

NATURAL RESOURCE DAMAGE ASSESSMENT PLAN

Mountain Creek Lake: Naval Air Station Dallas and Naval Weapons Industrial Reserve Plant

DRAFT

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Texas Commission on Environmental Quality

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TABLE OF CONTENTS

1. INTRODUCTION AND BACKGROUND INFORMATION	1
1.1 Purpose of the Assessment Plan	2
1.2 Authority to Conduct a NRDAR	3
1.3 NRDAR Process Overview	4
1.4 Invitation to Potentially Responsible Parties for Cooperative Assessment	5
1.5 Coordination with Other Activities	5
1.6 Public Participation	6
1.7 Assessment Timeline	6
2. DESCRIPTION OF THE ASSESSMENT AREA	7
2.1 Facility History	7
2.1.1 Facility Development	7
2.1.2 Summary of Releases	8
2.1.3 Confirmation of Exposure	9
2.2 Affected Natural Resources	10
2.2.1 Surface Water Resources	10
2.2.2 Groundwater Resources	11
2.2.3 Air and Geologic Resources	12
2.2.4 Biological Resources	12
2.2.5 Human/Recreational Use	13
3. INJURY ASSESSMENT AND PATHWAY DETERMINATION APPROACH	13
3.1 Temporal	13
3.2 Use of Available Data	14
3.3 Intent to Perform a Type B Assessment	14
3.4 Pathway Determination	15
4. INJURY ASSESSMENT	17
4.1 Injury Assessment for Aquatic Resources	17
4.1.1 Aquatic Resource Evaluation	17
4.2 Injury Assessment for Human/Recreational Use	18
5. APPROACH TO DAMAGE DETERMINATION	19
5.1 Aquatic Resource Damage Determination	19
5.2 Human/Recreational Use Damage Determination	19
6. PRELIMINARY ASSESSMENT OF DAMAGES	19
7. QUALITY ASSURANCE	19

8. REFERENCES..... 21

APPENDICES

APPENDIX A – SITE HISTORY..... 30
APPENDIX B – SUMMARY OF RELEASES..... 37
APPENDIX C – CHEMICALS OF POTENTIAL CONCERN 40
APPENDIX D – RARE, THREATENED, AND ENDANGERED SPECIES 45

FIGURES

Figure 1.1 Map of the Mountain Creek Lake system, Dallas Naval Air Station (NAS Dallas) and Naval Weapons Industrial Reserve Plant (NWIRP). 2
Figure 1.2 Phases of the Natural Resource Damage Assessment Process. 5
Figure 2.1 Cottonwood Creek and Mountain Creek Lake Watersheds..... 11
Figure 3.1 Conceptual model describing the fate of releases from the Facility. 16

TABLES

Table 1. Site History. 31
Table 2. NAS and NWIRP Hazardous Waste Generating Activities/Sources. 38
Table 3. List of chemicals of potential concern (COPC) and basic information describing the chemical. 41
Table 4. Rare, threatened, endangered species potentially present in the Assessment Area. 46

LIST OF ACRONYMS AND ABBREVIATIONS

ABMCIC	American Brownfields Mountain Creek Industrial Center, LLC
AOC	Area of Concern
APAR	Affected Property Assessment Report
ATSDR	Agency for Toxic Substances and Disease Registry
CDD	Chlorinated dibenzo-p-dioxin
BRAC	Base Realignment and Closure
CAO	Corrective Action Order
CDF	Chlorinated dibenzofuran
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	Contaminant of Concern
COPC	Chemical of Potential Concern
DGIC	Dallas Global Industrial Center
DOD	Department of Defense
DOI	United States Department of the Interior
DOJ	United States Department of Justice
DSAY	Discounted Service Acre-Year
EPA	United States Environmental Protection Agency
FACILITY	Naval Air Station and Naval Weapons Industrial Reserve Plant Dallas
GLO	Texas General Land Office
GOCO	Government-owned, Contractor-operated
HEA	Habitat Equivalency Analysis
MNR	Monitored Natural Recovery
NAS	Naval Air Station
NAVY	United States Department of the Navy
NCP	National Contingency Plan
NOAA	National Oceanic and Atmospheric Administration
NRDAR	Natural Resource Damage Assessment and Restoration
NWIRP	Naval Weapons Industrial Reserve Plant
PAHs	Polycyclic Aromatic Hydrocarbons
PAS	Preassessment Screen
PCBs	Polychlorinated Biphenyls
PCL	Protective Concentration Level
PCLE	Protective Concentration Level Exceedance

PR/VS	Preliminary Review/Visual Site Inspection
PRP	Potentially Responsible Party
QA	Quality Assurance
QAP	Quality Assurance Plan
QC	Quality Control
RAP	Response Action Plan
RAER	Response Action Effectiveness Report
RCDP	Restoration and Compensation Determination Plan
RCRA	Resource Conservation and Recovery Act
RFI	Resource Conservation and Recovery Act Facility Investigation
SLERA	Screening Level Ecological Risk Assessment
SRS	Substance Registry Service
SWMU	Solid Waste Management Unit
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
TDH	Texas Department of Health
TDSHS	Texas Department of State Health Services
TMDL	Total Maximum Daily Load
TPWD	Texas Parks and Wildlife Department
TXU	Texas Utilities
USACE	United States Army Corps of Engineers
USGS	United States Geological Survey

1. INTRODUCTION AND BACKGROUND INFORMATION

The Texas Commission on Environmental Quality (TCEQ), the Texas Parks and Wildlife Department (TPWD), and the Texas General Land Office (GLO) (collectively, the Trustees) are designated as Trustees for natural resources and may pursue claims for natural resource damages in Texas under section 107(f) of the Comprehensive Environmental Response, Compensation, and Liability Act as amended (CERCLA) (42 U.S.C. § 9607(f)). CERCLA regulations in 43 CFR Part 11 establish an administrative process for conducting a natural resource damage assessment (NRDA) to determine the injury, quantify the damage, and assess alternative remedies to restore the injured natural resources. While following these regulations is optional, Trustees who conduct an assessment consistent with these regulations are entitled by law to a rebuttable presumption in any subsequent NRDA litigation. (See 42 U.S.C. § 9607(f)(2)(C)).

Pursuant to 43 CFR Part 11, the Trustees completed a Preassessment Screen and Determination (PAS) in July 2000 finding that sufficient information was available to proceed with a natural resource damage assessment and restoration (NRDAR). Moving forward, the Trustees prepared this Assessment Plan to serve as the guiding document for damage assessment activities.

The U.S. Department of the Navy (Navy) formerly owned and/or operated the Naval Weapons Industrial Reserve Plant (NWIRP) and Naval Air Station Dallas (NAS Dallas)(collectively, the Facility) located along the northwest shore of Mountain Creek Lake, in the City of Dallas, Dallas County, Texas (Figure 1.1). As stated in the PAS, the Trustees evaluated existing data and determined that the Navy released hazardous substances from the Facility into the environment, potentially injuring multiple natural resources. The injury assessment (Section 4) will evaluate the areas impacted by the release of hazardous substances at or from the Facility, including but not limited to the Mountain Creek Lake system and the associated nearshore zone (Assessment Area). For the purposes of this assessment, the Mountain Creek Lake system includes Cottonwood Bay and the diversion channel connecting the two waterbodies.

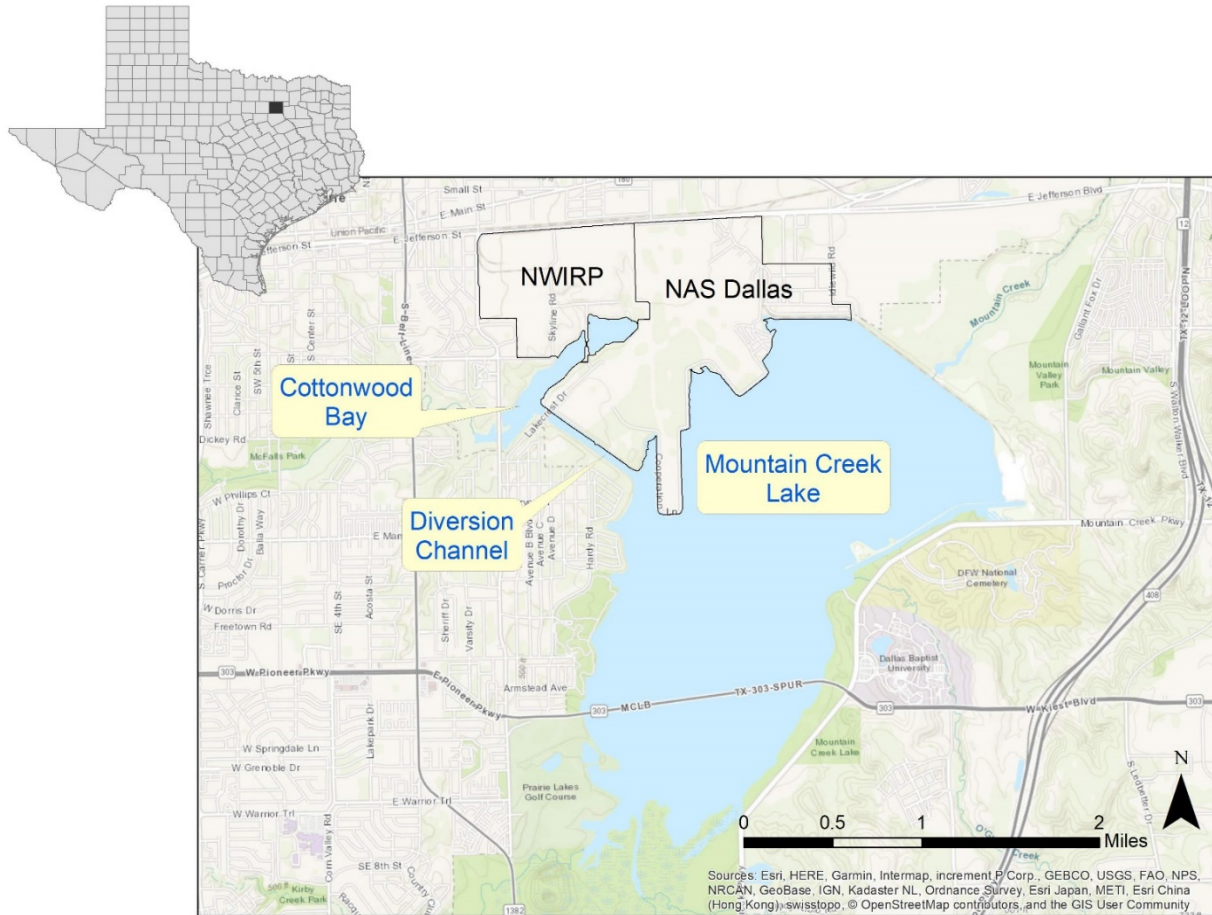


Figure 1.1 Map of the Mountain Creek Lake system, Dallas Naval Air Station (NAS Dallas) and Naval Weapons Industrial Reserve Plant (NWIRP).

