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SUPPORT OF AQUATIC LIFE USES
IN MCDONALD CREEK AND THE TETON RIVER
BASED ON PERIPHYTON COMPOSITION
AND COMMUNITY STRUCTURE

Prepared for:

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February 1999

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February 16, 1999

Ms. Carol Endicott
Monitoring and Data Management Bureau
Department of Environmental Quality
P.O. Box 200901
Helena, MT 59620-0901

Re: McDonald Creek and Teton River Periphyton Report

Dear Carol,

Enclosed is a copy of my report on periphyton samples collected last summer from McDonald Creek and the Teton River.

The Teton River at Deer Bridge was the only site that did not fully support aquatic life uses based on periphyton composition and community structure. The partial support recorded at this site was probably due to excessive sedimentation and homogeneity of algal microhabitats. The myriad of other insults to the Teton (dewatering, salinity, nutrients...) did not have a huge effect on periphyton composition and community structure.

Bob Bukantis called today to ask if I would give a seminar on interpreting periphyton data. I suggested using this report as the basis for discussion, so he may ask to copy this report for those who will attend the seminar.

Please let me know if you have any questions or if you want the results presented differently. The report is in my computer so I can easily correct errors or make changes.

Thanks for the work. My invoice is enclosed. By the way, your agency purchase order lists my telephone number as my federal ID number. If you need my Social Security Number it's 474-48-9443.

Sincerely,

Loren Bahls

Loren L. Bahls, Ph.D.
Phycologist

Enclosures (Teton River Report and Invoice)

Frustulia bahlsii Edlund and Brant

SUMMARY

Composite periphyton samples were collected at two sites on McDonald Creek and at nine sites on the Teton River in July and August 1998. The samples were analyzed using standard methods for the rapid bioassessment of stream periphyton.

McDonald Creek had a very rich algal flora that reflected the lacustrine origin of this stream in the Pine Butte Swamp Preserve. Despite severe dewatering at the lower station on McDonald Creek, water quality and biological integrity remained excellent. Aquatic life uses would be fully supported in McDonald Creek if streamflows are restored.

Sites on the upper Teton River (above Highway 221) had good water quality and biological integrity. Severe dewatering at Breen's, eroding streambanks and sediment from Deep Creek, and discharges from the Choteau WWTP and Priest Butte Lakes all had only minor effects on the periphyton community. As with McDonald Creek, restoring streamflows to the upper Teton River during the irrigation season would likely result in the full support of aquatic life uses. The North Fork of the Teton River proved to be a suitable reference stream for periphyton.

Floristic richness and biological integrity decreased significantly below Highway 221 in the lower Teton River. Sedimentation and habitat homogeneity resulting from channel instability were likely responsible for the observed decline in periphyton biointegrity in this reach of the river. Periphyton metrics at Dent Bridge indicated moderate impairment with only partial support at this site. Dent Bridge was the only site on either McDonald Creek or the Teton River where periphyton metrics indicated less than full support of aquatic life uses.

INTRODUCTION

This report evaluates the support of aquatic life uses, and probable causes of impairment to those uses, in the Teton River of northcentral Montana, and in a tributary, McDonald Creek. This evaluation is based on the species composition and community structure of periphyton (benthic algae) communities at two sites on McDonald Creek and nine sites on the Teton River that were sampled in July and August 1998.

The periphyton or phytobenthos is a diverse assortment of simple photosynthetic organisms, called algae, that live attached to or in close proximity of the stream bottom. Most algae, such as the diatoms, are microscopic. Although not visible to the naked eye, diatoms often carpet a stream bottom with a slippery brown film. Some algae, such as the filamentous greens, are conspicuous and their luxuriant growth in response to nutrient enrichment may deplete dissolved oxygen, interfere with fish spawning, clog irrigation intakes, and cause other problems. Collectively, the phytobenthos accounts for practically all of the primary production and much of the biological diversity in the mountain streams of Montana (Bahls et al. 1992).

Stevenson and Bahls (1999) list several advantages for using periphyton in biological assessments of streams:

- Algae are universally present in large numbers in all streams and unimpaired periphyton assemblages typically support a large number (>30) of species;
- Algae have rapid reproduction rates and short life cycles, making them useful indicators of short-term impacts;
- As primary producers, algae are most directly affected by physical and chemical factors, such as temperature,

nutrients, and toxins;

- Sampling is easy and inexpensive, and causes minimal impact to resident biota and their habitat;
- Standard methods and criteria exist for evaluating the composition, structure, and biomass of algal associations; and
- Excess algae in streams is often perceived as a problem by the public.

For several reasons, biological surveys are superior to water quality analyses for determining use support (Plafkin et al. 1989): (1) Biological communities measure our success at protecting the *biological integrity* of waterbodies, which is a goal of the Clean Water Act; (2) biological communities integrate the effects of different pollutants and provide a holistic measure of their aggregate impact; (3) routine biological monitoring can be relatively inexpensive; (4) the status of biological communities is of direct interest to the public; and (5) biological communities may be the only practical means to evaluate certain types of impacts, such as nutrient enrichment or habitat degradation from non-point sources.

Biological integrity is defined as "the ability of an aquatic ecosystem to support and maintain a balanced, integrated, adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of the natural habitats within a region" (Karr and Dudley 1981). It is an objective of the federal Clean Water Act, and of the state agencies that implement the Act, to "restore and maintain the chemical, physical, and *biological integrity* of the Nation's waters" (Section 101). In response to this directive, the state of Montana has developed methods and criteria for evaluating

various levels of *biological integrity* and use impairment in Montana streams (Bahls 1993, Bukantis 1998).

The Clean Water Act further directs states to develop pollution control plans (Total Maximum Daily Loads or TMDLs) that set limits on pollution loading to water quality-limited waterbodies. Water quality-limited waters are lakes and stream segments that do not meet state water quality standards, that is, do not fully support their beneficial uses. The Clean Water Act and EPA regulations require each state to (1) identify waters that are water quality-limited, (2) prioritize and target waters for TMDLs, and (3) develop TMDL plans to attain and maintain water quality standards for all water quality-limited waters (MDEQ 1998).

The underlying purpose of this report is to provide information that will help the state determine whether McDonald Creek and the Teton River are water quality-limited and in need of TMDLs.

PROJECT AREA AND SAMPLING SITES

The project area is in Teton and Chouteau Counties west and east of the town of Choteau in northcentral Montana. McDonald Creek is a tributary of the Teton River and the Teton River is a tributary of the Marias River in the Missouri River drainage. Periphyton samples were collected at two stations on McDonald Creek and nine stations on the Teton River (Table 1).

The North and South Forks of the Teton River head in the Bob Marshall Wilderness Area and converge just east of the Rocky Mountain Front about 20 miles west of Choteau, Montana. The source of McDonald Creek is McDonald Swamp, a unit of the Nature Conservancy's Pine Butte Swamp Preserve. Pine Butte Swamp and

McDonald Swamp are natural fens that are fed by groundwater flows from the Teton River. McDonald Creek enters the Teton River below the confluence of the Teton's North and South Forks and above the Teton River sampling site at Breen's (Table 1).

McDonald Creek begins and ends in the Montana Valley and Foothill Prairie Ecoregion (Omernik and Gallant 1987). McDonald Creek is classified B-1 in the Montana Surface Water Quality Standards. The most significant source of stress to McDonald Creek is dewatering for irrigation (MDEQ 1998; Carol Endicott, MDEQ, pers. comm.). Two sampling sites were located on McDonald Creek, one (**upper**) just below McDonald Swamp and another (**lower**) near the mouth of McDonald Creek below the zone of dewatering (Table 1).

The Teton River begins in the Northern Rockies Ecoregion, flows across the Montana Valley and Foothill Prairies Ecoregion, and ends in the Northern Great Plains Ecoregion (Omernik and Gallant 1987). The Teton River is classified B-1 above Deep Creek near Choteau, B-2 between Deep Creek and Interstate 15, and B-3 from I-15 to the mouth. The Teton River is stressed by dewatering for agricultural irrigation, salinization (mostly discharges from Freezeout Lake and Priest Butte Lakes), channel instability, habitat alteration, and sedimentation (MDEQ 1998; Carol Endicott, MDEQ, pers. comm.).

The nine sites on the Teton River extend from the North Fork just above its confluence with the South Fork, to the mouth of the Teton River near Loma, Montana (Table 1). The site on the **North Fork** has excellent stream and riparian conditions and may be considered as a reference (MDEQ field notes). The site behind Elizabeth **Breen's** house is just south of Eureka Reservoir and about 4 miles above Highway 89. This site was established mainly to assess the effects of dewatering for irrigation.

The site at Highway 89 is below Deep Creek and the Choteau wastewater lagoon and above the discharge from the Priest Butte Lakes. In contrast to the clear, riffle/run reaches upstream, this site shows significant sediment loading (MDEQ field notes). The site at Miller's is below the discharge from Priest Butte Lakes, which is a significant source of salinity. There is lots of bank erosion at this site but it still has relatively good habitat compared to sites farther downstream (MDEQ field notes; C. Endicott, MDEQ, pers. comm.).

Sampling sites below Miller's were established to evaluate deteriorating habitat conditions in the lower reaches of the river (Carol Endicott, MDEQ, pers. comm.). The Highway 221 site had a stream reach assessment score of only 41% of the maximum possible score. The site at Interstate 15, located below the frontage road and rest area, scored 56% of its potential (MDEQ field data).

Significant downcutting has occurred at the Kerr Bridge site, but riparian areas and the channel appear to be recovering; a stream reach assessment at this site scored 68% of the maximum possible points (MDEQ field data). At Dent Bridge, the stream reach assessment score was only 43% of the maximum possible score, and macroinvertebrate habitat rated only 29% of its potential; extensive channelization and moderately unstable banks were noted here (MDEQ field data). The habitat assessment score was twice as high at the site near the mouth at Loma, indicating much improved habitat conditions over the Dent site (MDEQ field data).

METHODS

Periphyton samples were collected in July and August 1998 using the composite, multi-habitat technique described by Bahls

(1993). All samples were collected by MDEQ personnel as one component of a suite of biological, habitat, and water quality assessments.

Samples were examined to estimate the relative abundance and rank by biovolume of diatoms and genera of "soft" (non-diatom) algae according to the method described in Bahls (1993).

After the identification of soft algae, raw periphyton samples were "cleaned" of organic matter and permanent diatom slides were prepared in Hyrax following Standard Methods for the Examination of Water and Wastewater (APHA 1998). For each slide, 400 diatom cells (800 valves) were counted at random and identified to species using standard taxonomic references.

The diatom proportional counts were used to generate an array of diatom association metrics (Table 2). A metric is a characteristic of the biota that changes in some predictable way with increased human influence (Barbour et al. 1999). Metric values from study sites are compared to numeric criteria for Montana streams (Tables 3 and 4). These criteria are based on metric values measured in least-impaired reference streams (Bahls et al. 1992) and on metric values measured in streams exhibiting various levels of use support, which are known to be impaired by various sources and causes of pollution (Bahls 1993).

Because of inherent differences in periphyton composition and community structure between mountain streams and prairie streams, two different sets of criteria are provided (Tables 3 and 4). For the purpose of periphyton assessment, mountain streams are those located in the Rocky Mountain and Montana Valley and Foothill Prairie Ecoregions (Omernik and Gallant 1987). These streams are generally classified B-1 and B-2 in the Montana Surface Water Quality Standards.

McDonald Creek and the five upstream sites on the Teton River may be considered mountain streams for the purpose of periphyton assessment, and metrics from these sites will be compared to criteria in Table 3. These sites are described in the Montana Surface Water Quality Standards as supporting cold-water or transitional (cool-water) fisheries (Table 1).

The lower four sites on the Teton River may be considered as prairie streams, and metrics from these sites will be compared to criteria in Table 4. These sites are classified as supporting warm-water fish and associated aquatic life (Table 1). Because of the transitional nature of the Teton River in the vicinity of Highway 221, metrics from this station will be evaluated using criteria for both mountain streams and prairie streams (Tables 3 and 4).

In some cases, natural stressors (e.g., high gradient, low light, cold temperatures, low nutrients) can mimic the effects of man-caused impairment on these metrics. An experienced phycologist with some knowledge of the study stream can usually sort out the natural stressors from the man-made ones.

The criteria in Tables 3 and 4 distinguish among four levels of impairment and three levels of aquatic life use support: no impairment or only minor impairment (full support); moderate impairment (partial support); and severe impairment (nonsupport). These impairment levels correspond to excellent, good, fair, and poor biological integrity, respectively.

Only periphyton samples collected in summer (June 21-September 21) can be compared to reference stream samples because metric values change seasonally and summer is the season in which reference streams were sampled for biocriteria development.

RESULTS AND DISCUSSION

Results are presented in Tables 5 through 8, located near the end of this report following the Literature Cited section. In each table, stations and their associated data are listed in order from upstream to downstream (left to right). Streamflow and conductivity in the Teton River (MDEQ field data) are charted in Figures 1 and 2, which follow the tables. Completed diatom proportional count forms are attached as Appendix A.

