

## **Salmon River Watershed Natural Resources Assessment Inventory and Land Analysis Summary**

The purpose of the Salmon River Watershed Inventory and Land Analysis was to evaluate the natural integrity and comparative quality of sub-watersheds within the 173,000-acre Salmon River watershed. The New York Natural Heritage Program (NYNHP) completed the land analysis report, funded by a grant from the U.S. Fish and Wildlife Service, and in collaboration with the New York State Department of Environmental Conservation (NYSDEC), NYS Tug Hill Commission (THC), NY Sea Grant (NYSG), Tug Hill Tomorrow Land Trust (THTLT), The Nature Conservancy (TNC), Oswego County Environmental Management Council (EMC), SUNY Oswego and SUNY College of Environmental Science and Forestry (ESF).

The goal of the Geographic Information System (GIS) analysis was to identify and rank the highest quality sub-watersheds within the entire basin using a transparent system that could then be applied to other basins in the state. There were three components to the analysis:

1. Using known locations for rare species statewide, NYNHP built GIS computer models for rare species and natural communities that are likely to occur within the watershed.
2. NYNHP conducted field inventories for rare species and significant natural communities based on the predictions of the models and other factors.
3. NYNHP conducted an assessment of the sub-watersheds within the entire basin using its computer models, field inventory data, and other GIS data available.

THTLT and NYNHP worked together and sent letters requesting permission to conduct inventories to about 84 private landowners, based on predictions for suitable rare species or natural communities habitat, and to an additional 51 private owners of large parcels. Of the 84 private parcels having predictions for rare species or natural communities, 63 of these were targeted towards rare plants, nine were targeted for rare animals (least bittern and a dragonfly, *Ophiogomphus anomalus*), and 15 were targeted for natural community inventory. These numbers sum to a value greater than 84 as some parcels were targets for more than one group.

About 16 private landowners gave permission for NYNHP to conduct inventories on their property. As NYNHP was also visiting public lands, they had to prioritize our final visits into the field. NYNHP made it to many of the private landholdings, but not all. During the winter of 2006, NYNHP provided information to those landowners who requested follow-up information on the surveys. NYNHP provided information on what we found to THTLT, who, in turn, sent follow-up letters to each of these landowners.

Inventory efforts during 2005 resulted in many new and updated locations for rare species and significant ecological communities. In all, 61 different occurrences of rare species and significant natural communities are known within the entire basin. Eleven of these are locations for rare animals, twelve for rare plants, and 39 for significant natural communities. Clusters of rare species and significant natural communities occur near the mouth of the Salmon River, in a few of the larger peat lands in the basin, such as Sloperville Fen, and within the Salmon River Gorge. Overall, the analysis singles out the Mad River sub-watershed as the area with the most intact landscape and the least human disturbances, barriers, and alterations. Cold Brook, a narrow sub-watershed adjacent to Mad River on the south side comes in a close second.

The entire Salmon River Watershed crosses through very different ecosystems as it extends from the Lake Ontario shoreline to the top of the Tug Hill plateau. Any basin-wide conservation plan should have representation from all these broad ecosystems. The variation in species and natural communities is one surrogate representation of this and the divide between the Lake Ontario shoreline and the Tug Hill is clearly shown with the rare species hotspots at the mouth of the Salmon River and the very few rare species but great many significant natural communities up on the Tug Hill.

The rare species and natural community inventories turned up new locations for rare animals, rare plants, and significant natural communities. NYNHP does not feel that all element occurrence locations are known for the entire Salmon River Watershed, and that there is excellent potential for other rare species sites in the basin with additional survey effort. More locations are believed to exist on private lands and in other locations that NYNHP just did not have time or opportunity to visit. However, the known locations of rare species and significant natural communities provide an excellent picture of both the general and specific patterns of biodiversity throughout the basin. The information and tools presented in this report can help guide a multi-tiered conservation planning effort that focuses at the smaller scales species, the small to large scales of natural communities, and the large scale of sub-watersheds.

