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WORK PLAN FOR ESTIMATING SECRETIVE MARSH BIRD MORTALITY DEEPWATER HORIZON (MSC 252) OIL SPILL NRDA BIRD STUDY #3

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INTRODUCTION

The Deepwater Horizon (MSC 252) oil spill began April 22, 2010. Oil spill related injury to wildlife is of major concern to the natural resource trustees. Seabirds, colonial waterbirds, coastal marsh birds, and shorebirds may be susceptible to impacts from the oil. Several work plans have been developed to concurrently evaluate oil spill related injuries to these different avian guilds. This plan specifically seeks to address injury to secretive marsh birds (species that live in dense marsh vegetation and are difficult to see) by: (1) quantifying abundances and densities of secretive marsh bird species in un-oiled representative habitats; (2) quantifying the proportion of live oiled and live un-oiled birds in representative habitats through active capture of live individual birds; (3) estimating representative marsh bird mortality rates using radio telemetry; and (4) quantifying fiddler crab burrow densities to supplement our understanding of marsh-specific rail densities.

The primary species of interest are clapper rails (*Rallus longirostris*) and seaside sparrows (*Ammodramus maritimus*). Other secondary marsh bird species that may be commonly found in fresh and/or brackish water, such as king rails (*R. elegans*), least bitterns (*Ixobrychus exilis*), mottled ducks (*Anas fulvigula*), purple gallinules (*Porphyrio martinica*), moorhens (*Gallinula chloropus*), and marsh wren (*Cistothorus palustris*) are also of interest in some areas. Surveys to collect data that documents the proportion of oiling of these secondary species will be conducted opportunistically by field crews after completion of their primary data collection tasks (Methodologies B, C, and D below).

Several methods of assessing marsh bird abundances are included in this plan because efficacy of each method may vary with marsh habitat type, species, and with season. Therefore, this study design seeks to employ each methodology for estimating adult rail density in a complementary manner on each representative habitat with the goal of obtaining robust measures of marsh bird densities. Point counts and playback surveys (to address both rails and seaside sparrows), and fiddler crab densities (to augment understanding of rail densities) will be used to collect the required marsh bird abundance information. Capture of adult rails and sparrows, in conjunction with radio telemetry techniques, will be primarily used to derive estimates of the proportion of oiled birds and oil spill associated marsh bird mortality rates in representative habitats. Ideally, capture of rails and seaside sparrows, and radio telemetry of adult rails and seaside sparrows, will take place at representative marshes where rail and seaside sparrow density measures have also been taken.

STUDY AREAS (MARSH SELECTION)

Given our present knowledge of the spill, the locations of pre-assessment rail density; surveys will be allocated among three marsh habitat types in Louisiana, Mississippi, Alabama, and Florida; saline *Juncus* marsh, saline *Spartina* marsh, and brackish *Phragmites* marsh. Other brackish and freshwater marsh habitats are also of interest but

will only be assessed as needed (i.e. if oil gets into these habitats). Sites for sampling rails and seaside sparrows (capturing rails seaside sparrows to determine oiling rates, and capturing rails and seaside sparrows for mortality rate estimation) will be selected and measured after the patterns of marsh oiling become known. This will be a dynamic process and study areas will be selected soon after they are impacted by oil. Within each habitat type, a range of severity of oiling of the marsh may be selected to attempt to select a range of severity of oiling of birds, as well as range of potential indirect effects on survival via changes in prey availability. Rail and seaside sparrow capture and telemetry work will be conducted at a minimum of four sites over the initial planning time frame covered by this work plan; two months.

STUDY DESIGN

Sampling Universe.—All accessible areas of estuarine and palustrine marsh (those not eliminated as "off limits" due to lack of permission on private property, military bases, parks, WMAs, or refuges) between Taylor County, Florida and the Louisiana/Texas border (Figure 1).

Target Species.— The primary species of interest are rails and seaside sparrows. In certain areas, secondary species may include marsh wrens, least bitterns, mottled ducks, purple gallinules and common moorhens. Secondary species will be opportunistically assessed for percent oiling and/or may be considered for further assessment at a later date.

Sample Units.—Units will vary with each sample methodology. Rail density survey units will be variable distance circles for the point counts and fiddler crab burrow densities. Individual birds will be used as the unit to report the numbers of dead oiled birds, the number and/or proportion(s) of live oiled birds, and/or mortality rates.

Stratification.—Initial stratification will be considered among representative types of marshes based on vegetation types (up to three strata), but post stratification also may occur to describe the status (changing or static) of marsh oiling.

