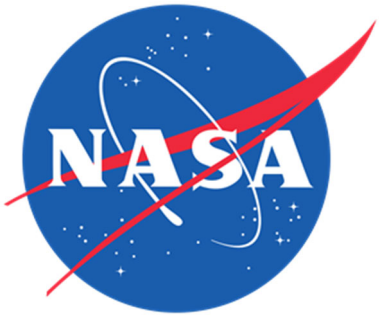
UN-NUMBERED OPERATIONAL AREAS, PRL 229
RAILROAD TIE DISPOSAL AREA POND
CONFIRMATORY SAMPLING WORK PLAN

KENNEDY SPACE CENTER, FLORIDA

Prepared for



National Aeronautics and Space Administration
John F. Kennedy Space Center

January 2022
Revision 0

Prepared by

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ACRONYMS/ABBREVIATIONS

bls	below land surface
CSWP	Confirmatory Sampling Work Plan
ERP	Environmental Resource Permit
FAC	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
HGL	HydroGeoLogic, Inc.
IM	Interim Measure
KSC	Kennedy Space Center
mg/kg	milligram per kilogram
NASA	National Aeronautics and Space Administration
PAH	polynuclear aromatic hydrocarbons
PRL	Potential Release Location
RCRA	Resource Conservation and Recovery Act
RTDA	Railroad Tie Disposal Area
SQAG	Sediment Quality Assessment Guidelines
SWMU	Solid Waste Management Units
UNOA	Un-Numbered Operational Areas
USEPA	United States Environmental Protection Agency

UN-NUMBERED OPERATIONAL AREAS, PRL 229 POND CONFIRMATORY SAMPLING WORK PLAN ADDENDUM (REVISION 0) KENNEDY SPACE CENTER, FLORIDA

1.0 INTRODUCTION

HydroGeoLogic, Inc. (HGL) has prepared this Confirmatory Sampling Work Plan (CSWP) for the National Aeronautics and Space Administration (NASA), Kennedy Space Center (KSC), Florida, under Contract Number 80KSC019D0012, Task Order 80KSC019F0118.

KSC's operating permit (0026028-009-HO) issued by the Florida Department of Environmental Protection (FDEP) under the Hazardous and Solid Waste Amendment portion of the Resource Conservation and Recovery Act (RCRA) requires KSC to investigate all known solid waste management units (SWMU) and locations of concern at KSC. In support of this requirement, the Un-Numbered Operational Areas (UNOA) is designated as Potential Release Location (PRL) 229 under the NASA RCRA permit. This CSWP addresses the Railroad Tie Disposal Area (RTDA) Pond portion of PRL 229.

2.0 SITE LOCATION AND DESCRIPTION

KSC is centrally located on the east coast of Florida, to the north and west of Cape Canaveral (Figure 2.1). It is situated in Brevard and Volusia Counties between the Merritt Island Barge Canal to the south, the town of Oak Hill to the north, the Atlantic Ocean and Cape Canaveral Space Force Station to the east, and the Indian River to the west. A large portion of the area, between the Indian River and the Atlantic Ocean, is in the northern part of Brevard County on Merritt Island, with the extreme north boundary extending approximately 7 miles into Volusia County. The RTDA pond is located along the Atlantic coastline of KSC, east of and between Launch Complex 39A and Launch Complex 39B (Figure 2.1).

UNOA (PRL 229), which consisted of three areas associated with former railroad operations, was first developed by the U.S. Air Force in 1958. A SWMU Assessment of PRL 229 was prepared in 2015 (MESC/IHA Environmental Services Branch, 2015). Only one of the three areas, the RTDA, was found to have past operations that warranted carrying forward into the Confirmatory Sampling phase. Confirmatory Sampling of soil and groundwater was performed at the RTDA between September 2018 and April 2019.

Confirmatory Sampling at the RTDA identified soils with total recoverable petroleum hydrocarbons and benzo(a)pyrene equivalents above Florida residential soil cleanup target levels. At RTDA Tie Piles #1 and #2, soil impacts were delineated on three sides and to the edge of the pond on the fourth side (Jacobs Engineering Group Inc., 2019). Railroad tie piles #3 thru #6 were fully delineated.

In September 2019, an Interim Measures (IM) Work Plan recommending excavation of impacted soil was prepared, identifying the lack of sediment samples in the pond as a data gap. The Kennedy Space Center Remediation Team concurred with the IM recommendation, with the addition of sediment sampling. The IM Work Plan was approved by FDEP on April 6, 2020. The site layout and proposed IM areas are presented on Figure 2.2.

Six sediment samples were collected from the RTDA Pond on June 23, 2020 (HGL, 2020). Sediment samples were collected along the northeast edge of the pond at a depth of 0 to 0.5 feet below the sediment surface and analyzed for polynuclear aromatic hydrocarbons (PAH) by U.S. Environmental Protection Agency Method 8270D and Total Petroleum Hydrocarbons (FL PRO). Sediment samples were collected 2 to 3 feet from the shoreline in 6- to 8-inches of water cover as shown on Figure 2.3.

The laboratory analytical results for sediment samples were compared to Florida Marine Sediment Quality Assessment Guidelines (SQAG) in accordance with the February 2019 NASA Decision Process Document for the RCRA Corrective Action Program. The analytical results for each sediment sampling location indicated exceedances of the SQAGs for Florida Inland Waters Threshold Effect Concentrations for multiple PAHs. Total PAHs concentrations ranged from 2.92 milligrams per kilogram (mg/kg) to 39.29 mg/kg, with each sample exceeding the SQAG of 1.6 mg/kg. Total PAHs concentrations were calculated by summing the total concentration of each of the detected PAHs and half of the limit of detection concentration for non-detected PAHs. In general, PAHs concentrations were highest directly west of Tie Pile #2 and decreased to the north and south. The sediment sample analytical results are summarized in Table 3.1. Sediment sample locations and analytical results that exceeded SQAGs are shown on Figure 2.3. Previous soil samples above/below soil cleanup target levels also are indicated on Figure 2.3 for reference.

The June 2020 sampling results were summarized in a Confirmatory Sampling Report Addendum (HGL, 2020), which recommended additional assessment of the pond based on the PAHs exceedances of SQAGs in sediment samples.

A copy of the applicable Kennedy Space Center Remediation Team meeting minutes is provided in **Appendix A**.

3.0 CSWP CONSIDERATIONS

Historical aerial photographs were reviewed to determine the historical footprint of pond. In 1951, the pond appears to be part of a saltmarsh that ultimately communicated with the Banana River Lagoon. In the 1960s the northwest and southeast portions of the pond were filled during the construction of the nearby railroad track (1963-1965) and the Area 2 Universal Camera Pad 7 facility (circa 1960). As a result of construction activities, the area became impounded. Between 1972 and 2018, only minor changes in pond water levels were observed. Historical aerial photographs on the site are presented in Figures 3.1 through 3.3.

The pond is part of what is now called the Launch Complex 39 Lagoonal System, which is classified as Class III - Fish Consumption; Recreation, Propagation and Maintenance of a Healthy, Well-Balanced Population of Fish and Wildlife, Predominantly Marine Waters.

The pond is currently surrounded by dense vegetation, requiring coordination and clearing for access. Approximately 60 to 90 feet of vegetation is present on the southwest side of the pond and approximately 60 feet of vegetation on the northwest side of the pond and approximately 40 feet of vegetation on the northeast side of the pond also is present. The pond bottom contains approximately 18 inches of muck (determined during staff gauge installation).

The St. Johns River Water Management District Environmental Resource Permit (ERP) and U.S. Army Corps of Engineers Section 404 permit for Coastal Dune Restoration were issued in 2017 (ERP modified in 2019). The Dune Restoration work has been completed and the ERP permit did not contain conditions that would affect the pond investigation.

The St. Johns River Water Management District ERP and U.S. Army Corps of Engineers Section 404 permit for IM activities were issued in 2020. It is anticipated that the soil IM will be implemented during the first quarter of 2022.

4.0 PROPOSED SURFACE WATER AND SEDIMENT SAMPLING

The collection of 10 sets of surface water and sediment samples along the edge of the pond is proposed (Figure 4.1). One set of sediment and surface water samples will be collected from the northwest and southeast ends and four evenly spaced sets sediment and surface water samples will be collected from the northeast and southwest sides of the pond. Surface water samples will be analyzed for volatile organic compounds, semi-volatile organic compounds, PAHs, priority pollutants metals plus barium, total hardness, and salinity (field measurement). Sediment samples will be analyzed for semi-volatile organic compounds, PAHs, total petroleum hydrocarbons, priority pollutants metals plus barium, and Total Organic Carbon.

The results of the surface water and sediment sampling will be summarized in a Confirmatory Sampling Report. The Confirmatory Sampling Report will include a Screening Level Ecological Risk Assessment. The Screening Level Ecological Risk Assessment Work Plan for the RTDA Pond is provided in **Appendix B**.

5.0 CONCLUSION

The recommendations in the CSWP were presented and approved at the KSC Remediation Team meeting on November 10, 2021. Excerpts from the November 10, 2021, meeting minutes have been included in **Appendix A**. Surface water and sediment sampling is anticipated to occur in the first quarter of 2022.

6.0 REFERENCES

HydroGeoLogic, Inc., 2020. *Un-Numbered Operational Areas, PRL 229, Confirmatory Sampling Report Addendum*. December.

Jacobs Engineering Group Inc., 2019. Un-Numbered Operational Areas, PRL 229, Confirmatory Sampling Report. September.

MESC/IHA Environmental Services Branch, 2015. Un-Numbered Operational Areas, PRL 229, SWMU Assessment Report/Confirmatory Sampling Work Plan. March.

TABLE

TABLE 3.1
PRL 229 RAILROAD TIE DISPOSAL AREA
SEDIMENT SAMPLE RESULTS

Boring ID:	Units	SQAG	UNOA-SD0001	UNOA-SD0002	UNOA-SD0003	UNOA-SD0004	UNOA-SD0005	UNOA-SD0006
Sample Depth:			0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5
Date Sampled:			6/23/2020	6/23/2020	6/23/2020	6/23/2020	6/23/2020	6/23/2020
Acenaphthene	mg/kg	0.0067	0.15 U	0.18 U	1.22 J	0.48 U	0.32 U	0.1 U
Acenaphthylene	mg/kg	0.0059	0.15 U	0.18 U	1.92	1.35	0.485 J	0.112 J
Anthracene	mg/kg	0.057	0.0816 J	0.18 U	1.52	1.04	0.432 J	0.0952 J
Fluoranthene	mg/kg	0.420	0.831	0.267 J	3.00	1.37	3.53	0.797
Fluorene	mg/kg	0.077	0.15 U	0.18 U	0.66 U	0.48 U	0.32 U	0.1 U
1-Methylnaphthalene	mg/kg	-	0.15 U	0.18 U	0.66 U	0.48 U	0.32 U	0.1 U
2-Methylnaphthalene	mg/kg	-	0.15 U	0.18 U	0.66 U	0.48 U	0.32 U	0.1 U
Naphthalene	mg/kg	0.180	0.15 U	0.18 U	0.66 U	0.48 U	0.32 U	0.1 U
Phenanthrene	mg/kg	0.200	0.0851 J	0.18 U	0.411 J	0.48 U	0.269 J	0.0789 J
Benzo(a)anthracene	mg/kg	0.110	0.595	0.195	2.26	1.28	3.62	0.646
Benzo(a)pyrene	mg/kg	0.150	0.504	0.207	3.84	2.55	3.82	0.665
Benzo(b)fluoranthene	mg/kg	-	0.995	0.473	8.09	5.42	7.67	1.55
Benzo(g,h,i)perylene	mg/kg	-	0.241	0.138	3.31	2.19	1.18	0.236
Benzo(k)fluoranthene	mg/kg	-	0.336	0.151	2.36	1.58	2.42	0.463
Chrysene	mg/kg	0.170	0.736	0.267	1.95	1.12	3.85	0.792
Dibenzo(a,h)anthracene	mg/kg	0.033	0.0946	0.0446 J	0.915	0.569	0.485	0.0853
Indeno(1,2,3-cd)pyrene	mg/kg	-	0.302	0.156	4.10	2.43	1.68	0.317
Pyrene	mg/kg	0.200	0.745	0.298 J	3.07	1.71	4.74	0.869
Total PAHs	mg/kg	1.600	6.00	2.92	39.29	24.05	34.98	6.96
TPH (C8-C40)	mg/kg	-	161	257	450	503	307	302

Notes:

Exceeds SQAG

SCTL = soil cleanup target level

J = Estimated concentration.

