# Nesowadnehunk Stream Summary Report

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Habitat and fishery surveys of Nesowadnehunk Stream were conducted in 2004 and 2008. Fishery surveys indicate that brook trout (*Salvelinus fontinalis*) are the dominant species in this stream, with three other native species occurring in lower numbers. Our habitat survey efforts on Nesowadnehunk Stream to date support the findings of similar efforts on other Maine streams with a history of log driving. These streams tend to be over widened and lack an adequate amount of deep pools for optimal brook trout habitat. The Geomorphic Surveys show this to be a type C stream, which is generally regarded as an ideal brook trout stream; however the lack of pools limits the amount of quality habitat.

**Fisheries**

Fishery surveys of the stream have revealed that, despite any historical impacts, a significant population of brook trout (BKT) is present. Other species found are typical of an intact native assemblage- Slimy Sculpin (SCL), and Finescale Dace (FSD) (Figure 1). A few Golden Shiners (GLS) were also found just below Nesowadnehunk Lake. Although native to Maine, they are likely non-indigenous to the Nesowadnehunk system. Two separate periods of fishery survey work occurred, using backpack electrofishing units in 2004 and an electrofishing raft in 2008 (Figure 3). Table 1 shows the results of the two electrofishing survey events. The majority of the fish caught were brook trout, with SCL, FSD, and GLS occurring in much lower numbers. Of the 333 fish handled, 311 were brook trout, or 93% or the total catch. As can be typical with degraded habitat conditions, the brook trout measured were small. Only 15 of the 311 brook trout measured were over 6" (Figure 2). This abundance of smaller sized fish can also be a result of overharvesting of larger individuals, a greater supply of food for smaller sized individuals, a high natural mortality on larger sized individuals, or a combination of all.

The 2008 electrofishing survey efforts took place in two sites near the outlet of Nesowadnehunk Lake. An electrofishing raft was used due to the depth of the dam pool (cover photo). Several large BKT were caught in the dam pool, with numerous BKT caught out of a spring hole further downstream. A total of 164 BKT were caught with the raft, ranging in length from 56 mm to 312 mm. A large number of the brook trout caught were located in the vicinity of a coldwater seep. Most likely they were using it as a thermal refuge during the higher water temperatures of July. Such thermal refuges are extremely important for year round persistence of brook trout populations. Figure 2 shows a histogram of the frequency of lengths of the brook trout sampled from Nesowadnehunk Stream. There are two distinct year classes, one at approximately 60 mm (YOY), and another at approximately 110 mm (1+ age class) and beyond that, the largest individuals likely represent at least two more year classes.

