FY 2017 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 fiscal year (FY) 2017. 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 (CTUIR), the U.S. Fish and Wildlife Service, National Oceanic and Atmospheric Administration (NOAA) Fisheries, and the U.S. Department of Energy (DOE) – 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 2017 focused on 10 injury assessment or restoration studies that are in various stages of completion, not including the 3 Tribal assessments. The Trustee Council also began and nearly completed an effort to revise its bylaws after signing an updated Memorandum of Agreement in FY 2016. The Trustee Council obligated more than $1M of funding this year for initiating or completing approved groundwater, Tribal, aquatic, and terrestrial studies. All of the ongoing and newly implemented studies have been taking advantage of previous investments to build-out an NRDA data management system and password-protected administrative workspace on the Trustee Council website. All Trustee Council project teams are using the systems; and, for the first time, the NRDA has a curated digital workspace where final and draft technical products and study-specific project status are available. All of the ongoing or newly implemented studies are based on the Injury Assessment Plan approved by the Trustee Council in 2013. The Trustee Council's goal is to complete the injury assessment and prepare a restoration plan by 2024.

Major technical milestones were achieved across the Hanford NRDA in the injury assessment, Tribal assessments, and analysis of terrestrial habitat recovery trajectories (i.e., restoration scaling). Project teams delivered project materials or technical updates for seven studies: (1) groundwater policy and legal evaluation, (2) 100-F Area assessment, (3) injury thresholds, (4) terrestrial soil sampling, (5) terrestrial disturbance, (6) information to help establish aquatic baseline and structure the aquatic assessment, and (7) shrub-steppe habitat restoration planning. Three other projects were initiated with new funds and results are expected in FY 2018 (i.e., chinook modeling, impacts of remedial activities, and aquatic data compilation in the Trustee Council's data management system. The Trustee Council continued to meet on a monthly basis to manage progress on these 10 studies and to plan, organize, implement, and direct Hanford NRDA activities.

Injury and Service Loss Studies

As of the closure of FY 2017, the following injury studies were at various stages of completion:

Injury Thresholds for Soil, Sediment, and Water

This project is developing Hanford-specific injury thresholds for contaminants of concern in soil, sediment, and surface water. Using the methodologies agreed upon by the Trustee Council in FY 2016, trustees and contractors from Oregon State University accomplished the following in FY 2017:

- Finalized memos for lead, uranium, and hexavalent chromium
- Distributed to trustees draft memos for cadmium and copper
- Conducted a narrative assessment of boron and barium as injury drivers
- Updated the companion methods document that explains the theories, methods, and assumptions used in developing thresholds.

In tandem with the memo effort, a small group of Trustee Council members met regularly as the Thresholds workgroup. The workgroup agreed upon a memo comment period process and a decision tool to determine which contaminants are more likely to be injury drivers and should be written up in the form of a memo. Using the decision tool, the contaminants in the table below were identified as priorities.

Radionuclides	Organics	Inorganics
Individual radionuclides (below) or total radiological dose	Aroclor-1254/1260 or total PCBs	Antimony
Am-241	Total petroleum hydrocarbons or subclasses (e.g., total PAHs) or individual compounds (e.g., benzo(a)pyrene)	Arsenic
C-14		Cadmium
Co-60		Chromium (including hexavalent)
Cs-137		Copper
Eu-152		Lead
I-129		Manganese
Pu-239/240		Mercury
Ra-226/228		Nitrate
Sr-90		Uranium
Tc-99		Vanadium
Th-232		Zinc
Tritium		
U-233/234/235/238		

Given the number of memos that need to be written and a desire to finish this work by the end of FY 2018, the Trustee Council approved funding for a new contractor to complete memos for organics and radionuclides while Oregon State University finishes the inorganics memos. The new contractor will also be tasked with researching and recommending approaches for service loss and contaminant mixtures. DOE sent the scope of work out in a request for proposals in September 2017.

Terrestrial

Terrestrial Disturbance (Study 18)

During FY 2017 the Terrestrial Disturbance Project Team, in coordination with its contractors from Freestone Environmental, advanced the work of Mr. Daniel Dietrich to quantify disturbances across the entire Hanford Site. The project team utilized geographic information system (GIS) data layers from the Waste Information Data System, cleanup verification packages, and aerial imagery to categorize and quantify the habitat disturbances created by Hanford operations and cleanup activities. The categories of disturbances, quantified in acres, will establish a range of injuries to terrestrial habitats that will form, in part, the bases for a habitat equivalency analysis and potential restoration projects. Freestone completed the initial report draft in FY 2017; it is expected to go through project team and Trustee Council review by December 2017.

