

Addendum to the Final Assessment Plan for the Natural Resource Damage Assessment of the Sauget Industrial Corridor Sites: Inclusion of the 2021 Aquatic Invertebrate Assessment and 2021 Breeding Birds Survey

April 2021

Aquatic Invertebrate Assessment

Introduction

Acting under their authority as natural resource trustees pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the United States Department of Interior Fish and Wildlife Service (FWS), Illinois Environmental Protection Agency (IEPA), Illinois Department of Natural Resources (IDNR), and Missouri Department of Natural Resource (MDNR) (collectively, the “Trustees”) are conducting a natural resource damage assessment (NRDA) within the Sauget Industrial Corridor (SIC), in Sauget, Cahokia, and East St. Louis, St. Clair County, Illinois. The NRDA Assessment Area (Assessment Area) is a relatively flat area of land in the municipalities of Sauget, Cahokia, and East St. Louis directly adjacent to and located within the floodplain of the East Bank of the Mississippi River, known as the American Bottoms Ecoregion. The SIC provides important habitat for a variety of fish and wildlife species and is situated within the Mississippi River Flyway. The American Bottoms Ecoregion is home to numerous species of endangered and threatened aquatic birds. The aquatic areas of the SIC that are the focus of this Addendum provide important ecological services to both local and migratory animals.

This Assessment Area contains numerous hazardous waste disposal sites, back-filled former wastewater impoundments and adjacent affected areas, including natural wetlands and waterways contaminated through releases of hazardous substances. As part of remedial investigation and response activities under CERCLA, the U.S. Environmental Protection Agency (USEPA) grouped these features into two areas (“Area 1” and “Area 2”), each comprised of multiple sub-units delineated on the basis of geographic features, historical aerial photographs, magnetometer surveys, soil gas surveys, and test trenches.

Given the long history of industrial development, unpermitted releases and dumping of hazardous substances within the Assessment Area, natural resources have been exposed to and injured by hazardous substances throughout much of the last century, and injury is expected to continue into the future.

The Trustee’s Preassessment Screen (PAS) for the Assessment Area evaluated readily available information related to releases of volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), dioxins and furans, and metals from the SIC Assessment Area at concentrations that “constituted an

imminent and substantial threat to public health and the environment”. The Trustees determined that an assessment was warranted and prepared the Assessment Plan for the NRDA of the Sauget Industrial Corridor Sites in January 2013 (<https://www.fws.gov/midwest/es/ec/nrda/Sauget/index.html>), focusing their efforts on surface water injury. The Surface Water Injury Determination report, drafted by the Trustees for the SIC Assessment Area, identified injuries to natural resources, while exposing gaps in the data required by the Trustees to fully quantify the extent of contamination and to evaluate potentially on-going releases of contaminants that may not be addressed by the remedial process.

Through a phased approach, the Trustees are evaluating pathway, exposure, injury and damages associated with the release of hazardous substances to the environment. The first step of this process focused on sampling sediments and benthic invertebrates pursuant to the 2018 Sediment and Benthic Macroinvertebrate Study (Sediment and Benthic Study). The purpose of the Sediment and Benthic Study was to identify if there were any uncertainties and data gaps associated with the spatial characterization of the concentrations of PCBs and other contaminants in sediments and benthic invertebrates in the vicinity of the SIC Assessment Area. Results from that study confirmed continued high levels of PCBs and other contaminants in sediments across many of the SIC Assessment Area 2 Sites. Benthic surveys were also conducted in 2018 in the same areas as the sediment sampling, and the Trustees found that nearly all of the sampling sites within the Assessment Area had no or few benthic macroinvertebrates (mostly snails) that could be recovered. Based on these findings and in continued support of assessing injury to natural resources, the Trustees are conducting the 2021 Aquatic Invertebrate Assessment, which will focus on evaluating the direct toxicity of contaminated sediments on invertebrates and the potential for contaminants to bioaccumulate in aquatic invertebrates – a critical point for contaminant bioaccumulation in the Sauget floodplain ecosystem. This assessment will focus on four main areas; Dead Creek, Borrow Pit Lake, Site M, and Site Q (Four Areas).

Objectives

1. Determine if the sediments from these Four Areas are toxic to aquatic invertebrates. This will be accomplished using four lines of evidence 1) chemical characterization of sediment and comparison to screening values, 2) direct toxicity using the amphipod and mayfly bioassay, 3) community health of aquatic benthic invertebrates, and 4) biomass of emerging adult aquatic insects.
2. Determine the bioavailability and potential for bioaccumulation of PCB from the Four Areas with previously reported elevated chemical concentrations using three lines of evidence: 1) laboratory mayfly bioaccumulation bioassay, 2) tissue concentrations of

aquatic and riparian invertebrates (benthic invertebrates, adult emergent aquatic insects, and spiders), and 3) organic chemical uptake in polyethylene passive samplers.

