FEDERAL AID
FINAL PERFORMANCE REPORT

ALASKA DEPARTMENT OF FISH AND GAME
DIVISION OF WILDLIFE CONSERVATION
PO Box 115526
Juneau, AK 99811-5526

Alaska Department of Fish and Game
State Wildlife Grant

Grant Number: **T-3** **Segment No. 1**

Project Number: **3.10**

Project Title: An integrated regional ecological assessment of the Black oystercatcher (*Haematopus bachmani*)

Project Duration: July 1, 2006 – June 30, 2008

Report Period: July 1, 2007 – June 30, 2008

Report Due Date: September 30, 2008

Principal Investigator: Dave Tessler, Alaska Department of Fish and Game

I. PROBLEM OR NEED THAT PROMPTED THIS RESEARCH

The black oystercatcher (*Haematopus bachmani*) is a large, long-lived shorebird with a global population of roughly 10,000 individuals. Black oystercatchers occur uncommonly along the North American Pacific coast from the Aleutian Islands to Baja California, and are completely dependent upon these marine shorelines throughout their life cycle. The black oystercatcher is an intertidal obligate, spending its entire life history in this narrow ecological zone, and feeding exclusively on intertidal invertebrates. They are thought to be a particularly sensitive indicator of the overall health of this ecological community (USDA Forest Service 2002). Although they range from the Aleutian Islands to Baja California, the vast majority (about 70%) of the global population resides in Alaska, conferring a significant amount of the global stewardship responsibility for this species to our state.

The black oystercatcher is listed as a “species of high concern” within the United States, Canadian, Alaskan, and Northern and Southern Pacific shorebird conservation plans and is on the Audubon Society’s Watch List (Donaldson et al. 2000, Drut and Buchanan 2000, Brown et al. 2001, Hickey, et. al. 2003, Alaska Shorebird Working Group 2000, National Audubon Society 2002). It is a management indicator species in the Chugach National Forest Plan, was selected as a U. S. Fish and Wildlife Service (USFWS) “Focal Species for Priority Conservation Action,” and is a “featured species” in Alaska’s Comprehensive Wildlife Conservation Strategy, as well as the strategies developed for Washington, Oregon, and California (U.S. Forest Service 2002, Tessler et al. 2007, Alaska Department of Fish and Game 2005, Washington Department of Fish and Wildlife 2005, Oregon Department of Fish and Wildlife 2005, California Department of Fish and Game, S. Blankenship, pers. comm.).

Conservation concerns for black oystercatchers are due to a number of factors, primarily the species’ small population size and restricted range; threats to its obligatory shoreline habitat; susceptibility to human-related disturbances; and a suite of ongoing anthropogenic and natural factors that may potentially limit long-term viability. Yet, despite the mounting concern for this species, direct conservation efforts have been limited by a general lack of information on factors such as the overall population status and trend, the sizes of local breeding populations, population demographics, productivity, local and regional threats to survival and productivity, the locations of important wintering areas, migratory connectivity between breeding and wintering sites, and genetic population structure.

The Nongame Program at the Alaska Department of Fish and Game (ADF&G) initiated this ambitious project to address several key aspects of black oystercatcher ecology critical to the conservation of this poorly understood species. ADF&G took the lead in this cooperatively funded and administered project drawing together the efforts of the U.S. Forest Service, National Park Service, U.S. Fish and Wildlife Service, U.S. Geologic Survey, the University of Alaska Fairbanks, Oregon State University, and ultimately the Canadian Wildlife Service, Parks Canada, and the Lakseek Bay Conservation Society in British Columbia. Initial project funding came through the federal State Wildlife Grant (SWG) Program administered by ADF&G, and was used to leverage hundreds of thousands of dollars of investment from participating partners.

