



Red-bellied woodpecker  
Area HA-2a (LAA-3)  
May 5, 2022 JCS

# Levert Ecological Risk Assessment

Helen Connelly, Ph.D.  
December 20, 2022

*August J. Levert, Jr., Family, LLC, et al. v. BP America  
Production Company, Grand River Oil & Gas Field*

Iberville Parish, Louisiana

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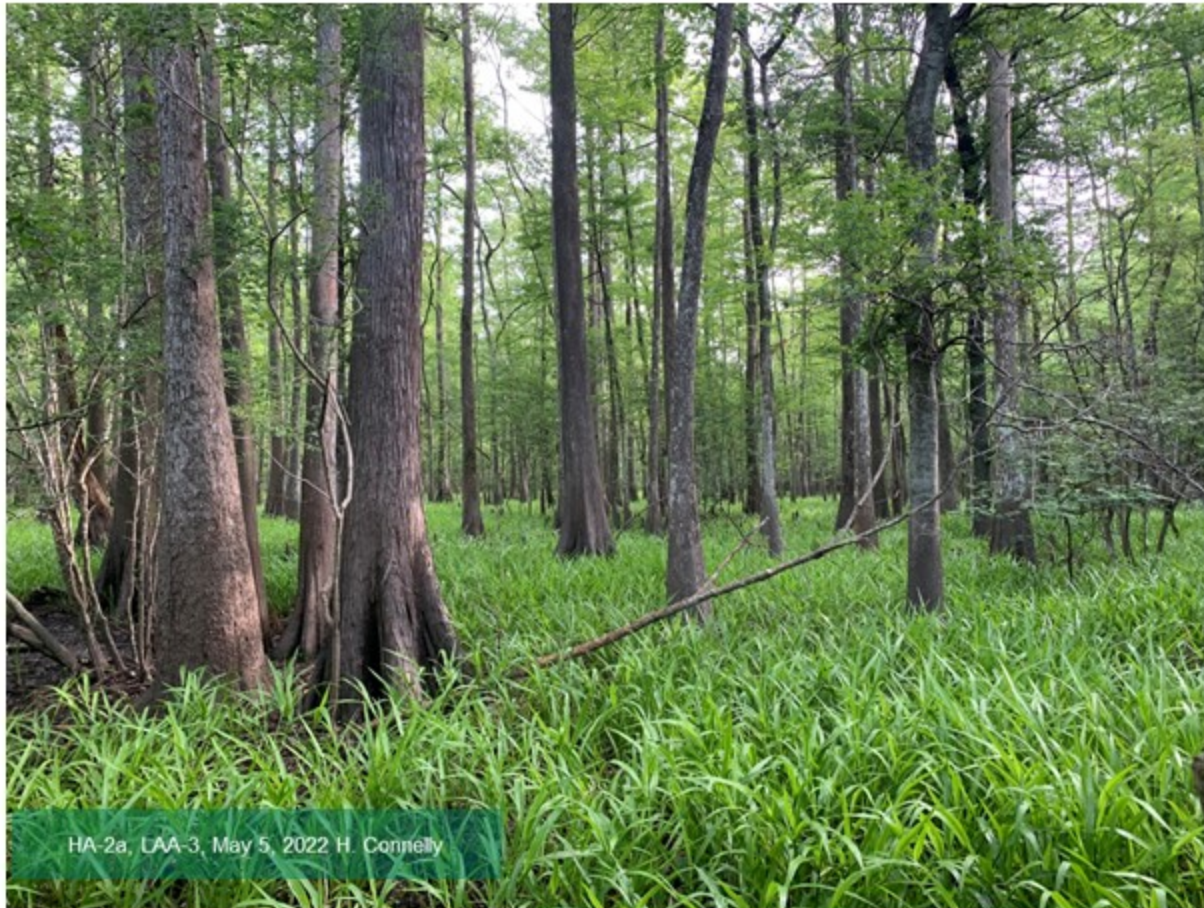


## Helen Connelly, Ph.D.



- B.S. degree in Geology, LSU
- Ph.D. in Toxicology, LSU School of Veterinary Medicine
- Adjunct Professor, LSU Department of Environmental Sciences, Energy, Coast, and the Environment
- 20 years experience in toxicology and risk assessment in Louisiana and the Gulf Coast
- Areas of expertise include ecotoxicology, ecological risk assessment, and wetland sciences

