EIGHTEENMILE CREEK AREA OF CONCERN DELISTING TARGETS: DRAFT FINAL REPORT

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U.S. Environmental Protection Agency

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Submitted by:

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INTRODUCTION

The Eighteenmile Creek Area of Concern (AOC) is located in the Town of Newfane, Niagara County, in Western New York State (Figure 1). The creek flows from the south and discharges through Olcott Harbor into Lake Ontario, approximately 18 miles east of the mouth of the Niagara River. The AOC includes Olcott Harbor at the mouth of the creek and extends upstream to the farthest point at which backwater conditions exist during Lake Ontario's highest monthly average lake level. This point is located just downstream of the Burt Dam, approximately 2 miles south of Olcott Harbor.[1]

Eighteenmile Creek was designated as an AOC because of water quality and bottom sediment issues associated with past industrial and municipal discharge practices, the disposal of waste and the use of pesticides. Over the years, numerous contaminants have been identified in creek sediments which have a detrimental effect to the AOC and Lake Ontario. These contaminants include but are not limited to; Polychlorinated Biphenyls (PCBs); Mercury; Dioxins and Furans; Dieldrin; Mirex; DDT; Lead; and Copper. Sediments contaminated with these substances have contributed to restrictions on fish and wildlife consumption, degradation of benthitic organisms, and restrictions on dredging activities in the AOC. It is also suspected that these contaminated sediments contribute to a degradation of fish and wildlife populations, the presence of fish tumors, and the prevalence of bird and animal deformities or reproductive problems.

The original listing of Areas of Concern (AOCs) within the Great Lakes was based on the presence of beneficial use impairments (BUIs). BUIs were defined by the International Joint Commission (IJC) along with generalized criteria for determining when a Beneficial Use was impaired. The next step is to determine the targets that are required to be met in order to de-list the individual BUIs and/or the AOC. Table 1 is a summary of the identified delisting targets for Eighteenmile Creek.

[1] New York State Department of Environmental Conservation, 1997. Eighteenmile Creek Remedial Action Plan; Region 9 Division of Water