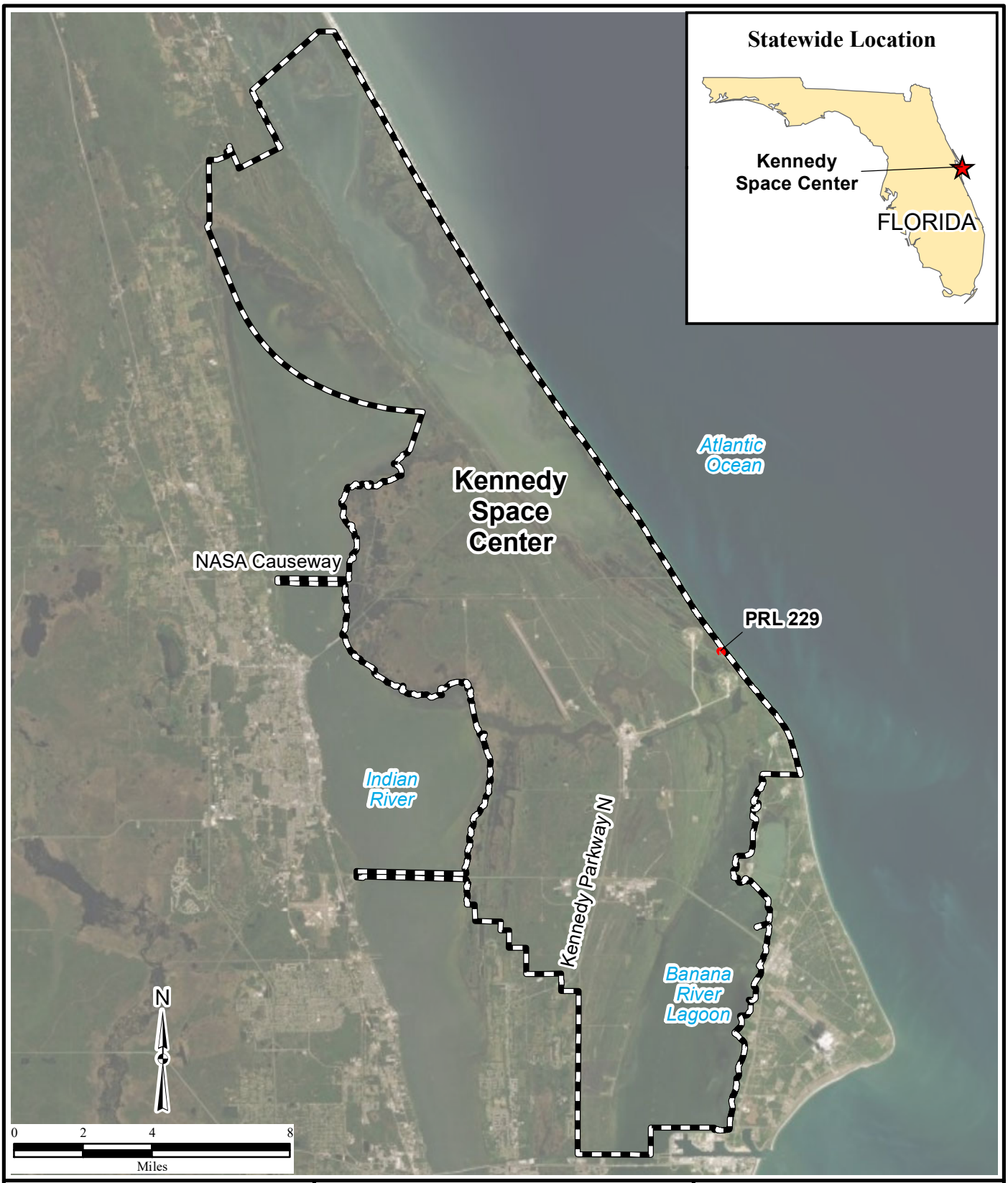
mg/kg = milligrams per kilogram

SQAG = sediment quality assessment guideline

U = Not detected at or above MDL (associated value).

Total PAHs concentrations were calculated by summing the total concentration of each of the detected PAHs and half of the limit of detection concentration for non-detected PAHs.

FIGURES



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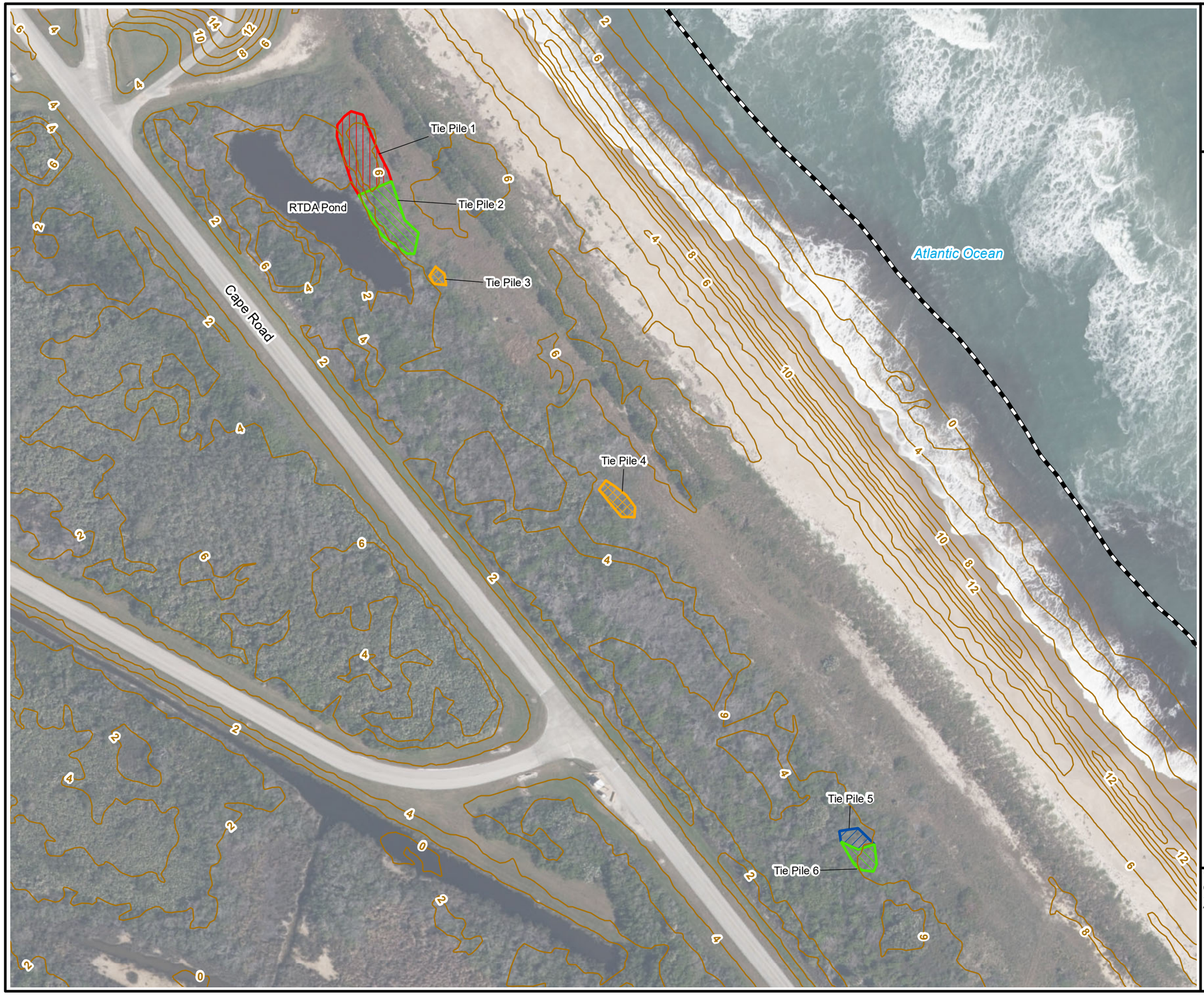
Source: HGL, 3E Consultants
ArcGIS Online Imagery

Legend

- Site Location
- Potential Release Location (PRL) 229 Boundary
- Kennedy Space Center

Figure 2.1
PRL 229
Railroad Tie
Disposal Area
Site Location

Figure 2.2
PRL 229
Railroad Tie
Disposal Area
Site Layout



Legend

- Topographic Elevation Contour (ft amsl, contour interval = 2 ft)
- Proposed Interim Measure Area (0-0.5 ft.)
- Proposed Interim Measure Area (0-2 ft.)
- Proposed Interim Measure Area (0-3 ft.)

Notes:
amsl=above mean sea level
ft=feet
KSC=Kennedy Space Center
PRL=Potential Release Location
RTDA=Railroad Tie Disposal Area