1.1 Purpose of the Assessment Plan

The purpose of this Assessment Plan is to outline the proposed approach for determining and quantifying natural resource injuries and damages associated with those injuries. *Injury* means a measurable adverse change, either long- or short-term, in the chemical or physical quality or the viability of a natural resource resulting either directly or indirectly from exposure to a discharge of oil or release of a hazardous substance. (43 CFR § 11.14(v)). *Damages* is a legal term for the amount of money sought in a claim made by Trustees as compensation for injury, destruction, or loss of natural resources; damages include the costs of assessing injuries as well as the costs of restoration. (42 U.S.C. §§ 9601(6), 9607(a)(4)(C)). By developing an Assessment Plan, the Trustees ensure that the NRDAR will be completed at a reasonable cost relative to the magnitude of the damages (43 CFR § 11.13(c)). The Trustees also intend for this Plan to communicate proposed assessment methodologies to the public and the potentially responsible party (PRP) so that these groups can productively participate in the assessment process.

This Assessment Plan was based on the Trustees' current understanding of relevant studies and identifies other processes (e.g., data review and analysis) that may be needed to quantify injury to natural resources and their associated services. Studies and other processes described in this Assessment Plan do not limit the possibility of additional work, nor does the Assessment Plan guarantee that the included efforts will be completed. The Assessment Plan provides an initial prioritization of efforts the Trustees will take during the Injury Assessment process.

1.2 Authority to Conduct a NRDAR

The NRDAR is being conducted jointly by the Trustees pursuant to their respective authorities and responsibilities as Texas natural resource Trustees. The Trustees have each been designated as a natural resource trustee pursuant to Section 107(f)(2)(B) of CERCLA, 42 U.S.C. § 9607(f)(2)(B); Section 311 of the Clean Water Act (CWA), 33 U.S.C. § 1321; and Subpart G of the National Contingency Plan (NCP), 40 C.F.R. §§ 300.600 - 300.615. Under these authorities, the Trustees act on behalf of the public to seek damages for the injury, loss, or destruction of natural resources belonging to, managed by, controlled by, or appertaining to the State, that resulted from releases of hazardous substances. This includes implementing a NRDAR to evaluate the injury, loss, or destruction of natural resources and their services due to releases of hazardous substances.

By order of Governor Clements on July 29, 1988, the Texas Water Commission (predecessor agency to the TCEQ) was designated as the state's natural resource trustee, pursuant to CERCLA, as amended by the Superfund Amendments and Reauthorization Act, which provided that "the Governor of each State shall designate State officials . . ." and that "(s)uch State officials shall assess damages to natural resources . . . for those natural resources under their trusteeship." (CERCLA Section 107(f)(2)(B)). Governor Clements designated TPWD as a co-trustee in 1990, as the state agency with primary responsibility for fish and wildlife resources under state law. GLO was designated as a third co-trustee for purposes of NRDA by Governor Richards in 1991.

Relevant regulations include Subpart G of the NCP (40 CFR §§ 300.600 through 300.615) and U.S. Department of the Interior's (DOI's) NRDAR Regulations at 43 CFR Part 11 (DOI NRDAR Regulations), which provide guidance for the NRDAR process under CERCLA. In addition, the Texas Water Code provides for recovery of costs to determine impacts on the environment from a spill or discharge and to restore land and aquatic resources held in trust or owned by the State (Tex. Water Code § 26.265). Trustees are authorized to act on behalf of the public under state and/or federal law to assess and recover natural resource damages and to plan and implement actions to restore natural resources and their services that are injured or lost as the result of hazardous substances released at or from the Facility.

Consistent with the DOI NRDAR Regulations, the Trustees' decision to proceed with this assessment is based on the results of a PAS. The PAS concluded that there is a viable PRP and all preassessment screening criteria have been met. (See 43 CFR § 11.23(e)). Accordingly, the

Trustees, acting on behalf of the public, found sufficient cause to proceed with a NRDAR. Specifically, the Trustees determined that:

- A discharge of oil or a release of a hazardous substance occurred;
- Natural resources for which the Trustees may assert trusteeship under CERCLA have been, or are likely to have been, adversely affected by the release;
- The quantity and concentration of the discharged oil or released hazardous substance is sufficient to potentially cause injury to natural resources;
- Data sufficient to pursue an assessment are readily available or likely to be obtained at a reasonable cost; and
- Response actions carried out, or planned, do not or will not sufficiently remedy injury to natural resources without further action.

1.3 NRDAR Process Overview

The goal of the NRDAR process is to replace, restore, rehabilitate, or acquire the equivalent of injured natural resources and their services lost due to the release of hazardous substances. As specified in the DOI NRDAR Regulations (43 CFR Part 11), the NRDAR process includes three phases (Figure 1.2):

- Preassessment,
- Assessment Plan, and
- Post-Assessment.

To date, as noted above, the Trustees have completed the Preassessment Phase. The Trustees are now undertaking the Assessment Plan Phase, which includes the following (see 43 CFR §§ 11.30 - 11.38):

- Injury determination,
- Quantification of injury, and
- Damage determination.

The final step of the Assessment Plan Phase may include the development of a Restoration and Compensation Determination Plan (RCDP), which would review restoration alternatives for restoring injured or lost natural resources and their services (see 43 CFR §§ 11.81, 11.93). Once the Assessment Plan Phase is complete, the Trustees will begin the Post-Assessment Phase. In the Post-Assessment Phase, the Trustees may develop a Report of Assessment, which contains the results of the assessment and RCDP, including Trustee responses to comments received on the drafts of the Assessment Plan and RCDP (see 43 CFR § 11.90). In addition, during the Post-Assessment Phase, a draft Restoration Plan that documents the restoration project(s) will be prepared and made available to the public for comment. The public will have an opportunity to guide the assessment and restoration activities by providing comments on the draft Assessment Plan, the draft RCDP, and the draft Restoration Plan. Once the Restoration Plan has been finalized, restoration will be implemented.



Figure 1.2 Phases of the Natural Resource Damage Assessment Process.

Each of the steps to be followed in assessing injury and damages is discussed in greater detail in the sections and chapters that follow.

1.4 Invitation to Potentially Responsible Parties for Cooperative Assessment

At the time of the Preassessment Screen and Determination, the Trustees examined information about the Facility in relation to Section 107(a) of CERCLA, 42 U.S.C. § 9607(a), to determine the PRP(s). Parties liable under the statute include current owners and operators of a facility and owners and operators of a facility at the time of a release of hazardous substances. Facility data indicated that the principle contamination in the Assessment Area occurred while the Navy or its contractors were owners and/or operators.

Following completion of the PAS, the Trustees sent a Notice of Intent and an Invitation to Participate in a Cooperative NRDAR to the PRPs, including the Navy, Department of Defense (DOD), Air Force, Army, Air National Guard, City of Dallas, Texas Utilities (TXU), Northrop Grumman Industries, and American Brownfields Mountain Creek Industrial Center, LLC (ABMCIC; Pitts 2000; Gregory 2016a; Gregory 2016b). The PRPs did not agree to participate in a cooperative NRDAR.

1.5 Coordination with Other Activities

Consistent with 43 CFR § 11.31(a)(3)), Texas recognizes the benefit of coordinating assessment activities associated with sites that may have significant contaminants of concern. To that end,

30 Tex. Admin. Code § 7.124 (2001) describes a Memorandum of Understanding that seeks to facilitate interactions between TCEQ and state and federal Trustees regarding ecological risk assessments and ecological service analyses. Integration of Trustee considerations into remedial decisions may resolve certain natural resource damages liability or decrease the cost of assessment activities.

The Trustees have participated in the remedial process for the Facility since the late 1990s, providing written and verbal comments on proposed actions. Trustee assessment activities discussed in this Plan make use of existing data generated through the remedial process as well as other research efforts.

1.6 Public Participation

The Trustees are seeking feedback on this draft Assessment Plan. To facilitate public participation, the Trustees are making this Plan available to the public and PRP to review and provide feedback on the proposed approach and studies. Public notice soliciting comments on this Plan will be posted on [TPWD's website](#) and published in the *Texas Register*. The 30-day public comment period for this Assessment Plan will begin on date of publication of notice in the Texas Register. All written public comments must be submitted within 30 days from the date of publication of notice in the Texas Register. These comments will help the Trustees plan and conduct an assessment that is scientifically valid, cost-effective, and that incorporates a broad array of perspectives. To that end, the Trustees request that you carefully consider this Assessment Plan and provide any comments you may have in writing to:

Michael Tennant
Texas Parks and Wildlife Department
Natural Resource Damage Assessment Team
4200 Smith School Road
Austin, TX 78744
Email: Michael.Tennant@TPWD.Texas.Gov

The Trustees will consider all timely public comments and input on the Assessment Plan. The Trustees' responses to public comments will be available in the Report of Assessment. Based on the public's comments or other information, the Trustees may modify the Assessment Plan at any time. Any substantive modifications will be made available for review by the public, including the PRP.

1.7 Assessment Timeline

The activities described in this plan are expected to take less than two years to complete. If new information becomes available as this assessment progresses, and additional study is deemed warranted, updates to this plan and the timeline will be made publicly available.