Sample Selection, Data Collection, Survey Frequency and Duration and Data Analysis.—Variable among survey types (see below)

METHODS

Objective 1: Collection of spatial distribution and density data on clapper rails and seaside sparrows in representative un-oiled habitats.

Methodology B: Marsh bird abundance/density quantification using point count and vocalization playback surveys.

Density estimates may be augmented by other techniques to more fully sample rail and other smaller birds of interest: seaside sparrow and marsh wren. A standardized set of protocols developed by Conway (2005) will be utilized in a consistent manner by each of the State Trustees for surveying these secretive marsh birds. Briefly, the methods involve visiting a series of randomly selected points, and recording all marsh birds seen or heard in five minutes, followed by additional recording of birds responding to playbacks of all target species. In addition to rail species, other important marsh species such as the seaside sparrow and marsh wrens will also be counted with visual and auditory detections but not call playback. Distances in meters from center points are recorded for every detected bird to estimate detection probability. Surveys are often conducted from a boat, which provides observers with a high vantage point from which to see birds that might be otherwise obscured by tall emergent vegetation.

These point count and vocalization playback surveys will be conducted in each of the marsh types. Points within randomly selected grids will be selected as starting points based on access along water courses. From start locations, routes will be established along water courses and will be comprised of 8 points at least 500 meters apart; the average number of points that can be effectively sampled by two observers in a single morning. The daily effective period when vocalization playback surveys can be conducted is one hour before sunrise until 9:00AM local time.

Just because a species is not detected and counted at a point doesn't necessarily mean it isn't there. The protocols developed by Conway (2005) call for repeated visits to each point during a single season, which allows for estimation of occupancy, defined as the probability that a particular area is occupied by a species of interest (MacKenzie et al. 2006). Rush et al. (2009) used this approach to relate marsh bird occupancy to a variety of current and projected habitat conditions in the northern Gulf Coast. While multiple visits for each point are recommended by Conway 2005, to improve estimation of detection probability, only one visit per point will be considered under this plan. Additional future visits to points will be accomplished at the discretion and expense of the state co-trustees and/or cooperators.

Although repeated point visits are recommended, this may not be possible given logistical constraints associated with the magnitude and severity of this oil spill. A subset of repeated point counts may be considered. Therefore, detection distance will be used to estimate density in much the same way as with line transect sampling. Laser range finders will be used to obtain distance measurements when possible. Program DISTANCE again will be used.

Objective 2: Estimation of marsh bird oiling and mortality rates in representative habitats

Methodology C: Monitoring of mortality rates of adult rails and seaside sparrows with sub-lethal levels of visible oiling using radio telemetry.

This methodology will assess the oiling and mortality rate of un-oiled adult rails and seaside sparrows in un-oiled reference marsh areas representing the three habitat types,

and oiled rails and seaside sparrows in areas with different degrees of oiling in three marsh types that represent the main marsh habitats in the northern Gulf of Mexico region: *Spartina*, *Juncus*, and/or *Phragmites*. It is acknowledged that un-oiled birds may later become oiled. In addition, storm activity may alter the locations and severity of marsh oiling as the spill event continues through time. Therefore, the primary purpose of monitoring un-oiled birds is to provide a control condition to examine the unlikely possibility of a transmitter effect on rail mortality. Multiple methods will be used for capture including mist nets, soft catch foot hold traps, net guns, night lighting and/or night vision with dip nets and cast nets, cannon nets, decoys in combination with drop nets, whoosh nets, and/or arrays of mist-nets, and playbacks in habitats commonly used for roosting or feeding.

The degree of external and internal oiling will be quantified for all captured rails and seaside sparrows. External oiling determination will use a combination of visual, UV light response, and feather swabbing that will analyze for hydrocarbons within 24 hours after sampling. While not used to categorize a bird as being visibly oiled, internal oiling will also be assessed by taking a small blood sample that will be analyzed for hydrocarbons within 24 hours after sampling. Both external and internal evaluations will use standardized methods.

Radio transmitters will be affixed to 60 individuals within each of the mortality monitoring scenarios; at *Spartina*, *Juncus*, *Phragmites* marsh habitat types and a reference marsh area. A maximum of 240 rails will be telemetered; 60 in the reference area and 60 in each of the three marsh habitat types. A maximum of 180 seaside sparrows will be telemetered; 60 in a reference area, 60 in *Juncus* marsh and 60 in *Spartina* marsh. Seaside sparrows do not occur in *Phragmites* marshes. Radios will be glued or attached as backpacks. Using standardized methods, individuals will be tracked daily with radio receivers using boat, vehicle and aerial surveys.