FIGURE 1 - EIGHTEENMILE CREEK AREA OF CONCERN

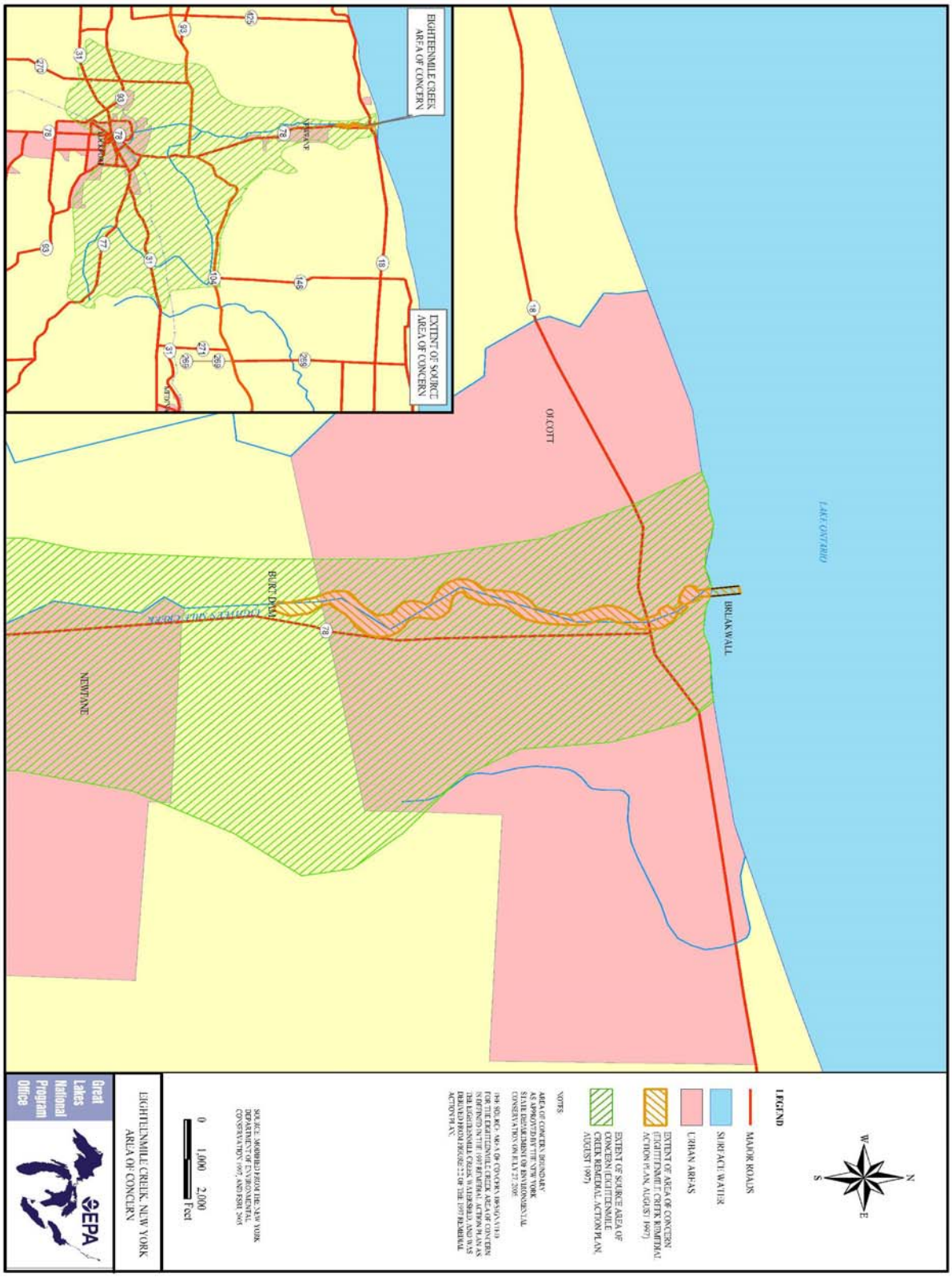

TABLE 1 - EIGHTEENMILE CREEK DELISTING TARGETS

RESTRICTIONS ON FISH & WILDLIFE CONSUMPTION

- **There is no Area of Concern-specific fish and wildlife consumption advisories issued by NYS.**
- **Contaminant levels in fish and wildlife must not be due to contaminant input from the watershed upstream of Burt Dam.**

DEGREDATION OF BENTHOS

- **Benthic macroinvertebrate communities are "non-impacted" or "slightly impacted" according to NYSDEC indices (Bode et al., 1996); OR**
- **In the absence of NYSDEC data, riffle habitats require benthic macroinvertebrate communities with a species richness higher than 20, EPT richness greater than 6, a biotic index value greater than 4.51, and a percent model affinity greater than 50; OR**
- **In the absence of benthic community data, this use will be considered restored when the level of toxic contaminants in sediments is not significantly higher than controls.**

RESTRICTIONS ON DREDGING ACTIVITIES

- **When contaminants in AOC sediments (located within the actual or potential dredging areas identified for the improvement of ship navigation) do not exceed standards, criteria, or guidelines such that there are restrictions on dredging or disposal activities.**

DEGREDATION OF FISH & WILDLIFE POPULATIONS

- **Fish & wildlife diversity, abundance and condition are statistically similar to diversity, abundance and condition of populations at non-AOC control sites. AND**
- **PCB levels in bottom dwelling fish do not exceed the critical PCB tissue concentration for effects on fish (440 micrograms per kilogram wet weight; Dyer et al. 2000)**

FISH TUMORS & OTHER DEFORMITIES

- **Prevalence and severity of external tumors and other deformities in brown bullheads is not statistically greater than that of non-AOC control sites; AND**
- **Prevalence and severity of neoplastic or preneoplastic liver tumors in brown bullheads is not statistically greater than that of non-AOC control sites.**

BIRD OR ANIMAL DEFORMITIES/REPRODUCTIVE PROBLEMS

- **No reports of wildlife population deformities or reproductive problems from wildlife officials; AND**
- **The toxicity of sediment-associated contaminants is not statistically higher than that of non-AOC control sites; AND**
- **PCB levels in bottom dwelling fish do not exceed levels associated with deformities in wildlife.**

Restrictions on Fish & Wildlife Consumption
Status: IMPAIRED

IJC Listing Guideline: *An impairment will be listed when contaminant levels in fish or wildlife populations exceed current standards, objectives or guidelines, or public health advisories are in effect for human consumption of fish or wildlife. Contaminant levels in fish and wildlife must be due to contaminant input from the watershed.*

