FY 2019 Hanford Natural Resource Damage Assessment

Activity and Accomplishment Report

Summary

This report provides a summary of the Hanford Natural Resource Damage Assessment (NRDA) activities and accomplishments during FY 2019. The Hanford Natural Resource Trustee Council ("HNRTC" or "Trustee Council") - composed of the State of Oregon, State of Washington, Nez Perce Tribe, Yakama Nation, Confederated Tribes of the Umatilla Indian Reservation, the U.S. Fish and Wildlife Service, NOAA Fisheries, and the U.S. Department of Energy – is implementing the NRDA process at Hanford. This report is organized around three main natural resource categories and the related services provided by those resources: terrestrial, aquatic, and groundwater.

Hanford NRDA work in FY 2019 focused on continuing injury assessment studies, and began work on 4 new studies. The Trustee Council obligated $1,235,000 in funding this year for initiating or completing approved chinook salmon spawning habitat mapping, NPT Service Loss Restoration Planning, aquatic restoration planning, and CTUIR Phase III Service Loss study. All of the Trustee Council project teams are a curating their draft and final technical study-specific products in the NRDA data management system. Most of the ongoing or newly-implemented studies are based on the Injury Assessment Plan (IAP) approved by the HNRTC in 2013. Some of the new studies have been initiated through an iterative working process, where previous studies have led to further studies to help refine injury.

Project teams delivered project materials or technical updates for eight assessment activities: (1) terrestrial data compilation, (2) injury thresholds for soil, sediment, and water, (3) terrestrial disturbance (4) terrestrial habitat restoration planning, (5) aquatic sediment and pore water toxicity study compilation, (6) chinook spawning study, (7) aquatic data compilation, (8) chinook salmon modeling, (9) aquatic restoration planning, and (10) groundwater phase III. The Council also created theAttorney Work Group in response to concerns about the affect of legal issues on the progress of the NRDA. The Attorney Work Group is conferring over approaches to moving the NRDA closer to resolution. The Council continued to meet on a monthly basis to manage progress on Council work activities and to plan, organize, implement, and direct continuing and future activities.

Injury and Service Loss Studies

As of the close of FY 2019, the following injury studies were at various stages of completion:

Terrestrial Data Compilation

The first phase (1 of 3) of the terrestrial data compilation project is ongoing by Alta Science & Engineering, Inc. at the end of FY 2019. The purpose of this work is to compile and review analytical data for their utility, quality, and relevance to injury assessment questions. Completion of Phase 1 will result in the compilation and review of at least 12 data utility assessments – (DUA) and represents all significant analytical data sets available for the Hanford Site, over 500,000 records. Other relevant data such as the Surface Environmental Surveillance Project data were also included in the data package compilation and review. Data packages and corresponding citations for Phase 1 are being uploaded and archived to the HNRTC data management system in Project Portal.

The second and third phases of the terrestrial data compilation project were also initiated in FY 2019 and are led by Freestone Environmental Services, Inc. The objective of Phase 2 is to address the formal acquisition process to search for, obtain, or extract original sources of analytical data; including GIS layers, project metadata, maps, images, and other information, that will require any form of manipulation and configuration management to be submitted to the HNRTC data management system in Project Portal. The development and implementation of data acquisition protocols provided a standardized and streamlined approach for documenting and tracking the data acquisition process and resulted in revisions to the HNRTC Data Acquisition Plan. Phase 3 of this project focuses on submitting the acquired data and information into the HNRTC Case User Library within Project Portal. This work and process is ongoing and is scheduled to be completed in FY 2020, concluding the terrestrial Data Compilation Project.

Injury Thresholds for Soil, Sediment, and Water

The process for determining whether terrestrial resources have been injured and the magnitude of injury involves the identification of threshold levels of contaminants that indicate measurable adverse effects to the resource. This project is developing Hanford-specific injury thresholds for contaminants of concern in soil, sediment, and surface waters, and has been underway since 2015. One contractor, Oregon State University, developed thresholds for inorganics. Their work was completed this fiscal year and resulted in injury threshold memos for 12 COCs, found in a 2019 document entitled "Development of Toxicity Based Thresholds for Hanford Contaminants of Concern." A second contractor, Freestone Environmental Services, Inc., was tasked with developing thresholds for radionuclides and organics. Significant progress was made on their deliverables this year but the project will not wrap up until FY 2020 so that trustee comments and concerns can be addressed in the final products. One of these products is a compendium report containing all the memos to support future decisions on injury determination and quantification, including memos produced by Oregon State University and Council trustees.

