BLACK OYSTERCATCHER REPRODUCTIVE SUCCESS ON THE OREGON COAST DURING 2006 AND 2007 – FINAL REPORT

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Thank you to Roy Lowe, Dave Pitkin, and Dave Ledig (USFWS Oregon Islands Refuges) for partnering with USGS FRESC on this project. We are grateful for your consultation and assistance in the field. In particular, boat surveys helped confirm the fate of 2006 nests. In 2007, we could not have coordinated and implemented monitoring on the southern Oregon coast without the resources provided by USFWS Refuges. Their assistance made it possible to support a part time technician (Neil Holcomb).

Additional thanks go to Pacific Coast Joint Venture (Carey Smith) and USFWS Coastal Program for their funding support of this project. Their assistance made it possible to continue the study for a second year. Funding provided also supported the writing of this report and allowed us to disseminate information about the study at various public venues across western Oregon.

Finally, we would like to extend our thanks to all the volunteers that assisted with this project. Many remarkable individuals donated many hours of their time assisting us collect data for this project, and without their assistance this project would not have been possible.

INTRODUCTION

The Black Oystercatcher is a rare species rangewide and its status is uncertain (Tessler et al. 2007). Yet until this project was conducted we had no information about reproductive success or threats in the southern portion of the range, where population numbers are particularly low. Total species population size is estimated to be between 8,900 – 11,000 individuals (Andres and Falxa 1995). It is considered a species of "high concern" by national and regional U.S. and Canadian Shorebird Conservation Plans (Donaldson et al. 2000, Drut and Buchanan 2000, Brown et al. 2001, Hickey, et. al. 2003) and is a U.S. Fish and Wildlife Service (USFWS) Bird of Conservation Concern (Regions 1 and 7; Bird Conservation Regions 5 and 32). Preliminary results from the USGS/USFWS 2005 Black Oystercatcher survey of suitable breeding habitat on the Oregon Coast indicated about 320 birds in Oregon . In the late 1980's, USFWS biologists estimated the population between 350-400, based on incidental data collected during a boat-based comprehensive seabird survey, however survey methods differed. Therefore, it is uncertain if the population is in decline regionally or rangewide. As a bird that sometimes nests just above the high tide line and forages exclusively on intertidal organisms, the Black Oystercatcher is a good indicator of intertidal health and may be quite sensitive to rocky shore disturbances (Tessler et al. 2007).

Evaluating reproductive success is often key to understanding species population status and threats to persistence (Clark and Martin 2007). Avian declines are commonly caused by low productivity and directly examining productivity is the best way to assess whether problems with this early life-stage could be contributing to declines. As a long-lived species, a single year of low productivity may not cause a population decline. However, multiple years of poor productivity could lead to a sudden population decline and recovery from such a decline would be challenging. Hence, adult surveys alone should not be used to determine that populations are stable; productivity studies are necessary to determine long-term threats to this species persistence.

Many Black Oystercatcher reproductive studies have been conducted in Alaska and British Columbia. However, there has only been one small reproductive study in the southern portion of the oystercatcher's range; it was conducted in Washington in the mid 1970's. Human density and recreation activity is higher along much of the Oregon coast compared with remote oystercatcher breeding sites in Alaska. In the Pacific Northwest there have been anecdotal accounts of threats to nesting birds, such as adults abandoning nests and a chick that washed up near Cannon Beach, Oregon, after 4th of July fireworks (2001).

An annual Black Oystercatcher one-day "window" survey has been coordinated by the USFWS on the central coast since 1997. With additional funds acquired in 2005 from Pacific Coast Joint Venture, USGS FRESC teamed up with USFWS to expand the oystercatcher survey coastwide in Oregon. As a result, the volunteer base increased and most accessible habitat was covered from land by volunteers. During land surveys a total of 20 confirmed or suspected oystercatcher nests were found. Here we describe a study

we initiated in 2006 to coordinate monitoring of oystercatcher nests found during the initial coastwide survey. We located and monitored additional nests in 2006 and 2007. Results from this study have helped track changes in population size and provided information to assist effective management of breeding sites. This project has also increased understanding of human impacts on oystercatcher populations and intertidal health, while providing opportunities to raise community awareness and local involvement. Furthermore, this study helps meet a goal of the Black Oystercatcher Conservation Plan, to obtain baseline information on hatching and fledging success in the southern portion of the species range (Tessler et al. 2007).