Based upon data from New York State Department of Environmental Conservation (NYSDEC), the New York State Department of Health (NYSDOH) has issued a fish consumption advisory for Eighteenmile Creek. The NYSDOH advisory for the creek upstream of Burt Dam is to EAT NO FISH of any species, based upon elevated PCB levels in fish samples. Fish that migrate from Lake Ontario are present in the AOC downstream of Burt Dam. Therefore, the NYSDOH advisory for this area is the same advisory that applies to Lake Ontario waters which is based upon elevated levels of PCBs, mirex and dioxins. The advisory is:

- Eat no America eel, channel catfish, carp, lake trout, chinook salmon, rainbow trout, white perch, coho salmon over 21", and brown trout over 20".
- Eat no more than one meal/month of white sucker, smaller coho salmon, and smaller brown trout.

Table 2 illustrates that all samples, except for four samples downstream of Burt Dam, exceed the Food & Drug Administration (FDA) limit for human consumption of 2 mg/kg for PCBs. However, all samples exceed the PCB critical tissue concentration for effects on fish (.440 mg/kg).

Table 2: PCB Concentrations of Eighteenmile Creek Fish

Sample Set	Species	# of Samples	Fish Part	Total PCBs (ppm)
July 1987 Downstream of Burt Dam	Carp	3	Whole Fish	**9.31**
July 1992 Downstream of Burt Dam	Lg. Mouth Bass	12	Standard Fillet	**3.64**
	Carp	10	Standard Fillet	**6.80**
	Sm. Mouth Bass	8	Standard Fillet	1.51
	Brown Bullhead	11	Standard Fillet	1.50
July 1992 Upstream of Burt Dam	Lg. Mouth Bass	11	Standard Fillet	**3.81**
	Black Crappie	12	Standard Fillet	**6.54**
	White Sucker	10	Standard Fillet	**3.21**
	Northern Pike	3	Standard Fillet	**5.16**
	Rock Bass	3	Standard Fillet	**2.31**
	Walleye	1	Standard Fillet	**6.74**
	Channel Catfish	2	Standard Fillet	**15.3**
August 2007 Downstream of Burt Dam	Bullhead 1	1	Whole Fish	**3.2**
	Bullhead 2	1	Whole Fish	**1.8**
	Bullhead 3	1	Whole Fish	**0.890**
	Bullhead 4	1	Whole Fish	**3.7**
	Bullhead 5	1	Whole Fish	**6.1**
	Bullhead 6	1	Whole Fish	**4.7**
	Bullhead 7	1	Whole Fish	**1.4**
	Bullhead 8	1	Whole Fish	**4.1**

KEY:
PCB = Polychlorinated biphenyls
Bold Numbers = Sample concentration equals or exceeds critical tissue concentration (.440 mg/kg for all aroclors; Dyer et al. 2000) for effects on fish.

IJC Delisting Guideline: *When contaminant levels in fish and wildlife populations do not exceed current standards, objectives or guidelines, and no public health advisories are in effect for human consumption of fish or wildlife. Contaminant levels in fish and wildlife must not be due to contaminant input from the watershed.*

Eighteenmile Creek Delisting Target

- **There is no Area of Concern-specific fish and wildlife consumption advisories issued by NYS.**
- **Contaminant levels in fish and wildlife must not be due to contaminant input from the watershed upstream of Burt Dam.**

Degradation of Benthos
Status: IMPAIRED

IJC Listing Guideline: *When the benthic macroinvertebrate community structure significantly diverges from unimpacted control sites of comparable physical and chemical characteristics. In addition, this use will be considered impaired when toxicity (as defined by relevant, field-validated, bioassays with appropriate quality assurance/quality controls) of sediment associated contaminants at a site is significantly higher than controls.*

Measurements of benthic macroinvertebrates inhabiting Eighteenmile Creek were made in 1977 by the Army Corps of Engineers. NYSDEC also collected benthic samples on three occasions during 1989, 1990 and as part of the 1990 Rotating Intensive Basin Study (RIBS). All studies that applied ratings to the stream concluded that benthic populations were moderately impacted. In 1994, NYSDEC completed an inventory of benthic populations at a site within Olcott Harbor and an additional site upstream of the Route 18 Bridge. The assessment of the number and species diversity of the benthic organisms in the AOC indicated a slight to moderate impairment.

