North Shore Periphyton [Attached Algae] Survey

July 2003

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Surveyed Streams:

Tischer Creek
Amity Creek and Lower Lester River
Talmadge River
French River
Knife River
Encampment River
Gooseberry River
Brule River

General Trends

· Periphyton abundance was greatest in the two Duluth urban streams (Tischer, Amity), and was not observed in the most rural stream (Brule)

· Despite a few exceptions, periphyton levels were lower in streams farther from Duluth

· Sunlight appears to be the limiting factor for periphyton growth in streams near the Duluth area. Essentially wherever adequate sunlight hit these streams, periphyton was observed

· As expected, rivers with more pristine watersheds had lower levels of periphyton

· In some survey streams, especially Knife River and Amity and Tischer Creeks, there was a noticeable increase in periphyton abundance near bridges or heavily used roads

· Both epipelon (growth on soft sediments) and epilithion (growth on stones) periphyton were observed. Epilithion forms were by far the most common in North Shore streams.

· Streamflow seems to factor into periphyton growth in North Shore streams. Riffles with moderate flow were found to support periphyton communities more often than stagnant backwaters or side pools. Growths along fast-flowing, shallow waterfalls were frequent.

Stream: Tischer Creek
Location of Survey: Greysolon Street to London Rd. Overpass (Duluth)
Date/Time: July 24, 2003 @ 1345

In a survey of Tischer Creek from London Road to the St. Marie Street bridge, abundant growths of periphyton were observed. Nearly every region of the stream within the survey range exhibited very noticeable growths, making it difficult to establish any clear periphyton trends for this particular stream. Scattered sections of Tischer Creek with limited or no periphyton growth were shaded by large trees for the majority of high-sunlight hours. These stretches of stream were very few. As expected, the largest mats of periphyton were observed in areas of plentiful sunlight. Shallow waterfalls and the edges of pools below falls had high periphyton cover (Figures 1,2). The greatest periphyton cover was observed near the London Road overpass, but all surveyed sections of the stream with adequate sunlight indicated very supportive conditions for growth.

Fig. 1. Periphyton growth on substrate of shallow waterfall near Greysolon Street

Fig. 2. Growths along edges of a sunny pool near London Road

Stream: Amity Creek and Lower Lester River
Location of Survey: Hawks Ridge to confluence with Lester R., stopping at all bridges on 7 Bridges Road (N. Edge of Duluth)
Date/Time: July 24, 2003 @910

Much like its urban Duluth counterpart Tischer Creek, the Amity appears to support periphyton growth along all of its lower reaches. Amity and Tischer Creeks had the highest periphyton cover of all survey streams. The Amity exhibited many of the same periphyton trends as Tischer, namely high growth along and under shallow, sun-exposed waterfalls (Fig. 3). Amity periphyton levels seemed to be the highest in the stretch from the MPCA monitoring station to the confluence with the Lester River. Two stormwater sewers entered the Creek within this reach, and periphyton was observed in these inlets (Fig. 4). Upstream of the monitoring bridge, periphyton growth was still quite evident but seemed to taper slightly.

