

Project SHARE Final Report
West Branch Brook Culvert Assessment and Design
Narraguagus River Watershed
GOMC #13-10

Project SHARE conducted a preconstruction site assessment of the 30-00-0 road crossing of West Branch Brook. West Branch Brook is a head water tributary of the Narraguagus River. The Beddington Lake HUC 12 is the top priority focus area for Atlantic salmon restoration in the Narraguagus River.

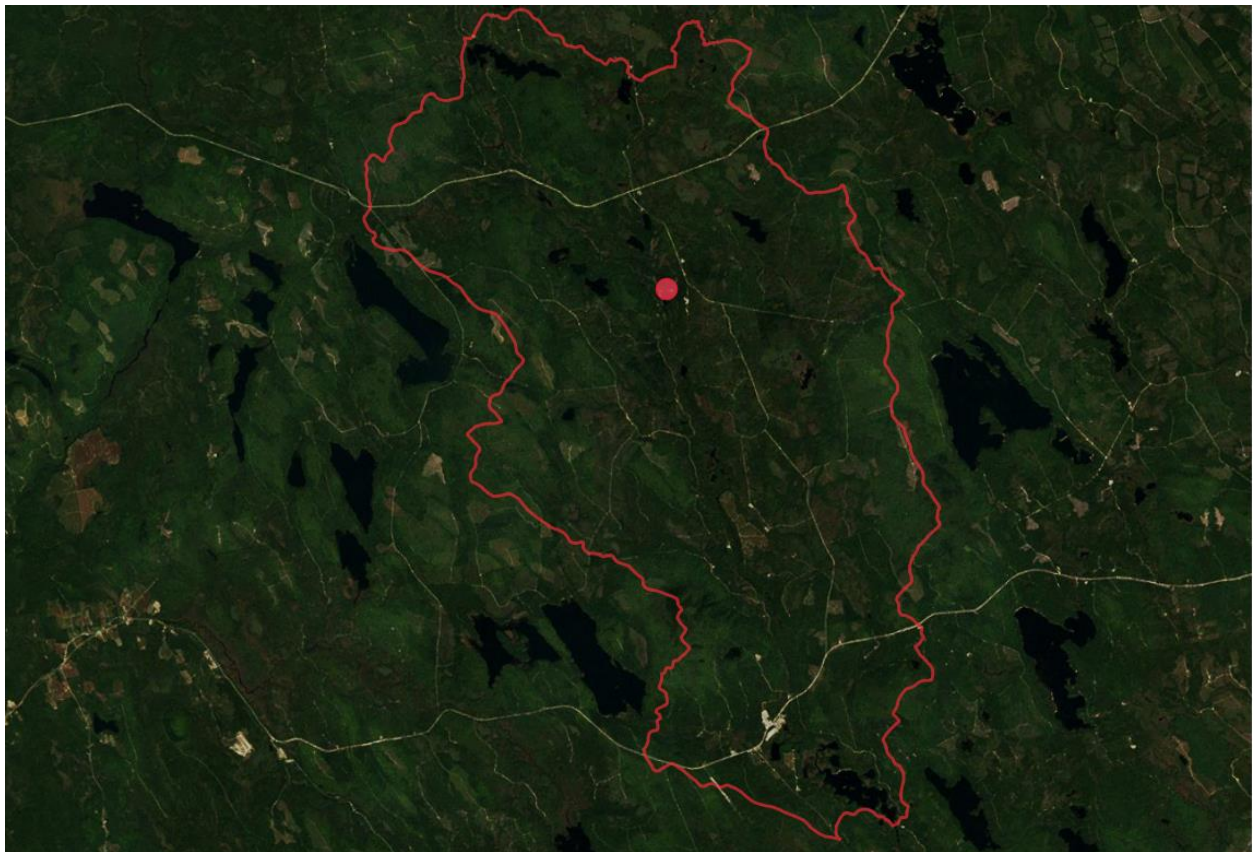


Figure 1. Map showing site location within the Beddington Lake priority focus area of the Narraguagus River.

