

Memo



Stantec

To:	Ray Senecal Kezar Lake Watershed Association	From:	Nathan Henderson Topsham, Maine
File:	Stantec PN 195600843	Date:	November 27, 2012

Reference: Summary of 2-day Salmonid Spawner and Habitat Survey in the Great Brook Watershed

Fisheries biologists from Stantec Consulting Services Inc. (Stantec) and members of the Kezar Lake Watershed Association conducted a 2-day salmonid spawner and habitat survey in the Great Brook Watershed. The survey stream assessment was conducted on November 9 and 16, 2012, and is the second task of a signed scope of services between Stantec and the client for professional services relating to the proposed Albany South timber harvest and its possible impacts to stream salmonids in the Great Brook Watershed.

The results and observations of the spawner survey are presented below by each brook surveyed. Please note that the lack of identified brook trout redds (i.e., small circular depressions in gravel with discernible pit and mound features where salmonids spawn by releasing eggs) documented in the Great Brook watershed do not indicate a lack of suitable spawning as numerous young-of-year brook trout were observed in the watershed. Furthermore, small redds created by small brook trout could have been washed out by elevated flows from Hurricane Sandy on October 29, which resulted in 2 inches of precipitation in the watershed.

Please see the attached Great Brook watershed map that depicts the stream area surveyed and approximate areas of landlocked salmon redd locations. The methods, results, additional photographs, sub-reach habitat descriptions, and discussion of habitat prioritization and possible restorations options can be presented in an optional formal report with approval from the client.

Great Brook

Approximately 3.56 river miles (RM) were surveyed from the old marina near the confluence with Kezar Lake upstream to the confluence with Shirley Brook (see attached map). Great Brook below the Adams Road bridge crossing is deep and narrow with a small width to depth ratio. The section extending upstream of the Adams Road crossing to the Beaver Brook confluence is relatively sinuous and flat (with a lower gradient ~2%) as it flows through a wide floodplain. The lower section of Great Brook has high quality salmonid spawning and rearing habitat with stable undercut banks and deep pools with large woody debris piles providing habitat complexity and cover, and it

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is dominated by small to large size gravel that is ideal for spawning (Photo 1). Just below the Beaver Brook confluence, a bedrock ledge cascade structure has historically been considered an impediment to yearly fall landlocked salmon spawning migrations (Photo 2). Upstream of Beaver Brook, Great Brook narrows and steepens with bedrock and boulder plunge pools. Upstream of this section to the Dwyer's Falls (Photo 3), Great Brook has high quality salmonid spawning habitat with deep pools and successive riffle-pool-run habitat complexes with gravel dominated pool tails. Upstream of Dwyer's Falls, Great Brook narrows and deepens with fewer riffles downstream of a steep bed-rock cascade section leading up to the bridge crossing at the end of Hut Road. From the Hut Road Bridge to the Red Rock Brook confluence, Great Brook's gradient relaxes back to approximately 2 or 3 percent with an accessible bankfull floodplain. The "chop and drop" habitat restoration efforts have resulted in high quality habitat with woody debris piles providing habitat cover and complexity. The substrate in the upper Great Brook watershed is larger than the section below Beaver Brook, with a higher percentage of cobble and boulders, but adequately sized gravel for spawning were present in select pool tails. Upstream of Red Rock Brook, there is a 1,000-foot section of impassable steep cascading bedrock. Before the confluence with Shirley Brook, Great Brook flattens out again with adequate salmonid spawning habitat.

During the 2-day survey, 20 landlocked salmon redds and 25 landlocked salmon were observed between the old marina and Dwyer's Falls. Sixty-five percent of the observed redds and 80 percent of the observed landlocked salmon were documented upstream of the previously considered bed-rock ledge impediment. No landlocked salmon or redds were observed upstream of the Dwyer's Fall ledge structure indicating that that structure is an impediment for landlocked salmon spawning. It should be noted that if Dwyer's Falls could be modified to enhance landlocked salmon passage, approximately 2 miles of spawning and rearing habitat in Great Brook and Willard Brook could be opened. Nineteen young-of-year (1-inch – 3-inch) brook trout and six 4-inch to 6-inch brook trout were documented in Great Brook upstream of the Hut Road Bridge indicating successful brook trout spawning in the upper watershed.

