6.0 SEDIMENT DATA COLLECTION SUMMARY

Assabet River sediments were assessed through sediment thickness and sediment nutrient flux surveys. Sediment surveys were focused on the 5 major Assabet River impoundments; Allen Street Impoundment (RM 25.7), Rt 85/Hudson Impoundment (RM 18.5), Gleasondale Impoundment (RM 14), Ben Smith Impoundment (RM 9), and Powdermill Impoundment (RM 6.5). Figure 3-1 illustrates the Assabet River watershed with major impoundments labeled in green lettering. Results of sediment thickness surveys and sediment nutrient flux surveys are summarized below.

6.1 Impoundment Bathymetry and Sediment Thickness Survey

An impoundment bathymetry and sediment thickness survey was performed in May and June 2000 by the Organization for the Assabet River (OAR). OAR personnel conducted the survey in collaboration with ENSR and followed procedures described in the Quality Assurance Program Plan (ENSR, 1999). OAR personnel also processed the sediment thickness survey data and generated depth contour maps of areas surveyed. The survey included measurement of water depths and soft sediment thicknesses throughout the 5 major impoundments listed above. The Ben Smith Impoundment was surveyed in two sections, one near the Ben Smith Dam (RM 9) and one further upstream in the Crow Island reach (RM 10.5).

6.1.1 Impoundment Bathymetric Surveys

Figures 6-1 through 6-6 present the bathymetry of the 5 major river impoundments, with 2 figures representing the Ben Smith Impoundment. Water depths in the river impoundments typically ranged from 2 to 12 feet. In general, river impoundments were deeper along a central main channel and near the dam location (6 to 12 feet deep) and shallower along the sides and in upstream reaches (0 to 6 feet deep). These findings are consistent with depositional patterns expected based on the hydrology of the river system. The bathymetry of each impoundment is summarized below.

In the Allen Street Impoundment (Figure 6-1), water depths are relatively shallow, with typically depths ranging from 2 to 6 feet with large areas of emergent vegetation. In the Rt 85/Hudson Impoundment (Figure 6-2), water depths are deeper, with typical depths ranging from 6 to 10 feet, with shallower areas in backwater and upstream areas. In the Gleasondale Impoundment (Figure 6-3), water depths are relatively deep in the downstream reach (typical depths ranging from 6 to 10 feet) and relatively shallow in the upstream reach (typical depths ranging from 4 to 8 feet). In the Ben Smith Impoundment (Figures 6-4 and 6-5), water depths are relatively deep in a main channel (typical depths ranging from 8 to 12 feet) and relatively shallow along the sides and in the upstream reach near Crow Island (typical depths ranging from 2 to 5 feet). In the Powdermill Impoundment (Figure 6-6), water depths were deeper in a main channel (typical depths ranging from 6 to 10 feet) and shallower along the sides and in upstream reaches (typical depths ranging from 2 to 6 feet).

6.1.2 Impoundment Sediment Thickness Surveys

Figures 6-7 through 6-12 present the sediment layer thicknesses of the 5 major river impoundments, with 2 figures representing the Ben Smith Impoundment. Sediment thicknesses in the river impoundments typically ranged from 1 to 6 feet. Sediment thicknesses measured in each impoundment are described below.

In the Allen Street Impoundment (Figure 6-7), sediment thicknesses typically ranged from 2 to 8 feet with the greatest sediment thicknesses measured in the main channel and near the impoundment dam. In the Rt 85/Hudson Impoundment (Figure 6-8), sediments were generally less thick than those of the Allen Street Impoundment. In the Rt 85/Hudson Impoundment, sediments were generally thicker in backwater and upstream reaches (typical values ranged from 4 to 6 feet) and thinner in downstream reaches (typical values ranged from 1 to 4 feet). In the Gleasondale Impoundment (Figure 6-9), sediments were typically 1 to 4 feet deep with thicker sediment layers (4 to 6 feet) in some backwater and upstream areas. In the Ben Smith Impoundment (Figures 6-10 and 6-11), sediment thicknesses typically ranged from 1 to 4 feet and were relatively uniform in the Ben Smith Dam reach (Figure 6-11). Conversely, in the Crow Island Reach (Figure 6-10) sediment thicknesses typically ranged from 4 to 8 feet. In the Powdermill Impoundment (Figure 6-12) sediment thicknesses typically ranged from 2 to 6 feet, with greatest thicknesses measured near the dam.

