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Buffalo River Natural Resource Damage Assessment: Fish Consumption Advisory Injury Determination

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prepared for:

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BUFFALO RIVER NATURAL RESOURCE DAMAGE ASSESSMENT: FISH CONSUMPTION ADVISORY INJURY DETERMINATION

The Buffalo River (River) is an urbanized river that flows through the city of Buffalo, New York and ends at its confluence with Lake Erie and the head of the Niagara River. Throughout its history of development, industry, and shipping, the River has suffered from long-term contamination.

Acting under their authority as natural resource trustees under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Section 107(f), 42 U.S.C. § 9607(f); Executive Order 12580; the National Contingency Plan ("NCP"), 40 C.F.R. Part 300 – Subpart G; the Oil Pollution Act of 1990 (OPA), 33 U.S.C. § 2701 et seq.; the Clean Water Act (CWA), 33 U.S.C. § 1251 et seq.; and the New York State Navigation Law (NYSNL), NYSNL Article 12; the U.S. Department of the Interior (DOI) Fish and Wildlife Service, the State of New York Department of Environmental Conservation (NYSDEC), and the Tuscarora Nation (collectively the Trustees) are conducting a natural resource damage assessment (NRDA).[1] The purpose of this action is to evaluate injuries within the assessment area to natural resources and losses in natural resource services due to the discharge or release of hazardous substances and oil, to plan and implement restoration actions to return any injured resources to their baseline condition, and to restore any associated interim service losses on behalf of the public.

The Trustees formally initiated NRDA efforts in 2008 with the issuance of a Preassessment Screen for the River (Trustees 2008). Currently, the Trustees are working in cooperation with two potentially responsible parties: Honeywell International, and the ExxonMobil Corporation, to perform NRDA activities. The assessment area for the NRDA includes riverine habitat from the confluence of Cazenovia Creek to the mouth of the River at Lake Erie (approximately the lower 6.2 miles of the main stem of the River plus the aquatic habitat of the City Ship Canal that runs 1.4 miles south from the mouth of the River parallel to Lake Erie), as well as the aquatic and terrestrial habitat of the Times Beach Confined Disposal Facility (TBCDF), where contaminated dredge materials from the River have been deposited.

[1] The Trustees are authorized to conduct natural resource damage assessments and restoration activities and to sue for damages resulting from the destruction of, loss of or injury to such natural resources by Section 107(a)-(f) of CERCLA, Section 1002 of OPA, 40 C.F.R. § 300.600 *et seq.*, and, to the extent appropriate and elected for use by the Trustees, the NRDA Regulations at 43 C.F.R. Part 11. In addition to this authority under CERCLA, one or more of the Trustees also have authority under Executive Order 12580, the NCP (40 C.F.R. Part 300 – Subpart G), OPA (33 U.S.C. § 2701 et seq.), CWA (33 U.S.C. § 1251 et seq.), and NYSNL (NYSNL Article 12).

As part of the NRDA, the Trustees have developed this injury determination report. As described in the DOI regulations at 43 C.F.R. Part 11, the purpose of an injury determination is "to ensure that only assessments involving well documented injuries resulting from the discharge of oil or release of a hazardous substance proceed through the type B assessment" (43 C.F.R. §11.61 (b)).[2] This injury determination report provides an overview of the Trustees' authority, a description of the River and the fish resources within it, background information of polychlorinated biphenyls (PCBs) and polycyclic aromatic hydrocarbons (PAHs) -- both contaminants of concern in the River, and defines injury in the context of the DOI regulations. Finally, it demonstrates that injury to biological resources (fish) has occurred in the River in accordance with the DOI regulations through documentation of the existence of advisories related to the consumption of fish from the River.

This document does not address injury quantification or the magnitude of potential service losses, including but not limited to recreational and cultural service losses; nor does it purport to address exhaustively the full suite of potential injuries to fish resources resulting from exposure to hazardous substances or oil in the River. As NRDA activities progress, the Trustees anticipate issuing additional injury determination reports, and other documents described in the DOI regulations.