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Photo 1. Landlocked salmon on spawning redd in Great Brook.



Photo 2. "First impediment" in Great Brook downstream of Beaver Brook.

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Photo 3. Dwyer's Falls in Great Brook.

Beaver Brook

Approximately 2.28 RM were surveyed in Beaver Brook upstream from its confluence with Great Brook (See attached map). The survey concluded where Beaver Brook drastically steepened and the plunge pool habitat became dominated with boulder/cobbles. Upstream of the confluence with Great Brook to the double culvert Beaver Brook Road crossing, Beaver Brook is moderately steep (~4% gradient) with minimal sub-habitats of gravel suitable for spawning. Upstream of the road crossing, Beaver Brook flattens (~2% – 3% gradient) with successive riffle-pool-run habitat complexes with large woody debris providing cover and high quality brook trout habitat (Photo 4). The stable banks have floodplain access at bankfull flows and streamside riparian vegetation provides stabilization and canopy cover. The substrate above Beaver Brook Road has ideal gravel composition for brook trout spawning. No landlocked salmon redds were observed in Beaver Brook and only one marginal (small and indistinct) brook trout redd was documented in lower Beaver Brook. However, 13 1-inch to 3-inch and 4 4-inch to 7-inch brook trout were observed in Beaver Brook indicating successful spawning throughout the surveyed reach, especially upstream of Beaver Brook Road.

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Photo 4. High quality brook trout habitat with gravel bar in Beaver Brook above the road crossing.

Willard Brook

Approximately 0.92 RM were surveyed in Willard Brook from the confluence with Great Brook to the high gradient feature at the headwaters of the Brook (see attached map). The lower reaches of Willard Brook can be characterized as a moderately steep tributary (~2% – 3% gradient) with a high percentage of medium to large gravels, small cobble, and very suitable spawning substrate for both brook trout and landlocked salmon. The lower reach also contains very high quality pool habitat for brook trout (Photo 5); however, only 2 small brook trout were observed in the tails of pools. The upper reach of Willard Brook transitions to a higher gradient habitat (~3% – 6% gradient) that contains mostly riffle runs with interspersed pocket pools. The pools in the upper reach were dominated by undercut banks that were formed by overhanging vegetation at the stream margins. Very little spawning substrate was observed in the upper reaches as large cobbles, boulders, and bedrock dominated the substrate of this stretch. It is presumable that if the impediment formed at Dwyer Falls in Great Brook could be modified to pass both smelt and landlocked salmon, that the lower Willard Brook would offer very high quality spawning and rearing habitat. The introduction of smelt and landlocked salmon in Willard Brook would have to be assessed to determine possible negative impacts to the native brook trout that rely on this very high quality habitat.

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Photo 5. Natural pool habitat in Willard Brook.

