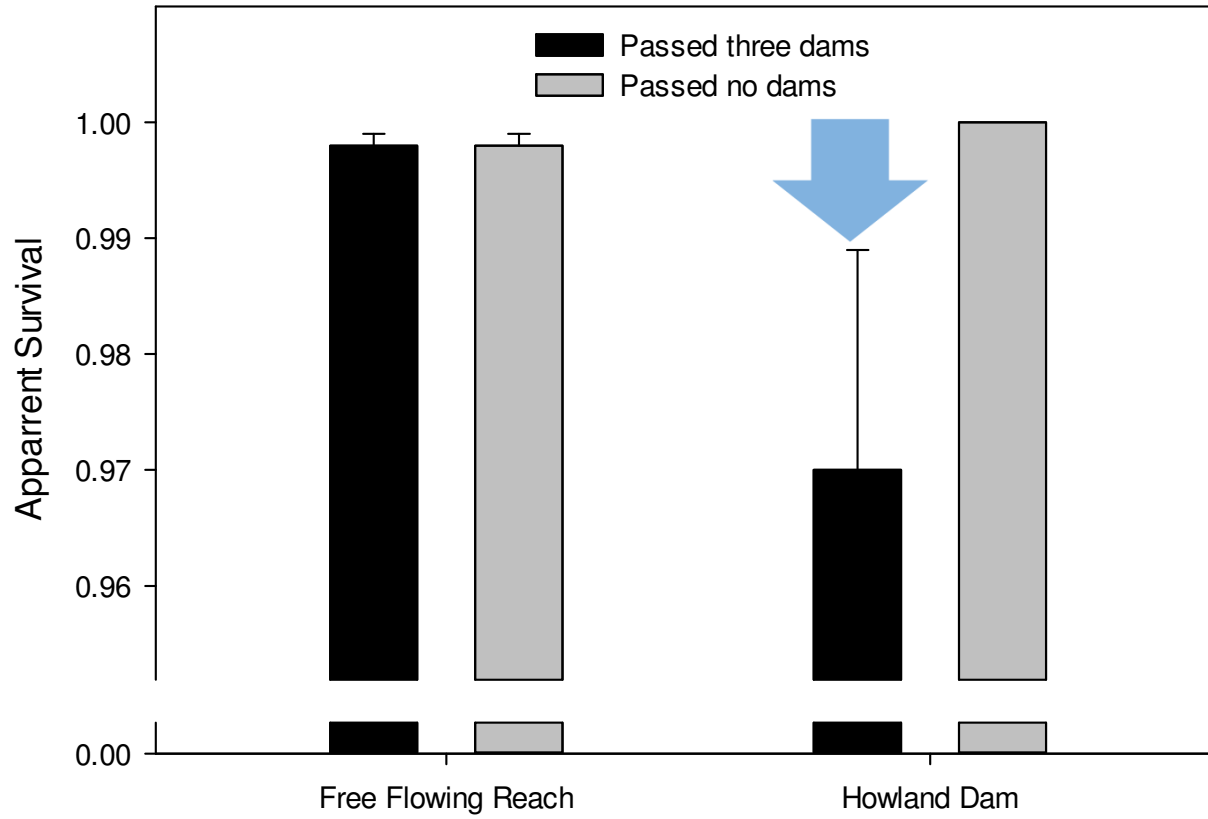
Poor tolerance
to seawater