TRUSTEES' AUTHORITY

Under Federal law, "any Federal natural resources management agency designated in the NCP and any State agency designated by the Governor of each State, pursuant to section 107(f)(2)(B) of CERCLA, that may prosecute claims for damages under section 107(f) or 111(b) of CERCLA; or an Indian tribe, that may commence an action under section 126(d) of CERCLA" is authorized to act as a natural resource trustee (42 U.S.C. § 9601 et seq. (CERCLA); 43 C.F.R. § 11.14(rr)). In addition to this authority under CERCLA, one or more of the Trustees also have authority under Executive Order 12580, the NCP (40 C.F.R. Part 300 – Subpart G), OPA (33 U.S.C. § 2701 et seq.), CWA (33 U.S.C. § 1251 et seq.), and NYSNL (NYSNL Article 12). The Trustee Council for the River consists of representatives from the following Federal, State, and Tribal groups:

- U.S. Department of the Interior Fish and Wildlife Service;
- The State of New York Department of Environmental Conservation; and
- The Tuscarora Nation.

[2] There are two types of assessments for NRDA under DOI regulations. Type A assessments are "standard procedures for simplified assessments requiring minimal field observation to determine damages as specified in section 301(c)(2)(A) of CERCLA." Type B assessments are "alternative methodologies for conducting assessments in individual cases to determine the type and extent of short- and long-term injury and damages, as specified in section 301(c)(2)(B) of CERCLA."

THE BUFFALO RIVER

The River is approximately 8.7 miles long with an approximate average width of 300 feet. It is formed by the confluence of the Buffalo and Cayuga Creeks (Exhibit 1). Additional source water is supplied by a third tributary, Cazenovia Creek, which flows into the River downstream of the confluence with Cayuga Creek. The River then empties into Lake Erie at the head of the Niagara River. The City Ship Canal, also referred to as the Buffalo Ship Canal, forms a spur of aquatic habitat that stretches approximately 1.4 miles parallel to the Lake Erie shoreline from the mouth of the River south to the Tift Nature Preserve. The Canal was originally constructed in 1850, widened in 1873, and lengthened in 1883 (Buffalo Niagara Riverkeeper 2005).

The River has endured a history of anthropogenic contamination. This issue was first addressed in the late 1960s as part of international efforts between Canada and the U.S. to evaluate contamination in the Great Lakes. In 1967, five industries in the area created the Buffalo River Improvement Corporation to construct and maintain a conduit for the supply of cooling and process water from Lake Erie.[3] This water discharges to the River and augments flow, especially during low-flow periods, helping to alleviate water quality problems associated with dissolved oxygen and temperature (Kozuchowski et al. 1993, Sargent 1975). In 1972, the Great Lakes Water Quality Agreement was signed by the U.S. and Canada (Sargent 1975).

In 1987, with the passage of the Clean Water Act Amendments, the River was designated a Great Lakes Area of Concern (AOC) because of historical and continuing contamination. The Great Lakes National Program Office of the U.S. Environmental Protection Agency (EPA) subsequently created the Assessment and Remediation of Contaminated Sediments program to evaluate alternative remedial options for cleaning up toxic sediments in the River and other AOCs (SAIC 1995). In 1989, a Remedial Action Plan (RAP) for the River was created to "restore and maintain the chemical, physical, and biological integrity of the Buffalo River ecosystem in accordance with the Great Lakes Water Quality Agreement" as well as to restore beneficial uses of the waterway (NYSDEC and Citizens 1989).[4] Since the early 2000s, evaluations have been underway to assess the feasibility of dredging to restore the River (ACOE 2003, Environ et al. 2010).

Ongoing remedial activities are being coordinated through a public/private/non-profit partnership that includes representatives from EPA, the U.S. Army Corps of Engineers (ACOE), NYSDEC, Buffalo Niagara Riverkeeper, and Honeywell International (NYSDEC 2011). Separate and distinct from this remedial effort is the NRDA effort that the Trustees are undertaking on behalf of the public.

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[3] These entities were: Mobile Oil, Allied Chemical--Industrial Chemical Division, Allied Chemical--Specialty Chemicals Division, Republic Steel, and Donner-Hanna Coke. As of 2011, PVS Chemicals, Inc., which acquired the Allied Chemical Corporation—Industrial Chemicals Division in 1981, was the only company still using and operating the Buffalo River Improvement Corporation conduit (Doster 2011).

[4] From 1989 to 2002, NYSDEC served as the RAP coordinator, and in 2003, Buffalo Niagara Riverkeeper (formerly Friends of the Buffalo and Niagara Rivers) was designated by EPA to serve as the RAP coordinator (Buffalo Niagara Riverkeeper 2005).