2. DESCRIPTION OF THE ASSESSMENT AREA

According to the DOI NRDAR Regulations, natural resources for which damages may be sought include: land, fish, wildlife, biota, air, water, groundwater, drinking water supplies, and other such resources belonging to, managed by, held in trust by, appertaining to, or otherwise controlled by the United States, any State or local government, any foreign government, any Indian tribe, or, if such resources are subject to a trust restriction on alienation, any member of an Indian tribe (42 U.S.C. § 9601(16)). Additionally, damages may be determined based on injuries that are reasonably unavoidable as a result of response actions taken (43 CFR § 11.15(a)(1)). The DOI NRDAR Regulations group these natural resources into five categories: surface water, groundwater, air, geologic, and biological (43 CFR § 11.62). The Assessment Area is defined in the DOI NRDAR Regulations as:

The area or areas within which natural resources have been affected directly or indirectly by the discharge of oil or release of a hazardous substance and that serves as the geographic basis for the injury assessment (43 CFR § 11.14(c)).

The Assessment Area includes, but is not limited to, the Mountain Creek Lake system and the associated nearshore zone (Figure 1.1).

2.1 Facility History

The Assessment Area has been affected by activities associated with the Facility. The NWIRP and NAS Dallas properties adjoin each other and border the Mountain Creek Lake system (Figure 1.1). Although both properties were used by the Navy, they were managed separately and have different site histories (Appendix A) that resulted in releases into the Mountain Creek Lake system (Appendix B).

2.1.1 Facility Development

NAS Dallas, named Hensley Field at the time, was established in August 1929 by the City of Dallas, leased to the U.S. Army as a training field for reserve pilots of the U.S. Army Air Corps (Leatherwood 1991) and expanded several times over the years. The largest expansion of NAS Dallas occurred during World War II, reaching a maximum size of over 4,000 personnel in 1945. The Navy began operations at the base in March 1941 and established a Naval Air Reserve Base in May 1941 adjacent to Hensley Field. The initial mission of NAS Dallas, starting in January 1943, was to provide primary flight training for naval, marine, and coast guard cadets. During World War II, the base also served as an engine repair station, flight test facility, and receiving station for training aircraft manufactured at the North American Aviation Plant (Leatherwood 1991). Between 1949 and 1950, the base expanded again, extending the main northeast-southwest runway on the fill that separated Cottonwood Bay from the main body of Mountain Creek Lake.

NWIRP was constructed in 1941 as an aerospace manufacturing complex. It was a government-

owned, contractor-operated (GOCO) facility that was used, in part, for designing, fabricating, and testing prototype weapons and aerospace equipment and for pilot training. North American Aviation, Inc., leased the site from 1941 to 1945, producing nearly 30,000 aircraft for the Army, Air Force, and Navy. Following the war, the Navy gained stewardship of the manufacturing complex and leased it to multiple entities, including: North American Aviation, Texas Engineering and Manufacturing Company (TEMCO), Chance Vought Aircraft Corporation, Ling-Temco-Vought, Northrop Grumman, and Vought Aircraft Industries.

Navy-related activities at the Facility eventually ceased and the properties were transferred to new owners. The 1993 Base Realignment and Closure Commission slated NAS Dallas for closure, and training for naval reservists ceased in 1993. In 1998, NAS Dallas was closed and returned to the City of Dallas. In 2012, the United States sold NWIRP to ABMCIC, now known as Dallas Global Industrial Center, LLC (DGIC, LLC).

Mountain Creek Lake adjoins the Navy properties and was developed during the same time period as NAS Dallas and NWIRP. The lake was created in 1929 by impounding Mountain Creek. It was designed as a cooling reservoir for a Dallas Power and Light Company electric power plant. Twenty years later, in 1949, a diversion channel was constructed to allow flow from the Cottonwood Creek drainage into Mountain Creek Lake (Figure 1.1).

2.1.2 Summary of Releases

The Facility has documented past releases of petroleum products, volatile organic compounds (VOCs), polychlorinated biphenyls (PCBs), and metals. Appendix B contains the list of hazardous substances released from the Facility.

Releases from the Facility occurred from various industrial and aircraft support operations, production buildings, solid waste management units, and storage areas. A 2003 report commissioned by the Navy stated that the largest single source of Navy contamination into the Mountain Creek Lake system was the west lagoon at the Facility, which discharges into Cottonwood Bay (Newfields 2003). The west lagoon received and discharged a variety of industrial wastes and treated sanitary sewage for approximately 30 years from the 1940s to 1970s. Other sources of contamination from the Facility include the east lagoon and various stormwater outfalls. VOC-contaminated groundwater beneath the Facility flows toward and seeps into the Mountain Creek Lake system (Newfields 2003; Van Metre et al. 2003). Historically, the Facility discharged water products and contaminated stormwater into the Mountain Creek Lake system.

The Trustees anticipate focusing the NRDAR on direct and indirect injuries stemming from exposure to released hazardous substances as defined in Section 101(14) of CERCLA. The damage assessment may also focus on injuries associated with response actions. The Trustees identified chemicals of potential concern (COPCs) in the preassessment phase. The COPCs that the Trustees anticipate considering as part of the Assessment process are listed in Appendix C.

The specific chemicals that the injury analysis will focus on will be chosen as part of the assessment process.

2.1.3 Confirmation of Exposure

As required by 43 CFR § 11.37, the Trustees have confirmed that at least one of the natural resources identified in the preassessment screen as potentially injured has been exposed to hazardous substances. The preassessment screen identified several potentially injured natural resources, including surface water, sediments, and benthic organisms. Surveys, field investigations, and assessments conducted over the years indicate that releases from the Facility entered the sediments and waters of the Mountain Creek Lake system and bioaccumulated into fish tissues.

NAS Dallas began conducting a Resource Conservation and Recovery Act (RCRA) Facility Assessment in the 1980s due to suspected releases from site operations. As part of the assessment, contaminants released, the potential for contaminants to be released, and the likelihood of transport of those contaminants was evaluated. Records related to this work can be found in the Navy's Administrative Record for NAS Dallas (Navy 2020b). Concurrent investigations were also done at NWIRP starting in the 1980s (see references in Section 3.2 of Radian International 1999). These investigations concluded there was contamination from hazardous substances in the surrounding area's surface waters, groundwater, soils, and sediments.

In 1991, the DOD notified state and federal natural resource Trustees of a release of hazardous substances associated with the Facility (Malone 1991).

As a result of the RCRA Facility Assessment, DOD, acting through the Southern Division Naval Facilities Engineering Command, began research in cooperation with the United States Geological Survey (USGS) to determine whether contaminants from the Facility migrated or continued to migrate into the Mountain Creek Lake system. The USGS report indicates that metals, PCBs, and VOCs from the Facility entered the sediments and waters of the Mountain Creek Lake system (Van Metre et al. 2003).

High levels of PCBs in the sediments of the lake system bioaccumulated in fish tissues and led the Texas Department of Health (TDH) to issue Aquatic Life Order Number 12, which banned the possession and consumption of fish taken from the system (TDH 1996). At the time the order was issued, fish tissue sampling indicated the presence of PCBs at concentrations exceeding health assessment guidelines established by TDH. The fish possession ban in Aquatic Life Order Number 12 demonstrates that natural resources, including surface water, sediments, and benthic organisms, were exposed to a release of hazardous substances from the Facility.

Detailed information confirming the exposure of resources to hazardous substances being assessed as part of the NRDAR are described in further detail as part of the remedial investigations (ENSAFE 1999; Jones et al. 1997; Van Metre et al. 2003).

2.2 Affected Natural Resources

The Assessment Area supports a variety of natural resources and services potentially affected by hazardous substances released from the Facility, including surface waters, groundwater, sediments, birds, fish, other biota, and human/recreational uses, including fishing. The following paragraphs briefly summarize select features of the natural resources that the Trustees are currently considering assessing for injury.

2.2.1 Surface Water Resources

The surface water resources in the Assessment Area include the water, suspended sediment, and bed sediments. The contamination of these resources has both direct and indirect impacts on the health of biological resources. For example, contaminated sediments can cause injury to benthic invertebrate populations, which in turn can result in injuries to resident fish populations that consume them as a source of food. Similarly, injury to invertebrates and/or fish resulting from exposure to contaminated sediments and surface water can lead to injury in local insectivorous (insect eating) or piscivorous (fish eating) bird populations. In addition, contaminated sediments serve as a source of continuing releases of hazardous substances to the water column.

Surface water resources provide a suite of ecological and human services. Ecological services include, but are not limited to, habitat for trust species, including food, shelter, breeding areas, and other factors essential to survival. Human services provided by surface water resources include, but are not limited to, recreational fishing, boating, and canoeing.

The Mountain Creek Lake system (TCEQ Segment 0841A) is a tributary of the Lower West Fork of the Trinity River. Today, Mountain Creek Lake is approximately 3.4 miles long and 1.2 miles wide, with an average depth of 8.5 feet and a maximum depth of approximately 26 feet (TPWD 2016). Cottonwood Bay, another part of the Mountain Creek Lake system, is approximately 1 mile long by 0.1 miles wide. Mountain Creek Lake has a surface area of 2,696 acres and reservoir storage capacity of 22,850 acre-feet at 457.0 feet conservation pool elevation (TWDB 2020). Mountain Creek Lake was created by damming Mountain Creek. Water flows towards the east from Cottonwood Creek into Cottonwood Bay. Waters from the Bay are transported through the diversion channel into the main body of Mountain Creek Lake. Waters in the Mountain Creek Lake watershed flow northerly from Lake Joe Pool to Mountain Creek into Mountain Creek Lake. Water flows out of Mountain Creek Lake to the north through a dam to Mountain Creek (Figure 2.1).

