The zone of vegetation formation contains the water scorpion Ranatra fusca, the creeping water bug Pelocoris femoratus, the small water bug Zaitha fluminea, water boatman, the stillwater brook beetle Elmis quadrinotatus, several species of predaceous diving beetles, water scavenger beetles, mayfly larvae (Caenis and Callibaetis), the damselfly larva Ischnura verticalis, and dragonfly larvae (Aeschnidae and Libellulidae). It includes the pulmonate snails Physa integra, Helisoma anceps, and often species of Lymnaea. In addition, it includes the crayfish Cambarus propinquus, the amphipods Hyalella azteca and Gammarus fasciatus, viviparous snails (Campeloma), and an occasional mussel (Anodonta grandis). This zone is well-developed in the Grand Calumet River.

As the area became more populated and industrialized, the Grand Calumet River was degraded both physically and chemically. Canals and ditches were dug, wetlands were drained and filled, and stretches of river were dredged or moved, severely altering the hydrology of the area (Moore 1959). Industrial waste,

located in Indiana Harbor Canal: INHS2, downstream of Columbus Drive; INHS3, downstream of Route 912; and INHS4, downstream of Dickey Road. Two sites were located in Indiana Harbor: INHS5, near the south end of the harbor; and INHS6, near the north end of the harbor. Sexually mature tubificid earthworms were identified to species level; other organisms were identified to family or genus level.

TAMS Consultants, Inc., study.--Benthic macroinvertebrate data from the Grand Calumet River were collected by TAMS Consultants, Inc. in 1990 and 1991 (Mierzwa et al. 1991). Three petite Ponar grab samples were collected from each site for each sampling period. Each sample was washed in a #30 mesh screen bucket and preserved in 10% buffered formalin. The East Branch was sampled at Route 12 (TAMS1) in July 1990, November 1990, and May 1991, and at Cline Avenue (TAMS2) in November 1990 and May 1991; the West Branch was sampled at Burnham Avenue (TAMS3) in November 1990, May 1991, and July 1991. Most organisms were identified to genus or species level, except the aquatic earthworms and midges, which were identified to family and subfamily. Numerical data were not published.

U.S. Fish and Wildlife Service study.--Benthic macroinvertebrate data from the East Branch of the Grand

identified below class at the NPS or FWS sites. Those in the Family Erpobdellidae were identified as Dina microstoma (uncertain), Dina parva, Erpobdella punctata, Mooreobdella, Mooreobdella fervida, and Mooreobdella microstoma. The Family Glossiphoniidae was represented by Helobdella, Helobdella stagnalis, and Placobdella. Cocoons were identified at IDEM4, 5, and 7. It is possible that the lack of leeches found at the INHS sites was partially due to the limited sampling done (i.e., one petite Ponar grab per site).

Leeches are generally considered pollution tolerant (Table 2); however, different leech species have different tolerances to pollution, with only about a dozen in the United States and Canada commonly or occasionally associated with polluted water (Sawyer 1974). Helobdella stagnalis and Erpobdella punctata are by far the most important of these, but they are common and can only be considered indicator species in terms of unusually high densities. Mooreobdella microstoma and Dina parva are occasionally associated with disturbed environments. Patrick & Palavage (1994) rated Dina parva, Erpobdella punctata, and Helobdella stagnalis as pollution-tolerant species (Table 2).

Phylum Mollusca (Mollusks)

Class Gastropoda (Snails).--Snails were found at every site except TAMS3 in the Far West reach and INHS1, 2, 3, 4, and 6 in the Federal Dredging Project reach (Fig. 1 and Table 1). The Family Ancylidae was identified to Ferrissia. The Family Hydrobiidae was identified to Amnicola. The Family Lymnaeidae was identified to Lymnaea. The Family Physidae was identified to Aplexa, Physa, and Physella. The Family Planorbidae was identified to Gyraulus, Helisoma, Planorbula, and Promenetus. The Family Valvatidae was identified to Valvata.

Most snails require high dissolved oxygen concentrations, so they are seldom found in severely polluted rivers or the deeper parts of lakes that become oxygen deficient (Pennak 1989). Other factors that can reduce the diversity of snails in a body of water are low pH values, heavy metals, pesticides, extreme temperatures, and organic pollution (Harman 1974). The pulmonates (Ancylidae, Lymnaeidae, Physidae, and Planorbidae) are more resistant to organic pollution. Of the snails found in these studies, Valvata and Amnicola are the least pollution tolerant (Table 2).

Class Pelecypoda (Bivalves).--Bivalves, including clams and mussels, live in almost all types of freshwater habitats but are particularly common in larger rivers (Pennak 1989). There are 266 species in North American fresh waters, including 227 in the Superfamily Unionacea, 37 in the Family Sphaeriidae (four introduced), and two additional exotics, Corbicula fluminea (Asiatic clam) and Dreissena polymorpha (zebra mussel) (McMahon 1991). The vast majority of freshwater bivalves feed by filtering suspended microscopic particles, such as organic detritus and plankton (Pennak 1989). Freshwater bivalves are hosts for various parasites, including flukes, roundworms, aquatic earthworm Chaetogaster limnaei, and water mites of the Family Unionicolidae.

Bivalves were identified at FWS2, 4, and 5 in the USX reach; TAMS1, TAMS2, and IDEM3 in the Gary Sanitary District and DuPont reaches; IDEM7 in the Lake George reach; and INHSI, 4, and 6 in the Federal Dredging Project reach (Fig. 1 and Table 1). Asiatic clams (Corbiculidae) were identified at FWS2, 4, and 5. Zebra mussels (Dreissenidae) were identified at FWS2. Sphaeriidae was identified to family at IDEM3, IDEM7, INHS1, and INHS6; Pisidium at TAMS2 and INHS1; and Sphaerium at TAMS1, TAMS2, and INHS4. No unionaceans were found.

Bivalves are adversely affected by various forms of pollution, including chemical wastes, asbestos, heavy metals, chlorine and paper mill effluents, urban wastewater effluents, and silt and acid discharges from mines (McMahon 1991). They have been rated both quite tolerant of certain natural phenomena and indicative of clean unpolluted waters (Table 2). Species diversity and density of unionaceans have declined greatly in North America in the last century, and many unionaceans are currently endangered (McMahon 1991). Many reasons have been postulated for this massive decline, including the freshwater pearling industry, extensive artificial impoundments, and channelization of drainage systems. Corbicula has been rated slightly tolerant of polluted conditions (Table 2). Pisidium and Sphaerium have been rated tolerant and somewhat tolerant of pollution (Table 2). Certain Sphaeriidae species, such as Sphaerium transversum, are tolerant of polluted, nearly septic conditions (Fuller 1974).

Phylum Arthropoda (Subphylum Crustacea)

Although only about 10% of the nearly 40,000 species of crustaceans occur in fresh waters, they are

Class Branchiopoda (Water fleas)

Water fleas, small (most < 1 mm in length) transparent animals, are widespread, living in all but the harshest freshwater habitats. Some water fleas are bottom dwellers (benthos), whereas others inhabit open water. Most water fleas are filter-feeders, eating a variety of small particles including bacteria, algae, ciliates, and small rotifers (Dodson & Frey 1991). They are an important food source for fish; in addition, they are eaten by hydras and immature and mature insects (Pennak 1989).