II. REVIEW OF PRIOR RESEARCH AND STUDIES IN PROGRESS ON THE PROBLEM OR NEED

Despite being gregarious and highly visible, this species remained relatively unknown – especially in Alaska. Research on black oystercatchers in Alaska has been largely limited to investigating the immediate effects of the *Exxon Valdez* oil spill, habitat selection and use, and potential human impacts on breeding birds (Andres 1997, 1998, 1999; Murphy and Mabee 2000; Meyers 2002; Poe 2003). Information on reproductive and demographic traits of this species is based on a hand full of birds banded in British Columbia (Andres and Falxa 1995). We completed a comprehensive review of all historical and contemporary research on black oystercatchers, including published and unpublished work, in the process of compiling the Black Oystercatcher Conservation Action Plan; see Tessler et al. 2007 for the complete review and citations.

III. APPROACHES USED AND FINDINGS RELATED TO THE OBJECTIVES AND TO PROBLEM OR NEED

OBJECTIVE 1: Determine the size and nesting density of several important local breeding populations throughout the range.

We intensively surveyed breeding populations throughout the summer for four years at each of four core sites known for high densities of black oystercatchers: Middleton Island in the Gulf of Alaska, Aialik and Northwestern Fjords in Kenai Fjords National Park, Harriman Fjord in Prince William Sound, and the Beardslee Islands in Glacier Bay National Park. We conducted thorough one-time surveys of breeding activity at seven other breeding areas: Kodiak Island, Sitka Sound, Baranof Island, the Necker Islands, the Myriad Islands, the Tebenkof Islands, and the Forester and Lowrie island complex. Collaborators outside of Alaska surveyed breeding pair numbers across much of the Queen Charlotte Islands, Barkley and Clayoquot Sounds on Vancouver Island, the Straight of Georgia, and the Gulf Islands in British Columbia, the San Juan Islands in

Washington, and most of the Oregon Coast. See Tessler et al. 2007 for a complete listing of breeding population size by geographic area.

OBJECTIVE 2: Assess the overall population status and demographic parameters important in regulating population size (i.e., overwintering and adult survival, fledging success, recruitment age, breeding site fidelity, and natal philopatry).

Black oystercatcher population estimates have historically been based mainly on incidental observations made during seabird surveys. To date, there has been no systematic effort to census the entire population. Due to the lack of a systematic sampling effort, broad-scale population trends are unknown.

We established a common protocol for conducting surveys of breeding black oystercatchers, and used this methodology to conduct our surveys of the breeding areas outlined above; thus providing the first consistent, region-wide baseline against which to compare future changes. We were able to compare our results to historical surveys conducted using similar methodologies at three of our survey areas, Middleton Island surveyed in 1976 and 2002 (Gill et al. 2004), the Beardslee Islands in 1987 (Lentfer and Maier 1995), and Sitka Sound surveyed in 1941 (Webster 1941). We synthesized all published and unpublished local population estimates throughout the entire range, and compared gross numbers qualitatively when possible. From these spotty sources, we are tempted to conclude that the population is stable: However, evaluating the actual population size, status, and trend will require a coordinated, systematic, range-wide monitoring effort that is not yet in place.

To assess the demographic parameters that regulate population size, we established an intensive banding effort at our four core breeding sites. We banded adults and chicks at these sites for three breeding seasons, and monitored these banded populations for four summers. In addition, we banded adult breeding birds on Kodiak Island, in Stephens Passage south of Juneau, and in Clayoquot and Barclay Sounds in B.C. In all, we banded 475 black oystercatchers (4-6% of the global population); 261 adults and 214 chicks.

We still have to compile and calculate adult survival, but apparent overwintering survival of banded birds over the four years of continuous observation is 87%. Site fidelity; 92% of returning banded birds returned to their territory from the previous year. Mate fidelity; 91% of returning banded birds returned to their mate from the previous year. Only eight of the 214 chicks banded have ever been resighted anywhere near their natal area in succeeding years, and none were seen in more than one subsequent year. Two chicks banded in Alaska were sighted in subsequent years in British Columbia. The small number of chicks seen in following years clouds the question of philopatry, as it is not currently possible to distinguish between widespread dispersal of subadults and poor survival of juveniles to the age of recruitment. This lack of data also prevents any determination about age of first reproduction at this point.