To assess the overall toxicological risk of surficial sediment contamination within the AOC that is currently exposed to the aquatic community, the U.S. Army Corps of Engineers (USACE), Buffalo District collected sediment samples from 15 locations within the lower reach of Eighteenmile Creek in August 2003. Organic contaminant data indicated that levels of the pesticide dichlorodiphenyldichloroethylene (DDE) in surficial sediments within the AOC may be chronically toxic. Bioaccumulation data indicated that DDE was bioavailable throughout AOC surface sediments (mean BSAF range = 1.21 to 5.41). The high bioavailability of DDE in surficial sediments located approximately .10 miles downstream of Burt Dam (BSAF = 4.60) and approximately .35 downstream of Burt Dam (BSAF = 5.41) indicate that it is bioaccumulating in benthic invertebrates, and is likely to bioaccumulate in predator fish and higher trophic levels.[2]

Both sediment and bioaccumulation data suggest that PCBs in surficial sediments throughout most or all of the AOC are being bioaccumulated to levels that pose a risk to aquatic organisms. PCB concentrations are bioavailable in surface sediments throughout the AOC (mean BSAF range = 1.55 to 4.36). The high bioavailability of PCBs in the surficial sediments located approximately .10 miles downstream of Burt Dam (BSAF = 2.95) and approximately .35 miles downstream of Burt Dam (BSAF = 4.36) indicate that they are bioaccumulating in benthic invertebrates, and are likely to bioaccumulate in predator fish and higher trophic levels. The site-specific BSAFs determined in this investigation can be used in a model to conservatively predict the bioaccumulation of DDE and PCBs by indigenous benthic organisms from AOC sediments. PCDD/F contamination in surficial sediments throughout the AOC indicates a bioaccumulation risk to wildlife.[3]

IJC Delisting Guideline: *When the benthic macroinvertebrate community structure does not significantly diverge from unimpacted control sites of comparable physical and chemical characteristics. Further, in the absence of community structure data, this use will be considered restored when toxicity of sediment-associated contaminants is not significantly higher than controls.*

Eighteenmile Creek Delisting Target

- **Benthic macroinvertebrate communities are "non-impacted" or "slightly impacted" according to NYSDEC indices (Bode et al., 1996); OR**
- **In the absence of NYSDEC data, riffle habitats require benthic macroinvertebrate communities with a species richness higher than 20, EPT richness greater than 6, a biotic index value greater than 4.51, and a percent model affinity greater than 50; OR**
- **In the absence of benthic community data, this use will be considered restored when the level of toxic contaminants in sediments is not significantly higher than controls.**

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[2] Pickard, S.W. 2006. *Eighteenmile Creek Great Lakes Area of Concern (AOC) Niagara County, New York; Concentrations, Bioaccumulation and Bioavailability of Contaminants in Surface Sediments.* Buffalo: USACE, Buffalo District

[3] IBID

Restrictions on Dredging Activities
Status: IMPAIRED

IJC Listing Guideline: *When contaminants in sediments exceed standards, criteria, or guidelines such that there are restrictions on dredging or disposal activities.*

Recreational boating is a beneficial use of Eighteenmile Creek that requires dredging of sediments. The outlet to Lake Ontario is protected by two piers and the navigation channel is periodically dredged by the U.S. Army Corps of Engineers. Other areas in the harbor have been periodically dredged by the Town of Newfane.

There have been some dredging restrictions placed on Eighteenmile Creek under the EPA's *Guidelines for the Pollutional Classification of Great Lakes Harbor Sediments* and the NYSDEC guidance on freshwater navigational dredging. The area surrounding a Corps of Engineers site located approximately at the mid-point of the Olcott Harbor was classified as unsuitable for open lake disposal. The sediments from this site were classified as polluted with chromium, copper, lead, manganese, nickel, zinc, and cyanides. All dredging spoils from this area must be placed in a land based confined disposal facility.[4]

Other sediment studies had samples that exceeded either the EPA or NYSDEC guidance for one or more contaminants. The 1994 Lake Ontario Tributary Sampling has two samples from Olcott Harbor, one of which exceeded EPA guidelines for mercury and the other which exceeded DEC the guidance value for 2,3,7,8-TCDD toxicity equivalence. The 1994 Olcott Harbor Sediment Sampling Project had two sample sites in the harbor area, both of which had contaminant levels which exceed EPA and NYSDEC criteria for copper, chromium, lead, mercury, zinc, and benzo(a)anthracene.