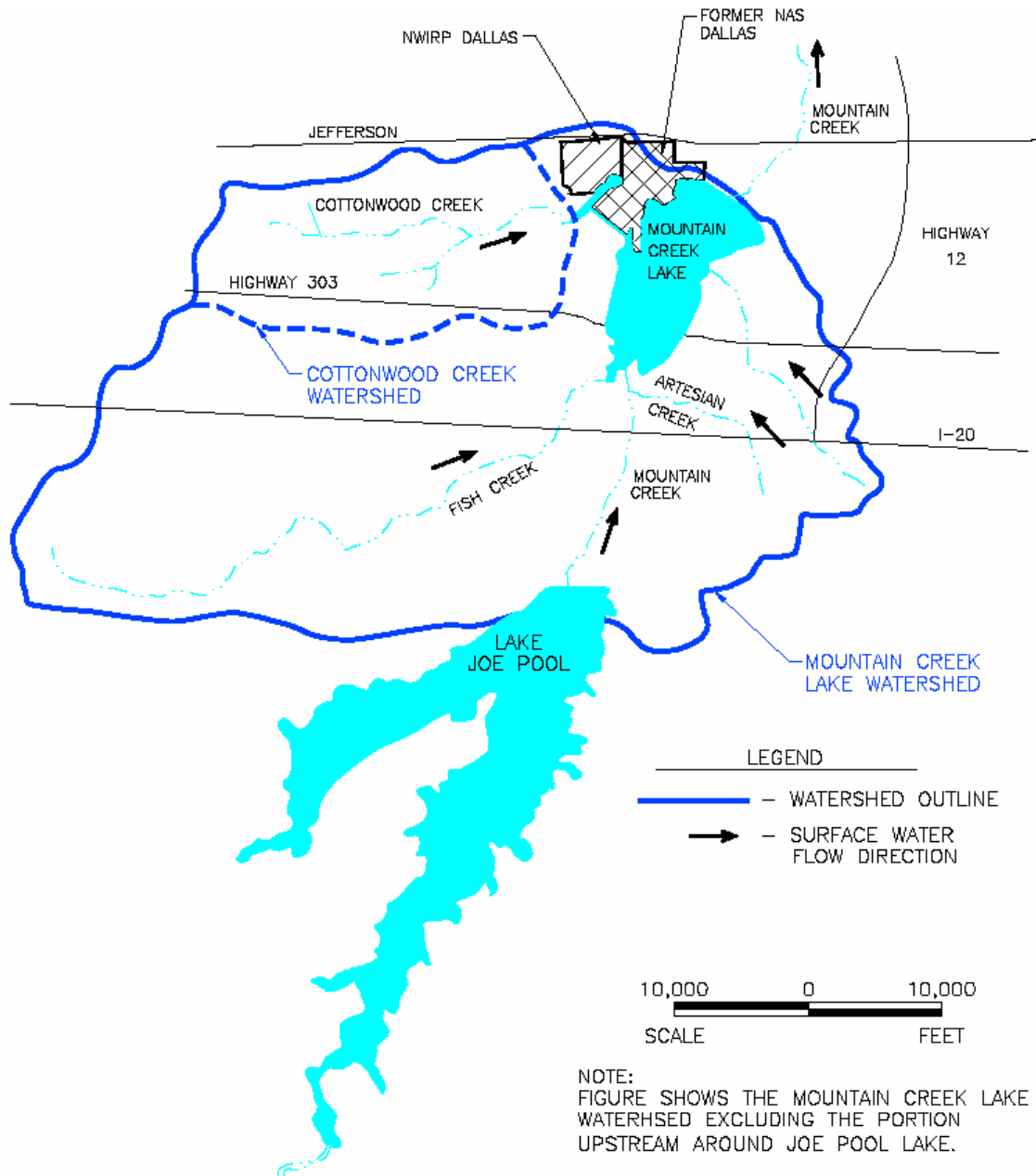


Figure 2.1 Cottonwood Creek and Mountain Creek Lake Watersheds (Newfields 2003).

2.2.2 Groundwater Resources

Groundwater resources include the water in a saturated subsurface zone and the rocks or sediments through which this water flows. Groundwater resources serve as a potential pathway for contaminants to migrate to surface water resources.

Subsurface geology is similar between NWIRP and NAS Dallas. There are three thin water-bearing zones above the Eagle Ford Shale that together reach to 65 feet below ground level.

The Eagle Ford Shale in this region is 100 to 200 feet thick and is thought to prevent the contamination from the shallower water bearing zones from migrating into the deeper aquifers (Radian International 1999; Tetra Tech 2003; ENSAFE 2001a). All the shallow groundwater at NWIRP is believed to discharge into surface water bodies, including Mountain Creek Lake (Radian International 1999).

The 2001 Affected Property Assessment Report for Mountain Creek Lake (ENSAFE 2001a) describes the geology/hydrogeology as follows:

A layer of sediment is submerged beneath the lake water and covers pre-lake clayey and silty clay soils. These soils overlie alluvial sequences deposited along the stream course of Mountain Creek. The fluvial alluvium directly overlies the Cretaceous Eagle Ford Shale. Groundwater is typically encountered in alluvial deposits. Directly beneath the lake, the entire alluvial column is likely saturated due to influent lake water.

Currently, the Trustees do not plan on focusing on groundwater for the assessment. However, it may be considered as a pathway for contamination for other resources. It is expected that any contamination associated with groundwater that was subsequently transported to other resources (e.g., biological or sediment resources) would be accounted for in the assessment of those resources.

2.2.3 Air and Geologic Resources

Currently, the Trustees are not considering assessment activities for air or geologic resources.

2.2.4 Biological Resources

Biological resources include fish, birds, terrestrial and aquatic plants, benthic organisms, threatened, endangered, state sensitive species, other legally protected species (Appendix D), and other living organisms not listed.

Many biological resources use the Mountain Creek Lake system. Species of birds observed by the public at the Mountain Creek Lake system are reported on ebird.org (eBird 2020) and include gulls, terns, cormorants, herons, egrets, vultures, osprey, kites, swallows, pigeons, sandpipers, and more. There are many fish species within the lake that are historically popular for fishing, including channel catfish, blue catfish, white crappie, flathead catfish, white bass, largemouth bass, freshwater drum, common carp, sunfish species, and smallmouth bass (Van Metre et al. 2003). Fish within the lake system have high concentrations of PCBs and dioxins, which led to fishing bans and consumption advisories (TDH 1996; TDSHS 2010b; TDSHS 2017). Vegetation is currently composed of emergent plant species. Water hyacinth, an invasive aquatic plant, has been observed on the lake and subsequently treated to control its spread (Fox et al. 2017).

2.2.5 Human/Recreational Use

The Mountain Creek Lake system provides opportunities for recreational activities. The area is surrounded by neighborhoods, parks, a golf course, a disc golf course, and a public boat ramp. Additionally, Dallas Baptist University is within walking distance of the lake. The lake is used for fishing, and many fish species were consumed by anglers (Van Metre et al. 2003). Historically, TPWD stocked Florida largemouth bass (1980-1994) and red drum (1981) in Mountain Creek Lake (TPWD 2020b). In 1996, TDH declared that the Mountain Creek Lake system was a prohibited area for the possession of all fish species in Aquatic Life Order Number 12 (TDH 1996) and TPWD stopped stocking the lake. The possession ban was rescinded in 2010, and it was replaced with a consumption advisory (ADV-44) that stated all fish species should not be consumed (TDSHS 2010b). In 2017, the consumption advisory was updated (ADV-59) to advise limited consumption of specific fish (TDSHS 2017).

3. INJURY ASSESSMENT AND PATHWAY DETERMINATION APPROACH

This Assessment Plan sets forth assessment studies and activities the Trustees intend to pursue as part of the NRDAR for the Mountain Creek Lake system. This document focuses primarily on studies relating to injury assessment (determination and quantification).

During the injury assessment, the Trustees quantify the effects of the release(s) of hazardous substances on the injured natural resources. For purposes of NRDAR, the Trustees measure the extent of the injury, estimate the baseline condition and/or baseline services of the injured natural resource, determine the recoverability of the injured natural resource, and estimate the reduction in services that resulted from the release(s) of hazardous substances (43 CFR § 11.70(c)). As defined in the DOI NRDAR Regulations, baseline means the condition or conditions that would have existed at the Assessment Area had the releases of the hazardous substances under investigation not occurred (43 CFR § 11.14(e)). Baseline conditions may be established based on the review of historical, pre-release data and information, or by control areas that exhibit similar physical, chemical, and biological conditions as the Assessment Area and lack exposure to the releases (43 CFR § 11.72).

At this time, the Trustees have determined that further assessment is required for the surface water resources and biological resources and their services, including human uses (e.g. recreational activities).

3.1 Temporal

The temporal scope of this assessment will be based on determining injuries to natural resources and corresponding reductions in natural resource services from the time of the initial release through the return of the injured resource to baseline conditions. The assessment will include a review of existing investigation reports and literature to determine when the injury

began and the length of the recovery period (the time required to return to baseline). The rate of recovery will be determined based on data and information concerning remedial and restoration activities, natural attenuation, and resource recoverability.

3.2 Use of Available Data

The Trustees' general approach to the assessment is to review the existing data, analyze gaps, and then undertake additional studies including sampling and data analysis as needed.

3.3 Intent to Perform a Type B Assessment

As part of the assessment planning process, the Trustees must decide whether to conduct a simplified assessment (Type A) or a comprehensive assessment (Type B). The Type A procedures, which use minimal field observations and computer models to generate a damage claim, are limited by the DOI NRDAR Regulations to the assessment of relatively minor, short duration discharges or releases in coastal or marine environments or in the Great Lakes. Considering the complexities noted above and other considerations, the Trustees have determined that the simplified procedures of the Type A assessment are inappropriate for this NRDAR. The Trustees have concluded that the Type B procedures are appropriate for this NRDAR based on the Trustees' assessment that (1) the nature of the releases and exposures to hazardous substances in the Assessment Area are complex, spatially and temporally, and are not short-term; (2) data that is site-specific and substantial already exists to support this assessment; and (3) additional data for the Assessment Area can be gathered at a reasonable cost/in a cost effective manner.

According to the DOI NRDAR Regulations, the Trustees must confirm that at least one of the natural resources identified as potentially injured in the Preassessment Screen has been exposed to released hazardous substance before including any Type B methodologies in the Assessment Plan. The Preassessment Screen identified several resources and their services that were potentially injured as a result of the releases of hazardous substances from the Facility, including:

- Recreational uses
- Migratory waterfowl
- Surface water
- Submerged lands and sediments
- Terrestrial organisms
- Benthic organisms
- Groundwater
- Biota

PCB concentrations found in fish tissue confirm the exposure of at least one natural resource to hazardous substances from the Facility (TDH 1996; TDSHS 2010a; TDSHS 2010b; TDSHS 2017). Information describing the methods that confirm additional resources have been exposed will

be described in the sections below under Pathway Determination and Injury Assessment.