River impoundment sediments were found to be thickest in the following backwater and near-dam locations:

- Allen Street Impoundment near the dam (up to 8 feet thick),
- Gleasondale Impoundment in backwater areas (up to 6 feet thick),
- Crow Island Impoundment in backwater areas (up to 8 feet thick), and
- Powdermill Impoundment near the dam (up to 6 feet thick).

Sediment thicknesses were generally greater in backwater areas than in main channels. Sediment thicknesses were varied at near-dam locations, with relatively thick sediments at Allen Street and Powdermill Dams, but relatively thinner sediment layers at Rt 85/Hudson, Gleasondale, Ben Smith Dams.

6.2 Sediment Nutrient Flux Surveys

Two sediment nutrient flux surveys were performed in Assabet River impoundments. The surveys featured collection of sediment cores and river water samples followed by on-going laboratory analyses for a period of several weeks. Sediment organic matter turnover and nutrient flux were measured in a field laboratory using sediment cores incubated at in-situ temperatures with overlying filtered water from the sampling site. The sediment cores were also analyzed under anaerobic

conditions by removing oxygen from the overlying water column in the laboratory and measuring associated nutrient flux. Sediment nutrient flux surveys were performed on samples collected in March 2000 and in September 2000 representing winter-time and summer-time conditions. Sediment nutrient flux survey results are summarized below.

6.2.1 March 2000 Sediment Nutrient Flux Survey

On March 28 and 29, 2000, eight (8) sediment cores were collected from the Ben Smith Impoundment for laboratory analysis. Figure 6-13 contains a bathymetric map of the Ben Smith Impoundment with the 8 sediment core sampling locations indicated. In selecting sampling locations, an attempt was made to collect samples representative of the different sedimentary environments of the impoundment (e.g., in backwater and in main channel locations). During the March survey, sediment cores were incubated at ambient temperature (10°C), at 18°C, and at 25°C in the field laboratory along the shore of the impoundment. This temperature sequence was conducted in an attempt to estimate summer-time rates of sediment processes.

A summary of sediment nutrient flux data is provided in Table 6-1. The mean value of 8 sediment cores is presented for each parameter. Note that flux is expressed in units of milligrams per sediment surface area (m^2) per day and that flux in the direction from sediments into the water column is represented as positive (+). At ambient temperature (10°C), a flux of dissolved nutrients and dissolved oxygen from the water column into impoundment sediments was measured during the March 2000 survey. Specifically, dissolved oxygen (-995 mg/m^2/day), ortho-phosphorus (-2.1 mg/m^2/day), nitrate (-5.0 mg/m^2/day), total dissolved nitrogen (-7.0 mg/m^2/day), and total dissolved phosphorus (-1.7 mg/m^2/day TDP) flux measurements were obtained. A flux in the opposite direction, from sediments into the water column, of ammonia (14.6 mg/m^2/day) and dissolved inorganic nitrogen (9.7 mg/m^2/day) was also measured at ambient temperature.

To enable estimation of the overall nutrient budget and comparison of sediment flux measurements to water quality sampling results, sediment flux measurements were converted from units of area (m^2) to units of volume (liters). Sediment flux values were converted to water column concentration fluxes (in units of volume, “mg/L/day”) by assuming an average water depth in the impoundment of 2 meters, based on the bathymetry measurements described above, and by assuming complete vertical mixing in the water column.