There were additional, threshold-related activities that occurred in FY 2019 through contract with Freestone. The Council asked Freestone to research and recommend approaches for service loss and contaminant mixtures. Consequently, Freestone produced a white paper and workshop on each topic.

Terrestrial Disturbance (Study 18 in the IAP)

During FY2019 the Terrestrial Disturbance Project Team, with contractor support provided through DOE contractor Mission Support Alliance, supplemented the Terrestrial Disturbance Inventory Report prepared in previous years by DOE contractors with an assessment and quantification of disturbed habitat from the installation of wells on the Hanford Site. The assessment was documented in HNF-63939, Rev. 0, "Impact of Hanford Site Wells and Well Roads on Habitat Quality".

The Terrestrial Disturbance Study is now under consideration by the Attorney Work Group as part of its evaluation of appropriate next steps in advancing the Terrestrial Resource NRDA. Relevant legal issues include determination of terrestrial baseline, the categorization of disturbances for purposes of determining terrestrial resource restoration obligations, and how best to address the temporal component of injury quantification across the disturbed areas. To assist in the discussion on terrestrial baseline, Mission Support Alliance completed an analysis of the changes in terrestrial habitat at Hanford between the early 1990's and present. The assessment was documented in HNF-63938, Rev. 0, "BRMP Resource Level Assessment of Current and Historical Habitat Quality on the Hanford Site".

Terrestrial Habitat Restoration Planning (Study 18b in the IAP)

The Study 18b team continued working on the second of two phases of shrub-steppe restoration planning, having completed Phase 1 in FY 2017. In the early part of this fiscal year, the team finalized a summary of the findings of an expert panel on shrub-steppe restoration that took place in February 2018. This summary, dated October 2018, can be found in the document entitled "Hanford Natural Resource Trustee

Council Expert Panel Workshop: Shrub-steppe Habitat Recovery." Using this summary, the team went on to produce a document containing its recommendations for how to credit shrub-steppe restoration activities under the NRDAR process. This document, dated May 2019, is entitled "Framework for Terrestrial Restoration Planning at Hanford: Analysis of Ecological Services and Recommendations for Terrestrial Restoration and Preservation Crediting." Following on this work, the team focused on the final tasks of Phase 2, which is intended to lead to the identification of potential areas for restoration or preservation on Hanford Site and off-site. In the latter part of FY2019, the team reviewed local and regional restoration-related planning documents and maps to understand existing landscape priorities.

Aquatic Work Initiated in FY2019

As part of the Council's work planning effort and implementation of the HNRTC Project Execution Plan, an Aquatic Work Plan was developed. Implementation of this plan has led to initiating several new work projects. Some aquatic work projects initiated in FY2019 will be ongoing in FY2020 while other projects will continue into future years. Implementation of project scopes of work that have been funded have begun; other scopes of work are still in development and funding decisions will ensue when development is complete.

Council work approved and implemented in FY2019 includes the following:

- Review of Hanford sediment and pore water toxicity studies, IAP study #4

  The goal of the study is to have a list of aquatic-oriented toxicity studies in one place since laboratory testing spans seven decades. Later in the injury assessment process, the Trustees will fully evaluate the study results during injury determination and quantification.

- Assessing Chinook Salmon Spawning Data – Comprehensive Data Compilation & Digitization

  Phase 1 - Assess effort and costs associated with compilation of spatially explicit Chinook salmon spawning data in Hanford Reach from 1975 to present day. The purpose is to assess what Chinook salmon datasets are available to Trustees and develop cost estimates and an approach for formal data acquisition. A Phase 2 effort includes implementing the compilation and digitization work.