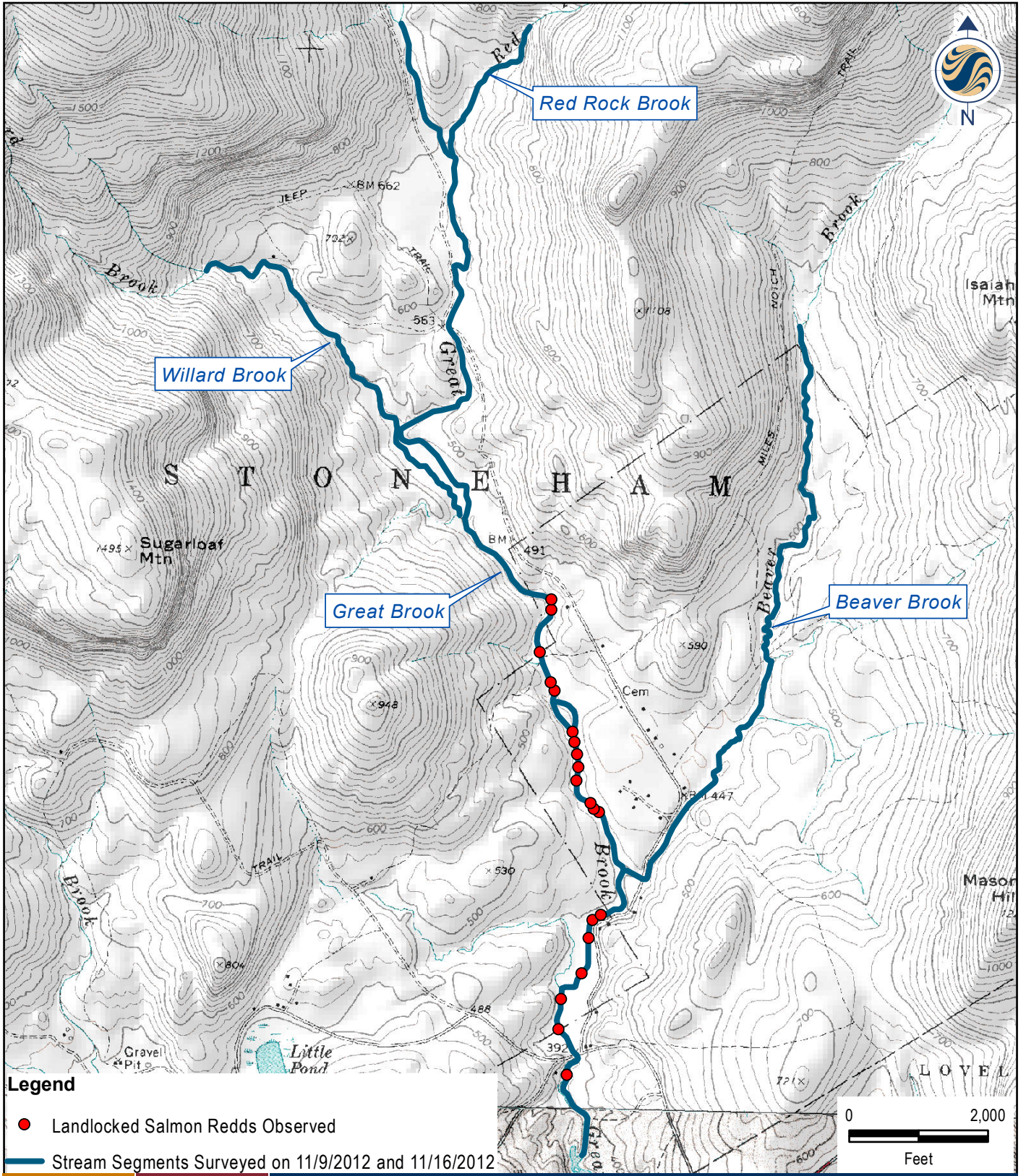
Red Rock Brook

Approximately 0.42 RM were surveyed in Red Rock Brook from its confluence with Great Brook to Red Rock Falls (see attached map). Red Rock Brook is a steeper tributary (~4% – 6% gradient) with a higher percentage of cobble and boulders versus more suitable salmonid spawning substrate of small to medium gravel. However, there were pockets of small to medium size gravel inter-dispersed in pockets in pool tails suitable for spawning (Photo 6). No brook trout or landlocked salmon redds were observed in Red Rock Brook. However, a total of six 1-inch to 3-inch brook trout and six brook trout greater than 4 inches were observed in a relatively small section of the brook. Seven of the 12 fish were observed in one large pool at the base of the expansive Red Rock Falls. The largest brook trout (~7 inches) observed in the Great Brook watershed was observed in this pool. The presence of multiple young-of-year brook trout is indicative of successful spawning in the lower portion of Red Rock Brook. It is presumable that brook trout unable to navigate the approximate 1,000-foot section of very steep bed-rock cascade in Great Brook just upstream of Shirley Meadows migrate up Red Rock Brook to access more quality habitat in the upper watershed.

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Photo 6. Successive plunge pool habitat in Red Rock Brook.



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Title

**2012 Great Brook
 Salmonid Spawn Survey**

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