Estimated in volumetric units, flux of dissolved oxygen from the water column to sediments was 0.5 mg/l/day at ambient temperature. Flux of dissolved nutrients from the water column to sediments ranged from 0.001 to 0.004 mg/l/day, expressed in volumetric units, at ambient temperature. In the reverse direction, a flux of ammonia and dissolved inorganic nitrogen was estimated to be 0.007 mg/l/day and 0.005 mg/l/day, respectively. The flux rate of dissolved nutrients into sediments was relatively small compared to typical ambient river water nutrient concentrations. For example, an ortho-phosphorus concentration measurement of 0.13 mg/l was collected above the Ben Smith

Impoundment in a March 2000 survey (Survey #5: Table 5-13). The magnitude of the ortho-phosphorus sediment flux rate is approximately 1% per day relative to the ambient water column concentration (0.13 mg/l vs. 0.001 mg/l/day).

As laboratory water temperatures were increased to 18°C and to 25°C to simulate summer-time conditions, sediment fluxes for all constituents increased dramatically toward release of nutrients to the water column and toward removal of oxygen from the water column (see Table 6-1). At 25°C, dissolved oxygen flux from the water column into sediments was 2,000 mg/m^2/day (1.0 mg/l/day), twice the flux associated with the ambient temperature conditions. Dissolved nutrient fluxes reversed direction and released nutrients to the water column. For example, ortho-phosphorus was released at a rate of 8.3 mg/m^2/day (0.004 mg/l/day), nitrate was released at a rate of 39.9 mg/m^2/day (0.02 mg/l/day), and ammonia was released at a rate of 32.8 mg/m^2/day (0.016 mg/l/day).

Table 6-2 contains a summary of sediment ortho-phosphorus flux measurements. Table 6-2 was generated to support further evaluation of the relative role of sediment nutrient flux in the Assabet River nutrient budget. Column 1 in Table 6-2 contains survey information, the next 3 columns contain reference information including impoundment mean travel time (based on time of travel studies) and water column concentration measurements throughout the river and in the impoundments at the time of the sediment survey. Column 5, daily volumetric flux, provides ortho-phosphorus flux measurements, estimated as described above. Column 6, sediment ortho-phosphorus as water concentration, represents ortho-phosphorus concentrations for the period that river waters are exposed to impoundment sediments (based on the product of flux and mean travel time). Lastly, column 7 contains percentage of ambient ortho-phosphorus concentration represented by sediment-derived ortho-phosphorus.

For the March 2000 survey, a small flux of ortho-phosphorus into sediments representing 0.6% of the impoundment water column concentration was measured. At laboratory- developed summer-time temperatures, a small flux of ortho-phosphorus out of sediments and into the water column representing 2.6% of the impoundment water column concentration was measured. These findings are consistent with the expected seasonal pattern of nutrient flux into sediments during winter-time and nutrient flux from sediments into the water column during summer-time conditions. The magnitude of the flux measured, however, was relatively small indicating that sediment nutrient flux may be a minor component of the overall nutrient budget in the Assabet River system.

6.2.2 September 2000 Sediment Nutrient Flux Survey

On September 11 and 12, 2000, 8 sediment cores were collected from the Ben Smith Impoundments and 8 sediment cores were collected from the Powdermill Impoundment for laboratory analysis, as described for the March 2000 survey. Figures 6-13 and 6-14 contain maps of the Ben Smith Impoundment and Powdermill Impoundment with sediment core sampling locations indicated. Note that sampling locations within the Ben Smith Impoundment were approximately the same for both the

March 2000 and September 2000 surveys. Also, as part of the September 2000 survey grab samples were collected for analysis of nutrient and other parameters in all 5 major river impoundments. Results of September 2000 sediment nutrient survey in Ben Smith Impoundment and Powdermill Impoundment and sediment quality sampling in all 5 impoundments are provided below.

6.2.2.1 Ben Smith Impoundment Summary

A summary of sediment nutrient flux data is provided in Table 6-1. In the Ben Smith Impoundment, the dissolved oxygen flux was 1,960 mg/m^2/day (1.0 mg/l/day) and was very similar to the 25°C laboratory simulation result from the March 2000 survey. Positive fluxes of ortho-phosphorus and ammonia and a negative flux of nitrate were measured. Thus, dissolved oxygen and nitrate were being removed from the water column and ortho-phosphorus and ammonia were being released to the water column during the September 2000 survey. These findings are indicative of dominant denitrification processes in the sediments.