TIMES BEACH CONFINED DISPOSAL FACILITY

As mentioned above, the assessment area for the NRDA for the River also encompasses the TBCDF. Historically, dredged materials from the River were disposed of in Lake Erie (open water disposal). Beginning in 1967, however, the ACOE was prohibited from disposing of River sediments in Lake Erie because of contamination (Sweeney 1973). Therefore, in 1971, the TBCDF was constructed and the ACOE began disposing of dredged materials from the River into that facility. Continual deposition of sediment led to the creation of 46 acres of both aquatic and terrestrial habitat, and the site was rapidly colonized by various plant and animal species (Stafford et al. 1991). At the request of the Buffalo Ornithological Society, the ACOE abandoned the TBCDF as a disposal site in 1976, and 15 years later it was designated a nature preserve managed by the City of Buffalo (Buffalo Niagara Riverkeeper 2005, NYSDEC 2004, Stafford et al. 1991).[5]

FISH RESOURCES OF THE BUFFALO RIVER

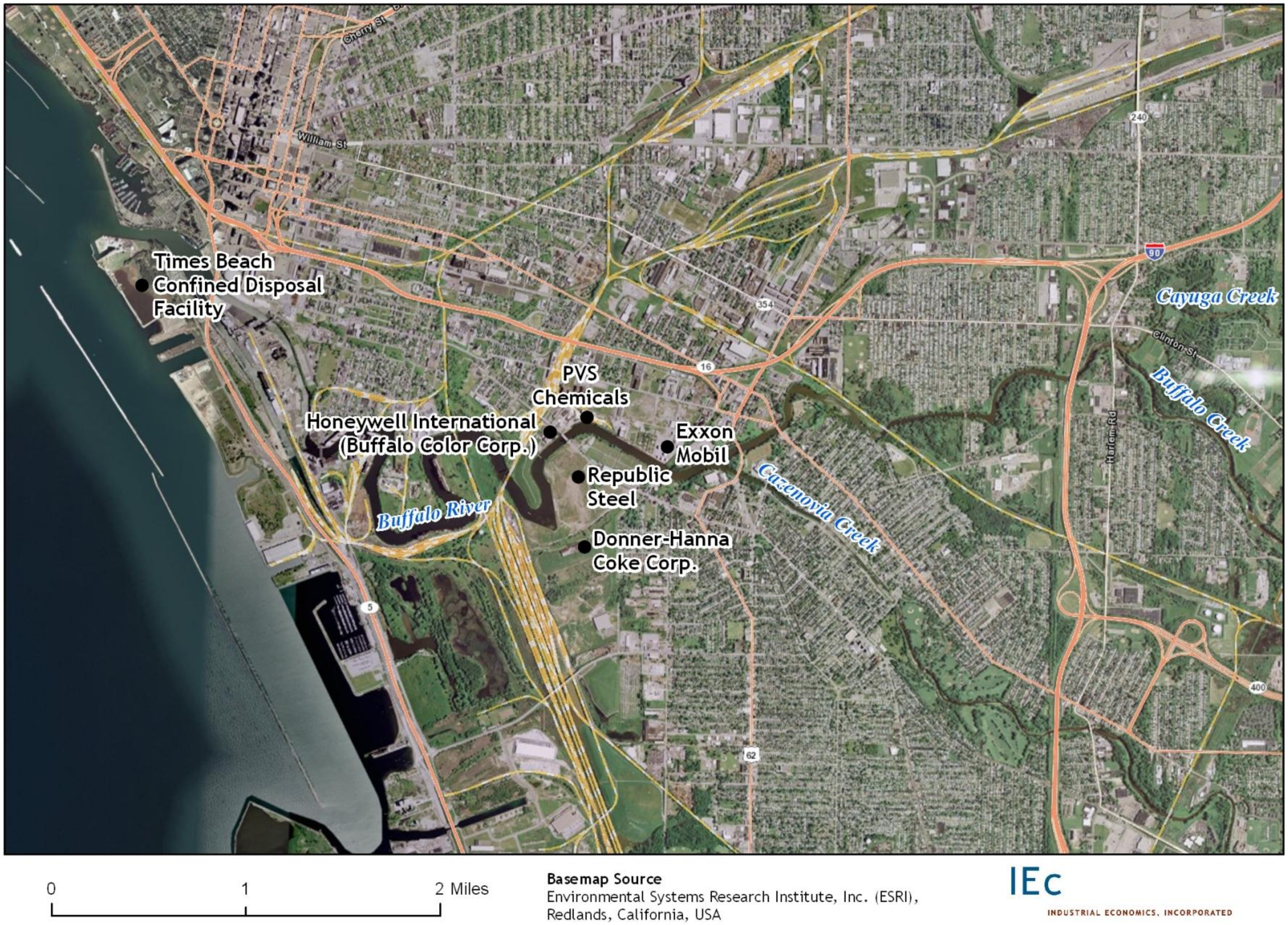
During the early 1960s, the River did not sustain a healthy fishery and sediments were described as "devoid of life" due to contamination (Kozuchowski et al. 1993, Bergantz 1977). By the late 1970s, pollution-tolerant organisms were present in the sediment, and fish began returning to the River. As with sediment-dwelling organisms, pollution-tolerant species like brown bullhead and carp were the first to establish year-round populations by the early 1980s; and species diversity improved throughout the early 1990s (Kozuchowski et al. 1993). As of the early 2000s, however, species diversity appeared to have plateaued (Irvine et al. 2005).[6] In 2003, 29 fish species were found in the river (Exhibit 2; Irvine et al. 2005).

