Route 9 Narraguagus Project

Maine Water Conference

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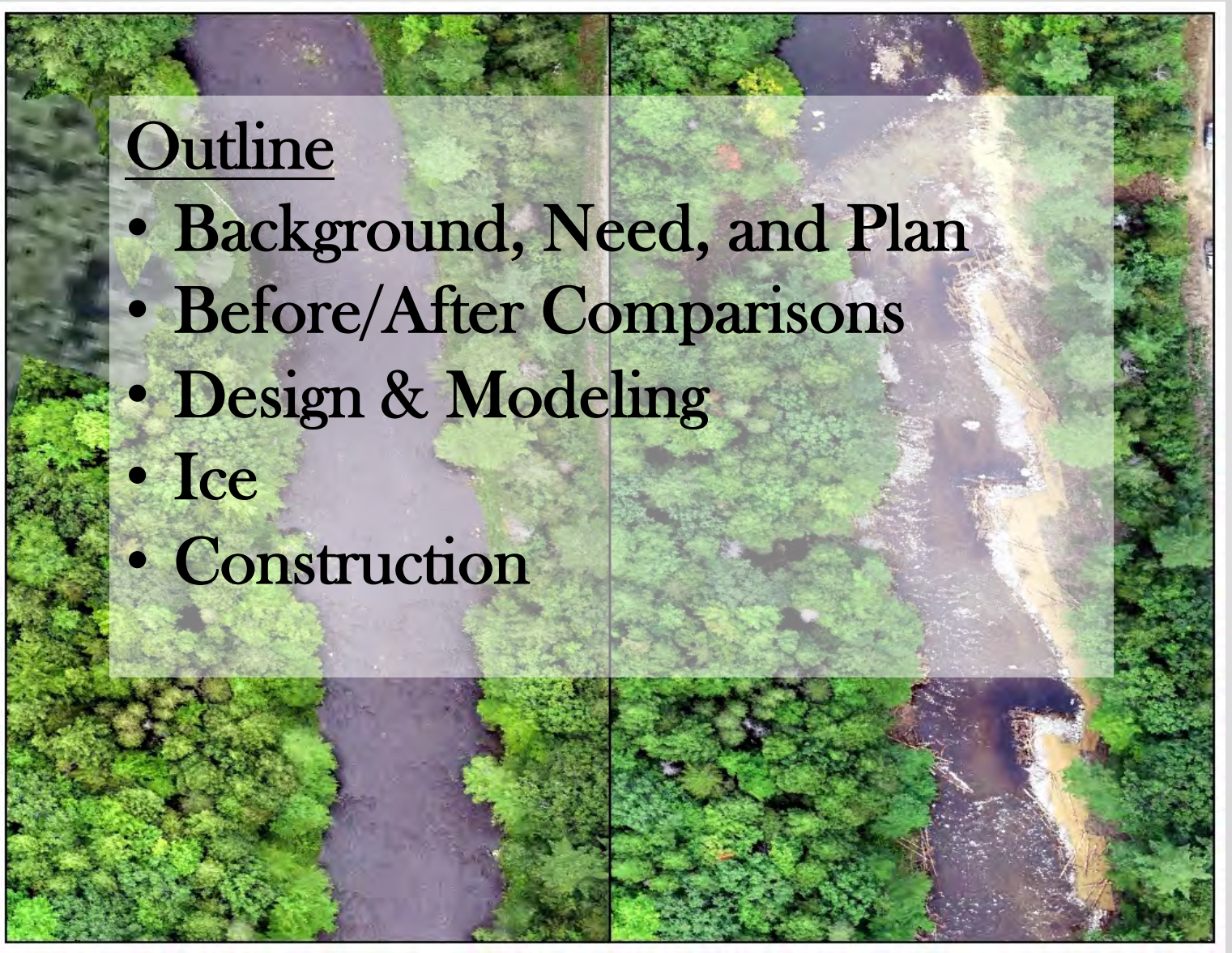
Project Partners & Funders