NON-DIATOM (SOFT) ALGAE

McDonald Creek

McDonald Creek had an exceptionally diverse flora of green algae and cyanobacteria (Table 5). Some of the taxa recorded for McDonald Creek (e.g., *Oocystis*, *Selenastrum*, and *Chroococcus*) are planktonic and reflect the lacustrine origin of this stream.

McDonald Creek had an assortment of green algae, diatoms, and cyanobacteria, which is the typical mix of algae in least-impaired Montana streams (Bahls et al. 1992). No significant differences in the soft algal flora were evident between the upper and lower sites on McDonald Creek. Worthy of note were *Bulbochaete*, a pollution-sensitive green alga, and *Tolypothrix*, a pollution-sensitive cyanobacterium, which were abundant and very common at the upper and lower sites, respectively (Table 5).

Upper Teton River

Only diatoms were found in the sample collected from the North Fork of the Teton River (Table 5). Field personnel were unclear about sampling methodology at this station (C. Endicott, MDEQ, pers. comm.). Insufficient sampling effort may explain the lack of soft algae and the sparse number of diatoms collected at

this site.

Sites at Breen's, Highway 89, Miller's, and Highway 221 all supported green algae, diatoms, and cyanobacteria (Table 5). The number of genera of soft algae increased downstream from 4 at Breen's, to 10 at Highway 89, to 11 at Miller's, to a Teton River high of 13 at Highway 221. The small number of algal genera at Breen's may be due in part to the extreme reduction in streamflow recorded at this site (Figure 1).

The observed downstream increase in floristic richness from Breen's to Highway 221 is probably due to an increase in habitat complexity, coupled with floristic contributions from tributary lakes and streams. Moderate increases in dissolved solids (Figure 2) and nutrients (from the Choteau WWTP and Priest Butte Lakes), a wider range of water temperatures, and an increase in habitat diversity would all increase the number of niches available for algae species.

Zygnema, an unbranched filamentous green that prefer warmer and slower moving waters, was the dominant soft alga at Breen's (Table 5). *Zygnema* was replaced as the dominant alga downstream (at Highway 89, Miller's, and Highway 221) by *Cladophora*, another filamentous green, but one that prefers cooler and faster moving waters. All of the *Cladophora* collected from the upper Teton River was senescent and covered with epiphytes, indicating that the seasonal peak of growth for this alga had passed.

Audouinella, a pollution-sensitive red alga, was very common at Highway 89, Millers, and Highway 221. *Euglena*, an alga that indicates organic loading, was present but rare at Highway 221. Highway 221 was also the only site on the river at which *Chara* (stonewort) was found.

Lower Teton River

Genus richness of soft algae declined significantly downstream from Highway 221 (Table 6). The number of genera declined from a Teton River high of 13 at Highway 221 to only 5 or 6 at Interstate 15, Kerr Bridge, and Dent Bridge. Only one genus of non-diatom algae (*Cladophora*) was found in the sample collected at the mouth of the river near Loma. *Cladophora* at the Loma site was in poor condition and covered with an opaque floc. Significantly, *Audouinella* disappeared downstream from Highway 221, to reappear in reduced numbers only at Dent Bridge.

DIATOM ALGAE

McDonald Creek

Several species of tychoplanktonic diatoms (e.g., *Rhopalodia gibba*, *Mastogloia smithii*, *Fragilaria construens*, and *Fragilaria pinnata*) confirm the lacustrine origin and slow-moving nature of McDonald Creek (Table 7). McDonald Creek supported a rich diatom flora commensurate with its exceptionally diverse non-diatom algal flora. The lower site on McDonald Creek had slightly less than half of its diatom flora in common with the upper site (Similarity Index = 46.93%, Table 7), indicating no major floristic changes between the two sites.

With two minor exceptions, both related to the stream's origin in McDonald Swamp, diatom metrics indicated excellent water quality in McDonald Creek. The pollution index and the percent dominant species both indicated minor impairment at the upper site. The pollution index was probably depressed because of natural organic loading from McDonald Swamp. The percent dominant species was elevated because of the large number of naturally occurring *Mastogloia smithii* at the upper site.

Despite the serious dewatering that occurs in lower McDonald Creek, water quality and biological integrity--as indicated by the periphyton community--were excellent. If flows are restored to lower McDonald Creek during the irrigation season, aquatic life uses would be fully supported.

Upper Teton River

The attached, sensitive species *Achnanthes minutissima* (= *Achnanthidium minutissima*) dominated the diatom association in the North Fork (Table 7). *Achnanthes minutissima* is often the dominant diatom in streams that have cold, fast, and nutrient-poor waters, and sometimes this taxon achieves a relative abundance of 60% or more where these natural stressors are operating (Bahls et al. 1992).

Dominance by *Achnanthes minutissima* resulted in a slightly elevated disturbance index and percent dominant species index in the North Fork, indicating minor impairment by natural stressors (Table 7). All diatom metrics indicated full support of aquatic life uses in the North Fork and validated this as a suitable reference stream. (The North Fork at the West Fork Guard Station was sampled as a biological reference site by Bahls et al. 1992.)

The predominance of tychoplanktonic diatoms (e.g., *Synedra ulna* and *Fragilaria construens*) at Breen's may be due to greatly reduced flows (Figure 1) and pooling at this site, or to the floristic influence of McDonald Creek upstream. Two common diatoms at Breen's were *Diatoma tenue* (7.25%), an unattached species, and *Cyclotella distinguenda* (7.37%), a planktonic species. Both diatoms prefer waters with elevated dissolved solids but neither diatom was recorded at upstream sites in McDonald Creek or in the North Fork, lending credence to the pooling theory. However, there are other potential upstream sources of these diatoms (e.g., South Fork and Eureka Reservoir).

The site at **Breen's** had only about one quarter of its diatom flora in common with the North Fork site (Similarity Index = 23.36%, Table 7), indicating a significant change in diatom composition and environmental conditions between these two sites. Diatoms introduced from the South Fork and from McDonald Creek may explain much of this observed change in floristics.

Reduced flows and the concentration of nutrients may explain the slightly depressed pollution index at **Breen's** (Table 7). Otherwise, water quality was excellent at this site and aquatic life uses would be fully supported here if streamflows were restored during the irrigation season.

The siltation index (percent abundance of motile diatoms) indicated minor impairment by sediment at **Highway 89** (Table 7). Deep Creek and eroding stream banks upstream are possible sources of sedimentation at this site. The Choteau lagoon apparently did not have a significant effect at this site because the pollution index was still within the "excellent" range and somewhat higher than it was at **Breen's**. All other periphyton metrics indicated full support of aquatic life uses at **Highway 89**.

Highway 89 had less than a quarter of its diatom flora in common with the next upstream site at **Breen's** (Similarity Index = 22.46%, Table 7), indicating a significant change in species composition and environmental conditions between these two sites. Deep Creek is a potential source of floristic change between **Breen's** and **Highway 89**.

The pollution-tolerant diatoms *Gomphonema parvulum* and *Cymbella silesiaca* peaked in abundance at **Miller's**, resulting in a depressed pollution index that indicated minor impairment (Table 7). The combined discharge from the Priest Butte Lakes and waterfowl-rich Freezeout Lake may be a significant source of organic nutrient loading to the Teton River at **Miller's**.

Although conductivity nearly tripled at Miller's compared to the Highway 89 site upstream (Figure 2), this increase did not trigger a major change in the diatom assemblage (Similarity Index = 51.55, Table 7). Habitat conditions aside, water quality at Miller's was good and aquatic life uses were fully supported.

The brackish water diatom *Diatoma tenue* reached its maximum abundance (15.12%) at Highway 221 (Table 7). This, together with an abundance of other pollution-tolerant species (*Cymbella silesiaca* and *Fragilaria vaucheriae*), caused the pollution index to remain at a level indicating minor impairment. Overall, the diatom flora at Highway 221 was quite similar to the flora at Miller's upstream (Similarity Index = 51.93%, Table 7).

Highway 221 was the only site where teratological diatoms were observed: four crooked valves of *Diatoma tenue*. Abnormal diatoms are caused by a variety of factors, including heavy metals (McFarland et al. 1997). In Tenmile Creek near Helena, acid mine drainage has produced abnormalities in up to 20% of the cells at some sites (Bahls 1998).

Elevated salinity (Figure 2) was probably the cause of the abnormal diatom valves observed in the Teton River at Highway 221. However, four deformed valves out of 800 (0.50%) is within an acceptable range for full support of aquatic life uses (Table 3). The pollution index and percent abnormal cells indicated minor impairment but good water quality and biological integrity at Highway 221.

Lower Teton River

When compared to criteria for plains streams (Table 8), diatom diversity at Highway 221 was judged to be somewhat depressed and indicating minor impairment. All other diatom metrics at Highway 221 were within the fully supporting range for

prairie streams.

An elevated siltation index indicated minor impairment at **Interstate 15** (Table 8). Species of *Navicula* and *Nitzschia* appeared as major species (>10% abundance) for the first time at **Interstate 15**. Most species of *Navicula* and *Nitzschia* are motile and adapted to living on silty, aggrading substrates. The total relative abundance of species in these genera, together with the relative abundance of *Surirella* species, is used to calculate the siltation index.

Other periphyton metrics indicated good water quality and biological integrity at **Interstate 15**. Specific conductance was considerably lower at I-15 and at downstream sites than it was at Highway 221 (Figure 2). **Interstate 15** had about 40% of its diatom flora in common with the next upstream site at Highway 221, which is quite a large similarity index considering the distance between these two sites (>20 miles) and the several intervening tributaries, including Muddy Creek.

Along with *Achnanthes minutissima*, the pollution-tolerant species *Cymbella microcephala* (also a salinity indicator) and *Navicula cryptotenella* dominated the diatom association at **Kerr Bridge** (Table 8). The large percentage of *A. minutissima* (37%) here resulted in borderline values for the diversity index, disturbance index, and percent dominant species, all indicating minor impairment (Table 8).

Chemical, physical, and biological disturbance (e.g., toxins, abrasion, and invertebrate grazing) may all cause an increase in the abundance of *Achnanthes minutissima*. The specific cause or causes of disturbance at **Kerr Bridge** are unknown, but channel downcutting and instability may be involved. The **Kerr Bridge** site had over half of its diatom flora in common with the I-15 site (Table 8), which is about 10 miles upstream.

The diatom flora at **Dent Bridge** was dominated by *Cymbella sinuata* (Table 8). *Cymbella sinuata* (= *Reimeria sinuata*) is a free-living and motile species (Round et al. 1990). Although not included in calculating the siltation index, it probably should be included by virtue of its motility and free-living lifestyle. If *C. sinuata* had been included in calculating the siltation index, it would have resulted in a rating of moderate impairment with partial support at this site.

The other major diatom at **Dent Bridge** was *Navicula tripunctata*, another motile species. *N. tripunctata* is more sensitive to organic pollution than *Navicula cryptotenella*, but is still considered an "eutrophic" species (Lowe 1974).

The very large percent abundance of *Cymbella sinuata* at **Dent Bridge**, and the resulting low diversity index, indicated moderate impairment with only partial support at this site (Table 8). Dent Bridge was the only site on either McDonald Creek or the Teton River where periphyton metrics indicated less than full support of aquatic life uses. The specific cause of the low diversity at this site is unclear, but sedimentation and the homogeneity of microhabitats (lack of habitat diversity) is likely responsible.

The similarity index comparing the **Dent Bridge** diatom flora with the **Kerr Bridge** diatom flora was only about 10% (Table 8). Adjacent riffles in the same reach of stream can be expected to have about 60% of their diatom floras in common (Bahls 1993). A great distance between sites (about 20 miles in this case), intervening tributaries and pollution sources, and large changes in stream habitat will all result in lower similarity values.

The site near the **mouth** of the Teton River near **Loma** had a much more equitable distribution of diatom species than did the **Dent Bridge** site (Table 8). Low diatom diversity, an elevated

disturbance index, and an elevated percent dominant species--due all or in part to the abundance of *Achnanthes minutissima*--indicated minor impairment with full support at Loma. In spite of, or perhaps because of the relatively great distance between the two sites (about 40 miles), the Loma site had less than a quarter of its diatom flora in common with the Dent Bridge site upstream (Table 8).

ACKNOWLEDGEMENTS

Carol Endicott of the Montana Department of Environmental Quality, Monitoring and Data Management Bureau, provided the author with copies of field data and with other helpful information about station locations and sources and causes of impairment along McDonald Creek and the Teton River.

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Table 1. Location of periphyton sampling sites on McDonald Creek and the Teton River, State of Montana surface water quality classifications at the sampling sites¹, and dates on which periphyton samples were collected. Sites are listed in order from upstream to downstream. McDonald Creek enters the Teton River between the mouth of the North Fork and the Teton River at Breen's above Choteau.