Few fish were noticed in a study focused on mosquito breeding from 1971-1972 inside the aquatic area of the TBCDF (Sweeney 1973); however, in 1983, the TBCDF was reported to contain rock bass, carp, pumpkinseed, and yellow perch (Stafford et al. 1991).

[5] Since the closing of the TBCDF, the ACOE disposes of sediments dredged from the River into the Dike 4 CDF (ACOE 2008).

[6] Only eight larval species were observed in 1993 and ten in 2003, and a maximum of 20 distinct juvenile and adult species were observed in both 1993 and 2003 in any one sampling event in the River (Irvine et al. 2005).

EXHIBIT 1 MAP OF THE ASSESSMENT AREA (BUFFALO RIVER AND TIMES BEACH CONFINED DISPOSAL FACILITY)



Basemap Source
Environmental Systems Research Institute, Inc. (ESRI), Redlands, California, USA

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EXHIBIT 2 FISH SPECIES IN THE BUFFALO RIVER

• Bluegill (*Lepomis macrochirus*)	• Northern pike (*Esox lucius*)
• Bluntnose minnow (*Pimephales notatus*)	• Pumpkinseed (*Lepomis gibbosus*)
• Brown bullhead (*Ameirus nebulosus*)	• Rainbow trout (*Oncorhynchus mykiss*)
• Carp (*Cyprinus carpio*)	• Redhorse (*Moxostoma species*)
• Common shiner (*Luxilus cornutus*)	• River chub (*Nocomis micropogon*)
• Emerald shiner (*Notropis atherinoides*)	• Rock bass (*Ambloplites rupestris*)
• Fathead minnow (*Pimephales promelas*)	• Rudd (*Scardinius erythrophthalmus*)
• Freshwater drum (*Aplodinotus grunniens*)	• Smallmouth bass (*Micropterus dolomieu*)
• Gizzard shad (*Dorosoma cepedianum*),	• Spottail shiner (*Notropis hudsonius*)
• Golden shiner (*Notemigonus crysoleucas*)	• Walleye (*Stizostedion vitreum*)
• Goldfish (*Carassius auratus*)	• White bass (*Morone chrysops*)
• Hogsucker (*Hypentelium nigricans*)	• White crappie (*Pomoxis annularus*)
• Largemouth bass (*Micropterus salmoides*)	• White perch (*Morone americana*)
• Logperch (*Percina caprodes*)	• White sucker (*Catostomus commersoni*)
	• Yellow perch (*Perca flavescens*)

Notes:
Species recorded as of 2003.
Source: Irvine et al. (2005).

