
To: Ray Senecal
Kezar Lake Watershed Association

From: Jake Riley
Topsham, Maine

File: Stantec PN 195600843

Date: December 19, 2013

Reference: Summary of 2-day Salmonid Spawner and Habitat Survey in the Kezar Lake Watershed: Great Brook, Boulder Brook, and Cold Brook

Stantec Consulting Services Inc. (Stantec) and members of the Kezar Lake Watershed Association conducted a 2-day salmonid spawner and habitat survey in the Kezar Lake Watershed on November 13 and 22, 2013. This memorandum summarizes the results of the fall 2013 survey and serves to complete the 2013 scope of environmental services provided by Stantec for the Kezar Lake Watershed Association, Greater Lovell Land Trust, and FB Environmental.

The results and observations of the salmonid spawner survey are presented below by each brook surveyed. Based on the results of the 2012 survey and direction from the Kezar Lake Watershed Association, the 2013 surveys focused primarily on documenting landlocked salmon spawning in lower Great Brook, Cold Brook and Boulder Brook. Cold Brook and Boulder Brook were not surveyed in 2012. The attached maps of Great Brook, Cold Brook and Boulder Brook depict areas surveyed and the approximate locations of observed landlocked salmon redds.

Great Brook

Approximately 1.85 river miles (RM) were surveyed from downstream of the Adams Road Bridge to Dwyer's Falls (see attached map). On November 13, the lower section of Great Brook was surveyed from downstream of Adams Road Bridge 0.74 miles upstream to the confluence with Beaver Brook. There were 36 redds, 10 adult landlocked salmon (Photograph 1) and 1 brook trout (7-9-inches) observed in the lower section of Great Brook, which had a higher density of redds per mile than the survey results from 2012 (Table 1). Given the large size of the redds and their proximity to adult live landlocked salmon, it is likely that all 32 redds were constructed by landlocked salmon. Downstream of the Adams Road bridge, there were only three redds in the pool/riffle areas compared to only one redd observed in last year's survey. In 2012, there were 6 redds between Adams Road and the "first impediment" compared to 29 redds observed in 2013. Thirteen of the 32 redds were located in the first run and head of a riffle downstream of the "first impediment" conceivably indicating that spawning salmon migrated as far as possible upstream before spawning. The clustering of redds abutting each other in large areas of disturbance downstream of the first impediment made it difficult to enumerate each individual redd objectively. Downstream of these 13 clustered redds, almost every pool tail or riffle head with suitable sized gravel had one or two redds (Photographs 2 and 3). The aquatic habitat in this section of Great Brook extending upstream of the Adams Road crossing to the Beaver Brook confluence is relatively sinuous and flat (~2% gradient) as it flows through a wide floodplain. Lower Great Brook has high quality spawning habitat with deep pools, large woody debris cover, and successive riffle-pool-run habitat complexity with gravel dominated pool tails (Photograph 3).

On November 22, the upper section of Great Brook was surveyed from the confluence with Beaver Brook upstream to Dwyer's falls. No fish or redds were observed in this upper section, which was approximately 1.11 RM long. It is likely that suitable flow conditions did not exist in 2013; therefore, no landlocked salmon were able to pass upstream of the "first impediment" to spawn in the upper section of Great Brook. The fall of 2013 was notably dry and did not receive a sizeable storm in late October or early November like the remnants of tropical storm Sandy, which resulted in 2 inches of rain in the Great Brook watershed on October 29, 2012

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(Frank Robey, personal communication). In 2012, 65 percent of the redds and 80 percent of the live landlocked salmon were observed upstream of the “first impediment” in Great Brook. Upstream of the “first impediment”, Great Brook is slightly steeper with less large woody debris but still has high quality salmonid spawning and rearing habitat. Upper Great Brook (upstream of Dwyer’s Falls), Willard Brook, Beaver Brook and Red Rock Brook were not surveyed in 2013.

Table 1: Redd counts and densities for Great Brook and Boulder Brook in 2012 and 2013

Stream Section	Year	Number of Total Landlocked Salmon Redds	Redds/Mile
Great Brook* (Kezar Lake to Dwyer’s Falls)	2012	20	10.8
Great Brook* (Kezar Lake to “First Impediment”)	2013	36	48.6
Boulder Brook* (Kezar Lake to Route 5)	2013	17	44.7

*Stream section that contained redds observed during the yearly survey.