Location	Legal Description	Water Quality Classification ¹	Sample Date
McDonald Creek (upper) near Pine Butte Swamp	T24NR07WS02DADD	B-1	07/22/98
McDonald Creek (lower) near mouth	T25NR06WS34BDAD	B-1	07/22/98
North Fork Teton River (Abbott's) near mouth	T25NR08WS28CDCB	B-1	07/22/98
Teton River at Breen's above Choteau	T25NR06WS36BDCA	B-1	07/23/98
Teton River at Highway 89 below Choteau WWTP	T24NR04WS31DBDB	B-2	08/07/98
Teton River at Miller's below Priest Butte L.	T24NR04WS33CDD	B-2	08/05/98
Teton River at Highway 221 east of Choteau	T24NR04WS23DCD	B-2	08/05/98
Teton River at Interstate 15 below Rest Area	T25NR01WS15BBA	B-3	08/04/98
Teton River at Kerr Bridge (USGS Station)	T25NR01ES12CCDC	B-3	08/04/98
Teton River at Dent Bridge NNE of Great Falls	T25NR04ES34DDAC	B-3	08/04/98
Teton River above bridge near mouth near Loma	T25NR09ES12CDAC	B-3	08/04/98

¹ Surface Water Quality Standards. Revised July 1994. Rule 16.20.607. Water-Use Classifications -- Missouri River Drainage. Administrative Rules of Montana.

Table 2. Diatom association metrics used to evaluate biological integrity in Montana streams: reference, range of values in Montana streams, and expected direction of metric response to increasing anthropogenic perturbation or natural stress.

Metric	Reference	Range of Values	Expected Response
Shannon Species Diversity	Bahls 1979	0.00-5.00+	Decrease ¹
Pollution Index ²	Bahls 1993	1.00-3.00	Decrease
Siltation Index ³	Bahls 1993	0.00-90.0+	Increase
Disturbance Index ⁴	Barbour et al. 1997	0.00-100.0	Increase
No. Species Counted	Bahls 1979, 1993	0-100+	Decrease ¹
Percent Dominant Species	Barbour et al. 1997	5.0-100.0	Increase
Percent Abnormal Cells	McFarland et al. 1997	0.0-20.0+	Increase
Similarity Index	Whittaker 1952	0.0-80.0+	Decrease

¹ Shannon diversity and species richness may increase somewhat in naturally nutrient-poor mountain streams in response to slight to moderate increases in nutrients or sediment.

² This is a composite numeric expression of the pollution tolerances assigned by Lange-Bertalot (1979) to the common diatom species; responds to **organic** pollution only.

³ Computed as the sum of the percent abundances of all species in the genera *Navicula*, *Nitzschia*, and *Surirella*. These are common genera of predominantly motile taxa that are able to maintain their positions on the substrate surface in depositional environments.

⁴ Computed as the percent abundance of *Achnanthes minutissima*. This attached taxon typically dominates early successional stages of benthic diatom associations and resists chemical, physical and biological disturbances in the form of metals toxicity, substrate scour by high flows and fast currents, and grazing by macroinvertebrates.

Table 3. Criteria for rating levels of biological integrity, environmental impairment or natural stress, and aquatic life use support in wadable mountain streams of Montana using selected metrics for benthic diatom associations. The lowest rating for any one metric is the overall rating for the study site.

Biological Integrity/ Impairment or Natural Stress/Use Support	Diversity Index (Shannon)	Pollution Index	Siltation Index	Disturbance Index	Number of Species Counted	Percent Dominant Species Cells	Percent Abnormal Cells	Percent Similarity Index ¹
Excellent None/Full Support	>2.99	>2.50	<20.0	<25.0	>29	<25.0	0.0	>59.9
Good/Minor Full Support	2.00- 2.99	2.01- 2.50	20.0- 39.9	25.0- 49.9	20- 29	25.0- 49.9	>0.0- <1.0	40.0- 59.9
Fair/Moderate Partial Support	1.00- 1.99	1.50- 2.00	40.0- 59.9	50.0- 74.9	10- 19	50.0- 74.9	1.0- 9.9	20.0- 39.9
Poor/Severe Nonsupport	<1.00	<1.50	>59.9	>74.9	<10	>74.9	>9.9	<20.0

¹ The Similarity Index or Percent Community Similarity (Whittaker 1952) may be used to compare a study site to an unimpaired upstream control site on the same stream. This metric measures the degree of floristic similarity between diatom associations at the two sites and is the sum of the smaller of the two percent abundance values for each species that is common to both sites. Adjacent riffles on the same stream, without intervening tributaries or environmental perturbations, will generally have at least 60% of their diatom floras in common (Bahls 1993). PCS may also be used to gauge the relative amount of impairment or recovery that occurs between adjacent study sites: >59.9% = very similar floras, no change; 40.0-59.9% = somewhat similar floras, minor change; 20.0-39.9% = somewhat dissimilar floras, moderate change; <20.0% = very dissimilar floras, major change.

Table 4. Criteria for rating levels of biological integrity, environmental impairment or natural stress, and aquatic life use support in wadable plains streams of Montana using selected metrics for benthic diatom associations. The lowest rating for any one metric is the overall rating for the study site.

Biological Integrity/ Impairment or Natural Stress/Use Support	Diversity Index (Shannon)	Pollution Index	Siltation Index	Disturbance Index	Number of Species Counted	Percent Dominant Species	Percent Abnormal Cells	Percent Similarity Index ¹
Excellent None/Full Support	>3.99	>2.25	<50.0	<25.0	>39	<25.0	0.0	>59.9
Good/Minor Full Support	3.00- 3.99	1.76- 2.25	50.0- 69.9	25.0- 49.9	30- 39	25.0 49.9	>0.0- <1.0	40.0- 59.9
Fair/Moderate Partial Support	2.00- 2.99	1.25- 1.75	70.0- 89.9	50.0- 74.9	20- 29	50.0- 74.9	1.0- 9.9	20.0- 39.9
Poor/Severe Nonsupport	<2.00	<1.25	>89.9	>74.9	<20	>74.9	>9.9	<20.0

¹ The Similarity Index or Percent Community Similarity (Whittaker 1952) may be used to compare a study site to an unimpaired upstream control site on the same stream. This metric measures the degree of floristic similarity between diatom associations at the two sites and is the sum of the smaller of the two percent abundance values for each species that is common to both sites. Adjacent riffles on the same stream, without intervening tributaries or environmental perturbations, will generally have at least 60% of their diatom floras in common (Bahls 1993). PCS may also be used to gauge the relative amount of impairment or recovery that occurs between adjacent study sites: >59.9% = very similar floras, no change; 40.0-59.9% = somewhat similar floras, minor change; 20.0-39.9% = somewhat dissimilar floras, moderate change; <20.0% = very dissimilar floras, major change.

Table 5. Estimated relative abundance of algal cells and rank by volume of diatoms and genera of non-diatom algae in periphyton samples collected from McDonald Creek and the upper Teton River in July and August 1998. R = rare, C = common, VC = very common, A = abundant, VA = very abundant.

Taxa	McDonald Creek Upper	Lower	North Fork	Breen's	Teton River Hwy. 89	Miller's ¹	Hwy. 221 ¹
Chlorophyta							
Ankistrodesmus	VC (10)	VC (7)			C (11)	C (10)	C (12)
Bulbochaete	A (4)						
Chaetophora	VA (2)	VA (1)			A (2)	A (2)	A (2)
Cladophora ²		C (8)					
Closteriopsis	R (20)	R (19)					
Closterium	R (19)	R (16)			C (9)	C (7)	
Cosmarium	C (15)	R (17)			R (10)	C (9)	VC (6)
Hormidium						R (11)	C (9)
Mougeotia	C (7)	VC (5)		C (3)		R (12)	
Oedogonium	C (9)				VC (4)	VC (4)	
Oocystis	C (12)	C (14)					
Pediastrum		C (15)			C (8)	C (6)	C (10)
Scenedesmus	C (13)	C (13)				C (8)	C (11)
Selenastrum	C (14)						
Spirogyra	VC (6)	C (9)		C (2)		VC (5)	C (8)
Staurastrum	C (11)	R (18)					
Zygnema	VC (5)	C (10)		VC (1)			
Charophyta							
Chara							VC (4)
Euglenophyta							
Euglena							R (13)
Chrysophyta							
Diatoms							
Tribonema							
Vaucheria							
	A (3)	A (2)	C (1)	C (4)	VA (1)	VA (1)	VA (1)
					C (6)		
					C (7)		

Table 5. Concluded.

Taxa	McDonald Creek Upper	Lower	North Fork	Breen's	Teton River Hwy. 89	Miller's ¹	Hwy. 221 ¹
Rhodophyta							
<i>Audouinella</i>					VC (5)	VC (3)	VC (3)
Cyanophyta							
<i>Amphithrix</i>		VC (6)					
<i>Anabaena</i>	VC (8)						
<i>Chroococcus</i>	C (17)						
<i>Oscillatoria</i>	C (16)	C (11)		R (5)			
<i>Phormidium</i>	C (18)	C (12)			VA (3)		VC (5)
<i>Rivularia</i>	VA (1)	VC (3)					R (14)
<i>Stichosiphon</i>							VC (7)
<i>Tolypothrix</i>		VC (4)					

¹ The periphyton samples from these sites contained large amounts of sediment.

² The *Cladophora* that was collected at sites on the upper Teton River was senescent and covered with epiphytes--including diatoms, *Audouinella*, *Phormidium*, and *Stichosiphon*.

Table 6. Estimated relative abundance of algal cells and rank by volume of diatoms and genera of non-diatom algae in periphyton samples collected from the lower Teton River in August 1998. R = rare, C = common, VC = very common, A = abundant, VA = very abundant.

Taxa	Highway 221 ¹	Interstate 15 ¹	Kerr Bridge ¹	Dent Bridge ¹	Near Mouth
Chlorophyta					
<i>Ankistrodesmus</i>	C (12)		R (7)		VC (1)
<i>Cladophora</i> ²	A (2)	VC (2)			
<i>Cosmarium</i>	VC (6)				
<i>Hormidium</i>	C (9)				
<i>Pediastrum</i>	C (10)				
<i>Scenedesmus</i>	C (11)	R (6)		R (6)	
<i>Spirogyra</i>	C (8)				
Charophyta					
<i>Chara</i>	VC (4)				
Euglenophyta					
<i>Euglena</i>	R (13)				
Chrysophyta					
Diatoms	VA (1)	A (1)	VC (2)	C (3)	VC (2)
Rhodophyta					
<i>Audouinella</i>	VC (3)			C (5)	
Cyanophyta					
<i>Anabaena</i>			R (6)		
<i>Hydrocoleum</i>		C (4)	VC (1)	VC (2)	
<i>Phormidium</i>	VC (5)	C (5)	VC (4)	C (4)	
<i>Rivularia</i>	R (14)	VC (3)	VC (3)	VC (1)	
<i>Stichosiphon</i>	VC (7)		C (5)		

¹ The periphyton samples from these sites contained large amounts of sediment.

² The *Cladophora* that was collected near the mouth of the river near Loma was very coarse and covered with an opaque floc.

Table 7. Percent abundance of major diatom species¹ and values of selected diatom association metrics for periphyton samples collected from McDonald Creek and the upper Teton River in July and August 1998. Underlined values indicate full support of aquatic life uses with minor impairment; **bold values** indicate partial support of aquatic life uses; underlined and bold values indicate nonsupport of aquatic life uses based on criteria for wadable mountain streams in Table 3. A "p" indicates the diatom was observed as present in the sample but was not encountered during the diatom proportional count.

Species/Metric (Pollution Tolerance Class	McDonald Creek		Teton River			
	Upper	Lower	N. Fork	Breen's Hwy. 89	Miller's Hwy. 221	
<i>Achnanthes minutissima</i> (3)	6.00	4.50	30.50	11.75	9.00	20.37
<i>Cocconeis placentula</i> (3)	0.12	4.87	10.12	0.50	5.50	3.87
<i>Cymbella minuta/silesiaca</i> (2)	1.00	1.37	0.50	3.75	1.12	16.50
<i>Diatoma tenue</i> (2)				7.25	0.12	1.00
<i>Fragilaria construens</i> (3)	7.50	16.50		8.12	0.37	p
<i>Fragilaria pinnata</i> (3)	8.37	15.00	0.25	3.00		
<i>Fragilaria vaucheriae</i> (2)	0.25	0.25	0.75	3.87	5.00	4.37
<i>Gomphonema minutum</i> (3)			0.75		13.00	8.62
<i>Gomphonema parvulum</i> (1)		0.12	0.25	1.25	3.00	14.12
<i>Gomphonema pumilum</i> (3)			10.50	1.25		
<i>Gomphonema subtile</i> (3)			11.75	0.87		0.25
<i>Mastogloia smithii</i> (2)	30.75	1.25				
<i>Rhoicosphenia curvata</i> (3)					10.37	1.87
<i>Synedra ulna</i> (2)	1.37	1.50	0.50	19.25	0.25	1.00
Number of Cells Counted	400	400	400	400	400	400
Shannon Species Diversity	4.17	4.57	3.57	4.49	4.61	4.10
Pollution Index	<u>2.45</u>	2.81	2.94	<u>2.42</u>	2.58	<u>2.27</u>
Siltation Index	5.86	6.60	0.62	<u>2.73</u>	<u>30.81</u>	15.21
Disturbance Index	6.00	4.50	<u>30.50</u>	11.75	9.00	20.37
Number of Species Counted	56	60	36	62	53	52
Percent Dominant Species	<u>30.75</u>	16.50	<u>30.50</u>	19.25	13.00	20.37
Percent Abnormal Cells	0.00	0.00	0.00	0.00	0.00	0.00
Similarity Index		46.93		23.36	22.46	51.55
						51.93

¹ A major diatom species is here defined as one that accounts for 10.0 percent or more of the diatom cells counted at one or more stations in a sample set.

