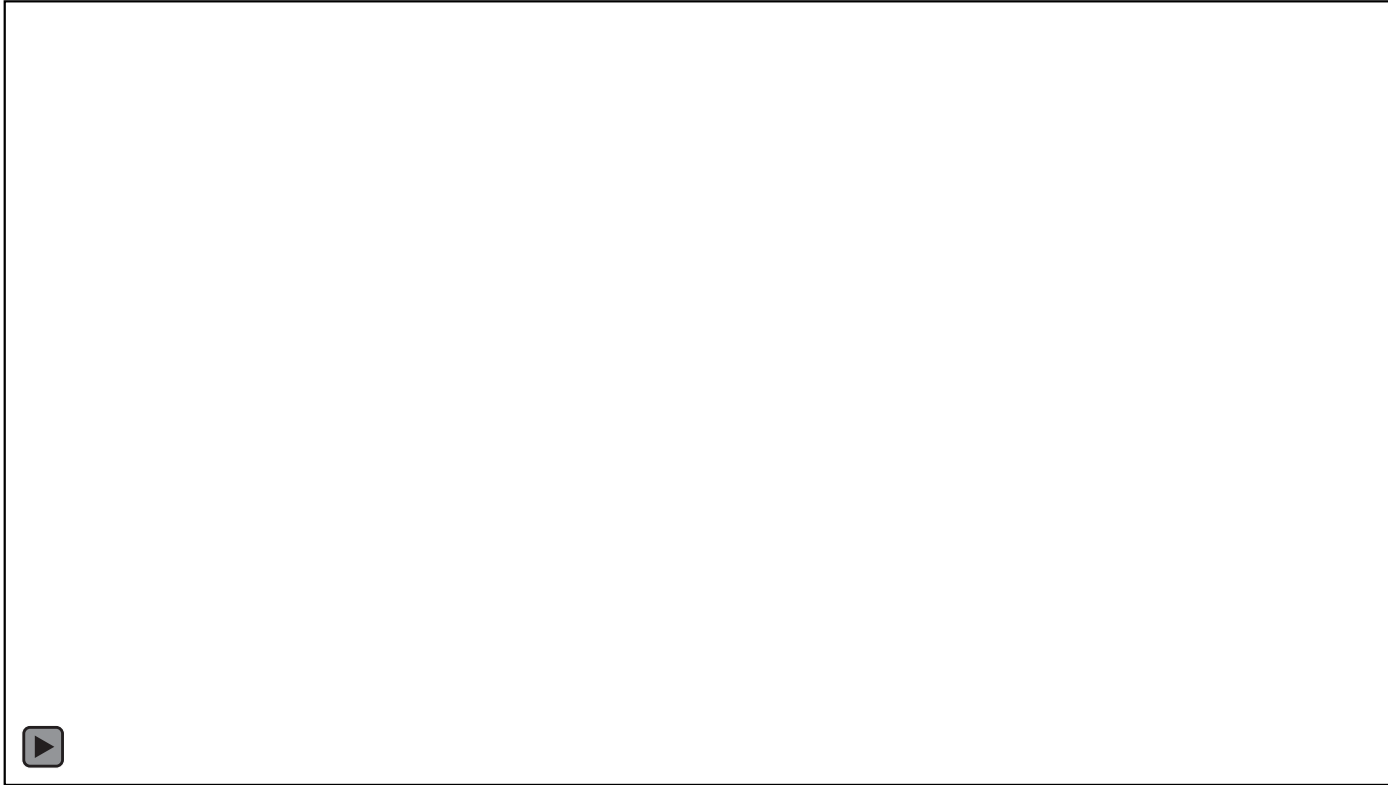


# High-Definition Stream Survey of the Upper Delaware River



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**Trutta Environmental Solutions, LLC**