# Ecological Risk Assessment Method



- *Review*: Available Soil Data
- *Collect*: Vegetation and Wildlife Field Data
- *Analyze*: Vegetation and Wildlife Field Data
- *Analyze*: Soil Data (HET, ICON)
- *Calculate*: Ecological Risk
- *Recommend*: Remedial Decisions

Exhibit 1: H. Connelly Report (August Levert\_BP Plan\_009489 – 009492, 009615)

# RECAP Points to EPA Guidance

Louisiana Department of Environmental Quality

## Risk Evaluation/ Corrective Action Program (RECAP)



Prepared by:  
Louisiana Department of Environmental Quality  
Corrective Action Group

October 20, 2003

generate data to be used in evaluating corrective alternatives. Ecological risk assessments performed under the RECAP shall be conducted in accordance with current EPA guidelines (*Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments*, EPA 1997). These guidelines shall be used in conjunction with the guidelines presented in RECAP when conducting an ERA.

Exhibit 1: H. Connelly Report (August Levert\_BP Plan\_0099491 -009911)

# Ecological Risk Assessment Conclusions



- Habitat: freshwater emergent and forested/shrub wetlands and waterbodies (canals and Willow Lake)
- Property Providing Ecological Services
- Property ecosystem providing habitat and feeding grounds for birds, mammals, reptiles, amphibians, and crustaceans
- Site-Specific Risk Assessment Prepared per USEPA and LDEQ Guidance Shows No Ecological Risk
- All Lines of Evidence Weighed: No Ecological Effects or Risk
- Site Ecology Does Not Require Remediation

Exhibit 1: H. Connelly Report (August Levert\_BP Plan\_009491 – 009911, 009654)

# Ecological Risk Assessment Method



- *Review*: Available Soil Data (ICON)
- *Collect*: Vegetation and Wildlife Field Data
- *Analyze*: Vegetation and Wildlife Field Data
- *Analyze*: Soil Data (ERM, ICON)
- *Calculate*: Ecological Risk
- *Recommend*: Remedial Decisions

Exhibit 1: H. Connelly Report (August Levert\_BP Plan\_009489 – 009492, 009615)

# Field Team: Dr. Helen Connelly, Jody Shugart, Emily Martin



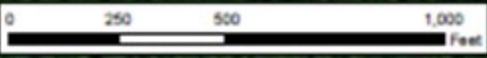
- Vegetation and Wildlife
- Species Identification
- Biota Survey
- Wetland Characterization
- Reference Locations
- Salt Investigation
- Photography
- Map and Document
- Site Investigation

# Vegetation and Wildlife Habitat Survey

- 7 Survey Locations
- Metals
- TPH
- Plaintiff Claims of Impact



Exhibit 1: H. Connelly Report, Figure 5A (August Levert\_BP Plan\_009596)





**LAA-2  
(HA-1)**

**Bottomland  
Hardwood forest**



**Conservation: Little Blue Heron, Prothonotary Warbler, Yellow-throated Vireo  
10 bird species  
33 plant species**



**LAA-3  
(HA-2a)**

**Cypress swamp,  
bottomland hardwood  
forest, and open water**

**Conservation: Little Blue Heron, Prothonotary Warbler, Yellow-throated Vireo  
11 bird species  
31 plant species**



**LAA-3  
(HA-2b)**

**Bottomland hardwood  
forest**

**Conservation: Chimney Swift, Prothonotary Warbler  
8 bird species  
46 plant species**



**LAA-1  
(HA-5)**

**Bottomland hardwood  
forest, cypress swamp**

**Conservation: Prothonotary Warbler  
6 bird species  
21 plant species**



**HA-4 (Adjacent to  
LAA-1)**

**Bottomland hardwood  
forest**



**Conservation: Prothonotary Warbler**  
4 bird species  
26 plant species



# Vegetation Observations Performed

## ➔ No Evidence of Salt Impact

Any Evidence of Damage?	USEPA / LDEQ	Wetland Forest Survey	Cypress Swamp Survey	Emergent Marsh Survey
		Damage Present?		
<i>Damage</i> to trees?	USEPA, 1992, pg. 9	NO	NO	NO
<i>Barren areas</i> with no vegetation?	USEPA, 1997, pgs. 1-3, 37	NO	NO	NO
<i>Absent species</i> , that are normally present?	USEPA, 1997, pg. 7	NO	NO	NO
High incidence of <i>pathologies</i> ?	USEPA, 1997, pg. 7	NO	NO	NO
<i>Ecological effects</i> observed during field surveys?	USEPA, 1998	NO	NO	NO
<i>Obvious impacts</i> to ecological receptors/habitats?	RECAP, 2003, Form 18	NO	NO	NO