Table 8. Percent abundance of major diatom species¹ and values of selected diatom association metrics for periphyton samples collected from the lower Teton River in August 1998. Underlined values indicate full support of aquatic life uses with minor impairment; **bold values** indicate partial support of aquatic life uses; **underlined and bold values** indicate nonsupport of aquatic life uses based on criteria for wadable plains streams in Table 4. Nonsupport of aquatic life was not recorded in the Teton River.

Species/Metric (Pollution Tolerance Class)	Highway 221	Interstate 15	Kerr Bridge	Dent Bridge	Mouth
<i>Achnanthes minutissima</i> (3)	24.50	17.25	37.50	0.50	28.25
<i>Cymbella microcephala</i> (2)	8.75	5.00	18.87		6.50
<i>Cymbella minuta/silesiaca</i> (2)	10.50	0.62		0.12	
<i>Cymbella sinuata</i> (3)	0.50	1.75	3.87	63.12	14.37
<i>Diatoma tenue</i> (2)	15.12	0.50	0.25		
<i>Fragilaria vaucheriae</i> (2)	18.12	0.87			1.25
<i>Navicula cryptotenella</i> (2)	1.37	12.00	13.75	0.25	6.37
<i>Navicula tripunctata</i> (3)	0.12	3.00	0.75	10.62	1.37
<i>Nitzschia frustulum</i> (2)	0.25	12.37	7.00		10.37
Number of Cells Counted	400	400	400	400	400
Shannon Species Diversity	<u>3.66</u>	4.60	<u>3.10</u>	2.49	<u>3.69</u>
Pollution Index	2.27	2.43	2.51	2.91	2.58
Siltation Index	12.70	<u>54.31</u>	28.60	15.08	27.09
Disturbance Index	24.50	17.25	<u>37.50</u>	0.50	<u>28.25</u>
Number of Species Counted	52	70	<u>38</u>	45	41
Percent Dominant Species	24.50	17.25	<u>37.50</u>	63.12	<u>28.25</u>
Percent Abnormal Cells	<u>0.50</u>	0.00	0.00	0.00	0.00
Similarity Index	39.79	56.46	10.08	24.07	

¹ A major diatom species is here defined as one that accounts for 10.0 percent or more of the diatom cells counted at one or more stations in a sample set.

Figure 1. Streamflow in the Teton River on periphyton sampling dates in 1998 (cfs). Source: Montana Department of Environmental Quality

Figure 2. Specific conductance in the Teton River on periphyton sampling dates in 1998 (mmhos/cm). Source: Montana Department of Environmental Quality

APPENDIX A: DIATOM PROPORTIONAL COUNTS

DIATOM PROPORTIONAL COUNT

Site-Sample No. 1753 - 01 . Notebook No. 11 . Page No. 26 .
 Water and Location McDonald Creek, upper (near Pine Butte Swamp) .
 Sample Date 07 / 22 / 98 . Community B . Substrate N .
 Collector/Agency C. Endicott / MDEQ . Project TMDL .
 HUC 10030205 . Reach No. _____ . County Teton .

 Cells Counted 400 . Total Species 59 . Species Counted 56 .
 Diversity Index 4.167 . Pollution Index 2.447 . Siltation Index 5.86 .
 Similarity Index (compared to site-sample no. 1754 - 01) 46.93 .

No.	Taxon	No. Cells	Values	PRA	PTC
1	<i>Rhopalodia gibba</i>	50		6.25	2
2	<i>Eunotia minor</i>			P	
3	<i>Diploneis oblongella</i>			2.62	
4	<i>Cymbella hustedtii</i>			0.75	
5	<i>Cymbella affinis</i>			0.87	
6	<i>C. cymbiformis</i>			2.25	
7	<i>Caloneis alpestris</i>			P	
⑧	<i>Mastogloia smithii</i>	246		30.75	2
9	<i>M. grevillei</i>	26		3.25	2
10	<i>Fragilaria brevistriata</i>	30		3.75	
11	<i>Fragilaria pinnata</i>	67		8.37	
12	<i>F. construens</i> v. <i>venter</i>	60		7.50	
13	<i>Aulacoseira crassipunctata</i>			0.50	
14	<i>Achnanthes minutissima</i>	48		6.00	
15	<i>Cymbella microcephala</i>			1.75	2
16	<i>C. silesiaca</i>			0.50	2
17	<i>Aulacoseira islandica</i>	23		2.87	
18	<i>Amphora libyca</i>			0.12	
19	<i>Cyclotella antiqua</i>			0.37	
20	<i>Pinularia microstauron</i>			P	
21	<i>Fragilaria vaucheriae</i>			0.25	2
22	<i>Synedra ulna</i>			1.37	2
23	<i>Amphora inariensis</i>			0.62	
24	<i>Amphiplusa pellucida</i>			1.12	2
25	<i>Gomphonema intricatum</i>			0.25	
26	<i>Amphora pediculus</i>			0.62	

No.	Taxon	No. Cells	Values	PRA	PTC
27	<i>Navicula cryptotenella</i>			0.25	
28	<i>N. radiosa</i>			1.12	
29	<i>N. bryophila</i>			0.75	
30	<i>N. sp. cf. peregrina</i>			0.37	2
31	<i>Synedra nanana</i>			0.25	
32	<i>Frustulia spicula</i>			0.25	
33	<i>Tabellaria sp.</i>			0.62	
34	<i>Denticula elegans</i>			0.25	
35	<i>Cymbella minuta</i>			0.50	2
36	<i>Gomphonema clavatum</i>			0.25	2
37	<i>Fragilaria leptostauron</i>			0.50	
38	<i>Gomphonema dichotomum</i>			0.25	
39	<i>G. acuminatum</i>			0.12	
40	<i>Nitzschia amphibia</i>			0.25	2
41	<i>Nitzschia palea</i>			0.50	1
42	<i>N. angustata</i>			0.62	2
43	<i>N. sp. #1</i>			1.25	2
44	<i>N. angustatula</i>			0.25	
45	<i>N. sp. #2</i>			0.25	
46	<i>Epithemia turgida</i>			0.12	
47	<i>Aulacoseira tenuior</i>			2.37	
48	<i>Fragilaria crotonensis</i>			0.37	
49	<i>Brachysira neoexilis</i>			0.25	
50	<i>Gomphonema truncatum</i>			0.12	
51	<i>Caloneis bacillum</i>			1.37	2
52	<i>Epithemia argus</i>			2.62	2
53	<i>Cocconeis placentula</i>			0.12	

Notes/Sketches/Additional Taxa: Slide analyzed 02/11/99 by L. Bahls

Pollution Index:

PRA PTC No. 1 _____ X 1 = _____

+

PRA PTC No. 2 _____ X 2 = _____

+

PRA PTC No. 3 _____ X 3 = _____

= _____ Divided By 100 = _____

Siltation Index:

PRA Navicula sp. _____

+

PRA Nitzschia sp. _____

+

PRA Surirella sp. _____ = _____

Hannaea/09-98/250

SITE_____ SAMP_____ TAXA_____ CHEM_____

DIATOM PROPORTIONAL COUNT

Site-Sample No. 1753 - 01 . Notebook No. 11 . Page No. 26 .
Water and Location McDonald Creek, upper (near Pine Butte Swamp) .
Sample Date 07 / 22 / 98 . Community B . Substrate N .
Collector/Agency C. Endicott / MDEQ . Project TMDL .
HUC _____ . Reach No. _____ . County Teton .

Cells Counted _____ . Total Species _____ . Species Counted _____ .
Diversity Index _____ . Pollution Index _____ . Siltation Index _____ .
Similarity Index (compared to site-sample no. _____ - _____) _____ .

No.	Taxon	No. Cells	Values	PRA	PTC
1	<i>Cymbella muelleri</i>	1		0.12	2
2	<i>Synedra parasitica</i>	11		0.25	2
3	<i>Diatoma tenue</i>	11		0.25	2
4	<i>Nitzschia valdecostata</i>	11		0.25	2
5	<i>Amphora</i> sp. cf. <i>A. veneta</i>	1		0.12	1
6	<i>Amphora montana</i>	11		0.25	
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					

Site-Sample No. 175 - 01.4 4
Page 2 of 2

No.	Taxon	No. Cells	Values	PRA	PTC
27					
28					
29					
30					
31					
32					
33					
34					
35					
36					
37					
38					
39					
40					
41					
42					
43					
44					
45					
46					
47					
48					
49					
50					
51					
52					
53					

Notes/Sketches/Additional Taxa: Slide analyzed 02/11/99 by L. Bahls

Site location: T24N R07W Section 2 DADD

Lat. 47 51 39

Long. 112 27 18

Pollution Index:

PRA PTC No. 1 0.62 X 1 = 0.62PRA PTC No. 2 54.09 X 2 = 108.18PRA PTC No. 3 45.29 X 3 = 135.87= 244.67 Divided By 100 = 2.447

Siltation Index:

PRA Navicula sp. 2.49PRA Nitzschia sp. 3.37PRA Surirella sp. 0.0 = 5.1

DIATOM PROPORTIONAL COUNT

Site-Sample No. 1754 - 01 . Notebook No. 11 . Page No. 27 .
 Water and Location McDonald Creek, lower (near mouth) .
 Sample Date 07/22/98 . Community B . Substrate N .
 Collector/Agency C. Endicott / MDEQ . Project TMDL .
 HUC 10030205 . Reach No. _____ . County Teton .

 Cells Counted 400 . Total Species 62 . Species Counted 60 .
 Diversity Index 4.575 . Pollution Index 2.807 . Siltation Index 6.60 .
 Similarity Index (compared to site-sample no. 1753 - 01) 46.93 .

No.	Taxon	No. Cells	Values	PRA	PTC
1	<i>Diploneis oblongella</i>	22		2.75	
2	<i>Amphora pediculus</i>			3.37	
3	<i>A. libyca</i>			0.12	
4	<i>A. sp. cf. A. veneta</i>			0.50	1
5	<i>Cocconeis placentula</i>	39		4.87	
6	<i>C. pediculus</i>	28		3.50	
7	<i>Fragilaria brevistriata</i>			7.75	
8	<i>F. pinnata</i>	120		15.00	
9	<i>F. construens</i>	132		16.50	
10	<i>F. leptostauron</i>			3.12	
11	<i>Rhopalodia gibba</i>	45		5.62	2
12	<i>Cymbella affinis</i>			1.87	
13	<i>C. cymbiformis</i>			1.75	
14	<i>C. hustedtii</i>			2.62	
15	<i>Synedra ulna</i>			1.50	2
16	<i>Eunotia minor</i>			2.37	
17	<i>Cyclotella distinguenda</i>			0.50	2
18	<i>Aulacoseira crassipunctata</i>			0.37	
19	<i>A. tenuis</i>			0.25	
20	<i>A. islandica</i>			0.37	
21	<i>Achnanthes minutissima</i>	36		4.50	
22	<i>Gomphonema subtile</i>			0.62	
23	<i>Cymbella delicatula</i>			1.25	
24	<i>Mastogloia smithii</i>	10		1.25	2
25	<i>Caloneis alpestris</i>			0.37	
26	<i>Cymbella prostrata</i>			1.87	

No.	Taxon	No. Cells	Values	PRA	PTC
27	<i>Navicula radicata</i>			1.37	—
28	<i>N. bryophila</i>			0.87	
29	<i>N. pseudoscutiformis</i>			P	
30	<i>N. sp. cf. weinzierlii</i>			0.25	2
31	<i>N. cryptotenella</i>			1.25	2
32	<i>N. tripunctata</i>			0.75	
33	<i>N. ignota</i> v. <i>acceptata</i>			0.12	2
34	<i>N. menisculus</i>			0.25	2
35	<i>N. laevissima</i>			0.25	
36	<i>N. caterva</i>			0.25	2
37	<i>Nitzschia</i> sp.			0.25	2
38	<i>Cymbella macrocephala</i>			1.25	2
39	<i>Synedra delicatissima</i>			0.12	
40	<i>Gomphonema intricatum</i>			0.12	
41	<i>Nitzschia angustata</i>			P	
42	<i>N. lacuum</i>			0.12	
43	<i>Achnanthes clevei</i>			0.37	
44	<i>Amphipleura pellucida</i>			0.25	—
45	<i>Gomphonema parvulum</i>			0.12	
46	<i>Amphora inianensis</i>			0.37	
47	<i>Achnanthes biasoletiana</i>			0.50	
48	<i>Achnanthes lanceolata</i>			1.25	2
49	<i>Diatoma vulgare</i>			0.12	
50	<i>Cymbella mexicana</i>			0.12	
51	<i>Mastogloia guillei</i>			0.75	2
52	<i>Amphora thumensis</i> (39.05 x 109.5)			0.87	2
53	<i>Cymbella silesiaca</i>			0.87	2

Notes/Sketches/Additional Taxa: Slide analyzed 02/12/99 by L. Bahls

Pollution Index:

PRA PTC No. 1 _____ X 1 = _____

PRA PTC No. 2 _____ X 2 = _____ +

PRA PTC No. 3 _____ X 3 = _____ +

= _____ Divided By 100 = _____

Siltation Index:

PRA *Navicula* sp. _____PRA *Nitzschia* sp. _____ +PRA *Surirella* sp. _____ +

= _____

Hannaea/09-98/250

SITE _____ SAMP _____ TAXA _____ CHEM _____

DIATOM PROPORTIONAL COUNT

Site-Sample No. 1754 - 01 . Notebook No. 11 . Page No. 27 .
 Water and Location McDonald Creek, lower (near mouth) .
 Sample Date 07 / 22 / 98 . Community B . Substrate N .
 Collector/Agency C. Endicott / MDEQ . Project TMDL .
 HUC 10030205 . Reach No. _____ . County Teton .