Movement Rates

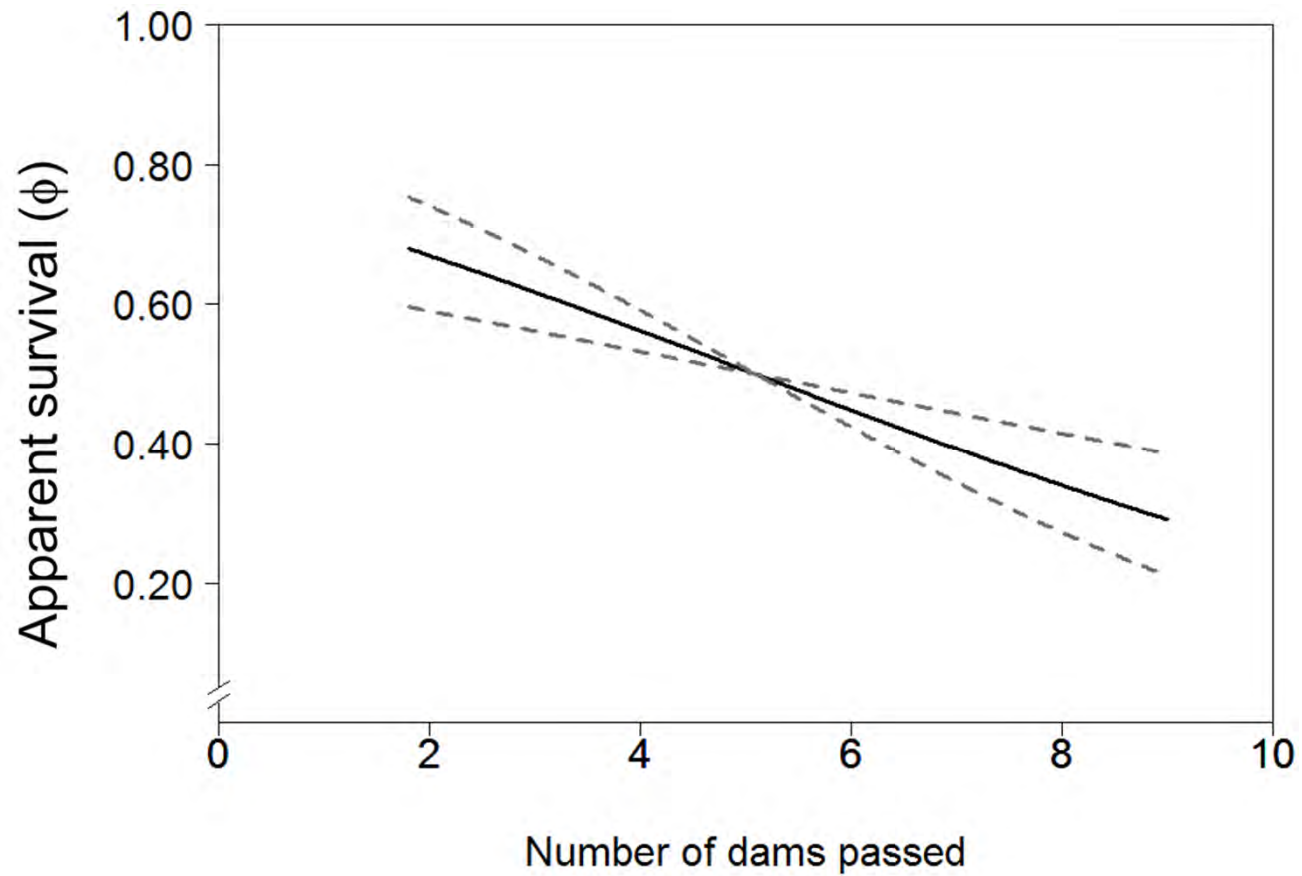
(Weldon release)