Water fleas were found at only one site--IDEM7 in the Lake George reach (Fig. 1 and Table 1). Two organisms were identified in 1986, and they were not identified to a lower taxonomic level. Water fleas have been rated quite tolerant of certain natural phenomena (Table 2). Pollution tolerances vary among species, but most (19 out of 22) of the water flea species identified in the Delaware and Neches Estuaries and the Flint River in New England were rated characteristic of natural conditions by Patrick & Palavage (1994).

Class Malacostraca

The class Malacostraca includes the superorders Pancarida (order Thermosbaenacea), Peracarida (orders Mysidacea, Amphipoda, and Isopoda), and Eucarida (order Decapoda) (Covich & Thorp 1991). Of these, amphipods (scuds), isopods (sow bugs), and decapods (crayfish and shrimp) were found in the Grand Calumet River.

Order Amphipoda (Scuds).--Scuds are found in unpolluted lakes, ponds, streams, brooks, springs, and subterranean waters (Pennak 1989). They are usually bottom species found only in shallow waters. Scuds are omnivorous, general scavengers, or detritus feeders and occasionally, filter feeders. Predators of scuds include fish, birds, aquatic insects, and amphibians, and parasites include tapeworms, flukes, roundworms, and Acanthocephala. In addition, algae and protozoans thrive on their external surfaces.

Scuds were found in both of the Grand Calumet Lagoons and in the USX reach (Fig. 1 and Table 1). They were identified simply as Amphipoda at FWS5, and to Hyallela (most likely Hyallela azteca) at NPS1, NPS2, and IDEM1. They were common at NPS1 and NPS2. Since scuds generally require high dissolved oxygen concentrations, they are usually limited to clean, cold waters (Covich & Thorp 1991). Also, they are especially sensitive to copper and a number of other heavy metals. Scuds (and Hyallela azteca) have been rated quite tolerant of certain natural phenomena (Table 2). Hyallela azteca has been rated pollution-tolerant, moderately tolerant, and indicative of very significant organic pollution (Table 2).

Order Isopoda (Aquatic sow bugs).-- Most freshwater sow bugs are restricted to springs, spring brooks, streams, and interstitial and subterranean waters but some may be found in ponds and lake shallows (Pennak 1989). Sow bugs are scavengers, eating dead and injured aquatic animals and both green and decaying vegetation. They are eaten by fish and may be parasitized by roundworms and Acanthocephala.

Sow bugs were found only in the Lagoons reach (Fig. 1 and Table 1). Caecidotea (Asellus) was identified at both NPS1 and 2, and Lirceus was identified at NPS1. Like scuds, sow bugs generally require high dissolved oxygen concentrations and are usually limited to clean, cold waters (Covich & Thorp 1991). Sow bugs are especially sensitive to copper and a number of other heavy metals. The Family Asellidae, which includes Caecidotea and Lirceus, has been used as an indicator of severe organic pollution (Table 2). Asellidae and Caecidotea have been rated quite tolerant of certain natural phenomena (Table 2). Caecidotea has been rated pollution-tolerant and moderately tolerant, and Lirceus has been rated slightly tolerant (Table 2).

Order Decapoda (Crayfish).--The order Decapoda, which includes a great diversity of marine, freshwater, and semiterrestrial crustaceans, is represented in North American fresh waters by freshwater shrimp and crayfish (Hobbs 1991). The 386 described species and subspecies of crayfish in North America are assigned to 12 genera in two families (Astacidae and Cambaridae); only Cambaridae occurs in this area. Crayfish are common inhabitants of a wide variety of freshwater environments, including running waters, shallows of lakes, ponds, sloughs, swamps, subterranean waters, and even wet meadows (Pennak 1989).

Crayfish (Family Cambaridae) were identified at two sites, NPS1 in the Lagoons reach and FWS3 in the USX reach (Fig. 1 and Table 1). Those found at NPS1 were identified as Orconectes. Channelization and siltation can be very detrimental to crayfish populations (Hobbs & Hall 1974). Although crayfish concentrations may increase with limited organic enrichment, organic pollution resulting in oxygen

permanent and temporary ponds and marshes, and occasionally may be found among vegetation in slow streams (Hilsenhoff 1991). They have been rated quite tolerant of certain natural conditions, indicative of clean, unpolluted streams, and indicative of likely severe organic pollution (Table 2).

Order Trichoptera (caddisflies).--The larvae and pupae of all but one or two species of caddisflies are aquatic (Hilsenhoff 1991). More than 1340 species are known in North America. Caddisflies occur in most types of freshwater habitats, including spring streams and seepage areas, rivers, lakes, temporary pools, and marshes (Wiggins 1984). Most larvae consume plant materials in some form, including algae and decaying plant tissue, and some are mainly predacious. Caddisflies are an important part of the stream community and may dominate the insect biomass (Hilsenhoff 1991). Many fish species feed on the larvae and emerging adults.

Caddisflies were found at NPS1 and 2 in the Lagoons reach, TAMS2 and IDEM3 in the Gary Sanitary District and DuPont reaches, IDEM6 in the East Chicago Sanitary District reach, IDEM7 in the Lake George reach, and IDEM8 in the Federal Dredging Project reach (Fig. 1 and Table 1). The Hydropsychidae (common netspinners) were identified to family at IDEM8, Cheumatopsyche at IDEM6

Parachironomus abortivus, Phaenopsectra, Polypedilum, Polypedilum convictum, and Stenochironomus. The Subfamily Chironominae (Tribe Tanytarsini) was identified to Cladotanytarsus and Rheotanytarsus. The Subfamily Orthocladimae was identified to: Cricotopus, Cricotopus bicinctus, Cricotopus intersectus, Cricotopus sylvestris, Eukiefferiella, and Eukiefferiella discoloripes. The Subfamily Tanypodinae was identified to: Ablabesmyia, Labrundinia, Procladius sublettel, and Thienemannimyia group. Midge larvae have been used as biological wa ter quality indicators because different species or species groups may be associated with different pollutants or environmental conditions (Williams & Feltmate 1992). As a group, they have been rated quite tolerant of certain natural phenomena and indicative of likely substantial organic pollution if they are not blood-red or likely severe organic pollution if they are blood-red (Table 2).

The Subfamily Chironominae includes species with various tolerances to pollution (Illinois EPA 1985; Hilsenhoff 1987). Of the Chironomini genera found in these studies, Chironomus has been rated the most tolerant and Stenochironomus the least (Table 2). The tribe Tanytarsini has been used to indicate clean, unpolluted waters (Table 2). Cladotanytarsus has been rated moderately pollution-tolerant, indicative of significant organic po1lution, and pollution-tolerant (Table 2). Rheotanytarsus has been rated moderately pollution tolerant, indicative of fairly significant organic pollution, and pollution-tolerant (Table 2).

The Subfamily Orthocladiinae contains species with a wide range of pollution tolerances (Illinois EPA 1985; Hilsenhoff 1987). It has been given a sliding scale of tolerance values by Chutter (1972) with the values dependent on the diversity and abundance of Baetid mayflies; in these studies, the subfamily indicates organically-enriched to polluted waters. Cricotopus has been rated moderately pollution-tolerant and indicative of significant organic pollution, and Cricotopus bicinctus has been rated very pollution-tolerant, indicative of severe organic pollution, and pollution-tolerant (Table 2). Eukiefferiella has been rated slightly pollution-tolerant, indicative of very significant organic pollution (Table 2).