3.4 Pathway Determination

Pathway determinations involve identifying the sources of hazardous substances and tracing the fate and transport of the substances through the environment (e.g., through surface water, sediments, or food webs). Pathways may be determined by demonstrating the presence of a hazardous substances in a resource or by using a model (43 CFR §11.63(a)(2)).

Significant investigation into pathways has been conducted in the Assessment Area (ENSAFE 1999; ENSAFE 2001a; Beckley 2016b; Beckley 2016c; Van Metre et al. 2003). Trustees developed a conceptual model visualizing the pathways for effects on ecological resources (Figure 3.1) based on these documents.

The primary mechanisms for releases of hazardous substances from the Facility was site operations, waste disposal, and spills and leaks. Stormwater runoff, historical point-source and non-point source discharges, and groundwater flow provide transport mechanisms for hazardous substances into the Mountain Creek Lake system. Possible pathways for ecological exposure include direct contact with contaminated surface water, sediments, and soil; ingestion of contaminated sediment or soil during foraging or feeding; indirect contact through ingestion of contaminated prey species (i.e., bioaccumulation, bioconcentration, and biomagnification); and/or, direct contact and ingestion of re-suspended contaminated sediments.

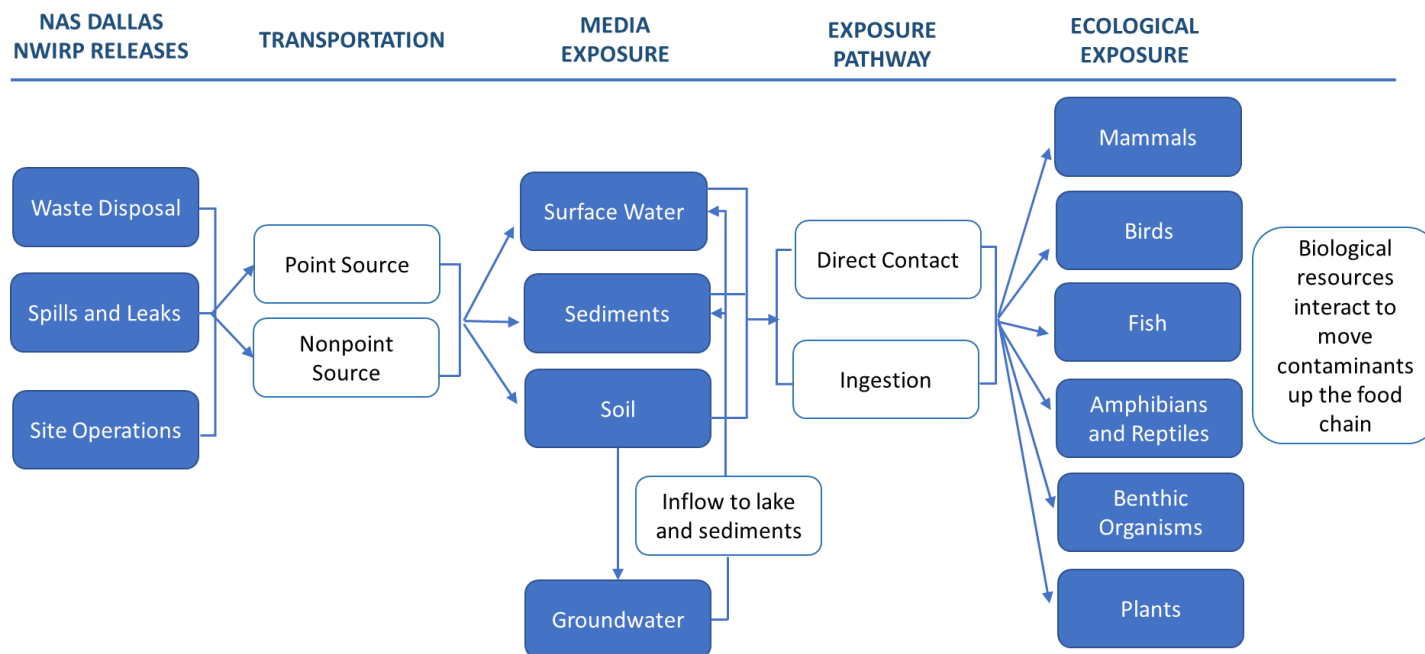


Figure 3.1 Conceptual model describing the fate of releases from the Facility.

4. INJURY ASSESSMENT

The Trustees will be evaluating injury associated with aquatic resources and human/recreational use. The assessment of aquatic resources will include consideration of sediments, waters, and biota in, or using, the aquatic habitat. Human/recreational use will consist of the services provided to humans from the Assessment Area.

4.1 Injury Assessment for Aquatic Resources

The Trustees anticipate focusing assessment of aquatic resources on the sediment and fish tissue data and the pathway for the sediments to affect biological resources. The Trustees will review data and information generated as part of the RCRA Facility Assessment, the remedial process (e.g., Corrective Action Orders, Remedial Action Plans, monitoring reports associated with monitored natural recovery [MNR]), and other relevant literature such as TCEQ benchmarks, EPA screening values, and published injury thresholds. The Trustees will evaluate remedial actions including those associated with hot spot removal and MNR. This will include reports associated with pre- and post-remedial monitoring data, since this data may be used to assess the likelihood and/or rate of resource recovery. The Trustees will consider peer-reviewed literature on the harmful effects of contaminated sediments on amphibians, aquatic mammals, benthic organisms, birds, fish, and reptiles. The Trustees will focus on published literature describing resource impairment at environmentally relevant concentrations observed in sediments and fish. The Trustees reserve the right to evaluate any new or relevant data sources that may inform the injury assessment.

4.1.1 Aquatic Resource Evaluation

Biological resources within the Assessment Area may have been injured by direct contact with suspended or dissolved chemicals in the water column, direct contact with contaminated sediments, ingestion of contaminated sediment during foraging or feeding, and/or indirect contact through ingestion of contaminated prey species, including bioaccumulation. Biological injuries to aquatic biota may be assessed in amphibians, aquatic mammals, benthic organisms, birds, fish, and reptiles.

The Trustees will evaluate the concentrations of chemicals in sediments and fish to assess the degree to which these substances may be causing adverse effects to exposed biological resources by performing a series of tasks.

Task 1 – Perform screening of chemical contaminants in sediment and fish

The purpose of Task 1 is to identify chemical contaminant concentrations exceeding the most stringent ecological benchmarks and injury thresholds:

- Identify the highest sediment and fish concentrations for each released chemical;
- Compare the highest chemical concentrations to the lowest and most conservative

- applicable ecological benchmark or injury thresholds; and
- Develop a database of retained chemical contaminants for analysis.

Task 2 – Assess trends of contaminant data and perform data analysis

The purpose of Task 2 is to identify the spatial extent and temporal patterns of chemical contaminant concentrations above baseline and determine if quantifiable injuries to biological resources occurred from exposure to chemical contaminants. The Trustees will use a data quality objectives approach to perform the data analysis (EPA 2000; EPA 2006a; EPA 2006b; EPA 2006c) to:

- Analyze and apply appropriate statistics on selected data to compare chemical concentrations in the Assessment Area to baseline concentrations or other appropriate chemical observations;
- Visualize data using charts, graphs, and/or maps; and
- Describe and document analysis results.

Task 3 – Perform geospatial analysis

The purpose of Task 3 is to determine the geographic and temporal extent of injury or contamination. Information from Task 1 and Task 2 will be used during this analysis. ArcGIS™ will be employed to perform data interpolation and visualization techniques that can quantify the geographical extent of injury or contamination. This task may include the following actions:

- Identify data that are appropriate for interpolation and visualization;
- Visualize data using charts, graphs, and/or maps; and/or
- Delineate the number of acres of impacted area by magnitude of contamination or magnitude of injury.

4.2 Injury Assessment for Human/Recreational Use

The Mountain Creek Lake system provides resources and services enjoyed by people. Recreational activities associated with the lake include fishing, boating, and bird watching.

The Trustees anticipate using existing data to model losses associated with angler use and enjoyment. This information could include, but is not limited to, information about limits or bans on the consumption of fish species; angler survey data, creel data, and fishing license data collected by TPWD; data collected by the U.S. Census; and fishing data collected by the USGS. Additional field data collection is not anticipated for this portion of the assessment.

Based on currently available information and the need to quantify injuries, lost angler use is the only lost recreational use that the Trustees are evaluating at this time. Other losses associated with passive use (e.g. bird watching, walking, general enjoyment) could be assessed and addressed in a separate Assessment Plan if the additional assessment is considered cost-effective (i.e., the cost of the assessment relative to the cost of restoration).

5. APPROACH TO DAMAGE DETERMINATION

In the damage determination phase, the Trustees determine the monetary value (damages) of the injuries to natural resources resulting from the releases of hazardous substances (CERCLA §§ 107(a)(4)(C), 107(f)(1); 43 CFR § 11.15).

5.1 Aquatic Resource Damage Determination

A common technique that the Trustees may use to determine aquatic resource damages is a service-to-service scaling approach using the habitat equivalency analysis (HEA) methodology. HEA is a tool that can be used to generate a common metric (discounted service acre-years [DSAYs]) to describe service losses due to injury and service gains due to restoration, thereby providing a way to directly compare the level of injury with the level of restoration. This tool considers the past and future losses of services provided by a habitat as a result of releases of hazardous substances. Using a discount factor, service losses are adjusted into a present-day level of services (NOAA 2006).

Once the above analysis is complete, the Trustees will identify appropriate restoration activities that will compensate for injured, lost, or destroyed natural resources, then estimate the cost to implement them (43 CFR § 11.14 (I)).

5.2 Human/Recreational Use Damage Determination

The Trustees will assess the value of the losses to human/recreational use that were incurred as a result of the releases from the Facility. At a minimum, the Trustees will rely on existing literature, studies and publicly available data to develop model(s) to evaluate the public's willingness to pay and/or the economic value of the resources to the public attributable to the direct use of the services provided by the natural resources.

The damage determination process will account for reservoir characteristics (e.g., shoreline miles, public access facilities, fish consumption advisory, etc.) that occur in both the baseline and release conditions. The Trustees will investigate the appropriateness of various models (including a recreation demand model) to determine the appropriate model for valuing lost human/recreational services associated with the injured natural resources.