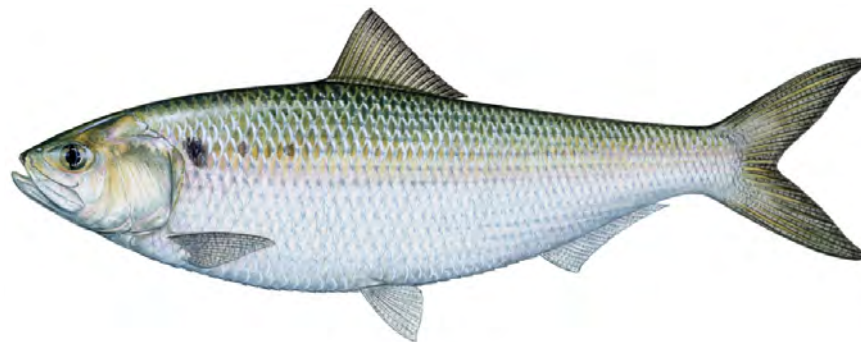
Survival Depends on Previous Experience



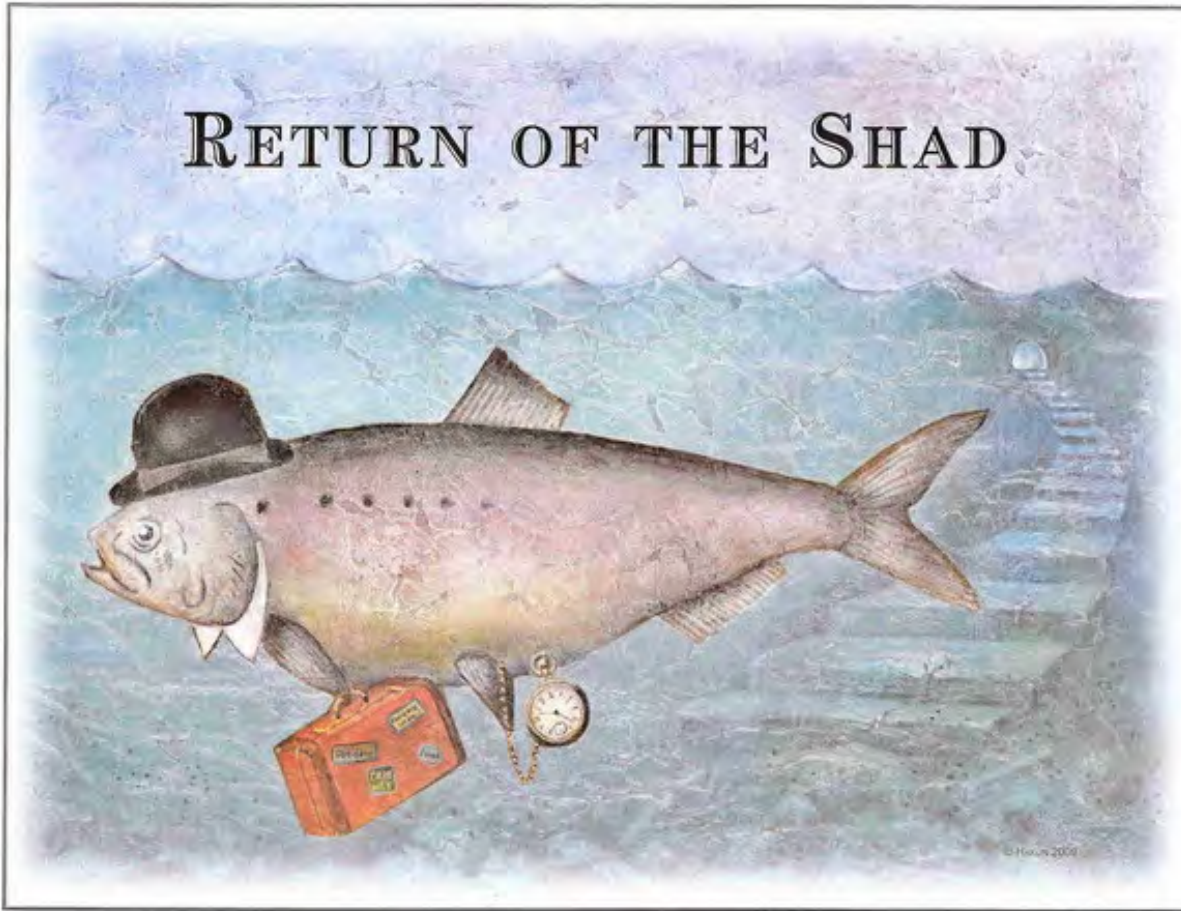
Estuary survival depends on number of dams passed