INJURY DETERMINATION

According to the DOI NRDA regulations:

> *An injury to a biological resource has resulted from the discharge of oil or release of a hazardous substance if concentration of the substance is sufficient to:*
>
> *(i) Cause the biological resource or its offspring to have undergone at least one of the following adverse changes in viability: death, disease, behavioral abnormalities, cancer, genetic mutations, physiological malfunctions (including malfunctions in reproduction), or physical deformations; or*
>
> *(ii) Exceed action or tolerance levels established under section 402 of the Food, Drug and Cosmetic Act, 21 U.S.C. 342, in edible portions of organisms; or*
>
> *(iii) Exceed levels for which an appropriate State health agency has issued directives to limit or ban consumption of such organism (43 C.F.R. § 11.62 (f)(1)).*

For this injury determination report the Trustees provide evidence of injury under paragraphs ii and iii of the injury definition above. Specifically, the New York State Department of Health (NYSDOH) has issued annual fish consumption advisories for the River since the year 1984 due to the contamination of fish tissue with PCBs in excess of the U.S. Food and Drug Administration (FDA) tolerance level of 2.0 parts per million (ppm) wet weight in the edible tissue of fish (NYSDOH 1984a, 1984b; 21 C.F.R. 109.30, and PAHs in the River have been associated with an increased prevalence of deformities, eroded fins, lesions, and tumors (so called DELT anomalies) in River fish. These contaminants and the specifics of the fish consumption advisories are described in greater detail below.

POLYCHLORINATED BIPHENYLS (PCBS)

PCBs are a class of compounds that consists of 209 chlorinated hydrocarbon chemicals (individually known as PCB congeners). Primarily manufactured in mixtures that contained different concentrations of individual congeners, the most common and well-known mixtures were produced by the Monsanto Company under the trade name Aroclor. PCBs were manufactured from the 1930s until their production was banned in the United States by EPA in 1979, which also required companies to phase out use of PCBs by 1985, except in uses in which they were totally enclosed (EPA 1979). PCBs were used primarily as insulating materials for electrical transformers and capacitors because of their chemical stability at high temperatures, but they were also used in such diverse products as paints and carbon copy paper.

PCBs are relatively mobile in the environment; they can be volatilized and transported in the atmosphere, resulting in their presence in animal tissues and environmental media around the world. The chemical structure of PCBs also allows these compounds to accumulate in the fatty tissues of organisms and bioaccumulate and biomagnify through food webs (Eisler 2000).

In biological organisms, including humans, PCBs can cause a range of adverse health effects, including liver and dermal toxicity, teratogenic and other reproductive effects, and neurological effects. Responses depend on the exposed species and the particular congener mixture to which that species is exposed, and can therefore vary from subtle (e.g., induction of hepatic microsomal enzymes) to severe (e.g., impaired reproduction and death). In addition, toxic effects are likely to be more severe at higher trophic levels (i.e., for organisms that are higher on the food chain) due to bioconcentration and biomagnification (Eisler 2000).

POLYCYCLIC AROMATIC HYDROCARBONS (PAHS)

PAHs are compounds that are characterized by their chemical structure that consists of clusters of benzene (five carbon atom) rings with a variety of substituted groups. Examples include anthracene, benzo(a)anthracene, benzo(a)pyrene, chrysene, dibenzo(a,h)anthracene, fluoranthene, fluorine, naphthalene, phenanthrene, and pyrene. PAHs are typically of petrogenic or pyrogenic origin—that is, they occur in petroleum products (petrogenic) but are also produced from the incomplete burning of organic matter (pyrogenic; Kuzia and Black 1985). Petrogenic PAHs are concentrated in the refining process, so are prevalent at higher concentrations in refined petroleum products as compared to crude oil (Connell and Miller 1981). Although PAHs of pyrogenic origin can be mobilized atmospherically, once PAHs enter aquatic environments (usually through runoff from land or when oil is spilled) they are not very mobile and are typically adsorbed to particles that settle into the sediments (Eisler 2000).

In the environment, PAHs are stable and persistent. They also partition into biological organisms, and can accumulate in fatty tissues. As a result, like PCBs, they can bioconcentrate in an individual organism as well as biomagnify through food webs, depending on specific organisms' abilities to metabolize and excrete PAHs. For example, although fish species exhibit different rates of PAH metabolism, most fishes can readily metabolize PAHs, so tissue concentrations in fish are not typically elevated (Eisler 2000).