<b>Rank</b>	<b>Name</b>	<b>Code</b>	<b>Acreage</b>	<b>Sub-Watershed Towns</b>
1	Mad River	MARI	21,013	Worth, Redfield, Montague, Osceola
2	Cold Brook	COBR	6,558	Worth, Redfield, Montague
3	Beaver-Gillmore-Willow-McDougal	BGWM	6,963	Worth, Redfield
4	Upper Salmon River	UPSR	16,365	Osceola, Lewis
5	Grindstone-Mill-Muddy	GRMM	11,183	Redfield, Osceola, Montague
6	Stony Brook-Lime Brook	SBLB	4,625	Redfield, Osceola
7	North Branch	NOBR	17,993	Boylston, Worth, Redfield
8	Fall Brook-Twomile-Threemile	FBTT	9,862	Osceola
9	Keese-Smith-Finnegan	KESF	6,419	Osceola
10	Prince-Mulligan-Little Baker	PMLB	7,245	Redfield, Osceola
11	Beaverdam Brook-Meadow Creek-Reservoir	BBMC	19,721	Albion, Williamstown, Florence, Redfield, Orwell
12	Orwell-Pekin	ORPE	12,992	Albion, Orwell, Boylston
13	Pennock-Coey-Kenny	PECK	10,880	Orwell, Redfield
14	Trout Brook	TRBR	12,938	Richland, Orwell, Boylston
15	Lower Salmon River-Main Stem	LSRM	11,544	Richland, Albion

### ***Mad River (MARI)***

The Mad River sub-watershed is the largest sub-watershed, at 21,000 acres, and is located in the northern portions of the basin. A large portion of the upper reaches of this sub-watershed is owned by TNC, and protected by a conservation easement held by the NYSDEC.

Holding 98% natural lands places it seventh based on this category. It has, however, a very high road-less block score, meaning that it intersects and/or contains the largest road-less blocks in the basin. We found no dams within this sub-watershed and there are only a few roads (20 miles). There were two rare plant species and one rare animal species predicted to have appropriate habitat in this sub-watershed, as well as a large number of significant palustrine (wetland) natural communities (shrub swamp, sedge meadow, spruce-fir swamp, and black spruce-tamarack bog). In all, the Mad River rises to the top as the sub-watershed with the 42 New York Natural Heritage Program highest landscape integrity.

### ***Cold Brook (COBR)***

Cold Brook is a narrow sub-watershed, with a width less than a mile wide in most places. At 6,600 acres, Cold Brook is the third smallest sub-watershed and, as all the sub-watersheds in the Tug Hill core, has quite high percentage of natural land (4<sup>th</sup> highest: 98.6%). Cold Brook has the highest road-less block score. Interestingly, as with Mad River, this sub-watershed ranked slightly lower for the amount of natural land adjacent to streams. Although we have not investigated fully, this pattern may be due to misclassification within the land use/land cover layer of the large sedge meadows and other beaver meadows in these sub-watersheds or our lack of inclusion of the emergent wetland types into the “natural lands” group. At any rate, these apparent inconsistencies do not play a large role in the overall assessment of these watersheds.

### ***Beaver-Gillmore-Willow-McDougal (BGWM)***

This sub-watershed consists of a merger of the lowest portion (about 2.5 miles) of the North Branch of the Mad River with the Cold Brook sub-watershed flowing from the east and the next portion (about 1 mile) with the series of tributaries flowing from the west, adjacent Cottrell Creek. These tributaries include Beaver Creek, Gillmore (Gillman) Creek, Willow Creek, and McDougal Creek. The Beaver-Gillmore-Willow-McDougal sub-watershed is the fourth smallest in the basin at 6,960 acres. It has the highest proportion of natural land (99.5%), the third from highest road-less block score, and the highest proportion of natural land near its streams (99.3%). We found no dams in this sub-watershed and only 2.5 miles of roads with eight road/stream crossings. There was only one rare species predicted to have appropriate habitat within this sub-watershed. The final assessment score for this sub-watershed ranked it third overall.

***NOTE:*** The goal for NYNHP natural community tracking is to find and document all rare natural communities *and* all excellent examples of common natural communities (thus the term *significant natural communities* for the entire set of tracked natural communities). The beech-maple mesic forest of the Tug Hill falls into the latter category: a forest community common throughout the state but of particularly good quality here in the Tug Hill. This is a mostly working forest with timber harvest as a major component. However, the minimal intrusion of roads, the good forest husbandry practices, the presence of core protected areas, and other factors all indicate an extensive, high-quality, viable forest ecosystem. The full delineation of this beech-maple mesic forest is not yet complete; much is mapped at a very coarse scale and more study is needed to determine the appropriate extent and precision for this huge natural community. NYNHP has mostly used the Mad River as the western edge of the forest, simply for convenience. Quality forest certainly extends west of this demarcation.

### ***Upper Salmon River (UPSR)***

The Upper Salmon River sub-watershed is sickle-shaped, beginning at the upper end of the upper reservoir and extending in a curve about 17 miles to the headwaters of the Mad River. Pickens Brook, West Fork Salmon River and East Fork Salmon River make up the major tributaries in this sub-watershed. Significant natural communities within or crossing into this sub-watershed include confined river, marsh and rocky headwater streams, black spruce tamarack bog, dwarf shrub bog, beech-maple mesic forest, and floodplain forest. The bog peat lands are now re-vegetating from beaver flooding; periodic beaver flooding may be the dynamic that keeps this peat land and others in the region open and mostly free of trees.