Due to the historic lack of a systematic sampling effort, broad-scale population trends are unknown; evaluating the actual population size, status, and trend will require a coordinated, systematic, range-wide monitoring effort that is not yet in place.

OBJECTIVE 3: Assess regional differences in nesting effort, breeding success and productivity.

We monitored productivity for three years at each of our four core research sites: Middleton Island in the Gulf of Alaska, Aialik and Northwestern Fjords in Kenai Fjords National Park, Harriman Fjord in Prince William Sound, and the Beardslee Islands in Glacier Bay National Park. In all, we monitored 177 individual breeding pairs for a total of 443 breeding pair seasons.

In our survey operations, we recorded the locations of all observed oystercatchers and identified territorial pairs via behavioral observation. Each actively defended territory was searched to locate nests, and a commercial GPS was used to record the locations of both territories and nests. We implemented a visitation schedule to insure that each black oystercatcher territory was revisited at least every seven days (within the average relaying period of nine days). When a nest was located, the size and number of eggs were recorded, the eggs were floated to estimate laying and hatching dates, and each was marked inconspicuously with a letter for individual identification. We determined breeding chronology and daily nest and chick survival rates using the Mayfield estimator. We plan to re-analyze the final data using program MARK. When a nest failed prior to hatch, territorial pairs were observed to determine if and when they initiated a second nest. Because black oystercatchers remain on their territories after successfully hatching young, we documented the survival of chicks by observing them on territories from a distance using spotting scopes (Andres 1999). We continued to monitor territories according to the visitation schedule until any chicks present fledged or until the end of field operations mid- August.

Clutch size, hatching percentage, fledging success, overall productivity, and causes of egg and chick loss vary widely both between study areas and between years. Average clutch size across all sites and years is 2.51 eggs per nest (range 2.18 – 2.80, n=572), with second and third replacement clutches progressively smaller. 572 clutches produced 1340 eggs, 479 chicks, and 175 fledglings. Average clutch size at Middleton Island was slightly higher (2.77 eggs, P-value < 0.0001) than the other three sites, which were statistically equivalent to one another. Overall hatching percentage (eggs hatched * eggs laid^{-1}) was 33% (range 13% - 72%), and again was significantly greater at Middleton Island (68%, P-value < 0.0001) than the other sites. Overall fledging (fledglings * eggs laid^{-1}) for the duration of the study was 13% (range 5%-25%); and overall productivity (fledglings * adult female^{-1} * season^{-1}) was 0.42 (range 0.15-0.89). Interestingly, there was no significant difference in productivity between any of the study areas. One particularly good year at two sites appears to have inflated our estimate of average productivity; if those unusually high years aren’t included in the analysis, annual productivity across the region is about 0.30.

The low average productivity described by this study (0.43) puts the continued stability of this species at risk. Although this study will provide an estimate of adult survival, lifespan has not yet been determined, nor has age of recruitment, nor reproductive lifespan. In addition, survivorship curves for post fledging to senescence are not available and the variation in reproductive output over the fertile lifespan remains unknown. However, for illustration purposes, let us assume an average lifespan of 15 years, recruitment at 5 years, and a reproductive lifespan of 10 years; a very optimistic estimate. If we use the unrealistic assumption of 100% survival at all age classes and an average productivity of between 0.30 and 0.43, we can postulate that a breeding pair would successfully produce their own replacement value (2 breeding adults) in about five to seven years, yielding a total lifetime productivity of three to four adult birds. In reality, survival is not 100%, and both annual survival and fecundity will likely vary throughout reproductive life. A very small change in either adult survival or productivity, even for a single year or affecting a single local breeding population, could result in a declining trend for the species as a whole. Conservation and management of the black oystercatcher will require additional research to determine experimentally the lifetime variation in survivorship and reproductive output. Only then can the viability if the population be assessed.

OBJECTIVE 4: Identify local threats or limitations to productivity.