N

0 60 120 240
Feet

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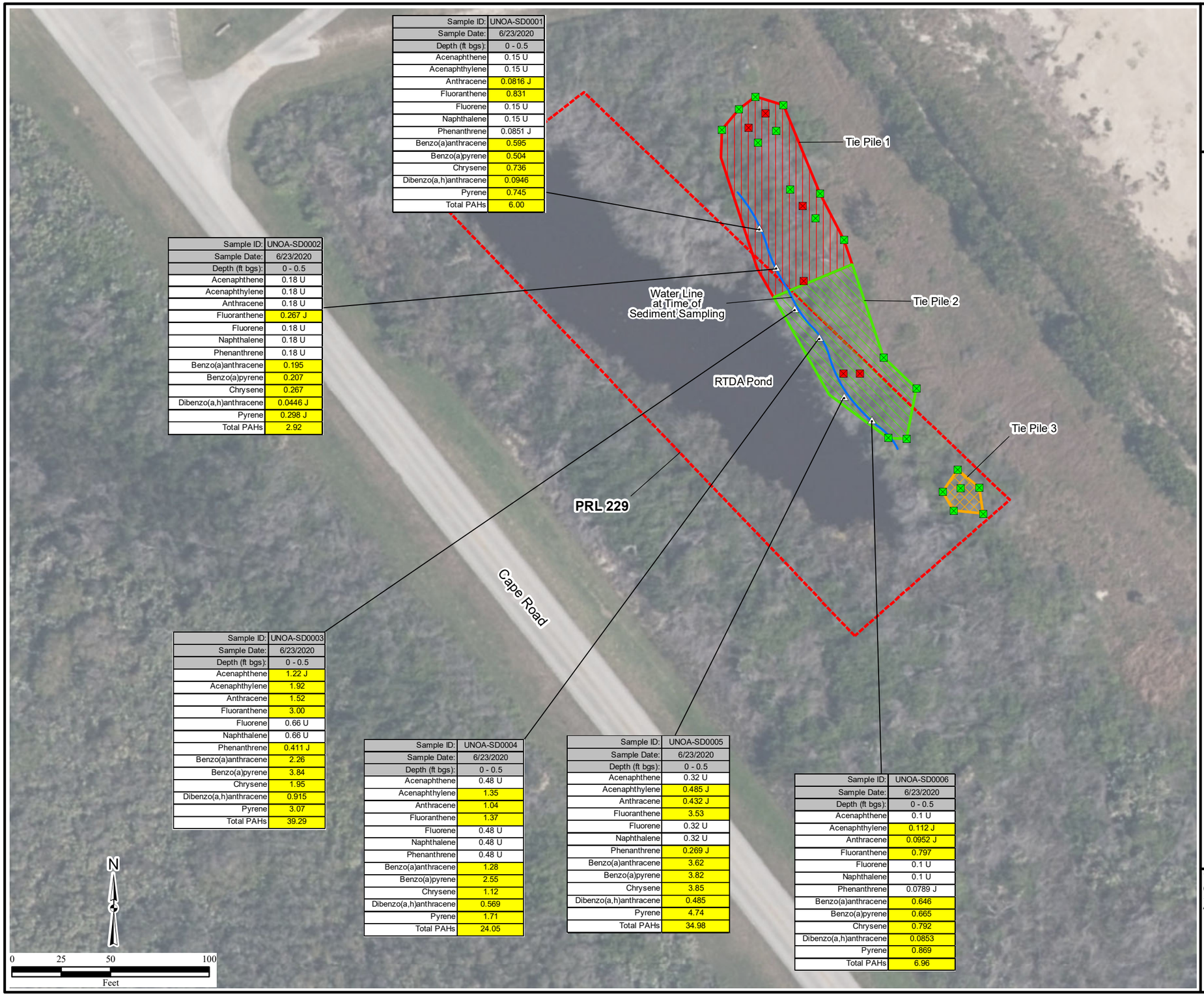
Source: HGL, FLDOT, USGS
ArcGIS Online Imagery

Figure 2.3
PRL 229
Railroad Tie
Disposal Area
Sediment Sample Results



Sample ID:	UNOA-SD0001
Sample Date:	6/23/2020
Depth (ft bgs):	0 - 0.5
Acenaphthene	0.15 U
Acenaphthylene	0.15 U
Anthracene	0.0816 J
Fluoranthene	0.831
Fluorene	0.15 U
Naphthalene	0.15 U
Phenanthrene	0.0851 J
Benzo(a)anthracene	0.595
Benzo(a)pyrene	0.504
Chrysene	0.736
Dibenzo(a,h)anthracene	0.0946
Pyrene	0.745
Total PAHs	6.00

Sample ID:	UNOA-SD0002
Sample Date:	6/23/2020
Depth (ft bgs):	0 - 0.5
Acenaphthene	0.18 U
Acenaphthylene	0.18 U
Anthracene	0.18 U
Fluoranthene	0.267 J
Fluorene	0.18 U
Naphthalene	0.18 U
Phenanthrene	0.18 U
Benzo(a)anthracene	0.195
Benzo(a)pyrene	0.207
Chrysene	0.267
Dibenzo(a,h)anthracene	0.0446 J
Pyrene	0.298 J
Total PAHs	2.92

Sample ID:	UNOA-SD0003
Sample Date:	6/23/2020
Depth (ft bgs):	0 - 0.5
Acenaphthene	1.22 J
Acenaphthylene	1.92
Anthracene	1.52
Fluoranthene	3.00
Fluorene	0.66 U
Naphthalene	0.66 U
Phenanthrene	0.411 J
Benzo(a)anthracene	2.26
Benzo(a)pyrene	3.84
Chrysene	1.95
Dibenzo(a,h)anthracene	0.915
Pyrene	3.07
Total PAHs	39.29

Sample ID:	UNOA-SD0004
Sample Date:	6/23/2020
Depth (ft bgs):	0 - 0.5
Acenaphthene	0.48 U
Acenaphthylene	1.35
Anthracene	1.04
Fluoranthene	1.37
Fluorene	0.48 U
Naphthalene	0.48 U
Phenanthrene	0.48 U
Benzo(a)anthracene	1.28
Benzo(a)pyrene	2.55
Chrysene	1.12
Dibenzo(a,h)anthracene	0.569
Pyrene	1.71
Total PAHs	24.05

Sample ID:	UNOA-SD0005
Sample Date:	6/23/2020
Depth (ft bgs):	0 - 0.5
Acenaphthene	0.32 U
Acenaphthylene	0.485 J
Anthracene	0.432 J
Fluoranthene	3.53
Fluorene	0.32 U
Naphthalene	0.32 U
Phenanthrene	0.269 J
Benzo(a)anthracene	3.62
Benzo(a)pyrene	3.82
Chrysene	3.85
Dibenzo(a,h)anthracene	0.485
Pyrene	4.74
Total PAHs	34.98

Sample ID:	UNOA-SD0006
Sample Date:	6/23/2020
Depth (ft bgs):	0 - 0.5
Acenaphthene	0.1 U
Acenaphthylene	0.112 J
Anthracene	0.0952 J
Fluoranthene	0.797
Fluorene	0.1 U
Naphthalene	0.1 U
Phenanthrene	0.0789 J
Benzo(a)anthracene	0.646
Benzo(a)pyrene	0.665
Chrysene	0.792
Dibenzo(a,h)anthracene	0.0853
Pyrene	0.869
Total PAHs	6.96

Legend

- Soil Sample Above SCTL
- Soil Sample Below SCTL
- Sediment Sampling Location
- Water Line
- Proposed Interim Measure Area (0-0.5 ft.)
- Proposed Interim Measure Area (0-2 ft.)
- Proposed Interim Measure Area (0-3 ft.)
- PRL 229

Note:
Yellow=exceeds SQAG
Data shown for compounds with SQAGs.
TPH and other PAHs were detected in all samples, but those data are not shown since they do not have SQAGs.
See Table 1 for complete analytical results.
Total PAHs concentrations were calculated by summing the total concentration of each of the detected PAHs and half of the limit of detection concentration for non-detected PAHs.

ft=feet
PAH=polynuclear aromatic hydrocarbons
RTDA=Railroad Tie Disposal Area
SCTL=soil cleanup target level
SQAG=Sediment Quality Assessment Guideline

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Source: HGL, FLDOT, USGS ArcGIS Online Imagery

APPENDIX A

KSC REMEDIATION TEAM MEETING AND MINUTES

Revision 0 Meeting Minutes for June 6th and 7th, 2019
Attendees:

John Armstrong/FDEP
John Winters/FDEP
Anne Chrest/NASA
Mike Deliz/NASA
Lindsay Morgan/NASA
Dinh Vo/NASA
Ryan O'Meara/NASA
Dan Heggen/NASA
Michelle Moore/KEMCON
Deda Johansen/Jacobs
Patrick Lawler/Jacobs
Craig Kish/Jacobs
Jason Glasgow/Jacobs
Harlan Faircloth/CORE
Jim Langenbach/Geosyntec
Melissa Hensley/Geosyntec
Eric Sager/Geosyntec
Rebecca Daprato/Geosyntec
Mike Burcham/Geosyntec
Olivia Cain/Geosyntec
Audrey Batzer/Geosyntec
Davis Lofton/Geosyntec
Joe Bartlett/Geosyntec
Mark Speranza/Tetra Tech
Chris Pike/Tetra Tech
Mark Jonnet/Tetra Tech
Jen Buel/Tetra Tech
Sarah Damphousse/Tetra Tech
Alex Murphy/Tetra Tech
Chris Neumann/Tetra Tech
Scott Anderson/Tetra Tech (phone)
Krista Sommerfeldt/AECOM
Matt Zenker/AECOM
Richard Smith/HGL
Tim Jellett/HGL

1906-M01	Team	<u>Meeting Minutes and Miscellaneous Items</u> Team consensus reached that revision 1 meeting minutes for the April 2019 Team meeting are final. Team members acknowledged and did not object to the fact that the meeting minutes may become public as part of a final report at a later date. CAMP: please update and get any revised dates to NASA. **Action Item:** Per FDEP correspondence letter dated (March 22, 2019) RPM Ryan O'Meara will provide a site history of the Visitor Center Maintenance Area (SWMU 099) at a future team meeting. **Result**: Decision item 1906-D01. Action Item 1906-A01.
1906-M02	Harlan Faircloth/ CORE	<u>Components Cleaning Facility (CCF) (SWMU 030)</u> **Goal**: Present October 2018 direct push technology (DPT) sampling results, discuss air sparge system expansion activities, present Year 2 Operations, Maintenance and Monitoring (OM&M), present performance monitoring event number 5 and obtain consensus on path forward.

- Investigating additional facilities that were not included under the Phase I assessment or where limited information was reviewed;
- Investigating the identified data gaps from Phase I SA; and
- Identifying existing monitoring wells within the initial LOCs.

Team discussed resampling at previous surface water sample locations to assess potential temporary changes in concentrations. Team also discussed tracking drainage patterns to determine where surface water is coming from for different stormwater ponds, basins, and other water bodies.

NASA discussed the proposed response to the detected exceedances of PFOS and PFOA provisional GCTLs: new KSC policy to no longer discharge AFFF to grade at KSC facilities, except to put out hydrocarbon fires. If AFFF needs to be used, a spill report will be submitted, and an investigation will be conducted. NASA is identifying and responding to PFAS concerns. Non-potable well sampling has been recently conducted on KSC.

Results: Decision item 1906-D04 to D41

1906-M04 Craig Kish/ Jacobs

<u>Unnumbered Operational Area (UNOA) (PRL 229)</u>
Goal: Summarize confirmation sampling (CS) activities, results, and obtain Team consensus on path forward.

Discussion: This Solid Waste Management Unit (SWMU) Assessment included three non-contiguous areas:
east yard and railroad tie disposal area (RTDA) east of Phillips Parkway and North of Launch Complex 39A, and the Communications Distribution Center & Switching Center (CD&SC) Siding in northwest quadrant of Kennedy Space Center (KSC) Industrial area, adjacent to M6-0138.
The KSC Remediation Team decided to perform a CS at RTDA. There were no concerns identified for the East Yard or CD&SC Siding.

There is no active facility and there are no personnel on site. The area is considered ecological habitat, but screening will be done to human health risk values first. The SWMU assessment identified two large piles of discarded railroad (RR) ties. Those piles were designated as Location of Concern 1 (LOC 1).

Soil headspace screening to the water table (5 feet). No readings were above 2 parts per million (ppm). No volatile organic compounds (VOC) or metals were detected above human health screening values in soil samples. Carcinogenic polycyclic aromatic hydrocarbons (PAH) were detected exceeding the benzo(a)pyrene equivalents (BaP TEQ) above residential (R-) soil cleanup target levels (SCTL) and industrial (I-) SCTLs at SB0001 and the R-SCTL at SB0002. The SB0001 0 to 0.5 feet (ft) below land surface (BLS) exceeded leachability (L-) SCTL for benzo(a)anthracene, benzo(b)fluoranthene, benzo(a)pyrene, dibenzo(a,h)anthracene, indeno-1,2,3-(cd)pyrene, and total recoverable petroleum hydrocarbons (TPH). The method detection limit (MDL) for pentachlorophenol was above the L-SCTL. Synthetic precipitation leaching procedure (SPLP) extract was analyzed for PAHs, TPH, and pentachlorophenol. TPH was not detected in SPLP. SPLP yielded 5 PAHs above GCTLs. Pentachlorophenol wad not detected in the SPLP, but the MDL was above the GCTL.