Individuals will be equipped with appropriately-sized radio transmitters built by Advanced Telemetry Systems (ATS). Radio transmitter monitoring will provide data regarding on-site movements, mortality, and scavenging rate data. Under this work plan, all radio-tagged birds will be individually tracked for a minimum of two months to determine mortality. The life of the radio transmitters will likely be one year; therefore longer term monitoring may be possible.

Individuals will be tracked daily using an ATS R4000 scanning receiver by boat or truck, as well by a fixed winged aircraft with a three-element Yagi antenna attached to the strut. Once a transmitting individual is located several passes will be made to identify its location. Field staff will periodically ground check by boat, truck, or foot. Locations will be obtained at least once every other day over the study period. If a mortality signal is received, every effort will be made to recover the individual within 24 hours. Each mortality event will be photographed with a geo-referenced stamp and will be archived. An assessment of the oiling status of the carcass will be made when possible.

Mortality rate data will be incorporated as key input parameters for an overall estimated marsh bird mortality rate model (Glenn Ford, pers. com.) The percent mortality of rails (both oiled and un-oiled) will be monitored and determined over time from the proportion of dead birds found after the mortality signal of each transmitter is triggered.

Methodology D: Quantify fiddler crab burrows in un-oiled marsh habitats

Fiddler crabs play important roles in estuarine ecosystems, including effects on estuarine productivity (Montague 1980, Bertness 1985) and as food for organisms of higher trophic levels, including marsh birds such as the clapper rail (Teal 1958, Eddleman and Conway 1998). Clapper rail diets in northern Gulf Coast ecosystems are dominated by fiddler crabs (Rush et al. *in press a*), their productivity is related to fiddler crab density (Rush 2009), and their home range sizes (and therefore density) are also typically inversely correlated with fiddler crab density (i.e., more food = better habitat = smaller home ranges = higher rail density; Rush et al. *in press b*). Therefore, pre-oil spill fiddler crab burrow density quantification may be useful to supplement our understanding of clapper rail prey base in northern Gulf Coast marshes.

Sample sizes will be determined based on variability in preliminary samples. At each study site, five randomly placed transects will be placed perpendicular to the marsh water edge. Each transect will consist of 12 sample locations. Each sample location will be 0.25 m^2. Sample locations will be placed along a 30-meter long transect, perpendicular to the shoreline in the following areas: intertidal region, 5 meter from shore, 10 m from shore, and in the interior marsh (30 m from shore). Locations of transect lines will be generated using a random number generator in EXCEL for each of the five sites per zone. A metal frame (0.25 m^2) will placed at each sample point. At each sample point the total number of fiddler crab burrows within the frame will be counted. The end points of each transect will be marked with PVC poles and the GPS coordinates marked for future (post impact) sampling efforts.

Additional Coordination

The RP plans to participate in the studies noted above in full cooperation with the Trustees. The only caveat to this is the helicopter surveys, in which the RP would participate provided it meets applicable BP safety requirements. The RP acknowledges the validity of the scientific methodology of the surveys, subject to the right of the parties to independently interpret the data obtained, and acknowledges that the costs of the helicopter surveys constitute reasonable assessment costs, subject to the submittal of appropriate cost documentation. It is understood that the Trustees and the RP will coordinate on a daily basis regarding implementation of field studies this breeding season. It would also be appropriate for the TWG to agree to a review of the data generated by Methodologies B and D after completion of the current breeding season. Consideration of alternative approaches to assessment for following breeding seasons will occur, which would include the use of existing literature to evaluate the value of the methods above on an ongoing basis.

Finally, signing parties agree that all data produced from fully cooperative efforts between the Trustees and RP in this effort be shared simultaneously with Trustees and the RP.

BUDGET ESTIMATE AND EQUIPMENT PLAN FOR ESTIMATING SECRETIVE MARSH BIRD MORTALITY DEEPWATER HORIZON (MC 252) OIL SPILL BIRD STUDY #3
Analytical Chemistry costs are not included in this budget estimate

Methodology B (point counts) Implementation Cost Estimates:

Point Count Allocation by State:
LA: 104 points in *Spartina* and 104 points in *Phragmites*
MS: 48 points in *Juncus* and/or *Spartina*
AL: 48 points in *Juncus* and/or *Spartina*
FL: 40 points in *Juncus* and/or *Spartina*

Points are allocated in multiples of 8; the size of a route. A single boat with three biologists can complete one route/morning; starting 30 minutes before sunrise, finishing by 9:00AM local time.