The Subfamily Tanypodinae also contains species with a wide range of tolerances (Illinois EPA 1985; Hilsenhoff 1987). It is considered indicative of clean unpolluted streams (Table 2). Ablabesmyia has been rated moderately pollution-tolerant, indicative of very significant organic pollution, and pollution-tolerant (Table 2). Labrundinia has been rated slightly pollution-tolerant and indicative of significant organic pollution (Table 2). Procladius has been rated moderately pollution-tolerant, indicative of severe organic pollution (Table 2). Thienemannimyia group has been rated moderately pollution-tolerant and characteristic of natural conditions (Table 2).

Mosquitoes (Family Culicidae): Mosquito larvae were identified at IDEM6 in the East Chicago Sanitary District reach (Fig. 1 and Table 1). Mosquito larvae have been rated quite tolerant of certain natural phenomena, moderately pollution-tolerant, and indicative of organically-polluted streams (Table 2).

Crane flies (Family Tipulidae): Crane fly larvae were common at IDEM6 in the East Chicago Sanitary District reach (Fig. 1 and Table 1). Crane fly larvae have been rated moderately tolerant of certain natural phenomena, slightly pollution-tolerant, indicative of unlikely organic pollution and of clean unpolluted waters (Table 2).

Dance flies (Family Empididae): One dance fly larva was found at FWS5 in the USX reach (Fig. 1 and Table 1). It was identified only to family. Dance fly larvae have been rated quite tolerant of certain natural phenomena, moderately pollution-tolerant, indicative of likely substantial organic pollution, and indicative of clean, unpolluted streams (Table 2).

Soldier flies (Family Stratiomyidae): Soldier fly larvae were identified at FWS4 in the USX reach (Fig. 1 and Table 1). They were not identified beyond family. Soldier fly larvae have been considered quite tolerant of certain natural phenomena, indicative of clean, unpolluted streams, and pollution-tolerant (Table 2).

Rat-tailed maggots/flower flies (Family Syrphidae): Rat-tailed maggots inhabit shallow standing waters or margins of running waters, especially areas high in decomposing organic matter (Hilsenhoff 1991). Because of their very long breathing tube, rat-tailed maggots are able to inhabit very polluted, low-oxygen areas such as sewage lagoons. Rat-tailed maggots were found at FWS4 in the USX reach (Fig. 1 and Table 1). Rat-tailed maggots have been rated as very pollution-tolerant, indicative of likely severe organic pollution (Table 2).

SUMMARY AND RESTORATION POSSIBILITIES

Current macroinvertebrate habitats in the Grand Calumet River and Indiana Harbor Canal are degraded, as is evident by the resident communities. In all reaches other than the Lagoons reach, aquatic earthworms and other pollution-tolerant organisms are dominant, and the more sensitive taxa are either scarce or non-existent, which suggests a highly degraded habitat (Tables 1, 2). The Lagoons reach appears to be less affected, probably because the lagoons are located above industrial and sanitary outfalls (IDEM 1991). This reach is somewhat degraded, however, particularly the West Lagoon where the macroinvertebrate community appears to be stressed by extremely high ammonia levels (Hardy 1984).

So many changes have occurred over the Grand Calumet River's history that it may be nearly impossible for it to return to its presettlement state. However, there are several ways to improve the river's habitat quality and bring back a healthier and more diverse macroinvertebrate population. Different approaches for restoring the various reaches will depend primarily on reach-specific factors other than macroinvertebrate community composition.

In-place sediment clean-up.--First, the problem of contaminated sediments must be addressed. Grand Calumet River and Indiana Harbor Canal sediments are known to he contaminated by a wide variety of pollutants, including nutrients, organic matter, polycyclic, aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), and high concentrations of metals (USACE 1994a). Contaminated sediment can impact macroinvertebrates in a number of ways--directly, as a living and foraging area and food source, and indirectly, as a source of water and prey contamination and oxygen depletion. Improving sediment quality will be necessary to restore macroinvertebrate habitat in the Grand Calumet River, and one way to achieve this is by cleaning up the contaminated sediments.

Sediment clean-up options include removal (dredging), capping with clean materials, and in-place

The negative impacts of capping would include the covering of existing benthic macroinvertebrates and rooted vegetation and possible adverse habitat impacts due to water depth reduction in shallow areas. Although little could be done about the first impact, the macroinvertebrate communities that would be buried are degraded, and the newly-exposed sediments would be recolonized and revegetated over time. In shallow areas, partial dredging prior to capping could compensate for water depth loss.

Sediment source controls.--Source controls, which reduce the quantity and contamination level of sediments entering the river, will be very important in improving sediment quality and macroinvertebrate habitat in the Grand Calumet River and Indiana Harbor Canal. If done properly, they may only impact the macroinvertebrate communities positively. Reductions in the quantity of sediment entering the river would improve habitat by decreasing siltation and turbidity, both of which can be detrimental to some macroinvertebrates. Without reductions in contamination levels of sediments entering the river, sediment clean-up would only provide a temporary solution, since uncontaminated sediment would simply be covered and replaced by more contaminated sediment (USACE 1994a).

There are three major sources of sediments to the Grand Calumet River and Indiana Harbor Canal: municipal and industrial point discharges, combined sewer overflows (CSOs), and urban runoff. Point sources include three municipal wastewater treatment plants and over 40 outfalls for discharges from industries and manufacturers. Over 90% of the system's dry-weather flow originates as treated municipal and industrial wastewater (McCown et al. 1976). Point discharges are regulated under the Clean Water Act (NPDES permit program); effects of this regulation can be seen in the 56% reduction of suspended solids loadings from point sources between 1974-1984 (USACE 1994a). The Remedial Action Plan (RAP) calls for full compliance of all NPDES discharges and the resolution of enforcement actions against violators (IDEM 1991).

Combined sewer overflows are not as easily controlled as point discharges (USACE 1994a). CSOs result from heavy rainfall events increasing flow in a combined sewer system so that it exceeds the capacity of the sewer or the wastewater treatment plant. This causes a mixture of stormwater and raw sew-age to be discharged directly to the river. Possible solutions to CSOs include separating sewers into sanitary and storm sewers and constructing a detention basin or tunnel for temporary storage of combined sewer flows during storms for later treatment and discharge. The NPDES permits with the sanitary districts of East Chicago, Hammond, and Gary would have to be modified by IDEM to require satisfactory maintenance and operation of the combined sewer systems.

Urban runoff is the most difficult source to control (USACE 1994a). Approximately 47% of the Grand Calumet River watershed east of the Illinois/Indiana border is occupied by heavy industry, while only 7.6% is open space (Ketcham et al. 1992). Measures for controlling the amount of sediment released into the river in stormwater (other than making large changes to the existing land-use practices) include detention basins, retention devices, constructed wetlands, vegetative controls, construction erosion controls, and source controls (e.g., street sweeping and protection of stockpiled materials from rainfall).

Sediment transport controls.--Transport controls reduce the resuspension and transport of sediments that have already been deposited on the river bottom. Reductions in sediment resuspension and transport would improve macroinvertebrate habitat by reducing turbidity, erosion, and the exposure of the organisms and the water column to sediment contaminants (USACE 1994a). Sediment impacts on water quality and aquatic organisms are directly related to the sediment surface area exposed; and when sediments are in suspension, surface area is greatly increased. Sediment resuspension could be reduced by changing the hydrology and hydraulics of the river and canal or by controlling physical disturbances that cause resuspension, such as boat traffic and dredging.