Monitoring well MW0001 was installed near SB0001 (screened 2 to 12 ft BLS). Groundwater sample from MW0001 was analyzed for PAHs and pentachlorophenol. No PAHs nor pentachlorophenol were detected.

Team consensus reached for NFA for groundwater at LOC 1.

Step-out and step-down samples were collected to delineate TPH and carcinogenic PAHs. Four additional railroad tie piles and several disturbed areas were identified, and samples were collected.

BaP TEQ exceedances at six locations at Tie Piles 1 and 2 ranged from 0.2 to 26 milligrams per kilogram (mg/kg). Co-located TPH exceedances at 2 locations (range 420 to 490 mg/kg). No exceedance of SCTLs at Tie Pile 3. Sediment in a pond adjacent to Tie Piles 1-3 on the west represents a data gap.

There were no exceedances in Tie Pile 4 or the two disturbed areas between Piles 4 and 5. BaP TEQ and TPH exceeded criteria at one Tie Pile 5 location. BaP TEQ exceeded criteria at two Tie Pile 6 locations and TPH at one location.

Team suggestion was to run a 95% UCL; may reduce the excavation. 95% UCL will need to be calculated by layer. Can a virtual remediation be done for this LOC 1?

Team consensus reached on interim measure for soil at LOC 1 with the addition of sediment sample collection. A 95% UCL will be calculated and results will be presented to the Team if results indicate a change in IM extents. All railroad ties will be removed, including at those locations where soil results did not exceed an SCTL.

Total low molecular weight and/or total high molecular weight PAHs exceed the ecological screening values of 29 and 1.1 mg/kg, respectively, at several locations. The proposed excavation based on human health criteria will also remediate locations with PAHs above ecological screening values.

Coordination with Wildlife Ecologists may require extra time due to gopher tortoise relocation. There is a beehive at the north end of Tie Pile 1. Dry season excavation is recommended so water from retention pond is not encroaching and to avoid potential dewatering at Tie Pile 5.

Results: Decision Item 1906-D42 to D43

1906-M05 Patrick Lawler/ Jacobs

<u>False Cape Data Collection Annex (FCDC) (PRL 217)</u>

Goal: Summarize confirmation sampling (CS) and results. At this time will not be requesting consensus since continued sampling did not allow distribution of an Advance Data Package to KSC Remediation Team member. The presentation will outline proposed path forward for each Location of Concern (LOC).

Discussion: Team has not had the opportunity to review the entire package; therefore, no Team consensus will be requested during this meeting.

Site is located between Complex 41 and Phillips Parkway. Site and immediate surroundings are overgrown; limited clearing was completed for the CS. The site is unused and unoccupied.

<u>LOC 1 – Former Warehouse Underground Storage Tank (UST) (K8-0842:</u>

June 2019 Decision items Rev 0		
Decision	Minutes	
No.	reference	Decision
1906-D42	1906-M04	Unnumbered Operational Area (UNOA) (PRL 229) - Team consensus reached for NFA for groundwater at LOC 1.
1906-D43	1906-M04	Unnumbered Operational Area (UNOA) (PRL 229) - Team consensus reached on interim measure for soil at LOC 1 with the addition of sediment sample collection. A 95% UCL will be calculated and results will be presented to team if results indicate a change in IM extents. All railroad ties will be removed.

Revision 0 Meeting Minutes for August 13th, 2020

Attendees:

1. Laura Barrett/FDEP
2. Mike Deliz/NASA
3. Dinh Vo/NASA/NASA
4. Ryan O'Meara/NASA
5. Deda Johansen/NASA
6. Michelle Moore/KEMCON
7. Mark Speranza/Tetra Tech
8. Mark Jonnet/Tetra Tech
9. Chris Hook/Tetra Tech
10. Chris Pike/Tetra Tech
11. Jennifer Buel/Tetra Tech
12. Sarah Damphousse/Tetra Tech
13. Debbie Wilson/Tetra Tech
14. Krista Sommerfeldt/AECOM
15. Bobby Harward/AECOM
16. Randy Sillan/AECOM
17. Mike McCoy/AECOM
18. Linnea King/AECOM
19. Steve Cobert/AECOM
20. Jennifer Joyal/AECOM
21. Matthew Zenker/AECOM
22. Richard Smith/HGL
23. Tim Jellett/HGL
24. Jason Bublitz/HGL

2008-M01 Team

Meeting Minutes and Miscellaneous Items

Team consensus was reached that Revision 1 of the meeting minutes for the June 2020 Team meeting are final. Team members acknowledged and did not object to the fact that the meeting minutes may become public as part of a final report at a later date (**2008-D01**).

Open action items were reviewed by the Team. No actions items were closed, but an update to the action items were provided by Team members for the record.

Result: Decision Item 2008-D01

2008-M02 Randy Sillan /AECOM

Mobile Launch Platform/Vehicle Assembly Area (MLPV), Solid Waste Management Unit (SWMU #056) Corrective Measures Implementation (CMI) and Interim Measures (IM) Update, August 2020

Goal: The objective is to present the existing groundwater quality and groundwater flow characteristics based on current data. A brief site history was provided to familiarize the current Florida Department of Environmental Protection (FDEP) Representative.

The Team reached consensus to continue annual water level measurements at 49 monitoring wells shown on slide 33 to include: NPSH-MW0027, NPSH-MW0036, MW0064, MW0074, MW0091, MW0095, MW0152, MW0154, MW0156, MW0087, MW0089, MW0096, MW0106, MW0109, MW0116, MW0125, MW0129, MW0142, MW0149, MW0150, MW0151, MW0153, NPSH-MW0010, NPSH-MW0017, NPSH-MW0019, NPSH-MW0020, NPSH-MW0022, MW0062, MW0063, MW0080, MW0088, MW0090, MW0097, MW0111, MW0140, MW0143, MW0146, MW0155, NPSH-MW0039, MW0046D, MW0068, MW0118, MW0141, MW0144, MW0145, MW0147, MW0148, MW0078, MW0130 **(2008-D37).**

The Team reached consensus to conduct the next sampling event in the Nov/Dec 2020 timeframe, prior to the air sparge IM construction **(2008-D38).**

FDEP -When is the construction planned for this site? NASA stated it is slated to begin January 2021. The project has DPT to be completed in October 2020. Following, the construction will kick off in Nov/Dec/Jan timeframe. FDEP inquired if the Team anticipates issues with getting in lines and equipment installed due to the dense vegetation? NASA stated that most of the vegetation will be removed with the exception of the larger trees.

Result: Decision item 2008-D35 through D38

2008-M06 Richard Smith /HGL

Un-Numbered Operational Areas (UNOA) (PRL 229) Confirmatory Sampling Results and Interim Measure (IM) Work Plan Update, August 2020

Goal: The purpose is to summarize recent sediment sampling and discuss path forward and changes to the Interim Measures Work Plan (IMWP).

Discussion: Site history was provided. In September 2019, an IMWP was recommended for the site. The lack of sediment samples in the pond was determined to be a data gap at that time, so the KSC Remediation Team (KSCRT) concurred with the IM

recommendation with the addition of sediment sampling moving forward.

Sediment sampling was conducted in July 2020, and the results were initially compared to the State of Florida soil cleanup target levels (SCTLs) in case the water level in the pond drops enough by the time of the IM to allow excavation. Screening determined that all sediment samples exceeded the residential SCTLs (R-SCTLs) for benzo(a)pyrene equivalents (BAPE) and five samples exceeded the industrial SCTL (I-SCTL) for BAPE. Two sediment samples exceeded the leachability SCTL for total recoverable petroleum hydrocarbons (TRPH) and one sample exceeded the R-SCTL for TRPH. Since the collected samples exceeded SCTLs, it is assumed that impacts extend into the pond and therefore results were compared to the Florida Marine Sediment Quality Assessment Guidelines (SQAG) in accordance with the KSC Remediation Program Decision Process Document (DPD). All sediment sample locations exceed the SQAGs.

The path forward was a recommendation to proceed with the IM and the removal of the contaminated upland soil when the pond has receded some. HGL will attempt to get within five ft of the pond; that distance is needed to avoid getting inundated with water during the excavation. Proceeding with the IM will reduce the footprint of soil impacts at the site. Following the excavation, it is recommended to reevaluate the soils adjacent to the pond to determine if additional action is necessary. This excavation would eliminate the soil concerns that were found at 4 of the tie piles at this site and would remove the railroad ties from all 6 piles found.

FDEP inquired if the Team only sampled for TRPH and benzo(a)pyrene, and why not other constituents of concern such as metals and pentachlorophenol? NASA clarified that the soils were sampled for pentachlorophenol, volatile organics, semi volatiles, metals, TRPH; a broad spectrum. However, it is the carcinogenic polynuclear aromatic hydrocarbons (PAHs) at the site that are driving the cleanup. The Team even put in a well and the groundwater had no actionable contamination. FDEP appreciated the clarification.

HGL stated on topo map that the yellow area is showing where they will try to excavate if it is dry enough. NASA recommended that

with the understanding that there is no western boundary to tie piles, proceed with test consensus on slide 21 with the future plan of performing additional sampling to characterize the pond afterwards. NASA made note that this IMWP was in the CSR that was submitted and approved by FDEP under John Winters.

Aerial maps presented show the pond may be an impounded salt marsh. Most of the surface waters associated with the Banana River Lagoon at KSC are Class III classification. When you look at maps of KSC, the lagoonal system at LC39 is excluded from this classification due to the impacts of shuttle launch deposition in those waters. The baseline risk assessment conducted for the LC39 area surface water included the estuary system at 17 surrounding ponds, but this pond was not one of the chosen ponds in that assessment. That risk assessment found there is no concern for the upper trophic levels. Potential risk to benthic invertebrates was identified at two of the ponds. However, the overall ecological community was healthy, and no action was determined to be taken.

The PAHs in the pond are higher than what was found in the study ponds. There is an alligator in that pond, there is no outflow or inflow, and rain causes the pond level fluctuation. NASA will collect additional data and come back to the Team and discuss further with regards to whether or not ecological risk assessment is needed at the pond.

The Team reached consensus on implementing the IM and removing the designated soil and tie piles #3 through #6. No further action for these areas will be necessary for human health and ecological receptors **(2008-D39).**

The Team reached consensus on implementing IM soil removal to the edge of the pond (within five feet) at tie piles #1 and #2; recognizing this will reduce but may not eliminate site contaminated soil footprint. Following excavation, evaluate remaining soil contamination to determine if additional action is necessary **(2008-D40).**

Result: Decision item 2008-D39, D40

2008-M07 Presenter /AECOM

Revision 0 Meeting Minutes for November 9 & 10, 2021

Attendees:

1. Bruce Moore/FDEP
2. Mike Deliz/NASA
3. Ryan O'Meara/NASA
4. Deda Johansen/NASA
5. Anne Chrest/NASA
6. Natasha Darre/NASA
7. Dinh Vo/NASA
8. Michelle Moore/NEMCON
9. Mark Speranza/Tetra Tech
10. Chris Neumann/Tetra Tech
11. Chris Pike/Tetra Tech
12. Jennifer Buel/Tetra Tech
13. Alex Murphy/Tetra Tech
14. Scott Anderson/TetraTech
15. James Lloyd/Tetra Tech
16. Mark Jonnet/Tetra Tech
17. Debbie Wilson/Tetra Tech
18. Sarah Damphousse/Tetra Tech
19. Jennifer Joyal/AECOM
20. Linnea King Clark/AECOM
21. Chad Lee/AECOM
22. Richard Smith/HGL
23. Howard Fowler/HGL

2111-M01 **Team** **Meeting Minutes and Miscellaneous Items**

Team consensus was reached that Revision 2 of the meeting minutes and action/decision items for the September 2021 Team meeting will become final. Team members acknowledged and did not object to the fact that these meeting minutes may become public as part of a final report at a later date **(2111-D01).**

Open action items were reviewed by the Team. The following action item was closed out:

Firex Water Tank (SWMU #069) Confirmation Sampling Work Plan for Soil LUCIP Removal, December 2020: NASA took an action item to see what they could find out on these discharge reports.