Photograph 1. Landlocked salmon in Great Brook downstream of the “first impediment”.

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Photograph 2. Typical redd (GB-RD-1) size and shape of the pit and mound with a distinct margin of disturbed substrate in Great Brook.



Photograph 3. Successive pool tails with a total of three redds (GB-RD-17, 18 and 19) in Great Brook downstream of the “first impediment”.

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Boulder Brook

On November 22, 2013, approximately 0.5 RM were surveyed in Boulder Brook upstream from its confluence with Kezar Lake to a beaver bog east of Route 5 (see attached map). Boulder Brook has a smaller watershed than Great Brook and the section surveyed does not contain as high quality salmonid spawning habitat (e.g., pools/riffles, large woody debris cover, and gravel substrate). Seventeen salmonid redds were observed between the confluence with Kezar Lake and the Route 5 crossing. The 44.7 redds per mile observed in Boulder Brook is very similar to density of redds in Great Brook in 2013 (Table 1). No spawning fish were observed in Boulder Brook during the survey, but it is likely that the redds were constructed by landlocked salmon based on their size and anecdotal information from representatives in the Kezar Lake Watershed Association. The redds were typically found in clusters in slower moving habitats with smaller spawning substrate (e.g., gravel). Four redds (BB-RD-5 through BB-RD- 8) were surveyed within a run 50 feet upstream of the recently rehabilitated small pier in Boulder Brook (Photograph 4). Landlocked salmon spawning activity was observed in this location in previous years (Ed Poliquin, personal communication).

Between Kezar Lake and Route 5, Boulder Brook can be characterized as a moderately steep (~2% – 3% gradient), with few channel spanning pools and minimal large woody debris cover with larger substrate (e.g., cobbles and boulders) (Photograph 5). Despite anthropogenic development adjacent to the channel banks and/or within the floodplains in the lower portion of the area surveyed, Boulder Brook had stable banks with accessible bankfull small floodplains. There is a large plunge pool at the outlet of the culvert under Route 5 and the most upstream redd (BB-RD-17) was observed in the pool tail of the plunge pool. Upstream of the Route 5 culvert, the gradient of Boulder Brook flattened with no successive pool-riffle habitat. Approximately 1,000 feet upstream from the Route 5 culvert, there was channel spanning beaver dam creating a beaver pond within a meadow wetland complex as the channel dissipated into a lentic aquatic environment.



Photograph 4: Run with four successive redds (BB-RD-5 through BB-RD- 8) on the river right side of the channel.

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Photograph 5: Typical pocket-pool boulder habitat in Boulder Brook with minimal anthropogenic influences on the river right.

Cold Brook

On November 13, 2013, approximately 0.45 RM were surveyed in Cold Brook from a wetland complex (near the confluence with Kezar Lake) to the culvert under Slide Hill Road (see attached map). No salmonids or redds were observed in the Cold Brook survey. The lower section of Cold Brook is very low gradient (<1% gradient) and can be characterized as poor spawning habitat with little observed suitable substrate or riffle/pool sequencing (Photograph 6). Between the much flatter section of Cold Brook and the Slide Hill Road culvert crossing, Cold Brook is a steep tributary (~4% – 6% gradient) dominated by larger substrate (cobble and boulders) (Photograph 7). Cold Brook has step/pool or cascade pocket pool stream morphology with very few developed pool tails—the microhabitat preferred by spawning landlocked salmon in Great Brook. Very little suitable spawning substrate was observed in Cold Brook. The section of Cold Brook surveyed appeared stable with no signs of erosion on the banks or fine sediment accumulated in the eddies. Approximately 500 feet downstream of the Slide Brook Road, there were multiple cascades (6 – 9 feet high), which are impediments to upstream passage by fish moving up out of Kezar Lake. These bedrock steep features are likely acting as migration barriers to smallmouth bass and other non-native fish species in Kezar Lake, thus maintaining up upper portions of Cold Brook for resident native brook trout. Upstream of the impediments and Slide Hill Road, Cold Brook had what appeared to be quality small mountain stream brook trout habitat.

