

**MAPPING & BIOINVENTORY OF
LAMPREY RIVER FLOODPLAIN WETLANDS
IN THE TOWNS OF
EPPING, LEE, DURHAM & NEWMARKET**

Prepared for:



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June 2013

1. INTRODUCTION

The floodplain of the Lamprey River in Epping, Lee, Durham, and Newmarket supports a wide variety of wetland plant communities that protect and enhance water quality of the river filtering surface water and trapping and attenuating pollutants and sediments. Silver maple floodplain forests, oxbow marshes, buttonbush swamps and vernal pools, can be found in floodplains and these wetlands provide critical habitat for several rare and endangered plant and wildlife species. Habitat for wood turtle, New Hampshire endangered Blanding's turtle, and spotted turtle is present in these wetlands. Habitat also exists for rare bird species including sedge wren, least bittern, pied-billed grebe, and sora. This project maps and inventories these habitats to help provide these towns important information for planning and protection. The information collected from this project can be used in future grant requests and to prioritize habitat and water quality protection.

Lamprey River Watershed Information from Wild and Scenic Designation Application

watershed area – 137,000 +/- acres (fresh water portion)
river length – 47.3 miles
drainage basin – 214 square miles
forested land – approximately 68%

This current study included mapping the wetlands within the pre-2012 FEMA (Federal Emergency Management Agency) mapped floodplain of the Lamprey River in the four towns (approximately 2,200 acres). Field data collection to verify plant communities and wildlife habitats was conducted in the lower river towns of Lee, Durham, and Newmarket in the summer and fall of 2011. Wetland mapping with minimal field verification was performed in the Epping portion of the river thread in the fall of 2011.

Study Area Information

total study area – 2,200 acres
overall reach of Lamprey River within study area – approximately 28 miles, almost half of the rivers reach
town reaches include:
Epping – 14.8 miles
Lee – 8.4 miles
Durham – 4.0 miles
Newmarket – 0.8

Portions of the FEMA mapped floodplain do not contribute to the Lamprey River and in some cases are not part of its watershed. The large backwater in Durham along Route 108 includes floodplain that drains north into the Oyster River. During extreme high water the Lamprey likely overflows into the Oyster River watershed.

There are three dams along the river within the field study portion: Macallen Dam in Newmarket, Wiswall Dam in Durham, and Wadleigh Falls Dam (breached) in Lee. These dams create flat water and lake-like habitat behind them.

The majority of the river corridor is forested with small areas of scrub-shrub and shallow marsh habitat dispersed throughout. These habitats provide critical basking areas for turtles and feeding areas for wading birds. The river corridor also provides important water fowl habitat for spring and fall migration.

The large river backwater complex in Durham along Route 108 provides high quality wildlife habitat for all of the above referenced species and is one of the most important wetland complexes within the study area.

2. FLOODPLAIN WETLAND MAPPING METHODOLOGY

Wetlands within the floodplain study area were mapped through aerial photo interpretation of spring 2010 color aerial ortho-photos. The preliminary wetland boundaries were mapped onto the photos in the office. Most wetlands have a hydrologic indicator of water which shows up dark or black on the aerial photos. Drier wetlands were mapped based on plant community signatures. Field inspections were conducted in the summer and fall of 2011 where access was granted by private landowners or on public lands and the river's main channel. Some of the wetlands mapped in this study were not accessible and, therefore, their mapping might be less accurate. Edits to wetland boundaries and water flow were performed as a result of field work. Wetland boundaries were then digitalized onto the color ortho-photos by West Environmental, Inc. with corresponding alpha numeric wetland identification. Some wetlands were separated into subcomponents based on hydrology and/or plant community.

A total of 1,045.5 acres of wetlands was mapped within the four towns. The breakdown by town is as follows:

Newmarket – 226.31 acres in four wetland complexes. The Tuttle Swamp wetland complex encompasses 215.2 acres which require further evaluation in order to determine what portion of the wetland flows into the Lamprey River.