OBJECTIVES:

1. Communicate and cooperate with USFWS's Newport Field Office during planning and implementation of the 2006 and 2007 Oregon Black Oystercatcher coastwide survey. USGS was alerted immediately when new nests were located by volunteers and coordinated with USFWS to find someone willing to monitor nests weekly. Additionally we coordinated with USFWS's Oregon Coast National Wildlife Refuges to gain information about near-shore nesting oystercatchers detected during their seabird surveys.
2. To write additional materials to provide better guidance to volunteers about how to locate oystercatcher nests and stressing the importance of conducting follow-ups to determine nest fate.
3. Coordinate nest checks by volunteers and assist in conducting visits to at least 20 oystercatcher nests. The project goal was to monitor nests weekly, and subsequent broods bi-weekly to determine nest success and productivity.
4. Compare Black Oystercatcher reproductive success in Oregon with Alaska and British Columbia. We use these comparisons to infer whether the Oregon population is declining and make management recommendations.

METHODS

USGS FRESC, USFWS, and numerous volunteers from other federal and state agencies and local communities assisted with the 2006 and 2007 Oregon Black Oystercatcher Window Survey. This included an initial survey during a one-week window in mid May, followed by a second survey within two weeks. Many pair locations were identified during these surveys and some nests were found that were later monitored.

Nests were monitored by USGS FRESC and USFWS personnel, in addition to many volunteers. Monitors were solicited from the volunteer pool that conducted the survey, and all monitors were provided with written instructions on locating and monitoring nests (*see* Appendix A). USGS FRESC personnel often assisted volunteers in locating nests in the field and in observing behavior to determine nesting status. All monitors were asked to check nests and broods on a weekly basis. During 2006 we asked that volunteers fill out a detailed form for each visit (*see* Appendix B), however this was not popular and compliance was low. Therefore, we designed a second summary data sheet (*see*

Appendix C) and in 2007 we asked volunteers to fill out one detailed data sheet when the nest was found but record subsequent visits on the summary data sheet.

Nest locations were mapped and data was summarized by year. Approximate nest location was plotted on a map of Oregon using ArcGIS. In general, we did not approach nests in the field, so nest coordinates were approximated using DRG quadrangles. We had intended to estimate nest and fledging success using Program Mark, but this has only been performed for one other study. Hence, it would be difficult to use this analysis to meet our goal of evaluating Oregon reproductive success relative to elsewhere throughout the range. Therefore we report hatch success as the percent of nests that hatched at least one egg and fledging success as the percent of nests that fledged at least one chick. We also calculate the average number of chicks fledged per nest and the average number of chicks fledged per pair (some pairs re-nested and so multiple nests were monitored). This differs slightly from how other studies report productivity; in other studies all eggs could be counted so hatching success is reported for each egg. However, unlike many nests in Alaska which were on gravel beaches that could be accessed, many of our nests were on cliffs and rocks out of view. In a few instances we were able to count eggs from afar, but often we could only observe the adult on the nest. Since we could not count all eggs, our summary statistics allowed for the best possible but still imperfect comparison of productivity in Oregon to other locations where Black Oystercatcher nests have been monitored.

Nest locations vary greatly with respect to remoteness, so we used the Fisher's Exact test to examine whether physical location was related to reproductive success. We asked monitors to report whether nests were on land or on off-shore islands and we also asked monitors to report whether they believed nests were vulnerable to human disturbance. Our a-priori hypothesis was that nests on land and/or near high recreation areas would have lower hatching and fledging success than more remote nests.

RESULTS

During the spring and summer of 2006, USGS FRESC monitored 51 Black Oystercatcher nests with the help of USFWS and volunteers (Figure 1). This is more than twice the number of nests we had planned to monitor (*see* Objective 3). Many nests were located during the coast-wide survey organized by USFWS Newport Field Office and USGS FRESC during the weeks of May 13-28. However additional nests were located by USGS staff and volunteers after the survey period. Nests and broods were monitored at least weekly in order to determine hatching and fledging success. In 2006, over 20 volunteers assisted with monitoring efforts, and in 2007 almost 30 volunteers helped us collect reproductive data. We estimate that at least 400 hours were contributed by volunteers in 2006, and over 600 hours were contributed in 2007.