- Aquatic Restoration Planning – Phase 1 Literature and Data Review

  The goal of this study is to initiate aquatic restoration planning and development of an aquatic restoration crediting framework. The study is focused on ecological aquatic resources and services. Initial tasks will support development of a framework for crediting aquatic restoration. A future phase of the study would entail development of the crediting framework based on the findings of this first phase of the study.

Council work planning initiated in FY2019:

- Comparison of aquatic (and terrestrial) tissue concentrations to effects thresholds – IAP study #3

  The purpose of this study is to determine potential past, current, and future injuries to aquatic biota based on comparisons of measured tissue COPC concentrations to literature-based effects thresholds. This effort will also identify COPCs that may be most strongly associated with potential biotic injuries (e.g., by virtue of having a greater magnitude and/or exceedance of effects thresholds). A geospatial analysis will help identify species and/or locations with higher or lower levels of exposure to hazardous substances, which may help inform site selection in potential future field studies of aquatic biota.

- Groundwater Surface Water Evaluation – IAP study #32

The main purposes of this study are to map the extent of contaminant plumes, identify groundwater preferential discharge locations, connect the known groundwater plumes to the riverine environment, and to estimate the contaminant flux to the river. This study is designed to help assess the exposure pathways and injury to aquatic biota. This statement of work attempts to address many of the needs outlined within the Injury Assessment Plan, past trustee discussions, expert panel discussions, and includes some of the efforts outlined in a groundwater plume connection pilot study.

- Aquatic (and Terrestrial) Data Analysis – IAP studies #1 & 2

  The purpose of this scope of work is to evaluate existing/compiled media and biota data to (1) compare measured and/or modeled concentrations of Hanford Site contaminants of potential concern (COPCs) to effects thresholds previously developed by HNRTC, (2) identify COPCs and receptors that may be most strongly associated with potential injuries (e.g., by virtue of having a greater magnitude and/or exceedance of effects thresholds), and (3) identify locations with higher or lower levels of exposure to hazardous substances, to help inform site selection in potential future injury studies.

- NRDA Data Workshop focused on aquatic habitat and species in the Columbia River.

  The objectives of this workshop are to initiate a facilitated group discussion about data types, parameter variability, statistical comparability of chemical data and rigor, analysis techniques or steps needed to fit data together, and whether new work needs to be considered in focus areas to narrow uncertainty. Aquatic focus topics will include benthic habitat in the Columbia River - Final chemical data for RM 385-365; habitat use and presence/absence information for macroinvertebrates, bivalves, and fishes in the Hanford Reach; quantity and location of different benthic habitat types.

Aquatic Data Compilation

Since the completion Phase 1 of the aquatic data compilation project in FY2018, work continued with identification and compilation of data. The purpose of this work was to compile and review analytical data for their utility, quality, and relevance to injury assessment questions. Initial work resulted in the compilation and review of 19 DUAs representing the most significant analytical data sets available for the Columbia River.

The second and third phases of the Aquatic Data Compilation project began in FY2019 and will continue into FY2020. The objective of Phase 2 of this work is to address the formal acquisition process to search for, obtain, or extract original sources of analytical data; including GIS layers, project metadata, maps, images, and other information, that will require any form of manipulation and configuration management to be submitted to the HNRTC data management system in Project Portal. The development and implementation of data acquisition protocols provided a standardized and streamlined approach for documenting and tracking the data acquisition process and resulted in revisions to the HNRTC Data Acquisition Plan. Phase 3 of this project focuses on submitting the acquired data and information into the HNRTC Case User Library within Project Portal. This work and process is ongoing and is schedule to be completed in FY2020.

Chinook Salmon Modeling

The Chinook Salmon modeling study started in second quarter FY2018 and continued throughout FY2019. The purpose of this study was to model mortality scenarios to assess the potential level of impact that chromium upwelling to the Columbia River could have on the Hanford Reach fall Chinook salmon population. Acute and chronic scenarios were developed to utilize multiple years of recorded

spawning data to model the measurable decline in productivity that may occur for a given scenario. The temporal time period of the study was from the time CERCLA was enacted (December 1980) to present day, with annual time steps.

The study was based on an existing stock-recruit model developed to evaluate the effects of Priest Rapids Dam operations on the freshwater productivity of the Hanford Reach fall Chinook salmon population. The model was modified so it could be used to apply various mortality scenarios for the purpose of estimating the percent reduction in annual egg-to-presmolt survival and the corresponding reduction in freshwater productivity.