American
shad



RETURN OF THE SHAD

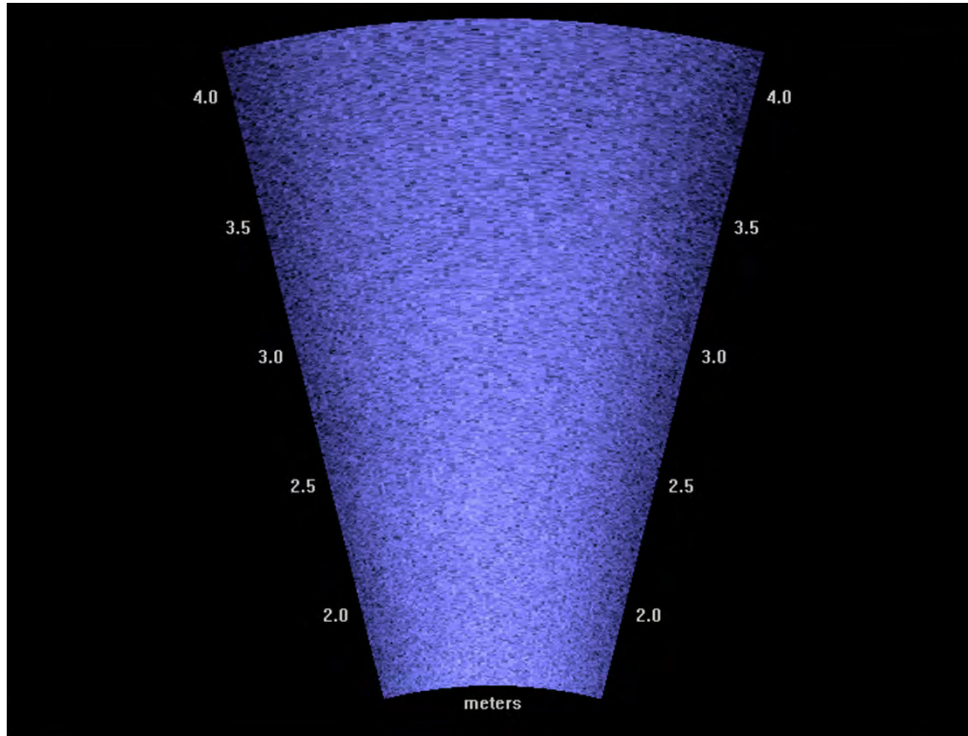


American shad prevented from migration in Penobscot River
DIDSON observations at Veazie Dam