Summer 2000 water quality measurements may be compared to sediment flux measurements to evaluate the relative impact of sediments on the overall nutrient budget (Table 6-2). Ortho-phosphorus concentration measurements of 0.36 mg/l (above the Ben Smith Impoundment) and 0.04 mg/l (within the Impoundment) were collected during the Summer 2000 survey (Table 5-9). The sediment flux rate for ortho-phosphorus into the water column was measured at a rate of approximately 0.001 mg/l/day during the September 2000 flux survey (Table 6.2). Thus, sediment flux of ortho-phosphorus into the water column accounted for approximately 7% of the ambient water column concentration per day.

In Assabet River waters, ortho-phosphorus concentrations were observed to decrease dramatically (to 0.04 mg/l from 0.36 mg/l) in the Ben Smith Impoundment. Yet, sediments were adding ortho-phosphorus to the water column. These measurements indicate that, overall, phosphorus was being removed from the water column at the time of the survey due to extensive biotic uptake of phosphorus (see Section 7). At the same time, river sediments were adding a relatively small component of the ortho-phosphorus budget to the water column, opposite to the overall trend of ortho-phosphorus removal.

For ammonia, sediment flux into the water column was much larger representing a rate of approximately 0.029 mg/l/day (converted from 58.1 mg/m^2/day). The ambient water column concentration of ammonia in the Ben Smith Impoundment was 0.04 mg/l (Table 5-9). Thus, sediments were contributing ammonia equal to approximately 75% of the ambient concentration of ammonia in the water column per day and representing a major source of ammonia during the Summer 2000 survey.

For nitrate, a relatively large flux (53.2 mg/m^2/day) from the water column into sediments was measured. A flux of approximately 0.027 mg/l/day was measured compared to an ambient water column concentration of 0.76 mg/l in the Impoundment. Thus, sediments were removing nitrate equal

to approximately 4% of the ambient concentration of nitrate per day. In general, the magnitude of ammonia sediment fluxes appeared to be large. The magnitude of ortho-phosphorus and nitrate sediment fluxes appeared to be relatively modest relative to the overall nutrient budget in the Ben Smith Impoundment. The magnitude of dissolved oxygen fluxes was also significant at approximately 1 mg/l/day.

The sediment evaluation included estimation of sediment nutrient flux under laboratory-induced anaerobic conditions. Under anaerobic conditions, sediments were observed to release ortho-phosphorus at a dramatically increased rate of 20 times that of aerobic conditions. Specifically, ortho-phosphorus was observed to be released at a rate of 0.022 mg/l/day under anaerobic conditions.

A summary of anoxic ortho-phosphorus flux measurements is provided in Table 6.2. Under anaerobic conditions, ortho-phosphorus flux was measured at 0.02 mg/l/day and 0.068 mg/l over the residence time of water in the impoundment. Thus, the sediment-derived ortho-phosphorus anoxic flux would represent 170% of ambient water column concentrations (0.04 mg/l). Clearly, under anaerobic conditions, sediment ortho-phosphorus would represent a major component of the impoundment nutrient budget, if present in the river system.

In order to determine whether or not anoxic conditions occur in Assabet River impoundments, numerous dissolved oxygen (DO) concentration profiles were collected in impoundments during the water quality surveys (e.g., see Table 5-3). In most cases, near-bottom measured DO concentrations were indicative of aerobic conditions (typical measurements ranged from 4.0 mg/l to 6.0 mg/l). In some cases, however, low dissolved oxygen measurements were collected (e.g., 1.1 mg/l measured in Ben Smith Impoundment at 5:48 am, July 22, 1999) that could correspond to anoxic conditions in the underlying sediment. It appears that impoundment sediments are generally and typically aerobic, but it is possible that at some times and in some locations impoundment sediments become anaerobic.