Due to the effects of urbanization on the Grand Calumet River watershed, stormwater flows in the river can be much greater than normal flows, resulting in scouring and resuspension of sediments. In addition to the other ecological problems created by these high flows, they could make capping of contaminated sediment more difficult or infeasible, since the capping material may be washed downstream (USACE 1994a). Many of the same methods mentioned above for decreasing sediments in urban runoff and CSOs would also reduce peak storm flows.

Another method that has been used to control sediment transport is a sediment trap or settling basin (USACE 1994a). A deepened channel or basin is excavated within a waterway to catch sediments from upstream, and the sediments are then dredged and disposed nearby. This practice is useful for preventing deposition in a high quality reach, and it is more cost-effective than removing sediments from a long stretch of river.

yet there remains a great potential for improving the health of the river and the whole ecosystem.

Table 1
Macroinvertebrate taxa identified from the various river sections (reaches). Indiana Dunes National Lakeshore sites (NPS) are from Hardy (1984); Indiana Department of Environmental Management sites (IDEM) are from Bright (1988); Illinois Natural History Survey sites (INHS) are from Risatti & Ross (1989); TAMS Consultants, Inc. sites (TAMS) are from Mierzwa et al. (1991); and U.S. Fish and Wildlife Service sites (FWS) are from Sobiech et al. (1994). X = present, C = 20% or more of the total individuals found in any sample. * This beetle, recorded as "Gyraulus," is assumed to have been Gyrinus.

	Lagoons		USX Reach
Taxa	NPS1	NPS2	FWS1
Phylum Porifera			
Phylum Cnidaria			
Hydridae			
Hydra			
Phylum Platyhelminthes			
Turbellaria			
Phylum Nematoda			
Phylum Bryozoa			
Plumatella			
unidentified bryozoans			
Phylum Annelida			
Oligochaeta			
Lumbricidae			
Lumbriculidae			
Tubificidae			
Limnodrilus			
Limnodrilus cervix			
Limnodrilus hoffmeisteri			
Potamothrix vejdovskyi			
Quistadrilus multisetosus			
immature w/o capil. chaetae			
immature w/ capil. chaetae			
unidentified earthworms	X		X
Hirudinea			
Erpodellidae			
Dina microstoma?			
Dina parva			
Erpobdella punctata			
Mooreobdella			
Mooreobdella fervida			
Mooreobdella microstoma			
Glossiphoniidae			
Helobdella			
Helobdella stagnalis			
Placobdella			
unidentified leeches	X	X	
leech cocoons			
Phylum Mollusca			
Gastropoda			
Ancylidae			
Ferrissia	C		
Hydrobiidae			
Amnicola	X		
Lymnaeidae			X
Lymnaea			
Physidae			C

Aplexa		
Physa	X	X
Physella		
Planorbidae		
Gyraulus	X	
Helisoma		
Planorbula	X	
Promenetus	X	
Promenetus?		
Valvatidae		

Hydropsyche simulans?		
Hydropsyche simulans pupae		
Hydroptilidae		
Neotrichia	X	
Orthotrichia	X	
Leptoceridae		
Anthripsodes		X
Leptocerus		X
Nectopsyche		X
Oecetis		X
Polycentropodidae		
Cyrnellus fraternus		
Neureclipsis		
Hemiptera		
Belostomatidae		
Lethocerus		X
Corixidae		
Sigara	X	
Pleidae		
Plea		X
Coleoptera		
Dysticidae		
Dytiscus		
Laccophilus		X
Gyrinidae		
Dineutus		X
Gyrinus? *		
Haliplidae		
Haliplus		X
Diptera		
Ceratopogonidae		
Palpomyia	X	X
unident. biting midges		
Chaoboridae		
Chaoborus		
Chironomidae		
Chironominae		
(Chironomini)		
Chironomus	X	X
Chironomnus decorus		
Dicrotendipes/Limnochironomus	X	X
Dicrotendipes nervosus		
Glyptotendipes	X	C
Microtendipes		
Parachironomus		
Parachironomus abortivus		
Phaenopsectra	X	X
Polypedilum		X
Polypedilum convictum		
Stenochironmous		
(Tanytarsini)		
Cladotanytarsus	X	
Rheotanytarsus		
(Orthocladiinae)		
Cricotopus		X
Cricotopus bicinctus		
Cricotopus intersecuts		
Cricotopus sylvestris		
Eukiefferiella		X
Eukiefferiella discoloripes		

(Tanypodinae)				
Ablabesmyia		X		
Labrundinia		X		
Procladius sublettei				
Thienemannimyia group				
unident. midge larvae			X	
unident. midge pupae				
Culicidae				
Tripulidae				
Empididae				
Stratiomyidae				
Syrphidae				

	USX Reach			
Taxa	IDEM1	FWS2	FWS3	IDEM2
Phylum Porifera				
Phylum Cnidaria				
Hydridae				
Hydra				
Phylum Platyhelminthes				
Turbellaria	X			
Phylum Nematoda				
Phylum Bryozoa				
Plumatella				
unidentified bryozoans				
Phylum Annelida				
Oligochaeta				
Lumbricidae				
Lumbriculidae				
Tubificidae				
Limnodrilus				
Limnodrilus cervix				
Limnodrilus hoffmeisteri				
Potamothrix vejdovskyi				
Quistadrilus multisetosus				
immature w/o capil. chaetae				
immature w/ capil. chaetae				
unidentified earthworms	C	X	X	C
Hirudinea				

Aplexa				
Physa	X			C
Physella				
Planorbidae		X		
Gyraulus				
Helisoma				
Planorbula				
Promenetus				
Promenetus?				
Valvatidae				
Valvata				
unidentified snails				
Pelecypoda				
Corbiculidae		X		
Dreissenidae		X		
Sphaeriidae (unident.)				
Pisidium				
Sphaerium				
Phylum Arthropoda				
Branchiopoda				
"Cladocera"				
Amphipoda				
Hyalella	X			
unident. scuds				
Isopoda				
Caecidotea/Asellus				
Lirceus				
Decapoda				
Cambaridae			X	
Orconectes				
Arachnida				
Acari				
Insecta				
Ephemeroptera				
Baetidae				
Baetis				
Caenidae				
Caenis				
Heptageniidae				
Stenonema (pulchellum group)				
Odonata (Anisoptera)				
Aeshnidae			X	
Corduliidae				
Neurocordulia				
Tetragoneuria				
Libellulidae				
Erythemis				
Odonata (Zygoptera)				
Coenagrionidae			X	
Argia	X			
Chromagrion				
Ischnura	X			X
Lestidae				
unident. dameselflies				X