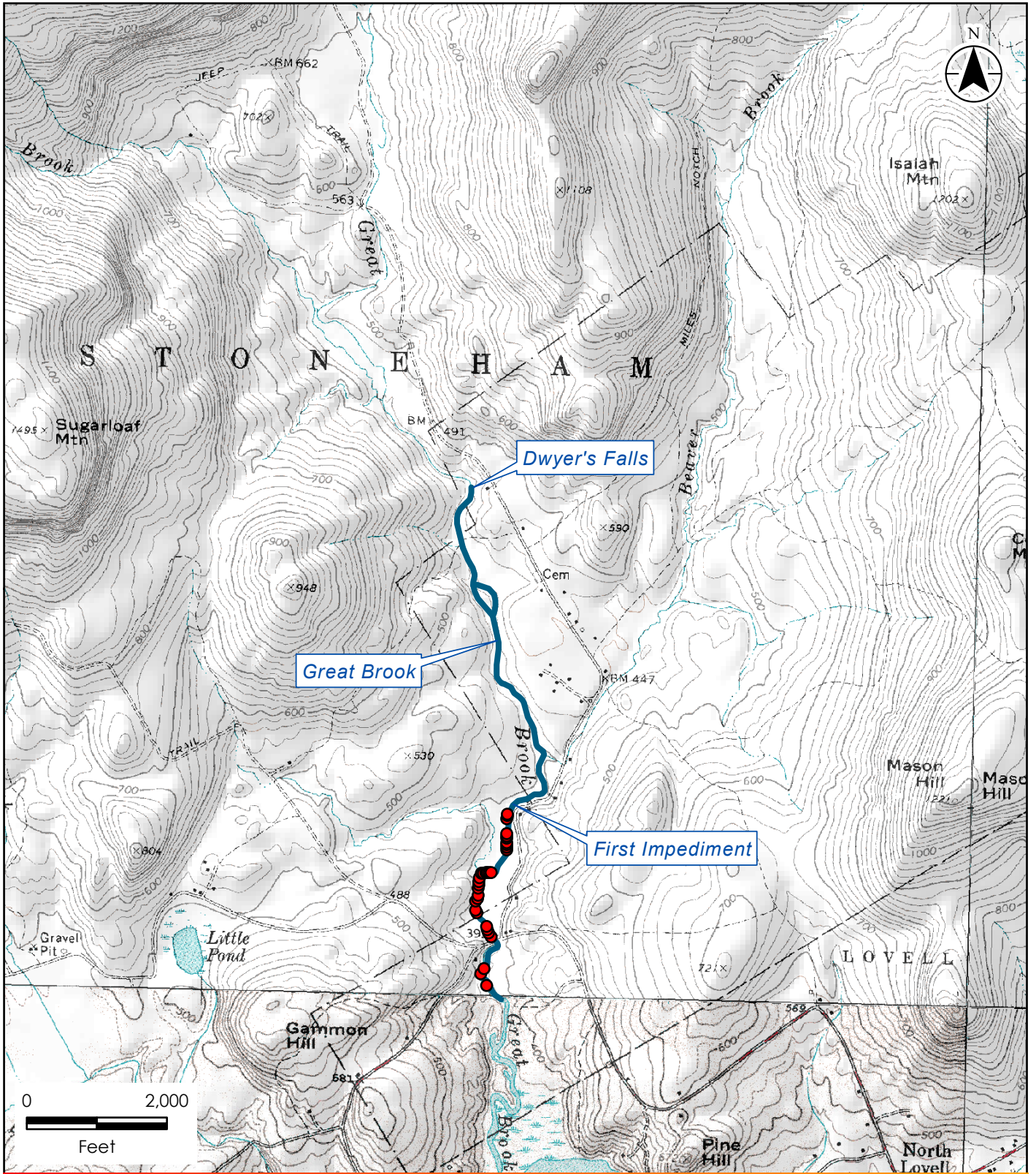
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Photograph 6. Cold Brook is very flat with unsuitable spawning habitat adjacent to a wetland complex, near its confluence with Kezar Lake.



Photograph 7: Upper Cold Brook is steep and dominated by boulders with minimal pool development and suitable spawning substrate for landlocked salmon spawning.