General Design

Sediment Collection

Sediment sample sites will be selected from across the SIC Sites including Dead Creek, Site Q, Site M, and Borrow Pit Lake, and reference sites. Sediments will be collected using stainless steel petite ponar grab sampler or modified PVC scoop to a depth of around 10 cm. A total of five grab samples from an area of 1 to 2 m² will be collected and mixed to create a composite for each sample location. Samples will be transported in a refrigerated trailer at 4 °C to the laboratory at the U.S. Geological Survey (USGS) Columbia Environmental Research Center (CERC) and held for less than 8 weeks in the dark at 4° C until use in toxicity bioassays. At the time samples are prepared for bioassays, a subsample will be taken for grain size, total organic carbon, percent moisture; total metals, simultaneously extracted metals and acid volatile sulfide (SEM/AVS), PCB congeners and aroclors, Dioxins, organo chlorine pesticides (dieldrin, DDT), acid extractable SVOC; base/neutral extractable SVOC; and PAHs. These samples will be shipped overnight to the FWS Analytical Control Facility (ACF) contract analytical laboratory for chemical analysis.

Sediment Toxicity and Bioaccumulation Bioassays

Sediment toxicity of up to 14 sediment samples will be assessed using the amphipod, *Hyalella azteca* 28-day bioassay (survival and growth) following standard test methods (U.S. Environmental Protection Agency 2000, ASTM International 2018). The amphipod bioassay will be used because it is known to be sensitive to these contaminants, has a proven reliable history at other sites, and can be compared to previous amphipod toxicity data collected at the Four Areas. Bioaccumulation of PCB, dioxin, and metals will be assessed using the mayfly *Hexagenia limbata* 28-day bioassay following standard guidance (Ontario Ministry of the Environment and Climate Change 2016). The mayfly was selected because it represents an exposure pathway that is relevant for other species of concern at the site and is also known to be sensitive to contaminants at the site. The *H. limbata* is not as commonly used for bioaccumulation bioassays because of the difficulty obtaining test organisms. However, in the event organisms are not available, an alternative mayfly *Neocloeon triangulifer* or oligochaete *Lumbriculus variegatus* will be used to determine toxicity of sediments or bioaccumulation of contaminants of concern.

Field collection of invertebrates

Invertebrates will be collected to assess benthic community health of aquatic sites and to measure bioaccumulation in aquatic and terrestrial food webs. Hester-Dendy (HD) invertebrate colonization devices will be deployed at each site for 28 days. Invertebrate communities will be picked from the HDs and used to assess potential benthic community

impairment using an invertebrate index of biotic integrity. Larval insects will be collected using sweep nets to assess bioaccumulation; adult insects will be sampled using floating emergence traps to assess bioaccumulation and changes in adult insect biomass, both of which could have negative consequences for higher order terrestrial insectivores, such as migratory birds and bats. Riparian spiders that are specialized predators on adult aquatic insects will be sampled for contaminant bioaccumulation analysis. This information will be used to assess accumulation of aquatic contaminants transported to terrestrial food webs and to assess the potential exposure pathways to higher order predators such as birds, many species of which rely on spiders for a substantial proportion of their diet.

Chemical analysis of sediments and tissue

Chemical analysis will be performed by an ACF laboratory. The exception is that total Hg, methyl mercury, and Hg isotopes will be analyzed by Dr. Collin Eagle-Smith and Dr. David Krabbenhoft in the USGS. Drs. Eagle-Smith and Krabbenhoft will be used because of specific expertise that is required for mercury analyses. Chemical analysis will include the following: PCB congeners, metals, Hg/MeHg, HG isotopes, AVS/SEM, organochlorine pesticides, PAH, and dioxins.

Data Quality Objectives:

Generation of high quality, reliable sediment data is a primary objective of the study. All reasonable efforts will be made to minimize the potential for sample contamination and/or degradation during sample collection, handling, and processing. A Quality Assurance Project Plan (QAPP) documenting the planning, implementation, and assessment procedures and specific standard operating procedures (SOPs) will be developed and maintained for the project. The SOPs and detailed study plan will be essential to understand and assist in performing experiments consistently following good scientific practices. Data will be collected following the CERC Quality Assurance Project Plan (last updated 21 Feb 2013) available on the CERC intranet. All data will be collected following the Guidelines for Developing Research Study Plans/Protocols, following relevant SOP files, entry into lab data books and data sheets, and archived following guidance in the CERC Quality Assurance Policy Plan.