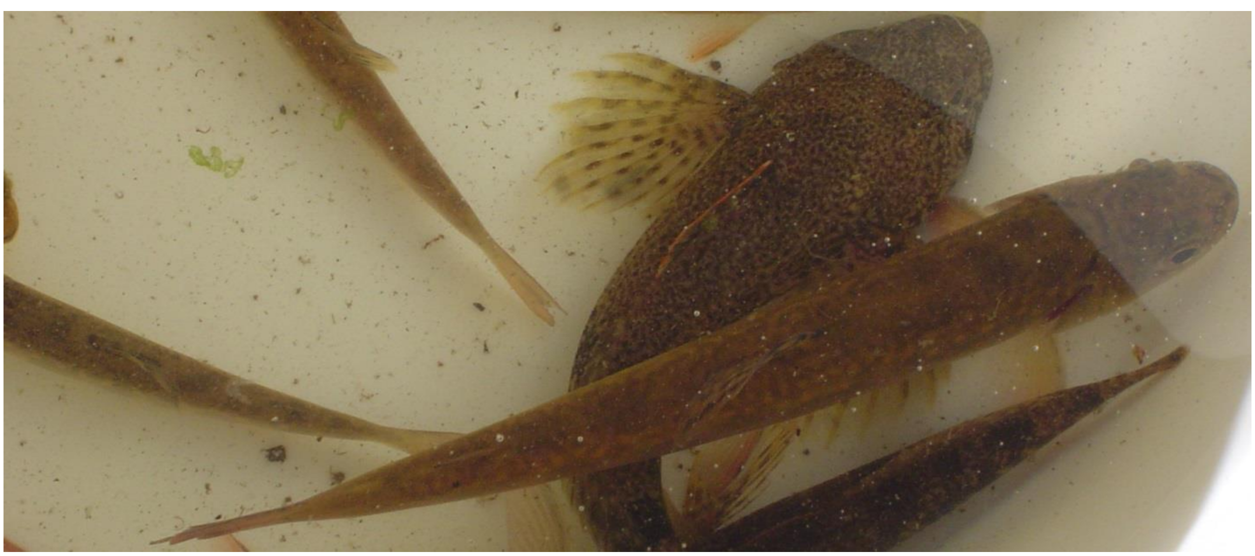
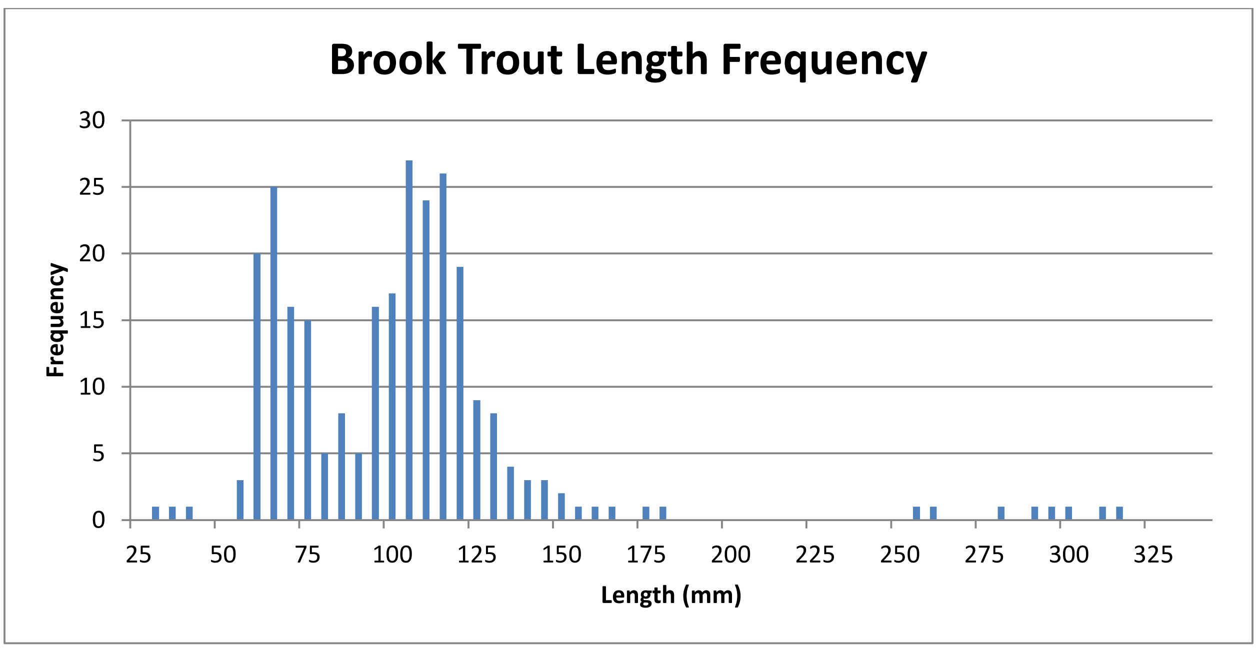


Figure 1- Several small brook trout and a slimy sculpin captured by electrofishing.

Table 1- The results of fish sampling by electrofishing, Nesowadnehunk Stream system.