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Hydropsyche simulans?				
Hydropsyche simulans pupae				
Hydroptilidae				
Neotrichia				
Orthotrichia				
Leptoceridae				
Anthripsodes				
Leptocerus				
Nectopsyche				
Oecetis				
Polycentropodidae				
Cyrnellus fraternus				
Neureclipsis				
Hemiptera				
Belostomatidae				
Lethocerus				
Corixidae				
Sigara				
Pleidae				
Plea				
Coleoptera				
Dysticidae				
Dytiscus	X			
Laccophilus				
Gyrinidae				
Dineutus				
Gyrinus? *				
Haliplidae				
Haliplus				
Diptera				
Ceratopogonidae				
Palpomyia				
unident. biting midges				
Chaoboridae				
Chaoborus				X
Chironomidae				
Chironominae		X		
(Chironomini)				
Chironomus				
Chironomnus decorus				
Dicrotendipes/Limnochironomus				
Dicrotendipes nervosus				
Glyptotendipes				
Microtendipes				
Parachironomus				
Parachironomus abortivus				
Phaenopsectra				
Polypedilum				
Polypedilum convictum				X
Stenochironmous				X
(Tanytarsini)				
Cladotanytarsus				
Rheotanytarsus				
(Orthocladiinae)				
Cricotopus				
Cricotopus bicinctus				C
Cricotopus intersecuts				
Cricotopus sylvestris				
Eukiefferiella				
Eukiefferiella discoloripes				X

(Tanypodinae)				
Ablabesmyia				
Labrundinia				
Procladius sublettei				
Thienemannimyia group				X
unident. midge larvae	X	C	C	C
unident. midge pupae				X
Culicidae				
Tripulidae				
Empididae				
Stratiomyidae				
Syrphidae				

Taxa	USX Reach FWS4	FWS5
Phylum Porifera		
Phylum Cnidaria		
Hydridae		
Hydra		
Phylum Platyhelminthes		
Turbellaria		
Phylum Nematoda		
Phylum Bryozoa		
Plumatella		
unidentified bryozoans		
Phylum Annelida		
Oligochaeta		
Lumbricidae		
Lumbriculidae		
Tubificidae		
Limnodrilus		
Limnodrilus cervix		
Limnodrilus hoffmeisteri		
Potamothrix vejdovskyi		
Quistadrilus multisetosus		
immature w/o capil. chaetae		
immature w/ capil. chaetae		
unidentified earthworms	C	X
Hirudinea		
Erpodellidae		
Dina microstoma?		
Dina parva		
Erpobdella punctata		
Mooreobdella		
Mooreobdella fervida		
Mooreobdella microstoma		
Glossiphoniidae		
Helobdella		
Helobdella stagnalis		
Placobdella		
unidentified leeches	C	X
leech cocoons		
Phylum Mollusca		
Gastropoda		
Ancylidae		
Ferrissia		
Hydrobiidae		
Amnicola		
Lymnaeidae	X	X
Lymnaea		
Physidae	C	X

Aplexa		
Physa		
Physella		
Planorbidae	X	X
Gyraulus		
Helisoma		
Planorbula		
Promenetus		
Promenetus?		
Valvatidae		
Valvata		
unidentified snails		
Pelecypoda		
Corbiculidae	X	X
Dreissenidae		
Sphaeriidae (unident.)		
Pisidium		
Sphaerium		
Phylum Arthropoda		
Branchiopoda		
"Cladocera"		
Amphipoda		
Hyalella		
unident. scuds		X
Isopoda		
Caecidotea/Asellus		
Lirceus		
Decapoda		
Cambaridae		
Orconectes		
Arachnida		
Acari		
Insecta		
Ephemeroptera		
Baetidae		
Baetis		
Caenidae		
Caenis		
Heptageniidae		
Stenonema (pulchellum group)		
Odonata (Anisoptera)		
Aeshnidae	X	X
Corduliidae		
Neurocordulia		
Tetragoneuria		
Libellulidae		
Erythemis		
Odonata (Zygoptera)		
Coenagrionidae	X	X
Argia		
Chromagrion		
Ischnura		
Lestidae		X
unident. dameselflies		
Trichoptera		
Hydropsychidae		
Cheumatopsyche		
Hydropsyche		
Hydropsyche orris?		
Hydropsyche simulans		

Hydropsyche simulans?	
Hydropsyche simulans pupae	
Hydroptilidae	
Neotrichia	
Orthotrichia	
Leptoceridae	
Anthripsodes	
Leptocerus	
Nectopsyche	
Oecetis	
Polycentropodidae	
Cyrnellus fraternus	
Neureclipsis	
Hemiptera	
Belostomatidae	
Lethocerus	
Corixidae	X
Sigara	
Pleidae	
Plea	
Coleoptera	
Dysticidae	
Dytiscus	
Laccophilus	
Gyrinidae	
Dineutus	
Gyrinus? *	
Haliplidae	
Haliplus	
Diptera	
Ceratopogonidae	
Palpomyia	
unident. biting midges	X
Chaoboridae	
Chaoborus	
Chironomidae	
Chironominae	
(Chironomini)	X
Chironomus	
Chironomnus decorus	
Dicrotendipes/Limnochironomus	
Dicrotendipes nervosus	
Glyptotendipes	
Microtendipes	

(Tanypodinae)				
Ablabesmyia				
Labrundinia				
Procladius sublettei				
Thienemannimyia group				
unident. midge larvae	X	C		
unident. midge pupae				
Culicidae				
Tripulidae				
Empididae		X		
Stratiomyidae	X			
Syrphidae	X			

	Gary San. District	
Taxa	TAMS1	TAMS2
Phylum Porifera		
Phylum Cnidaria		
Hydridae		
Hydra		
Phylum Platyhelminthes		
Turbellaria		
Phylum Nematoda		X
Phylum Bryozoa		
Plumatella		
unidentified bryozoans		
Phylum Annelida		
Oligochaeta		
Lumbricidae	X	X
Lumbriculidae	X	X
Tubificidae		
Limnodrilus		
Limnodrilus cervix		
Limnodrilus hoffmeisteri		
Potamothrix vejdovskyi		
Quistadrilus multisetosus		
immature w/o capil. chaetae		
immature w/ capil. chaetae		
unidentified earthworms		
Hirudinea		
Erpodellidae		
Dina microstoma?		
Dina parva	X	
Erpobdella punctata		
Mooreobdella	X	X
Mooreobdella fervida		
Mooreobdella microstoma		
Glossiphoniidae		
Helobdella		X
Helobdella stagnalis		
Placobdella	X	X
unidentified leeches		
leech cocoons		
Phylum Mollusca		
Gastropoda		
Ancylidae		
Ferrissia		
Hydrobiidae		X
Amnicola		
Lymnaeidae		
Lymnaea	X	
Physidae		

Topics:

Aquatic insects
Observations
Aquatic invertebrates
Environmental aspects
Observations
Environmental remediation
Planning
Insects, Aquatic
Observations
Pollution
Measurement
Sediments (Geology)
Environmental aspects
Stream ecology
Research

Aplexa	X		New records for the alien oriental weatherfish, Misgurnus anguillicaudatus, in the Lake Michigan basin, Indiana (Cypriniformes: cobitidae).
Physa			
Physella	X	X	
Planorbidae			
Gyraulus	X	X	
Helisoma			
Planorbula			
Promenetus			
Promenetus?			
Valvatidae			
Valvata			
unidentified snails			
Pelecypoda			
Corbiculidae			
Dreissenidae			
Sphaeriidae (unident.)			
Pisidium		X	
Sphaerium	X	X	
Phylum Arthropoda			
Branchiopoda			
"Cladocera"			
Amphipoda			
Hyalella			
unident. scuds			
Isopoda			
Caecidotea/Asellus			
Lirceus			
Decapoda			
Cambaridae			
Orconectes			
Arachnida			
Acari			
Insecta			
Ephemeroptera			
Baetidae			
Baetis			
Caenidae			
Caenis			
Heptageniidae			
Stenonema (pulchellum group)			
Odonata (Anisoptera)			
Aeshnidae			
Corduliidae			
Neurocordulia			
Tetragoneuria			
Libellulidae			
Erythemis			
Odonata (Zygoptera)			
Coenagrionidae			
Argia			
Chromagrion			
Ischnura			
Lestidae			
unident. dameselflies			
Trichoptera			
Hydropsychidae			
Cheumatopsyche			
Hydropsyche		X	
Hydropsyche orris?			
Hydropsyche simulans			