# Food Chain

## Top Predators



Prey  
Small mammals; birds; fish/reptiles/amphibians

## Secondary Consumers



Prey  
Invertebrates (beetles, bees, wasps, grasshoppers, crickets)

## Primary Consumers



Diet  
plants

# Ecosystem Overview





# Habitat Evaluation

## Vegetation Assessment

Plant Species	Wetland Plants (USDA)	Woody Species	Comparison to Reference
87	Majority Wetland Species	43%	74% of species in common with Sherburne WMA South Farm Unit

## Wildlife Habitat Assessment

Wildlife Species	Bird Population	Avian Food Chain
68	Primarily Insectivores 4 Species of Greatest Conservation Need 22 Species Observed	23% Top Predators and Scavengers 73% Secondary Consumers 5% Primary Consumers



# Quantitative Ecological Risk Assessment

## USEPA ERA 8-Step Process

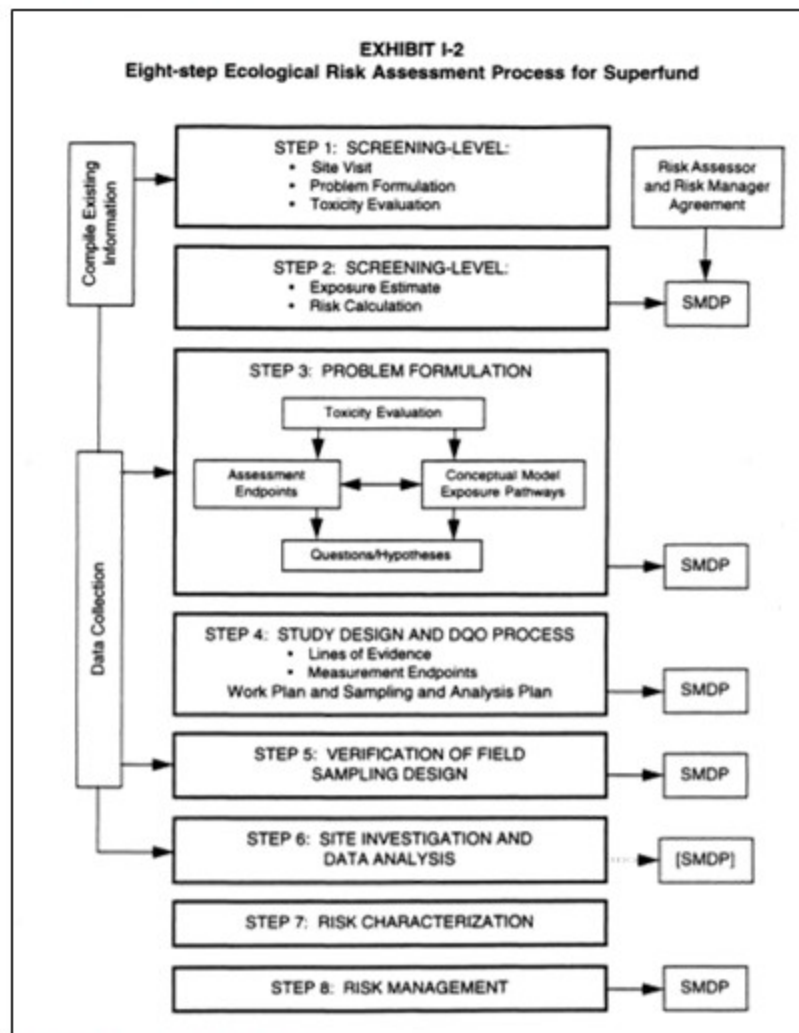


Exhibit 1: H. Connelly Report, Figure 6 (August Lvert\_BP Plan\_009548)