Internal discharge records were located and saved to the NASA shared drive. No additional spill records have been located for the release(s). The site entered the RCRA process through a SWMU Assessment and was added to KSC's RCRA Permit Appendix A. A Discharge Report Form does not appear to have been filed. **(Closed 2012-A04).**

2111-M07 Howard Fowler/HGL

Un-Numbered Operational Areas (PRL #229), Confirmatory Sampling Work Plan (CSWP), November 2021

Goal: The objective of the ADP is to summarize the PRL 229 Pond site history, present the CSWP, and obtain Team consensus on the recommendation to implement the surface water and sediment confirmatory sampling and screening level ecologic risk assessment (SLERA).

Discussion: A Solid Waste Management Unit (SWMU) Assessment of PRL 229 was prepared in 2015. Confirmation Sampling of soil and groundwater was performed at the Railroad Tie Disposal Area (RTDA) between September 2018 and April 2019.

Confirmation Sampling at the RTDA identified soils with total recoverable petroleum hydrocarbons (TRPH) and benzo(a)pyrene equivalents above Florida residential Soil Cleanup Target Levels (SCTLs). At RTDA Tie Piles #1 and #2, soil impacts were delineated on three sides and to the edge of the pond on the fourth side.

In September 2019, an Interim Measures (IM) Work Plan recommending excavation of impacted soil was prepared. The lack of sediment samples in the pond was identified as a data gap. The Kennedy Space Center Remediation Team (KSCRT) concurred with the IM recommendation, with the addition of sediment sampling. The Work Plan was formally approved by the Florida Department of Environmental Protection (FDEP) in April 2020.

In July 2020, six sediment samples were collected along the northeast edge of the pond at a depth of 0-0.5 feet and analyzed for polycyclic aromatic hydrocarbons (PAHs) and TRPH. Samples were collected 2-3 feet from the shoreline with 6-8 inches of water above. All sediment sample locations exceed the Sediment Quality Assessment Guidelines (SQAGs) for multiple PAH compounds.

A Confirmation Sampling Report Addendum (CSRA) was submitted in December 2020 and approved by FDEP on June 9, 2021. The CSRA recommended additional assessment of the pond based on the PAHs exceedances of SQAGs in sediment samples. This CSWP summarizes the additional sampling to be performed as part of the pond investigation.

CSWP Considerations

Historical aerial photographs were reviewed to determine the historical footprint of pond. In 1951, the pond appears to be part of a saltmarsh that ultimately communicated with the Banana River Lagoon. In the 1960s the northwest and southeast portions of the pond were filled during the construction of the nearby railroad track (1963-1965) and the Area 2 Universal Camera Pad 7 facility (circa 1960). As a result of construction activities, the area became impounded. Between 1972 and 2018, only minor changes in pond water levels were observed.

The pond is part of what is now called the Launch Complex 39 Lagoonal System which is classified as Class III - Fish Consumption; Recreation, Propagation and Maintenance of a Healthy, Well-Balanced Population of Fish and Wildlife, Predominantly Marine Waters.

The pond is currently almost surrounded by dense vegetation, requiring coordination, and clearing for access. The Pond bottom contains approximately 18 inches of muck (determined during staff gauge installation).

The St. Johns River Water Management District (SJRWMD) Environmenal Resources Permit (ERP) and US Army Corps of Engineers (USACE) Section 404 permit for the adjacent Coastal Dune Restoration project were issued in 2017 (ERP modified in 2019). The Dune Restoration work has been completed and the ERP Permit did not contain conditions that would affect the pond investigation.

The SJRWMD ERP and USACE Section 404 permits for IM activities have been approved. The soil IM will be implemented during the 1st quarter of 2022 prior to pond sampling. The plan is to clear vegetation in December 2021, have a KSC Wildlife Ecologist come out to relocate any wildlife in the area, and perform the soil removal afterward.

Pond Sampling Work Plan

The collection of 10 sets of surface water and sediment samples along the edge of the pond is proposed. One set of sediment and surface water samples will be collected from the northwest and southeast ends and 4 evenly spaced sets of sediment and surface

water samples will be collected from the northeast and southwest sides of the pond. Surface water samples will be analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), PAHs, priority pollutant metals plus barium, total hardness, and salinity (field measurement). Sediment samples will be analyzed for SVOCs, PAHs, TRPH, priority pollutant metals plus barium, and total organic carbon.

Screening Level Ecological Risk Assessment (SLERA)

The CSWP will establish the methodologies and approach that will be used to complete a SLERA for the RTDA site as part of the confirmatory sampling investigation. The methodologies and approach mirror the SLERA portion of the Launch Complex 39 Area Ecological Risk Assessment (Geosyntec, 2014), including assessment endpoints, exposure parameters, and toxicity reference values. The SLERA will be performed in accordance with Kennedy Space Center's Resource Conservation and Recovery Act program, as well as current Environmental Protection Agency and FDEP guidance documents, including Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments, Interim Final (EPA, 1997) and Florida Ecological Risk Assessment Guidance Document (University of Florida, 2016).

The dataset to be used in the SLERA will include the six historical sediment samples collected in December 2020 and the sediment and surface water data to be collected as part of confirmatory sampling.

The SLERA will include the following steps:

Step 1 – Screening Level Problem Formulation; Site Description; Sensitive Environments; and Preliminary Assessment and Measurement Endpoints.

Step 2 – Screening Level Exposure Estimate and Risk Calculation; Benthic Invertebrate Community; Aquatic Community; and Wildlife Receptors.

Step 3a – SLERA Refinement; Refined Ecological Risk Assessment; and Uncertainty Analysis.

The Team reached consensus on proceeding with PRL 229 Pond Investigation Confirmatory Sampling Work Plan **(2111-D16).**

Results: Decisions Items 2109-D16

2111-M08 Alex Murphy/Tetra Tech

Central Heat Plant (SWMU #045), Air Sparge Construction Completion and First Quarter Results, November 2021

Goal: The presentation goal is to provide a summary of the Interim Measure (IM) air sparge system construction that was recently completed at the site.

Discussion: The Central Heat Plant (CHP) Interim Measure (IM) air sparge system construction has been completed. Performance monitoring through Year 1, Quarter 1 has been conducted. This ADP details those construction activities and performance monitoring results to date. The CHP IM air sparging system includes 240 two-inch inside diameter (I.D.) Schedule 40 polyvinyl chloride (PVC) air sparging wells and 27 two-inch I.D. stainless steel air sparging wells. Three of the stainless-steel air sparging wells are set to a screen interval depth of 20-22 feet below land surface (bls), and the remainder of the air sparging wells are set to an approximate screen interval depth of 49-51 feet bls. "Hot" air, defined as approximately 200-250 °F at the air sparging well head, is supplied to the stainless-steel wells via a 40-horsepower (hp) compressor capable of 240 cubic feet per minute (cfm) at 35 pounds per square inch (psi). "Cold" air, defined as approximately 85 °F at the air sparging well head, is supplied to the PVC wells via a 60-hp compressor capable of 350 cfm at 35 psi. Groundwater is the medium of concern at CHP. Tetrachloroethene (PCE), trichloroethene (TCE), cis-1,2-dichloroethene (cDCE), and vinyl chloride (VC) are the contaminants of concern (COCs). The objective of this IM is to reduce chlorinated volatile organic compound (CVOC) concentrations within the treatment area to concentrations that facilitate a transition to long-term monitoring.

Year1, Quarter 1 analytical results from the 22-well performance monitoring network were collected in September 2021 and compared to pre-IM (baseline) results. PCE and TCE results were reduced by an order of magnitude or more.

APPENDIX B

SCREENING LEVEL ECOLOGICAL RISK ASSESSMENT WORK PLAN

APPENDIX B

UN-NUMBERED OPERATIONAL AREAS, PRL 229
RAILROAD TIE DISPOSAL AREA POND

SCREENING LEVEL ECOLOGICAL RISK ASSESSMENT WORK PLAN (REVISION 0)

KENNEDY SPACE CENTER, FLORIDA

Prepared for

National Aeronautics and Space Administration
John F. Kennedy Space Center

January 2022
Revision 1

Prepared by

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ATTACHMENTS

ACRONYMS/ABBREVIATIONS

COPEC	chemical of potential ecological concern
CS	confirmatory sampling
CSWP	Confirmatory Sampling Work Plan
DPD	*Decision Process Document for the RCRA Corrective Action Program*
ERA	ecological risk assessment
ESV	ecological screening value
FDEP	Florida Department of Environmental Protection
HGL	HydroGeoLogic, Inc.
HQ	hazard quotient
IHA	InoMedic Health Applications
IPaC	information for planning and consultation
KSC	Kennedy Space Center
MassDep	Massachusetts Department of Environmental Protection
NASA	National Aeronautics and Space Administration
PAH	polynuclear aromatic hydrocarbon
PRL	Potential Release Location
RCRA	Resource Conservation and Recovery Act
RTDA	Railroad Tie Disposal Area
SA	Site Assessment
SLERA	screening level ecological risk assessment
TPH	total petroleum hydrocarbons
UNOA	Un-Numbered Operational Areas
USEPA	U.S. Environmental Protection Agency

APPENDIX B

UN-NUMBERED OPERATIONAL AREAS, PRL 229
SCREENING LEVEL ECOLOGICAL RISK ASSESSMENT WORK PLAN
(REVISION 0)
KENNEDY SPACE CENTER, FLORIDA

1.0 INTRODUCTION

HydroGeoLogic, Inc. (HGL) prepared this Screening Level Ecological Risk Assessment (SLERA) Work Plan in support of the Confirmatory Sampling Work Plan for the Railroad Tie Disposal Area (RTDA) of the Un-Numbered Operational Areas (UNOA), Potential Release Location (PRL) 229 located at Kennedy Space Center (KSC), Florida. This SLERA Work Plan was prepared to establish the methodologies and approach that will be used to complete a SLERA for the RTDA site as part of the confirmatory sampling (CS) investigation. The approach presented herein follows that described in the *Decision Process Document for the RCRA Corrective Action Program at KSC* (DPD) (Geosyntec, 2019).

The SLERA will be conducted under KSC's Resource Conservation and Recovery Act (RCRA) Corrective Action Program. The ecological risk assessment (ERA) approach outlined in the DPD is based on Florida Department of Environmental Protection (FDEP) guidance, U.S. Environmental Protection Agency (USEPA) guidance, and historical ERAs completed for NASA-KSC sites. The DPD outlines four steps to an ERA: ecological scoping assessment (Step 1); SLERA (Step 2); baseline ecological risk assessment (Step 3); and ecological risk management (Step 4). The SLERA, or Step 2, consists of three sub-steps:

- Step 2a – SLERA problem formulation;
- Step 2b – SLERA exposure estimate and risk calculation; and
- Step 2c – SLERA refinement.