To assess the overall toxicological risk of surficial sediment contamination within the AOC that is currently exposed to the aquatic community, the U.S. Army Corps of Engineers (USACE), Buffalo District collected sediment samples from 3 locations within Olcott Harbor in August 2003. A composite sample of those 3 sites exceeded EPA guidelines for copper, lead, manganese, and zinc. Furthermore, total PCB concentrations significantly exceeded lake reference levels.[5]

IJC Delisting Guideline: *When contaminants in sediments do not exceed standards, criteria, or guidelines such that there are restrictions on dredging or disposal activities.*

Eighteenmile Creek Delisting Target

- **When contaminants in AOC sediments (located within the actual or potential dredging areas identified for the improvement of ship navigation) do not exceed standards, criteria, or guidelines such that there are restrictions on dredging or disposal activities.**

[4] New York State Department of Environmental Conservation, 1997. Eighteenmile Creek Remedial Action Plan; Region 9 Division of Water

[5] Pickard, S.W. 2006. *Eighteenmile Creek Great Lakes Area of Concern (AOC) Niagara County, New York; Concentrations,*

Degraded Fish & Wildlife Populations
Status: Undetermined by Remedial Advisory Committee

IJC Listing Guideline: *When fish and wildlife management programs have identified degraded fish or wildlife populations due to a cause within the watershed. In addition, this use will be considered impaired when relevant, field-validated, fish or wildlife bioassays with appropriate quality assurance/quality controls confirm significant toxicity from water column or sediment contaminant.*

Eighteenmile Creek is a significant Lake Ontario tributary fishery. Most angler effort has been directed at migratory trout and salmon. However, the creek also provides fishing opportunities for warm water species. An angler survey of all the major tributaries to Lake Ontario in New York was initiated in 2005 by the NYSDEC. Five NYSDEC technicians surveyed 28 Lake Ontario tributaries, including Eighteenmile Creek. NYSDEC estimated effort (numbers of angler hours and angler trips), catch and harvest (total numbers), and catch and harvest rates (fish per angler hour) for each species in each tributary. The total estimated effort for all 28 tributaries was 805,419 angler hours. Eighteenmile Creek accounted for 8.5% (69,111 hours) of the total angler hours calculated, ranked second behind the Salmon River which accounted for 60% of calculated angler hours. The total estimated angler trips from all 28 tributaries were 256,907. Eighteenmile Creek accounted for 12.5% (32,295 trips) of the total angler trips calculated, ranked third behind the Salmon River and Oak Orchard Creek.[6]

Sixteen of the 28 tributaries surveyed had reported catches of steelhead. For all tributaries surveyed, the total estimated catch was 28,245. The Salmon River had the highest estimated catch of 7,738 fish. Eighteenmile Creek ranked second with estimated catches exceeding 7,000 fish. Fifteen of the 28 waters surveyed had reported catches of brown trout. For all tributaries surveyed, estimated brown trout catches were 43,320. Catches of brown trout (22,684) on Eighteenmile Creek were markedly higher than for any other tributary. Twenty-three of 28 tributaries surveyed had reported catches of Chinook salmon. The estimated catch of Chinook salmon on all tributaries surveyed in 2005 was 158,029. Catches of Chinook salmon on Eighteenmile Creek (13,457) were second only to South Sandy Creek. [7]

In 2007, fish & wildlife populations were assessed by conducting seasonal fish and wildlife population surveys within the AOC and a control creek (Oak Orchard Creek). The primary components of this investigation included: Conducting fish community surveys during two periods—early spring (May) and summer (late August); targeted sampling of brown bullhead for gross external and internal observations, excision of livers for pathological/histological examination, and preparing selected specimens for whole-body tissue chemical analyses (for PCBs and dioxin) (late August); and periodic bird, amphibian, and mammal surveys from May through September. The data generated by the field activities was used in a weight-of-evidence approach to determine the status of this beneficial use. [8]