Local Landowners

Limiting Factors

- Overwi

  Embedded a

  Anchor Ice a

- Proxim

  Little to no s

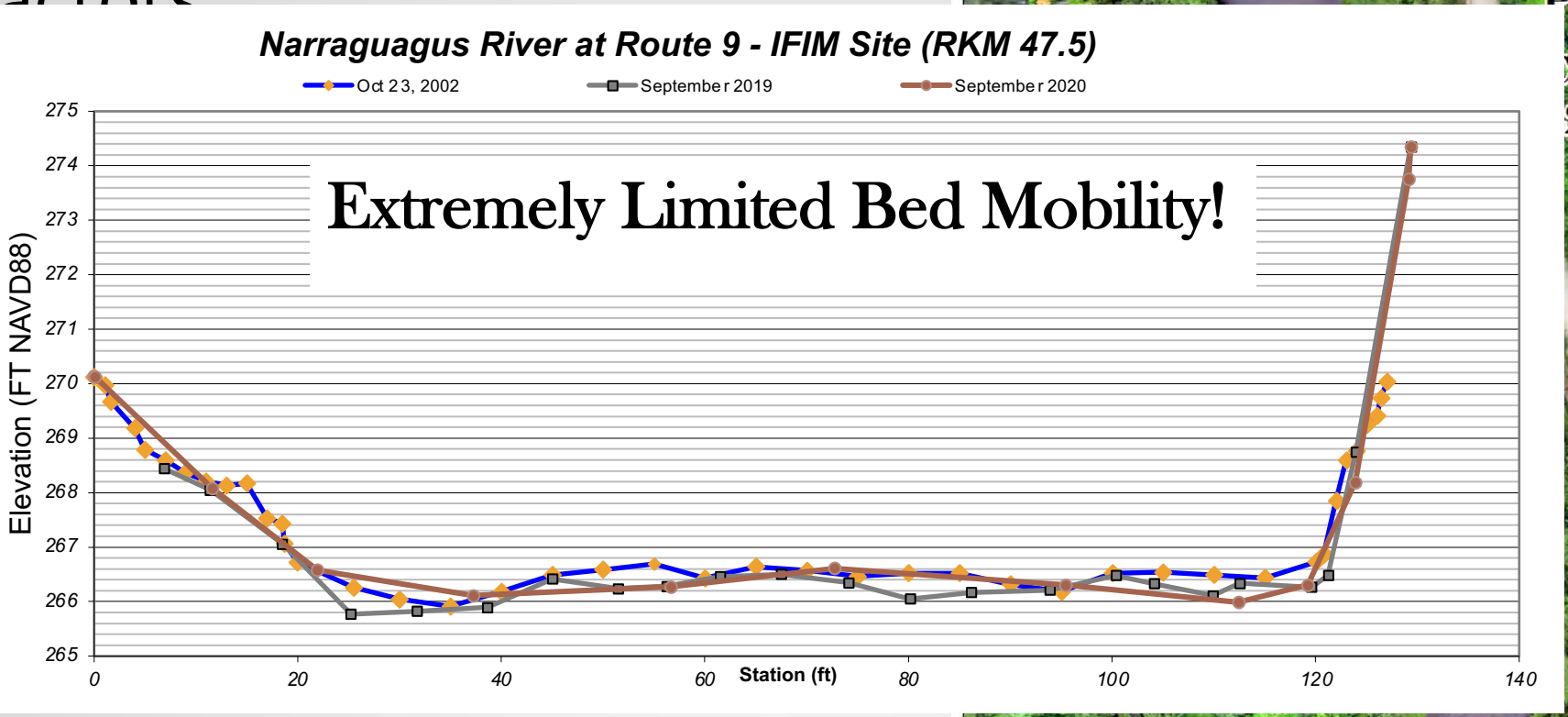
  Little YOY a

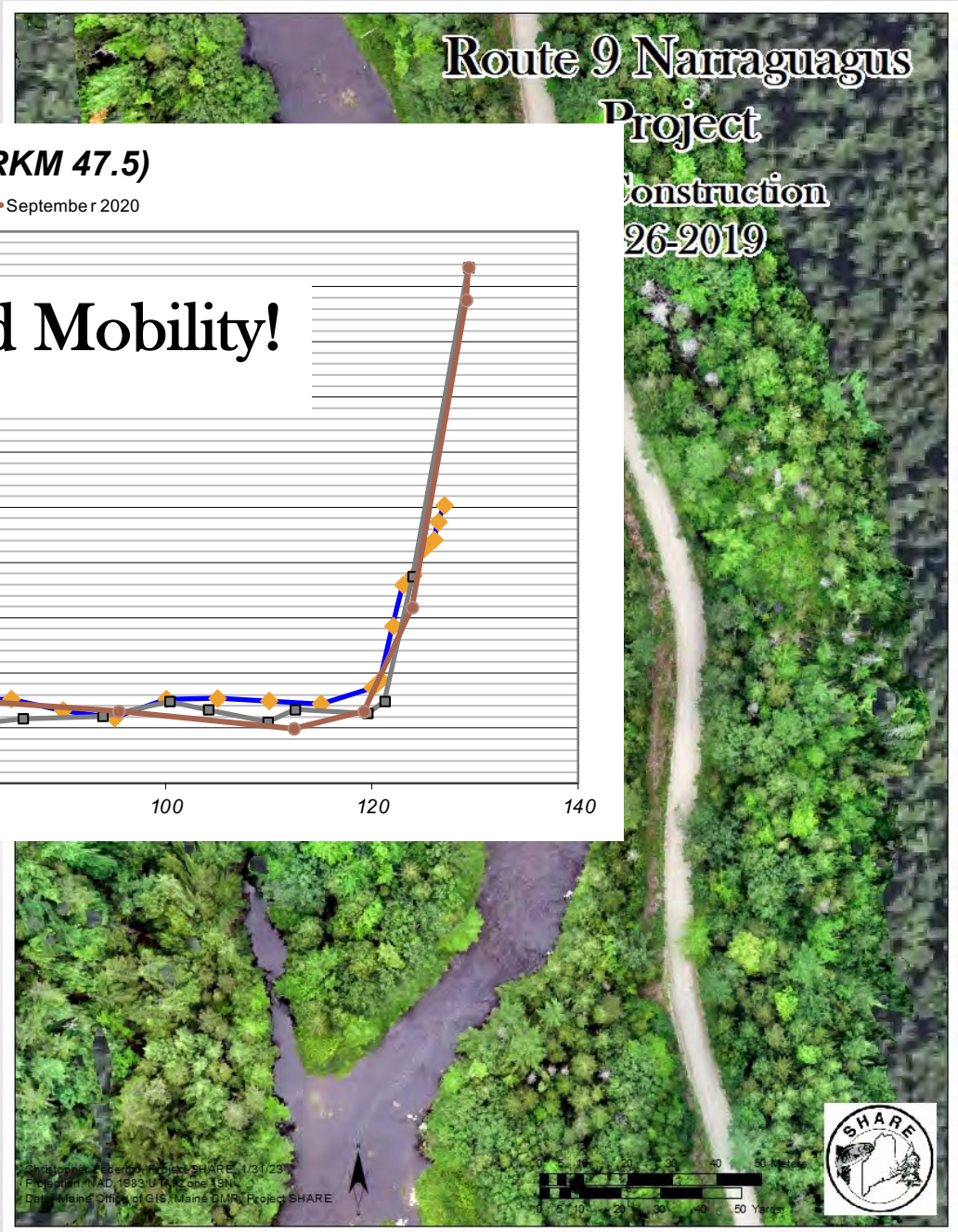