6.2.2.2 Powdermill Impoundment Summary

A summary of sediment nutrient flux measurements from the Powdermill Impoundment is provided in Table 6-1. Sediment nutrient flux results for Powdermill Impoundment were generally similar to those of the Ben Smith Impoundment. The direction of flux was the same for all constituents in Ben Smith and Powdermill Impoundment during the September 2000 survey. The magnitude of fluxes was measured to be significantly higher in Powdermill Impoundment than in Ben Smith Impoundment. In the Powdermill Impoundment, the dissolved oxygen flux was measured to be 2,430 mg/m^2/day (1.2 mg/l/day), 20% higher than that of the Ben Smith Impoundment. The magnitude of ortho-phosphorus flux and ammonia flux was greater by 60% and 50%, respectively, in Powdermill Impoundment compared to Ben Smith Impoundment measurements. A summary of sediment flux contributions relative to the nutrient budget for Powdermill Impoundment is provided below.

A summary of sediment flux rates for ortho-phosphorus is provided in Table 6-2. Ortho-phosphorus flux was observed to be into the water column was approximately 0.0013 mg/l/day (converted from 2.6 mg/m^2/day) in Powdermill Impoundment during the September 2000 flux survey. An ambient water column concentration measurement of 0.05 mg/l (Table 5-9) was collected in Powdermill Impoundment. Thus, sediment flux of ortho-phosphorus into the water column accounted for approximately 3.4% of the ambient water column concentration over the residence time of water in the impoundment.

For ammonia, sediment flux into the water column was much larger representing a rate of approximately 0.043 mg/l/day (converted from 86.7 mg/m^2/day). Ambient water column concentration of ammonia in the Ben Smith Impoundment was 0.1 mg/l (Table 5-9). Thus, sediments were contributing ammonia equal to approximately 45% of the ambient concentration of ammonia in the water column per day and representing a major source of ammonia during the Summer 2000 survey. For nitrate, the magnitude of sediment flux and relative contribution to the overall nutrient budget were similar in the Powdermill and Ben Smith Impoundments.

Under anaerobic conditions, ortho-phosphorus flux measurements increased dramatically and were similar to those of the Ben Smith sediments (Table 6.2). In the Powdermill Impoundment, as in the Ben Smith Impoundment, sediment anoxia is believed to be sporatic and not a typical summer-time condition.

The general findings of the Powdermill sediment flux processes are similar to those of the Ben Smith sediment fluxes. The magnitude of ammonia sediment fluxes were observed to be large and the magnitude of ortho-phosphorus and nitrate sediment fluxes were observed to be modest relative to the overall nutrient budget in the Powdermill Impoundment. The magnitude of dissolved oxygen fluxes was also significant at approximately 1.2 mg/l/day.

6.3 September 2000 Sediment Quality Sampling Summary

Grab samples of sediments were collected on September 19, 2000 in the 5 major impoundments and were analyzed for nutrient concentrations, total carbon, density, and porosity. The sediment quality survey was performed to support inter-impoundment comparisons. Table 6-3 contains a summary of sediment quality sampling results.

In general, sediment nutrient concentrations were found to be similar for all 5 impoundments. Total ortho-phosphorus and total nitrogen concentrations measurements varied modestly throughout the impoundments with ranges of 0.17 to 0.25 mg/cm^3 and 1.01 to 1.43 mg/cm^3, respectively. Total carbon concentration measurements also varied modestly ranging from 13.5 to 20.1 mg/cm^3. Extractable ammonia concentration measurements varied from 0.009 to 0.0029 mg/cm^3.

Extractable ortho-phosphorus concentration measurements of sediments varied greatly between impoundments during the September 2000 survey. Relatively larger concentrations were measured in Rt 85/Hudson, Ben Smith, and Powdermill Impoundments (0.11 to 0.15 mg/cm^3) and relatively smaller concentrations were measured in Allen Street and Gleasondale Impoundments (0.058 and 0.006 mg/cm^3, respectively). Dry weight density measurements of impoundment sediments ranged from 0.13 to 0.34 grams/cm^3 and sediment porosity measurements ranged from 0.74 to 0.87 mLs/cm^3.