Project SHARE has previously completed a road crossing inventory of the entire focus area. The 30-00-0 crossing of West Branch Brook is the largest road crossing project identified in the focus area. The culvert appears to be set on a legacy dam site. It has been assessed as a velocity barrier to upstream migration of fish

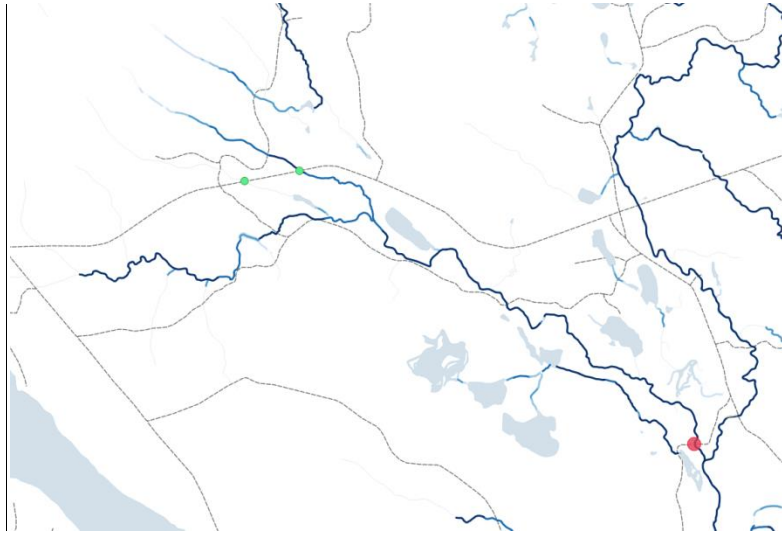


Figure 2. Map showing location of road crossing (red dot) in relationship to W.B.Brook. Green dots represent 2 previously completed road crossings in the watershed.

Target Species

- Atlantic salmon – federally listed as endangered
- Eastern brook trout – species of interest for the Eastern Brook Trout Joint Venture
- Sea lamprey
- American eel
- Alewife
- Blueback herring

Site Assessment

USFWS assisted SHARE staff conducting a field survey of the site including: longitudinal profile and pebble counts. Ice conditions inhibited the field crew ability to obtain accurate cross sections. The culvert is a smooth steel pipe approximately 11 feet in diameter and 37.5 feet long. The culvert is set on top of remnant crib work that is evident on both the upstream and downstream side of the road. At this time it cannot be confirmed if the crib work represents wood abutments from a former bridge or a remnant dam site. However, it appears the site may be a former dam site. There is a similar remnant dam structure at the confluence of Barrel Brook which is a tributary immediately downstream of West Branch Brook. Several likely dam sites have been identified in LIDAR imagery in the upper portions of West Branch Brook.