  No adult hol

- Summer Rearing

  Embedded and armored habitat

  Potential for cold water

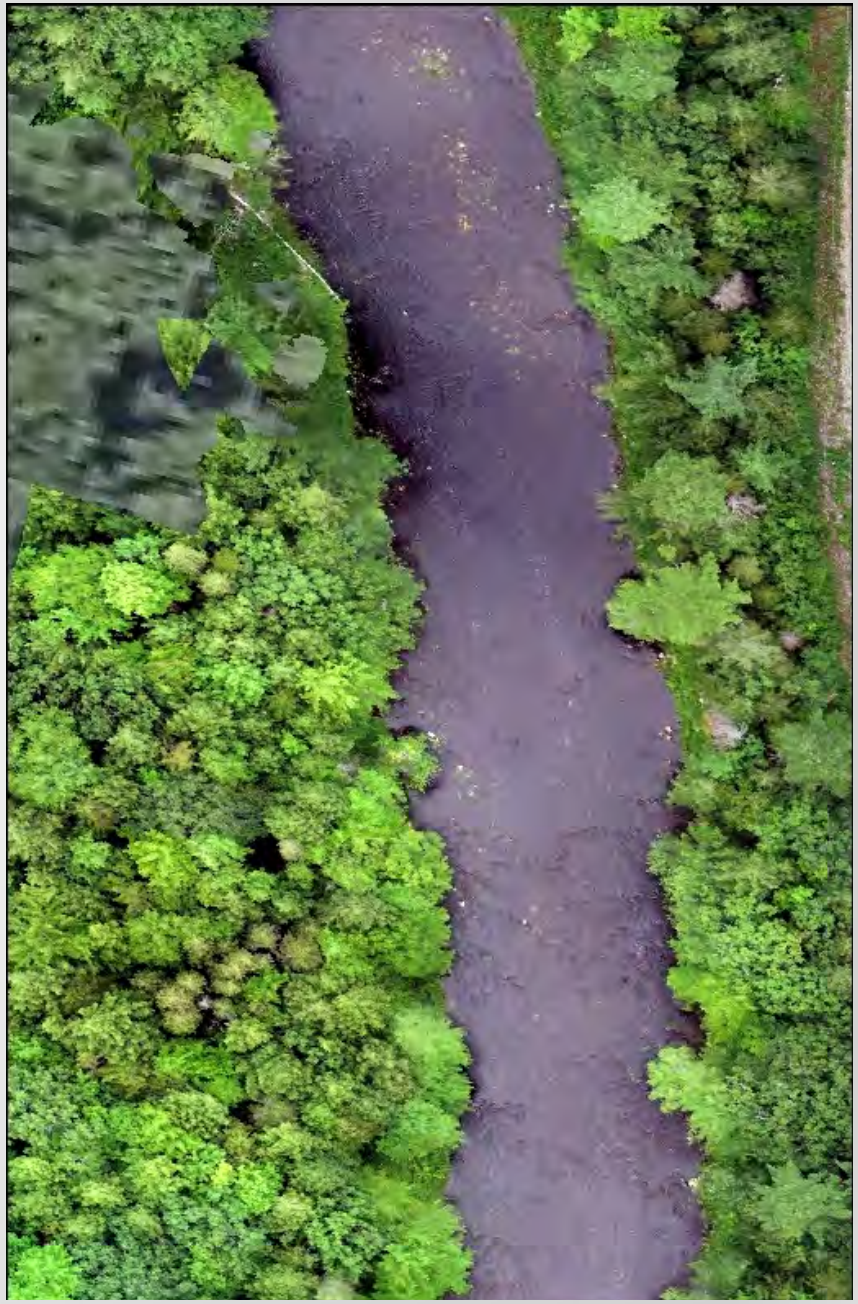




Project Objectives

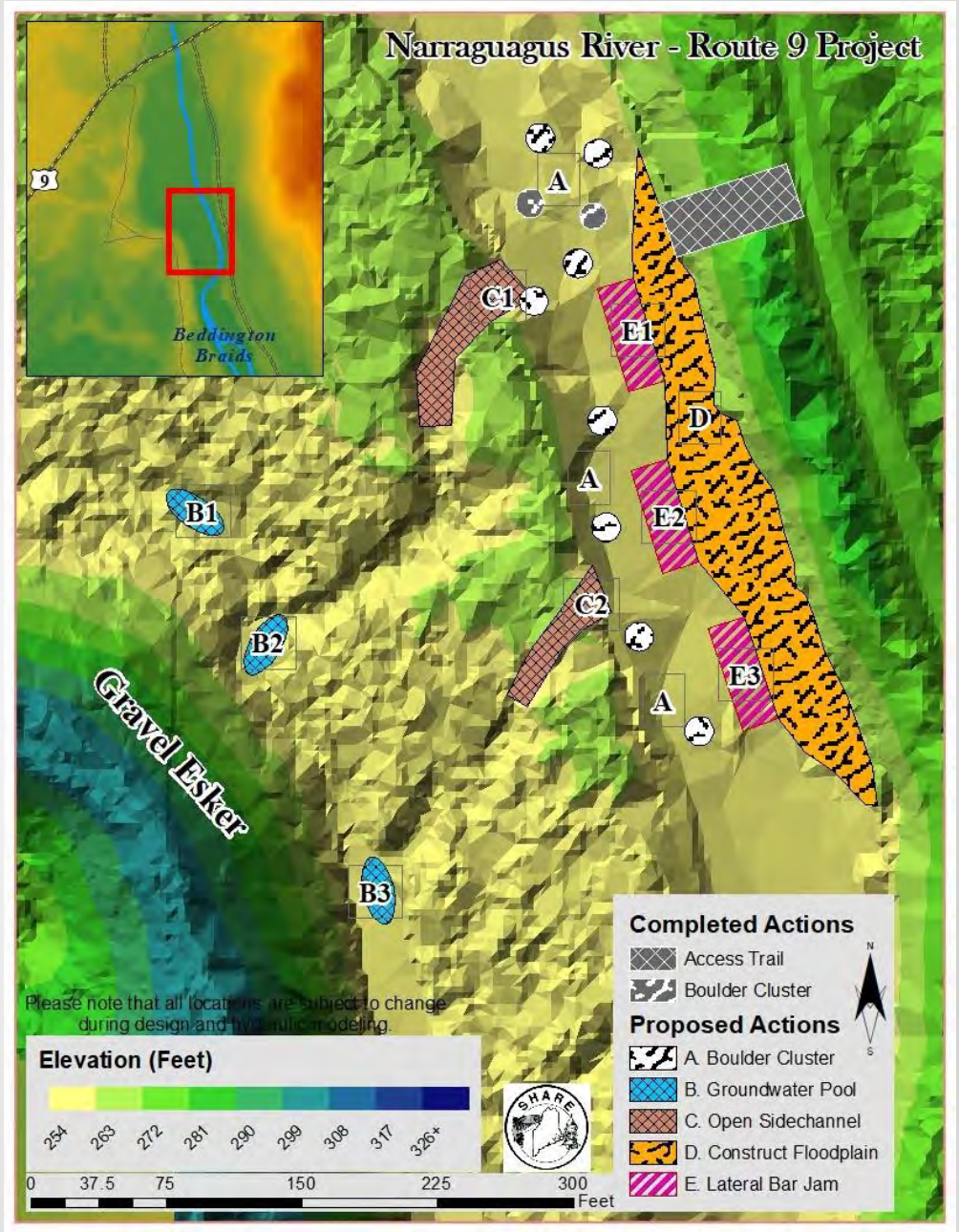
<u>Restore River's Natural Functions</u>

1. Do No Harm!
2. Successful demonstration of techniques
3. Provide all habitat types
4. Increase stream complexity (depth/velocity)
5. Show persistence of structures