Louisiana Point Count Costs:
208 points x 3 = 624
4 boats operating every day (32 points/day), would take 19.5 days (624/32)
78 Boat Days x $2625* = $204,750.00

Mississippi Point Count Costs:
48 points x 3 = 144
2 boats operating every day (16 points/day), would take 9 days (144/16)
18 Boat Days x $2625 = $47,250.00

Alabama Point Count Costs:
48 points x 3 = 144
2 boats operating every day (16 points/day), would take 9 days (144/16)
18 Boat Days x $2625 = $47,250.00

Florida Point Count Costs:
40 points x 3 = 120
2 boats operating every day (16 points/day), would take 7.5 days (120/16)
15 Boat Days x $2625 = $39,375.00

Data Management and Analysis: $50,000.00

Methodology B Subtotal: *$388,625.00*

Methodology C (clapper rail telemetry) Implementation Cost Estimates:

Category	Item	Unit	Cost/Unit	Total Cost
Time	Principle investigator (hours)	100	$180	$18,000
	Project supervisor (hours)	300	$105	$31,500
	Telemetry Data Management (hours)	400	$120	$48,000
	Safety& Operations Manager	200	$90	$18,000
	QA/QC Manager	200	$90	$18,000
	Field supervisor (hours)	400	$90	$36,000
	Field Data Assistant	400	$75	$30,000
	Rail Expert (subcontract)**			$10,000
	Field Assistant (hours)	400	$75	$30,000
	Field Assistant (hours)	400	$75	$30,000
	Field Assistant (hours)	400	$75	$30,000
	Field Trackers (hours)	400	$75	$30,000
	Field Trackers (hours)	400	$75	$30,000
	Field Trackers (hours)	400	$75	$30,000
Travel	Airline tickets	15	$1,100	$16,500
	Car rental (3 trucks)	180	$75	$13,500
	Gas (estimated miles 4 trucks)	25000	$0.25	$6,250
	Boat rental and Guide (1 per day)**	60	$600	$36,000
	Night Airboat (1 per night)**	60	$1,200	$72,000
	Banding Barge (1 per day)**	60	$112	$6,720
	Aerial surveys (hours)**	160	$620	$99,200
Housing and per diem	Hotel PI (days)	10	$175	$1,750
	Hotel project supervisor (days)	60	$175	$10,500
	Hotel field supervisor (days)	60	$175	$10,500
	Hotel 2 Pilots (days)	120	$175	$21,000
	Hotel 6 field assistants (days)	360	$175	$63,000
	Per diem (all staff, days)	610	$50	$30,500
Equipment	Capture Supplies	1	$10,000	$10,000
	GPS, Camera, Computers	1	$20,000	$20,000
Radio	Transmitter costs	240	$235	$56,400
	Receivers	4	$2,650	$10,600
	Antenna	4	$200	$800
	Plane mount antenna	2	$2,000	$4,000

	Headset	2	$1,000	$2,000
Misc	Equipment	1	$15,000	$15,000
Administrative	Administrative overhead on subcontracts		20%	$44,784
Rail Sub-Total				$940,504

Methodology C (seaside sparrow telemetry) Implementation Cost Estimates:

Category	Item	Unit	Cost/Unit	Total Cost
Time	Principle investigator (hours)	40	$180	$7,200
	Project supervisor (hours)	120	$105	$12,600
	Telemetry Data Management (hours)	120	$120	$14,400
	Safety& Operations Manager	80	$90	$7,200
	QA/QC Manager	80	$90	$7,200
	Field supervisor (hours)	320	$90	$28,800
	Field Assistant (hours)	320	$75	$24,000
	Field Assistant (hours)	320	$75	$24,000
	Field Trackers (hours)	320	$75	$24,000
	Field Trackers (hours)	320	$75	$24,000
	Field Trackers (hours)	320	$75	$24,000
Travel	Airline tickets	6	$1,100	$6,600
	Car rental (2 trucks)	96	$75	$7,200
	Gas (estimated miles 2 trucks)	10,000	$0.25	$2,500
	Boat rental and Guide (1 per day)**	45	$600	$27,000
	Hotel 6 field staff (days)	288	$175	$50,400
	Per diem (all staff, days)	288	$50	$14,400
Equipment	Capture Supplies	1	$7,500	$7,500
	GPS, Camera, Computers	1	$10,000	$10,000
Radio	Transmitter costs	240	$235	$56,400
	Receivers	2	$2,650	$5,300
	Antenna	2	$200	$400
	Plane mount antenna	2	$2,000	$4,000
	Headset	2	$1,000	$2,000
Misc	Equipment	1	$7,500	$7,500
Administrative	Administrative overhead on subcontracts		20%	$5,400

Total	$404,000

Methodology C Subtotal: $1,344,504.00

Biodiversity Research Institute Payment Terms: An estimated $1,344,504.00 will be required to fulfill the capture, radio telemetry and monitoring of rails and seaside sparrows. Twenty five (25%) of this amount, $336,126.00, is to be paid immediately upon signing of the contract for advance start-up and logistical costs. BRI will submit bi-monthly invoices for costs incurred above and beyond the initial 25% down payment, with 10 day payment terms from the date of the invoice.