Hydropsyche simulans?	
Hydropsyche simulans pupae	
Hydroptilidae	
Neotrichia	
Orthotrichia	
Leptoceridae	
Anthripsodes	
Leptocerus	
Nectopsyche	
Oecetis	
Polycentropodidae	
Cyrnellus fraternus	
Neureclipsis	
Hemiptera	
Belostomatidae	
Lethocerus	
Corixidae	
Sigara	
Pleidae	
Plea	
Coleoptera	
Dysticidae	
Dytiscus	
Laccophilus	
Gyrinidae	
Dineutus	
Gyrinus? *	
Haliplidae	
Haliplus	
Diptera	
Ceratopogonidae	
Palpomyia	
unident. biting midges	
Chaoboridae	
Chaoborus	
Chironomidae	
Chironominae	
(Chironomini)	
Chironomus	X
Chironomnus decorus	
Dicrotendipes/Limnochironomus	
Dicrotendipes nervosus	
Glyptotendipes	
Microtendipes	
Parachironomus	
Parachironomus abortivus	
Phaenopsectra	
Polypedilum	
Polypedilum convictum	
Stenochironmous	
(Tanytarsini)	
Cladotanytarsus	
Rheotanytarsus	
(Orthocladiinae)	
Cricotopus	
Cricotopus bicinctus	
Cricotopus intersecuts	
Cricotopus sylvestris	
Eukiefferiella	
Eukiefferiella discoloripes	

Lymnaea			
Physidae			
Aplexa			C
Physa	C	X	
Physella			
Planorbidae			
Gyraulus			
Helisoma	X	X	
Planorbula			
Promenetus			
Promenetus?			
Valvatidae			
Valvata			
unidentified snails			
Pelecypoda			
Corbiculidae			
Dreissenidae			
Sphaeriidae (unident.)	X		
Pisidium			
Sphaerium			
Phylum Arthropoda			
Branchiopoda			
"Cladocera"			
Amphipoda			
Hyalella			
unident. scuds			
Isopoda			
Caecidotea/Asellus			
Lirceus			
Decapoda			
Cambaridae			
Orconectes			
Arachnida			
Acari			
Insecta			
Ephemeroptera			
Baetidae			
Baetis			
Caenidae			
Caenis			
Heptageniidae			
Stenonema (pulchellum group)			
Odonata (Anisoptera)			
Aeshnidae			
Corduliidae			
Neurocordulia			
Tetragoneuria			
Libellulidae			
Erythemis			
Odonata (Zygoptera)			
Coenagrionidae			
Argia	X	X	X
Chromagrion			
Ischnura	X		X
Lestidae			
unident. dameselflies	X	X	X
Trichoptera			
Hydropsychidae			
Cheumatopsyche			
Hydropsyche			

Hydropsyche orris?				
Hydropsyche simulans				
Hydropsyche simulans?				
Hydropsyche simulans pupae	X			
Hydroptilidae				
Neotrichia				
Orthotrichia				
Leptoceridae				
Anthripsodes				
Leptocerus				
Nectopsyche				
Oecetis				
Polycentropodidae				
Cyrnellus fraternus				
Neureclipsis				
Hemiptera				
Belostomatidae				
Lethocerus				
Corixidae				
Sigara				
Pleidae				
Plea				
Coleoptera				
Dysticidae				
Dytiscus				
Laccophilus				
Gyrinidae				
Dineutus				
Gyrinus? *				
Haliplidae				
Haliplus				
Diptera				
Ceratopogonidae				
Palpomyia				
unident. biting midges				
Chaoboridae				
Chaoborus				
Chironomidae				
Chironominae			X	
(Chironomini)				
Chironomus	X	X		
Chironomnus decorus				C
Dicrotendipes/Limnochironomus		X		
Dicrotendipes nervosus				X
Glyptotendipes	X			
Microtendipes				
Parachironomus				
Parachironomus abortivus	X	X		C
Phaenopsectra				
Polypedilum				
Polypedilum convictum	X			
Stenochironmous				
(Tanytarsini)				
Cladotanytarsus				
Rheotanytarsus		X		
(Orthocladiinae)				
Cricotopus	C	X		
Cricotopus bicinctus	C	X		
Cricotopus intersecuts	X			
Cricotopus sylvestris				

Eukiefferiella	X	X		
Eukiefferiella discoloripes				
(Tanypodinae)				
Ablabesmyia				
Labrundinia				
Procladius sublettei				X
Thienemannimyia group				
unident. midge larvae	X	C		C
unident. midge pupae	X			X
Culicidae				
Tripulidae				
Empididae				
Stratiomyidae				
Syrphidae				

Taxa	E. Chic. IDEM6	L. George IDEM7	FederalDredgingProject Reach INHS1	
Phylum Porifera				
Phylum Cnidaria				
Hydridae				
Hydra		C		
Phylum Platyhelminthes				
Turbellaria	X			
Phylum Nematoda				
Phylum Bryozoa				
Plumatella				
unidentified bryozoans		C		
Phylum Annelida				
Oligochaeta				
Lumbricidae				
Lumbriculidae				
Tubificidae				
Limnodrilus			X	
Limnodrilus cervix			X	
Limnodrilus hoffmeisteri			C	
Potamothrix vejdovskyi				
Quistadrilus multisetosus				
immature w/o capil. chaetae			C	
immature w/ capil. chaetae				
unidentified earthworms	C	C		
Hirudinea				
Erpodellidae				
Dina microstoma?				
Dina parva				
Erpobdella punctata				
Mooreobdella				
Mooreobdella fervida				
Mooreobdella microstoma				
Glossiphoniidae				
Helobdella				
Helobdella stagnalis		X		
Placobdella				
unidentified leeches	X	X		
leech cocoons		X		
Phylum Mollusca				
Gastropoda				
Ancylidae				
Ferrissia				

Hydrobiidae				
Amnicola				
Lymnaeidae				
Lymnaea				
Physidae				
Aplexa	X	C		
Physa				
Physella				
Planorbidae				
Gyraulus				
Helisoma		X		
Planorbula				
Promenetus				
Promenetus?				
Valvatidae				
Valvata				
unidentified snails				
Pelecypoda				
Corbiculidae				
Dreissenidae				
Sphaeriidae (unident.)		X	X	
Pisidium			X	
Sphaerium				
Phylum Arthropoda				
Branchiopoda				
"Cladocera"		X		
Amphipoda				
Hyalella				
unident. scuds				
Isopoda				
Caecidotea/Asellus				
Lirceus				
Decapoda				
Cambaridae				
Orconectes				
Arachnida				
Acari				
Insecta				
Ephemeroptera				
Baetidae				
Baetis				
Caenidae				
Caenis				
Heptageniidae				
Stenonema (pulchellum group)				
Odonata (Anisoptera)				
Aeshnidae				
Corduliidae				
Neurocordulia				
Tetragoneuria				
Libellulidae				
Erythemis		X		
Odonata (Zygoptera)				
Coenagrionidae				
Argia		X		
Chromagrion				
Ischnura		X		
Lestidae				
unident. dameselflies	X			
Trichoptera				