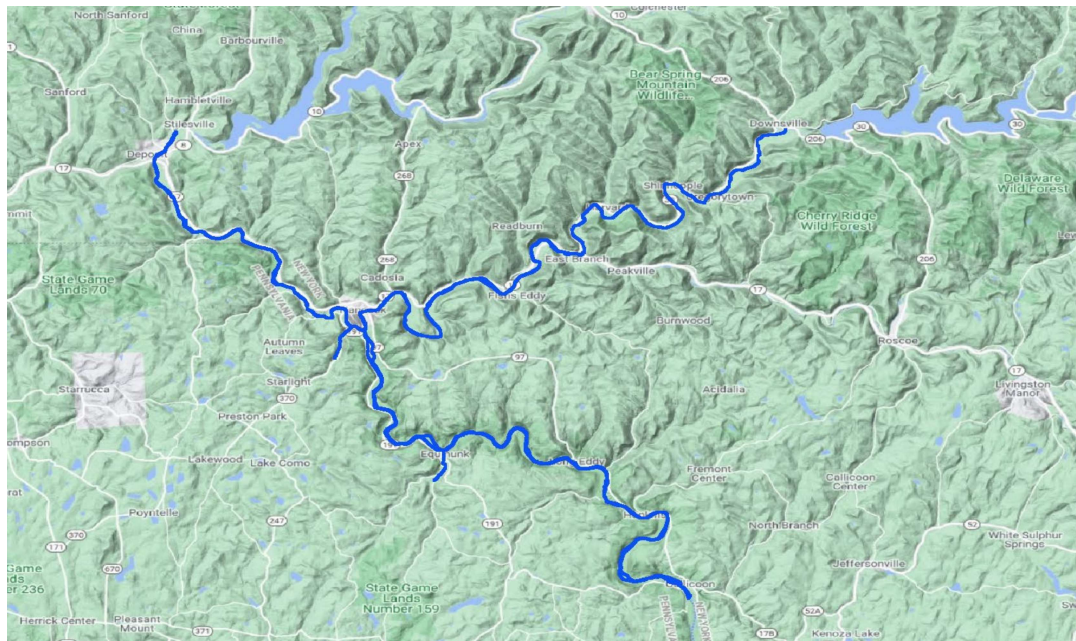
**TruttaSolutions.com**

Water, Water Everywhere 2021

# Thanks to:

- National Fish and Wildlife Foundation in collaboration with:
- Friends of the Upper Delaware River,
- Division of Fish and Wildlife, New York Department of Environmental Conservation,
- Pennsylvania Fish and Boat Commission
  - As Part of the 3-year Upper Delaware River Joint Fisheries Investigation Plan
- Embrace a Stream Program of Trout Unlimited and the Shehawken Chapter of Trout Unlimited
- Upper Delaware Scenic and Recreational River, National Park Service

# HDSS Survey - East, West and Mainstem of Delaware River and lower Shehawken and Equinunk Creeks



Field work completed - Aug 31 to Sept 9, 2020

Complete a High Definition Stream Survey on 77 miles of the Upper Delaware River to document:

- Collect continuous Video, Sonar, GPS and Water Quality.
- Assess river and stream corridor conditions to help determine potential restoration opportunities.
- Estimate suitable rainbow trout habitat for adult and juvenile life stages

# Overview

- What is the High-Definition Stream Survey Methodology (HDSS)?
- Why HDSS?: A Key Component for Multi-spatial Data Integration.
- Results
- General Conclusions