Methodology D: Quantify fiddler crab burrows

Methodology D Subtotal: $0.00

WORK PLAN COST ESTIMATE = $1,733,129
20% CONTINGENCY = $346,626
TOTAL BUDGET ESTIMATE = $2,079,755

(*Boat Day costs are calculated by summing per diem costs ($185/day x 3), boat fuel costs ($20/day x 1), automobile fuel costs ($70/day x 1), and salary costs ($660/day x 3) for three biologists/boat.

(**Contract are 'time and materials, not to exceed budget' estimates. BRI will submit a change order for written approval should circumstances dictate the need to increase the budget amount.)

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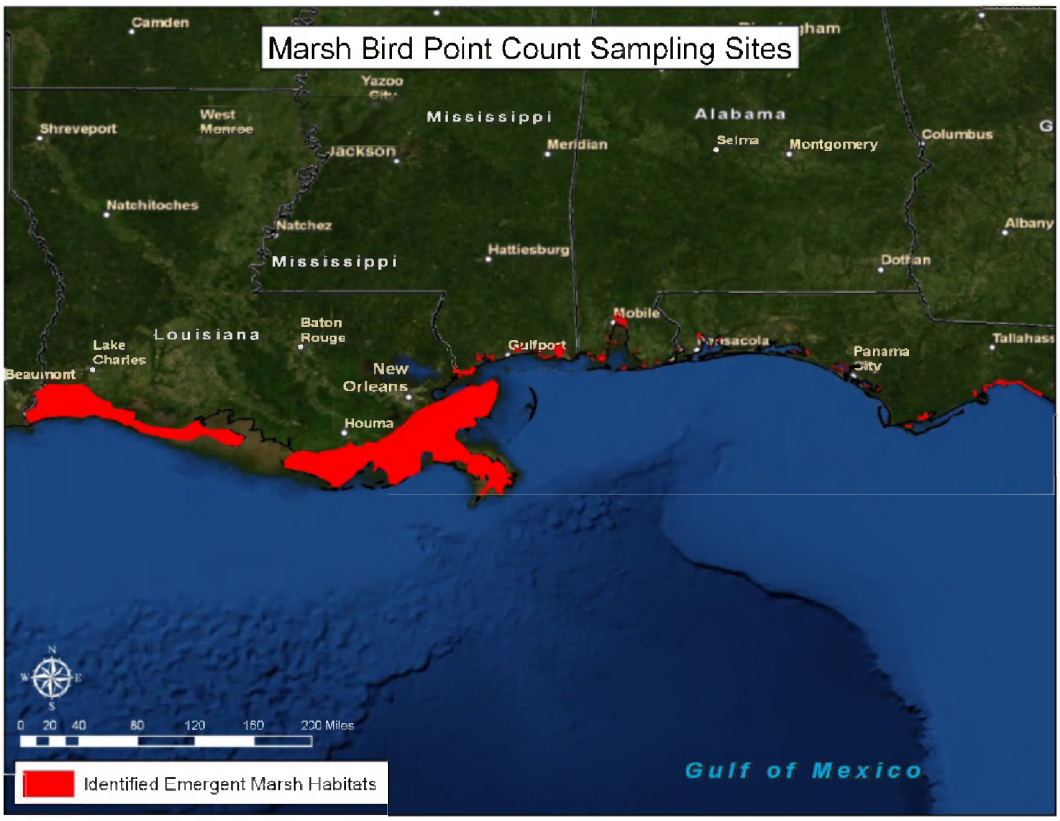

Figure 1. Map of area covered by marsh bird surveys. Red indicates distribution of marshes.

****Approval of this work plan is for the purposes of obtaining data for the Natural Resource Damage Assessment. Parties each reserve its right to produce its own independent interpretation and analysis of any data collected pursuant to this work plan****

APPROVAL

Daniel Welsh (USFWS)
Trustee NRDA Bird Group Lead

6/7/10
Date

FOR ROLAND GUIDRY 6/8/10

State of Louisiana Trustee Representative Date

BP NRDA Coordinator

07 June 2010
Date