Hydropsychidae			
Cheumatopsyche	X		
Hydropsyche			
Hydropsyche orris?			
Hydropsyche simulans			
Hydropsyche simulans?			
Hydropsyche simulans pupae			
Hydroptilidae			
Neotrichia			
Orthotrichia			
Leptoceridae			
Anthripsodes			
Leptocerus			
Nectopsyche			
Oecetis			
Polycentropodidae			
Cyrnellus fraternus		X	
Neureclipsis	X		
Hemiptera			
Belostomatidae			
Lethocerus			
Corixidae			
Sigara			
Pleidae			
Plea			
Coleoptera			
Dysticidae			
Dytiscus			
Laccophilus			
Gyrinidae			
Dineutus			
Gyrinus? *	X		
Haliplidae			
Haliplus			
Diptera			
Ceratopogonidae			
Palpomyia			
unident. biting midges			
Chaoboridae	X		
Chaoborus			X
Chironomidae			
Chironominae			
(Chironomini)			
Chironomus	X		
Chironomnus decorus			
Dicrotendipes/Limnochironomus			
Dicrotendipes nervosus		X	
Glyptotendipes			
Microtendipes			
Parachironomus		X	
Parachironomus abortivus		X	
Phaenopsectra			
Polypedilum			
Polypedilum convictum			
Stenochironmous			
(Tanytarsini)			
Cladotanytarsus			
Rheotanytarsus		X	
(Orthocladiinae)			
Cricotopus		X	

Hydrobiidae			
Amnicola			
Lymnaeidae			
Lymnaea			
Physidae		X	
Aplexa			
Physa		X	
Physella			
Planorbidae			
Gyraulus			
Helisoma		X	
Planorbula			
Promenetus			
Promenetus?		X	
Valvatidae			
Valvata			
unidentified snails			
Pelecypoda		X	
Corbiculidae			
Dreissenidae			
Sphaeriidae (unident.)			
Pisidium			
Sphaerium			X
Phylum Arthropoda			
Branchiopoda			
"Cladocera"			
Amphipoda			
Hyalella			
unident. scuds			
Isopoda			
Caecidotea/Asellus			
Lirceus			
Decapoda			
Cambaridae			
Orconectes			
Arachnida			
Acari			
Insecta			
Ephemeroptera			
Baetidae			
Baetis		X	
Caenidae			
Caenis			
Heptageniidae			
Stenonema (pulchellum group)		X	
Odonata (Anisoptera)			
Aeshnidae			
Corduliidae			
Neurocordulia			
Tetragoneuria			
Libellulidae			
Erythemis			
Odonata (Zygoptera)			
Coenagrionidae			
Argia			
Chromagrion			
Ischnura		X	
Lestidae			
unident. dameselflies			
Trichoptera			

Hydropsychidae	X
Cheumatopsyche	X
Hydropsyche	
Hydropsyche orris?	X
Hydropsyche simulans	X
Hydropsyche simulans?	X
Hydropsyche simulans pupae	
Hydroptilidae	
Neotrichia	
Orthotrichia	
Leptoceridae	
Anthripsodes	
Leptocerus	
Nectopsyche	
Oecetis	
Polycentropodidae	
Cyrnellus fraternus	
Neureclipsis	
Hemiptera	
Belostomatidae	
Lethocerus	
Corixidae	
Sigara	
Pleidae	
Plea	
Coleoptera	
Dysticidae	
Dytiscus	
Laccophilus	
Gyrinidae	
Dineutus	
Gyrinus? *	
Haliplidae	
Haliplus	
Diptera	
Ceratopogonidae	
Palpomyia	
unident. biting midges	
Chaoboridae	
Chaoborus	
Chironomidae	
Chironominae	
(Chironomini)	
Chironomus	
Chironomnus decorus	
Dicrotendipes/Limnochironomus	X
Dicrotendipes nervosus	
Glyptotendipes	
Microtendipes	
Parachironomus	X
Parachironomus abortivus	
Phaenopsectra	
Polypedilum	
Polypedilum convictum	
Stenochironmous	
(Tanytarsini)	
Cladotanytarsus	
Rheotanytarsus	X
(Orthocladiinae)	
Cricotopus	

Cricotopus bicinctus		X
Cricotopus intersecuts		
Cricotopus sylvestris		X
Eukiefferiella		
Eukiefferiella discoloripes (Tanypodinae)		
Ablabesmyia		
Labrundinia		
Procladius sublettei		
Thienemannimyia group		
unident. midge larvae		X
unident. midge pupae		
Culicidae		
Tripulidae		
Empididae		
Stratiomyidae		
Syrphidae		

Taxa	Federal Dredging Project Reach INHS5	INHS6
Phylum Porifera		
Phylum Cnidaria		
Hydridae	C	X
Hydra		
Phylum Platyhelminthes		
Turbellaria		
Phylum Nematoda		
Phylum Bryozoa		
Plumatella		
unidentified bryozoans		
Phylum Anne AbI4n. T* (Hydra)Tj aEecdne AbI4n. j/Hydra		
Phylnmbl4flumLeroy ed bryozoanhSgy rsecuts		
ss		
Phylum N[j 0 Bewto]px		
Phylum N[j 0 Behoffmeisicoi	C	

Ferrissia	
Hydrobiidae	
Amnicola	
Lymnaeidae	
Lymnaea	
Physidae	
Aplexa	
Physa	
Physella	
Planorbidae	
Gyraulus	
Helisoma	
Planorbula	
Promenetus	
Promenetus?	
Valvatidae	
Valvata	
unidentified snails	
Pelecypoda	
Corbiculidae	
Dreissenidae	
Sphaeriidae (unident.)	X
Pisidium	
Sphaerium	
Phylum Arthropoda	
Branchiopoda	
"Cladocera"	
Amphipoda	
Hyalella	
unident. scuds	
Isopoda	
Caecidotea/Asellus	
Lirceus	
Decapoda	
Cambaridae	
Orconectes	
Arachnida	
Acari	
Insecta	
Ephemeroptera	
Baetidae	
Baetis	
Caenidae	
Caenis	
Heptageniidae	
Stenonema (pulchellum group)	
Odonata (Anisoptera)	
Aeshnidae	
Corduliidae	
Neurocordulia	
Tetragoneuria	
Libellulidae	
Erythemis	
Odonata (Zygoptera)	
Coenagrionidae	
Argia	
Chromagrion	
Ischnura	
Lestidae	
unident. dameselflies	