The Upper Salmon River sub-watershed is fourth largest, at 16,400 acres. It has a relatively moderate amount of natural land, both overall (97%) and within the 100m stream buffer (97%). This sub-watershed is 5th in its road-less block score, and has the lowest proportion of road crossings per stream mile. These factors help bring the relative overall ranking for this sub-watershed to fourth.

### ***Grindstone-Mill-Muddy (GRMM)***

The major feature of this basin is the documentation of the high quality rocky headwater stream, encompassing most of Mill Creek and its tributaries. At 11,000 acres, Grindstone-Mill-Muddy falls in the middle of the pack for size. The metric for proportion natural lands places it fifth (98.4%) and for proportion of streams in natural land places it fourth (98.6%). There are no dams in this sub-watershed and about 12 miles of roads. With 57 miles of stream and 14 stream/road crossings, there are 0.25 road crossings per stream mile. Element distribution models predicted appropriate habitat for one rare animal species and two rare plant species. Overall, this sub-watershed was ranked fifth.

### ***Stony Brook-Lime Brook (SBLB)***

Stony Brook flows from the north into the Salmon River just east of the upper reservoir. About 2.5 miles upstream, Line Brook diverges and both continue in parallel up towards the old logging camp called New Campbellwood Wye. Stony Brook-Lime Brook is the smallest sub-watershed, at about 4,600 acres and averaging about 0.7 mile wide and about 7 miles long. Only the extensive beech-maple-mesic forest matrix-forming significant natural community occurs in this sub-watershed. We have no rare species documented within this sub-watershed, although element distribution models predicted appropriate habitat for one rare animal species and two rare plant species. A very high proportion of this watershed is natural (98.6%) and a very high proportion of natural land occurs within the stream buffers (98.3%), and received a moderate road-less block score. Overall, this sub-watershed was ranked sixth.

### ***North Branch (NOBR)***

At 17,400 acres, North Branch is the third largest sub-watershed in the basin. This sub-watershed falls along the cusp between the Tug Hill Transition and Tug Hill Core zones, with a larger proportion of agricultural lands than those solely in the Tug Hill Core. This sub-watershed has many streams (69 miles), moderate road mileage (30 miles), and a moderate number of stream/road crossings (33). The very bottom of the North Branch where it commingles with the Mad River is classified as a confined river and recognized as one of these stream courses of statewide significance. This natural community occurrence continues up the Mad River. Cottrell Creek supports a mosaic of beaver – altered wetlands and high quality floodplain forest. We mapped this high quality floodplain forest as a significant natural community during this project. North Branch falls out right in the middle of the pack with a rank of seventh.

### ***Fall Brook-Twomile-Threemile (FBTT)***

Fall Brook merges with the Salmon River at Osceola. Crooked Brook, Onemile Creek, Twomile Creek, and Threemile Creek are all small tributaries to Fall Brook and included in this sub-watershed. It encompasses 9,800 acres. The extensive beech-maple mesic forest matrix-forming significant natural community occurs in this sub-watershed. The confined river significant natural community of the East Branch also passes along (and makes up) the southern boundary of this sub-watershed. The only record for a rare species in the sub-watershed is a New York State Museum herbarium specimen of a rare orchid (broad-lipped twayblade) from collected in 1927. NYNHP searched for this plant in 2005 but did not find it. Overall, this sub-watershed ranks eighth in the evaluation.

### ***Keese-Smith-Finnegan (KESF)***

The Keese-Smith-Finnegan sub-watershed is the second smallest sub-watershed at 6,400 acres. It has a high proportion of natural land (98.8%, second highest) and natural land within the 100m stream buffer (98.7%, second highest). As tributaries to the Salmon River, this sub-watershed borders the Salmon River and contains the confined river significant natural community mapped for this River. New significant natural communities were mapped within this sub-watershed, including a dwarf shrub bog and a tamarack bog now revegetating from flooding. Periodic beaver flooding may be the dynamic that keeps this peatland and others in the region open and mostly free of trees. However, we found two dams in this sub-watershed, and a relatively poor road-less block score (ranked tenth). The final score for his sub-watershed was ninth.

### ***Prince-Mulligan-Little Baker (PMLB)***

At 7,200 acres, the Prince-Mulligan-Little Baker sub-watershed is fifth smallest. It has lower proportions of natural land (97%) and natural land within stream buffers (97%), primarily because of North Osceola and environs. There are no known dams, fourteen miles of road, and 13 road stream crossings with a resulting 0.46 road crossings per stream mile. As with many of the adjacent sub-watersheds, the element distribution models predicted appropriate habitat for one rare animal species and two rare plant species. Overall, this sub-watershed was ranked tenth.