# HDSS Data Collection



## Side video

- Left and Right Streambank
- Riparian Area
- Infrastructure

## Front video

- Habitat type
- Canopy cover

## Down video

- Substrate type
- Embeddedness

## Side scan sonar

- Depth
- Roughness
- Hardness
- Side scan imagery

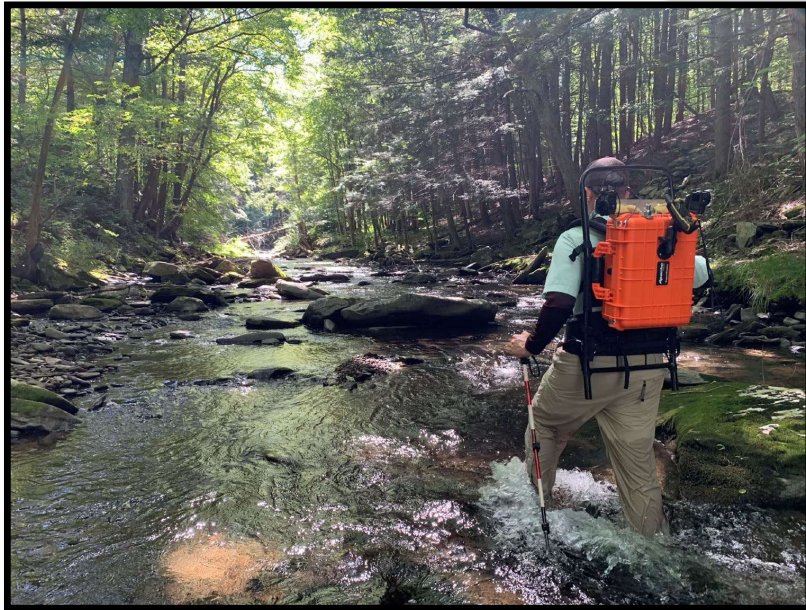
## Water quality sensor

- DO, pH, Temp, etc

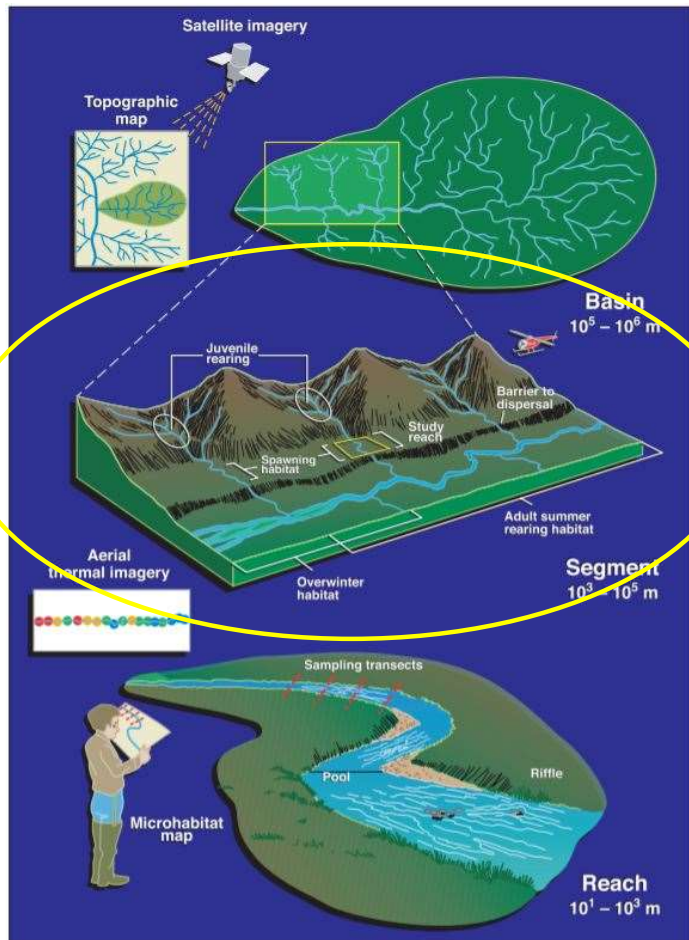
## GPS

- Time
- Location
- Elevation

# How Do We Collect the Data?



# Why HDSS? Conserve, Restore, Protect, and Manage



Spatial scale (m)	Microhabitat $10^{-1} - 10^0$	Channel units $10^1$	Reaches $10^1 - 10^3$	Segments $10^3 - 10^5$	Drainage basins $10^5 - 10^6$
Current understanding	[Hatched bar]			[Hatched bar]	[Hatched bar]
Critical stream fish life-history events	?	[Hatched bar]	[Hatched bar]	[Hatched bar]	[Hatched bar]
Understanding needed	[Hatched bar]	[Hatched bar]	[Hatched bar]	[Hatched bar]	[Hatched bar]

**Intermediate scale = 1 to 100 km**

Fausch et al. 2002. Landscapes to Riverscapes: Bridging the Gap between Research and Conservation of Stream Fishes. BioScience