Trichoptera
 Hydropsychidae
  Cheumatopsyche
  Hydropsyche
  Hydropsyche orris?
  Hydropsyche simulans
  Hydropsyche simulans?
  Hydropsyche simulans pupae
 Hydroptilidae
  Neotrichia
  Orthotrichia
 Leptoceridae
  Anthripsodes
  Leptocerus
  Nectopsyche
  Oecetis
  Polycentropodidae
  Cyrnellus fraternus
  Neureclipsis
 Hemiptera
  Belostomatidae
   Lethocerus
  Corixidae
   Sigara
  Pleidae
   Plea
 Coleoptera
  Dysticidae
   Dytiscus
   Laccophilus
 Gyrinidae
  Dineutus
  Gyrinus? *
 Haliplidae
  Haliplus
Diptera
  Ceratopogonidae
   Palpomyia
   unident. biting midges
 Chaoboridae
  Chaoborus
 Chironomidae
 Chironominae
 (Chironomini)
   Chironomus
   Chironomnus decorus
   Dicrotendipes/Limnochironomus
   Dicrotendipes nervosus
   Glyptotendipes
   Microtendipes
   Parachironomus
   Parachironomus abortivus
   Phaenopsectra
   Polypedilum
   Polypedilum convictum
   Stenochironmous
 (Tanytarsini)
   Cladotanytarsus
   Rheotanytarsus
 (Orthocladiinae)

Cricotopus
Cricotopus bicinctus
Cricotopus intersecuts
Cricotopus sylvestris
Eukiefferiella
Eukiefferiella discoloripes
(Tanypodinae)
Ablabesmyia
Labrundinia
Procladius sublettei
Thienemannimyia group
unident. midge larvae
unident. midge pupae
Culicidae
Tripulidae
Empididae
Stratiomyidae
Syrphidae

Table 2.
Examples of tolerance ratings for macroinvertebrates collected in the Grand Calumet River. Ranges of tolerance: USDA (1989) = 2-108; Illinois EPA (1985) = 0-11; Chutter (1972) = 0-10; Hilsenhoff (1988) = 0-10; Hilsenhoff (1987) = 0-10; Patrick & Palavagc (1994) = P(ollution tolerant) or N (atural conditions). * Value dependent on number of Betid Ephemeroptera.

Taxa	USDA	Illinois EPA	Chutter
Phylum Porifera			
Phylum Cnidaria	108		
Hydridae			
Hudra			6
Phylum Platyhelminthes			
Turbellaira	108	6	3
Phylum Nematoda	108		7
Phylum Bryozoa			
Plumatella			
Phylum Annelida			
Olifochaeta	108	10	8 or 10 *
Lumbricidae	108		
Lumbriculidae			
Tubificidae	108		
Limnodrilus			
Limnodrilus cervix			
Limnodrilus hoffmeisteri			
Potamothrix vejdovskyi			
Quistadrilus mudtisetosus			
Hirudinea	108	8	7
Erpobdellidae		8	
Dina microstoma?			
Dina parva			
Expobdella punctata			
Mooreobdella fervida			
Mooreobdella microstoma			
Glossiphoniidae		8	
Helobdella			
Helobdella stagnalis			
Placobdella			
Phylum Mollusca			
Gastropoda	108		0
Ancylidae			4
Ferrissia		7	

Hydrobiidae			
Amnicola		4	
Lymnaeidae	108		
Lymnaea	108	7	
Physidae	108		
Aplexa		7	
Physa	108	9	
Physella			
Planorbidae	108	6	
Gyraulus		7	
Helisoma		7	
Planorbula			
Promenetus			
Promenetus?			
Valvatidae			
Valvata		2	
Bivalvia/Pelecypoda	108		0
Corbiculidae		4	
Dreissenidae			
Sphaeriidae (unident.)			
Pisidium		5	
Sphaerium		5	
Phylum Arthropoda			

Hydropsyche	108	5	
Hydropsyche orris?		4	
Hydropsyche simulans		5	
Hydroptilidae	108		
Neotrichia	108	4	
Orthorichia		1	2
Leptoceridae	54		
Anthripsodes			
Leptocerus		3	
Nectopsyche		3	
Oecetis	54	5	
Polycentropodidae	72		
Cyrnellus fraternus		5	
Neureclipsis		3	
Hemiptera			0
Belostomatidae	72		
Lethocerus	72		
Corixidae	108		
Sigara	108		
Pleidae			
Plea			
Coleoptera			0
Dytiscidae	72		
Dytiscus	72		
Laccophilus	72		
Gyrinidae	108		
Dineutus		4	
Gyrinus?	108	4	
Haliplidae	54		
Haliplus	54		
Diptera			
Ceratopogonidae	108	5	0
Palpomyia		6	
Chaoboridae		8	0
Chaoborus			
Chironomidae	108		
Chironominae			
(Chironomini)			7 *
Chironomus		11	10
Chironomus decorus			
Dicrotendipes/Limnochironomus		6	
Dicrotendipes nervosus		6	
Glyptotendipes		10	
Microtendipes		6	
Parachironomus		8	
Parachironomus abortivus			
Phaenopsectra		4	
Polypedilum		6	
Polypedilum convictum			
Stenochironomus		3	
(Tanytarsini)			0
Cladotanytarsus		7	
Rheotanytarsus		6	
(Orthocladiinae)			7 *
Cricotopus		8	
Cricotopus bicinctus		10	
Cricotopus intersectus			
Cricotopus sylvestris			
Eukiefferiella		4	
Eukiefferiella discoloripes			0

(Tanypodinae)			
Ablabesmyia		6	
Labrundinia		4	
Procladius sublettei		8	
Thienemannimyia group		6	
Culicidae	108	8	10
Tipulidae	72	4	0
Empididae	108	6	0
Stratiomyidae	108		0
Syrphidae	108	11	0

Taxa	Hilsenhoff (1998)	Hilsenhoff (1987)	Patrick & Palavage
Phylum Porifera			
Phylum Cnidaria			
Hydridae			
Hudra			N
Phylum Platyhelminthes			
Turbellaira			
Phylum Nematoda			?
Phylum Bryozoa			
Plumatella			
Phylum Annelida			
Olifochaeta			
Lumbricidae			
Lumbriculidae			
Tubificidae			
Limnodrilus			P
Limnodrilus cervix			P
Limnodrilus hoffmeisteri			P
Potamothrix vejdovskyi			
Quistadrilus mudtisetosus			
Hirudinea			
Erpobdellidae			
Dina microstoma?			
Dina parva			P
Expobdella punctata			P
Mooreobdella fervida			
Mooreobdella microstoma			
Glossiphoniidae			
Helobdella			
Helobdella stagnalis			P
Placobdella			
Phylum Mollusca			
Gastropoda			
Ancylidae			
Ferrissia			P
Hydrobiidae			
Amnicola			
Lymnaeidae			
Lymnaea			
Physidae			
Aplexa			
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Valvatidae			
Valvata			N
Bivalvia/Pelecypoda			
Corbiculidae			
Dreissenidae			
Sphaeriidae (unident.)			
Pisidium			P
Sphaerium			P
Phylum Arthropoda			
Branchiopoda			
"Cladocera"			
Amphipoda			
Hyalella		8	P
Isopoda			
Asellidae			
Caecidotea/Asellus			P
Lirceus			
Decapoda			
Cambaridae			
Orconects			
Arachnida			
Acari			
Insecta			
Ephemeroptera			
Baetidae	4		
Baetis			N
Caenidae	7		
Caenis		7	N
Heptageniidae	4		
Stenonema (pulchellum group)		3	N
Odonata, Anisoptera			
Aeshnidae	3		
Corduliidae	5		
Neurocordulia			
Tetragoneuria			
Libellulidae	9		
Erythemis			N
Odonata, Zygoptera			

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