In 2007, we were able to monitor a total of 65 nests (Figure 2). During both years, nests monitored were spread across the rocky shore of Oregon from Ecola Point in Cannon Beach, OR, to Chetco Cove in Brookings, OR. In both years most nests were located on

Figure 1. Approximate Black Oystercatcher Nesting Locations in Oregon during the 2006 Breeding Season

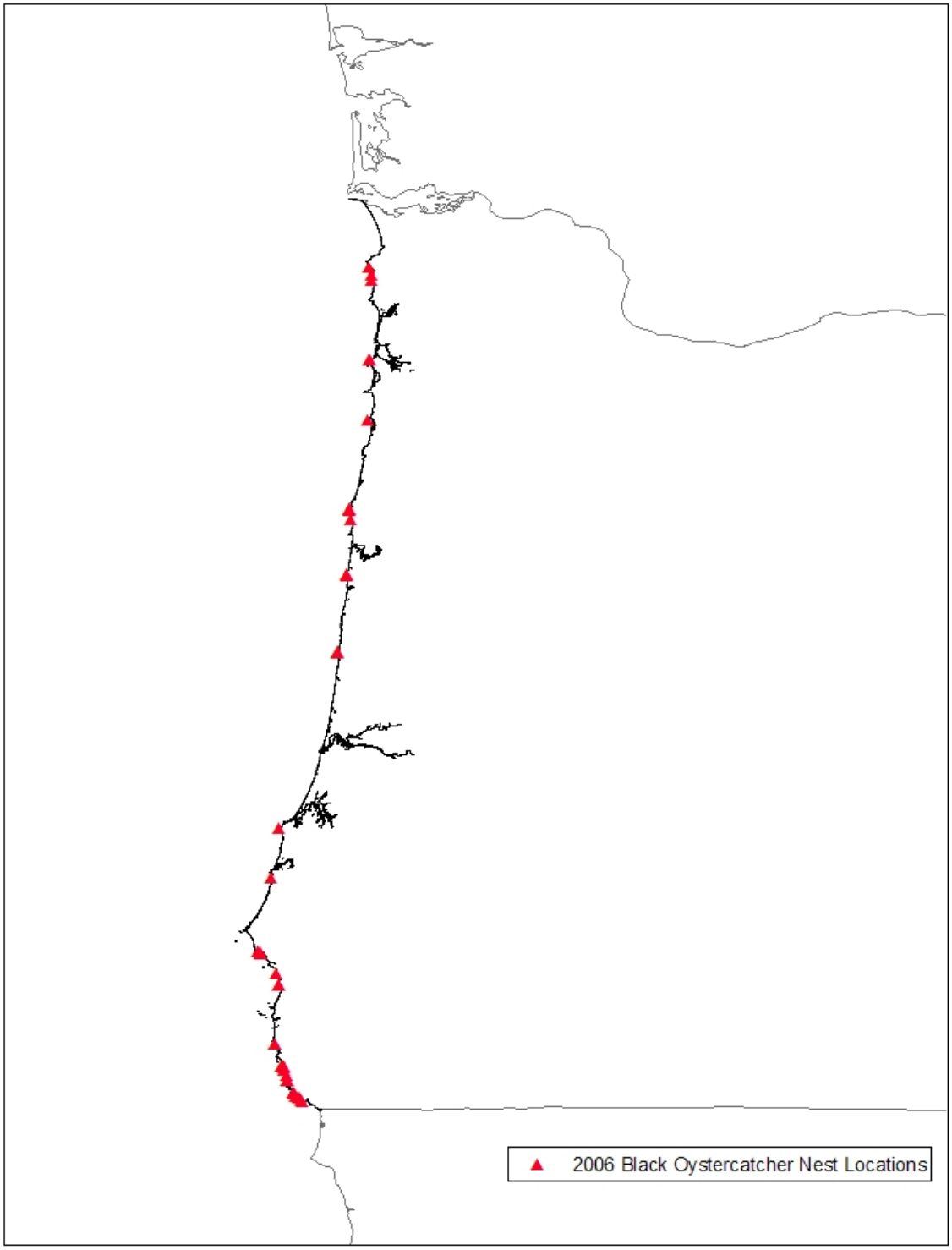
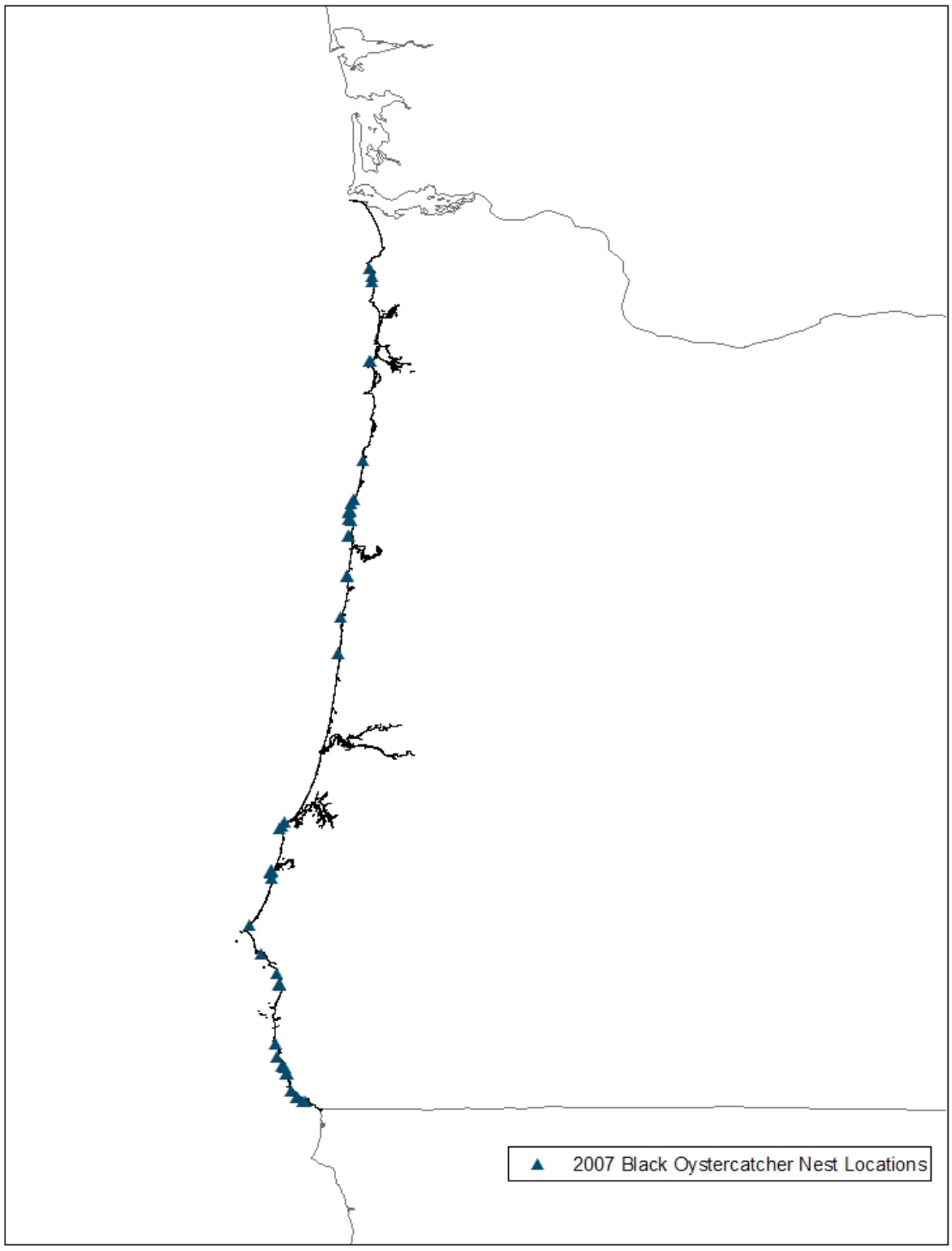