 Cells Counted _____ . Total Species _____ . Species Counted _____ .
 Diversity Index _____ . Pollution Index _____ . Siltation Index _____ .
 Similarity Index (compared to site-sample no. _____ - _____) _____ .

No.	Taxon	No. Cells	Valves	PRA	PTC
1	<i>Gomphonema truncatum</i>	11		0.37	
2	<i>Navicula decussis</i>	11		0.25	
3	<i>Cocconeis thumensis</i> (37.0 x 112.3)	11		0.25	
4	<i>Epithemia adnata</i>	11		0.25	2
5	N. sp. (<i>Navicula</i> sp.) #1	1		0.12	2
6	<i>Cymbella minuta</i>	111		0.50	2
7	<i>Navicula</i> sp. cf. <i>vitabunda</i>	11		0.25	2
8	N. sp. #2	11		0.25	2
9	<i>Fragilaria vaucheriae</i>	11		0.25	2
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					

No.	Taxon	No. Cells	Values	PRA	PTC
27					
28					
29					
30					
31					
32					
33					
34					
35					
36					
37					
38					
39					
40					
41					
42					
43					
44					
45					
46					
47					
48					
49					
50					
51					
52					
53					

Notes/Sketches/Additional Taxa: Slide analyzed 02/12/99 by L. BahlsSite Location : T25N R06W section 34 BDADLat. 47 52 55Long. 112 21 50

Pollution Index:

PRA PTC No. 1 0.62 X 1 = 0.62PRA PTC No. 2 18.10 X 2 = 36.20PRA PTC No. 3 81.28 X 3 = 243.84= 280.66 Divided By 100 = 2.807

Siltation Index:

PRA Navicula sp. 6.23PRA Nitzschia sp. 0.37PRA Surirella sp. 0.0 = 6.6

DIATOM PROPORTIONAL COUNT

Site-Sample No. 1747 - 01 . Notebook No. 11 . Page No. 20 .
 Water and Location North Fork Teton River nr. mouth (Abbott's) .
 Sample Date 07/22/98 . Community B . Substrate N .
 Collector/Agency C. Endicott / MDEQ . Project TMDL .
 HUC 10030205 . Reach No. _____ . County Teton .

 Cells Counted 400 . Total Species 41 . Species Counted 36 .
 Diversity Index 3.574 . Pollution Index 2.940 . Siltation Index 0.62 .
 Similarity Index (compared to site-sample no. 1748 - 01) 23.36 .

No.	Taxon	No. Cells-Valves	PRA	PTC
①	<i>Achnanthes minutissima</i>	244	30.50	
2	<i>A. biasolettiana</i>	44	5.50	
3	<i>Synedra rumpens</i>	I	0.12	2
4	<i>S. ulna</i>		0.50	2
⑤	<i>Gomphonema punctum</i>	84	10.50	
⑥	<i>G. subtile</i>	94	11.75	
7	<i>G. angustatum</i>	I	1.37	2
8	<i>G. angustum</i> (= <i>G. intricatum</i>)	75	9.37	
9	<i>G. minutum</i>		0.75	
⑩	<i>Cocconeis placentula</i>	81	10.12	
11	<i>Denticula tenuis</i>		0.25	
12	<i>Cymbella affinis</i>	10	1.25	
13	<i>C. sinuata</i>	34	4.25	
14	<i>C. delicatula</i>		P	
15	<i>Amphora ovalis</i>		P	
16	<i>Diatoma mesodon</i>		1.00	
17	<i>Hannaea arcus</i>		0.87	
18	<i>Denticula elegans</i>		P	
19	<i>Melosira islandica</i>		1.25	
20	<i>Fragilaria leptostauron</i>		1.00	
21	<i>F. vaucheriae</i> (incl. v. <i>capitellata</i>)		0.75	2
22	<i>Aulacoseira crassipunctata</i>		0.62	
23	<i>A. sp.</i>		1.25	
24	<i>Cymbella microcephala</i>		1.25	2
25	<i>Aulacoseira italica</i>		0.87	
26	<i>Gomphonema bohemicum</i>		0.75	

No.	Taxon	No. Cells	Values	PRA	PTC
27	<i>Navicula gregaria</i>			P	
28	<i>N. minima</i>			0.37	
29	<i>N. sp. cf. perpusilla</i>			0.25	Z
30					
31					
32					
33					
34					
35					
36					
37					
38					
39					
40					
41	<i>Nitzschia intermedia</i>			P	
42					
43	<i>Cymbella amphicephala</i>			0.25	
44	<i>Achnanthes sp. #2 cf. laevis</i>			0.25	
45	<i>Diatoma hemale</i>			0.12	
46	<i>Achnanthes sp. #1 cf. linearis</i>			0.25	
47	<i>Cymbella minuta</i>			0.50	Z
48	<i>Gomphonema parvulum</i>			0.25	1
49	<i>Cymbella cistula</i>			0.37	
50	<i>Fragilaria pinnata</i>			0.25	
51	<i>Caloneis sp. (griddle)</i>			0.25	
52	<i>Aulacoseira cf. crenulata</i>			0.50	
53	<i>Cymbella sp. (cf. pseudoaffinis)</i>			0.50	

Notes/Sketches/Additional Taxa: Slide analyzed 02/07/99 by L. Bahls
 #19 = *Aulacoseira islandica* Site Location: T25N R08W Sect. 28 CDCB
 #22 cf. *A. granulata* Lat. 47 53 10
 Long. 112 38 15

Sample incompletely diluted; resolution not very good.

Pollution Index:

PRA PTC No. 1 0.62 X 1 = 0.62

PRA PTC No. 2 4.74 X 2 = 9.48

PRA PTC No. 3 94.64 X 3 = 283.92

= 294.02 Divided By 100 = 2.940

Siltation Index:

PRA *Navicula* sp. 0.62

PRA *Nitzschia* sp. 0.0

PRA *Surirella* sp. 0.0 = 0.6

DIATOM PROPORTIONAL COUNT

Site-Sample No. 1748 - 01 . Notebook No. 11 . Page No. 20 .
 Water and Location Teton River @ Breen's (above Choteau) .
 Sample Date 07 / 23 / 98 . Community B . Substrate N .
 Collector/Agency C. Endicott / MDEQ . Project TMDL .
 HUC 10030205 . Reach No. _____ . County Teton .

 Cells Counted 400 . Total Species 67 . Species Counted 62 .
 Diversity Index 4.493 . Pollution Index 2.422 . Siltation Index 2.73 .
 Similarity Index (compared to site-sample no. 1747 - 01) 23.36 .

No.	Taxon	No. Cells Valves	PRA	PTC
①	<i>Achnanthes minutissima</i>	94	11.75	
2	<i>A. biasolettiana</i>	III	1.00	
③	<i>Synedra ulna</i>	154	19.25	2
4	<i>S. amphicephala</i>	IIII	1.50	
5	<i>Cymbella microcephala</i>	40	5.00	2
6	<i>Synedra famelica</i>	IIII	1.75	2
7	<i>Achnanthes lanceolata</i>		P	
8	<i>Isolasioira italica</i>	II	0.25	
9	<i>A. islandica</i>	IIII	1.75	
10	<i>Amphipleura pellucida</i>	II	0.37	2
11	<i>Cyclotella distinquenda</i>	59	7.37	2
12	<i>Cocconeis placentula</i>	III	0.50	
13	<i>Diatoma tenue</i>	58	7.25	2
14	<i>Fragilaria leptostauron</i>	III	0.50	
15	<i>Fragilaria nanana</i>	IIII	2.50	
16	<i>F. capucina</i>	IIII	2.37	2
17	<i>F. vaucheriae</i> (= <i>S. austriaca</i> Grun.)	31	3.87	2
18	<i>F. construens</i>	65	8.12	
19	<i>F. pinnata</i>	IIII	3.00	
20	<i>Brachysira neoexilis</i>	IIII	1.37	
21	<i>Cymbella minuta</i>	30	3.75	2
22	<i>C. delicatula</i>	II	0.25	
23	<i>Gomphonema intricatum</i>	IIII	1.00	
24	<i>G. subtile</i>	IIII	0.87	
25	<i>Eunotia</i> sp. (girdle) #1	I	0.12	
26	<i>Tabellaria</i> sp.		P	

No.	Taxon	No. Cells	Values	PRA	PTC
27	<i>Synedra tenera</i>		1	0.75	
28	<i>Cyclotella meneghiniana</i>			0.50	
29	<i>Mastogloia grevillei</i>			0.12	2
30	<i>Cymbella cesatii</i>			0.50	
31	<i>Amphora pediculus</i>			0.37	
32	<i>Diploneis oblongella</i>			0.25	
33	<i>Fragilaria (Synedra) delicatissima</i>			0.87	
34	<i>Cymbella</i> sp. cf. <i>brehmii</i>			0.25	
35	<i>Gomphonema olivaceum</i>			0.25	
36	<i>Meridion circulare</i>			0.25	
37	<i>Cyclotella Kutziniana</i>			0.12	2
38	<i>Pinnularia microstauron</i>			0.12	2
39	<i>Gomphonema angustatum</i>			0.25	2
40	<i>Nitzschia perminuta</i>			0.25	
41	<i>Nitzschia bacillum</i>			P	
42	<i>N. dissipata</i>			0.25	
43	<i>N. palea</i>			0.87	1
44	<i>N. lanceolata</i>			0.12	
45	<i>Achnanthes flexella</i>			0.12	
46	<i>Cymbella affinis</i>			0.25	
47	<i>C. amphicephala</i>			0.25	
48	<i>Aulacoseira tenuior</i>			1.50	
49	<i>Gomphonema parvulum</i>			1.25	1
50	<i>Gomphonema parvulum</i>			1.25	
51	<i>Cymbella cristata</i>			P	
52	<i>Amphora montana</i>			P	
53	<i>A. mariensis</i>			0.50	

Notes/Sketches/Additional Taxa: Slide analyzed 02/08/99 by W. Bahls
 #3 Various varieties of *S. ulna* are present

Pollution Index:

PRA PTC No. 1 _____ X 1 = _____

PRA PTC No. 2 _____ X 2 = _____
+PRA PTC No. 3 _____ X 3 = _____
+

= _____ Divided By 100 = _____

Siltation Index:

PRA Navicula sp. 0.62PRA Nitzschia sp. 2.11
+PRA Surirella sp. 0.0 = 2.7

Hannaea/09-98/250

SITE _____ SAMP _____ TAXA _____ CHEM _____

DIATOM PROPORTIONAL COUNT

Site-Sample No. 1748 - 01 . Notebook No. 11 . Page No. 20 .
 Water and Location Teton River @ Breen's (above Choteau) .
 Sample Date 07 / 23 / 98 . Community B . Substrate N .
 Collector/Agency C. Endicott/MDEQ . Project TMDL .
 HUC 10030205 . Reach No. _____ . County Teton .

 Cells Counted _____ . Total Species _____ . Species Counted _____ .
 Diversity Index _____ . Pollution Index _____ . Siltation Index _____ .
 Similarity Index (compared to site-sample no. _____ - _____) _____ .

No.	Taxon	No. Cells	Values	PRA	PTC
1	<i>Cocconeis pediculus</i>	11		0.25	
2	<i>Gomphonema</i> sp. (<i>ventricosa</i> ?) (girdle)	111		0.37	
3	<i>Nitzschia amphibia</i>	11		0.25	2
4	<i>Aulacoseira</i> sp. cf. <i>distans</i>	1		0.12	
5	<i>Navicula radians</i>	1		0.12	
6	<i>Aulacoseira crassipunctata</i>	111		0.37	
7	<i>Fragilaria crotonensis</i>	11		0.25	
8	<i>Caloneis bacillum</i>	11		0.25	2
9	<i>Nitzschia sublinearis</i>	1		0.12	2
10	<i>Synedra parasitica</i>	11		0.25	2
11	<i>Nitzschia lacuum</i>	11		0.25	
12	<i>Eunotia</i> sp. # 2	1		0.12	
13	<i>Navicula perpusilla</i>	11		0.25	2
14	<i>N. cryptotenella</i>	11		0.25	2
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					

Site-Sample No. 174 - 01

Page 4 of 4

No.	Taxon	No. Cells/Valves	PRA	PTC
27				
28				
29				
30				
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				
41				
42				
43				
44				
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48				
49				
50				
51				
52				
53				

Notes/Sketches/Additional Taxa: Slide analyzed 02/08/99 by L. Bauls

Site Location: T25N R06W Section 36 BDCA

Lat. 47 52 36

Long. 112 19 15

Pollution Index:

PRA PTC No. 1 2.12 X 1 = 2.12

PRA PTC No. 2 53.58 X 2 = 107.16

PRA PTC No. 3 44.30 X 3 = 132.90

= 242.18 Divided By 100 = 2.422

Siltation Index:

PRA Navicula sp. 0.62

PRA Nitzschia sp. 2.11

PRA Surirella sp. 0.0 = 2.7

DIATOM PROPORTIONAL COUNT

Site-Sample No. 1749 - 01 . Notebook No. 11 . Page No. 21 .Water and Location Teton River @ Highway 89 @ McKays .Sample Date 08 / 07 / 98 . Community B . Substrate N .Collector/Agency C. Endicott / MDEQ . Project TMDL .HUC 10030205 . Reach No. _____ . County Teton .*****
Cells Counted 400 . Total Species 60 . Species Counted 53 .Diversity Index 4.608 . Pollution Index 2.579 . Siltation Index 30.81 .Similarity Index (compared to site-sample no. 1748 - 01) 22.46 .