Over the three years of our intensive productivity monitoring, we made every effort to identify the causes of egg, nest, and chick loss at each of our four core research sites.

Over three years a total of 572 clutches produced 1340 eggs, of which 861 (64%) were lost. When considered together, causes of egg loss were: depredation 32%; tidal flooding 28%; unknown 28%; duds 8%; abandoned 5%; observer induced 0%. Causes of egg and chick loss varied among years and study sites, but a few patterns emerged. In the Beardslee Islands and Harriman Fjord, predation and flooding of nests during high tide events were the two dominant causes of explainable loss: predation accounted for 18% and 21% of losses respectively, while flooding made up 40% and 20% of losses at those sites. In Kenai Fjords, predation accounted for the majority of losses (65%) while tidal flooding made up a smaller proportion (6%) of explained losses. We hypothesize that a large number of the unexplained losses at Kenai Fjords were due to flooding. The most notable difference among study areas was Middleton Island which supports very high densities of nesting oystercatchers on “new” supra-tidal land uplifted in the Alaskan earthquake of 1964: Tidal flooding was virtually absent (3%), as was egg depredation due to the absence of mammalian predators on the island. These factors may explain why both clutch size and hatching success were significantly higher on Middleton Island. However, Middleton is home to a great many avian predators, and once eggs hatched, predation of young chicks by glaucous-winged gulls was largely responsible for reducing fledging success to 16%; statistically the same level found at the other sites. Also, Middleton Island had the greatest percentage of “dud” eggs reported (38%); this rather high proportion is believed to be a consequence of the unusually high nesting density of oystercatchers on that island (nearly 300 breeding pairs or 10 pairs km^{-1} of shoreline), and is due either to confusion on behalf of the incubating parents or interference from conspecifics.

We have photographic, video, visual, or spoor evidence for the following egg predators: mink (*Mustela vison*), marten (*Martes americana*), river otter (*Lutra canadensis)*, wolverine (*Gulo gulo*), red fox (*Vulpes vulpes*), brown bear (*Ursus arctos*), black bear (*Ursus americanus*), Glaucous-winged Gull (*Larus glaucenscens*), Northwestern Crow (*Corvus caurinus*), and Common Raven (*C. corax*).

Clutches on low sloping gravel beaches and wave cut platforms are regularly lost to high tides or wave action. Periods of particularly high tides, storm surges, tsunamis, and boat wakes may all contribute to nest flooding. In an area of high breeding density (e.g., Harriman Fjord in Prince William Sound), a single wave or wake event coincident with monthly high tides could destroy the majority of nests.

OBJECTIVE 5: Elucidate levels of population structuring and the degree of connectivity between regional breeding populations.

We collected 662 individual genetic samples in the form of blood or egg shell membrane from breeding sites throughout the range, including Kodiak Island, Prince William Sound, Middleton Island, Kenai Fjords National Park, Glacier Bay National Park, Stephens Passage, Gwaii Haanas National Park on Queen Charlotte Island, and Pacific Rim National Park on Vancouver Island.

We have analyzed the genetic structure of the species using both DNA microsatellite and mitochondrial DNA techniques. Our final analysis is not yet complete. However, preliminary analyses indicate that no breeding population examined is significantly differentiated from any other population, with the exception of Middleton Island, which is genetically distinct from all others. The genetic distinction of black oystercatchers on Middleton Island is likely the result of a founder effect. The 1964 earthquake resulted in tectonic uplift of the island creating a vast amount of newly available foraging and nesting habitat. The island was first colonized by oystercatchers in 1976, and as recently as 1994 there were just 37 breeding pairs on Middleton Island or just over one pair km^{-1}: in 2006 there were nearly 300 breeding pairs or 10 pairs km^{-1}. We detected no signature of a genetic bottleneck, but it appears that the current population does not recruit from outside at detectable levels.

Overall levels of heterozygosity were lowest at MDO and highest at Queen Charlotte Island; allelic richness was lowest in MDO and PWS, and highest in Kenai Fjords and Queen Charlotte Island. Lower observed levels of heterozygosity on MDO point to some level of inbreeding or a founder effect.