# Landscape vs Riverscape

DSL Project Component: Modeling ecological integrity

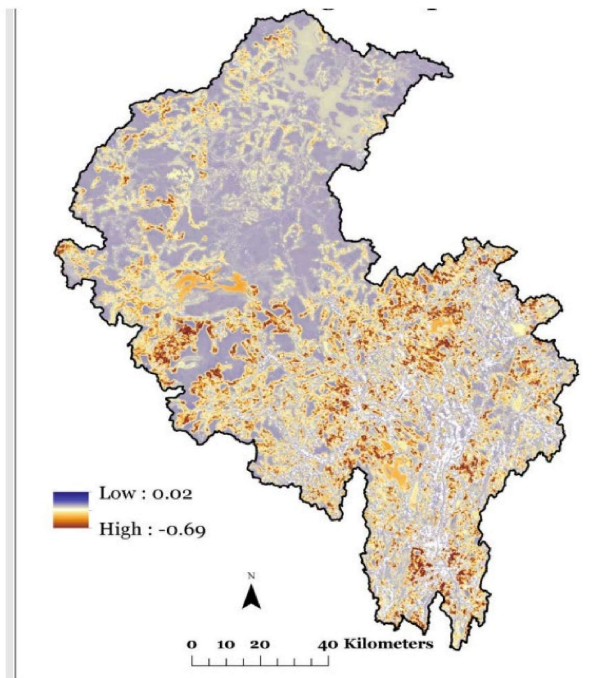


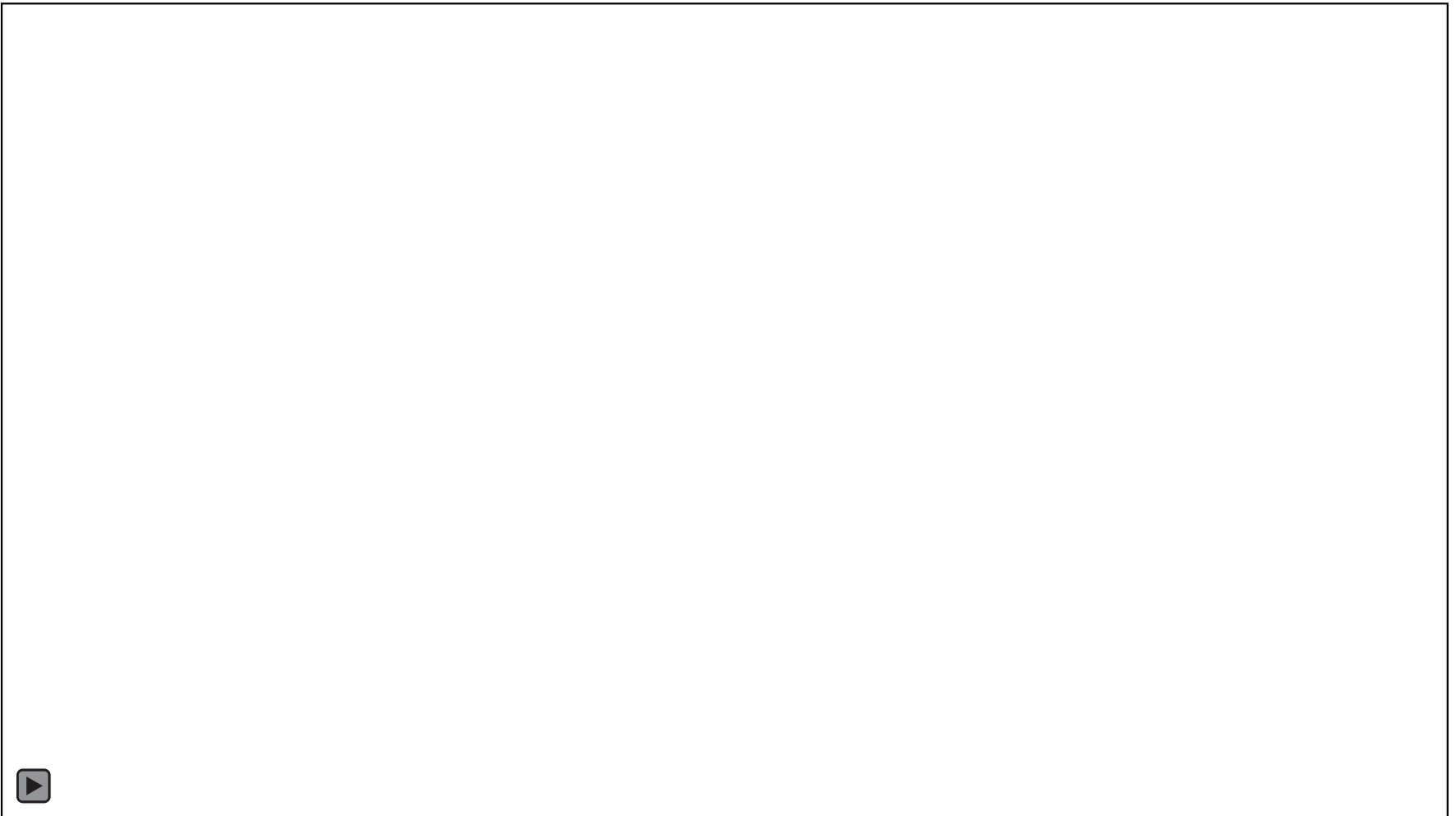
Figure 10. Index of Ecological Impact (Impact) metric in 2080 for the Kennebec River watershed in Maine averaged across replicate landscape change simulations. Large negative values indicate areas of high predicted ecological impact of the forecasted landscape changes and represent places with high current ecological integrity (i.e., high *IEI* in 2010) and relatively large predicted loss of ecological integrity over time. Note, this figure is based on earlier phase 1 landscape change simulations.

