

PRELIMINARY DRAFT
List of Instream Public Uses, Outstanding Characteristics, and Resources
(IPUOCR)
Souhegan River
For the
Protected Instream Flow (PISF) Study

The New Hampshire Department of Environmental Services (DES) has defined the Instream Public Uses, Outstanding Characteristics, and Resources (IPUOCR) that must be evaluated and included in the development of a PISF Study and eventual Water Management Plan (WMP). Categories of potential IPUOCR include the following:

- Navigation: The use of the river for non-recreational, transportation purposes.
- Recreation: Use of the river for swimming, boating or significant shoreland recreation such as hiking, camping, picnicking and bird watching.
- Fishing: both Recreational Use and Commercial Use
- Storage: Natural or man-made attributes of a river for water storage.
- Conservation/Open Space: Issues concerning management of open space, conservation easements or municipal, state or federal parks.
- Maintenance and Enhancement of Aquatic and Fish Life: Those aquatic-dependent species that make up a balanced, integrated and adaptive community of organisms having a species composition, diversity and functional organization comparable to that of similar natural habitats of a region.
- Fish and Wildlife Habitat: Species that rely on flow and flow to regions which are important to the survival of fish and wildlife populations, including but not limited to: spawning and feeding beds, waterfowl breeding or wintering areas, freshwater wetlands or riparian habitat.
- Rare, Threatened or Endangered (RTE): fish, wildlife, vegetation or natural/ecological communities: As listed by New Hampshire Natural Heritage Inventory (NHI) and nomination papers.
- Water Quality Protection/Public Health: Characteristics that maintain water quality of the river including, but not limited to, chemical and physical parameters that support designated and existing uses.
- Public Water Supply: An existing source of public drinking water as defined in Env-Ws 302.02.
- Pollution Abatement: Wastewater treatment facilities or industrial treatment facilities and aspects of flow affecting assumptions of flow for dilution and dispersal of waste in mixing zones and the river's overall capacity to mitigate natural and non-point source contamination.
- Aesthetic Beauty/Scenic: Including but not limited to designated viewing areas, scenic vistas and overlooks.
- Hydroelectric Energy Production: An existing hydroelectric facility or a former hydroelectric facility site that has been unused for fewer than six years.

- Cultural: On-going river corridor management planning effort or other local efforts to protect or manage the river, riverside parks or other public areas, or community support for riverfront revitalization.
- Historical or Archaeological: Based on the presence or absence of known historical or archaeological resources.
- Community Significance: A natural, managed, cultural or recreational resource or use thereof associated with the river that is recognized by local residents or a municipal document as being important to the community adjacent to the river.
- Hydrological/Geological: A national, regional, state or local resource as determined by the state geologist or as listed in a national or state resource assessment.
- Agricultural: As defined by RSA 21:34a.

The IPUOCR entities for the Souhegan River are extensive; a preliminary list has been created for the purposes of dividing those entities into three categories based on an initial assessment of their Dependence (Flow Dependent), Potential Dependence or Non-Dependence on instream flow. Further work to be completed as a part of this study will allow a determination of the flow dependence of those resources classified as having Potential Dependence.

Preliminary List of Flow Dependent Entities:

Fishing

The majority of the fishing in the river is for stocked trout.

Storage

There are eleven dams on the Designated Reach:

- Souhegan River Dam in New Ipswich,
- Souhegan River Dam III in New Ipswich,
- Souhegan River Dam in Greenville,
- Souhegan River Dam IV in Greenville,
- Souhegan River Dam VI in Greenville,
- Souhegan River Dam in Wilton,
- Souhegan River Dam III in Wilton,
- Souhegan River Dam (Label Arts) in Wilton,
- Goldman Dam in Milford,
- McLane Dam in Milford (inactive), and
- Souhegan River Dam in Merrimack.

Maintenance and Enhancement of Aquatic and Fish Life

Native Fish Species

Species present in Souhegan River include American eel, Atlantic Salmon, Blacknose Dace, Brook Trout, Brown Bullhead, Chain Pickerel, Common Shiner, Common White Sucker, Creek Chub Sucker, Fallfish, Golden Shiner, Longnose Dace, Longnose Sucker, Margined Madtom, Pumpkinseed, Redbreast Sunfish, Spottail Shiner, Yellow Bullhead, Yellow Perch (SRWR 1997).

Introduced Fish Species

Species present in Souhegan River include Brown Trout, Largemouth Bass, Smallmouth Bass, and Rainbow Trout. Although these species are not native, they have been introduced and are part of the aquatic community (SRWR 1997).