# Screening Assessment



# Screening Assessment

## Soil Screening Values

Constituent	Soil Ecological Screening Value	Background USGS	Screening Comparison	
			Soil Concentration [Maximum Value]	Soil Screening Exceedance [Y/N]
Property Excluding SRAs				
Arsenic	18	12 <sup>a</sup>	16.6	N
Barium	2424	775	1370	N
Cadmium	0.36	0.8	1.7	Y
Chromium	26	84	34	N
Lead	11	44	42.8	N
Mercury	N/S	0.11	1.47	Y
Selenium	0.52	1.0	ND	N
Silver	4.2	ND	ND	N
Strontium	N/S	203	448	Y
Zinc	46	140	199	Y

**Notes**

Concentrations are in mg/kg-dry.

ND = Non-Detect.

Soil Ecological Screening Value is the lowest of the available USEPA Eco-SSLs.

Background, USGS: Background Data for Louisiana, 95% Upper Tolerance Limit, United States Geological Survey, 2013.

There are no Eco-SSLs or other reliable ecological screening values for strontium, and strontium is not further assessed.

Mercury is retained for BERA due to exceedance of Louisiana soil background (0.11 mg/kg, USGS)

<sup>a</sup> Arsenic value is LDEQ-approved soil background for Louisiana.

## Sediment Screening Values

Constituent	NOAA TEC	NOAA PEC	Screening Comparison	
			Soil Concentration [Maximum Value]	Soil Screening Exceedance [Y/N]
Property Excluding SRAs				
Arsenic	9.79	33	16.6	N
Barium	N/S	N/S	1370	N
Cadmium	0.99	4.98	1.7	N
Chromium	43.4	111	34	N
Lead	35.8	128	42.8	N
Mercury	0.18	1.06	1.47	Y
Selenium	N/S	N/S	ND	N
Silver	N/S	N/S	ND	N
Strontium	N/S	N/S	448	N
Zinc	121	459	199	N

**Notes**

Concentrations are in mg/kg-dry.

ND = Non-Detect.

Sediment screening values are included to account for portions of the forest that have standing water.

Sediment Ecological Screening Values are NOAA TEC and NOAA PEC (NOAA SQuiRT, 2008).

Arsenic, Lead, and zinc exceed the TEC and not the PEC.

# XRD and EDX Results Show Barium Found on Property Is Barium Sulfate, NOT Soluble Barium (Ba<sup>2+</sup>)

Waypoint Analytical  
Report # 22-202-0001  
Hydro-Environmental Technology



Core Mineralogy, Inc.  
Analytical Consulting Services

Semi Quantitative X-Ray Diffraction (XRD) &  
Energy Dispersive X-Ray Spectrometry (EDX)

[www.coremineral.com](http://www.coremineral.com)  
100 Jared Drive  
Broussard, LA 70518  
Phone: (337) 984-0500  
e-mail: mansourr@coremineral.com  
Analyst: Mansour Rahmatian (M.S.)  
CMI # 22072202 EDXXRD  
Date Reported: 7/26/2022