Summary

The 2021 Aquatic Invertebrate Assessment Study is a follow-up study to the initial 2018 Sediment and Benthic Study. The 2021 Study will support injury assessment by providing information on the direct toxicity of contaminated sediments at Four Areas within the Assessment Area on invertebrates and the potential for contaminants to bioaccumulate in aquatic invertebrates. Depending on the information from this Study, additional foodweb studies may be conducted.

Timeline for Tasks to be Completed:

Sample collection: June – July 2021

Data compilation and analysis: July – December 2021

Report generation and review: January – March 2022

Breeding Birds Survey

Introduction

The NRDA Assessment Area for the Sauget Industrial Corridor (SIC) is a relatively flat area of land in the municipalities of Sauget, Cahokia, and East St. Louis directly adjacent to, and located within, the floodplain of the East Bank of the Mississippi River. This area is known as the American Bottoms Ecoregion, which is an ecologically significant area because it is located along the Mississippi River migratory bird flyway and has multiple floodplain wetlands located throughout it. In particular, the SIC provides important habitat for a variety of fish and wildlife species and is home to numerous species of endangered and threatened aquatic birds. Results of sediment and water samples within the SIC show elevated levels of contaminants including PCBs, heavy metals, pesticides, SVOCs, and VOCs. This area also comprises numerous hazardous waste disposal sites, back-filled former wastewater impoundments, and adjacent contaminated areas, including natural wetlands and waterways contaminated through releases of hazardous substances. Habitats in and around the Assessment Area support numerous bird species, with several heron rookeries known to occur in and around the Assessment Area, although no official bird surveys are known to exist. The Comprehensive Environmental Response Compensation and Liability Act's implementing regulations stipulate that injury quantification should consider "species, habitats, or ecosystems that are especially sensitive to the oil or hazardous substance and the recovery of which will provide a useful indicator of successful restoration" (43 C.F.R. § 11.71(l)(2)(ii)). Following the Sauget Industrial Corridor Final Assessment Plan (Sauget Industrial Corridor Trustee Council, 2013), the Trustees documented levels of PCBs, heavy metals, and pesticides in sediment and surface waters that present potential toxic exposure levels to avian resources utilizing the Assessment Area (Sauget Industrial Corridor Trustee Council Surface Water Injury Report 2021). In order to better understand the bird community at the Assessment Area, a breeding birds survey will take place at Assessment Area 2 during spring/summer 2021 to gather information on the presence, density and abundance of bird species using the Assessment Area. Results from this study will determine whether future studies are required to evaluate potential effects of contaminants on birds.

Methods

The survey route will consist of Dead Creek segments B-F and wetland sites M, P, Q and Borrow Pit Lake all within Area 2 of the Assessment Area. Surveys will follow methodology standardized by the North American Breeding Bird Survey program (<https://www.pwrc.usgs.gov/BBS/participate/instructions.html>). Survey locations will include areas with appropriate nesting habitat in riparian zones, consisting of small trees and bushes for nesting along the creek and wetlands. It may also encompass the range of diverse habitats within the Site, including marshes, neighborhoods, and industrial property.

Preliminary efforts will include visiting potential survey sites and discussing conditions that may prohibit or impair successful surveys. Sites will be selected such that they are, to the extent possible, spread evenly across the geographic scope of the Assessment Areas and such that they are representative of habitat ratios throughout the corridor reach. Sites visited will be given the sequential numbers and the latitude and longitude of each site will be recorded in a master site list. Predominant habitat type at each site (e.g., marsh, developed, forest, field, etc.) will be described on a master site list. Notes will be made on any peculiarities affecting birds (e.g., recent construction activity that would not show up on aerial photo).

Sites will be surveyed up to three separate times (i.e., on different days) during the standard Breeding Bird Survey window for this area: May 1 –June 15. All individual birds observed will be recorded by species. A laser-based rangefinder (Bushnell Yardage Pro450, Overland Park, KS or similar device) will be employed to estimate ground distance to each bird (or the base of the tree that it is in) at first detection. Using the DISTANCE software package, a distance cut-off for each species based on the species' detectability will be determined. Birds simply flying over (i.e., not using the habitat) or seen outside of the count period will not be included in analyses but will be recorded for an auxiliary list of species present. If the bird initially detected flying overhead starts aerially foraging, lands on a tree, or does a flight display, for example, that is recorded as a regular detection at the distance where this occurs, and notes will be made to explain.

Concurrent with this study, the Aquatic Invertebrate Assessment will be occurring. The Breeding Birds Survey will be coordinated with the Aquatic Invertebrate Assessment collection sites. Results from the Aquatic Invertebrate Assessment will be compared to bird species presence to determine if there is potential concern for effects to birds feeding on insects within the SIC.

Timeline

Breeding birds field surveys: June 2021

Data compilation and analysis: July – October 2021

Report generation and review: November – December 2021

Study Area