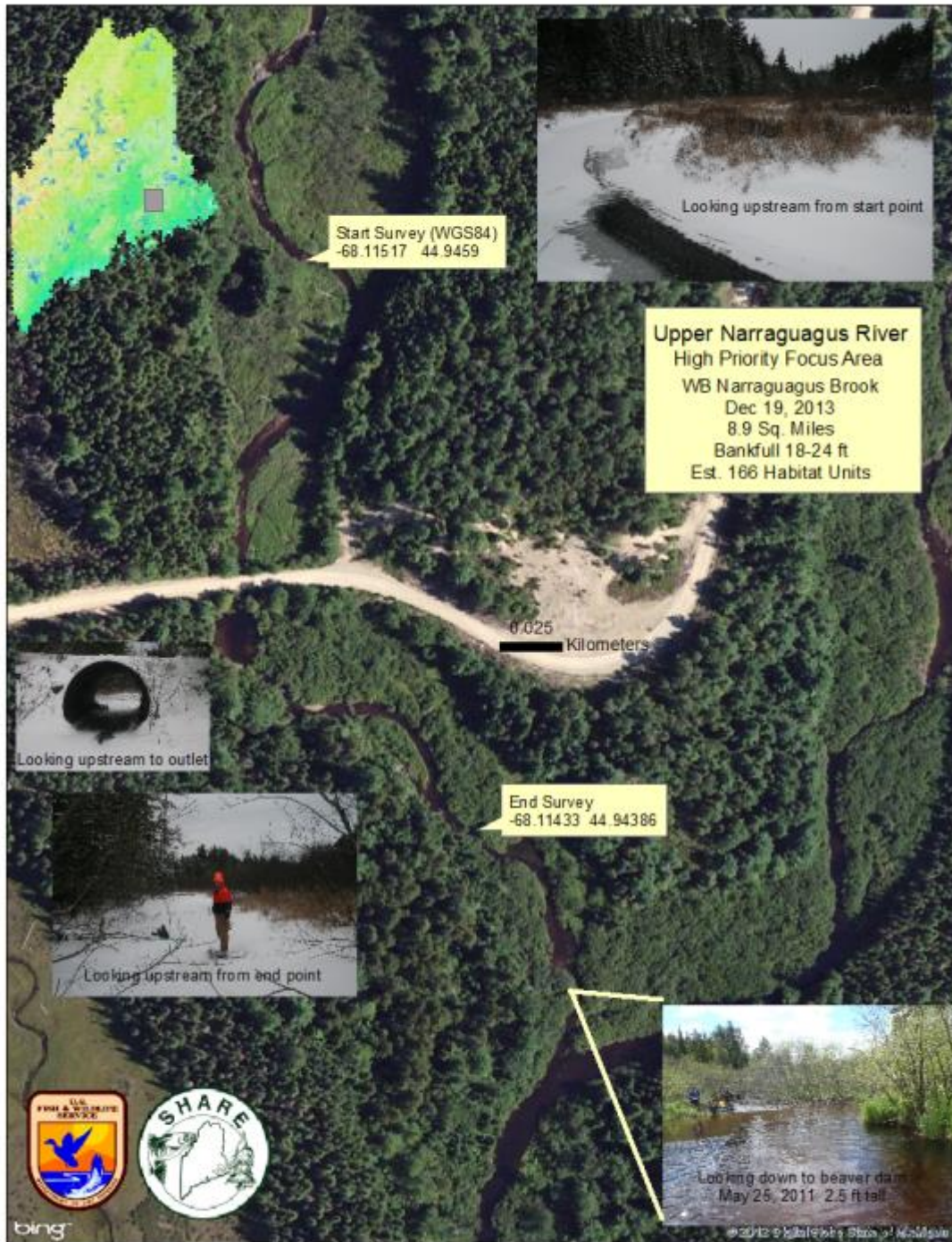


Figure 3. Aerial view of project site with phot inserts providing additional detail.