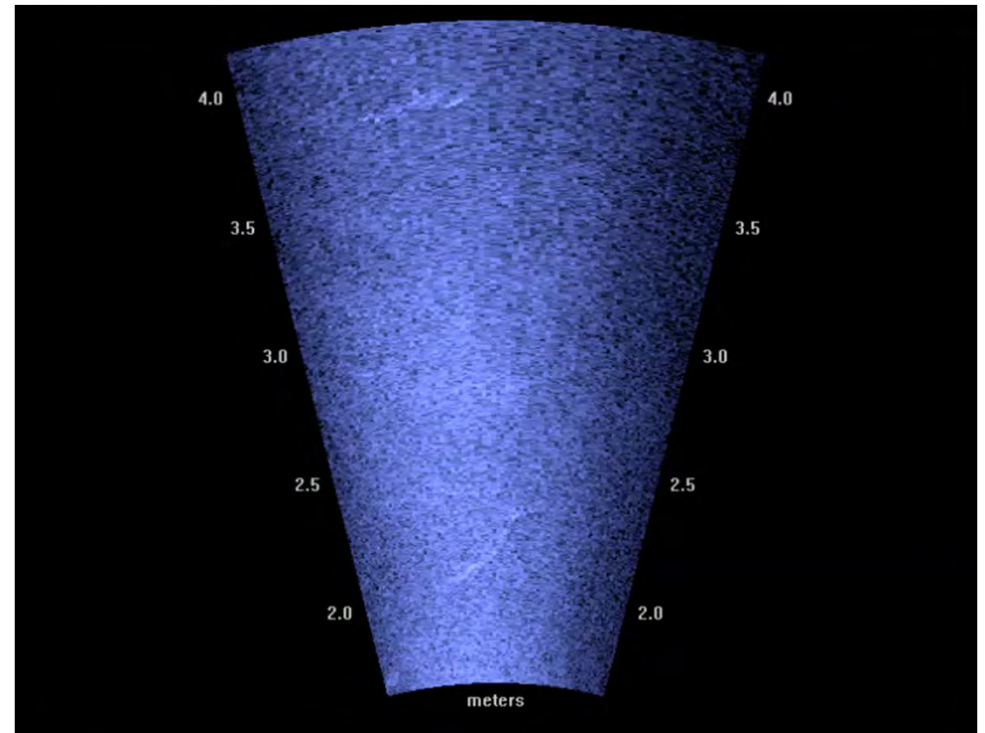


*Only a few dozen American shad
passed the Veazie Dam in decades*

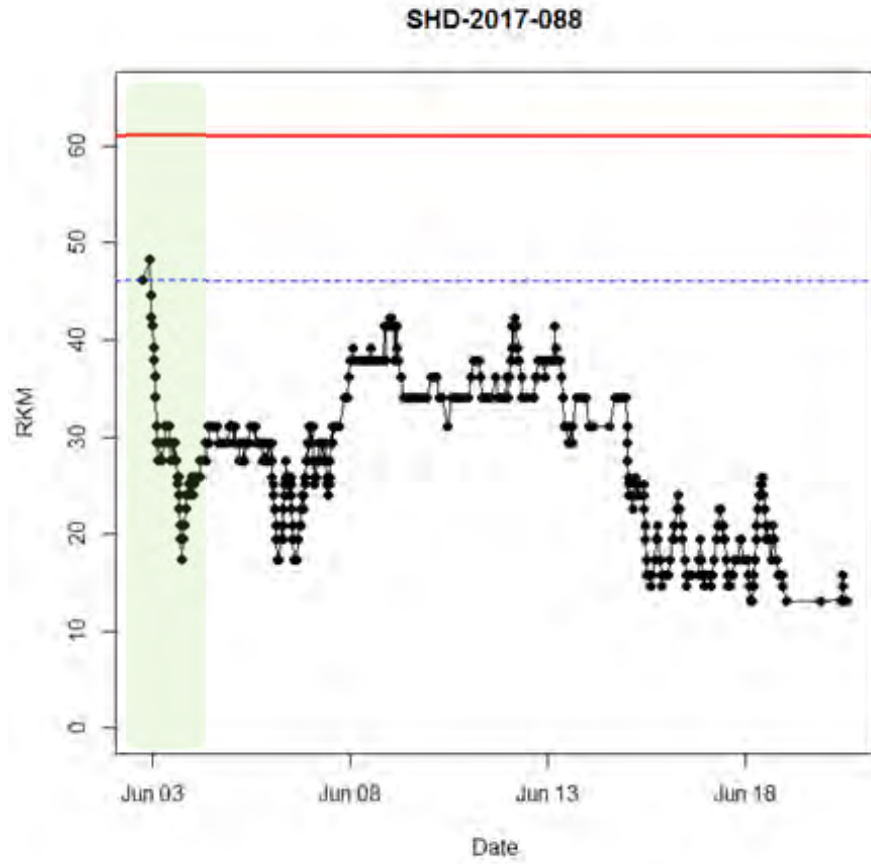
DIDSON Observations at Veazie Dam:



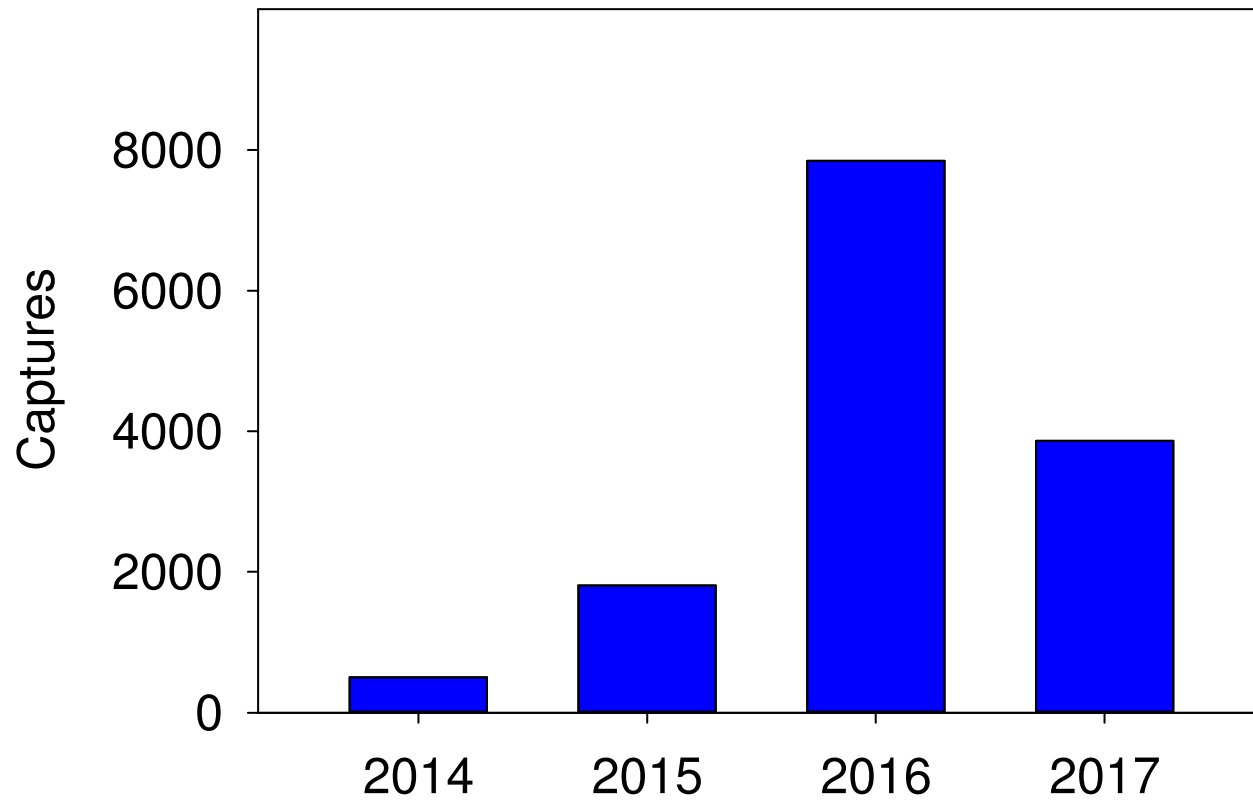
Atlantic Salmon



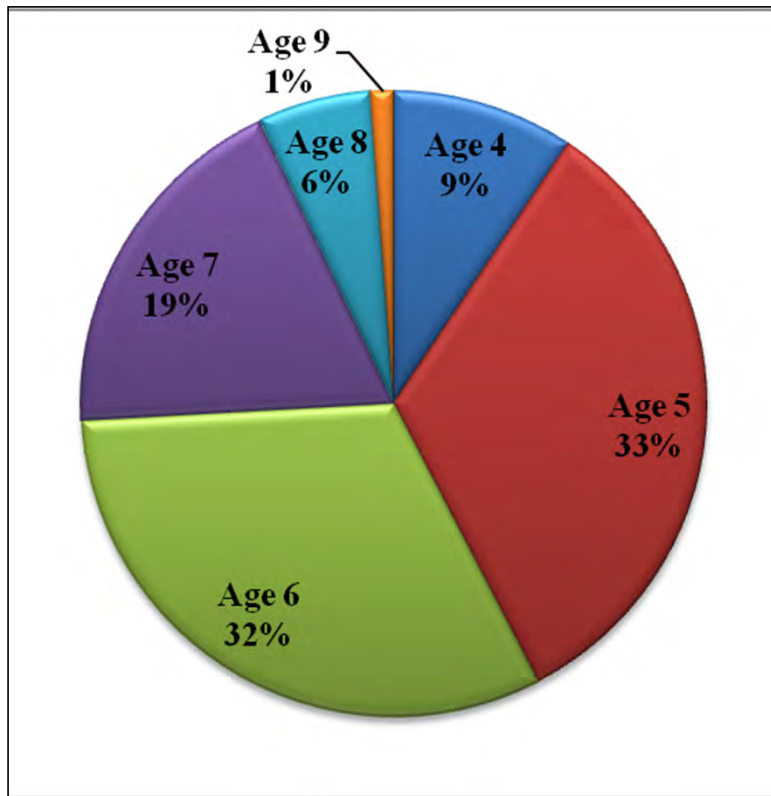
American shad



American shad captures at Milford Dam

