Appendix 3

Non-Flow Dependent Entities

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In the Final Report of the Instream Public Uses, Outstanding Characteristics, and Resources of the Lamprey River and Proposed Protective Flow Measures for Flow Dependent Resources (Normandeau and others 2006) two non-flow dependent entities were to be further evaluated as part of the Task 5 effort to confirm their non-flow dependent status. These two entities included Pollution Abatement and Water Quality Protection/Public Health. Based upon a review of existing information neither of these entities were found to be flow dependent. These findings are discussed in the following sections.

Pollution Abatement

There are no permitted wastewater discharges on the designated segment of the Lamprey River. As a result, pollution abatement in the designated segment is not flow dependent. However, the Epping Wastewater Treatment Facility is located approximately six river miles upstream of the beginning of the designated segment (WWTF, NPDES Permit #NH0100692). The status and current conditions of this facility were recently reviewed as part of the New Hampshire Seacoast Region Wastewater Management Study (Metcalf & Eddy and others 2005). The Epping WWTF provides treatment of wastewater collected from the sewered portion of the Town of Epping, serving a population of 1,000 persons. The average day design flow for the facility is 0.50 million (or 500 thousand) gallons per day. Reported average daily discharges (or use) from the facility to the Lamprey River for the period from 2000 through 2005 ranged from 150 to 339 thousand gallons per day (0.23 to 0.52 cfs, or 0.0001 to 0.0028 cfsm, relative to the Packers Falls gage).

As part of the NPDES permit conditions, specific discharge limits for several water quality parameters were either modified or added. The final permit included limits for:

- pH
- Dissolved oxygen
- Five day carbonaceous biochemical oxygen demand ($CBOD_5$)
- Total suspended solids (TSS)
- TSS percent removal
- Ammonia nitrogen
- Total phosphorus
- *Escherichia coli*
- Total residual chlorine
- Aluminum
- Whole effluent toxicity (WET)

The limits included in the NPDES permit were based on the findings of a Total Maximum Daily Load (TMDL) study for the Lamprey River (NHDES 1995) and upgrades at the Epping WWTF. The objectives of the study and the upgrade was to reduce pollutant loading to the Lamprey River and to reduce water quality violations associated with the past discharge of wastewater to the river.

Relative to the designated segment of the Lamprey River, the Fact Sheet issued with the draft NPDES permit that "it's the intent of this draft permit to insure that this discharge does not cause the State's assigned Class B designation to be violated" (USEPA undated). According to Env-Ws 1705.02 of the State's surface water quality regulations (NHDES, 1999), the river flow used to calculate permit limits for aquatic life criteria and human health criteria for non-carcinogens for NPDES permits is "7Q10". The 7Q10 is the average seven day low flow that occurs, on average, once every ten years. Use of 7Q10 for establishing waste discharge permit limits means that when river flow is at or above 7Q10, the permitted discharges would not, by themselves, cause water quality in the river to be less than applicable water quality criteria. Consequently, the protected instream flow (PISF) necessary for pollution abatement in the Lamprey would be the 7Q10 at the point of discharge. This value was estimated by Metcalf & Eddy (2005) to be 3.0 cfs (or 0.016 cfsm relative to the Packers Falls gage). But since the point of discharge is not in the designated segment of the Lamprey, it is not considered a flow dependent entity. This is because instream flow at the wastewater discharge point (the Epping WWTF) is dependent upon runoff and baseflow contributed by the portion of the watershed at least six miles above the designated segment.

The 7Q10 flow at the Epping WWTF is not expected to be influenced by the alternatives to be evaluated as a part of the Water Management Plan (WMP). Should the WMP recommend specific actions that would significantly affect or alter this flow to support the existing NPDES permit conditions, then additional studies would need to be performed to more quantitatively evaluate their impacts.

Water Quality Protection/Public Health

The IPUOCR Report (Normandeau and others 2006) originally included water quality protected/public health as a non-flow dependent entity. Existing water quality data were obtained from online sources and the status of this entity as non-flow dependent was reviewed.