Sample Submitted to CMI Labs on: 7/22/2022 @ 8:45 AM  
Attention: Amy Jackson

Client Sample ID	Lab #	Sampling Date	Sampling Time	CMI Sample #	Semi Quantitative Weight Percent Elemental Composition by EDX Normalized to 100%																	Mineral Phases Identified by XRD															
					Carbon (C)	Oxygen (O)	Sodium (Na)	Magnesium (Mg)	Aluminum (Al)	Silicon (Si)	Phosphorus (P)	Sulfur (S)	Chlorine (Cl)	Potassium (K)	Calcium (Ca)	Chromium (Cr)	Manganese (Mn)	Iron (Fe)	Zinc (Zn)	Strontium (Sr)	Barium (Ba)	Titanium (Ti)	Total	Quartz (SiO <sub>2</sub> )	K-Field spars (KAlSi <sub>3</sub> O <sub>8</sub> )	Plagioclase (NaAlSi <sub>3</sub> O <sub>8</sub> )	Calcite (CaCO <sub>3</sub> )	Pyrite (FeS <sub>2</sub> )	Fe Dolomite (FeMgCa(CO <sub>3</sub> ) <sub>2</sub> )	Barium Sulfide (BaS)	Barite (BaSO <sub>4</sub> )	Witherite (BaCO <sub>3</sub> )	Barium Chloride (BaCl <sub>2</sub> )	Barite (BaO)	Barium Peroxide (BaO <sub>2</sub> )	Total Clay	Total
SB-03 (0-2)	71734	6/21/22	11:40	17778	2.17	32.64	0.26	0.35	2.47	8.66	ND	9.07	0.04	0.63	1.87	ND	ND	3.01	ND	ND	38.84	ND	100	19.5	0.5	0.6	3.0	ND	ND	ND	64.1	ND	ND	ND	ND	12.3	100
SB-04 (0-2)	71735	6/21/22	12:10	17779	2.27	31.41	0.16	0.21	1.66	7.09	ND	10.03	0.02	0.48	1.67	ND	ND	2.05	ND	ND	42.96	ND	100	13.3	0.3	1.2	3.6	ND	ND	ND	73.4	ND	ND	ND	ND	8.2	100
SB-11 (2-4)	71736	6/22/22	13:45	17780	3.90	35.68	0.27	0.72	5.19	13.25	ND	6.46	0.03	1.31	1.68	ND	ND	3.41	0.42	ND	27.68	ND	100	17.8	1.4	1.0	2.6	ND	ND	ND	44.9	ND	ND	ND	ND	32.3	100
SB-12 (2-4)	71737	6/22/22	14:30	17781	2.67	32.53	0.20	0.31	2.56	8.77	ND	9.14	0.01	0.62	1.46	ND	ND	2.20	0.41	ND	39.14	ND	100	18.3	0.3	1.4	3.0	ND	ND	ND	66.0	ND	ND	ND	ND	11.1	100

ND = None Detected

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# Site-Specific BERA



Gulf Coast Toad  
Area HA-1 (LAA-2)  
Trophic Level: Secondary  
May 5, 2022 JCS

# Preliminary AOIs



# BERA Receptors



**Northern Cardinal**



**American Robin**



**Spotted Sandpiper**



**Mallard**



**Snowy Egret**



**Swamp Rabbit**



**Marsh Rice Rat**



**American Mink**



# Risk Calculation

Wildlife Risk Model (USEPA, 2003)

$$\frac{([Soil_a \times P_s \times FIR \times AF_{as}] + [\sum_i^N B_i \times P_i \times FIR \times AF_{ai}]) \times AUF}{TRV} = HQ$$

Where:

- HQ = Hazard Quotient for analyte  $a$  (COPEC  $a$ ) (unitless)
- Soil $_a$  = Concentration of analyte  $a$  (COPEC  $a$ ) in soil (mg/kg dry weight)
- N = Number of different biota types in diet (food types)
- B $_i$  = Analyte  $a$  (COPEC  $a$ ) in biota type (i) (mg/kg dry weight)
- P $_i$  = Proportion of biota type (i) in diet
- FIR = Food ingestion rate (kg food [dry weight]/kg BW [wet weight]/day); BW = body weight
- AF $_{ai}$  = Absorbed fraction of analyte  $a$  (COPEC  $a$ ) from biota type (i)
- AF $_{as}$  = Absorbed fraction of analyte  $a$  (COPEC  $a$ ) from soil (s)
- TRV $_a$  = The estimated no adverse effect dose (mg/kg BW/day) for the surrogate species
- Ps = Soil ingestion as a proportion of diet
- AUF = Area use factor (based on home range and time [temporal] factor)

# HQ Calculations for Mallard

## SB-06R

All HQs < 1



ATTACHMENT I-5. Table 4

Soil HQ Calculations (Average Conc.): SB-06R (0-3'): Mallard  
 August J. Levert, Jr., Family, LLC, et al. v. BP America Production Company  
 Grand River Oil & Gas Field, Iberville Parish, Louisiana

Mallard			Calculations based on average values						
Parameter	Value	Symbol	Absorbed Fraction (AF)			Absorbed Concentration from Medium and Biota			
Body weight (kg)	1.134	BW							
Soil ingestion proportion	0.033	Ps							
Food ingestion Rate (kg/kgBW/d)	0.05	FIR							
Proportion of diet, plants	0.5	Pp							
Proportion of diet, benthic inverts	0.5	Pbi							
Spatial factor	0.00012	SF							
Temporal factor	0.3	TF							
Area use factor	0.000036	AUF							
	Average Soil Concentration (0-3')	TRV	Soil bio-factor	BCF plants	BCF benthic inverts	Soil/ Sediment	Plants	Benthic Inverts	HQ
COPEC									
Cadmium	0.92	1.47	0.036	0.586	0.614	0.0000546	0.0135	0.0141	0.000000677
Cadmium Sulfide	0.92	79	0.036	0.586	0.614	0.0000546	0.0135	0.0141	1.26E-08