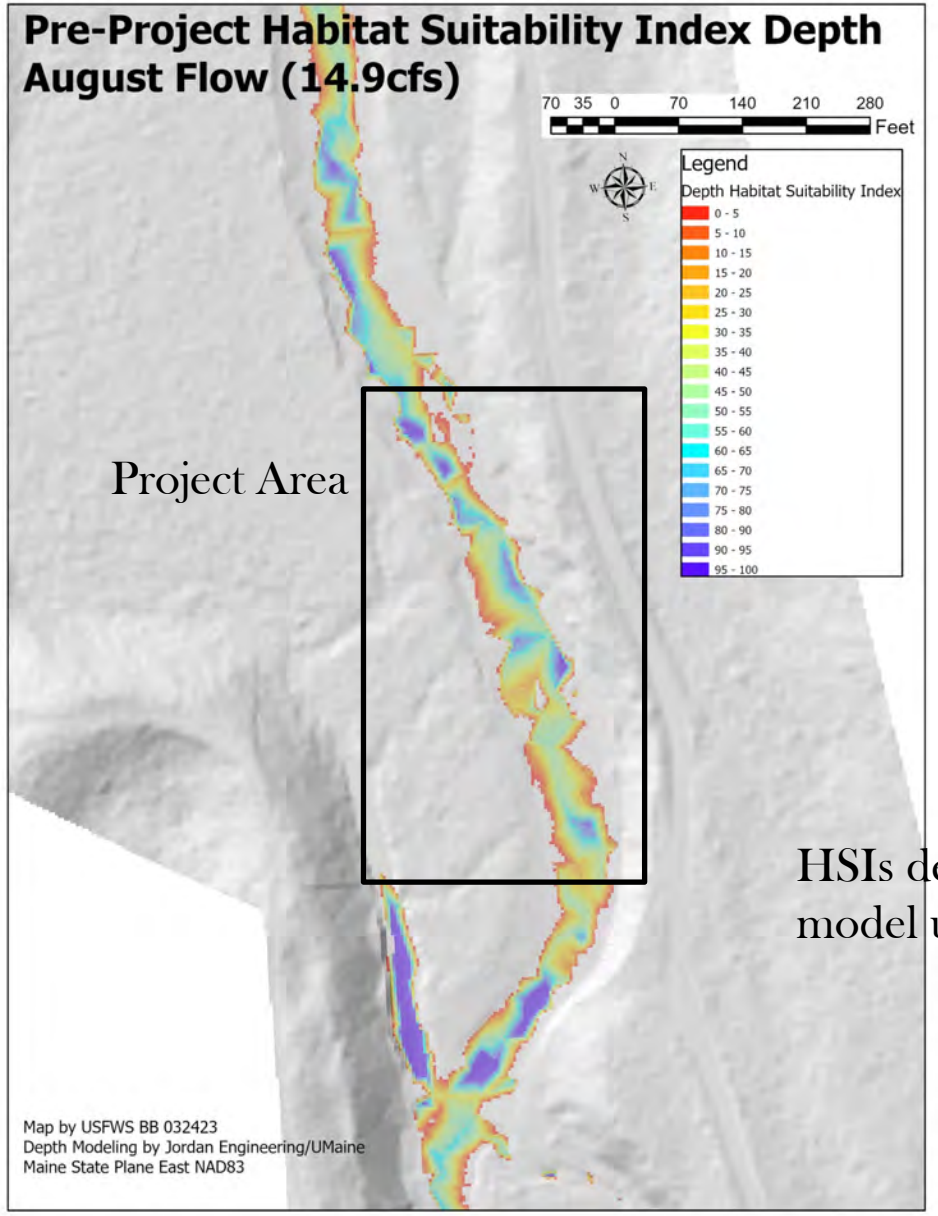


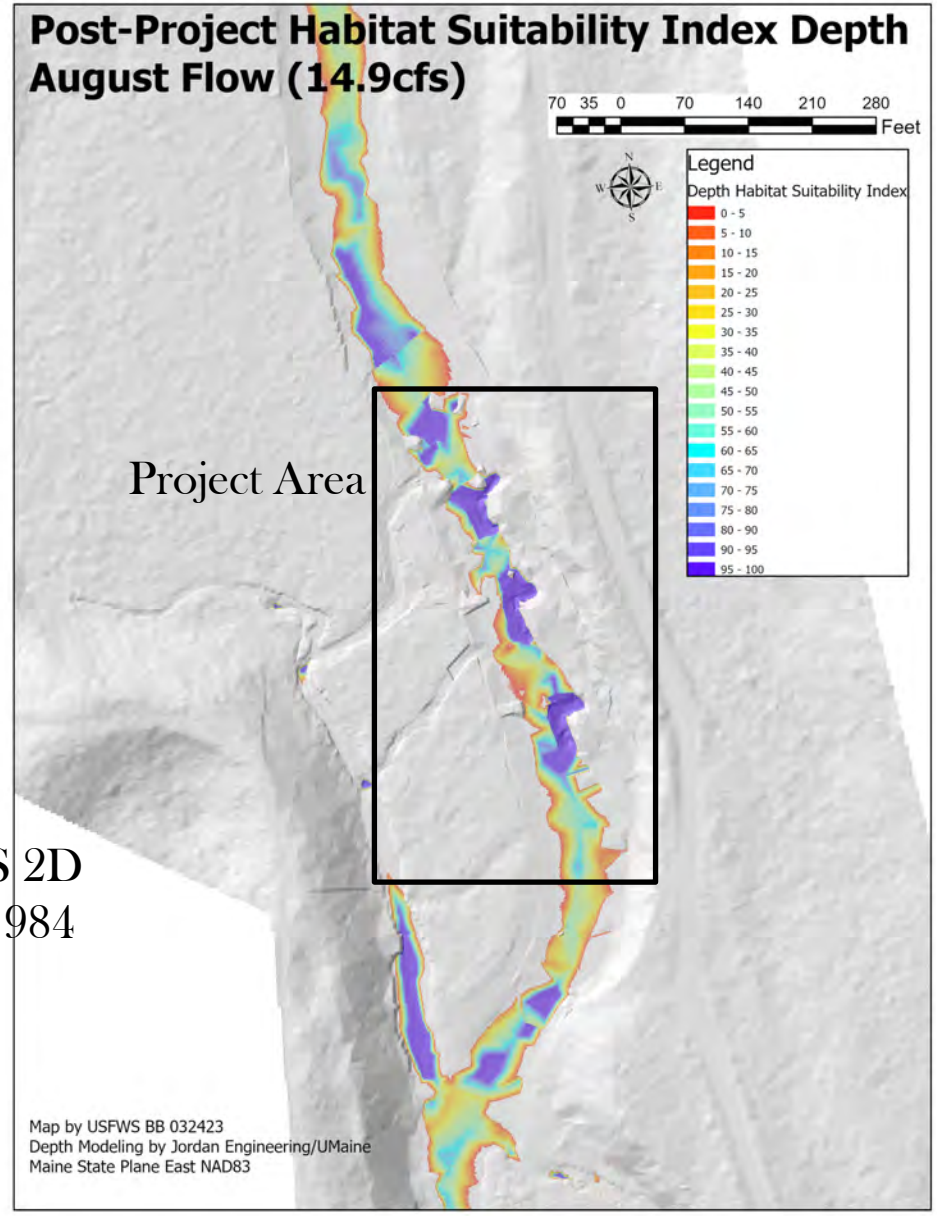
Planned Project Actions

- In-stream boulder clusters
- Off-channel Pools