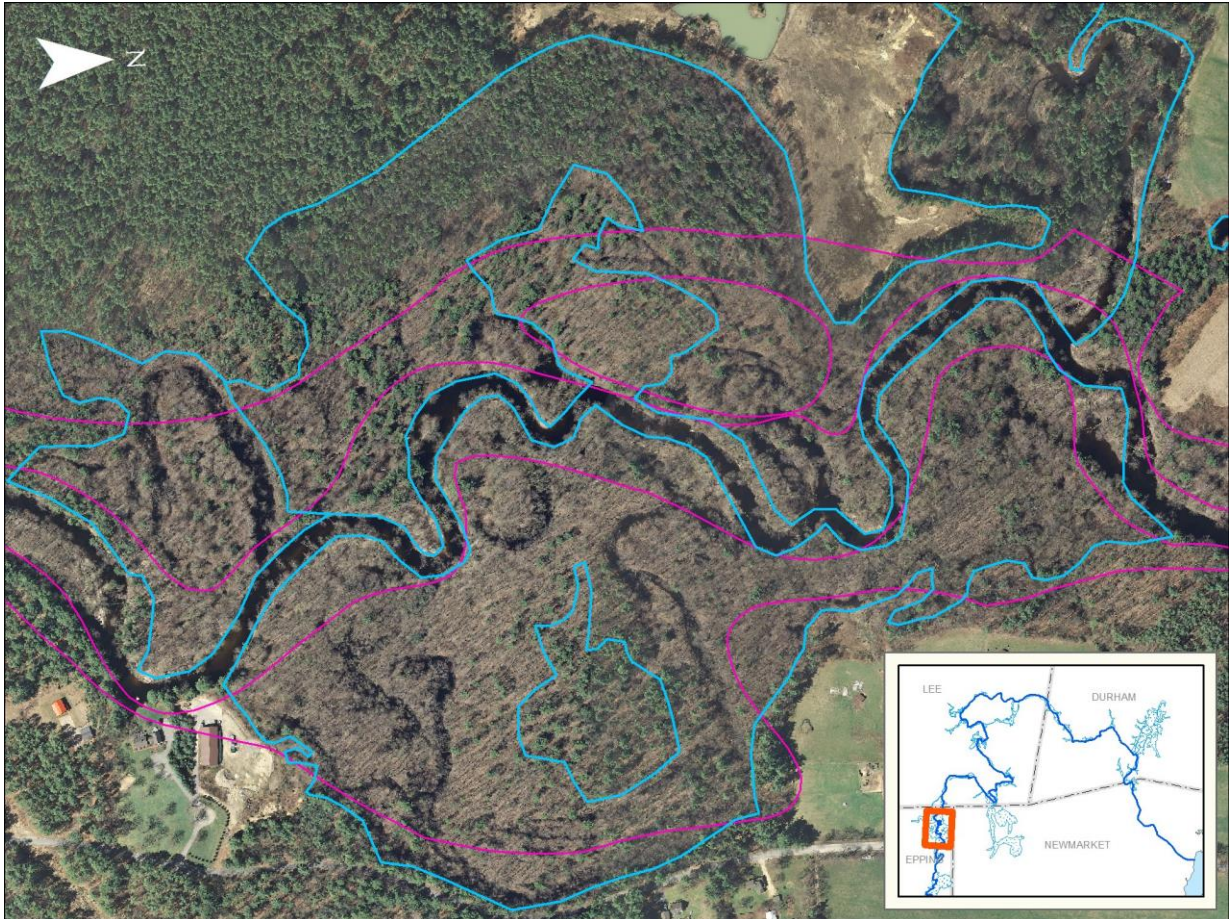
Durham – 205 acres in 28 wetland components. Oyster River overflow is 27.49 acres.

Lee – 160.5 acres in 43 wetland components.

Epping – 426.2 acres in 59 wetland components.

The total wetland areas mapped of the 1,045 acres are 49% of the 100 year floodplain.

Example Map



pink line = FEMA floodplain boundary
blue line = mapped wetland area boundary

This map shows an excellent example of a river oxbow wetland complex in Epping with old river channels now separated from the main stem of the Lamprey River. This also shows that the actual floodplain wetlands sometime extend outside the FEMA floodplain and/or the FEMA floodplain include upland areas that are not wetlands.

3. FIELD RESEARCH AND DOCUMENTATION

This work was completed for the river reach from the Lee/Epping town line to the Macallen Dam in Newmarket. Field inspections were conducted in June, July, August, September, and October 2011 on public land and roads and on land where owner access was granted. The majority of the river reach within the bioinventory area was also accessed by kayak. Wetlands where access was not feasible have limited data. A Wetland Data Form was completed for each wetland and includes the following data:

Plant Community Data were collected to classify wetlands and understand their habitat components. Wetlands were classified using the **Classification of Wetlands and Deepwater Habitats of the United States, U.S. Fish & Wildlife Service (1979)**. Wetland systems have a dynamic water regime and floodplain wetlands exhibit varying hydroperiods due to precipitation variation. The presence of beavers throughout the study area can also cause changes to wetland hydrology and plant communities over time. Despite this activity, the wetlands appear to remain relatively stable in their plant community types. Plant communities were also evaluated to determine if they were rare natural communities based on the **Natural Communities of New Hampshire**. Section 5 of this report details this evaluation process.