Mussels

There are 12 species of freshwater mussels found in the northeast. A concise list of species can be obtained from the Connecticut Department of Environmental Protection. These species are important in bodies of water as they maintain clean water by filtering algae and plankton, and are eaten by many species of wildlife. The species with potential to be present in the Souhegan River is Eastern Pearlshell, Dwarf Wedgemussel, Triangle Floater, Brook Floater, Creeper, Eastern Elliptio, Eastern Floater, Alewife Floater, Eastern Pondmussel, Tidewater Mucket, Yellow Lampmussel, and Eastern Lampmussel.

Insects

There are a variety of insects which are dependant upon a river system for habitat and breeding grounds. In this study, dragonflies and damselflies are of most concern. There are many different species of these insects, and many have been located in Hillsborough County, the county in which much of the Souhegan River and its watershed is found. Dragonflies and damselflies are good indicators of water quality and are easily identifiable. If water is impacted through sedimentation, an increase or decrease in stream flow or other drastic event, these insects are affected, as their presence indicates high quality water. The only species of dragonfly which is listed as endangered in New Hampshire is the Ringed bog haunter (*Williamsonia lintner*).

Fish and Wildlife Habitat

The Souhegan is a Salmon Restoration river. The river is integral to the extremely successful US Fish and Wildlife Service (FWS) Adopt-a-salmon family project that uses a watershed approach for environmental education. At present, the river is the main release site for the program that currently involves approximately 25 schools in Massachusetts and New Hampshire. The river contains Atlantic salmon nursery habitat (gravelly, sloping bottoms, water temperatures, oxygen levels, and food sources), identified by FWS as the best nursery habitat in the region. The river is part of the Merrimack River anadromous fish restoration program and is considered one of the most productive rivers in the watershed (SRN 1999).

RTE: fish, wildlife, vegetation or natural/ecological communities

Fish

The river is habitat for the endangered Banded Sunfish (*Enneacanthus obesus*). This fish occurs in slow-water areas and impoundments and prefers heavily vegetated areas (Cairns 2004).

Vegetation

The river corridor contains Long's Bitter-cress (*Cardamine longii*), an endangered aquatic plant, existing primarily in sandy muck or cobbles (Cairns 2004).

Natural/Ecological Communities

Two vegetative communities have been identified as being exemplary Natural Ecological communities by NHHI: Southern New England High-Energy Riverbank Community and Southern New England Floodplain forest (Cairns 2004).

Public Water Supply

The Pennichuck Water Works (PWW) historically withdrew water for public supply from 1965-1984 and maintains the right to withdraw water in the future from the Souhegan Woods Water System. The sources of this water supply are two wells located off Amherst Road in Amherst.

Hydroelectric Energy Production

The river corridor currently contains four hydroelectric facilities:

- Waterloom Pond Dam in New Ipswich,
- Otis Dam in Greenville,
- Souhegan River Dam in Greenville and
- Pine Valley Mill in Wilton.

Hydrological/Geological

River Morphology

From aerial photographs and visual observation of the river, the form of the river varies throughout its length. Characteristics such as oxbows and meanders can be determined from maps and photographs, while substrate, width, depth and other characteristics are to be viewed at the small scale. Flow has the ability to alter the morphology of the river.

Preliminary List of Potentially Flow Dependent Entities:

An evaluation of these IPUOCR entities will be performed during and after the field survey in order to establish their dependence on flow.

Recreation

Boating: Western sections of the river (from Greenville to Wilton) provide whitewater canoeing and kayaking during spring and periods of high water. The Wilton to Milford stretch provides limited opportunities for canoeing and kayaking because water is generally low and requires portage around dams. Below the Rt.122 bridge the river is flat and provides excellent opportunities for family canoeing. The stretch below Seaverns Bridge is impassable to watercraft because of Wildcat Falls. The river is impassable to motorboats except in western reaches, on the impoundments(SRN 1999).

Maintenance and Enhancement of Aquatic and Fish Life

Exotic/Invasive Species

There are exotic and invasive species of vegetation and invertebrates present in New Hampshire, which have the potential for causing harm to the watershed. These species can be found listed on the New Hampshire Department of Environmental Services website. The only invasive species found in a water body near the Souhegan River is Variable milfoil (*Myriophyllum heterophyllum*), which is very difficult to eradicate once it is established. If it is reported to be present in the river during the course of the study, it will be evaluated further. It is unknown how this species responds to changes in river flow.

RTE: fish, wildlife, vegetation or natural/ecological communities

Vegetation

The river corridor contains the following species of endangered or threatened flora that are potentially flow dependent: Siberian/Wild Chives (*Allium schoenoprasum*) and Giant/Great-laurel Rhododendron (*Rhododendron maximum*) (Cairns 2004, NAI 2004). Siberian chives typically require pristine floodplain forest or mid-river island habitat. Giant rhododendron typically requires acidic, moist soils associated with heavily wooded, low-lying forests. Potential and existing locations of these species will be examined in the field to better determine flow dependence.