- Re-open Side Channels
- Construct Floodplain
- Engineered Log Jams



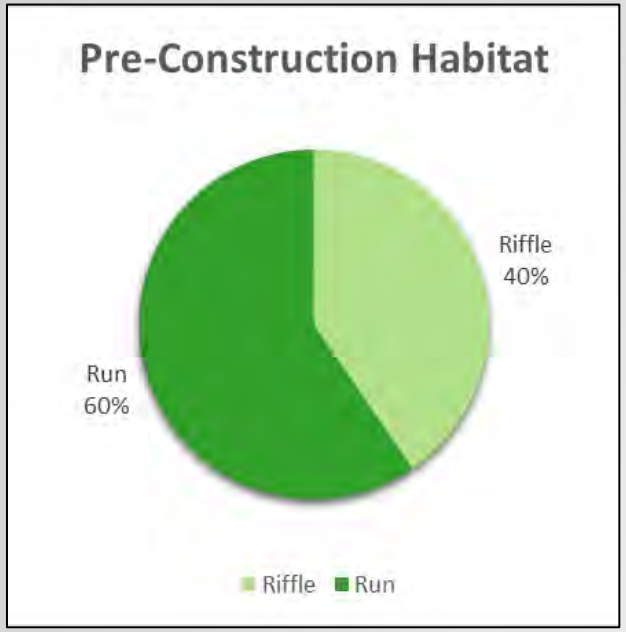
Habitat Suitability Index (Depth)