| Date | LocationID | Stream Name | Sample ID | Species | Count | Average Length (mm) | Average Weight (g) | Max Length (mm) | Min Length (mm) |
|---|---|---|---|---|---|---|---|---|---|
| 9/2/2004 | 604.001 | Nesowadnehunk Stream | R-09/02/2004-01 | Slimy Sculpin | 2 | 85.0 | 6.6 | 88.0 | 82 |
| 9/2/2004 | 604.001 | Nesowadnehunk Stream | R-09/02/2004-01 | Brook Trout | 59 | 69.7 | 4.5 | 149.0 | 55 |
| 9/2/2004 | 604.002 | Nesowadnehunk Stream | R-09/02/2008-02 | Slimy Sculpin | 10 | 86.4 | 9.2 | 101.0 | 39 |
| 9/2/2004 | 604.002 | Nesowadnehunk Stream | R-09/02/2008-02 | Brook Trout | 21 | 82.9 | 6.7 | 162.0 | 60 |
| 9/2/2004 | 604.003 | Nesowadnehunk Stream | R-09/02/2008-02 | **No Fish** | | | | | |
| 9/2/2004 | 604.004 | Nesowadnehunk Stream | R-09/02/2004-04 | Slimy Sculpin | 2 | 90.5 | 9.0 | 105.0 | 76 |
| 9/2/2004 | 604.004 | Nesowadnehunk Stream | R-09/02/2004-04 | Finescale Dace | 3 | 40.3 | 3.0 | 60.0 | 27 |
| 9/2/2004 | 604.004 | Nesowadnehunk Stream | R-09/02/2004-04 | Brook Trout | 10 | 79.3 | 6.1 | 124.0 | 58 |
| 7/23/2008 | 607.301 | Nesowadnehunk Stream | R-07/23/2008-01 | Brook Trout | 50 | 132.1 | 41.2 | 312.0 | 66 |
| 7/23/2008 | 607.301 | Nesowadnehunk Stream | R-07/23/2008-01 | Finescale Dace | 2 | | | | |
| 7/23/2008 | 607.302 | Nesowadnehunk Stream | R-07/23/2008-02 | Brook Trout | 114 | 112.0 | 19.4 | 295.0 | 56 |
| 7/23/2008 | 607.302 | Nesowadnehunk Stream | R-07/23/2008-02 | Finescale Dace | 1 | | | | |
| 7/23/2008 | 607.302 | Nesowadnehunk Stream | R-07/23/2008-02 | Golden Shiner | 2 | | | | |
| 7/22/2008 | 608.0308 | McManus Brook | Z-07/22/2008-02 | Brook Trout | 39 | 64.4 | 4.9 | 160.0 | 40 |
| 7/22/2008 | 608.0309 | L. Nesowadnehunk Stream | R-07/23/2008-03 | Brook Trout | 6 | 64.0 | 4.3 | 98.0 | 39 |
| 7/22/2008 | 608.031 | Roaring Brook | R-07/22/2008-04 | Brook Trout | 12 | 72.9 | 4.8 | 104.0 | 55 |