The sediment quality survey found relatively similar sediments in the 5 major river impoundments. The Allen Street Impoundment and the Gleasondale Impoundment sediments had lower concentrations of extractable nutrients compared to the other impoundments, but had similar concentrations of total nutrients.

6.4 Summary

The following observations were made of sediments in Assabet River impoundments during the data collection program.

- Depth, sediment thicknesses, and sediment quality of the 5 major Assabet River impoundments are generally similar.
- The river impoundments are 1 to 12 feet deep with typical depths of 3 to 7 feet and feature a deeper main channel with shallower side and backwater areas.
- Impoundment soft sediments are generally 1 to 6 feet deep with deeper sediment layers in backwater areas and shallower sediment layers in the main channel.
- Sediment quality sampling found similar sediment concentration measurements of total ortho-phosphorus and total nitrogen in all 5 river impoundments. Extractable nutrient concentration measurements varied significantly from impoundment to impoundment.
- Sediment nutrient flux surveys found a flux of dissolved phosphorus and dissolved nitrogen into river sediments during the winter and a reversal of flux of these constituents out of sediments (and into the water column) during the summer-time. Nitrate was observed to be an exception to this trend, however, as it was observed to flux into sediments during both winter-time and summer-time surveys. The magnitude of these fluxes was found to be relatively small compared to ambient water concentrations.
- A sediment oxygen demand of 1.0 to 1.2 mg/l/day was estimated during the Summer 2000 survey.
- During the Summer 2000 nutrient flux survey, dissolved oxygen and nitrate were removed from the water column and ammonia was released to the water column. These observations are indicative of denitrification processes in river impoundment sediments.

- Under laboratory-induced anoxic conditions, sediment nutrient flux was found to increase dramatically (e.g., by a factor of 20 for ortho-phosphorus). Anoxic conditions appear to occur only sporadically and in limited areas of the Assabet River impoundments based in dissolved oxygen concentration profile measurements.

In summary, impoundment sediment nutrient flux surveys performed in March and September 2000 confirmed the role of impoundment sediments as sinks for nutrients during the winter-time and sources of nutrients to the water column during the summer-time. Nitrate was observed to be an exception to this trend, however, as it was observed to flux into sediments during both winter-time and summer-time surveys. The extent of sediment nutrient flux was observed to be limited indicating that sediment nutrient flux processes represent a relatively minor component of the overall Assabet River nutrient budget. For example, during winter conditions, a flux of available phosphorus (ortho-phos) of 0.001 mg/l/day from the water column to sediments was observed. During summer conditions, a flux of available phosphorus of approximately 0.001 mg/l/day from sediments into the water was observed. Thus, an exchange of ortho-phosphorus of approximately 1 part per billion per day was observed to occur between sediments and the overlying water column. During summer 2000 conditions, the sediment flux of ortho-phosphorus was estimated to be modest, representing approximately 5% of impoundment waters ortho-phosphorus concentrations.

The sediment evaluation included estimation of sediment nutrient flux under laboratory-induced anaerobic conditions. Under anoxic conditions, sediments were observed release ortho-phosphorus at a dramatically increased rate and would represent a dominant nutrient process in river impoundments. Review of numerous DO concentration profile measurements collected in river impoundments indicates that anaerobic conditions are not typical in the system. Thus, sediment nutrient flux is estimated to represent a modest component of the overall nutrient budget in the Assabet River system.

The sediment data collection program was successful in capturing bathymetric, sediment thickness, sediment nutrient flux, and sediment quality measurements throughout Assabet River impoundments. Sediment nutrient flux was successfully measured under winter-time and summer-time conditions. Sediment measurements will be applied to support assessment of the relative impact of sediments on the nutrient budget and to support a mathematical modeling application for the Assabet River system.