Terrestrial Habitat Restoration Planning (Study 18b)

The Study 18b team completed the first of two phases of the restoration planning study in FY 2017. The purpose of Phase 1 for Study 18b was to collect and analyze information on past and current habitat conditions of disturbed, revegetated, and habitat enhancement areas on the Hanford Site (including the Arid Lands Ecology Reserve, McGee Ranch-Riverlands, Saddle Mountain, and Wahluke Units, in addition to the central DOE-managed areas) as well as conduct a literature review and identify reference sites and conditions to support a variety of restoration planning actions that had been outlined in the Restoration Project Team work plan. This work resulted in the following deliverables in FY 2017:

- Production of the final report "Creating a Framework for Ecological Restoration Planning at Hanford Shrub-steppe Habitat Recovery at Hanford: Data Compilation and Analysis." This report provided a detailed description of the Trustee Council Terrestrial Restoration Framework, as well as the key findings and remaining data gaps to be addressed.
- The report, GIS files, annotated bibliography, and data analysis files were uploaded onto Project Portal.

Phase 2 of Study 18b is designed to fill in the remaining data gaps from Phase 1 and further advance restoration planning. The specific tasks worked on in FY 2017 are summarized below. In concert with Task 7, the team requested and the Trustee Council approved funding for an expert panel to address gaps in knowledge on the length of time it takes for shrub-steppe habitat

to recover after restoration actions have been completed and the projected end state resulting from said restoration actions.

Task 6: The goal of this task was to select surrogate shrub-steppe ecological services for crediting and scaling. The recommended surrogate ecological services for shrub-steppe habitat are wildlife habitat as well as resistance to and resilience from disturbance. The project team developed a working level agreement that will likely be approved by the Trustee Council in early FY 2018.

Additionally, the project team completed a literature review for the two recommended surrogate services. The team, led by representatives from NOAA Fisheries, reviewed 85 papers and, if appropriate, used them to provide a relative rank for how different states or metrics either positively or negatively affect the ability of shrub-steppe habitats to provide those services. Analyses of these results is ongoing and will provide a foundation for initial ranges of service levels that the different reference states in the Trustee Council Terrestrial Restoration Framework provide. All papers reviewed were uploaded to Project Portal.

Task 7: Task 7 is the refinement of recovery trajectories for targeted services and recommended management approaches. To complete this task a scope of work for an Expert Panel to address remaining data gaps after Phase 1 was developed and approved for funding in FY 2017. The four experts to participate in the panel have been selected and approved by the Trustee Council; contracting for their time and travel is underway. A facilitator and note taker have also been selected. The panel is expected to meet in February 2018.

Non-Process Area Sampling (Study 15a)

The purpose of this study is to fill existing gaps in Trustee Council understanding of the nature and extent of contaminants of concern (COCs) in the surficial soils of non-process areas. Trustee Council members consider this a priority study because the collected data will be used to assess terrestrial injury in the over 100,000 land acres that fall outside of process areas. This study continued through FY 2017 in the planning stages.

During FY 2017 project team members completed a Data Quality Objectives (DQO) process with a contracted facilitator and statistician. The resulting DQO report, while not a consensus document, provides a potential path forward to soil sampling. Trustees have different viewpoints on the net benefit of soil sampling as well as aspects of sampling design (e.g., number and depth of samples). The Trustee Council will continue to discuss how, whether, and when to bring this study to fruition and how the resulting data will be used.

Institutional Controls Inventory (Study 38)

The purpose of Study 38 is to determine the extent to which institutional controls at the Hanford Site are related to the release of hazardous contaminants. As part of the study it will be necessary to define the temporal and geographic scope and nature of these controls and to describe the types of human uses that may be impacted. A draft of the study completed in FY 2017 includes GIS maps showing the geographic boundaries of current controls. DOE cleared the map data for release and the Trustee Council Data Management Coordinator uploaded the GIS maps into Project Portal in September 2017. The Trustee Council review of the study is ongoing with a final report expected around the end of the calendar year 2017.