Although at the completion of Step 2b the SLERA could conclude that site conditions do not pose an ecological risk, it is likely, given the conservatism associated with Step 2b, that the SLERA will proceed to Step 2c. If the SLERA refinement concludes potential risks to ecological receptors are not indicated, No Further Action with respect to ecological receptors will be recommended. If the SLERA refinement concludes potential risks to ecological endpoints exceed target levels, the ERA will move to Step 3a of the NASA-KSC ERA process, which is the baseline problem formulation that will be used to support subsequent completion of a Baseline Ecological Risk Assessment. A Baseline Ecological Risk Assessment, if required, would be completed under separate cover and is not part of the scope of the SLERA.

2.0 SITE DESCRIPTION

This section describes the site and its investigational history as it pertains to the risk assessment.

The RTDA is located on the Atlantic coastline of KSC, east of and between Launch Complex 39A and Launch Complex 39B. An additional UNOA site, the East Yard, is located adjacent to the

RTDA. As illustrated on Figure 2.2 of the Confirmatory Sampling Work Plan (CSWP), an approximately half-acre sized pond is adjacent and west of the RTDA. The pond is surrounded by dense vegetation and provides viable ecological habitat. The pond is a wetland and part of what is now called the Launch Complex 39 Lagoonal System, which has the following surface water classification per FAC 62-302.400: Class III - Fish Consumption; Recreation, Propagation and Maintenance of a Healthy, Well-Balanced Population of Fish and Wildlife, Predominantly Marine Waters.

The pond is surrounded by dense vegetation that will require coordination and clearing for access. Approximately 60 to 90 feet of vegetation is present on the southwest side of the pond, approximately 60 feet of vegetation on the northwest side of the pond, and approximately 40 feet of vegetation on the northeast side of the pond is present. The pond bottom contains approximately 18 inches of muck (determined during staff gauge installation).

Both the East Yard and the RTDA were under the ownership of the Florida East Coast Railway when the area was developed in 1963-1965 as part of the KSC Railroad System. The railroad system consisted of a single track, with a parallel siding track in the East Yard that allowed for passing train traffic and railcar staging. In 1983, NASA acquired the KSC portion of the railroad from Florida East Coast Railway. Between 1984 and 1986, a 6-mile portion of railway along the Atlantic coast was replaced due to poor conditions from age and weathering. The original track was replaced with new materials, and granite ballast replaced the original limestone ballast. Between 1986 and 2003, the East Yard was used as a staging area for loaded liquid hydrogen tanker railroad cars. No evidence of railroad operations was identified in historical aerial photos from 2004 to 2013. The East Yard tracks were removed between December 2013 and January 2014 as part of NASA's Beach Dune Restoration Project (Jacobs Engineering Group, Inc. [Jacobs] and CORE Engineering & Construction, Inc. [CORE], 2019).

The RTDA is approximately 350 feet north of East Yard and west of the former railroad. The site assessment identified the RTDA based on the presence of two large piles of discarded railroad ties. The date(s) when the railroad ties were placed at this location is not known (Jacobs and CORE, 2019).

A Site Assessment (SA) was conducted in 2014 to identify potential environmental impacts related to operations at UNOA, which encompasses the RTDA. The SA included site reconnaissance and interviews with personnel possessing knowledge of past and present work practices and operations at the site. Additional documents evaluated were: engineering documents and basic information guides, historical photographs, and Real Property records; Safety Data Sheets for chemicals that may have been used or stored at the facility; soil type and lithology descriptions found in a previous geotechnical investigation report; and types of wildlife habitat on the site also were evaluated. In addition, current site conditions were documented in photographs. The objective of the SA was to identify potential locations and contaminants of concern at UNOA and the need, if any, for further study (InoMedic Health Applications [IHA], 2015).

No concerns were identified at the East Yard through the SA and No Further Action was recommended for this site in the SA Report. The RTDA was identified as a location of concern

based on the potential for creosote, metals, hydrocarbons, and solvents that may have been released to the surrounding soils due to weathering of or leaching from the piled and scattered railroad ties. The SA did not find any reason for concerns for potential groundwater contamination (Jacobs and CORE, 2019).

CS was completed at the RTDA site between September 2018 and April 2019 to characterize and delineate potential contamination in site soil. The subsequent report concluded that carcinogenic polynuclear aromatic hydrocarbons (PAH) and total petroleum hydrocarbons (TPH) detected in RTDA soil represent a potential risk for human receptors under both residential and industrial use scenarios. For ecological receptors, low molecular and/or high molecular weight PAHs were present in soil at concentrations greater than ecological screening values, resulting in the conclusion that this PAH contamination could pose an ecological risk. Soil contamination will be addressed by a future Interim Measure to excavate and properly dispose of impacted soil off site. Review of the CS data did not suggest potential metals or volatile organic compounds contamination and no further investigation of these potential contaminants in soil was recommended. Similarly, No Further Action was recommended for groundwater at RTDA based on review of analytical data from a monitoring well (MW0001) installed and sampled for analytes detected at concentrations greater than the leachability SCTLs or that lacked leachability SCTLs. The absence of sediment data from the pond adjacent to RTDA was identified as a data gap (Jacobs and CORE, 2019).

In June 2020, six sediment samples were collected from the northeast edge of the pond adjacent to RTDA and analyzed for PAHs and TPH (HGL, 2020). Exceedances of sediment quality assessment guidelines were observed for at least one PAH at each location. Based on these results, the CS Report Addendum recommended further characterization of potential sediment and surface water contamination in the RTDA pond (HGL, 2020).

3.0 CONCEPTUAL SITE MODEL

The contaminant source at RTDA is the railroad ties that are piled at the site, including ties that are partially or fully submerged in the adjacent pond. PAH and TPH contamination were observed in soil samples collected from locations surrounding the railroad tie piles during the CS (Jacobs and CORE, 2019). The possible sources of PAH contamination in the pond are dissolution of contaminants into surface water from submerged railroad ties, adsorption of contaminants onto sediment from submerged railroad ties, and overland flow of contaminants in eroded soil.

Because PAHs are hydrophobic, the PAHs in the pond are likely adsorbed to the sediment and are unlikely to dissolve substantially into the surface water. PAHs are bioaccumulative chemicals that could be taken up into the tissues of organisms that live and/or forage in the sediment.

TPH encompasses a large group of several hundred compounds, all hydrocarbons, that originally come from crude oil. Because TPH is a mixture of many compounds, the chemical properties of TPH vary based on the mixture's composition. Some TPH constituents, such as benzene, toluene, or xylenes, are not considered to be bioaccumulative. Other constituents, such as PAHs, are bioaccumulative.

The site is currently open space and provides potential viable aquatic habitat for ecological receptors. The pond is part of what is now called the Launch Complex 39 Lagoonal System, which is classified as Class III - Fish Consumption; Recreation, Propagation and Maintenance of a Healthy, Well-Balanced Population of Fish and Wildlife, Predominantly Marine Waters.

Potential ecological receptors and exposure routes are identified in Section 5.1. The conceptual site model is summarized on Figure 3.1.

4.0 DATA TO BE USED IN THE SLERA

The dataset used in the SLERA will include the analytical results for the six sediment samples collected in December 2020 and the sediment and surface water data to be collected as part of the planned CS. The six historical sediment samples were analyzed for PAHs and TPH (C8-C40 using Method FL-PRO), were validated in accordance with the CSWP, and are considered usable for risk assessment (IHA, 2015).

The planned CS includes the collection of 10 co-located sediment samples and surface water samples, distributed along the banks of the RTDA pond as shown on Figure 4.1 of the CSWP. Sediment samples will be analyzed for semivolatile organic compounds, PAHs, TPH (C8-C40 via Method FL-PRO), metals, and total organic carbon. Surface water samples will be analyzed for volatile organic compounds, semivolatile organic compounds, PAHs, metals, total hardness, and salinity.

Only data determined to be usable will be evaluated in the SLERA. Data rejected during validation will not be included in the SLERA datasets. Detections qualified "B," indicating a detection less than five times (or in the case of common laboratory contaminants, 10 times) the detection in the associated blank, will be evaluated as non-detect results (USEPA, 1989). Only one result will be used for each parent sample and field duplicate pair. If an analyte is detected in both the parent and duplicate samples, the maximum detection will be used as the proxy concentration for that location. If an analyte is positively detected in only one sample, the detection will be used as the proxy concentration. If an analyte is not detected in either sample, the lower of the two limits of detection will be used as the proxy result.

5.0 SCREENING LEVEL ECOLOGICAL RISK ASSESSMENT

The assessment of potential ecological risks will be completed using a SLERA. The SLERA will be performed in accordance with Steps 2a through 2c of the DPD (Geosyntec, 2019). The ERA process outlined in the DPD generally follows the step-wise processes described in current USEPA and FDEP guidance, including *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments, Interim Final* (USEPA, 1997) and *Florida Ecological Risk Assessment Guidance Document* (University of Florida, 2016*)*.

5.1 STEP 2A - SLERA PROBLEM FORMULATION

The initial step in the SLERA process is to formulate the problem. This step develops the conceptual site model for the SLERA and defines the assessment and measurement endpoints. During the field investigation, the field team will photograph the site and document flora and fauna observed at the site to support a more detailed problem formulation in the SLERA.

5.1.1 Site Description

A site description is provided in Section 2 of the SLERA. The CS report will include a more detailed site description, including vegetation and biota observed during field activities. The SLERA will evaluate only the pond habitat. The SLERA will not consider terrestrial habitat at the RTDA because the prior CS report already included this evaluation and removal of the contaminated soil is planned.

5.1.2 Sensitive Environments

According to the U.S. Fish & Wildlife Service Information for Planning and Consultation (IPaC) tool (available at https://ecos.fws.gov/ipac/), 16 federally listed species are potentially present within the RTDA site. These species are listed in Table 5.1 and the IPaC report is provided as Attachment A. Because there was no ecological or biological survey of the RTDA site, it is not known if these listed species are present. For the purposes of the SLERA, it is assumed the site could provide habitat for the species listed in Table 5.1.

5.1.3 Preliminary Assessment and Measurement Endpoints

Benthic invertebrates can be exposed directly to contaminants in the sediment. The aquatic community (e.g., primary producers, invertebrates, fish, etc.) can be exposed directly to surface water contaminants. Aquatic wildlife (birds and mammals) can be exposed directly to sediment and/or surface water contaminants as well as indirectly via bioaccumulation into the tissues of dietary items (plants, benthic invertebrates, and fish) and consumption of these items. The preliminary assessment and measurement endpoints are summarized in Table 5.2.

Reptiles and amphibians could be present at the site. However, based on an absence of exposure and effects information in the literature, potential risks to reptiles and amphibians were not identified as assessment and measurement endpoints and these potential receptors will not be evaluated in the SLERA. It is assumed that conditions protective of the communities listed in Table 5.2 will also be protective of reptiles and amphibians.

5.2 STEP 2B - SLERA RISK CHARACTERIZATION

The second step in the SLERA process consists of comparing maximum detections to NASA-KSC background threshold values (BTVs), as available, and ecological screening values (ESVs). If the maximum detection is not greater than the BTV (meaning that the constituent is not a contaminant), then the chemical is unlikely to pose an ecological risk and will not be evaluated further (i.e., the maximum detection will not be compared to the ESV). If the maximum detection

is greater than the BTV or if there is no BTV, then the maximum detection will be used as the exposure level and will be divided by the ESV to calculate a hazard quotient (HQ) (i.e., a quantitative risk estimate) as shown below.

$$HQ = \frac{Exposure\ Level}{Effects\ Level}$$

BTVs and ESVs (i.e., effects levels) for surface water and sediment will be obtained from Appendix D, Tables D-4 and D-6, of the DPD (Geosyntec, 2019). The DPD does not provide an ESV for TPH. For this reason, the Massachusetts Department of Environmental Protection (MassDEP) sediment benchmark for the C9-C12 fraction (adjusted to account for the average site-specific organic carbon content) will be used to screen TPH in sediment (MassDEP, 2007).