Pollution Abatement

Point source discharges include: Greenville WWTF (wastewater), Souhegan Wood products (non-contact cooling waters), Hitchiner Manufacturing (non-contact cooling waters), Milford WWTF (wastewater), and Harcros Chemicals (non-contact cooling waters). Savage Well and Fletcher Paint Superfund sites are located in Milford, NH adjacent to the river and have historically indirectly discharged pollutants into the waterbody.

Hydrological/Geological

The Milford-Souhegan aquifer consists of as much as 114 ft. thick of unconsolidated glacial sediments and has a maximum saturated thickness of approximately 100 ft. Horizontal hydraulic conductivity of stratified-drift deposits ranges from approximately 1 to 1,000 ft per day (Harte and Mack 1992). The groundwater flow is governed by the hydraulic connection between the Souhegan River and its tributaries. In the western reaches of the Souhegan River, the River recharges the aquifer and groundwater flow is away from the river. In the eastern reaches ground water discharges into the river and groundwater flow is towards the river. Based on October 1998 stream flow data the aquifer is recharged from surface water infiltration at a rate of 1.44 ft³/s (Harte and Mack 1992). During extreme low-flow events, aquifer recharge from the river will be reduced. This may impact groundwater resources in the vicinity of the river.

Preliminary List of Non-Flow Dependent Entities:

Navigation

None listed at this time

Recreation

Golf: There are two public golf courses where the river crosses Route 122 in Amherst.

Other: Locations used for hiking, nature study, fishing access, picnicking and such include:

- the Taft Land owned by New Hampshire Fish and Game (NHF&G) in Greenville;
- the Town Forest owned by the Town of Wilton;
- Society for Protection of New Hampshire Forests (SPNHF) land in Wilton;
- the Souhegan River Scenic Easement owned by New Hampshire Department of Transportation (NHDOT) in Greenville/Wilton;
- The Horseshoe, a privately owned parcel in Wilton;
- the Milford Fish Hatchery, owned by NHF&G;
- Milford town land;
- Bicentennial Park, owned by the Town of Milford;
- Keyes field, owned by the Town of Milford;
- Emerson Park, owned by the Town of Milford;
- Kaley Park owned by the Town of Milford;
- Cemetery Fields on Merrimack Road near Beaver Brook (that feeds the Souhegan), in Amherst;
- Amherst canoe port, owned by the Town of Amherst;
- Route 122 access, owned by the Town of Amherst;
- the Sherburne Site, owned by the Town of Amherst;
- Eighty Acres, owned by the Town of Merrimack; and
- the Turkey Hill Bridge Site, owned by the Town of Merrimack.

Conservation/Open Space

Open Space parcels include the following:

- Merrimack: Eighty Acres site-predominately forested includes Wildcat falls, Turkey Hill bridge site-open and forested, provides car top access to the River, Davidson Avenue green space-predominately forested, and Whippoorwill Boy Scout Camp
- Amherst: Scott and Sherburne sites- predominately floodplain, The Currier Land- predominately floodplain, and The Curtis Well Site- public drinking water, mixed woods and fields.
- Milford: An unnamed piece east of downtown- floodplain, forest, field, the site east of the swinging bridge-open area and woods, Emerson Park- a small developed park, Keyes Memorial Park- floodplain, open recreational area, and an unnamed parcel adjacent to the fish hatchery- mixed fields and forest.
- Wilton: the Town Forest, SPNHF owns a parcel along the River- forested, NHDOT owns a 3.2-mile scenic easement on Rt. 31 in Wilton and Greenville.
- Greenville: NHF&G owns a large parcel that is predominately forested and includes the gorge.
- New Ipswich: There are a couple of small pieces of land owned by the town along the River that are predominately forested.

RTE: fish, wildlife, vegetation or natural/ecological communities

Wildlife

While the river corridor is habitat for the threatened Eastern Hognose Snake, the endangered Woodhouse's Toad and the critically imperiled Grasshopper Sparrow, none of these species is dependent on water levels or flows (Cairns 2004, NAI 2004).

Vegetation

The river corridor contains the following species of endangered or threatened flora: Wild Lupine (*Lupinus perennis*), Bird's Foot Violet (*Viola pedata*), Wild Garlic (*Allium vineale*), Skydrop Aster (*Symphiotrichum patens*), Goat's Rue (*Galega officinalis*) and Stiff/Pine-barren Tick Trefoil (*Desmodium strictum*). None of these species are dependent on water levels or flows (Cairns 2004, NAI 2004).