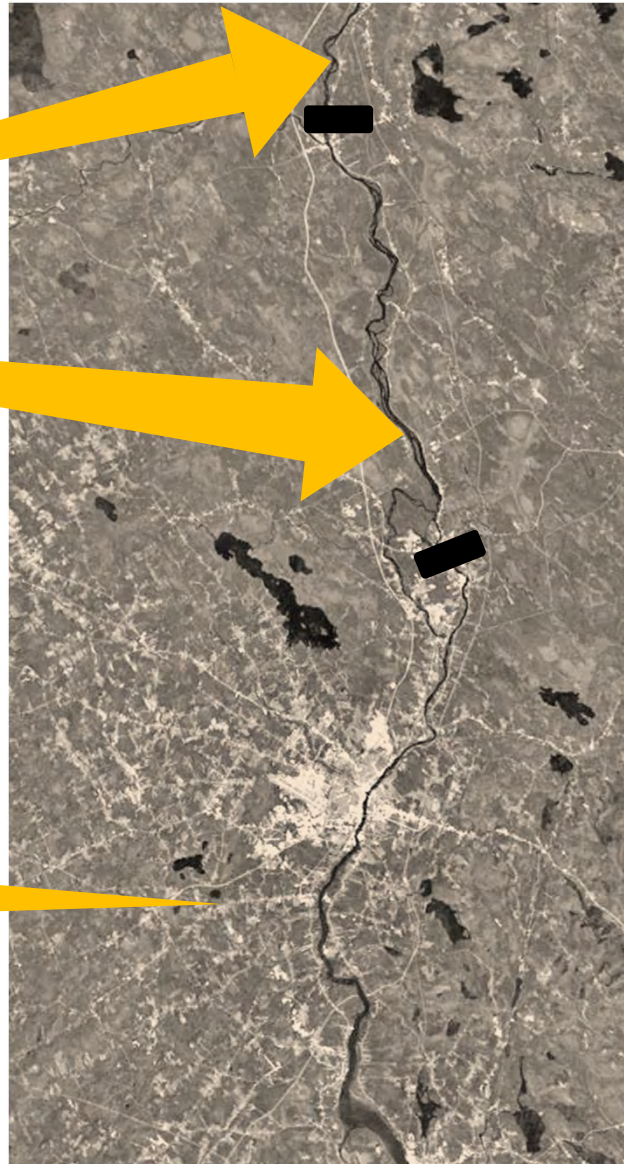
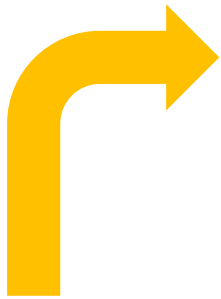


Loss of older age classes ?

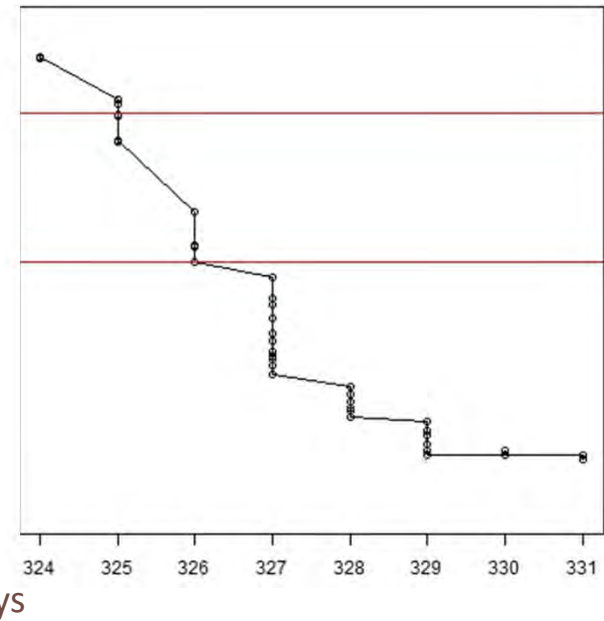
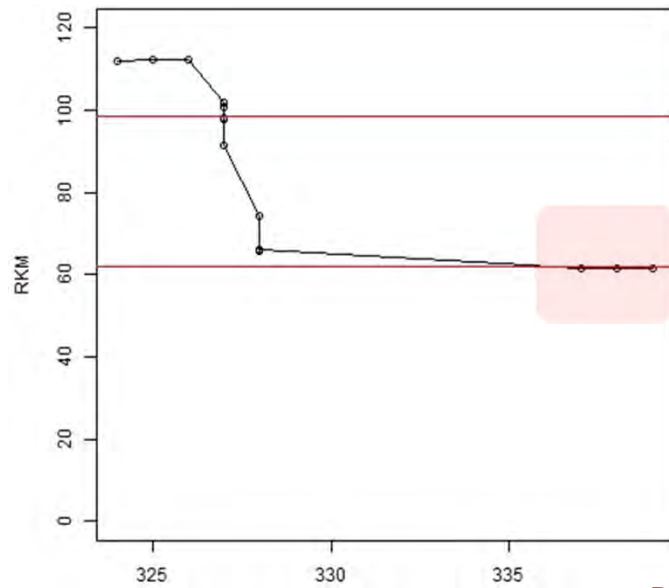