One would expect *a priori* that a long lived species, with such high mate and site fidelity would exhibit considerable genetic differentiation between geographic areas. Yet black oystercatchers appear to be thoroughly mixed. We hypothesize that the lack of genetic differentiation for the species as a whole, and the genetic distinction of the Middleton population are both consequences of the same interplay between habitat availability and behavior. In general, black oystercatcher populations appear to be ultimately regulated by the availability of high quality nesting and foraging habitat, and, with the exception of the 405 ha of newly minted habitat on Middleton Island, nesting habitat is patchily and sparsely distributed throughout the range. In most breeding areas, the suitable territories are already occupied by long lived, monogamous, highly site faithful and territorial breeding pairs, leaving few or no opportunities for newly recruited individuals to mate and establish themselves. If there are no available sites in their natal areas, the young must disperse to take advantage of opportunities in other areas as they arise. Thus, the dispersal of young is likely the primary mechanism for genetic mixing in this species. On Middleton Island, immediately following the initial colonization, because abundant habitat was available for additional territories, young recruits were not forced to disperse.

The fact that so few (3%) of the chicks we banded were ever seen in their natal areas, and then only for brief periods is consistent with this hypothesis. During the course of this project, the population of Middleton Island stopped expanding and began to stabilize at around 700 individuals. The population size appears to have peaked in 2004 at 781 birds and has since dropped off to 703 birds in 2006. The available habitat is apparently now saturated. Had we banded chicks on the island 20 years ago, we would likely have seen them return and establish their own territories.

OBJECTIVE 6: Identify locations of important wintering areas and the numbers of birds in those areas.

We surveyed a number of areas we believed might be important to wintering concentrations of oystercatchers: The Alaska Peninsula, Kodiak Island, Middleton Island, Prince William Sound conducted several winter time surveys of areas. We conducted aerial surveys of portions of the Alaska Peninsula near Izembeck National Wildlife Refuge in February 2005 in a Piper Super Cub at an altitude of 100-150 ft., and airspeed of 60-80 mph. Only 121 oystercatchers were observed, dispersed widely across the survey area, suggesting the area isn't a wintering "hotspot."

We conducted boat based surveys of the shoreline of Kodiak Island in January 2005 and observed a total of 1,716 birds in flocks of tens to hundreds of individuals. The majority (1,155) were found in Chiniak Bay. Adjacent Afognak Island was not surveyed due to inclement weather and sea state conditions, and its potential importance to oystercatchers remains unknown. That the winter estimate for Kodiak is similar to summer counts of between 1,350 and 1,750 (made during Harlequin Duck surveys 1994-2005) suggests Kodiak may be a year round residence for non-migratory oystercatchers. No banded individuals from other study areas were observed in Kodiak surveys. Kodiak Island supports a very large population of black oystercatchers year round, representing nearly 20% of the global population of the species.

We surveyed Middleton Island on foot in February and September 2005. No oystercatchers were seen in February 2005 and only two groups of oystercatchers, one group of four juveniles and a flock of 58 mixed adults and juveniles, were seen in September. The migration of all the 700+ individuals from the island stands in stark contrast to the large number of birds overwintering on Kodiak Island, and suggests differential migratory behavior; some individuals migrate while others remain in place.

We surveyed the ice free shorelines of Prince William Sound by boat in March 2007, and observed 203 oystercatchers in flocks numbering in the tens of individuals. Danger Island had the most with 105. A female banded on Middleton Island in June 2005 was seen on Green Island. The total number observed is less than half of the breeding population. Although the overall number is not as dramatically high as Kodiak, Prince William Sound supports just under 2% of the global population of this species in the winter.

We surveyed the shorelines of Clayoquot and Barclay Sounds on Vancouver Island by boat in October 2006, and detected approximately 300 oystercatchers; a number similar to previous breeding season estimates.