Wetland Hydrology Data were collected to provide a better understanding of the flood storage capacity of each wetland and its hydroperiod. Hydroperiod is the depth and duration of flooding in a wetland. Although many of the floodplain wetlands experience flooding during spring runoff and major rain events, a significant portion of the headwater areas are permanently or semi-permanently flooded by beaver dams. These wetland complexes provide critical flood storage which in turn provide downstream protection to residents and roadways. The dams along the study area have a significant impact on the hydrology of the bordering wetland complex.











Wildlife Habitat Data were also collected including information on habitat structure, diversity, and potential rare and endangered species habitat. This information includes the specific features present that provide special habitat requirements for each rare species. It was also determined whether a wetland was mapped as highest ranked habitat by the NH Fish and Game Wildlife Action Plan. Section 4 of this report details this evaluation.

Other wetland features documented during field inspections included recreational use in the form of fishing, watercraft access, parking, walking/biking trails and other uses. Additional data collected included invasive plant species, water quality degradation, and restoration/stabilization potential. This last feature identifies areas where restoration opportunities might occur if landowner interest exists. Examples include wetland trail crossings that could benefit from a wooden bridge to reduce on-going erosion caused by trail use, existing fill in wetlands, and exposed soils areas where erosion is occurring.

Data forms for each wetland were completed. The goal of the collection of data was to provide a better understanding of the plant community, hydrology, and wildlife habitat found in each wetland.

Map Legend

Below is the legend used for the maps to indicate information about wetlands and other information contained within the bioinventory data. Invasive Species symbols indicate the presence of an invasive plant in a particular wetland and do not show a precise location. Actual species lists are found on the data forms. Restoration Site symbols indicate potential wetland restoration opportunities. Rare Plant Community symbols document the presence of rare plant species which are identified on the data forms. Potential Rare Wildlife Species Habitat symbols indicate that habitat exists for rare wildlife species within that particular wetland and more information is included in the data form. Vernal Pool symbols indicate the presence of vernal pool habitat within that particular wetland.

-  Floodplain Wetland
-  Invasive Species
-  Parking
-  Restoration Site
-  Rare Plant Community
-  Potential Rare Wildlife Species Habitat
-  Vernal Pool
-  Flow direction
-  FEMA Floodplain
-  Town Boundary

4. WILDLIFE HABITAT ASSESSMENT

A map of the study area in relation to the NH Wildlife Action Plan's Highest Ranked Wildlife Habitat is included in this section of the report. Significant portions of the Lamprey River floodplain wetlands are either highest ranked habitat in the state or in the biological region. One of the goals of this study was to further evaluate the presence of potential habitat for rare and endangered species in the floodplain wetlands. In addition, the quality and importance of the habitats were also documented.

Based on information provided by the NH Natural Heritage Bureau and habitat types found in the study area wetlands, a list of rare wildlife species was generated. These species are listed below along with their special habitat requirements. The timing of the field inspections limited the potential for actual observation of most of these species; however, the wetland data forms provide information regarding potential rare species habitat and whether it is present within a particular wetland. A detailed evaluation of fish habitat and invertebrate habitat was not included as part of this project.

NH Natural Heritage reported the following information:

reptiles

- Blanding's turtle – endangered
- spotted turtle – threatened
- wood turtle – special concern

amphibians

- blue-spotted salamander– special concern

birds

- sedge wren – endangered
- pied billed grebe - threatened
- least bittern - special concern
- sora - special concern

special habitat requirements

Blanding's turtle habitat requirements:

- slow moving rivers with beaver ponds
- aquatic vegetation
- soft muddy bottoms
- loafing logs

spotted turtle habitat requirements:

- unpolluted shallow water
- marshes
- vernal pools
- forested wetlands

wood turtle habitat requirements:

- slow moving meandering streams
- sandy bottoms
- overhanging wooded banks

blue-spotted salamander

- wooded swamps
- marshes with semi-permanent open water for breeding
- relatively open forested wetlands
- wet meadows

sedge wren

- wet meadows
- shallow marsh edges with little or no standing water

pied-billed grebe

- marshes and ponds greater than 12.5 acres
- open water inlets and marshy edges of rivers

least bittern

- shallow marshes with tall dense vegetation
- buttonbush swamps
- marshes with scattered shrubs

sora

- large marshes with abundant emergent vegetation
- marshes with cattails, burreeds, bulrushes and sedges

Photo examples of these species and their habitats are included in this section. Other species that might be present within these habitats are sedge wren (state endangered), pied-billed grebe (state endangered), and least bittern (state species of concern). Additional field work during the active breeding season for these species is recommended.