Four lines of evidence were examined to evaluate the potential impairment of fish populations in Eighteenmile Creek: (1) diversity, abundance, and condition of fish; (2) concentrations of PCBs and dioxins/furans in bullheads; (3) the prevalence and severity of external tumors in bullheads; and (4) the prevalence and severity of liver tumors in bullheads. Three lines of evidence (1, 3, and 4) showed no impairment at Eighteenmile Creek. Impairment was noted at Eighteenmile Creek regarding the levels of PCBs in fish, which were highly elevated compared with the levels found in fish from Oak Orchard Creek. Whole-body PCB concentrations in bullheads were ten times greater in fish from Eighteenmile Creek compared with fish from Oak Orchard Creek and exceeded the critical PCB tissue concentration for effects on fish. Dioxins/furans also were elevated in fish from Eighteenmile Creek compared with fish from Oak Orchard Creek, but the critical tissue concentration for dioxins/furans was not exceeded.[9]

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[6] Prindle, S.E., Bishop, D.L., Penney, M.E.. 2005. *Fall 2005 Lake Ontario Tributary Angler Survey.* Cortland: NYSDEC
[7] IBID
[8] Ecology & Environment, Inc. 2008. Beneficial Use Impairment Investigation for Eighteenmile Creek Niagara County, New York
[9] IBID

Two lines of evidence were examined to evaluate the potential impairment of bird populations at Eighteenmile Creek: (1) the diversity and abundance of birds, and (2) the risk of reproductive impairment for fish-eating birds. No impairment was found.

Two lines of evidence were examined to evaluate the potential impairment of mammal populations at Eighteenmile Creek: (1) the diversity and abundance of mammals, and (2) the risk of reproductive impairment for fish-eating mammals. Insufficient data was available to evaluate the first line of evidence. Reproductive impairment potentially exists at Eighteenmile Creek for fish-eating mammals such as the mink due to the high levels of PCBs in fish.

Only a single line of evidence was examined to evaluate potential impairment of amphibian populations at Eighteenmile Creek—the diversity and abundance of amphibians. No impairment was noted.

IJC Delisting Guideline: *When environmental conditions support healthy, self-sustaining communities of desired fish and wildlife at predetermined levels of abundance that would be expected from the amount and quality of suitable physical, chemical and biological habitat present. An effort must be made to ensure that fish and wildlife objectives for Areas of Concern are consistent with Great Lakes ecosystem objectives and Great Lakes Fishery Commission fish community goals. Further, in the absence of community structure data, this use will be considered restored when fish and wildlife bioassays confirm no significant toxicity from water column or sediment contaminants.*

Eighteenmile Creek Delisting Target

- **Fish & wildlife diversity, abundance and condition are statistically similar to diversity, abundance and condition of populations at non-AOC control sites. AND**
- **PCB levels in bottom dwelling fish do not exceed the critical PCB tissue concentration for effects on fish (440 micrograms per kilogram wet weight; Dyer et al. 2000)**

Fish Tumors & Other Deformities
Status: Undetermined by Remedial Advisory Committee

IJC Listing Guideline: *When the incidence rates of fish tumors or other deformities exceed rates at unimpacted control sites or when survey data confirm the presence of neoplastic or preneoplastic liver tumors in bullheads or suckers.*

In 2007, prevalence of fish tumors and other deformities was assessed. One hundred brown bullheads, 50 from Eighteenmile Creek and 50 from a control creek (Oak Orchard Creek), were collected during the August sampling event. The data generated by the field activities was used in a weight-of-evidence approach to determine the status of this beneficial use. Two lines of evidence were used to evaluate this BUI: (1) the prevalence and severity of external tumors and other deformities in bullheads, and (2) the prevalence and severity of liver tumors in bullheads. Mild impairment was noted at Eighteenmile Creek regarding the first line of evidence. No difference between creeks was observed regarding the second line of evidence.

In summary, although the number of external aberrations was greater in fish from Eighteenmile Creek compared with those from Oak Orchard Creek, their severity was typically very low. Internal visual observations of the fish from Eighteenmile indicated that there appeared to be a relatively high incidence of discoloration and/or granular appearance to the livers (40 fish had some degree of pale discoloration, and many of those exhibited a granular texture [see photos in Appendix F]). However, the results for the Oak Orchard Creek specimens were similarly high, with 43 fish exhibiting the same or similar characteristics. Observations of parasites and lesions on the livers also were similar (and in low numbers) for specimens from both creeks. One liver abnormality that appeared to be a tumor was documented in an Eighteenmile Creek fish during the visual examination of livers. Overall, the incidence of visual liver abnormalities in fish from the two creeks was comparable.[10]