Oystercatchers concentrate in large groups of tens to hundreds of individuals during the winter months and therefore large segments of the population are more vulnerable to localized environmental perturbations at that time. Further efforts to map and define the locations of these important wintering concentrations are needed to assist in assessment and mitigation in the event of a shoreline catastrophe.

OBJECTIVE 7: Identify movement patterns between various breeding and wintering areas.

Our intensive banding efforts of juveniles and adults provided some tantalizing information on the seasonal movements of this species, but due to the fact that they reside in exceedingly remote locations year round, interseasonal band resightings were uncommon.

No clear patterns of movements emerged, but rather both seasonal movements and dispersal appear quite variable.

Chick Dispersal / Migration

Two chicks banded in Alaska were seen in subsequent years in British Columbia. One was banded in Glacier Bay in 2005, and was seen the following January on Vancouver Island, BC; the other was in Kenai Fjords in 2005 and was observed June 2006 in Masset Inlet, Graham Island, BC.

Three chicks banded in Alaska were later seen near their natal grounds: A chick banded in 2005 in Harriman Fjord, Prince William Sound, was sighted August 2007 at Green Island, about 100km southwest. A chick banded in Northwestern Fjord, Kenai Fjords in 2003, was documented back in Northwestern Fjord in May 2006, and another chick from Kenai Fjords banded in Aialik Fjord 2005, was observed in the same fjord July 2007.

Adult Winter Migration

An adult male bird banded on Middleton Island June 2004 was observed in Barklay Sound, Vancouver Island, BC in October 2006; while an adult female banded on Middleton June 2005 was seen on Green Island in Prince William Sound, March 2007.

Site fidelity

Despite variation in dispersal and seasonal movement patterns, site fidelity is strong in adults. In addition to the 92% site fidelity noted from our four intensive core sites, adults from non-intensive sites have been observed returning to the area of their capture: An adult male banded in Bay of Isles, Prince William Sound March in 2004, was seen at the same location in March 2008; and an adult banded on Green Island in 2004 was seen in the same spot again in 2008.

OBJECTIVE 8: Follow the movements of oystercatchers from their breeding areas to their wintering areas.

In 2007, we initiated a migration study utilizing both implanted satellite transmitters (N=18) and backpack harness VHF radio transmitters (N=19) to track black oystercatchers from five breeding sites (Vancouver Island, British Columbia; Kodiak Island, Prince William Sound, Middleton Island, and Juneau Alaska) to nonbreeding sites, and back again (2007-2008). Results of our winter surveys and banding efforts suggested that birds from some breeding areas likely undertake significant post-breeding migrations, while birds breeding in other locations remain relatively close to their breeding sites. We fit individuals from suspected resident populations on Kodiak and Vancouver Islands with conventional VHF transmitters (N = 20, 10/site). Birds from suspected migratory populations (Middleton Island, Prince William Sound, and Juneau Alaska) were implanted with satellite transmitters (N = 18, six/site). We observed variation in migration strategy among breeding populations. None of the oystercatchers fitted with conventional VHF transmitters have been documented more than 20 km from their nest sites. Preliminary results suggest long-distance migration in three populations (range of migration distances: Prince William Sound, 1218-1664 km; Middleton Island, 1031-1479 km; Juneau, 130-1033 km) and year-round residency in two others (Kodiak and Vancouver Islands). Preliminary findings indicate that the coasts of British Columbia and Southeast Alaska provide critical nonbreeding habitat for Black Oystercatchers, as all of the migratory birds we monitored wintered there. We are currently investigating which factors have the greatest effect on Black Oystercatcher space and habitat use throughout the annual cycle to better understand observed variation in migration strategy.

OBJECTIVE 9: Analyze data, write reports, attend conferences, and present papers and results.

We are currently in the midst of finalizing all the analyses for this project, but the data collected from this effort contributed immeasurably to the new Black Oystercatcher Conservation Action Plan (Tessler et al. 2007), the single strategic planning resource now in use for this species throughout its range.