Figure 2- Histogram of Brook Trout Length Frequency in Nesowadnehunk Stream



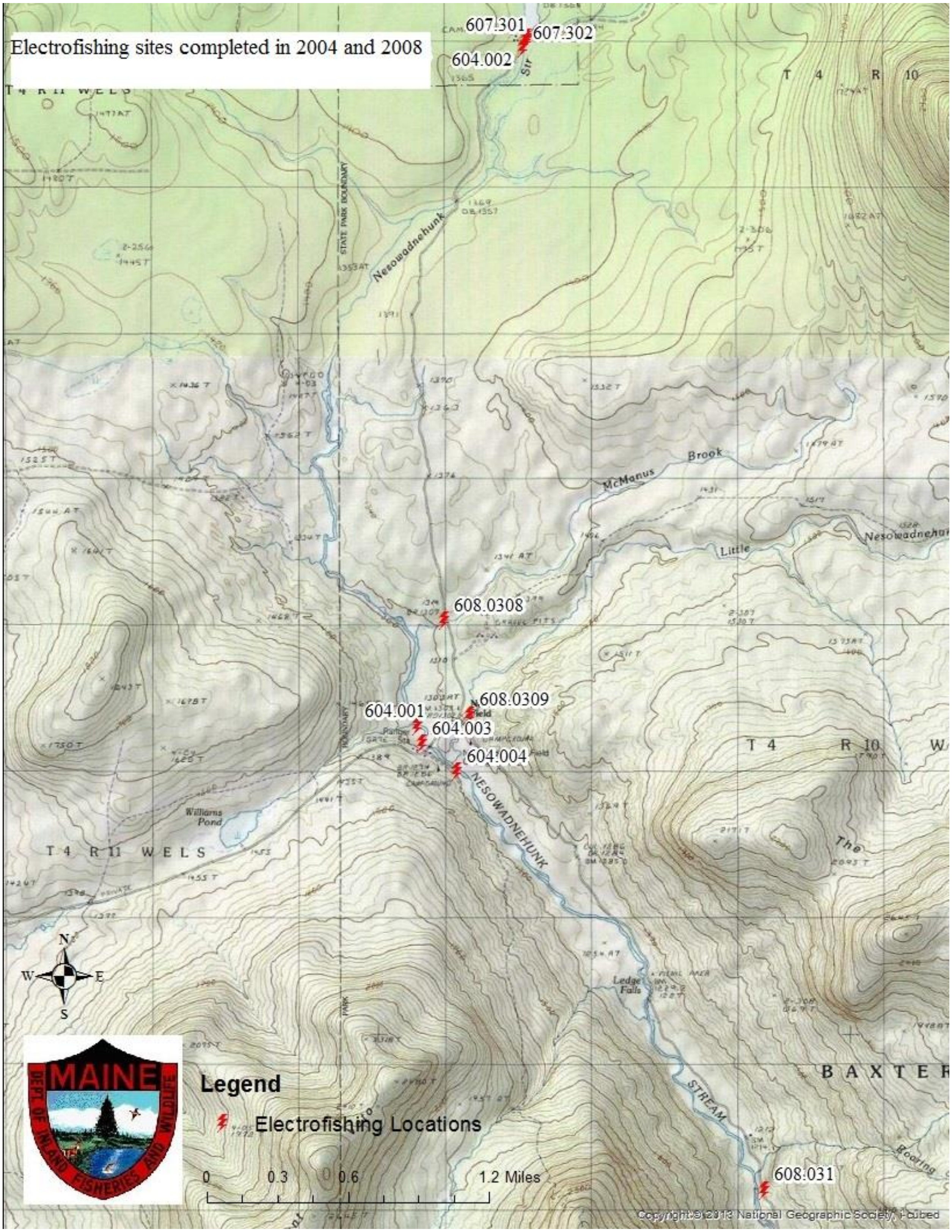



Figure 3- The sites surveyed during the 2004 and 2008 electrofishing events.

**Habitat**

Running along the western border of Baxter State Park, Nesowadnehunk Stream is a tributary to the West Branch of the Penobscot River. Its source is Nesowadnehunk (Sourdnahunk) Lake, 553 hectares (1,368 acres) in size. From Nesowadnehunk Lake, it runs south approximately 19.3 kilometers (11.8 miles) to its junction with the Penobscot, just below the Nesowadnehunk deadwater. Overall length of the stream channel is approximately 26.7 km (16.6 miles). The stream sinuosity (ratio of channel length to valley length) is 1.38. The watershed of Nesowadnehunk Stream is approximately 17,329 hectares (42,822 acres).

The watershed is hilly, primarily forested with a mixture of spruce-fir and deciduous forest types. The majority of the watershed lies within Baxter State Park, and like many streams in Maine, there is ample evidence of the log driving that occurred in the past. There are still a significant number of pulpwood logs on the stream bottom. In addition, the grave of "The Unknown River Driver" on the Nesowadnehunk's banks provides evidence of the human cost of log drives as well.

Table 2- Average values of transect measurements (N = 62 transects).

| | Average Values |
|---|---|
| Length of Section (m) | 135 |
| Bankfull Width (m) | 13.5 |
| Wetted Width (m) | 11 |
| Depth (m) | .36 |
| Max Depth (m) | .94 |
| Overhanging Vegetation (m) | 1.5 |
| Trees (%) | 24 |
| Shrubs (%) | 50 |
| Forbes (%) | 24 |
| Bare Ground (%) | 2 |
| Overhead Shade (%) | 6.5 |

Table 2 shows the average values of some of the measurements collected over the 62 transects (Figure 4) that were completed. The length of the section refers to the distance along the river in meters from one transect to another. The overhanging vegetation describes the amount of vegetation within one foot of the surface of the water and measures the amount of water surface that is shaded and is an indicator of the amount of cover available to fish. Compared to the full wetted width of 11 m, this value is somewhat low, but is to be expected from a large over-widened system. The next four values describe the riparian area, where the dominant form of vegetation is shrubs, with trees and forbes (grasses and low soft plants) ranking lower. There was little bare ground observed in the proximal riparian area. The overhead shade value refers to the amount of shade created by the canopy. This is very low, but is expected based on the high percentage of shrubs in the overbank zone.

Cobble was the primary substrate in 22/37 transects. Mud and gravel were less common, each listed as the primary substrate in 6/37 transects, with boulders and rubble comprising the remaining substrates.