Blanding's turtle on river loafing log.



Wetland E-4 Blanding's turtle habitat- oxbow floodplain vernal pool with loafing logs.



Spotted turtle on the move.



Wetland D-4 is an example of spotted turtle habitat



Wood turtle preparing to lay eggs.



Wetland L-8 includes a stretch of river with woody debris and overhanging banks which provide good wood turtle habitat.



Blue-spotted salamander.



Wetland L-9b, a vernal floodplain pool, provides potential breeding habitat for blue-spotted salamander.



Sedge wren.

From Wikipedia



Wetland D-6, potential sedge wren habitat.



Pied-billed grebe.

From Wikipedia Commons



Wetland D-7, potential pied-billed grebe habitat.



Least bittern. from Wikipedia



Wetland L2b provides potential least bittern habitat.



Sora.

Photo provided by Wikipedia.



Wetland D-5 provides potential sora habitat.

5. RARE PLANT COMMUNITIES

A list of rare wetland plant communities found in the study area includes the state ranking S1-S5. S5 are the most common plant communities and S1 are the rarest. Several S2 and S3 community types were identified within the study area wetlands. Identified natural communities include:

floodplain forests

- red maple floodplain forest (S2/S3)
- silver maple – false nettle – sensitive fern forest (S2)
- swamp white oak floodplain forest (S1)
- vernal floodplain pool (S2)

scrub-shrub floodplain swamps

- oxbow buttonbush swamp (S3)
- alder – dogwood – arrowwood alluvial thicket (S4)
- buttonbush swamp (S3)

herbaceous floodplain communities

- emergent marsh (S5)
- aquatic bed (S4/S5)
- herbaceous sandy river channel (S2/S4)
- wet meadow – low floodplain – high floodplain

Photo examples of these habitat types follow.



Wetland D7 – **buttonbush swamp** taken from Route 108. This is a potential pied-billed grebe habitat.



Wetland L2a –**emergent marsh**



Wetland L4d – **aquatic bed community**



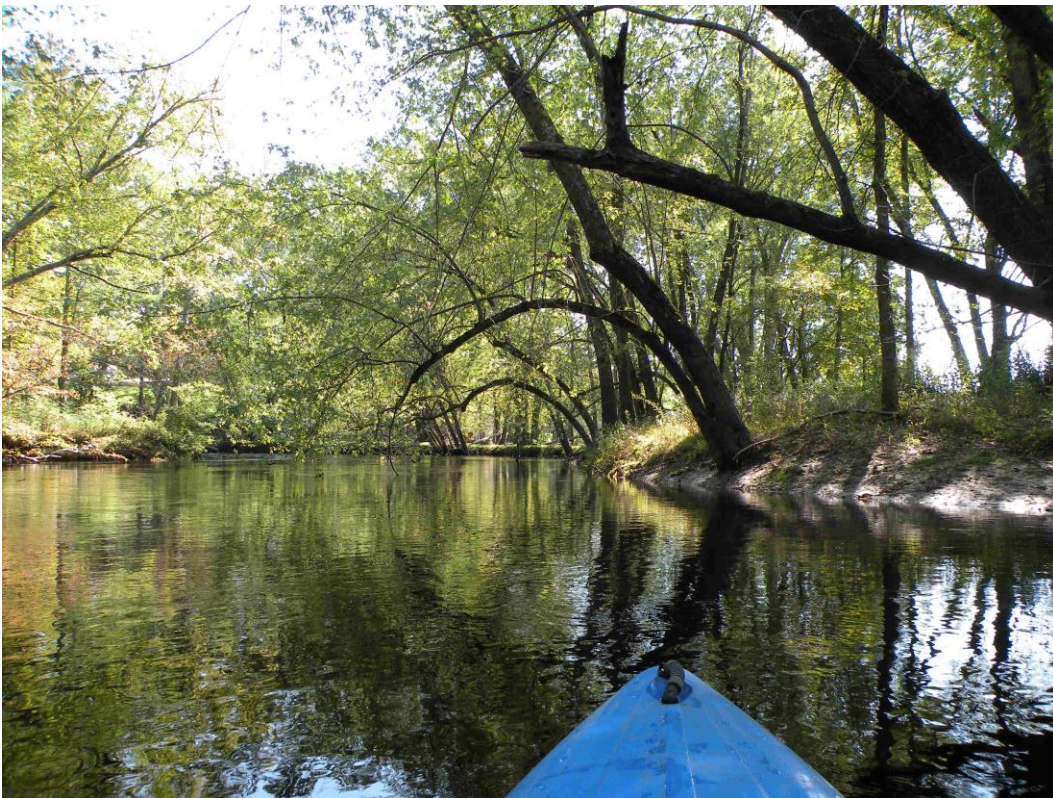
Wetland L9b – vernal floodplain pool community