No.	Taxon	No. Cells	Values	PRA	PTC
1	<i>Cocconeis placentula</i>	44		5.50	
2	<i>C. pediculus</i>	38		4.75	
3	<i>Fragilaria vaucheriae</i>			5.00	2
4	<i>F. leptostauron</i>			0.50	
5	<i>F. construens</i>			0.37	
6	<i>Cyclotella meneghiniana</i>			1.00	2
7	<i>Achnanthes minutissima</i>	72		9.00	
8	<i>Diatoma tenue</i>	1		0.12	2
9	<i>Rhoicosphenia curvata</i>	83		10.37	
10	<i>Epithemia sorex</i>	32		4.00	
11	<i>Gomphonema minutum</i>	104		13.00	
12	<i>G. parvulum</i>	24		3.00	1
13	<i>G. olivaceum</i>			P	
14	<i>Cymbella minuta</i>			1.12	2
15	<i>C. microcephala</i>			1.75	2
16	<i>Surirella angusta</i>			P	
17	<i>Amphora pediculus</i>			2.62	
18	<i>Cymbella sinuata</i>			1.87	
19	<i>Surirella brebissonii</i>			P	
20	<i>Amphora libyca</i>	1		0.12	
21	<i>Synedra rumpens</i>	1		0.12	2
22	<i>S. ulna</i>			0.25	2
23	<i>Cymbella affinis</i>			1.12	
24	<i>Gomphonema truncatum</i>			P	
25	<i>Cymbella muelleri</i>			P	
26	<i>C. caespitosa</i>			1.25	2

No.	Taxon	No. Cells/Valves	PRA	PTC
27	<i>Navicula radiosa</i>		0.12	
28	<i>N. caterva</i>		3.87	
29	<i>N. capitata radiata</i>		4.25	2
30	<i>N. reichardtiana</i>		1.50	2
31	<i>N. veneta</i>		0.50	1
32	<i>N. minuscula</i>		P	
33	<i>N. tripunctata</i>		0.50	
34	<i>N. cryptotenella</i>		3.37	2
35	<i>N. viridula</i> v. <i>rostellata</i>		0.12	2
36	<i>N. decussis</i>		0.25	
37	<i>N. cryptocephala</i>		0.50	
38	<i>N. minuscula</i>		0.25	1
39	<i>N. minima</i>		0.25	1
40	<i>Melosira crassipunctata</i>		0.12	
41	<i>Nitzschia dissipata</i>	55	6.87	
42	<i>N. frustulum</i> (v. <i>subsalina</i>)		1.00	2
43	<i>N. inconspicua</i>		1.62	2
44	<i>N. paleacea</i>		0.62	
45	<i>N. palea</i>		2.62	
46	<i>N. lacuum</i>		0.37	
47	<i>N. amphibia</i>		0.50	2
48	<i>N. perminuta</i>		0.12	
49	<i>Achnanthes lanceolata</i>		0.37	2
50	<i>Gomphonema ventricosa</i>		0.25	
51	<i>Epithemia adnata</i>		0.12	2
52	<i>Amphora inariensis</i>		0.87	
53	<i>Neidium binode</i>		P	

Notes/Sketches/Additional Taxa: Slide analyzed 02/09/99 by L. Bahls
#42 compare with *N. Liebetruithii*

Pollution Index:

PRA PTC No. 1 _____ X 1 = _____

PRA PTC No. 2 _____ X 2 = _____

PRA PTC No. 3 _____ X 3 = _____

= _____ Divided By 100 = _____

Siltation Index:

PRA Navicula sp. _____

PRA Nitzschia sp. _____

PRA Surirella sp. _____

Hannaea/09-98/250

SITE_____

SAMP_____

.AXA_____

CHEM_____

DIATOM PROPORTIONAL COUNT

Site-Sample No. 1749 - 01 . Notebook No. 11 . Page No. 21 .Water and Location Teton River @ Highway 89 @ McKays .Sample Date 08 / 07 / 98 . Community B . Substrate N .Collector/Agency C. Endicott / MDEQ . Project TMDL .HUC 10030205 . Reach No. _____ . County Teton .*****
Cells Counted _____ . Total Species _____ . Species Counted _____ .

Diversity Index _____ . Pollution Index _____ . Siltation Index _____ .

Similarity Index (compared to site-sample no. _____ - _____) _____ .

No.	Taxon	No. Cells	Values	PRA	PTC
1	<i>Nitzschia fonticola</i>	11		0.25	
2	<i>N. angustatula</i>	1		0.12	2
3	<i>N. bacillum</i>	1111		0.50	
4	<i>Navicula lenzii</i> Hustedt (38.0 x 103.0)	1		0.12	2
5	<i>Nitzschia acicularis</i>	11		0.25	2
6	<i>Navicula gregaria</i>	11		0.25	2
7	<i>N. pupula</i>	1		0.12	2
8					
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19					
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21					
22					
23					
24					
25					
26					

No.	Taxon	No. Cells Values	PRA	PTC
27				
28				
29				
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31				
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Notes/Sketches/Additional Taxa:

Site location: T24N R04W Section 31 DBDB

Lat. 47 47 25

Long. 112 09 55

Pollution Index:

PRA PTC No. 1 6.62 X 1 = 6.62PRA PTC No. 2 28.81 X 2 = 57.62PRA PTC No. 3 64.57 X 3 = 193.71= 257.95 Divided By 100 = 2.579

Siltation Index:

PRA Navicula sp. 15.97PRA Nitzschia sp. 14.84PRA Surirella sp. P = 30.

DIATOM PROPORTIONAL COUNT

Site-Sample No. 0825 - 02 . Notebook No. 11 . Page No. 22 .
 Water and Location Teton River @ Miller's below Priest Butte Lake .
 Sample Date 08 / 05 / 98 . Community B . Substrate N .
 Collector/Agency C. Endicott / MDEQ . Project TMDL .
 HUC 10030205 . Reach No. _____ . County Teton .

 Cells Counted 400 . Total Species 65 . Species Counted 52 .
 Diversity Index 4.104 . Pollution Index 2.292 . Siltation Index 15.21 .
 Similarity Index (compared to site-sample no. 1749 - 01) 51.55 .

No.	Taxon	No. Cells/Valves	PRA	PTC
①	<i>Achnanthes minutissima</i>	163	20.37	
2	<i>Cymbella amphicephala</i>		P	
3	<i>Cymbella minuta</i>		0.75	2
4	<i>C. sinuata</i>		0.75	
5	<i>Gomphonema minutum</i>	69	8.62	
6	<i>Fragilaria vaucheriae</i>	35	4.37	2
7	<i>Diatoma tenue</i>		1.00	2
8	<i>Rhizosolenia curvata</i>	15	1.87	
⑨	<i>Gomphonema parvulum</i>	113	14.12	1
10	<i>G. olivaceum</i>		P	
11	<i>G. subtile</i>		0.25	
12	<i>Cocconeis placentula</i>	31	3.87	
13	<i>C. pediculus</i>	25	3.12	
14	<i>Amphora pediculus</i>		0.75	
15	<i>A. mairiensis</i>		0.25	
16	<i>Cymbella muciocephala</i>		1.87	2
17	<i>C. affinis</i>		2.50	
18	<i>Cyclotella meneghiniana</i>		0.25	2
19	<i>C. distinguenda</i>		P	
20	<i>Synedra ulna</i>		1.00	2
⑳	<i>Cymbella silesiaca</i>	126	15.75	2
22	<i>C. muelleri</i>		0.25	2
23	<i>Gomphonema mexicanum</i>		P	
24	<i>Fragilaria construens</i>		P	
25	<i>Amphipleura pellucida</i>		0.87	2
26	<i>Diatoma vulgare</i>		0.12	

No.	Taxon	No. Cells	Values	PRA	PTC
27	<i>Navicula tripunctata</i>			0.50	
28	<i>N. capitatoradiata</i>			2.37	
29	<i>N. cryptotenella</i>			2.37	2
30	<i>N. caterva</i>			1.50	2
31	<i>N. libonensis</i>			0.25	2
32	<i>N. viridula</i> v. <i>rostellata</i>			0.12	2
33	<i>N. recens</i>			P	
34	<i>N. halophila</i>			0.25	2
35	<i>Surirella brebissonii</i>			0.62	2
36	<i>Diploneis puella</i>			0.37	2
37	<i>Rhopalodia gibba</i>			P	
38	<i>Aulacoseira islandica</i>			0.12	
39	<i>Denticula elegans</i>			0.50	
40	<i>Fragilaria leptostauron</i>			0.12	
41	<i>Nitzschia dissipata</i>			0.75	
42	<i>N. palea</i>			1.00	1
43	<i>N. paleacea</i>			0.50	2
44	<i>N. frustulum</i> (including v. <i>subsalina</i>)			1.50	
45	<i>N. consticta</i> (= <i>N. apiculata</i>)			P	
46	<i>N. intermedia</i>			P	
47	<i>N. lacuum</i>			P	
48	<i>N. sp. cf. supralitoria</i>			0.25	2
49	<i>N. angustata</i>			P	
50	<i>N. sigmoides</i>			P	
51	<i>N. amphibia</i>			0.62	2
52	<i>N. hungarica</i>			P	
53	<i>N. gracilis</i>			0.37	2

Notes/Sketches/Additional Taxa: *Slide analyzed 02/09/99 by L. Bahls*

Pollution Index:

PRA PTC No. 1 _____ X 1 = _____

PRA PTC No. 2 _____ X 2 = _____

PRA PTC No. 3 _____ X 3 = _____

= _____ Divided By 100 = _____

Siltation Index:

PRA *Navicula* sp. _____PRA *Nitzschia* sp. _____PRA *Surirella* sp. _____

= _____

Hannaea/09-98/250

SITE _____ SAMP _____ TAXA _____ CHEM _____

DIATOM PROPORTIONAL COUNT

Site-Sample No. 0825 - 02 . Notebook No. 11 . Page No. 22 .
 Water and Location Teton River @ Miller's below Priest Butte Lake .
 Sample Date 08 / 05 / 98 . Community B . Substrate N .
 Collector/Agency C. Endicott / MDEQ . Project TMDL .
 HUC 10030205 . Reach No. _____ . County Teton .

 Cells Counted _____ . Total Species _____ . Species Counted _____ .
 Diversity Index _____ . Pollution Index _____ . Siltation Index _____ .
 Similarity Index (compared to site-sample no. _____ - _____) _____ .

No.	Taxon	No. Cells-Values	PRA	PTC
1	<i>Navicula veneta</i>		1.00	1
2	<i>Synedra delicatissima</i>		0.12	
3	<i>Nitzschia fonticola</i>		0.12	
4	<i>Cymbella cesatii</i>		0.25	
5	<i>C. caespitosa</i>		0.12	2
6	<i>Navicula cineta</i>		0.50	2
7	<i>Nitzschia</i> sp.		0.25	2
8	<i>Amphora libyca</i>		0.12	
9	<i>Nitzschia bergii</i>		0.12	1
10	<i>N. angustifolia</i>		0.25	2
11	<i>Gomphonema truncatum</i>		0.12	
12	<i>Cymbella</i> sp.		0.12	
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				

Site-Sample No. 085 - 02

4 4
Page 2 of 2

No.	Taxon	No. Cells values	PRA	PTC
27				
28				
29				
30				
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				
41				
42				
43				
44				
45				
46				
47				
48				
49				
50				
51				
52				
53				

Notes/Sketches/Additional Taxa:

#1 = N. cineta v. rostrata

Site Location: T24NR04W Sect. 33C1

Lat. 47 47 04

Long. 112 07 39

Pollution Index:

PRA PTC No. 1 16.24 X 1 = 16.24

PRA PTC No. 2 38.32 X 2 = 76.64

PRA PTC No. 3 45.44 X 3 = 136.32

= 229.20 Divided By 100 = 2.292

Siltation Index:

PRA Navicula sp. 8.86

PRA Nitzschia sp. 5.73

PRA Surirella sp. 0.62 = 15.2

DIATOM PROPORTIONAL COUNT

Site-Sample No. 1750 - 01 . Notebook No. 11 . Page No. 23 .
 Water and Location Teton River @ Highway 221 (~5 mi. east of Choteau)
 Sample Date 08/05/98 . Community B . Substrate N .
 Collector/Agency C. Endicott / MDEQ . Project TMDL .
 HUC 10030205 . Reach No. _____ . County Teton .