- Basin Modeling:
- Critical to overall planning, management and collaboration
- Aerial overview is excellent for landscape representation
- Useful for understanding overland and groundwater flow
- But for understanding streams and rivers...

McGarigal K, Compton BW, Plunkett EB, DeLuca WV, and Grand J. 2018. Designing sustainable landscapes: modeling ecological integrity. Report to the North Atlantic Conservation Cooperative, US Fish and Wildlife Service, Northeast Region.

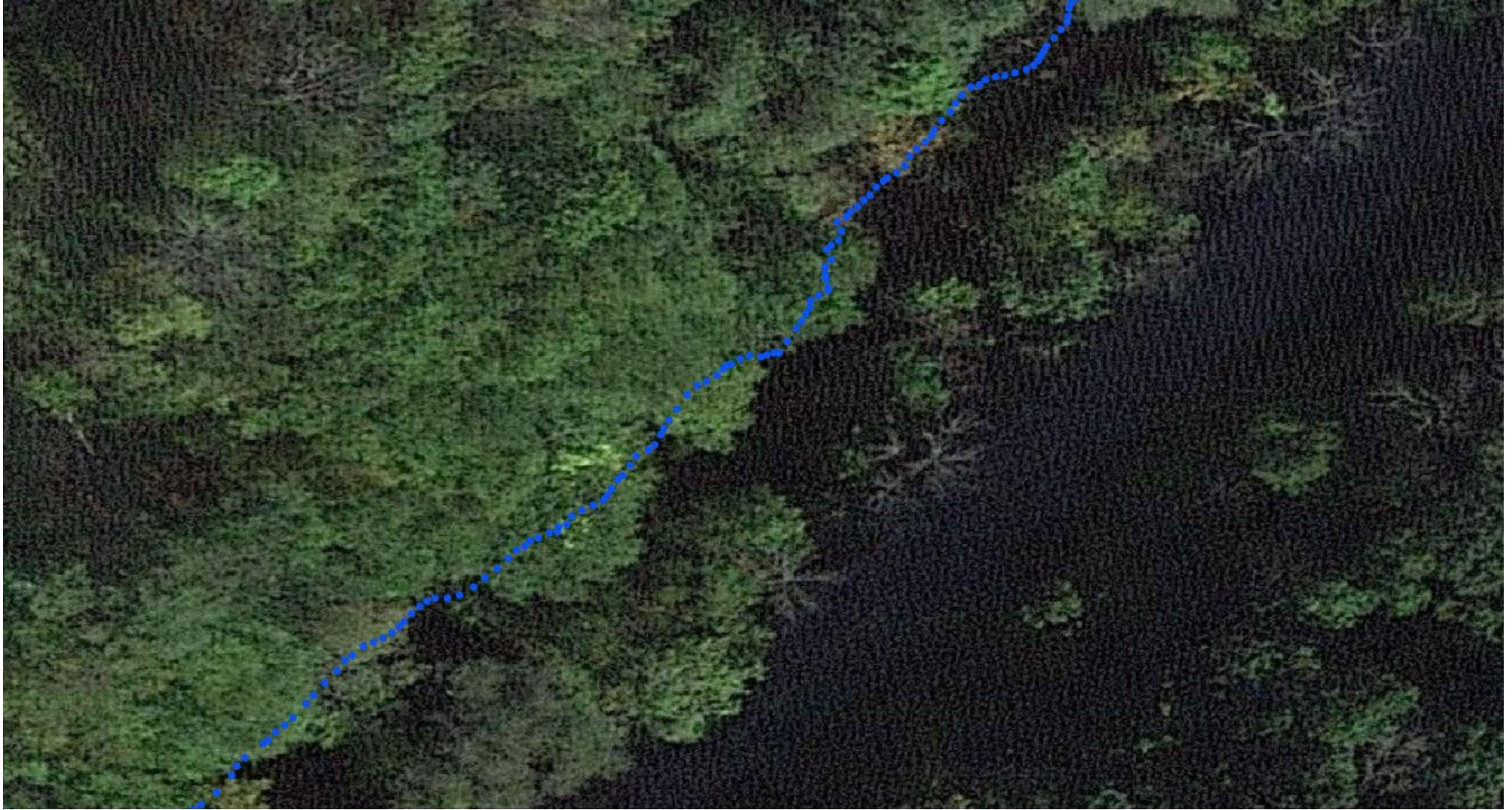


Riverscape is best viewed within the channel



Shehawken Creek Habitat  
and Fish Surveys







# High Definition Fish Survey (HDFS)

GPS - Video system for underwater surveys

Sample results