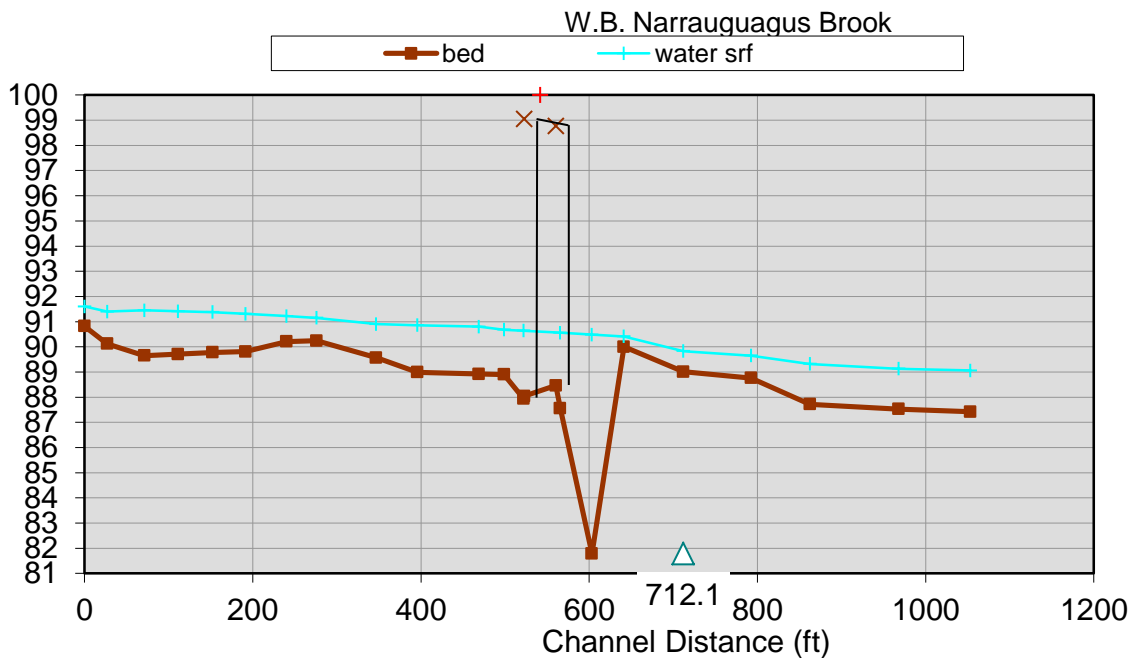


Figure 4. Longitudinal profile of West Branch Brook

The longitudinal profile suggests the culvert may be set an elevation (88 feet) relatively close to the original stream elevation. The stream elevation downstream of the culvert at station 1000 is 87 feet; upstream at station 20 feet the stream elevation is 90 feet. The depth of the plunge pool supports the assessment that the culvert is undersized and represents a high flow velocity barrier. The creation of the plunge pool results in a berm of material downstream of the plunge pool which appears to be 2 feet deep. The berm is well establish and vegetated with alders. There are several small channels exiting the plunge pool rather than a single stream channel.

Upstream of the road there appears to be a sediment wedge at station 250-300 feet. The sediment wedge is the result of a back water condition above the road during high water events. At such time, current velocity above the road diminishes in the back water and the sediment load is deposited upstream of the road.

West branch brook is a sand/gravel based substrate: d50 is 4.7 mm and d95 36 mm (Figure 6).



Figure 5. Photo identifying location of the plunge pool (8.7 feet deep) relative to the culvert.