 Cells Counted 400 . Total Species 77 . Species Counted 52 .
 Diversity Index 3.665 . Pollution Index 2.273 . Siltation Index 12.70 .
 Similarity Index (compared to site-sample no. 0825 - 02) 51.93 .

No.	Taxon abnormal values	No. Cells-Values	PRA	PTC
1	<i>Cymbella muelleri</i>	1	0.12	2
2	<i>C. silesiaca</i>	75	9.37	2
3	<i>C. microcephala</i>	70	8.75	2
4	<i>C. amphicephala</i>	1	0.12	
5	<i>C. minuta</i>		1.12	2
⑥	<i>Achnanthes minutissimum</i>	196	24.5	
⑦	<i>Diatoma tenue</i> +	117 = 121	15.12	2
8	<i>Rhoicosphenia curvata</i>	1	0.12	
9	<i>Denticula elegans</i>		0.25	
10	<i>Brachysira neoexilis</i>		0.25	
⑪	<i>Fragilaria vaucheriae</i>	145	18.12	2
12	<i>Cymbella sinuata</i>		0.50	
13	<i>Surirella ovalis</i>		P	
14	<i>Synedra ulna</i>	1 + 25 = 26	3.25	2
15	<i>S. famelica</i>		P	
16	<i>Stauroneis smithii</i>		P	
17	<i>Diploneis puella</i>	1	0.12	2
18	<i>Gomphonema minutum</i>		0.50	
19	<i>Surirella brebissonii</i>		0.50	2
20	<i>Cyclotella meneghiniana</i>		P	
21	<i>Cymbella caespitosa</i>		0.25	2
22	<i>Cyclotella distinguenda</i>		P	
23	<i>Surirella angusta</i>		P	
24	<i>Rhopalodia musculus</i>		P	
25	<i>Cocconeis placentula</i>		0.25	
26	<i>C. pediculus</i>		0.50	

No.	Taxon	No. Cells	Values	PRA	PTC
27	<i>Navicula cryptotenella</i>			1.37	
28	<i>N. veneta</i>			1.87	
29	<i>N. reichardtiana</i>			0.75	2
30	<i>N. capitatoradiata</i>		14	1.75	2
31	<i>N. menisculus</i>			P	
32	<i>N. capitata</i> (v. <i>hungarica</i>)			P	
33	<i>N. tripunctata</i>			0.12	
34	<i>N. catena</i>			0.50	2
35	<i>N. laevissima</i>			P	
36	<i>Surirella ovata</i>			P	
37	<i>Amphipleura pellucida</i>			0.75	2
38	<i>Synedra nanana</i>			0.25	
39	<i>Navicula pupula</i>			P	
40	<i>Cymatopleura solea</i>			P	
41	<i>Nitzschia constriata</i> (= <i>N. apiculata</i>)			0.12	2
42	<i>N. amphibia</i>			0.25	2
43	<i>N. dissipata</i>		7	0.87	
44	<i>N. palea</i>			1.37	
45	<i>N. linearis</i>			0.12	
46	<i>N. angustata</i>			P	
47	<i>N. gracilis</i>			1.00	2
48	<i>N. angustatula</i>			0.25	2
49	<i>N. pusilla</i>			P	
50	<i>Diploneis oblongella</i>			P	
51	<i>Cymbella affinis</i>			0.25	
52	<i>Gomphonema dwaceum</i>			0.50	
53	<i>Amphora pediculus</i>			0.25	

Notes/Sketches/Additional Taxa: Slide analyzed 02/10/99 by K. Bahls
 Deformed valves of Diatoma tenue present.

Pollution Index:

PRA PTC No. 1 _____ X 1 = _____

PRA PTC No. 2 _____ X 2 = _____

PRA PTC No. 3 _____ X 3 = _____

= _____ Divided By 100 = _____

Siltation Index:

PRA *Navicula* sp. _____PRA *Nitzschia* sp. _____PRA *Surirella* sp. _____ = _____

Hannaea/09-98/250

SITE _____

SAMP _____

TAXA _____

CHEM _____

DIATOM PROPORTIONAL COUNT

Site-Sample No. 1750 - 01 . Notebook No. 11 . Page No. 23
 Water and Location Teton River @ Highway 221 (~ 5 mi. e. of Choteau)
 Sample Date 08 / 05 / 98 . Community B . Substrate N
 Collector/Agency C. Endicott / MDEQ . Project TMDL
 HUC 10030205 . Reach No. _____ . County Teton

 Cells Counted _____ . Total Species _____ . Species Counted _____
 Diversity Index _____ . Pollution Index _____ . Siltation Index _____
 Similarity Index (compared to site-sample no. _____ - _____)

No.	Taxon	No. Cells	Values	PRA	PTC
1	<i>Gomphonema parvulum</i>			0.50	1
2	<i>Navicula stroemii</i>			0.12	2
3	<i>Fragilaria construens</i>			P	
4	<i>Synedra delicatissima</i>			0.37	
5	<i>Navicula libonensis</i>			P	
6	<i>Epithemia sorex</i>			P	
7	<i>Nitzschia bacillum</i>			P	
8	<i>Navicula gregaria</i>			0.25	2
9	<i>Diatoma vulgare</i>			P	
10	<i>Opephora</i> sp.			P	
11	<i>Nitzschia intermedia</i>			P	
12	<i>Pleurosigma delicatulum</i>			P	
13	<i>Nitzschia reversa</i>			P	
14	<i>Cymbella delicatula</i>			0.25	
15	<i>Amphora libyca</i>			0.25	
16	<i>Caloneis lewisii</i>			0.25	
17	<i>Amphora inariensis</i>			0.12	
18	<i>Nitzschia paleacea</i>			0.50	2
19	<i>N. acicularis</i>			0.25	2
20	<i>Navicula radiosa</i>			0.12	
21	<i>Nitzschia frustulum</i>			0.25	2
22	<i>Synedra amphicephala</i>			0.25	
23	<i>Nitzschia lacuum</i>			0.12	
24	<i>N. capitellata</i>			0.25	2
25					
26					

No.	Taxon	No. Cells	Values	PRA	PTC
27	<i>Gomphonema parvulum</i>				
28					
29					
30					
31					
32					
33					
34					
35					
36					
37					
38					
39					
40					
41					
42					
43					
44					
45					
46					
47					
48					
49					
50					
51					
52					
53					

Notes/Sketches/Additional Taxa: *Slide analyzed 02/10/99 by L. Bahls*Site Location: *T24N R04W 23 DCD*Lat. *47 48 42*Long. *112 04 52*

Pollution Index:

PRA PTC No. 1 3.74 X 1 = 3.74PRA PTC No. 2 65.20 X 2 = 130.40PRA PTC No. 3 31.06 X 3 = 93.18= 227.32 Divided By 100 = 2.273

Siltation Index:

PRA Navicula sp. 6.85PRA Nitzschia sp. 5.35PRA Surirella sp. 0.5 = 12.7

DIATOM PROPORTIONAL COUNT

Site-Sample No. 0393 - 05 . Notebook No. 11 . Page No. 24 .
 Water and Location Teton River @ I-15 below Rest Area .
 Sample Date 08 / 04 / 98 . Community B . Substrate N .
 Collector/Agency C. Endicott / MDEQ . Project TMDL .
 HUC 10030205 . Reach No. _____ . County Teton .

 Cells Counted 400 . Total Species 75 . Species Counted 70 .
 Diversity Index 4.605 . Pollution Index 2.428 . Siltation Index 54.31 .
 Similarity Index (compared to site-sample no. 1750 - 01) 39.79 .

No.	Taxon	No. Cells	Values	PRA	PTC
①	<i>Achnanthes minutissima</i>	138		17.25	
2	<i>Gomphonema olivaceum</i>			0.37	
3	<i>G. parvulum</i>			0.12	1
4	<i>Amphora inariensis</i>			0.75	
5	<i>Amphora pediculus</i>	29		3.62	
6	<i>Epithemia srex</i>			1.75	
7	<i>Fragilaria construens</i>			P	
8	<i>F. vaucheriae</i>			0.87	2
9	<i>Rhopalodia musculus</i>			0.12	2
10	<i>Cymbella affinis</i>			1.25	
11	<i>C. microcephala</i>	40		5.00	2
12	<i>C. amphicephala</i>			1.12	
13	<i>C. silesiaca</i>			0.50	2
14	<i>Diploneis puella</i>			0.25	2
15	<i>Caloneis bacillum</i>			0.75	2
16	<i>Rhoicosphenia curvata</i>	7		0.87	
17	<i>Pinnularia mucrostauron</i>			0.12	2
18	<i>Cocconeis pediculus</i>			1.12	
19	<i>Cymbella sinuata</i>			1.75	
20	<i>Gomphonema minutum</i>			1.25	
21	<i>Diatoma tenue</i>			0.50	2
22	<i>Amphipleura pellucida</i>			1.75	2
23	<i>Synedra ulna</i>			1.12	2
24	<i>Cymbella minuta</i>			0.12	2
25	<i>Cocconeis placentula</i>			0.25	
26	<i>Aulacoseira tenuior</i>			0.50	

No.	Taxon	No. Cells/Valves	PRA	PTC
27	<i>Navicula tripunctata</i>	24	3.00	2
28	<i>N. sp. cf. tenera</i> (38.15 x 103.9)		P	
29	<i>N. veneta</i>		1.37	1
30	<i>N. reichardtiana</i>		0.25	2
(31)	<i>N. cryptotenella</i>	96	12.00	2
32	<i>N. stromii</i>		0.25	2
33	<i>N. catenata</i>		3.00	2
34	<i>N. capitatoradiata</i>		1.75	2
35	<i>N. symmetrica</i>		0.50	2
36	<i>N. gregaria</i>		0.25	2
37	<i>N. tenelloides</i>		0.50	1
38	<i>N. viridula v. rostellata</i>		0.12	2
39	<i>N. recens</i>		0.37	2
40	<i>Nitzschia lebetruthii</i>		1.00	
41	<i>Nitzschia dissipata</i>	72	9.00	
42	<i>N. angustata</i>		P	
43	<i>N. supralittorea</i>		P	
(44)	<i>N. frustulum (v. subsalina)</i>	+ 91 = 99	12.37	2
45	<i>N. consticta (= N. apiculata)</i>		P	
46	<i>N. angustatula</i>		0.37	2
47	<i>N. palea</i>		2.50	1
48	<i>N. valdestriata</i>		0.37	2
49	<i>N. sp.</i>		0.50	2
50	<i>N. reversa</i>		0.12	2
51	<i>N. linearis</i>		0.37	2
52	<i>N. inconspicua</i>		0.62	2
53	<i>N. tryblionella</i>		0.12	2

Notes/Sketches/Additional Taxa: Slide analyzed 02/10/99 by L. Bahls

Pollution Index:

PRA PTC No. 1 _____ X 1 = _____

PRA PTC No. 2 _____ X 2 = _____

PRA PTC No. 3 _____ X 3 = _____

= _____ Divided By 100 = _____

Siltation Index:

PRA Navicula sp. _____

PRA Nitzschia sp. _____

PRA Surirella sp. _____

= _____

Hannaea/09-98/250

SITE _____ SAMP _____ TAXA _____ CHEM _____

DIATOM PROPORTIONAL COUNT

Site-Sample No. 0393 - 05 . Notebook No. 11 . Page No. 24 .
 Water and Location Teton River @ I-15 below Rest Area .
 Sample Date 08 / 04 / 98 . Community B . Substrate N .
 Collector/Agency C. Endicott / MDEQ . Project TMDL .
 HUC _____ . Reach No. _____ . County _____ .

 Cells Counted _____ . Total Species _____ . Species Counted _____ .
 Diversity Index _____ . Pollution Index _____ . Siltation Index _____ .
 Similarity Index (compared to site-sample no. _____ - _____) _____ .