6. PRELIMINARY ASSESSMENT OF DAMAGES

A preliminary assessment of damages will use information from the Injury Assessment. Since injury has not yet been fully quantified, the preliminary assessment of damages will be completed later. Once complete, it will be made available for public review and comment.

7. QUALITY ASSURANCE

Assessments employing Type B methods are required to develop a Quality Assurance Plan

(QAP) that adheres to the requirements of the NCP and guidance provided by EPA (43 CFR § 11.31(c)(2)). The purpose of the QAP is to ensure that data are of sufficient quality to be used for injury assessment and damage determination. The quality assurance procedures described below are general in nature because the assessment relies primarily on data and information that already exists. The QAP will be updated and made publicly available prior to the initiation of any new Trustee-led data collection.

Data sources will be screened to verify that supporting documentation is sufficient to allow for an evaluation of the reliability and usability of the information. Required information will differ with data and information types, but may include:

- Sampling methodology, including information on sample locations, environmental media sampled, and measurement units;
- Chemical analysis, including information on detection limits and methodology accompanying quality assurance/quality control (QA/QC) data or separate QA/QC report;
- Raw data or data tabulations (e.g., rather than figures only); and
- Agreement from a governing body that the data collection methods/analysis were appropriate (e.g., published in a peer reviewed journal; approved for use in the remedial process).

The Trustees may compile data from multiple sources to assess injury. Quality checks will be made on all data that is keyed into an electronic format. All data and data sources will be backed up on external drives or a common network drive. The data and data sources used in the injury assessment will be stored and maintained by TPWD.

Data may be excluded from consideration if it is determined that appropriate supporting documentation has not been provided or the available documentation is insufficient. The Trustees may reference comments made during the remedial process to help make this determination.

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APPENDIX A – SITE HISTORY

Table 1. Site History.

Year	Activity or Document Description
1928	The city of Dallas leases property to the U.S. government for a military base (Hensley Field, later known as NAS Dallas). The base was expanded several times over its history (THC 2000).
1929	Mountain Creek Dam construction starts (Crawford 2011).
1937	Mountain Creek Lake dam construction completed. The reservoir was constructed to provide cooling water for the Dallas Power and Light Company steam turbine power plant (TPWD 1957).
1939	Mountain Creek Lake opens to fishing (TPWD 1957).
1941	The U.S. government commissions the military base as a Naval Air Reserve Base (Navy 1985).
1941	As part of the U.S. World War II Industrial Mobilization Program the U.S. government builds the Naval Weapons Industrial Reserve Plant (NWIRP) Dallas, an aerospace manufacturing complex. NWIRP initially consisted of 85 buildings and structures on 153 acres. The manufacturing complex expanded over its history to 314 acres (Hardy 2002).
1943	The Navy changes the official designation of the Naval Air Reserve Base (formerly known as Hensley Field) to Naval Air Station Dallas (NAS Dallas). The base was used as a training installation for Navy pilots and Naval Air Reservists from 1943 – 1993 (Navy 1985).
1978	Mountain Creek Lake fish stocking programs starts (first documented fish stocking for Mountain Creek Lake). Stocking History for Mountain Creek Lake (Dallas County) (TPWD 2020b).
1985	The Navy performs an Initial Assessment Study of NAS Dallas to identify and assess sites posing a potential threat to human health or to the environment due to past disposal practices (Navy 1985).
1989	The Navy performs a Final Resource Conservation and Recovery Act Facility Assessment Preliminary Review/Visual Site Inspection (PR/VSI) for 135 Solid Waste Management Units (SWMUs) and 4 Areas of Concern (AOCs) at NAS Dallas (Kearney 1989).
1991	The Navy sends a letter to the federal and state natural resource Trustees identifying Department of Defense (DOD) as the lead agency for performing CERCLA response actions and identifying currently known releases or potential releases (Malone 1991).
1993	Dallas forms a formal redevelopment authority with the city of Grand Prairie and Dallas County (Crawford 2011).
1993	Post-Cold War federal law designates NAS Dallas for closure (Crawford 2011).
1993	Navy pilots and Naval Air Reservists no longer train at NAS Dallas (Crawford 2011).

Year	Activity or Document Description
1994	TNRCC issues the Navy RCRA Permit No. 50279 authorizing operation of a hazardous waste storage area and requires the Navy to address offsite contamination (TNRCC 1994).
1994	The Base Realignment and Closure (BRAC) Clean Up Plan summarizes the status of NAS Dallas' environmental restoration and compliance programs and the comprehensive strategy for environmental restoration and restoration compliance activities (ENSAFE 1995).
1994	The Draft-Final Comprehensive Resource Conservation and Recovery Act Facility Investigation Work Plan, NAS Dallas, Texas, characterizes any potential or past releases of hazardous substances into the environment from facilities identified in the BRAC (ENSAFE 1994).
1994	Mountain Creek Lake fish stocking program ends (last documented fish stocking for Mountain Creek Lake; TPWD 2020b).
1994	The United States Geological Survey (USGS) collects water, sediment, and fish to support Mountain Creek Lake Phase 1 and 2 studies from 1994 – 1997 (Van Metre et al. 2003).
1996	Texas Department of Health (TDH) issues a fish possession ban, which prohibits the possession of any fish from the Mountain Creek Lake (TDH 1996).
1997	The USGS Open-File Report 97-245 reports chemical data for bottom sediment, lake water, bottom-sediment pore water, and fish in Mountain Creek Lake, Dallas, Texas, 1994 – 1996 (Jones et al. 1997)
1998	The U.S. government decommissions NAS Dallas (Crawford 2011).
1999	The Navy completes a Final Resource Conservation and Recovery Act Facility Investigation (RFI) for NWIRP. The RFI finds that historical Navy operations resulted in unauthorized releases to soil, groundwater, and sediment, and identified multiple solid waste management units (SWMUs) and areas of concern (AOCs; ENSAFE 1999).
2000	TPWD, on behalf of the Trustees, notifies the DOD, Navy, Air Force, Army, Air National Guard, City of Dallas, Texas Utilities, and Northrop Grumman Industries of its intent to pursue damages for the pollution of Mountain Creek Lake and requests participation in a cooperative natural resource damage assessment (NRDA; Pitts 2000).
2000	The NRDA Preassessment Screen and Determination finds sufficient cause to proceed with a NRDA of Mountain Creek Lake, Cottonwood Bay, NAS, NWIRP, and associated facilities at Mountain Creek Lake, Dallas, Texas (TPWD et al. 2000).
2000	The Navy declines to participate in a cooperative NRDA and states that if a claim for damages is filed, the Department of Justice (DOJ) will represent the Navy (Munsell 2000).

Year	Activity or Document Description
2001	The Environmental Protection Agency (EPA) and Texas Commission on Environmental Quality (TCEQ) approves Nine TMDLs for Legacy Pollutants in Streams and a Reservoir in Dallas and Tarrant Counties (TNRCC 2001a).
2001	TCEQ develops Implementation Plan, Dallas and Tarrant County Legacy Pollutant TMDLs (TNRCC 2001b).
2001	The Navy submits the APAR for NWIRP Dallas, Texas, to TCEQ. The APAR concludes that there are multiple sources of contamination at the site. These include former degreasers, storage areas, an incinerator, and two lagoons that receive storm and wastewater. (ENSAFE 2001a).
2001	The Navy submits the Draft Affected Property Assessment Report (APAR) for Mountain Creek Lake, Dallas, Texas, to TCEQ. The APAR concludes that the Navy's past operations impacted Mountain Creek Lake sediments (ENSAFE 2001b).
2001	The Navy develops screening level ecological risk assessment (SLERA) for Mountain Creek Lake and Cottonwood Bay (ENSAFE 2001c).
2002	The USGS open-file report 02-053 summarizes chemical data for bottom sediment in Mountain Creek Lake, Dallas, Texas, 1999 – 2000 (Wilson 2002).
2003	The Navy submits Newfield's Revised Sediment Background Analysis Report for Mountain Creek Lake to TCEQ. The study confirms that Navy activities impacted Cottonwood Bay sediments, and impacts to Mountain Creek Lake sediments are limited to the immediate proximity of two NAS Dallas outfalls. The study also identifies contaminants of concern (COCs) attributed to Navy activities, and background values for these COCs were recommended as protective concentration levels (PCLs) for sediment (Newfields 2003).
2003	A USGS Water-Resources Investigations Report 03-4082, Chemical Quality of Water, Sediment, and Fish in Mountain Creek Lake, Dallas, Texas, 1994 – 1997 , summarizes the occurrence, trends, and sources of inorganic and organic contaminants in Mountain Creek Lake (Van Metre et al. 2003).
2009	The Navy submits the Draft Final Mountain Creek Lake Sediment RAP to TCEQ. The Sediment RAP recommends the dredging and consolidation of affected sediments from selected PCLE zones and capping sediments in Cottonwood Bay (Tetra Tech NUS 2009).
2009	The Navy submits a Groundwater RAP and schedule for clean-up to address groundwater contamination associated with AOC-18 to TCEQ (ENSAFE 2009).
2010	The Texas Department of State Health Services (DSHS) rescinds the fish possession ban and issues a fish consumption advisory recommending no consumption of fish from Mountain Creek Lake. (TDSHS 2010b; TDSHS 2010c).
2011	TCEQ approves the Soil Response Action Plan (RAP) dated June 2009, Groundwater RAP dated June 2009, and Mountain Creek Lake Sediment