Table 6-1 March 2000 and September 2000: Sediment Nutrient Flux Data Summary

Description	Sediment Nutrients						
	Dissolved Oxygen	Ortho-Phosphorous	Ammonia	Nitrate	Total Dissolved Nitrogen	Total Dissolved Phosphorous	Dissolved Inorganic Nitrogen
March 2000 Survey:							
Ben Smith Impoundment							
at 10 C	-995	-2.1	14.6	-5.0	-7.0	-1.7	9.7
at 18 C	-1390	3.7	17.2	3.5	24.1	7.7	20.8
at 25 C	-2000	8.3	32.8	39.9	45.2	13.3	72.7
September 2000 Survey							
Ben Smith Impoundment							
at 20.5 C	-1960	1.6	58.1	-53.2	10.8	4.0	4.8
Powdermill Impoundment							
at 20.5 C	-2430	2.6	86.7	-58.4	19.8	2.8	28.4

Notes: All units are mg/m2/d
Values represent average of 8 core samples throughout impoundment.
Positive values represent rate of flux to the water column from sediments.

Table 6-2 Summary of Assabet River Sediment Nutrient Flux of Ortho-Phosphorus Expressed Relative to Water Column Concentrations

	Reference Information			Sediment PO4 Flux		
Description	Est. Mean Travel Time[1] (days)	Water Column PO4 Range in River[2] (mg/l)	Water Column PO4 Conc Impoundment (mg/l)	Daily Vol. Flux Rate[3] (mg/l/day)	Sed PO4 as Water Conc.[4] (mg/l)	Sed-derived PO4 as % Water Conc.[5] (%)
March 2000 Survey						
Ben Smith Impoundment						
Ambient Temp. (10 C)	0.8	0.1 to 0.2	0.13	-0.001	-0.0008	**0.6%**
Lab Temp 18 C				0.002	0.0016	1.1%
Lab Temp 25 C				0.004	0.0033	2.6%
Sept 2000 Survey						
Aerobic Conditions:						
Ben Smith Impoundment						
Ambient Temp 20.5 C	3.4	0.1 to 0.6	0.04	0.0008	0.0027	**6.8%**
Powdermill Impoundment						
Ambient Temp 20.5	1.3	0.1 to 0.6	0.05	0.0013	0.0017	**3.4%**
Anaerobic Conditions:						
Ben Smith Impoundment						
Ambient Temp 20.5 C	3.4	0.1 to 0.6	0.04	0.02	0.068	**170%**
Powdermill Impoundment						
Ambient Temp 20.5	1.3	0.1 to 0.6	0.05	0.024	0.031	**62%**

Notes:
[1] Based on time of travel surveys conducted at similar stream flowrates.
[2] Typical values measured during concurrent water quality surveys, see Tables 5-9 and 5-13.
[3] Based on mg/m2/day flux rates converted to mg/l/day assuming average impoundment depth of 2 meters.
[4] Estimated by multiplying mean detention time (column 2) times flux rate (column 5).
[5] Estimated percentage of measured ambient impoundment concentration accounted for bysediment flux.

Table 6-3 September 2000: Sediment Quality Sampling Analyses

Impoundment Stations	Extractable PO_4 (mg/cm^3)	Total PO_4 (mg/cm^3)	Extractable NH_4 (mg/cm^3)	Total Nitrogen (mg/cm^3)	Total Carbon (mg/cm^3)	Dry Weight Density (g/cm^3)	Porosity (mLs/cm^3)
Allen Street (RM 25.1)	0.058	0.25	0.018	1.29	18	0.34	0.81
Rt. 85/Hudson Center(RM 17.9)	0.15	0.23	0.021	1.08	13.5	0.13	0.87
Gleasondale (RM 14.1)	0.006	0.17	0.009	1.31	17.9	0.32	0.79
Ben Smith (RM 8.7)	0.11	0.18	0.029	1.01	10.2	0.14	0.87
Powdermill (RM 6.2)	0.13	0.21	0.024	1.43	20.1	0.25	0.74
Notes: Average of two samples (duplicates) presented, except for at Gleasondale (single sample collected).							