Wetland L7 – red maple floodplain swamp



Wetland D5b – swamp white oak floodplain forest



Wetland L12b – silver maple – false nettle – sensitive fern floodplain forest



Wetland L9e – **high floodplain wet meadow**



Wetland L5 – **alder dogwood arrowwood alluvial thicket**



Wetland D6 –low floodplain wet meadow



Wetland L11 –herbaceous sandy river channel

6. MAPPING RESULTS

Each wetland is identified by a letter and number. Tables for each town are shown below and include total acreage of wetland. It should be noted that several wetland complexes do not flow into the Lamprey River and do not appear to be within its floodplain.











Durham		Lee		Newmarket			
wetland	acres	wetland	acres	wetland	acres		
D1a	5.78	L1	8.57	L17a	0.77	N1	1.78
D1b	7.76	L2a	3.29	L17b	2.61	N2	5.36
D2a	1.41	L2b	21.87	L17c	0.19	N3	3.97
D2b	1.33	L2c	3.43	L18	2.14	N4	215.2
D2c	1.54	L2d	1.63	L19a	0.84		
D3a	2.27	L3a	1.52	L19b	0.97	total	226.31
D3b	1.82	L3b	0.95	L19c	0.24		
D3c	1.29	L3c	2.03	L20	3.24		
D4a	16.69	L3d	0.27				
D4b	5.11	L4a	1.24	total	160.47		
D4c	23.83	L4b	2.58				
D5a	26.56	L4c	0.56				
D5b	4.19	L4d	0.33				
D5c	4.45	L4e	2.45				
D6	6.53	L4f	2.88				
D7a	44.02	L5	8.08				
D8	10.09	L6	3.1				
D9a	2.11	L7a	0.66				
D9b	1.97	L7b	1.59				
D9c	2.57	L8	3.7				
D10	5.08	L9a	1.91				
D11	3.98	L9b	1.97				
D12a	1.89	L9c	12.46				
D12b	5.33	L9d	9.79				
D13a	8.97	L9e	2.55				
D13b	1.24	L10a	1.74				
D13c	6.92	L10b	2.4				
D13d	0.25	L11	4.48				
		L12a	13.63				
total	204.98	L12b	11.34				
		L13a	4.95				
		L13b	8.46				
		L14	7.97				
		L15	2.26				
		L16	3.83				

Epping				Oyster River watershed	
wetland	acres	wetland	acres	wetland	acres
E1	0.93	E36	1.71	OR1	23.22
E2	53.72	E37	1.92	OR2	3.58
E3	64.09	E38	4.18	OR3	<u>0.69</u>
E4	11.7	E39	1.07		
E5	2.07	E40	3.35	total	27.49
E6	1.38	E41	1.26		
E7	2.09	E42	2.1		
E8	82.86	E43	3.79		
E9	6.96	E44	0.67		
E10	5.8	E45	19.11		
E11	1.07	E46	2.1		
E12	9.9	E47	11.73		
E13	3.67	E48	2.36		
E14	34.41	E49	0.81		
E15	18.53	E50	5.5		
E16	1.75	E51	1.9		
E17	0.59	E52	2.78		
E18	0.5	E53	1.25		
E19	12.68	E54	0.32		
E20	3.61	E55	0.61		
E21	11.52	E56	0.56		
E22	25.61	E57	1.26		
E23	6.68	E58	0.69		
E24	15.41	E59	<u>0.77</u>		
E25	0.72				
E26	0.74	total	426.24		
E27	0.84				
E28	4.35				
E29	1.76				
E30	0.66				
E31	1.87				
E32	0.66				
E33	8.25				
E34	27.73				
E35	1.13				

overall total acres: 1,045.49

Data forms and additional photographs are available upon request. Wetland maps that include wetland boundaries based on aerial photo interpretations, wetland ID, and other mapped features below are available upon request from West Environmental, Inc. (mark@westenv.net) or the Lamprey Rivers Advisory Committee (info@lampreyriver.org).

Map Legend

-  Floodplain Wetland
-  Invasive Species
-  Parking
-  Restoration Site
-  Rare Plant Community
-  Potential Rare Wildlife Species Habitat
-  Vernal Pool
-  Flow direction
-  FEMA Floodplain
-  Town Boundary

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