American eel





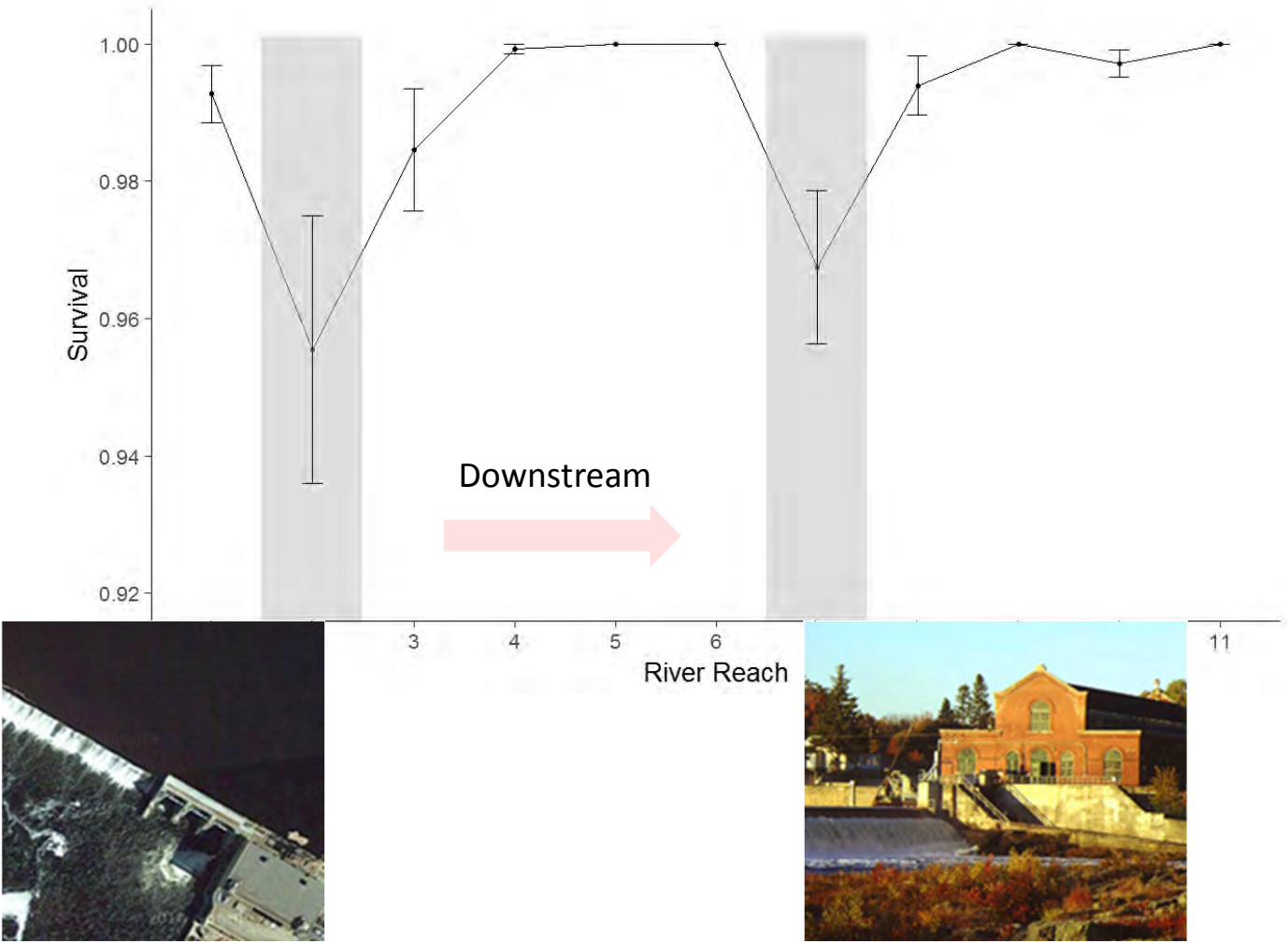
Migratory Behavior



Direct impacts of turbines



Survival Estimates Per Kilometer



Dam Impacts

Sea lamprey



Brookfield
Renewable Power