195600843



30 Park Drive
 Topsham, ME USA 04086
 Phone (207) 729-1199

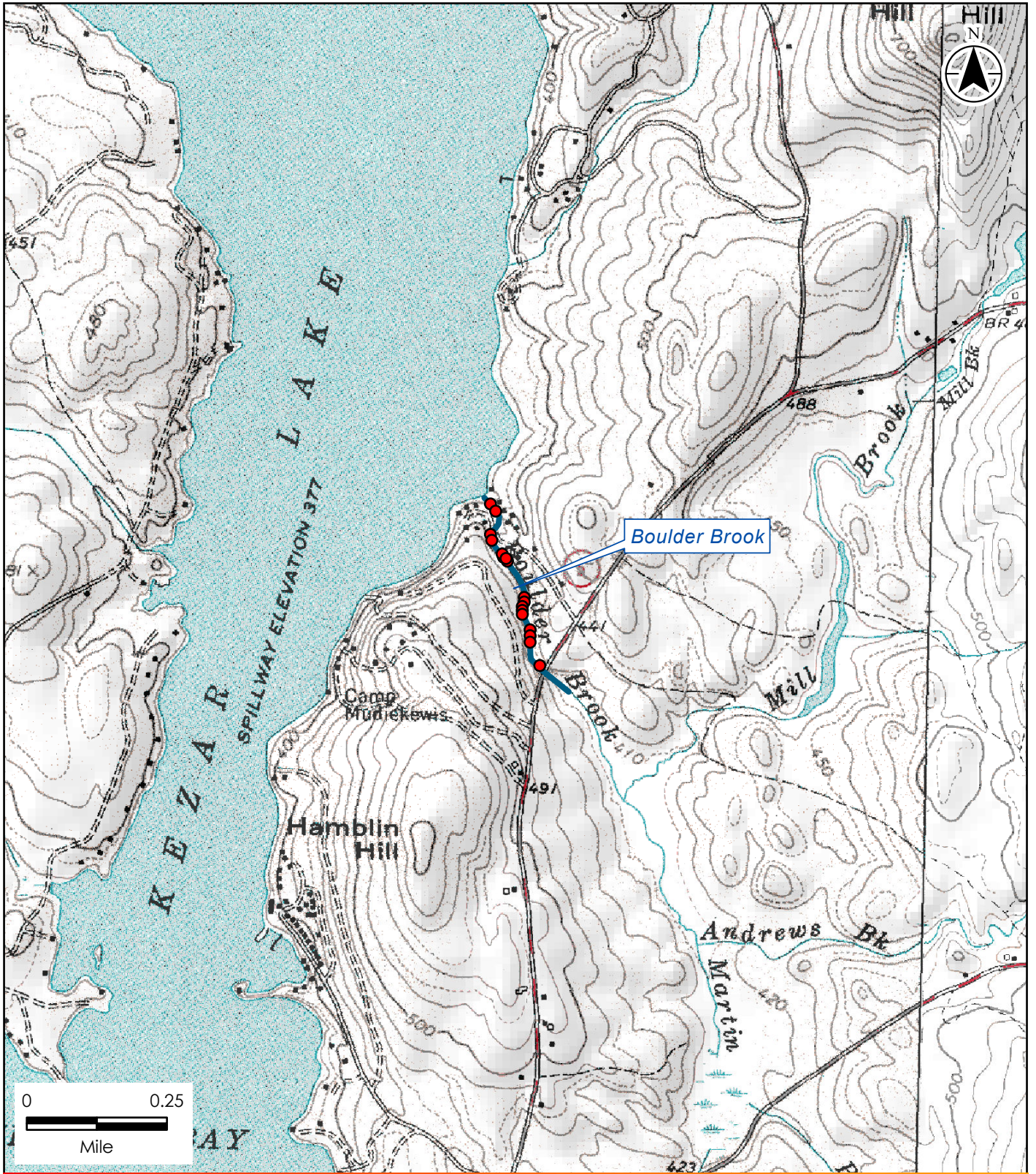
Legend

- 32 Landlocked Salmon Redds Observed
- Stream Segments Surveyed on 11/13/2013 & 11/22/2013