Several PAHs, including benzo(a)anthracene, benzo(a)pyrene, chrysene, and dibenzo(a,h)anthracene are some of the most potent carcinogens known to exist (Eisler 2000; ATSDR 1995). Although the occurrence of cancer in aquatic organisms has not been definitively linked to PAHs, they have been implicated in causing a variety of developmental anomalies and tumors in fish and aquatic mammals. PAHs have also been shown to cause a variety of other toxicological responses in aquatic organisms, birds, and mammals, including inhibited survival, growth, and reproduction (Eisler 2000).

PATHWAY

An important component of injury determination in the context of NRDA is the documentation of an injury pathway. Pathway is defined as:

> *The route or medium through which…a hazardous substance is or was transported from the source of the discharge or release to the injured resource (43 C.F.R. § 11.14(dd)).*

Site-specific pathway studies, as well as existing information included in numerous peer-reviewed journals and reports, indicate multiple pathways of contamination from various industrial facilities to biological resources in the River. These include, but are not limited to:

- Discharges and uncontrolled releases of hazardous contaminants and oil, including PCBs and PAHs, have been documented at contaminated sites adjacent to the River, in the effluents of industrial facilities, and in combined sewer overflows that discharge to the River (Loganathan et al. 1997, NYSDEC and Citizens 1989).
- Reports document the leaching of hazardous contaminants and oil into the surface water of the River from contaminated groundwater (e.g., Roux Associates 2007, EPA and NYSDEC 2005).
- PCBs and PAHs remobilize into the water column from River sediment, implicating historical sediment contamination as a continuing source of contamination to the River and the biological resources that live there (Benhabib et al. 2006, Taggart et al. 2003).
- PCBs have been found in River sediments, biological organisms, and dredged sediments from the River (including sediments that were disposed of at the TBCDF (Sweeney 1973), and elevated concentrations of PAHs and

PCBs were found in dredged material and biota within the TBCDF (Stafford et al. 1991).

- PCB and PAH contaminant concentrations measured in fish as well as in shellfish deployed for biomonitoring purposes indicate that these contaminants are bioavailable (Richman 2003, 1999).

FISH CONSUMPTION ADVISORIES

The River, with easy access to Lake Erie and within walking distance of a major metropolitan area, supports a small recreational fishery. During 2003-2004, an estimated 12,784 person-days of recreational use occurred on the River, equivalent to approximately five percent of the recreational park use in Erie County (Irvine et al. 2005). Of these visits to the River, approximately 27 percent or 3,452 person-days were for fishing (Irvine et al. 2005).

Fish consumption advisories (FCAs) have been in place for the River since 1984, when the NYSDOH issued FCAs advising intake of carp be limited to one meal per month, based on samples of carp that exceeded the FDA tolerance level for PCBs in fish. Beginning in 1987-88, NYSDOH revised the FCA from limited consumption to eat no carp from the River (Crane 1993, NYSDEC and Citizens 1989). Additionally, beginning in 1984 and continuing through today, women of childbearing age and anyone under the age of 15 have been advised to avoid consuming any species from the River.[7]

After the construction of the TBCDF in the early 1970s anglers were reported to fish the harbor from the walls of the TBCDF (Sweeney 1973). As of the mid-1980s, PCB concentrations in rock bass and carp from the TBCDF exceeded the FDA tolerance level, with concentrations of 2.2 and 5.5 ppm wet weight in the edible portion of the fish (Kay et al. 1986 as cited by Stafford et al. 1991). Reflecting these concerns, beginning 1988 and onwards, the River fish consumption advisory was extended to include Buffalo Harbor. Exhibit 3 presents historic and current FCAs on the River.

[7] Beginning in 2010, this advisory was specified to include children under the age of 15 and women under the age of 50.

EXHIBIT 3 FISH CONSUMPTION ADVISORIES FOR THE RIVER[1]

DATE OF ISSUE	SPECIES OF CONCERN	NATURE OF EXTENT
1984-1987	Carp	Eat no more than one meal per month
1987 – Present	Carp	Eat none
1985 – Present	All Species	Eat no species with tumors or lesions[2]
1984 – Present	All Species	Women of child-bearing age and children under 15 should eat none[3]

Notes:
1. Beginning in 1988, fish consumption advisories related to the River were extended to include Buffalo Harbor.
2. Advisories include a general recommendation not to eat fish with any visible deformities, lesions, or tumors of the skin or internal tissues. Tumors and lesions can be naturally occurring, but in the case of the Buffalo River observed anomalies have been linked to polycyclic aromatic hydrocarbons (PAHs) (e.g., Hickey 1993, Black 1983).
3. Beginning in 2010, this advisory was specified to include children under the age of 15 and women under the age of 50.