Under the State of New Hampshire Water Pollution and Waste Disposal Classification of Waters (RSA Chapter 485-A), the designated segment of the Lamprey River is Class B. Class B waters are to be acceptable for fishing, swimming and other recreational purposes and after adequate treatment, for use as a water supply. Under this classification several class-specific numerical water quality criteria (Chapter Env-Ws 1700 or RSA Chapter 485) must be met including:

- Bacteria – *Escherichia coli* (*E.coli*), cannot contain more than a geometric mean based on at least three samples obtained over a 60-day period or 126 *E. coli* per 100 milliliters, or greater than 406 *E. coli* per 100 milliliters in any one sample.

- Dissolved oxygen (D.O) – at least 75% of saturation, based on a daily average, and an instantaneous minimum dissolved oxygen concentration of at least 5 mg/l.

- Turbidity – shall not exceed naturally occurring conditions by more than 10 NTUs.

- pH – shall be 6.5 to 8.0, unless due to natural causes.

Monitoring of the water quality of the designated segment of the Lamprey River has been performed by both federal and state agencies. The USGS has collected water quality data at its gaging station (01073500) located immediately upstream of Packers Falls. Water quality data were collected at this location from 1953 to 1999. Other than two rounds of samples that were collected in 1953 and 1954, most of the water quality data are limited to water temperature and specific conductance. With the cessation of monitoring in 1999, the data collected by the USGS provides historical, if somewhat limited, documentation of water quality conditions in the designated segment.

The Environmental Monitoring Database (EMD) at the NHDES was queried for available water quality data collected under state programs for the designated segment of the Lamprey. The results of this search provided data collected under three different monitoring events or programs including the Ambient Rivers Monitoring Program (ARMP), the Volunteer River Assessment Program (VRAP) and a short term Baseline Fish Sampling study performed in 2003 (NHDES 2005). The data gathered range from comprehensive testing (ARMP and VRAP) to limited measurements (BFS study).

The results of the NHDES water quality monitoring programs (ARMP and VRAP) are reviewed every two years as part of a statewide assessment of water quality conditions. The existing water quality conditions are evaluated to determine if they support the designated uses for the water body. If the water quality conditions do not support attainment of the designated use or threatens its designated use, the water body is considered to be impaired or threatened. This assessment is part of NHDES's biennial 305(d)/303(d) reporting to the USEPA. The NHDES recently issued a draft of its 2008 305(b) Report and 303(d) List (www.des.state.nh.us/WMB/swqa/03dListDRAFT.html) (Edwardson 2008). Portions of the designated segment are included in the draft 303(d) List and include:

Assessment Unit ID	**Primary Town**	**Water Size**	**Use**	**Impairment**
NHIMP600030709-02	Durham	30 acres	Aquatic Life	pH
NHIMP600030709-03	Durham	120.0 acres	Aquatic Life	pH
NHRIV600030709-07	Lee	5.79 miles	Aquatic Life Recreation	pH *E. coli*
NHRIV600030709-08	Lee	2.23 miles	Aquatic Life	pH
NHRIV600030709-09	Durham	1.18 miles	Aquatic Life	pH

The first two listings include the impoundments (IMP) upstream of Wiswall Dam (709-2) and the Macallen Dam (709-03). The river sections (RIV) include the reaches through Wadleigh Falls (709-07), Lee Hook Road (709-08) and Packers Falls (709-09).

The source for the impairment of the designated segment by pH is listed as being unknown. The exceedence of the water quality standard by pH (<6.5) has been noted in each of the VRAP reports (various authors, 1998 to 2006). The lower pH values are believed to be the "result of natural conditions such as the soils, geology, or the presence of wetlands in the area. Rain and snow falling in New Hampshire is relatively acidic, which can also affect pH levels; after the spring melt or significant rain events, surface waters will generally have a lower pH"(Walsh and others 2007). This condition occurs throughout the year and is not considered to be flow dependent.

The other listed impairment is for *E. coli*. This impairment is listed for the section of the designated segment in the area upstream of Wadleigh Falls. The source of this pathogen is listed as unknown (Edwardson 2008). The presence of *E. coli* in this reach of the Lamprey is source dependent as opposed to flow dependent, meaning that this pathogen is present in the river most likely due to nonpoint runoff as opposed to instream flow conditions. As a result, the impairment of a portion of the designated reach by *E. coli* is not considered to be flow dependent.

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