Title

2013 Great Brook
 Salmonid Spawn Survey
 12/13/2013

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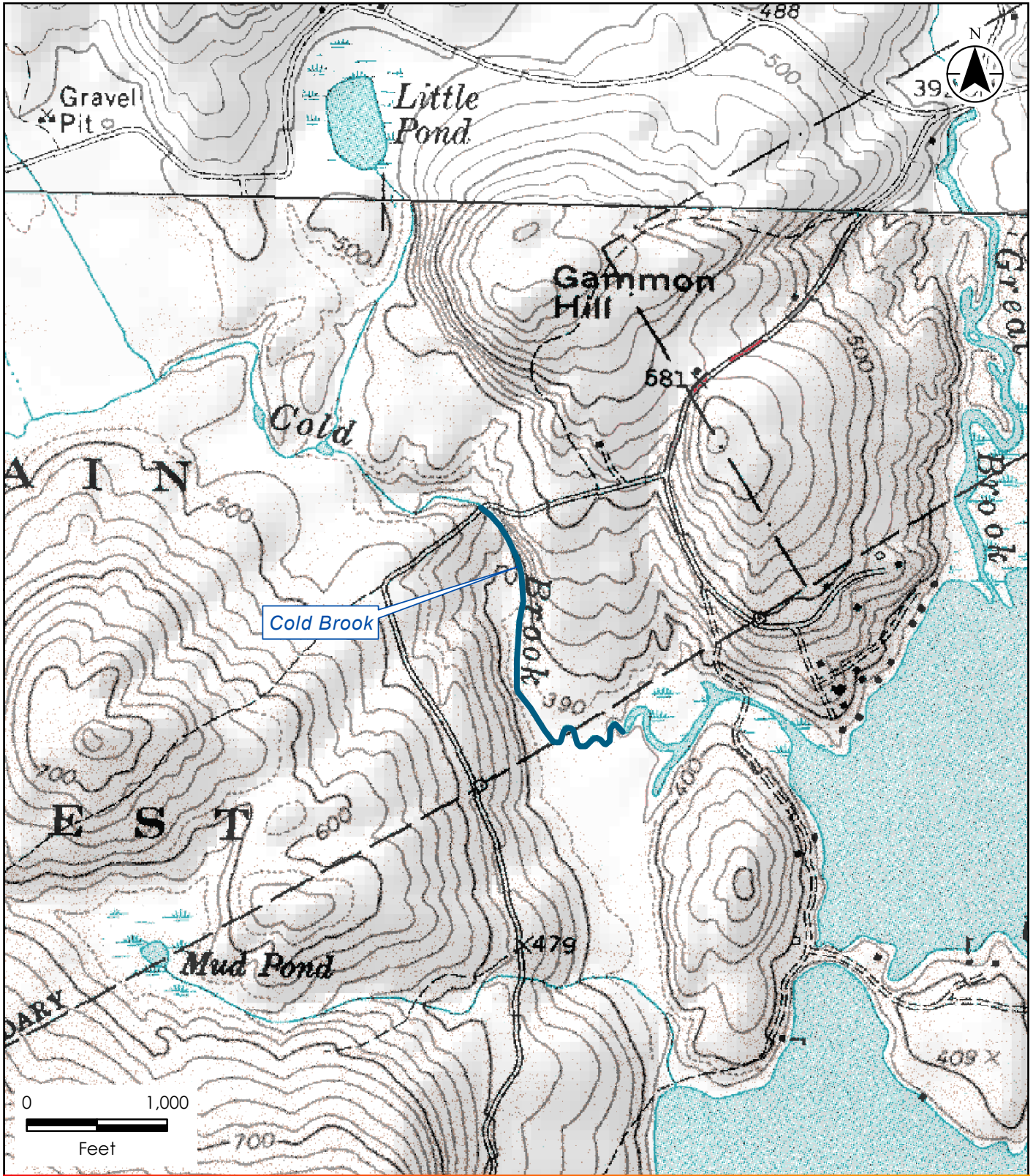
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- 17 Landlocked Salmon Redds Observed
- Stream Segments Surveyed on 11/22/2013

Title

2013 Boulder Brook
 Salmonid Spawn Survey
 12/13/2013

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Legend

- 0 Landlocked Salmon Redds Observed
- Stream Segments Surveyed on 11/13/2013

Title

2013 Cold Brook
 Salmonid Spawn Survey
 12/13/2013

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