A large number of publications are forthcoming from this body of work; and we expect work to be completed on the majority of these manuscripts over the autumn and winter 2008-2009. Two are already in print. This work has also resulted in a large number of reports to land management agencies.

Aspects of this work have been presented at a number of international, national, and local meetings, including: American Ornithologists Union, Portland, Oregon, August 2008. International Wader Study Group La Rochelle, France, October 2007; Shorebird Science in the Western Hemisphere, Boulder, Colorado, March 2006.

Please see Section VI: PUBLICATIONS for a complete formal list of publications, reports, oral presentations, and posters.

IV. MANAGEMENT IMPLICATIONS

Implications are included above with the sections on the various objectives.

V. SUMMARY OF WORK COMPLETED ON JOBS FOR LAST SEGMENT PERIOD ONLY (July 1, 2007 – June 30, 2008)

JOB/ACTIVITY 1A: Determine the size and nesting density of several important local breeding populations throughout the range.

None.

JOB/ACTIVITY 2A: Assess the overall population status and demographic parameters important in regulating population size (i.e., overwintering and adult survival, fledging success, recruitment age, breeding site fidelity, and natal philopatry).

None.

JOB/ACTIVITY 3A: Assess regional differences in nesting effort, breeding success and productivity.

None.

JOB/ACTIVITY 4A: Identify local threats or limitations to productivity.

One area of particular importance to breeding black oystercatchers, Prince William Sound, experiences relatively high volumes of boat traffic, from both privately owned recreational vessels and tour boat operations. In these areas, should significant boat wake activity coincide with periods of particularly high tides, the potential exists for the majority of black oystercatcher nests on beaches in the area to be lost.

We developed an instrument, a small, unobtrusive salt water data logger, capable of recording the amount of time it is immersed in sea water. With the device we can detect the difference between tidal flooding and an overwash from a wave or boat wake. By combining the use of these devices with regular nest checks, we will be able to determine if a flooded nest was lost to the tide or to a wave. We placed of these salt water data loggers adjacent to all 11 black oystercatcher nests on beaches in Harriman Fjord in Prince William Sound, after the onset of egg laying and prior to the first major high tide cycle. We followed the fate of the eggs in each nest with nest visits at intervals between 5 and 8 days through five major high tide cycles between May 17 and July 17. We made every effort to determine the cause of nest loss and categorized as either due to predation, flooding, abandonment, or unknown causes. We will be analyzing these data through the autumn of 2008.

JOB/ACTIVITY 5A: Elucidate levels of population structuring and the degree of connectivity between regional breeding populations.

None.

JOB/ACTIVITY 6A: Identify locations of important wintering areas and the numbers of birds in those areas.

None.

JOB/ACTIVITY 7A: Identify movement patterns between various breeding and wintering areas.

None.

JOB/ACTIVITY 8A: Capture at least five adult oystercatchers at each of two important breeding areas in Alaska, and attach backpack mounted satellite transmitters to them.

In 2007, we initiated a migration study utilizing both implanted satellite transmitters (N=18) and backpack harness VHF radio transmitters (N=19) to track black oystercatchers from five breeding sites (Vancouver Island, British Columbia; Kodiak Island, Prince William Sound, Middleton Island, and Juneau Alaska) to nonbreeding sites, and back again (2007-2008). Results of our winter surveys and banding efforts suggested that birds from some breeding areas likely undertake significant post-breeding migrations, while birds breeding in other locations remain relatively close to their breeding sites. We fit individuals from suspected resident populations on Kodiak and

Vancouver Islands with conventional VHF transmitters (N = 20, 10/site). Birds from suspected migratory populations (Middleton Island, Prince William Sound, and Juneau Alaska) were implanted with satellite transmitters (N = 18, six/site). We observed variation in migration strategy among breeding populations. None of the oystercatchers fitted with conventional VHF transmitters have been documented more than 20 km from their nest sites. Preliminary results suggest long-distance migration in three populations (range of migration distances: Prince William Sound, 1218-1664 km; Middleton Island, 1031-1479 km; Juneau, 130-1033 km) and year-round residency in two others (Kodiak and Vancouver Islands). Preliminary findings indicate that the coasts of British Columbia and Southeast Alaska provide critical nonbreeding habitat for Black Oystercatchers, as all of the migratory birds we monitored wintered there. We are currently investigating which factors have the greatest effect on Black Oystercatcher space and habitat use throughout the annual cycle to better understand observed variation in migration strategy.