Water Quality Protection/Public Health

The river supports its water quality classification, class B, at all locations. According to the 1999 Souhegan River Nomination, certain sites exceeded acceptable limits for bacteria (below Wilton and at 122 bridge) and Phosphorous (Greenville and Milford wastewater treatment facilities and continued downstream). Low DO levels were also documented at the Pine Valley Mill site. The Souhegan River Watershed Report (1997) states "The Souhegan River, with one exception, met all of its water quality standards criteria during dry weather and demonstrated that it is fully supporting its Class B designation of being fishable and swimmable. However, the biotic integrity of the waterbody does show signs of impairment and degradation. Cold-water and pollutant intolerant

non-game species were present in the Souhegan, indicating that chemical and physical water quality conditions are favorable to supporting a diverse cold and warm water fishery. While only one station was rated non-impacted, most supported healthy macroinvertebrate communities and fell into the slight impact range.”

Aesthetic Beauty/Scenic

These areas include: Route 31 along scenic Water Loom Pond and under High Bridge in the center of Town; in Greenville Route 31 affords views of pastures and agricultural lands and a scenic gorge; Route 31 proceeds through a 3.2 mile corridor protected by a scenic easement donated by the NHDOT; The Horseshoe in Wilton is an area where the River passes through a series of ledges that are steep on one side; in Milford the river passes under historic Green Bridge; The Souhegan River Trail in Milford follows the river along the state owned fish hatchery property and the adjacent Town owned property; in Merrimack are Indian Ledges and Wildcat Falls.

Cultural/Community Significance

The river is discussed in each of the municipal master plans and is recognized as a significant community resource. The Souhegan River Watershed Study includes significant amounts of information about the river and provides specific recommendations for local and regional action. All communities in the watershed received the study well and some have started to implement the recommendations of the study. The study recommendations include amendments to local zoning ordinances and land use regulations, the development of a continuous trail along the River, additional public access sites in each community, public education on River resources and their protection, continuation of the volunteer monitoring program and state actions.

Historical or Archaeological

According to the New Hampshire Division of Historical Resources, New Hampshire Archaeological Inventory, there are four sites of historical significance within 100 meters of the Souhegan River along the designated reach. Three of these sites are located in Milford and one in Merrimack. Historical and archeological information is sensitive in nature therefore specific site locations are not identified in public documents.

Historical Resources located in the towns along the designated reach include the following:

- Merrimack: McClure--Hilton House 16 Tinker Rd. Listed; 12-01-1989, Signer's House and Matthew Thornton Cemetery S of Merrimack on US 3 Listed; 12-22-1978 Amherst Village Historic District 101 and NH 122 Listed; 08-18-1982
- Milford: Milford Cotton and Woolen Manufacturing Company 2 Bridge St. Listed; 08-18-1982, Milford Town House and Library Annex Nashua St. Listed; 12-01-1988, Peabody, William, House N. River Rd. Listed; 11-30-1979
- Wilton: County Farm Bridge NW of Wilton on Old County Farm Rd. 05-14-1981. Cragin, Daniel, MillW of Wilton at Jct. of Davisville Rd. and Burton Hwy. Listed; 03-23-1982, Hamblet--Putnam--FryeHouse 293 Burton Hwy. Listed; 06-22-2000, Stonyfield Farm NW of Wilton on Foster Rd. Listed; 08-03-1983, Whiting, Oliver, Homestead Old County Farm

- Rd. Listed; 03-09-1982, Wilton Public and Gregg Free Library Forest St. Listed; 01-11-1982, Monument Park, a 1.0 acre park that is identified as a historic site for passive use.
- New Ipswich: New Ipswich Center Village Historic District Roughly bounded by Turnpike Rd., Porter Hill Rd., Main St., NH 123A, Preston Hill, Manley and King Rds. Listed; 09-03-1991, New Ipswich Town Hall Main St. Listed; 12-13-1984.

Hydrological/Geological

The river runs through a gorge in Greenville with steep sides. The Horseshoe in Wilton is another geologically significant area that serves as the local swimming hole.

Agricultural

Abutting the river are parcels of land in Milford used as agricultural fields.

References

Cairns, S. 2004. Personal Communication. New Hampshire Natural Heritage Inventory (NHI). Concord, NH.

Harte, P.T. and T.J. Mack. 1992. Geohydrology of and simulation of ground-water flow in the Milford-Souhegan glacial-drift aquifer, Milford, New Hampshire. Report Number 91-4177. NHDES, Concord, NH.

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Souhegan River Nomination (SRN). 1999. Souhegan River Watershed Association and the Nashua Regional Planning Commission. Milford, NH.

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