The HQs will be reported to one significant figure. The decision logic outlined below will be used to identify chemicals of potential ecological concern (COPECs) that warrant evaluation in Step 2c.

Constituents will be excluded from further evaluation (i.e., not identified as preliminary COPECs) in the SLERA if:

- The maximum detection is less than or equal to the BTV;
- For non-bioaccumulative constituents detected at concentrations greater than the BTVs, the HQ is less than or equal to 1;
- For bioaccumulative constituents detected at concentration greater than the BTVs, the HQ is less than or equal to 1 and the ESV is protective of upper trophic level receptors; or
- The constituent is an essential nutrient (calcium, magnesium, potassium, and sodium).

Constituents will be identified as COPECs for further evaluation in Step 2c of the SLERA if:

- The constituent is present at concentrations greater than the BTV, or there is no BTV, and the HQ is greater than 1;
- For bioaccumulative constituents detected at concentrations greater than the BTV, or that do not have a BTV, the HQ is less than or equal to 1 but the ESV is not protective of upper trophic-level receptors or the ESV's basis is unknown;
- The maximum detection exceeds the BTV and an ESV or appropriate surrogate is not available; or
- The constituent lacks both a BTV and ESV or appropriate surrogate.

5.3 STEP 2C – SLERA REFINEMENT

Because of the conservatism inherent in the Step 2b screening, further evaluation of the COPECs will be conducted. This step is referred to as the SLERA refinement, with goals of providing a more realistic evaluation of potential risks and attaining KSCRT consensus on a scientifically-defensible recommendation to (i) terminate the ERA process and submit a request for no further action; (ii) propose a risk management strategy; or (iii) conduct a BERA (Geosyntec, 2019).

SLERA refinement includes quantitative and qualitative refinements to the list of COPECs identified during Step 2b. Refinements will be presented and evaluated following a weight-of-evidence approach to provide recommendations for further assessment or elimination of remaining COPECs. Examples of screening refinements are listed below.

- Mean concentrations within the range of background values.
- Exceedance frequency and magnitude.
- Spatial distribution of COPECs.
- Bioaccumulation or acute toxicity of COPECs.
- Bioavailability of COPECs.
- Basis for the ESV used in Step 2b.

5.4 UNCERTAINTY ASSESSMENT

The SLERA will include a discussion of the uncertainties associated with the risk assessment process, including uncertainties resulting from chemical analysis and any other uncertainties identified during the SLERA. The uncertainty assessment for chemical analysis will include a tabular screening of reporting limits for non-detected analytes against ESVs.

6.0 REFERENCES

Geosyntec Consultants, Inc., 2019. Decision Process Document for the RCRA Corrective Action Program, John F. Kennedy Space Center, Florida. Revision 2. February.

HydroGeoLogic, Inc., 2020. Un-Numbered Operational Areas, PRL 229, Confirmatory Sampling Report Addendum, Kennedy Space Center, Florida. Revision 1. December.

IHA (InoMedic Health Applications), 2015. Un-numbered Operational Areas (UNOA) PRL 229, SWMU Assessment/Confirmation Sampling Work Plan, Kennedy Space Center, Florida.

Jacobs Engineering Group, Inc. (Jacobs) and CORE Engineering & Construction, Inc. (CORE), 2019. Un-Numbered Operational Areas, PRL 229, Confirmation Sampling Report, Kennedy Space Center, Florida. Revision 0. September.

Massachusetts Department of Environmental Protection (MassDEP), 2007. Sediment Toxicity of Petroleum Hydrocarbon Fractions. September.

U.S. Environmental Protection Agency (USEPA), 1989. Risk Assessment Guidance for Superfund Volume I Human Health Evaluation Manual (Part A), Interim Final. EPA/540/1-89/002. December.

USEPA, 1997. Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments, Interim Final. EPA 540-R-97-006. June.

University of Florida, 2016. Florida Ecological Risk Assessment Guidance Document, Final. November.

TABLES

Table 5.1
Federal and State Listed Species Potentially Present On Site
Railroad Tie Disposal Area, Un-Numbered Operational Areas, PRL 229
Kennedy Space Center, Florida

Common Name *(Scientific Name)*	Status
Reptiles	
Atlantic salt marsh snake *(Nerodia clarkii taeniata)*	FT
Eastern indigo snake *(Drymarchon corais couperi)*	FT
Gopher tortoise *(Gopherus polyphemus)*	FC/ST
Green sea turtle *(Chelonia mydas)*	FT
Hawksbill sea turtle *(Eretmochelys imbricata)*	FE
Leatherback sea turtle *(Dermochelys coriacea)*	FE
Loggerhead sea turtle *(Caretta caretta)*	FT
Birds	
Eastern black rail *(Laterallus jamaicensis ssp. jamaicensis)*	FT
Florida scrub-jay *(Aphelocoma coerulescens)*	FT
Red knot *(Calidris canutus rufa)*	FT
Wood stork *(Mycteria americana)*	FT
Mammals	
Southeastern beach mouse (*Peromyscus polionotus niveiventris*)	FT
Insects	
Monarch butterfly *(Danaus plexippus)*	FC
Plants	
Carter's mustard *(Warea carteri)*	FE
Lewton's polygala (*Polygala lewtonii)*	FE

FC = federal candidate for listing

FE =federally listed as endangered

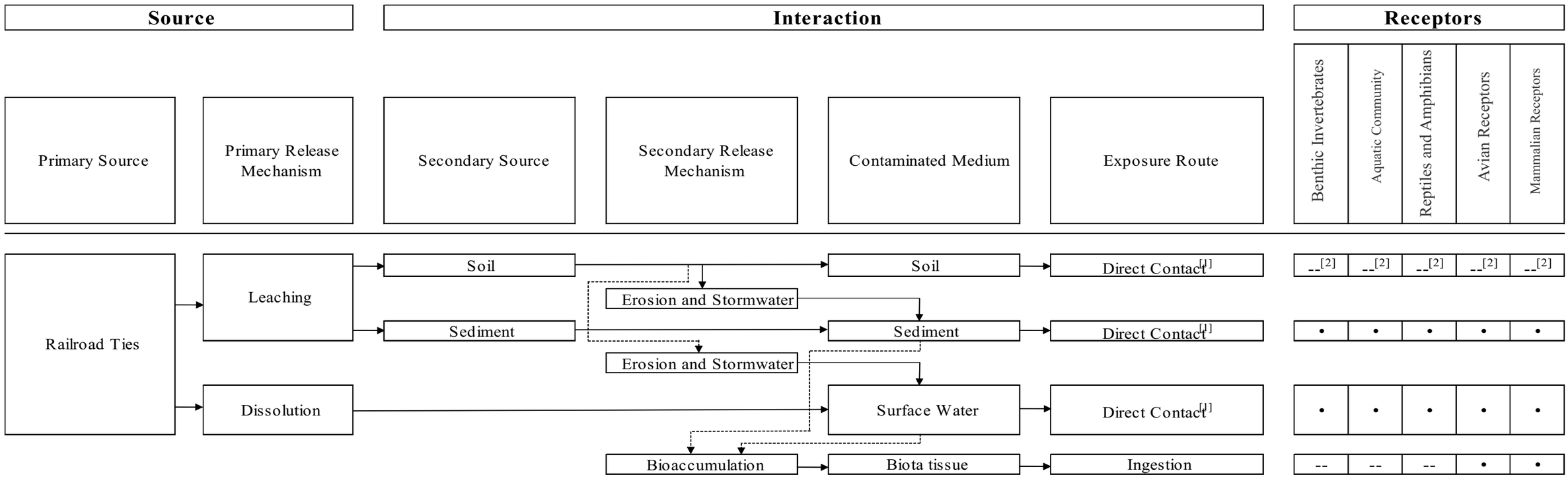
FT = federally listed as threatened

ST = state listed as threatened

Table 5.2
Preliminary Assessment and Measurement Endpoints
Railroad Tie Disposal Area, Un-Numbered Operational Areas, PRL 229
Kennedy Space Center, Florida

Assessment Endpoint	Basis For Assessment Endpoint	Measurement Endpoint
Growth, survival, and reproduction of benthic invertebrate communities.	Benthic invertebrates recycle nutrients and condition the sediment. They also are important prey species for upper trophic level receptors.	Comparison of the maximum detections reported for sediment and surface water samples to ecological screening values. A refined evaluation, including incorporation of mean concentration, detection frequency, lateral distribution, etc., will be completed, as warranted by the initial comparison.
Growth, survival, and reproduction of aquatic communities, including fish.	A healthy aquatic community is critical to maintenance of water body function. Members of this community serve as prey species for upper trophic level receptors.	
Growth, survival, and reproduction of aquatic mammals.	Aquatic/wetland mammals utilize a wide variety of food sources, including insects, amphibians, benthic invertebrates, and fish, thereby providing balance for the aquatic ecosystem. Mammals may be particularly vulnerable to bioaccumulative chemicals.	
Growth, survival, and reproduction of aquatic birds.	Aquatic/wetland birds utilize a wide variety of food sources, including insects, amphibians, benthic invertebrates, and fish. Birds may be particularly vulnerable to bioaccumulative chemicals.	

FIGURE



Notes:
[1] Direct contact includes incidental ingestion, dermal contact, and inhalation exposure pathways. Although wildlife receptors may be exposed to chemicals via dermal contact and inhalation, there are no equations or methods available to estimate intake by these exposure routes. Exposure via dermal contact and inhalation will not be quantified or evaluated.

[2] Exposure to terrestrial habitat is outside of the scope of the SLERA because soil contamination will be remediated as part of the Interim Measure.