Year	Activity or Document Description
	RAP. The Sediment RAP includes wholesale sediment dredging and capping options (Posnick 2011).
2011	TCEQ issues Corrective Action Order (CAO) No. 31268, Docket No. 2010-0069-IHW-US, to the Navy as the owner of NWIRP and Cottonwood Bay. The CAO supersedes RCRA Permit No. 50279 and sets the terms and conditions by which the Navy conducts remediation of soil, groundwater, and sediment at NWIRP and off-site (TCEQ 2011).
2012	The Navy performs a sediment sampling investigation to evaluate current sediment chemical concentrations (Tetra Tech NUS 2012).
2012	The Navy sells NWIRP to American Brownfield Mountain Creek Industrial Center (ABMCIC). Subsequently, TCEQ issues a Class 1 CAO Modification, approving the transfer of the CAO from the Navy to ABMCIC (TCEQ 2012).
2013	The United States Army Corps of Engineers (USACE) determines that the 2010 approved Draft Final Sediment RAP sediment dredging and capping options are not viable for permitting (TCEQ 2018).
2014	TCEQ approves a shallow sediment sampling program to reevaluate the sediment chemical conditions in relation to ecological risk at Cottonwood Bay and Mountain Creek Lake (USA Environmental 2014a).
2014	ABMCIC submits a revised Sediment RAP to TCEQ (USA Environment 2014b). The revised Sediment RAP requests modification of the approved remedy as stipulated in the CAO for removal and off-site disposal of sediments with elevated PCBs from a portion of SWMU 35, Monitored Natural Recovery (MNR), for Cottonwood Bay and SWMU 35, and that no further action is necessary at SWMU 85. TCEQ does not have sufficient data to support a modification of the CAO. An MNR study is needed to demonstrate it is a viable alternative for remediating contaminated sediments. TCEQ does not oppose ABMCIC's concurrently performing an MNR study and implementing tasks and subtasks of the CAO and performing interim removal actions such as PCB sediment hot spot removal at SWMU 35 (Seaton 2014).
2014	USACE grants permission to complete SWMU 35 hot spot sediment dredging and dewatering activities (TCEQ 2018).
2015	In March 2015, ABMCIC collects sediment and fish tissue samples from Cottonwood Bay and Mountain Creek Lake to supplement existing historical data to evaluate the effectiveness of an MNR remedy. Ramboll Environ 2015).
2015	TCEQ approves Sediment RAP for SWMU 35 PCB hot spot removal (Posnick 2015).
2015	ABMCIC submits a Draft Tier 2 SLERA for Mountain Creek Lake and Cottonwood Bay to TCEQ (Beckley 2016a).
2016	ABMCIC submits a report to TCEQ titled: <i>Development of Fish Risk-Based Exposure Limits (RBELS) and Representative Fish Tissue Concentrations for</i>

Year	Activity or Document Description
	<i>Human Health Consumption Pathway Mountain Creek Lake and Cottonwood Bay.</i> This report addresses deficiencies of the Draft Tier 2 SLERA related to the human health fish consumption pathway (Beckley 2016b).
2016	ABMCIC submits a revised SLERA to TCEQ. The results of the SLERA indicate that no further action is required to achieve critical ecological PCLs in Cottonwood Bay or SWMU 85, but that a remedy was required for one small area of elevated PCB-affected sediments in SWMU 35 in Mountain Creek Lake (Beckley 2016c).
2016	TPWD, on behalf of the Trustees, provides the Navy and ABMCIC with a notice of intent to conduct restoration planning for the NWIRP and NAS Dallas at Mountain Creek Lake in the City of Dallas, Dallas County, Texas, and an invitation to participate in a cooperative NRDA (Gregory 2016a; Gregory 2016b).
2016	The Navy declines participation in a cooperative NRDAR (Maculan 2016).
2016	ABMCIC declines participation in a cooperative NRDAR (Mack 2016).
2016	ABMCIC responds to TCEQ comments on the evaluation of the human health fish consumption pathway for Mountain Creek Lake and Cottonwood Bay. ABMCIC believes that the issues can be resolved by discussing remediation options, timeframes, and related issues (Beckley 2016d).
2016	TCEQ approves the revised Tier 2 SLERA (Seaton 2019).
2016	In August 2016, ABMCIC submits the MNR Evaluation Report for Cottonwood Bay and Mountain Creek Lake to TCEQ. Following the receipt of TCEQ's comments in April 2017, ABMCIC submits revised report material to TCEQ in May 2017. The report outlines multiple lines of evidence demonstrating the natural recovery process (Ramboll Environ 2016).
2016	ABMCIC submits revised SWMU 35 Sediment Hot Spot Removal RAP to TCEQ. The interim measure includes dredging and dewatering of affected sediments from hot spot SWMU 35 (USA Environment 2016).
2017	TCEQ approves revised SWMU 35 Sediment Hot Spot Removal RAP (TCEQ 2018).
2017	DSHS revises Mountain Creek Lake fish consumption advisory to a species-specific advisory recommending consumption guideline for women of childbearing age and children <12 and women past childbearing age and males 12 and older (TDSHS 2017).
2017	ABMCIC submits Draft Sediment RAP to TCEQ. The draft RAP consists of an MNR response action for Cottonwood Bay and Mountain Creek Lake (ABMCIC 2017).
2018	ABMCIC submits Final Sediment RAP for Cottonwood Bay, SWMU 35, and SWMU 85. This Sediment RAP replaces the 2009 Sediment RAP in which ABMCIC proposes to leave sediments in place and use MNR. Wholesale dredging and removal would have destroyed existing benthic habitat in

Year	Activity or Document Description
	Cottonwood Bay, resulting in significant disruption of existing ecosystems that would have taken years to recover. MNR will allow existing habitats to be preserved and for sediment contaminant concentrations to decrease over time (ABMCIC 2018).
2018	ABMCIC submits Draft-SWMU-35 Sediment Hot Spot Removal Response Action Completion Report to TCEQ (USA Environment 2018).
2018	TCEQ provides conditional approval for the Final Sediment RAP for Cottonwood Bay. The RAP proposes to remediate sediments contaminated with PCBs in Cottonwood Bay and Mountain Creek Lake through the implementation of MNR. Final approval of the RAP is contingent upon Dallas Global Industrial Center's fulfilling the institutional control requirements of 30 Tex. Admin. Code §350.94 (Posnick 2018).
2018	TCEQ approves SWMU 35 Sediment Hot Spot Removal Response Action Completion Report (Posnick 2018b).
2018	TCEQ approves the ABMCIC name change. ABMCIC changed its name to DGIC, LLC, to be more consistent with the branded name of the facility (Dallas Global Industrial Center; Meyer 2018).
2019	TCEQ approves and issues Notice of Class 2 Modification in Accordance with 30 Tex. Admin. Code, Sections 39.403 and 305.69(c) for DGIC, LLC, CAO. The CAO authorizes the revised Sediment RAP referenced in the CAO Class 2 Modification to be replace the previous Sediment RAP. The Class 2 Modification authorizes implementation of MNR of sediments in Cottonwood Bay and Mountain Creek Lake (Seaton 2019).
2019	The DGIC, LLC, submits the Year 0 RAER to TCEQ. The RAER describes the Year 0 status of the MNR response action for Cottonwood Bay and Mountain Creek Lake. The MNR response action objective for Cottonwood Bay is to demonstrate continued decreases in fish fillet PCB concentrations over time for those species that continue to exceed the DSHS' HAC value for PCBs of 0.047 mg/kg (TCEQ 2019). DSHS data from 2008 and 2015 does not indicate a decrease in PCB concentrations. The mean PCB concentration for all fish combined from 2008 and 2015 were 0.138 mg/kg and 0.141 mg/kg, respectively (Ramboll Environmental 2019).
2020	TCEQ issues a Class 1 CAO Modification approving an administrative update to the CAO to reflect the transfer of fee simple title in the Home Depot NWIRP parcel to VEREIT/OW Dallas TX, LLC (new buyer). DGIC, LLC, will remain the named party on the CAO and the RAPs (Seaton 2020).
2020	TCEQ approves the Year 0 RAER (Hatfield 2020).

APPENDIX B – SUMMARY OF RELEASES

Table 2. NAS and NWIRP Hazardous Waste Generating Activities/Sources.

Waste Type or Material	Source/Activity
Metal plating solutions and rinse water containing magnesium, nickel, titanium, copper, cadmium, chromium, and zinc	NWIRP Plating Shops
Neutralized acid solutions (sulfuric, nitric, chromic, phosphoric, and hydrofluoric)	NWIRP Plating Shops
Alkaline cleaning solutions	NWIRP Plating Shops
Waste petroleum, oil, lubricants, hydraulic oils, solvents, antifreeze, and cleaning detergents	NWIRP stormwater runoff, shop floor washdown water, disposal of wastes to onsite lagoons and ditches/trenches
Solvents (acetone, methyl ethyl ketone, and isopropanol)	NWIRP Bond Shop
Treated effluent from sewage treatment plant possibly containing hazardous waste	NWIRP
Boiler and cooling tower blowdown	NWIRP
Phenolic stripper rinse water	NWIRP Aluminum parts stripper shop
Herbicide rinse water	NWIRP herbicide formulation
Acetone, acetic acid, isopropyl alcohol, methyl isobutyl ketone, and chlorinated solvents	NAS parts cleaning
Alodine (contains chromium), butyl cellosolve	NAS aircraft and vehicle washing
Batteries and acid, ethylene glycol, Fuels (JP-5, AVGAS, JP-4), and oils (engine, hydraulic lubricating, cutting)	NAS aircraft and vehicle repairs and maintenance
Epoxy paints and strippers (contain phenols and methylene chloride), lead, toluene, and xylene	NAS aircraft and vehicle painting/thinning/stripping
Methyl ethyl ketone, PD-680 Type I and II (mineral spirits solvent), 1,1,1-trichloroethane, trichloroethylene, trichlorotrifluoroethane, toluene, and xylene	NAS degreasing
Identified and unidentified inert fill material as well as old oil drums, waste oil lockers, waste oils, chlorinated solvents, and possible PCB-containing debris	NAS SWMU 1 (The Rubble Landfill - unlined)
PCBs	NAS storage of transformers and electrical distribution equipment including small capacitors, leaks/spills, and waste drums
Fuels (JP-5, AVGAS, JP-4), PD-680, trichloroethylene, alcohol, and petroleum waste	NAS fire fighter training areas
Lead	NAS indoor firing range, building 34, and

Waste Type or Material	Source/Activity
	building 20
Petroleum products and waste, chlorinated solvents, industrial soaps	NAS above-ground and underground storage tanks
Petroleum products	NAS fuel Tank Farms
Photographic solutions (Silver)	NAS photo processing
Sewer discharge including paint strippers, waste Paints, chlorinated and non-chlorinated solvents, cleaning compounds, neutralized battery acid, photo processing chemicals, and petroleum wastes	NAS sanitary sewer system

APPENDIX C – CHEMICALS OF POTENTIAL CONCERN

Table 3. List of chemicals of potential concern (COPC) and basic information describing the chemical.