Riffle Surface Pebble Count, W.B. Narrauguagus Brook

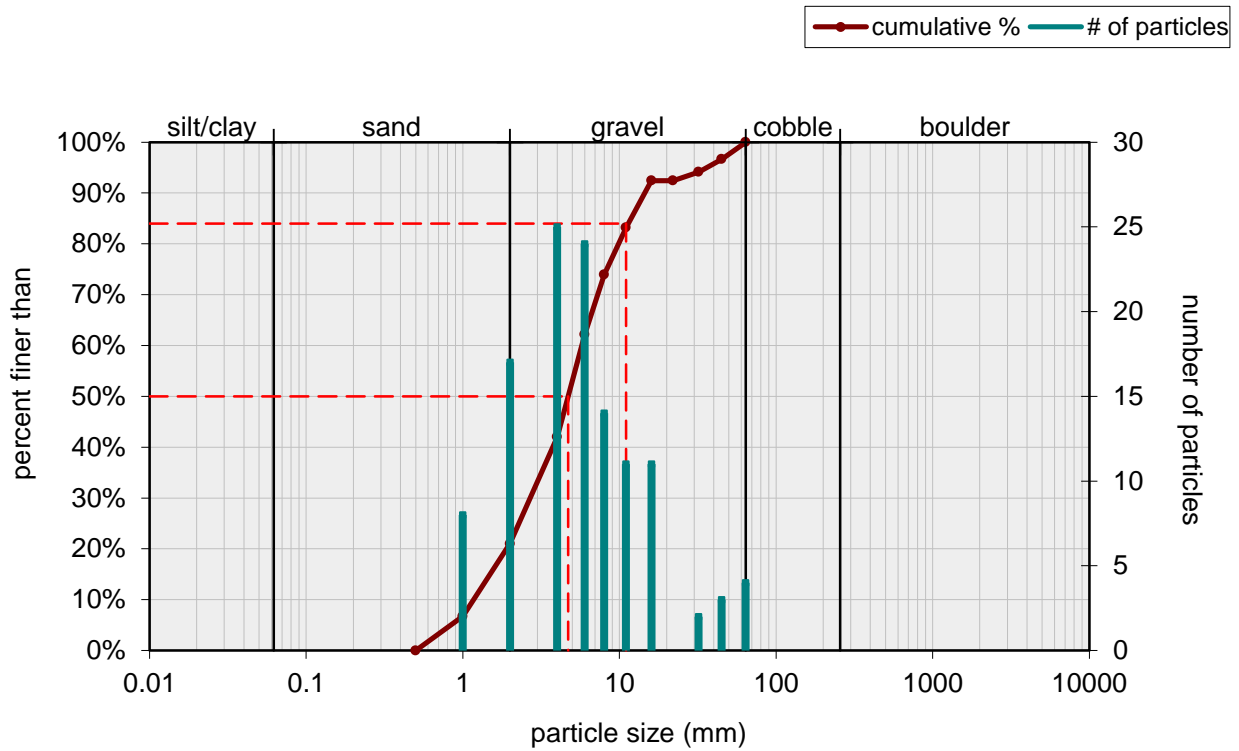
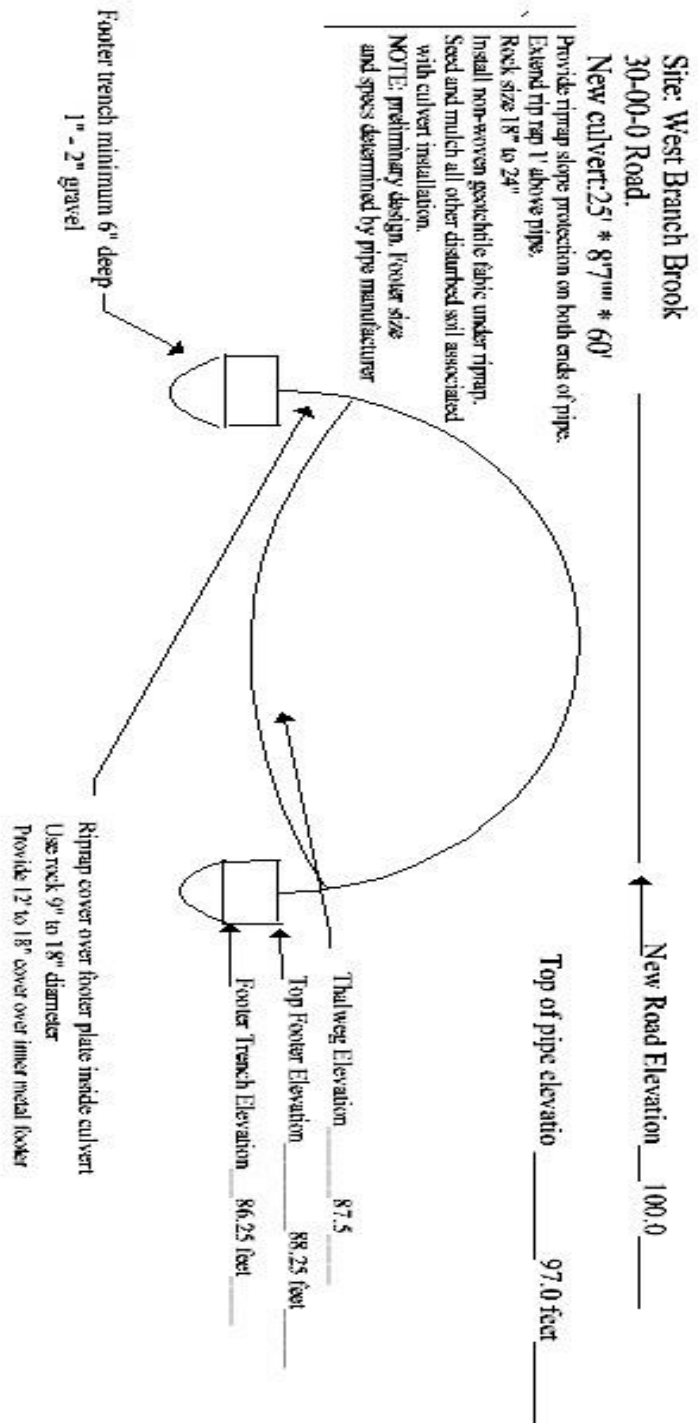


Figure 6. Particle size distribution for reference site in W. B. Brook.

Hydrology and Available Habitat above project site

- Contiguous predicted Atlantic salmon habitat units: 167 habitat units
- Contiguous, accessible upstream habitat: 8.77 miles
- Craig/Koenig projected bankfull width: 18.4 feet
- 1.2*bankfull width: 22.1 feet
- USGS projected bankfull width: 23.9 feet
- 1.2*bankfull width: 28.7 feet
- Hodgkin's 1999 Q2: 282 cubic feet/sec
- Hodgkin's 1999 Q25: 723 cubic feet/sec
- Hodgkin's 1999Q100: 1,334 cubic feet/sec

Preliminary design



Funding was provided by a grant from the Association of US Delegates to the Gulf of Maine Council on the Marine Environment (GOMC #13-10).