**Notes:**  
 Soil concentrations are in mg/kg dry weight.  
 Average soil concentrations in SB-06R.

# HQs

Soil Hazard Quotients (HQs)									
Single Point Locations	COPEC	Avian Receptor Species					Mammalian Receptor Species		
		Northern Cardinal	American Robin	Spotted Sandpiper	Mallard	Snowy Egret	Swamp Rabbit	Marsh Rice Rat	American Mink
Average Concentration as Exposure Concentration									
HA-5	Bioavailable Cadmium	0.000204	0.014	0.000206	0.000000972	0.00000137	0.000249	0.00264	0.00000852
	Cadmium, Limited Bioavailability	0.00000379	0.00026	0.00000384	0.0000000181	0.0000000256	0.00000243	0.0000257	0.000000083
SB-06R	Bioavailable Cadmium	0.000142	0.00973	0.000144	0.000000677	0.000000957	0.000173	0.00184	0.00000593
	Cadmium, Limited Bioavailability	0.00000264	0.000181	0.00000268	0.0000000126	0.0000000178	0.00000168	0.0000179	0.0000000578
SB-07R	Bioavailable Cadmium	0.000139	0.00952	0.00014	0.000000663	0.000000937	0.000169	0.0018	0.00000581
	Cadmium, Limited Bioavailability	0.00000258	0.000177	0.00000261	0.0000000123	0.0000000174	0.00000165	0.0000175	0.0000000566
SB-14	Mercury	0.0000152	0.000942	0.0000464	0.000000176	0.000000942	0.0000556	0.000804	0.00000375
Maximum Concentration as Exposure Concentration									
HA-5	Bioavailable Cadmium	0.000131	0.00899	0.000132	0.000000626	0.000000885	0.00016	0.0017	0.00000549
	Cadmium, Limited Bioavailability	0.00000244	0.000167	0.00000246	0.0000000116	0.0000000165	0.00000156	0.0000166	0.0000000535
SB-06R	Bioavailable Cadmium	0.000262	0.018	0.000266	0.00000125	0.00000177	0.00032	0.0034	0.000011
	Cadmium, Limited Bioavailability	0.00000488	0.000334	0.00000495	0.0000000233	0.0000000329	0.00000312	0.0000332	0.000000107
SB-07R	Bioavailable Cadmium	0.000252	0.0172	0.000255	0.0000012	0.0000017	0.000306	0.00326	0.0000105
	Cadmium, Limited Bioavailability	0.00000468	0.000321	0.00000474	0.0000000223	0.0000000316	0.00000298	0.0000318	0.000000102
SB-14	Mercury	0.0000264	0.00163	0.0000803	0.000000305	0.00000164	0.0000966	0.00139	0.00000651

## Current and Future Use: Fishing

- Presence of fish consuming predators (Tricolored Heron, Little Blue Heron, cottonmouth, American alligators)
- Property is safe habitat for fish to thrive and humans to fish



Area HA-2b (LAA-3)  
May 5, 2022 H. Connelly

## Current and Future Use: Hunting

Property can support game animals for hunting such as squirrels, other birds, and mammals for hunting



## Future Use: Timber

- Property soils can support native timber growth
- Tree species observed: 37



# Ecological Risk Assessment Conclusions



- Habitat: freshwater emergent and forested/shrub wetlands and waterbodies (canals and Willow Lake)
- Property Providing Ecological Services
- Property ecosystem providing habitat and feeding grounds for birds, mammals, reptiles, amphibians, and crustaceans
- Site-Specific Risk Assessment Prepared Per USEPA and LDEQ Guidance Shows No Ecological Risk
- All Lines of Evidence Weighed: No Ecological Effects or Risk
- Site Ecology Does Not Require Remediation

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Spanish moth caterpillar  
Area HA-2a (LAA-3)  
Trophic Level: Primary  
May 5, 2022 JCS