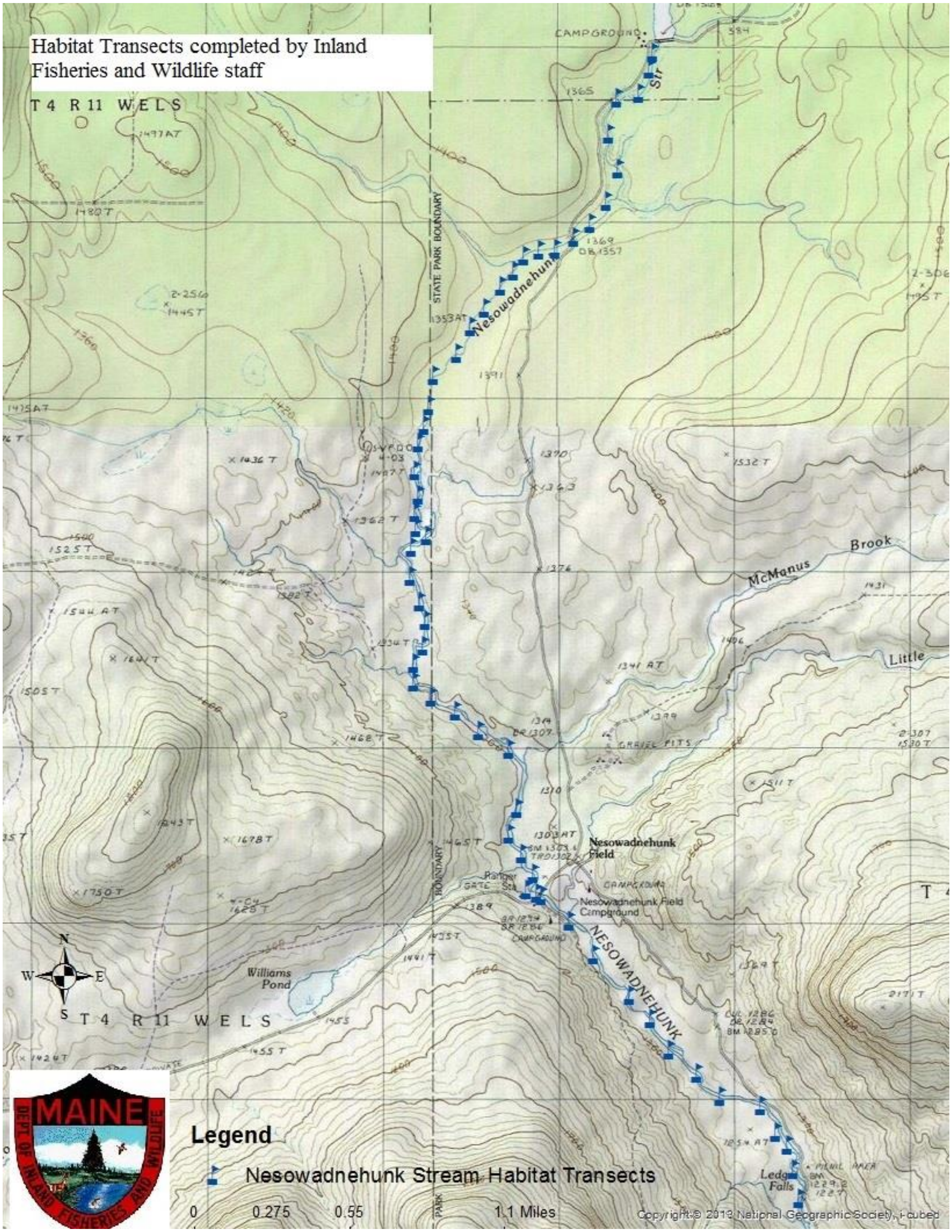



Figure 4- Habitat transects completed by IFW survey crews in 2004 and 2008.