IJC Delisting Guideline: *When the incidence rates of fish tumors or other deformities do not exceed rates at unimpacted control sites and when survey data confirm the absence of neoplastic or preneoplastic liver tumors in bullheads or suckers*

Eighteenmile Creek Delisting Target

- **Prevalence and severity of external tumors and other deformities in brown bullheads is not statistically greater than that of non-AOC control sites; AND**
- **Prevalence and severity of neoplastic or preneoplastic liver tumors in brown bullheads is not statistically greater than that of non-AOC control sites.**

[10] Ecology & Environment, Inc. 2008. Beneficial Use Impairment Investigation for Eighteenmile Creek Niagara County, New York

Bird or Animal Deformities or Reproductive Problem
Status: LIKELY

IJC Listing Guideline: *When wildlife survey data confirm the presence of deformities (e.g. cross-bill syndrome) or other reproductive problems (e.g. egg-shell thinning) in sentinel wildlife species.*

There is no data available on the incidence of bird or animal deformities or reproductive problems in the AOC. There are however, contaminants in the creek that are known to bioaccumulate and possibly cause deformities or reproductive problems in wildlife. The creek is easily accessible to fish-eating wildlife.

To assess the overall toxicological risk of surficial sediment contamination within the AOC that is currently exposed to the aquatic community, the U.S. Army Corps of Engineers (USACE), Buffalo District collected sediment samples from 15 locations within the lower reach of Eighteenmile Creek in August 2003. Organic contaminant data indicated that levels of the pesticide dichlorodiphenyldichloroethylene (DDE) in surficial sediments within the AOC may be chronically toxic. Bioaccumulation data indicated that DDE was bioavailable throughout AOC surface sediments (mean BSAF range = 1.21 to 5.41). The high bioavailability of DDE in surficial sediments located approximately .10 miles downstream of Burt Dam (BSAF = 4.60) and approximately .35 downstream of Burt Dam (BSAF = 5.41) indicate that it is bioaccumulating in benthic invertebrates, and is likely to bioaccumulate in predator fish and higher trophic levels.[11]

Both sediment and bioaccumulation data suggest that PCBs in surficial sediments throughout most or all of the AOC are being bioaccumulated to levels that pose a risk to aquatic organisms. PCB concentrations are bioavailable in surface sediments throughout the AOC (mean BSAF range = 1.55 to 4.36). The high bioavailability of PCBs in the surficial sediments located approximately .10 miles downstream of Burt Dam (BSAF = 2.95) and approximately .35 miles downstream of Burt Dam (BSAF = 4.36) indicate that they are bioaccumulating in benthic invertebrates, and are likely to bioaccumulate in predator fish and higher trophic levels. The site-specific BSAFs determined in this investigation can be used in a model to conservatively predict the bioaccumulation of DDE and PCBs by indigenous benthic organisms from AOC sediments. PCDD/F contamination in surficial sediments throughout the AOC indicate a bioaccumulation risk to wildlife.[12]

Adult fish serve as a food source for picivorous wildlife. In 2007, eight adult brown bullheads were analyzed for PCBs. Total PCB concentrations in fish sampled ranged from .890 mg/kg to 6.10 mg/kg. All fish that were analyzed exceeded the NYSDEC level established for the protection of fish-eating wildlife (.11 mg/kg) and the PCB critical tissue concentration for effects on fish (.440 mg/kg). Because NYSDEC wildlife criteria for contaminant concentrations in adult fish flesh are exceeded for PCBs in all fish samples, the impairment of this beneficial use is considered likely.

IJC Delisting Guideline: *When the incidence rates of deformities (e.g. cross-bill syndrome) or reproductive problems (e.g. egg-shell thinning) in sentinel wildlife species do not exceed background levels in inland control population.*

Eighteenmile Creek Delisting Target

- **No reports of wildlife population deformities or reproductive problems from wildlife officials; AND**
- **The toxicity of sediment-associated contaminants is not statistically higher than that of non-AOC control sites; AND**
- **PCB levels in bottom dwelling fish do not exceed levels associated with deformities in wildlife**

[11] Pickard, S.W. 2006. *Eighteenmile Creek Great Lakes Area of Concern (AOC) Niagara County, New York; Concentrations, Bioaccumulation and Bioavailability of Contaminants in Surface Sediments. Buffalo: USACE, Buffalo District*
[12] IBID