JOB/ACTIVITY 9A: Analyze data, write reports, attend conferences, and present papers and results.

We are currently in the midst of finalizing all the analyses for this project, but the data collected from this effort contributed immeasurably to the new Black Oystercatcher Conservation Action Plan (Tessler et al. 2007), the single strategic planning resource now in use for this species throughout its range.

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International Wader Study Group La Rochelle, France, October 2007; Shorebird Science in the Western Hemisphere, Boulder, Colorado, March 2006.

Please see Section VI. PUBLICATIONS for a complete formal list of publications, reports, oral presentations, and posters.

VI. PUBLICATIONS

Current Publications

Guzzetti, B. M., S.L. Talbot, **D.F. Tessler**, V.A. Gill, and E.C. Murphy. 2008. Secrets in the eyes of Black Oystercatchers: a new sexing technique. J. Field Ornithology 79(2):223–231

Tessler, D. F., J.A. Johnson, B.A. Andres, S. Thomas, and R.B. Lanctot. 2007. Black Oystercatcher (*Haematopus bachmani)* Conservation Action Plan. International Black Oystercatcher Working Group, U.S. Fish and Wildlife Service, Manomet Center for Conservation Sciences, Manomet, Massachussets. 115 pp. (see http:www.whsrn.org/shorebirds/conservation_plans.html)

Invited Presentations

Tessler, D.F., B.A. Andres, J.A. Johnson, S. Thomas, V.A. Gill, M.I. Goldstein, B.S. Guzzetti, R.B. Lanctot, J. Morse, E. Murphy, M. Johnson, S. Talbot, C. Speigel, P. Clarkson, T. Golumia, D. Nysewander, D. Zwiefelhofer, A.Gaston, M. Hipfner, M. Hahr, and S. Haig. 2007. Black Oystercatcher *(Haematopus bachmani)*: Ecology, status, conservation planning, and recent successes. Invited symposium presentation at the Wader Study Group annual meeting, University of La Rochelle, La Rochelle, France, October 2007.

Tessler, D.F., V.A. Gill, M.I. Goldstein, B. Guzzetti, R.B. Lanctot, J. Morse, S. Talbot, M. Tetreau, C. Speigel, and S. Haig. 2006. An Integrated Regional Ecological Assesment of the Black Oystercatcher (*Haematopus bachmani).* Invited Symposium presentation at the Shorebird Science in the Western Hemisphere conference, University of Colorado, Boulder, Colorado, March 2006.

Other Oral Presentations and Posters

Johnson, M., P. Clarkson**,** M.I. Goldstein, S.M. Haig, R.B. Lanctot, **D.F. Tessler**, D. Zwiefelhofer. Inter-seasonal Movements, Habitat Use and Migratory Connectivity of Black Oystercatchers. Oral Presentation at the American Ornithologists Union annual meeting, Portland, Oregon, August 2008.

Tessler, D.F., M. Johnson, S.M. Haig, R.B. Lanctot, D. Zwiefelhofer, M.I. Goldstein, and P. Clarkson. 2008. Inter-seasonal movements and migratory connectivity of Black Oystercatchers. Oral Presentation at the Alaska Bird Conference, Fairbanks, Alaska, March 2008.

Brian M. Guzzetti*, Verena A. Gill, Sandra L. Talbot, George K. Sage, **David F. Tessler**, Edward C. Murphy, and Eduardo Wilner. 2008. Structure and Dynamics of Black Oystercatchers on an isolated and rapidly changing island. Oral Presentation at the Alaska Bird Conference, Fairbanks, Alaska, March 2008.

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