Aquatic

Subject Matter Expert

The Aquatic project team worked with subject matter expert Dr. Dennis Dauble on numerous interim deliverables that will culminate in a project report in FY 2018. These deliverables include but are not limited to:

- Working level agreements on aquatic and riparian definitions.
- Project kickoff and NRDA 101 presentation with Dr. Dauble.
- Framed "use of experts" discussion with NOAA attorney at Trustee Council after project hold enacted.
- Meeting #1: Long-term monitoring and habitat delineation (Baker).
- Meeting #2: Upwelling and river modeling (Baker).
- Meetings #3, 4, and 5: Species Life History (Christie/Baker). Species are Chinook salmon, steelhead, lamprey, sculpin, and white sturgeon. Resident fish species, including bull trout, was also discussed.
- Established regular meeting dates for the entire project from January to September 2017
- As a precursor to Dr. Dauble's discussions, NOAA presented upstream site data in GIS (aka, reference polygon presentation).
- A robust fisheries and aquatics literature review and co-Trustee Council distribution was completed. The task is largely completed for a river corridor-focused chapter in a report of assessment.
- Example exposure/injury polygons were constructed around the 100-F Area; draft proposal for river corridor polygons was discussed among Trustee Council members, this was used to refine the aquatic data proposal and initiate habitat mapping by the Trustee Council.

Aquatic Data Compilation

For the aquatic data compilation proposal, the Trustee Council approved funding to implement the study. Although the project was initiated late in FY 2017, several early products were produced to make the study run smoothly:

- A matrix for COCs by major documents was constructed in Microsoft Excel® so this information could be provided to contractors.
- A detailed data ingest work plan was created to help contractors and sequence data into Project Portal data management system (DMS).
- Washington Department of Health Technical Support option evaluated for contributing rad data.
- Two major batches of documents/data were delivered to Project Portal
    - 100+ files/reports and contractor deliverables archived to the system
    - Tested/refined batch submission process with quality assurance (QA)/quality control coordinator on behalf of all project teams.
- In late summer, the Trustee Council prioritized and are in the process of logging the River Corridor Baseline Risk Assessment (RCBRA), the Columbia River Component of the RCBRA, and the 100 B/C Pilot Process Risk Assessment data into Project Portal so it can be used for upcoming injury quantification.
- A data quality evaluation form was designed by the Trustee Council to pair with data evaluated during the aquatic data study. This form is consistent with the Trustee Council Data Management Plan and Quality Management Plan.

Chinook Salmon Modeling

The purpose of this study is to evaluate what level of impacts, from chromium upwelling to the Columbia River on young Chinook salmon, was necessary to observe a meaningful decline in the number of adult spawners. Toxic exposures of hexavalent chromium and other substances to young salmon have not been included in published Fall Chinook population modeling near the Hanford Site, yet contamination has occurred in the Hanford Reach for long periods of time and is forecasted to continue. The Trustee Council approved funding not to exceed $100K so Pacific Northwest National Laboratory could work with the Trustee Council to modify existing models with a contamination variable (or variables) and get model results for potential use in the NRDA and estimates of model sensitivity. The geographic focus of the study is the Hanford Reach, from the upper boundary of the 100-B/C Area to the Hanford Site boundary near Richland, Washington. The temporal time period of the study is from the time the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* was enacted (December 1980) to present day, with annual time steps. The project is targeted for completion by fall 2018.

Groundwater (Study 36)

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

Groundwater study 36 focuses on describing the services provided by groundwater under baseline conditions at the Hanford Site and how services may have been adversely impacted by contaminants under a “no release” scenario. This portion of the study included framing federal

policies surrounding land use, determining the quantity of groundwater and its availability under regulatory frameworks, and then listing out baseline services.

FY 2017 accomplishments/results:

- Ecology personnel developed scopes of work and contracted organizations to perform work surrounding federal land policies, quantity of available groundwater, and baseline services.
- Ecology received a final white paper explaining federal policy framework on land use and how the federal government releases excess land. The paper provided areas (acreages) of Hanford Site land that could have been available for industrial, agricultural, and residential uses under the "no release" scenario.
- Ecology received a draft white paper examining the quantity of groundwater available for use in acre-feet per year following Washington State's regulatory framework given land use appropriations listed under the federal land-use component.
- Contractor presented a narrowed baseline services list to Ecology at the end of August 2017.
- Contractor compiled and submitted a comprehensive white paper to Ecology that ties the federal land use and quantity of available groundwater to baseline services.
- Ecology staff presented comprehensive white paper to Ecology executive management.

For FY 2018:

- Ecology to present a comprehensive white paper to Trustee Council.
- The Trustee Council to discuss application of present and future contaminated groundwater volume to service loss.
- The Trustee Council to identify and discuss the scale of appropriate restoration projects to restore or replace lost services.