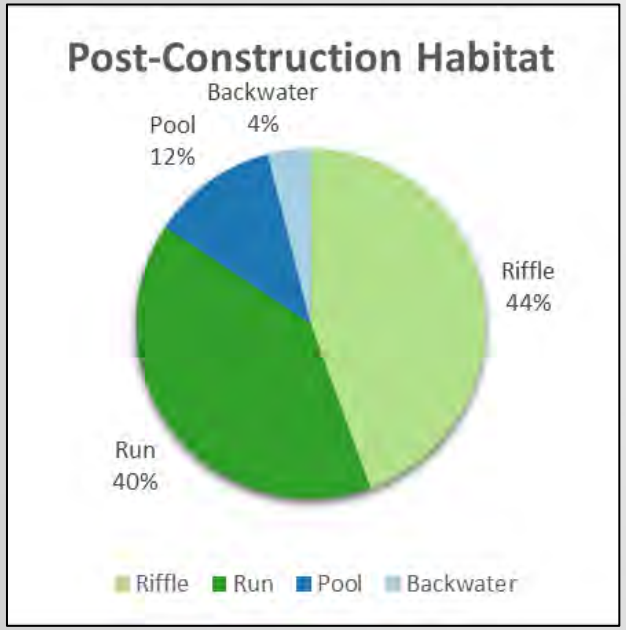


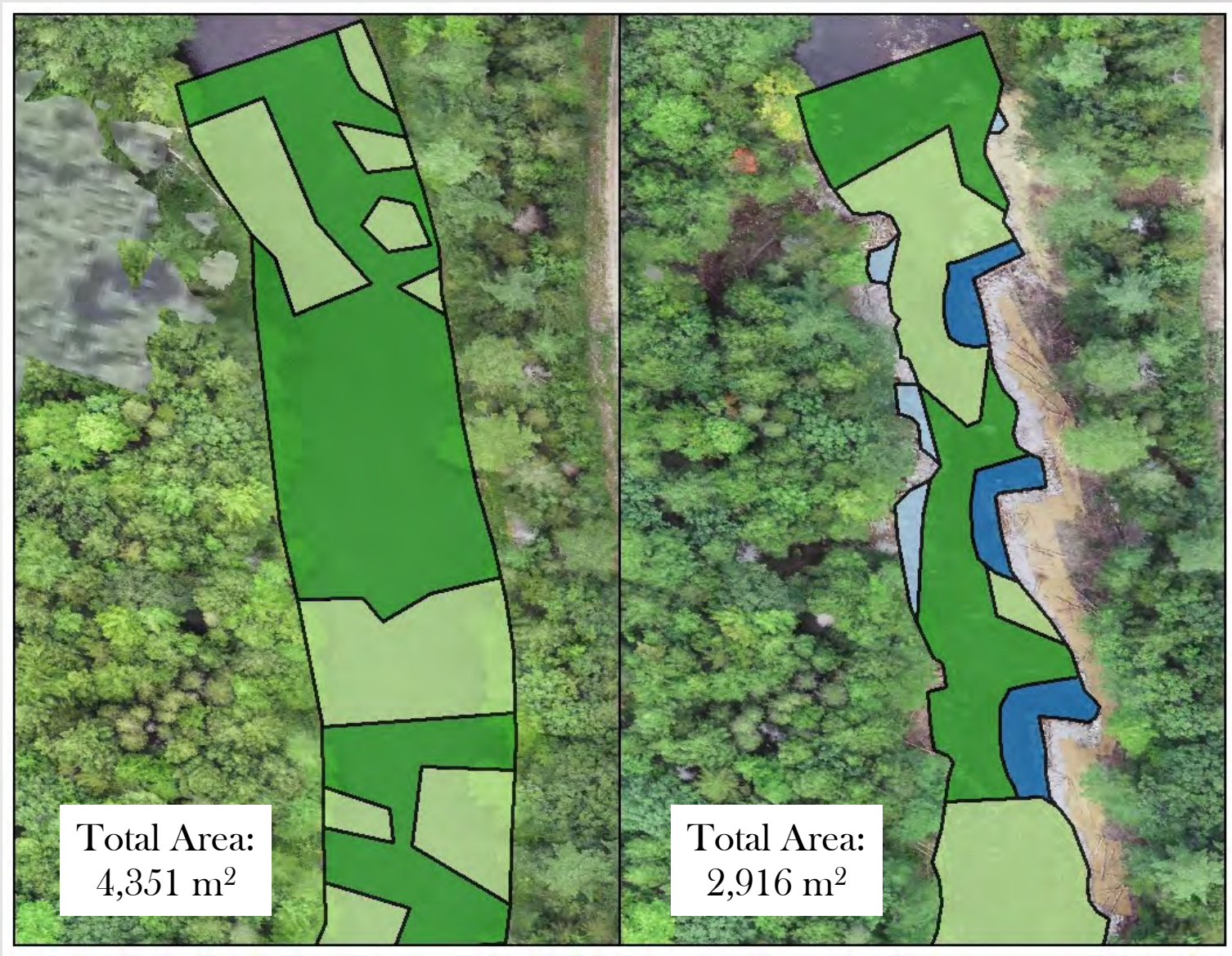


HSIs derived from HEC-RAS 2D model using Stanley & Trial 1984

Proportions of Habitat







Project Planning & Design Team

Fluvial Geomorphologists:

- **Robert (Bob) Gubernick, P.G.**, US Forest Service – National AOP and Restoration Team Leader.
- **Doug Thompson**, **PhD**, Professor, Connecticut College.

Fishery Biologists:

- **Colby Bruchs**, ME Dept. of Marine Recourses, Salmon restoration biologist.
- **Scott Craig**, US Fish & Wildlife Services, Project Leader, Fish and Aquatic Conservation.
- **George Pess**, **PhD**, NOAA Watershed Program Manager and Affiliated Associate Prof., Univ. of Washington.
- **Joan Trail, PhD**, ME Dept. of Marine Recourses, Salmon restoration biologist (retired).
- **John Kocik**, **PhD**, NOAA, Chief, Atlantic Salmon Ecosystems Research Team.

River & Wetlands Ecologist/Biologist:

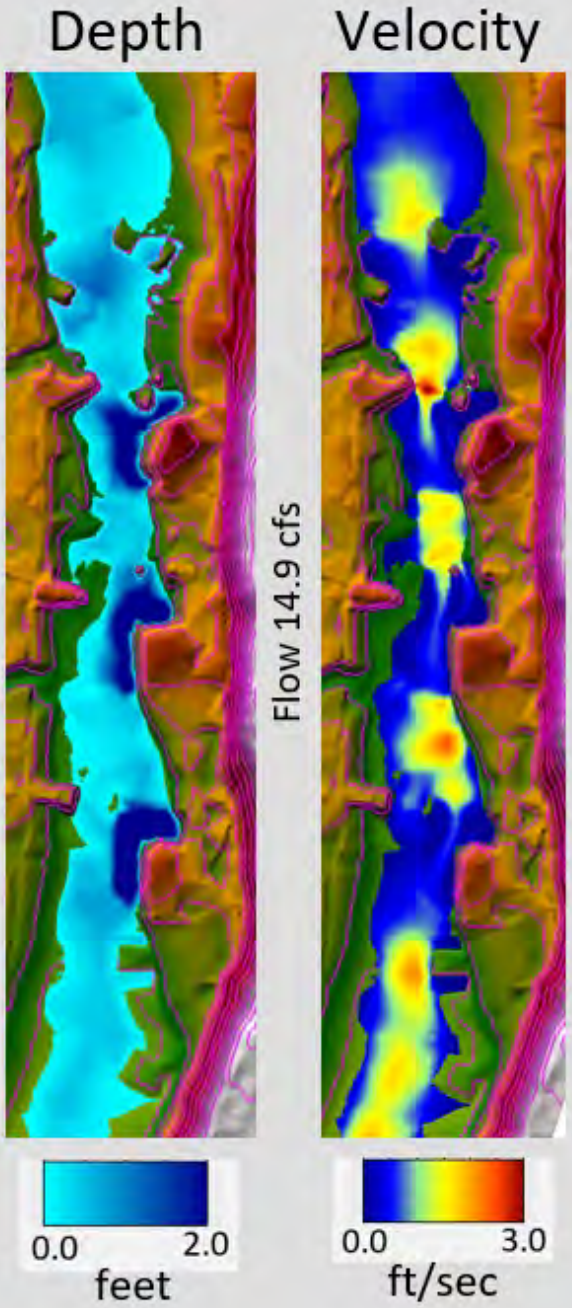
- **Bill Bennett**, US Fish & Wildlife Services, Assessment & restoration of river ecosystems.