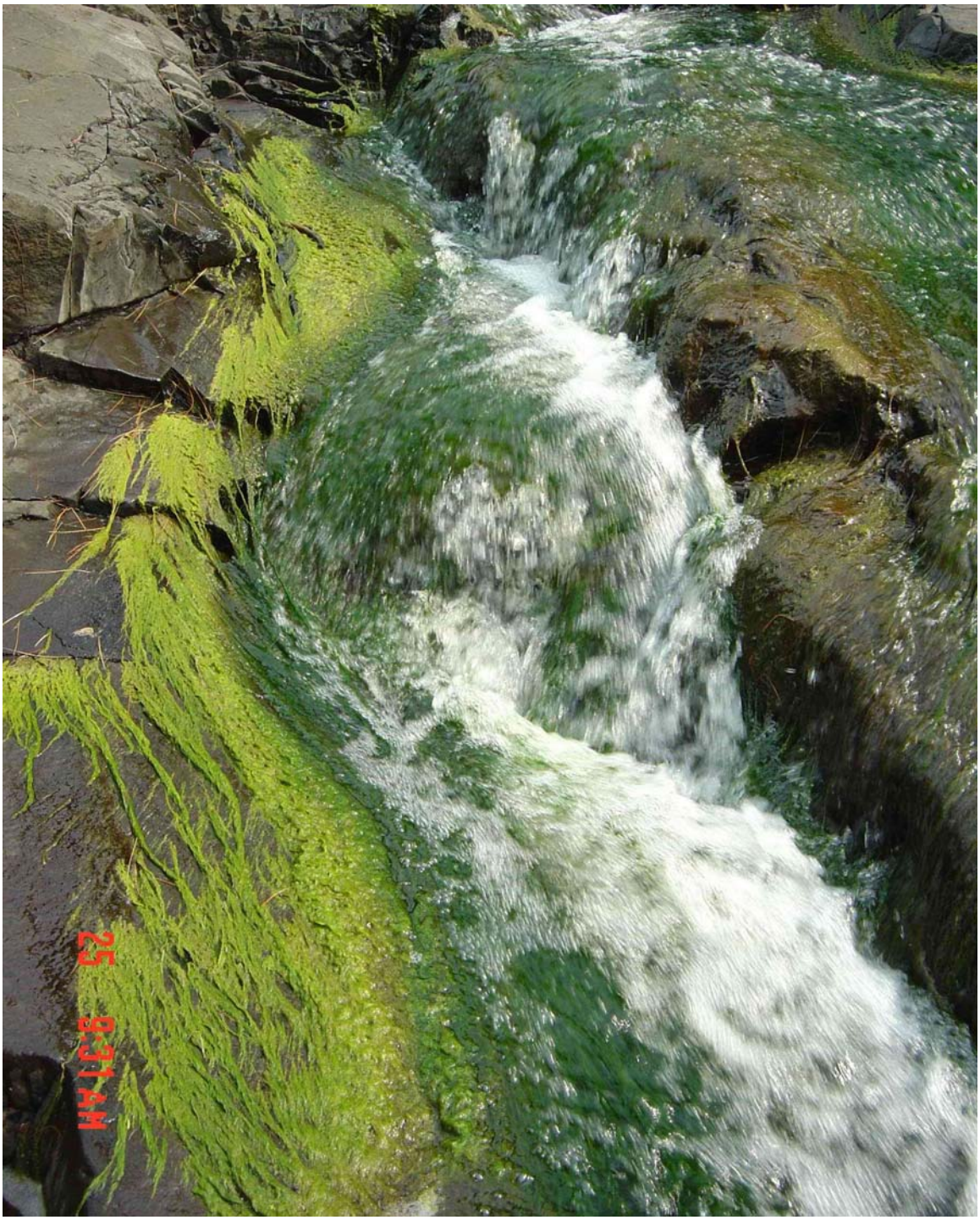

Fig. 3 Periphyton on shallow, sun exposed waterfall (Amity Cr.)

Fig. 4 Periphyton in stormwater inlet (Amity Cr.)

Stream: Talmadge River
Location of Survey: Estuary, Cant Road, Old North Shore Rd. Bridge
Date/Time: July 24, 2003 @1415

Very little periphyton cover was observed within the survey areas on the Talmadge River on this date. However, growths of periphyton have previously been documented in these sections of the stream. The three locations included in this survey relate to distinct segments of the lower Talmadge: Cant Road (4 miles upstream of estuary), Old North Shore Rd. Bridge (1.5 miles upstream of estuary), and the estuary (Lake Superior). This detail is significant for the Talmadge survey because a trend emerged linking increased periphyton cover with locations further downstream. No periphyton was seen near the

Cant Road Bridge, while small scattered patches of periphyton turned up at the two locations downstream of Cant Road. The Talmadge River was one of the survey streams with the lowest periphyton counts. Tree cover along the banks of the Talmadge may be responsible for the low amount of periphyton observed. The Talmadge was extremely low and slow-flowing on the survey date. These conditions have also been found to limit periphyton growth. Mats of periphyton were observed about 5 yards out into Lake Superior where the river entered, and were not seen to either side of the mouth, likely indicating substantial nutrient loading to the lake (Fig 5).

Fig. 5 Periphyton-covered rocks in Lake Superior out from the mouth of the Talmadge River

Stream: French River
Location of Survey: From estuary to 200 ft. above Expressway overpass, monitoring station (Ryan Rd.)
Date/Time: July 25, 2003 @1300

Just below DNR hatchery periphyton and floating algae were observed. However, growths were scattered and relatively few in comparison to the Duluth streams (Amity, Tischer). Upstream of the hatchery, which serves as a popular swimming area, much greater periphyton cover was observed. The pools were essentially free of periphyton, but thick growths lined many of the shallow waterfalls in this reach of the stream (Fig. 6). This stretch of stream receives more sunlight than other surveyed stretches of the French. Periphyton growth was also evident attached to cobbles in some riffle stretches. Overall, periphyton growths seemed to be most frequent downstream of the expressway and upstream of the DNR fish hatchery. Growths were at times as numerous and as thick as those observed in Tischer and Amity Creeks.

Fig. 6 Periphyton patches on sun-exposed stretch of French River upstream of DNR hatchery

Stream: Knife River
Date: July 31, 2003
Location of Survey: 200 yards upstream and downstream of Highway 61 overpass

Periphyton growths were abundant near the Highway 61 bridge, but were essentially none upstream and downstream of that location. Thick growths were seen in the numerous step falls and pools in the vicinity of the bridge (Fig. 7)

Figure 7. Periphyton in the French River near Highway 61

Stream: Encampment River
Location of Survey: Scenic Highway 61 Bridge
Date/Time: July 28, 2003 @1130

Looking upstream and downstream from the Highway 61 overpass, no periphyton was observed in the Encampment River. Private property severely limited the scope of the survey. More observation is necessary before concluding that the Encampment does not support periphyton growth.

Stream: Gooseberry River
Location of Survey: Gooseberry State Park

Date/Time: July 31, 2003 @1030

Scattered patches of periphyton were observed in the Gooseberry River within the boundaries of the State Park. Gooseberry exhibited different periphyton trends than the other survey streams. Shallow, sunlight-exposed waterfalls had little to no growth. In the other streams, the largest growths were seen in those specific stream conditions. The most abundant periphyton communities in the Gooseberry River were seen on the edges of stagnant pools below large waterfalls, or in sunny riffle stretches. It may be beneficial to compare the periphyton species of Gooseberry to those of the other streams to determine if a difference in species is the reason for the contrasting growth trend. Overall, periphyton growths in the Gooseberry River is minimal.

Stream: Brule River
Location of Survey: Highway 61 Bridge
Date/Time: August 20, 2003

No periphyton was seen in the Brule River two-hundred feet upstream and downstream of the Highway 61 overpass. The absence of periphyton in this stream is not alarming given its relatively undisturbed watershed.

Survey Streams Ranked in Observed Periphyton Abundance (from greatest to least amount)

(1) Amity Creek and Lower Lester
(1) Tischer Creek
(2) French River
(3) Knife River
(4) Gooseberry River
(5) Talmadge River (under extreme low flow conditions at time of survey)
(6) Encampment River (survey extremely limited by private property)
(7) Brule River