Tribal Lost Service (TLS) Studies

The three Hanford Tribal trustees (Yakama Nation, Nez Perce, and CTUIR) have each continued studies to determine the nature and extent of potential impacts of Hanford Site releases on the cultural services provided to Tribal communities by natural resources. These services may have been diminished in quality or interrupted by the presence of contaminants released by Hanford Operations.

Yakama Nation

Through FY 2017 the Yakama Nation has continued to work on ethnographic research. Two interviews were conducted. Interviews were recorded and transcribed. Research continued into historic records at various locations. These records have been categorized according to topic, waiting to be put into our database.

Archeological data has been analyzed based on site type. A GIS layer has been created for each type. Additional information has been entered into the attribute tables of each site. This information will show spatial patterns and use and match up with ethnographic data collected. This activity was performed by a Central Washington University graduate student, guided by two professors. (This project was part of a thesis topic and did not require funding to be completed.)

In FY 2017 the Yakama Nation hired an additional contractor to implement improvements in their database to more completely meet their needs.

Nez Perce

The Nez Perce Tribal Service Loss study is in the final year of the project but may extend into FY 2018 with no additional costs. The project has 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 is currently in the drafting and analysis phase of the project. The final product will be an anthological report on the baseline and injury assessment to the Tribe's cultural practices due to releases at the Hanford Site. The draft report is scheduled to be completed in December 2017 with final approval in early 2018.

CTUIR

The CTUIR, through their contractor Terra Graphics, delivered a presentation on the final product for the 100-F Area Tribal Lost Services Pilot Study to the Trustee Council in May 2017. The product resulting from this study is an online mapping tool that can display information relevant to the injury assessment. This tool includes data layers for biota, ground disturbance, built systems, as well as residual contamination. The information from these data layers can be combined to evaluate the cumulative lost services to CTUIR members in the terrestrial and aquatic environments. This work is considered Phase 1 of a two-part project that also entails development of a cultural services mapping layer (Phase 2). The CTUIR Cultural Resources Protection Program staff are currently engaged in the development of the cultural services layer for Phase 2 of the 100-F pilot project. As cleanup is completed at other reactor area sites along the Columbia River, the CTUIR intends to replicate the methodology used for the 100-F pilot project using site-specific data for each location.

Project Management

This element includes staffing for the Trustee Council, project coordination, and Trustee Council management oversight. The Trustee Council generally met on a monthly basis in FY 2017 to plan and oversee Hanford NRDA activities. The FY 2018 budget request was developed and submitted to

DOE in March 2017. A key Trustee Council objective for FY 2017 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.

The Trustee Council has an ongoing process in place for submittal of documents to its Administrative Record. Two batches of documents are under review by the Trustee Council's technical representatives and their respective legal counsel as of the end of FY 2017. The Trustee Council has also curated digital workspace with its administrative materials, including recently developed documents like the new member packet, the pivot table that connects resolutions to funding history, and a full archive of meeting notes and associated technical materials discussed.

Troy Baker, NOAA was Chair of the Trustee Council for FY 2017 and Matthew Johnson, CTUIR, was vice-chair. For FY 2018, Matthew Johnson will serve as Chair and Wanda Elliott, Ecology, will be Vice Chair.

Information Management

The intent of this activity is to implement, operate, and maintain a DMS as outlined in the Data Management Plan approved by the Trustee Council. This includes: (1) implementing, operating, and maintaining a DMS and (2) providing data management, document management, GIS and non-GIS data stewardship, QA, and data access coordination functions. The goal of this data management effort is for the DMS contractor, Trustee Council, 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 Trustee Council continued its contract with Mission Support Alliance to provide a DMS through its subcontractor, ddms, in FY 2017. To manage the DMS, the Trustee Council also maintains a contract with Freestone Environmental Inc. for a Data Manager/QA Coordinator position. During FY 2017 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:

- Establishing a project workspace and a Workspace User Guide to help the Trustee Council and its contractors with content transfer
- 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
- Facilitating acquisition of historical imagery and geospatial files for use in Disturbance Inventory quantification
- Creating a look-up table of manually entered locational data with Hanford Environmental Information System samples and site names.

Administration

The Trustee Council was assisted in FY 2017 by a professional facilitator, a technical assistant for administration, and a technical assistant for website support. The facilitation team assisted the Trustee Council in coordinating and conducting Trustee Council meetings and maintaining Trustee Council records. Specific tasks included scheduling meetings, preparing agendas, tracking action items, issuing meeting materials, facilitating meetings, overseeing the Trustee Council website, designing and implementing the administrative record section of the Trustee Council website, and supporting the Trustee Council in issue resolution.