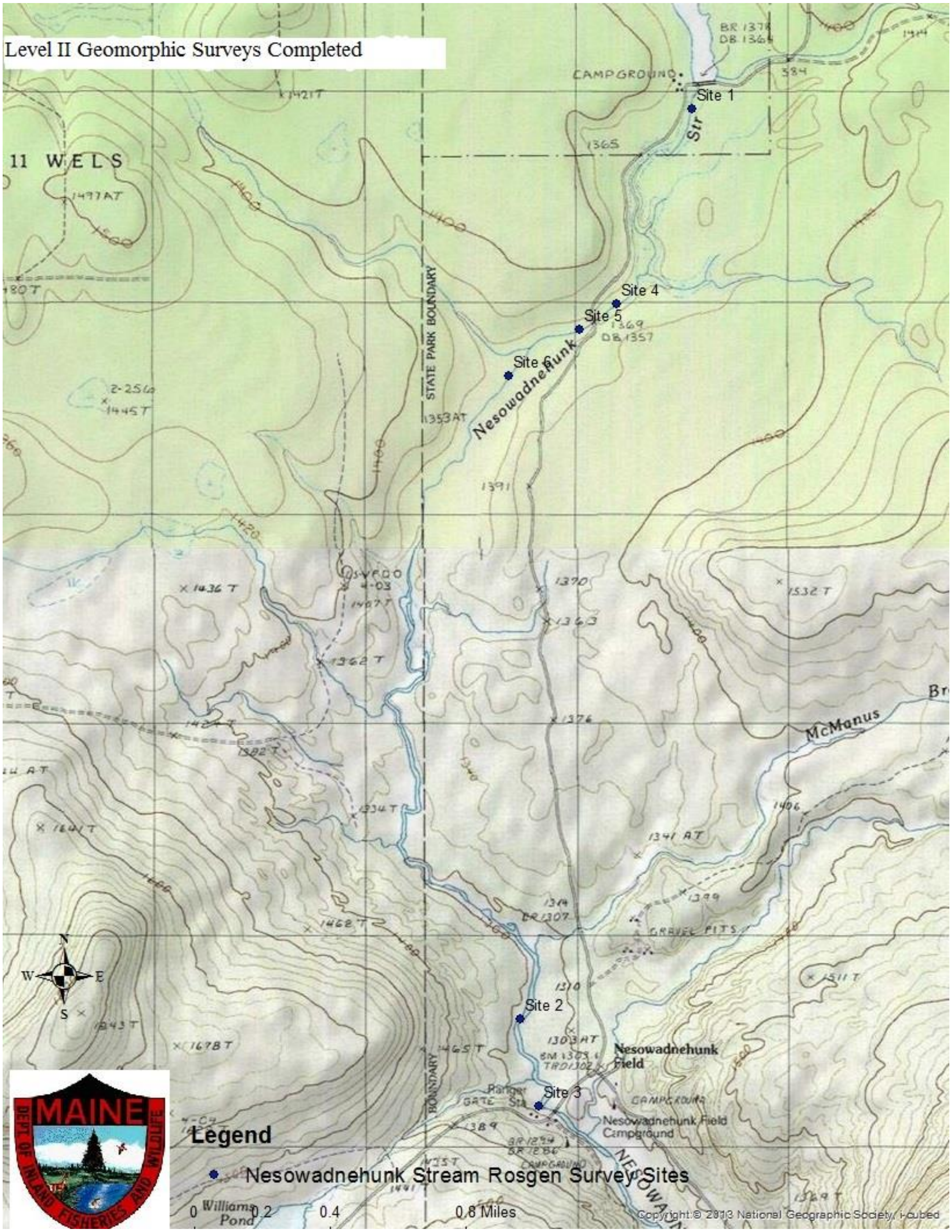



Figure 5- Nesowadnehunk Stream Geomorphic Survey Sites

Geomorphic level II surveys were conducted at 6 sites (Figure 5). Most surveys indicated type C (riffles and pools) channel types, with one section of type F (degraded, entrenched and unstable) located directly below the lake outlet dam.

Combining the habitat survey data with the geomorphic classification indicates that Nesowadnehunk stream is lacking in pools. This observation is highlighted by the fact that only 11 pools were found and measured within the surveyed area. A class C stream should, on average, have a pool every 5 to 7 bankfull widths of stream length. For this stream that translates to an average of one pool every 67 to 91 meters. To be considered a class 1 (large, deep, good cover) pool, the size and depth must be sufficient to provide a low velocity resting place for several adult sized brook trout, and more than 30% of the bottom needs to be obscured by some type of cover. For a stream with a wetted width of 11 meters a class 1 pool should have a minimum depth of 1.5-2 meters. Nesowadnehunk stream had 11 measurable pools over a distance of approximately 8368 meters, or about 1 pool every 760 m and no class 1 pools. That translates to a pool approximately every 57 bankfull widths, or 10% as many as would be expected in a non-degraded stream of this channel type. This is likely due to in-stream alterations to facilitate log driving, such as removing large boulders and snags, backfilling cut off channels, and other assorted channelization techniques. Instream features influence the flow regime, create and enhance pools, and provide habitat diversity to maximize benefits to resident fishes. The present native fish community, the stream type, and the current degraded fish habitat condition make this system a potential candidate for stream restoration. Techniques that contribute to enhancing deepwater and pool habitats, and increasing overall in-stream cover elements and shading would likely be beneficial.


Figure 6 – IFW staff measuring substrate as part of the Level II Geomorphic survey


Figure 7- IFW staff using a transit level to determine slope as part of the Level II Geomorphic Survey