No.	Taxon	No. Cells/Valves	PRA	PTC
1	<i>Fragilaria crotonensis</i>	11	0.25	
2	<i>Nitzschia lacuum</i>	111	0.50	
3	<i>Navicula rhynchocephala</i>	11	0.25	
4	<i>N. menisculus</i>	11	0.25	2
5	<i>Nitzschia amphibia</i>	111	0.50	2
6	<i>Epithemia adnata</i>	1	0.12 0.25	2
7	<i>Cyclotella</i> sp.	1	0.12	
8	<i>Navicula libonensis</i>	11	0.25	2
9	<i>Aulacoseira islandica</i>	111	0.37	
10	<i>Amphora libyca</i>	11	0.25	
11	<i>Navicula cincta</i>	11	0.25	2
12	<i>Nitzschia gracilis</i>	111	0.75	2
13	<i>Navicula pupula</i>	1	0.12	2
14	<i>N. capitata</i>	1	0.12	2
15	<i>Surirella brebissonii</i>	111	0.37	2
16	<i>Rhopalodia gibba</i>	11	0.25	2
17	<i>Nitzschia paleacea</i>	11	0.25	2
18	<i>Denticula tenuis</i>	11	0.25	
19	<i>Amphora montana</i>	111	0.37	2
20	<i>Diploneis oblongella</i>	11	0.25	
21	<i>Diatoma vulgare</i>	1	0.12	
22	<i>Rhopalodia gibberula</i>	1	0.12	2
23				
24				
25				
26				

Site-Sample No. 0343 - 05

4 4
Page 2 of 2

No.	Taxon	No. Cells	Valves	PRA	PTC
27					
28					
29					
30					
31					
32					
33					
34					
35					
36					
37					
38					
39					
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52					
53					

Notes/Sketches/Additional Taxa: Slide analyzed 02/10/99 by K. Bahls

Site Location: T25N R01W Section 15 BBA
Lat. 47 55 40
Long. 111 43 36

Pollution Index:

PRA PTC No. 1 4.49 X 1 = 4.49

PRA PTC No. 2 48.18 X 2 = 96.36

PRA PTC No. 3 47.33 X 3 = 141.99

= 242.84 Divided By 100 = 2.428

Siltation Index:

PRA Navicula sp. 24.60

PRA Nitzschia sp. 29.34

PRA Surirella sp. 0.37 = 54.1

DIATOM PROPORTIONAL COUNT

Site-Sample No. 1751 - 01 . Notebook No. 11 . Page No. 24 .
 Water and Location Teton River @ Kerr Bridge (USGS Gage) .
 Sample Date 08 / 04 / 98 . Community B . Substrate N .
 Collector/Agency C. Endicott / MDEQ . Project TMDL .
 HUC 10030205 . Reach No. _____ . County Teton .

 Cells Counted 400 . Total Species 42 . Species Counted 38 .
 Diversity Index 3.098 . Pollution Index 2.515 . Siltation Index 28.60 .
 Similarity Index (compared to site-sample no. 0393 - 05) 56.46 .

No.	Taxon	No. Cells	Values	PRA	PTC
①	<i>Achnanthes minutissima</i>	300		37.5	
2	<i>Amphora pediculus</i>	26		3.25	
3	<i>Cymbella sinuata</i>	31		3.87	
④	<i>C. microcephala</i>	151		18.87	2
5	<i>C. affinis</i>			0.25	
6	<i>Rhoicosphenia curvata</i>			0.12	
7	<i>Gomphonema subtile</i>			1.75	
8	<i>Epithemia adnata</i>			0.12	2
9	<i>Epithemia sarex</i>	9		1.12	
10	<i>Brachysira neoexilis</i>			1.12	
11	<i>Fragilaria leptostauron</i> (v. dubia)			P	
12	<i>F. construens</i>			0.25	
13	<i>Aulacoseira tenuis</i>			P	
14	<i>Amphora maiensis</i>			1.00	
15	<i>A. veneta</i>			0.25	1
16	<i>Caloneis bacillum</i>			0.50	2
17	<i>Cocconeis pediculus</i>			0.25	
18	<i>Caloneis thermalis</i> (Grun.) Krammer			0.25	
19	unknown genus (girdle)			0.25	2
20	<i>Caloneis ventricosa</i>			0.37	
21	<i>Diatoma tenue</i>			0.25	2
22					
23					
24					
25					
26					

No.	Taxon	No. Cells	Values	PRA	PTC
27	<i>Navicula caterva</i>	23		2.87	1
(28)	<i>N. cryptotenella</i>	110		13.75	-
29	<i>N. veneta</i>			0.25	1
30	<i>N. stroemii</i>			0.50	2
31	<i>N. laevissima</i>			0.25	
32	<i>N. capitatoradiata</i>			P	
33	<i>N. reichardtiana</i>			0.25	2
34	<i>N. capitata</i>			0.12	2
35	<i>N. libonensis</i>			0.25	2
36	<i>N. bryophila</i>			0.25	
37	<i>N. tripunctata</i>			0.75	
38	<i>N. radiosa</i>			0.12	
39	<i>N. gregaria</i>			0.25	2
40	<i>N. recens</i>			0.12	2
41	<i>Nitzschia siligua</i>			P	
42	<i>N. fustulum v. subsalina</i>	56		7.00	2
43	<i>N. valdestriata</i>			0.50	2
44	<i>N. amphibia</i>			0.12	
45	<i>N. palea</i>			0.75	
46	<i>N. dissipata</i>			0.25	
47	<i>N. inconspicua</i>			0.25	2
48					
49					
50					
51					
52					
53					

Notes/Sketches/Additional Taxa: Slide analyzed 02/10/99 by L. Bahls
 #18 coordinates: 37.05 x 100.1

Site location: T25N R01E Section 12 CCDC

Lat. 47 55 46

Long. 111 33 19

Pollution Index:

PRA PTC No. 1 1.25 X 1 = 1.25

PRA PTC No. 2 45.97 X 2 = 91.94

PRA PTC No. 3 52.78 X 3 = 158.34

= 251.53 Divided By 100 = 2.515

Siltation Index:

PRA Navicula sp. 19.73

PRA Nitzschia sp. 8.87

PRA Surirella sp. 0.0 = 28.1

DIATOM PROPORTIONAL COUNT

Site-Sample No. 1752 - 01 . Notebook No. 11 . Page No. 25 .Water and Location Teton River @ Dent Bridge .Sample Date 08 / 04 / 98 . Community B . Substrate N .Collector/Agency C. Endicott / MDEQ . Project TMDL .HUC 10030205 . Reach No. _____ . County Imperial Chouteau .Cells Counted 400 . Total Species 45 . Species Counted 45 .Diversity Index 2.492 . Pollution Index 2.913 . Siltation Index 15.08 .Similarity Index (compared to site-sample no. 1751 - 01) 10.08 .

No.	Taxon	No. Cells	Values	PRA	PTC
①	<i>Cymbella sinuata</i>	505		63.12	
2	<i>Gomphonema parvulum</i>			0.62	
③	<i>Navicula tripunctata</i>	85		10.62	
4	<i>N. sp.</i>			0.25	2
5	<i>Caloneis bacillum</i>			0.25	2
6	<i>Amphora pediculus</i>			3.00	
7	<i>Aulacoseira tenuior</i>			1.00	
8	<i>Gyrosigma sp.</i>			0.12	2
9	<i>Aulacoseira sp.</i>			1.00	
10	<i>A. islandica</i>			2.00	
11	<i>Caloneis ventricosa</i>			3.87	2
12	<i>Cyclotella meneghiniana</i>			0.25	2
13	<i>Nitzschia dissipata</i>			1.00	
14	<i>Aulacoseira crassipunctata</i>			1.37	
15	<i>Stauroneis sp.</i>			0.12	
16	<i>Epithemia borex</i>			1.50	
17	<i>Amphora inaiensis</i>			0.87	
18	<i>Achnanthes bischoffiana</i>			0.25	
19	<i>Cocconeis pediculus</i>			0.12	
20	<i>Amphora montana</i>			0.25	
21	<i>Nitzschia amphibia</i>			0.37	2
22	<i>Navicula viridula (v. rostrata)</i>			0.62	2
23	<i>Nitzschia apiculata (= N. constricta)</i>			0.37	2
24	<i>N. sp.</i>			0.12	2
25	<i>Gomphonema olivaceum</i>			1.25	
26	<i>Navicula cincta</i>			0.12	2

No.	Taxon	No. Cells	Valves	PRA	PTC
27	<i>Gomphonema subtile</i>			0.62	
28	<i>Cymbella cymbiformis</i>			0.12	
29	<i>Aulacoseira lirata</i> (?)			0.62	
30	<i>Gomphonema angustatum</i>			0.12	2
31	<i>Nitzschia valdestriata</i>			0.12	2
32	<i>Cymbella minuta</i>			0.12	2
33	<i>Nitzschia sigmoides</i>			0.12	
34	<i>N. angustata</i>			0.50	2
35	<i>Fragilaria construens</i>			0.50	
36	<i>Caloneis lewisii</i>			0.25	
37	<i>Navicula cryptotenella</i>			0.25	2
38	<i>Cocconeis placentula</i>			0.25	
39	<i>Nitzschia vermicularis</i>			0.25	2
40	<i>Rhopalodia musculus</i>			0.50	2
41	<i>Surirella angusta</i>			0.12	1
42	<i>Caloneis limosa</i>			0.12	
43	<i>Navicula catenula</i>			0.25	2
44	<i>Achnanthes minutissima</i>			0.50	
45	<i>Aulacoseira granulata</i>			0.12	
46					
47					
48					
49					
50					
51					
52					
53					

Notes/Sketches/Additional Taxa: Slide analyzed 02/07/99 by L. Balts
 Slide scanned + counted @ 400x, zooming in to 1000x for ID confirmation if necessary.
 Diatoms very sparse.

Site Location: T25N R04E Section 34 DDAC
 Lat. 47 52 35
 Long. 111 11 50

Pollution Index:

PRA PTC No. 1 0.12 X 1 = 0.12PRA PTC No. 2 8.45 X 2 = 16.90PRA PTC No. 3 91.43 X 3 = 274.29= 291.31 Divided By 100 = 2.913

Siltation Index:

PRA Navicula sp. 12.11PRA Nitzschia sp. 2.85PRA Surirella sp. 0.12 = 15.0

DIATOM PROPORTIONAL COUNT

Site-Sample No. 0397 - 02. Notebook No. 11. Page No. 25.
 Water and Location Teton River near mouth near Loma.
 Sample Date 08 / 04 / 98. Community B. Substrate N.
 Collector/Agency C. Endicott / MDEQ. Project TMDL.
 HUC 10030205. Reach No. _____. County Chouteau.

Cells Counted 400. Total Species 45. Species Counted 41.
 Diversity Index 3.688. Pollution Index 2.577. Siltation Index 27.09.
 Similarity Index (compared to site-sample no. 1752 - 01) 24.07.

No.	Taxon	No. Cells	Values	PRA	PTC
①	<i>Achnanthes minutissima</i>	226		28.25	
②	<i>Cymbella sinuata</i>	115		14.37	
3	<i>C. microcephala</i>	52		6.50	2
4	<i>Caloneis amphibia</i>	1		0.12	
5	<i>Cyclotella meneghiniana</i>	11		0.25	2
6	<i>Cocconeis pediculus</i>	54		6.75	
7	<i>Amphora</i> sp. cf. <i>A. veneta</i>			2.75	1
8	<i>Amphora pediculus</i>	59		7.37	
9	<i>A. inaiensis</i>			1.75	
10	<i>Gomphonema subtile</i>			P	
11	<i>Fragilaria leptostauron</i> v. <i>dubia</i>			P	
12	<i>Epithemia sorex</i>			P	
13	<i>Aulacoseira islandica</i>			0.62	
14	<i>Caloneis thermalis</i>			0.62	
15	<i>Fragilaria nanana</i>			0.25	
16	<i>Aulacoseira tenuior</i>			0.37	
17	<i>Denticula elegans</i>			0.25	
18	<i>Rhizosolenia curvata</i>			0.25	
19	<i>Diploneis puella</i>			0.25	2
20	<i>Fragilaria vanchevici</i>			1.25	2
21	<i>Amphipleura pellucida</i>			0.25	2
22	<i>Amphora montana</i>			0.25	
23	<i>Gomphonema olivaceum</i>			0.37	
24					
25					
26					

No.	Taxon	No. Cells/Values	PRA	PTC
27	<i>Navicula gregaria</i>		0.25	2
28	<i>N. tripunctata</i>	(eleven)	1.37	
29	<i>N. reichardtiana</i>		0.25	2
30	<i>N. catenata</i>		0.50	2
31	<i>N. veneta</i>		1.62	1
32	<i>N. libonensis</i>		0.50	2
33	<i>N. capitatoradiata</i>		1.00	2
34	<i>N. symmetrica</i>		0.75	2
35	<i>N. ediosa</i>		0.50	1
36	<i>N. capitata</i>		0.25	2
37	<i>N. recens</i>		0.37	2
38	<i>N. cryptotenella</i>	51	6.37	2
39				
40				
41	<i>Nitzschia frustulum</i> v. <i>subsalina</i>	83	10.37	2
42	<i>N. dissipata</i>		0.50	
43	<i>N. palea</i>		1.00	1
44	<i>N. hungarica</i>		P	
45	<i>N. inconspicua</i>		0.25	
46	<i>N. valdestriata</i>		0.25	2
47	<i>N. angustata</i>		0.12	2
48	<i>N. apiculata</i> (= <i>N. constricta</i>)		0.50	2
49	<i>N. gracilis</i>		0.12	2
50	<i>N. angustatula</i>		0.25	2
51				
52				
53				

Notes/Sketches/Additional Taxa: Slide analyzed 02/11/99 by K. Bahls

Site location: T25N R09E Section 12 CDAC

Lat. 47 55 55

Long. 110 30 57

Pollution Index:

PRA PTC No. 1 5.87 X 1 = 5.87

PRA PTC No. 2 30.60 X 2 = 61.20⁺

PRA PTC No. 3 63.53 X 3 = 190.59⁺

= 257.66 Divided By 100 = 2.577

Siltation Index:

PRA Navicula sp. 13.73

PRA Nitzschia sp. 13.36⁺

PRA Surirella sp. 0.0⁺ = 27.0