In September 2019, the Council received a "Final Technical Memorandum and Overview of the Fall Chinook Salmon Population Modeling Study," and a summary report titled "Change in egg-to-presmolt survival required to affect productivity of Hanford Reach fall Chinook salmon." Overall, the results indicated that exposure to contaminants would have to reduce egg-to-presmolt survival by at least 9% annually to significantly reduce freshwater (egg-to-presmolt) productivity.

Aquatic Restoration Planning (Study 18c in the IAP)

The aquatic restoration planning team successfully held its inaugural and only meeting of FY2019 in September. The team agreed upon holding monthly 3hr meetings, sending out meeting agendas beforehand and meeting minutes afterwards, and to use Google Drive as a collaborative work space. Work products and deliverables will be shared in the Google Drive until they are in final forms appropriate for Project Portal. The team consists of an evolving roster of 22 co-trustee representatives. The first task before the team was cataloging and creating a database of all aquatic restoration/rehabilitation/revegetation work done on Central Hanford and the Monument lands as part of the remedial action process or other authorities apart from NRDA restoration actions, and developing a map product with GIS layers based on the findings. We began by searching the following: DOE's annual revegetation monitoring reports, USFWS refuge and fire rehabilitation reports, WNH/WDNR reports, Washington State Recreation and Conservation Office Project Search, Columbia Basin Fish & Wildlife Program Project Search (BPA), and NOAA's Restoration Atlas.

Groundwater (Study 36) Phase III

This study is a sub-set of groundwater studies that the Council has listed in the Project Execution Plan and Injury Assessment Plan. By consensus vote the Washington State Department of Ecology was designated as the lead for the study.

Groundwater study 36 was initiated in phases beginning in 2014, and is intended to describe the services provided by groundwater under baseline conditions at Hanford and how services may have been adversely impacted by contaminants under a "no release" scenario. The 3rd Phase of the study begins evaluating the aquifer storage and recovery (ASR) baseline services described in Phase II portion of the study.

For FY 2019:

- Phase III was initiated to address the uncertainties identified in Phase II of the project. A final contractor report provides the results of the Phase III ASR evaluation for the following 3 main tasks:

    1. *Investigate future regional water demands that could come from onsite irrigation and the downriver needs from users on the Columbia River.*

2. *Perform a hydrogeologic evaluation of the Hanford Site's aquifer characteristics as it relates to the storage capacity of the Hanford Site aquifer under a "no release" scenario, and to estimate the volume of surface water available for diversion.*
3. *Perform a cost evaluation utilizing outputs from task 1 and 2 to complete a comparative economic analysis of ASR and include a description of the regulatory considerations of source water availability, timing, mitigation, water rights availability, and in-stream flow requirements and possible cost of mitigated water rights.*

- The HNRTC briefly discussed:
  - Application of present and future contaminated groundwater volume to service loss.
  - The scaling of appropriate restoration projects to restore or replace lost services.
  - Quantity of groundwater available for use in acre-feet per year following Washington State's regulatory framework.

FY 2019 accomplishments/results

Results of the ASR work indicate the Hanford Site - absent contamination - would have been a desired water storage facility based on the following:

1. The unconfined aquifer is deep and suitable for passive infiltration through infiltration basins. Soil infiltration capacity is high, reducing groundwater flooding via recharge, and the resident time is suitable for both short-term and long-term storage at appropriate locations.
2. The proximity to a major source of diversionary surface water from the Columbia River.
3. Surface water for ASR is plentiful for recharge and during drought years.
4. The aquifer has adequate storage to accommodate long-term and short-term objectives.
5. The aquifer is well-suited for ASR based on a cost per-acre foot.

At the Hanford Site, absent contamination, water would be available for recharge, the aquifer has storage capacity to support ASR projects, and instream flow and municipal demands could be satisfied with ASR. In addition, regulatory permitting would likely allow for an interruptible water right to capture and store water (Figure 1).