DEFORMITIES, ERODED FINS, LESIONS, AND TUMORS (DELT ANOMALIES)

In addition to the PCB-driven component of the advisories, fish consumption advisories also include a general provision on not consuming fish with visible abnormalities, including deformities, tumors, and lesions. Site-specific fish surveys have documented a high degree of DELT anomalies in fish from the River (Irvine et al. 2005, Kozuchowski et al 1994, Hirethota 1992). Of the 33 species of fish collected in 1992 and 1993 by Kozuchowski and others (1994), 21 species had individuals with physical deformities, including "spinal or vertebral deformities; missing eyes, fins or barbels; cottony fungal growths; nodular growths; open sores (lesions); and unusual pigmentation, like melanism." The most affected species were goldfish, carp, white sucker, brown bullhead, and freshwater drum (Kozuchowski et al. 1994). As of 2004, DELT scores averaged 37 percent for the River as a whole, with the lowest prevalence occurring in pumpkinseed (14 percent) and the highest prevalence occurring in brown bullhead (87 percent), compared to typical rates of two to five percent and less than two percent for moderately impacted and unimpacted rivers, respectively (Irvine et al. 2005). The most recent assessment of the brown bullhead population in the River found the overall prevalence of liver tumors to be eight percent and of liver lesions to be 57 percent as of 2008; the proportion of fish with visible deformities was not reported (Lauren et al. 2010).

Site-specific studies published in peer-reviewed journals indicate that DELT anomalies recorded on River fish are likely caused by PAHs. For example, Black (1983) conducted a laboratory-based exposure study in which he painted brown bullheads collected from an uncontaminated pond with extracts of sediment from the River. Exposed fish developed hyperplastic skin (a pre-cancerous condition), oral lesions, and papillomas after 12 to 14 months of exposure while control fish did not. Analysis of the sediment implicated high concentrations of PAHs (Black 1983). Hickey (1993) measured concentrations of PAHs in the bile of brown bullhead from the River and found metabolites of naphthalene, phenanthrene, and benzo(a)pyrene that were 18, 19.5, and 33 times greater than reference site fish, respectively. Additional studies compared the prevalence of DELT anomalies in fish from the River and other contaminated rivers to reference sites in the Great Lakes, with results indicating an increased prevalence of DELT anomalies in the River fish (Flomar et al. 1993, Hirethota 1992, Hickey 1984, Black 1983).

More recently, in a study of Anacostia River fish, Pinkney et al. (2004) conclusively linked PAH contamination to the prevalence of DELT anomalies and liver tumors in brown bullheads. The authors evaluated multiple lines of evidence, including PAH metabolites and DNA adducts, statistically linking these with DELT anomalies and liver tumors in two size classes of fish using correlation and logistic regression techniques (Pinkney et al. 2004).

Although such DELT anomalies have been shown to occur as a result of pathogens, Baumann et al. (1996) and others noted that "it is probable that these lesions have a multifactorial etiology involving viruses, chemical contaminants and other biotic and abiotic factors" and concluded, based on a review of multiple studies, that prevalence of cutaneous papillomas in excess of 25 percent and hepatic neoplasms in excess of five percent indicate environmental degradation. Specifically they noted: "it is highly probable that the etiology of hepatic cancers in bullheads and suckers from the Great Lakes is associated with exposure to chemical contaminants, and in particular, to polynuclear aromatic hydrocarbons (PAHs) in contaminated sediments" (Baumann et al. 1996).

DETERMINATION OF INJURY

This report demonstrates that biological resources (fish resources, in particular) in the River have been injured. The elements contained in the DOI NRDA regulations have been met, fulfilling the requirements for biological injury determination (43 C.F.R. § 11.61 through 11.63). In particular:

- Pathways for the release of the hazardous substances PCBs and PAHs to fish resources have been established,
- A fish consumption advisory has been in place since 1984 through the present for fish from the River, due to the exceedance of the FDA tolerable limit for PCBs in edible tissues, and
- PAHs have been shown to contribute to the increased prevalence of DELT anomalies in River fish-- anomalies that are the subject of general provisions in NYSDOH fish consumption advisories that advise against the consumption of fish with such anomalies.

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