Count	Chemical Name	CAS Number ¹	COPC Group ²	EPA Substance Registry Service (SRS) ³	ATSDR Toxicological Profile ⁴
1	Cyanide	57-12-5	Cyano	SRS Info	Toxicological Info
2	Chlorinated dibenzofurans ⁵	---	Dioxins and Furans	SRS Info	Toxicological Info
3	Chlorinated dibenzo-p-dioxins ⁵	---	Dioxins and Furans	SRS Info	Toxicological Info
4	Aluminum	7429-90-5	Metal	SRS Info	Toxicological Info
5	Antimony	7440-36-0	Metal	SRS Info	Toxicological Info
6	Arsenic	7440-38-2	Metal	SRS Info	Toxicological Info
7	Barium	7440-39-3	Metal	SRS Info	Toxicological Info
8	Beryllium	7440-41-7	Metal	SRS Info	Toxicological Info
9	Cadmium	7440-43-9	Metal	SRS Info	Toxicological Info
10	Chromium	7440-47-3	Metal	SRS Info	Toxicological Info
11	Chromium III	16065-83-1	Metal	SRS Info	Toxicological Info
12	Cobalt	7440-48-4	Metal	SRS Info	Toxicological Info
13	Copper	7440-50-8	Metal	SRS Info	Toxicological Info
14	Lead	7439-92-1	Metal	SRS Info	Toxicological Info
15	Manganese	7439-96-5	Metal	SRS Info	Toxicological Info
16	Mercury	7439-97-6	Metal	SRS Info	Toxicological Info
17	Nickel	7440-02-0	Metal	SRS Info	Toxicological Info
18	Selenium	7782-49-2	Metal	SRS Info	Toxicological Info
19	Silver	7440-22-4	Metal	SRS Info	Toxicological Info
20	Thallium	7440-28-0	Metal	SRS Info	Toxicological Info

¹ CAS number is a unique identifier of chemical substances

² Chemicals of Potential Concern (COPC) group are grouped into categories of similar chemicals.

³ The Substance Registry Service (SRS) is EPA's authoritative resource for information about chemicals.

⁴ The Agency for Toxic Substances and Disease Registry (ATSDR) provides toxicological profiles for select hazardous substances.

⁵ There are nearly 210 chlorinated dibenzo-p-dioxin (CDD) and chlorinated dibenzofuran (CDF) isomers in the environment. The World Health Organization recognizes 17 CDD and CDF congeners that are known to significantly bioaccumulate and has developed toxic equivalency factors for mammals, birds, and fish to support ecological risk assessment (EPA 2008). The Trustees will consider the evaluation of 17 CDD and CDF congeners in the injury assessment.

Count	Chemical Name	CAS Number ¹	COPC Group ²	EPA Substance Registry Service (SRS) ³	ATSDR Toxicological Profile ⁴
21	Titanium	7440-32-6	Metal	SRS Info	---
22	Vanadium	7440-62-2	Metal	SRS Info	Toxicological Info
23	Zinc	7440-66-6	Metal	SRS Info	Toxicological Info
24	1,2-dimethylnaphthalene	573-98-8	PAH	SRS Info	Toxicological Info
25	1,6-dimethylnaphthalene	575-43-9	PAH	SRS Info	Toxicological Info
26	1-Methyl-9H-fluorene	1730-37-6	PAH	SRS Info	Toxicological Info
27	1-methylphenanthrene	832-69-9	PAH	SRS Info	Toxicological Info
28	1-methylpyrene	2381-21-7	PAH	SRS Info	Toxicological Info
29	2,3,6-trimethylnaphthalene	829-26-5	PAH	SRS Info	Toxicological Info
30	2,6-dimethylnaphthalene	581-42-0	PAH	SRS Info	Toxicological Info
31	2-ethylnaphthalene	939-27-5	PAH	SRS Info	Toxicological Info
32	2-methylanthracene	613-12-7	PAH	SRS Info	Toxicological Info
33	4,5-methylenephenanthrene	203-64-5	PAH	SRS Info	Toxicological Info
34	4-methylphenol (p-Cresol)	106-44-5	PAH	SRS Info	Toxicological Info
35	9,10-Anthraquinone	84-65-1	PAH	SRS Info	Toxicological Info
36	9H-Fluorene	1730-37-6	PAH	SRS Info	Toxicological Info
37	Acenaphthene	83-32-9	PAH	SRS Info	Toxicological Info
38	Acenaphthylene	208-96-8	PAH	SRS Info	Toxicological Info
39	Acridine	260-94-6	PAH	SRS Info	Toxicological Info
40	Anthracene	120-12-7	PAH	SRS Info	Toxicological Info
41	Benzo[a]anthracene	56-55-3	PAH	SRS Info	Toxicological Info
42	Benzo[a]pyrene	50-32-8	PAH	SRS Info	Toxicological Info
43	Benzo[b]fluoranthene	205-99-2	PAH	SRS Info	Toxicological Info
44	Benzo[e]pyrene	192-97-2	PAH	SRS Info	Toxicological Info
45	Benzo[ghi]perylene	191-24-2	PAH	SRS Info	Toxicological Info
46	Benzo[k]fluoranthene	207-08-9	PAH	SRS Info	Toxicological Info
47	Carbazole	86-74-8	PAH	SRS Info	Toxicological Info

Count	Chemical Name	CAS Number ¹	COPC Group ²	EPA Substance Registry Service (SRS) ³	ATSDR Toxicological Profile ⁴
48	Chrysene	218-01-9	PAH	SRS Info	Toxicological Info
49	Coronene	191-07-1	PAH	SRS Info	Toxicological Info
50	Dibenzo[a,h]anthracene	53-70-3	PAH	SRS Info	Toxicological Info
51	Dibenzothiophene	132-65-0	PAH	SRS Info	Toxicological Info
52	Fluoranthene	206-44-0	PAH	SRS Info	Toxicological Info
53	Indeno(1,2,3-cd)pyrene	193-39-5	PAH	SRS Info	Toxicological Info
54	Naphthalene	91-20-3	PAH	SRS Info	Toxicological Info
55	Perylene	198-55-0	PAH	SRS Info	Toxicological Info
56	Phenanthrene	85-01-8	PAH	SRS Info	Toxicological Info
57	Phenanthridine	229-87-8	PAH	SRS Info	Toxicological Info
58	Phenol	108-95-2	PAH	SRS Info	Toxicological Info
59	Pyrene	129-00-0	PAH	SRS Info	Toxicological Info
60	Aroclor 1242	53469-21-9	PCB	SRS Info	Toxicological Info
61	Aroclor 1254	11097-69-1	PCB	SRS Info	Toxicological Info
62	Aroclor 1260	11096-82-5	PCB	SRS Info	Toxicological Info
63	PCB Congeners ⁶	---	PCB	---	Toxicological Info
64	2,2-Biquinoline	119-91-5	SVOC	SRS Info	Toxicological Info
65	2-Chloronaphthalene	91-58-7	SVOC	SRS Info	---
66	Bis(2-ethylhexyl) phthalate	117-81-7	SVOC	SRS Info	Toxicological Info
67	Butylbenzyl phthalate	85-68-7	SVOC	SRS Info	---
68	Diethyl phthalate	84-66-2	SVOC	SRS Info	Toxicological Info

⁶ A polychlorinated biphenyl (PCB) congener is a single well-defined chemical compound in the PCB group (EPA 2020). There are 209 PCB congeners. Most PCBs were manufactured as mixtures of individual congeners (e.g., Aroclor 1254). The Trustees will consider the sum of all 209 PCB congener concentrations to derive a Total PCB concentration for the injury assessment if PCB congener analytical data is available. The DSHS utilizes recommendations from NOAA, McFarland and Clarke, and EPA's guidance documents for assessing contaminants in fish and shellfish for the Texas Fish Consumption Advisory Program (DSHS 2010). The DSHS selects 43 PCB congeners encompassed by the McFarland and Clark and NOAA articles to derive a Total PCB concentration. The referenced authors chose to use congeners that were relatively abundant in the environment, were likely to occur in aquatic life, and were most likely – as projected from structure – activity relationships – to show assessable toxicity.

Count	Chemical Name	CAS Number ¹	COPC Group ²	EPA Substance Registry Service (SRS) ³	ATSDR Toxicological Profile ⁴
69	Dimethyl phthalate	131-11-3	SVOC	SRS Info	---
70	Di-n-butyl phthalate	84-74-2	SVOC	SRS Info	Toxicological Info
71	Di-n-octyl phthalate	117-84-0	SVOC	SRS Info	Toxicological Info

APPENDIX D – RARE, THREATENED, AND ENDANGERED SPECIES

Table 4. Rare, threatened, endangered species potentially present in the Assessment Area.

Taxon	Scientific Name	Common Name	Endangered Species Act Listing Status	Relevant Habitat Description
Birds	<i>Laterallus jamaicensis</i>	Black Rail	Threatened	Habitat includes salt, brackish, and freshwater marshes, pond borders, wet meadows, and grassy swamps
Birds	<i>Grus americana</i>	Whooping Crane	Endangered	Potential migrant via plains throughout most of state to coast; winters in coastal marshes of Aransas, Calhoun, and Refugio counties, Texas.
Birds	<i>Charadrius melodus</i>	Piping Plover	Threatened	Wintering migrant along the Texas Gulf Coast
Birds	<i>Calidris canutus rufa</i>	Rufa Red Knot	Threatened	May travel through during spring and fall migrations
Birds	<i>Sternula antillarum athalassos</i>	Interior Least Tern	Endangered	Habitat includes rivers, lakes, or other wetlands. Diet includes small fish.
Birds	<i>Setophaga chrysoparia</i>	Golden-Cheeked Warbler	Endangered	Nest in central Texas mixed Ashe-juniper and oak woodlands. They are in Texas from March to July to raise their young.
Clams	<i>Truncilla macrodon</i>	Texas Fawnsfoot	Candidate	Endemic to the Brazos and Colorado Rivers