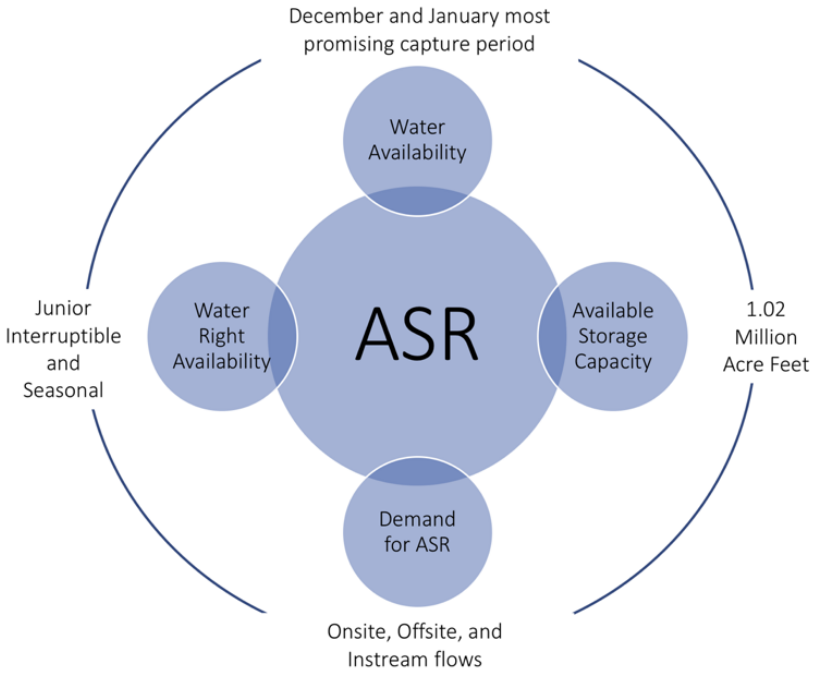

Figure 1 ***Factors associated with ASR suitability. The outside ring indicates the Hanford Site would have met each component, absent contamination.***

Tribal Lost Service (TLS) Studies

The three Hanford Tribal trustees [Yakama Nation (YN), Nez Perce (NPT) and Confederated Tribes of the Umatilla Indian Reservation (CTUIR)] have each continued studies to determine the nature and extent of potential impacts of Hanford releases on the cultural services provided to tribal communities by natural resources. These services may have been diminished in quality and/or no longer present and in need of restoration efforts, or interrupted by the presence of contaminants released by Hanford Operations.

Yakama Nation

The Yakama Nation Tribal Lost Service Study did not receive additional funds in FY 2019 and the project has been on pause due to changes in management and program structure. YN is working with DOE on budget allocation so the work can continue.

Nez Perce Tribe

The NPT Tribal Service Loss study was completed at the end of FY 2018 with no additional costs. The project reviewed and catalogued over 7,000 documents, and interviewed individuals, both elders and people knowledgeable of the Hanford Site. Other relevant interviews conducted in the past were screened and catalogued. All interviews are transcribed for use by the Principal Investigator (PI). The PI completed a draft anthrological report on the injury to the Tribe's cultural practices due to releases at Hanford. The draft report was the basis for a SOW submitted to the HNRTC to develop a Restoration Plan for Tribal Service Loss. The study was approved by the HNRTC but was not funded in FY2019 by DOE.

Confederated Tribes of the Umatilla Indian Reservation

During FY2019, the Confederated Tribes of the Umatilla Indian Reservation (CTUIR) developed, presented, and received approval from the Trustee Council to implement the scope of work associated Phase 3 of the 100-F Tribal Lost Services study. However, funding for Phase 3 was provided in the FY2020 budget and so work on Phase 3 will be completed and reported on after completion of the FY20 cycle.

The purpose of Phase 3 of the 100-F Tribal Lost Services study is to prepare a synthesis of information developed in previous phases in order to describe the impact to CTUIR-specific uses of the Hanford Site over time. Phase 2 of the study resulted in development of a Traditional Use Report that provides information on First Foods resources potentially available in the 100-F area, with a focus on botanical resources, as well as additional cultural resource information related to Sahaptian place names, historic villages, trade networks and trails, and other archeological information. An on-line mapping tool created in Phase 1 of the 100-F project displays information on waste sites, soil, air, and groundwater monitoring data, as well as wildlife and vegetation. Phase 3 is anticipated to be the final step in CTUIR's analysis of its lost use of the Hanford Site that is pertinent to the release of contamination, with planning for restoration of losses associated with these human uses of the site to be forthcoming.