Project SHARE - Constructability & Landowner Engagement:

- **Steve Koenig** & **Chris Federico**, Project SHARE, Cherryfield, Maine.

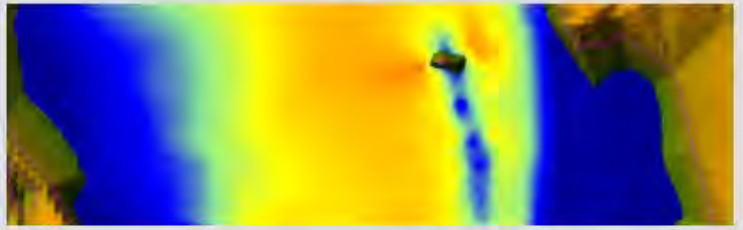
Engineering & Hydraulic Modeling:

- **Mark Jordan**, **P.E.**, Water Resources Engineer & UMaine student.



2D - Hydraulic Modeling (HEC-RAS 2D)

- Allows designers to evaluate and compare various restoration options over:
  - A range of flows.
  - A range of physical scales.



- It is easy to generate graphics to distribute to the planning/design team for review.
- It is essential to evaluate the impact of the 100-year flood:
  - Increased flooding potential.
  - Evaluate hydrodynamic forces the restoration structures are subject to.
- What about ice jams.

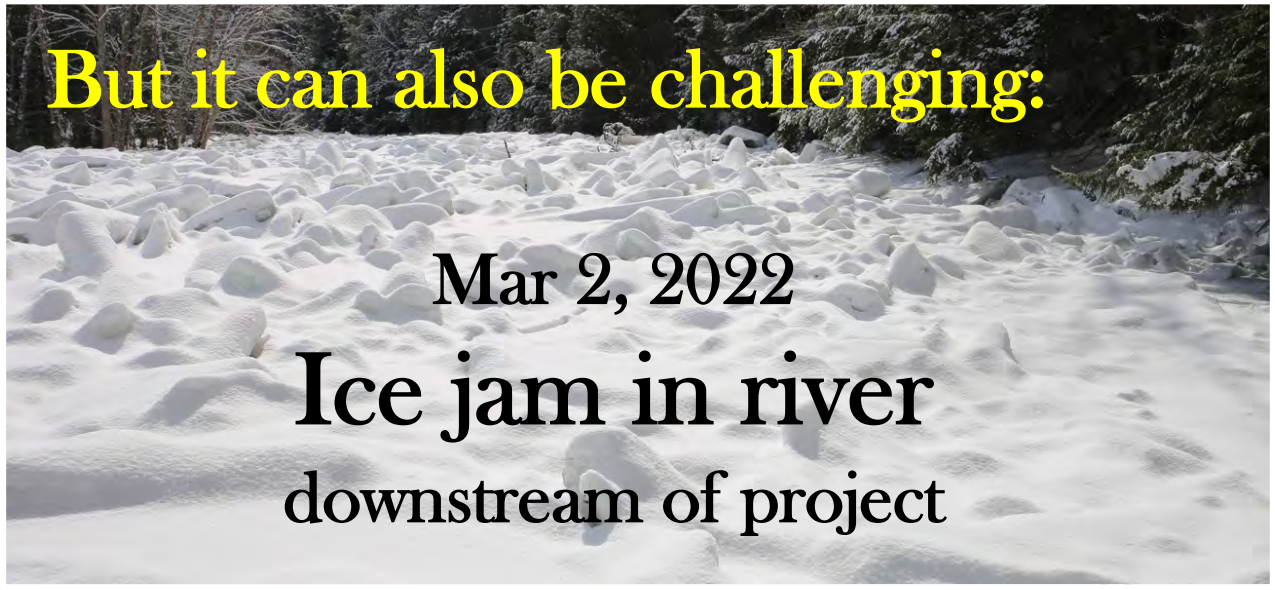
Ice Issues

Ice is good:

Hedger et al. (2013) and Watz et al. (2016) . . . Atlantic salmon (parr and smolts) are more active and **healthier when they spend the winter under an ice cover.** But with climate change . . .

Ice cover

https://en.wikipedia.org/wiki/File:Atlantic_salmon_parr.jpg



Restoration structures influence ice formation and where ice jams are likely to occur.

Construction - Floodplain

Coffer Dam

Eng. Log Jam Construction

Questions / Comments?

Questions?

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Mark Jordan – Modelling & Design
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