SLERA=Screening Level Ecological Risk Assessment

\\srv-gst-01\HGLGIS\KSC_NS1002\PRL_229\Pond_CSWP\(3-01)CSM.cdr
1/11/22 JG
Source: HGL

Legend

• Potentially Complete Exposure Route

-- Incomplete Exposure Route

Figure 3.1
Conceptual Site Model

ATTACHMENT A.1

U.S. FISH & WILDLIFE SERVICE IPAC REPORT

IPaC **U.S. Fish & Wildlife Service**

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Brevard County, Florida

Local office

North Florida Ecological Services Field Office

(904) 731-3336
(904) 731-3045

7915 Baymeadows Way, Suite 200
Jacksonville, FL 32256-7517

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information. IPaC only shows species that are regulated by USFWS (see FAQ).
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS

Southeastern Beach Mouse Peromyscus polionotus niveiventris — Threatened
Wherever found
No critical habitat has been designated for this species.
http://ecos.fws.gov/ecp/species/3951

West Indian Manatee Trichechus manatus — Threatened
Wherever found — Marine mammal
There is **final** critical habitat for this species. The location of the critical habitat is not available.
http://ecos.fws.gov/ecp/species/4469

Birds

NAME	STATUS

Eastern Black Rail Laterallus jamaicensis ssp. jamaicensis — Threatened
Wherever found
No critical habitat has been designated for this species.
http://ecos.fws.gov/ecp/species/10477

Florida Scrub-jay Aphelocoma coerulescens — Threatened
Wherever found
No critical habitat has been designated for this species.
http://ecos.fws.gov/ecp/species/6174

Red Knot Calidris canutus rufa — Threatened
Wherever found
There is **proposed** critical habitat for this species. The location of the critical habitat is not available.
http://ecos.fws.gov/ecp/species/1864

Wood Stork Mycteria americana — Threatened
No critical habitat has been designated for this species.
http://ecos.fws.gov/ecp/species/8477

Reptiles

NAME	STATUS

Atlantic Salt Marsh Snake Nerodia clarkii taeniata — Threatened
Wherever found
No critical habitat has been designated for this species.
http://ecos.fws.gov/ecp/species/7729

Eastern Indigo Snake Drymarchon corais couperi — Threatened
Wherever found
No critical habitat has been designated for this species.
http://ecos.fws.gov/ecp/species/646

Gopher Tortoise Gopherus polyphemus — Candidate
No critical habitat has been designated for this species.
http://ecos.fws.gov/ecp/species/6994

Green Sea Turtle Chelonia mydas — Threatened
There is **final** critical habitat for this species. The location of the critical habitat is not available.
http://ecos.fws.gov/ecp/species/6199

Hawksbill Sea Turtle Eretmochelys imbricata — Endangered
Wherever found
There is **final** critical habitat for this species. The location of the critical habitat is not available.
http://ecos.fws.gov/ecp/species/3656

Leatherback Sea Turtle Dermochelys coriacea — Endangered
Wherever found
There is **final** critical habitat for this species. The location of the critical habitat is not available.
http://ecos.fws.gov/ecp/species/1493

Loggerhead Sea Turtle Caretta caretta — Threatened
There is **final** critical habitat for this species. The location of the critical habitat is not available.
http://ecos.fws.gov/ecp/species/1110

Insects

NAME	STATUS

Monarch Butterfly Danaus plexippus — Candidate
Wherever found
No critical habitat has been designated for this species.
http://ecos.fws.gov/ecp/species/9743

Flowering Plants

NAME	STATUS

Carter's Mustard Warea carteri — Endangered
Wherever found
No critical habitat has been designated for this species.
http://ecos.fws.gov/ecp/species/5583

Lewton's Polygala Polygala lewtonii — Endangered
Wherever found
No critical habitat has been designated for this species.
http://ecos.fws.gov/ecp/species/6688

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME

BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE. "BREEDS ELSEWHERE" INDICATES THAT THE BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)

American Kestrel *Falco sparverius paulus* — Breeds Apr 1 to Aug 31

This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
http://ecos.fws.gov/ecp/species/9587

Bald Eagle *Haliaeetus leucocephalus* — Breeds Sep 1 to Jul 31

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.
http://ecos.fws.gov/ecp/species/1626

Black Skimmer *Rynchops niger* — Breeds May 20 to Sep 15

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
http://ecos.fws.gov/ecp/species/5234

Great Blue Heron *Ardea herodias occidentalis* — Breeds Jan 1 to Dec 31

This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA

Gull-billed Tern *Gelochelidon nilotica* — Breeds May 1 to Jul 31

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
http://ecos.fws.gov/ecp/species/9501

King Rail *Rallus elegans* — Breeds May 1 to Sep 5

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
http://ecos.fws.gov/ecp/species/8936

Lesser Yellowlegs Tringa flavipes This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. http://ecos.fws.gov/ecp/species/9679	Breeds elsewhere
Magnificent Frigatebird Fregata magnificens This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds Oct 1 to Apr 30
Prairie Warbler Dendroica discolor This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 1 to Jul 31
Reddish Egret Egretta rufescens This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. http://ecos.fws.gov/ecp/species/7617	Breeds Mar 1 to Sep 15
Ruddy Turnstone Arenaria interpres morinella This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds elsewhere
Short-billed Dowitcher Limnodromus griseus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. http://ecos.fws.gov/ecp/species/9480	Breeds elsewhere
Swallow-tailed Kite Elanoides forficatus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. http://ecos.fws.gov/ecp/species/8938	Breeds Mar 10 to Jun 30
Willet Tringa semipalmata This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Apr 20 to Aug 5

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (▪)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

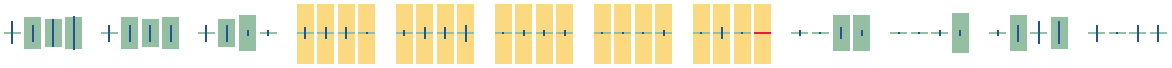
No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

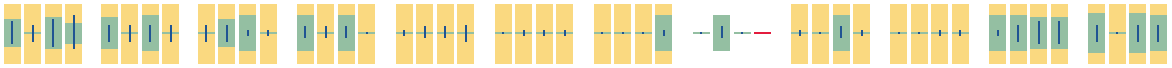
▪ probability of presence ▪ breeding season | survey effort – no data

SPECIES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC

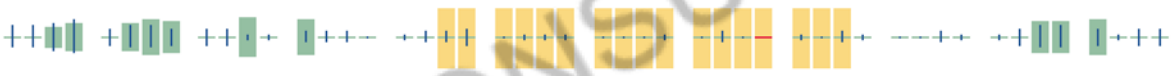
American Kestrel BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)



Bald Eagle Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)

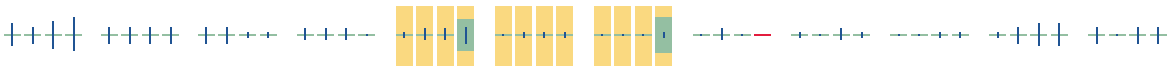


Black Skimmer BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

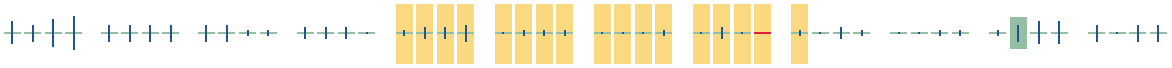


Great Blue Heron BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)

Gull-billed Tern BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



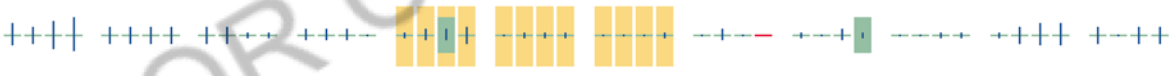
King Rail BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



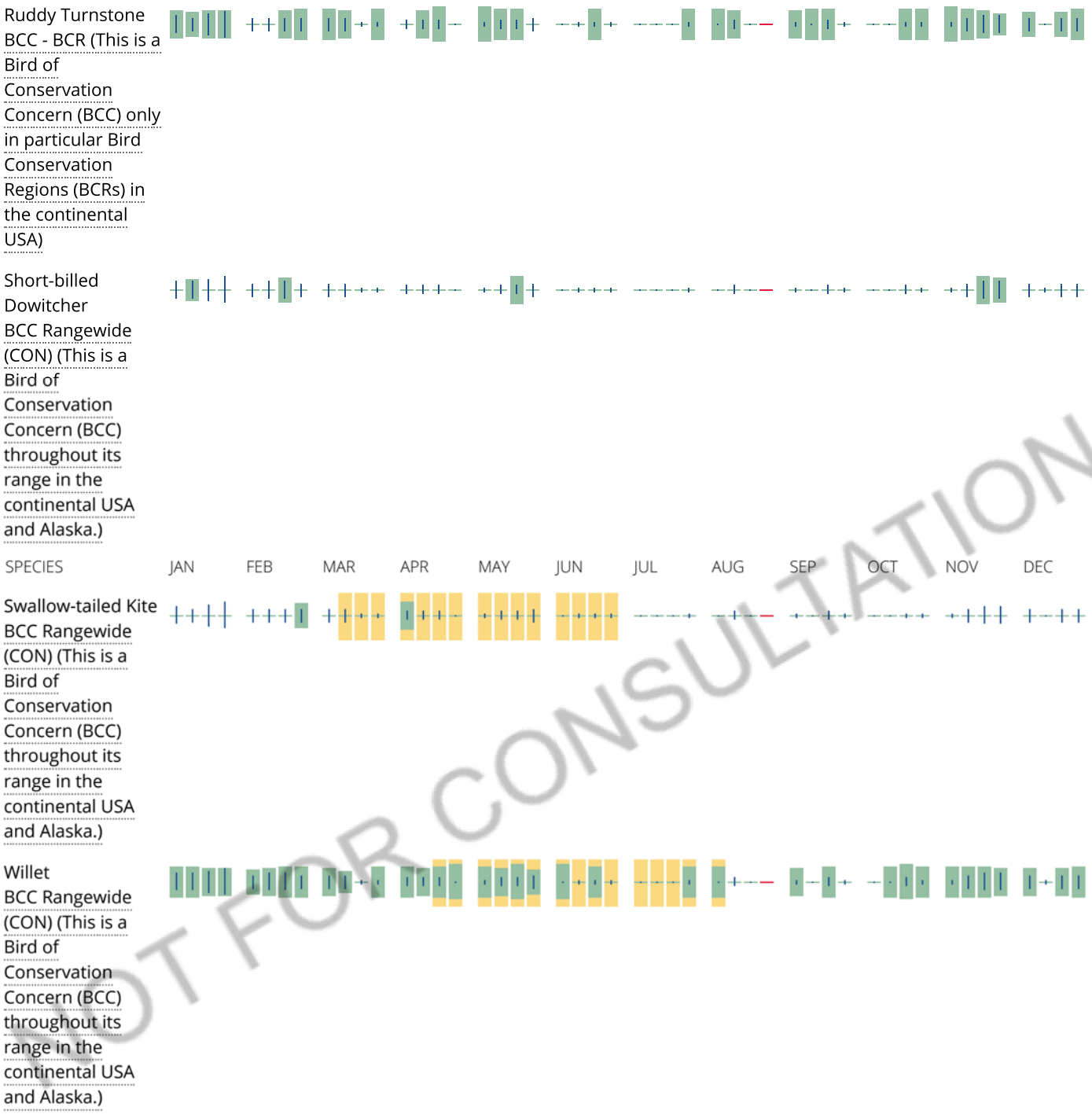
Lesser Yellowlegs BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Magnificent Frigatebird BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)

Prairie Warbler BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Reddish Egret BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. *offshore energy development or longline fishing*).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Marine mammals

Marine mammals are protected under the Marine Mammal Protection Act. Some are also protected under the Endangered Species Act[1] and the Convention on International Trade in Endangered Species of Wild Fauna and Flora[2].

The responsibilities for the protection, conservation, and management of marine mammals are shared by the U.S. Fish and Wildlife Service [responsible for otters, walruses, polar bears, manatees, and dugongs] and NOAA Fisheries[3] [responsible for seals, sea lions, whales, dolphins, and porpoises]. Marine mammals under the responsibility of NOAA Fisheries are **not** shown on this list; for additional information on those species please visit the Marine Mammals page of the NOAA Fisheries website.

The Marine Mammal Protection Act prohibits the take (to harass, hunt, capture, kill, or attempt to harass, hunt, capture or kill) of marine mammals and further coordination may be necessary for project evaluation. Please contact the U.S. Fish and Wildlife Service Field Office shown.

1. The Endangered Species Act (ESA) of 1973.
2. The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) is a treaty to ensure that international trade in plants and animals does not threaten their survival in the wild.
3. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following marine mammals under the responsibility of the U.S. Fish and Wildlife Service are potentially affected by activities in this location:

NAME
West Indian Manatee *Trichechus manatus* http://ecos.fws.gov/ecp/species/4469

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

This location overlaps the following National Wildlife Refuge lands:

LAND	ACRES

MERRITT ISLAND NATIONAL WILDLIFE REFUGE 129,277.02 acres

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

THERE ARE NO KNOWN WETLANDS AT THIS LOCATION.

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal,

state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.