Project Management

This element includes staffing for the Council, Project Coordination and Trustee Management Oversight. The Council generally met on a monthly basis in FY 2019 to plan and oversee Hanford NRDA activities. Funding for Facilitation and HNRTC administrative activities was not funded by DOE in FY2019. The FY 2020 budget request was developed and submitted to US DOE in March 2019. A key Council objective for FY 2019 was to fund and make substantial progress on injury studies focused on analysis of existing data. Current year funding/costs were reviewed on a routine basis.

Wanda Elliott (Washington) was Chair of the Council for FY 2019 and, Jack Bell (NPT) was vice-chair. For FY2020, Jack Bell (NPT) will serve as Chair and Sara Lovtang (Oregon) will be Vice Chair.

Information Management

The intent of this activity is to implement, operate and maintain a data management system (DMS) as outlined in the Data Management Plan approved by the Council. This includes: (1) implementing, operating and maintaining a DMS and (2) providing the following functions: data management; document management; GIS and non-GIS data stewardship; QA and data access coordination. The goal of this data management effort is for the DMS contractor, Trustees, other DOE contractors, and research organizations to collaboratively maintain a working database for assessing potential injury to natural resources and the services they provide, resulting from releases of hazardous substances from the Hanford Site.

The Council continued to rely on contract support from MSA to provide a DMS through its subcontractor, ddms, in FY 2019. To manage the DMS, the Council also relies on DOE contractor Freestone Environmental Inc. for a Data Manager/QA Coordinator position. During FY 2019 the Data Manager assisted Project Leaders and contractors with import and export of data from the DMS along with acquisition of data from outside sources. Notable accomplishments included:

- Assisting Project Leaders in setting up customized file structure in Project Workspace;
- Compiling data summaries for non-process areas, aquatic media, reference sites, thresholds development, and historical sampling of Hanford Reach National Monument Lands; and
- Facilitating acquisition of historical imagery and geospatial files for use in Disturbance Inventory quantification.

Administration

Facilitation Services

Facilitation services were not funded in FY 2019. Administrative tasks were completed by the Chair and Vice Chair and other trustees on a voluntary basis.

Non-Federal Trustee Group Development

Late in the fiscal year the non-federal Trustee organizations met to discuss creating a non-federal Trustee work group that would include attorneys for each organization. The general consensus was that forming a workgroup would be helpful for:

- Articulating common interests,
- Addressing potential non-consensus issues before we get to the full Trustee council,
- Working together to develop ways to move the assessment forward, and
- Strategic planning for assessment work.

Attorney Work Group Development

As part of the NRDA, the technical Trustees understand there are legal issues that require discussion to have final resolution of injury assessment matters. In order to facilitate discussions and resolve complex legal issues the Council agreed to develop and DOE agreed to fund for FY19 and FY20 an Attorney Work Group. DOJ and Trustee Attorneys began pre-planning and coordination efforts in FY19. An Attorney Work Group Kick-Off Meeting with DOJ and all Trustee Attorneys was held on October 8, 2019. The following documents have been produced in cooperation with the Attorney WG:

- Cooperative agreement modification for legal work group funding for each trustee
- Potential leagal work group topics by the technical trustees
- Technical briefing – terrestrial baseline and terrestrial disturbance injuries

- Technical briefing – vadose zone" by the technical trustees
- Federal Entities "Suggested Attorney Work Group Process and Legal Topics" by the federal trustees.

Upcoming Work

In addition to the many accomplishments summarized in this report, trustees have scoped and drafted statements of work for several large complex projects for the next couple of years:

- Scope of Work for a Terrestrial and Aquatic Data Analysis Supporting the Hanford Natural Resource Trustee Council;
- Technical Contract Support for Comparison of Terrestrial and Aquatic Biota Tissue Concentrations to Adverse Effects Thresholds;
- Statement of Work for Contracting NRDA Expertise.