### ***Beaverdam Brook-Meadow Creek-Reservoir (BBMC)***

At 19,700 acres, the Beaverdam Brook-Meadow Creek-Reservoir sub-watershed is the second largest in the basin. It has a relatively low amount of natural land cover (82%), and a relatively low road-less block score. The largest number of known dams are in this sub-watershed (11), but these dams are spread throughout the second largest number of streams (70 miles). Combine this stream mileage with the second longest road mileage and the result is the largest number of road/stream crossings in the basin. As with the lower Salmon River, the biodiversity within this watershed forced NYNHP to take a second look. Element distribution models predicted eight different rare plant (3) and rare animal (5) species for this sub-watershed and five different species at one single location. Strategies for conserving or otherwise protecting natural biodiversity within this watershed might be most appropriately targeted towards specific sites or species. The final overall rank for this sub-watershed is low (fifth from last).

### ***Orwell-Pekin (ORPE)***

The Orwell-Pekin sub-watershed, at nearly 13,000 acres, spans most of the Tug Hill Transition zone. In comparison with those further up on the Tug Hill, this sub-watershed has relatively low forested cover (82%), a low road-less block score, and a lower than most others (but still quite impressive) percentage of streams within natural lands (93%). A fairly large number of roads (30 miles) and road/stream crossings appear here. On the plus side, Orwell-Pekin has rare species present and predicted. A Bald Eagle has chosen a nest site in the southern portion of this sub-watershed recently.

A new Pied-billed grebe nesting site was found as a result of surveys undertaken as a part of this project. A cluster of vernal pools, an inland poor fen, and a new site for pod grass (*Scheuchzeria palustris*) were newly documented in this sub-watershed during the Salmon River Greenway project. Two headwater areas contain significant natural communities. A spruce-fir swamp and shallow emergent marsh at Pennock Bog feed into Pekin Brook. A very large hemlock-hardwood swamp encompasses much of “Tamarack Swamp” to the north. The Orwell-Pekin sub-watershed ranks twelfth in the evaluation.

### ***Pennock-Coey-Kenny (PECK)***

The Pennock-Coey-Kenny sub-watershed falls into the middle of the pack for most of the analysis measurements. At 11,000 acres it is ninth of the 15 sub-watersheds for size, twelfth in natural land cover (90%) and road-less block score, and second from last in the proportion of natural land nearby streams (79%). At this time there are no known significant natural communities or rare species in this sub-watershed. This sub-watershed sorts out to third from last in the final ranking.

### ***Trout Brook (TRBR)***

At the edge of the Lake Ontario plain in the transition zone to the Tug Hill, the Trout Brook 12,900 acre sub-watershed has a large agricultural base. Although relatively large in size, this sub-watershed has the second lowest coverage of natural land (76%). There are no known rare species or significant natural communities for this sub-watershed. This does not mean that there are none, however. The narrow ravines in and around Trout Brook reforestation area and the larger wetlands in the southern portion of the sub-watershed may eventually turn up interesting species or natural communities.

**Agricultural systems, however, play an important role in biodiversity conservation and maintenance** (emphasis added). Many grassland birds, for example, depend on agricultural fields for nesting. Also, the open space and relatively un-fragmented nature of agricultural systems is far more beneficial to wildlife than other commercial or residential developments. In the final ranking scheme, the Trout Brook sub-watershed comes out second to last behind the Lower Salmon River.

### ***Lower Salmon River-Mainstem (LSRM)***

At 7,000 acres, this the Lower Salmon River sub-watershed is the sixth smallest of the fifteen. Being located on the Lake Ontario plains carries some integrity issues: this sub-watershed has by far the least natural land cover (64%), has the lowest road-less block score, the fewest acres in larger natural blocks, and the lowest percentage of streams running through natural land (79%). These development pressures also create more roads (60 miles of them), more stream/road crossings (39), more dams, and more documented point-source pollution. However, the Lake Ontario plain also brings unique geology, landforms, and habitats to this basin. The wetlands and natural areas in and around the mouth of the Salmon River are hot spots for biological diversity, rare species, and unique and interesting natural communities. NYNHP element distribution models also predicted the highest number of rare species in this sub-watershed (22) as well as the highest number predicted in any single location in a sub-watershed (e.g., hot spot), at 11 species. These factors make evaluation of this watershed important, but perhaps less at the scale of the sub-watershed but more at the scale of specific targets and sites.