Figure 2. Approximate Black Oystercatcher Nesting Locations in Oregon during the 2007 Breeding Season



near-shore islands. However, 12 nests were located on mainland sites in 2006 and 18 nests were found on the mainland in 2007. Since we did not have regular access to a boat we were unable to monitor nests on distant islands and reefs, with the exception of Yellow Rock which was visible from the mainland with great difficulty. A few nests were located on distant islands during the 2005 boat survey, and nest success on these distant islands may differ from mainland or near-shore islands (likely reproductive success is higher).

Of the nests located, we were successful at following up with monitoring and determining nest fate. Incubation checks were relatively easy, and it was almost always possible to confirm hatching or failure. However, monitors did have some trouble locating chicks about 2-3 weeks post-hatch. This seems like a time period when many chicks were more mobile and moved away from their nests, yet were inconspicuous (likely to avoid predation). However, by continuing to check the area, we were often able to relocate chicks as they approached fledging (around 5 - 6 weeks of age). In 2006, we were unable to determine the fate of one nest that hatched at Haystack Rock (Cape Kiwanda), and in 2007 there were three nests for which we were uncertain of the fate (of chicks).

Unlike monitoring efforts in Alaska, where nests can usually be approached, we were not always able to determine the number of eggs laid or the fate of each egg. Therefore, our data is slightly different than the data collected in other reproductive studies. Out of the 51 nests that were successfully monitored in 2006, 75 % successfully hatched at least one chick and 38 % produced at least one fledgling, resulting in a total of 31 fledged young (Table 1). In 2007, hatching success was lower, with hatching success at only 49%. However, fledging success was not substantially lower than 2006 at 34%. Despite a greater number of nests monitored to fledge in 2007 (62 compared to 50), we observed the same number of total fledglings in 2007 (31).

Table 1. Reproductive success of Black Oystercatchers on the Oregon coast in 2006 and 2007.

Year	# Nests Monitored to hatch	% Nests Hatched	% That Produced ≥ 1 Fledgling	# Chicks Fledged	Average Fledged/Nest	Average Fledged/Pair
2006	51	74.5%	38.0% (n=50)	31	0.62	0.74
2007	65	49.2%	33.9% (n=62)	31	0.50	0.61

Our data is within the range of what has been observed during other Black Oystercatcher reproductive studies. Data from our study is not directly comparable to others because we were not able to follow the fate of each egg. However, previous studies have shown hatching success to range from 28-86.5% and fledging success has ranged from 12-37% (Table 2).

Table 2. Reproductive success elsewhere in the Black Oystercatchers range (from unpubl. report, Spiegel et al. 2006)

Years of Data	Location	Avg. Clutch Size	%Hatched n=eggs laid	% Fledged n= eggs laid	# Young Hatched Per Pair
3	Harriman Fjord, AK	2.67	28% (n=213)	18% (n=207)	0.76
1	Sitka, AK	2.69	n/a	n/a	0.42
3	Western PWS, AK	2.44	37% (n=314)	12% (n=311)	0.29
3	Eastern PWS, AK	2.38	38% (n=460)	31% (n=450)	0.68
2	Middleton Is., AK	2.65	86.5% (n=253)	n/a	n/a
6	Cleland Is., BC	2.07	34% (n=614)	12% (n=339)	0.25
2	Gulf Is. BC	2.09	39% (n=161)	19% (n=161)	0.44
2	Destruction Is., WA	2.15	70% (n=56)	37% (n=56)	0.95

If we assume that 3 eggs were laid in each of our nests (most nests likely had 3 eggs laid but some may have had only 2), our fledging success per egg would have been 21% in 2006 and 16% in 2007. This is still within the range of that observed elsewhere, but is on the lower end of observed values.

When comparing reproductive success by location, it is clear that more remote nests in Oregon have higher reproductive success. Nests located on land appear to have lower success than off-shore nests. In 2006, hatching success was 50% on land but 82% on off shore islands (Fisher's Exact test, $p = 0.04$). Fledging success suggested a similar trend (17 % on land, 45% off-shore, $p=0.07$). In 2007, hatching success was 28% on the mainland compared to 57% offshore (Fisher's Exact test, $p = 0.03$), and fledging success was also lower with only 13% of mainland nests fledging at least one young compared to 41% of nests on off-shore islands (Fisher's Exact test, $p = 0.03$).

It is not clear from our data whether vulnerability to human disturbance further lowers success rates. In 2006, the hatching success and fledging success was similar for nests reported as vulnerable to human disturbance compared to more remote sites. In 2007, fledging success was significantly lower for vulnerable sites (13%) compared to more remote nests (40%; Fisher's Exact test, $p = 0.048$). However, when we separated nests by their location on land versus off-shore and then examined vulnerability to disturbance,

none of the differences in hatching success or fledging success were significant. Our sample sizes were low for some comparisons and looking at the direct numbers (not considering statistical tests), success rates appeared lower at sites vulnerable to disturbance. Although it would seem straightforward to assess whether a nest is on shore, since some nests may only be connected to land at extreme low tides it is not always obvious whether a nest is on the mainland or off-shore. There is certainly some overlap between nests that are on the mainland and nests that are vulnerable to human disturbance, but there is also a great amount of variability. Some nests were on land but at the base of a cliff that was inaccessible by humans (and may have been inaccessible for many land predators), whereas, other nests were on off-shore islands so close to heavy recreation areas that they were considered vulnerable to human disturbance.

DISCUSSION

Overall, we feel that this has been an extremely successful project. We were able to more than double our goal of the number of nests to monitor, and also continued the reproductive study for a second year. Many community members became involved in the project and some volunteers were so excited about the project that they recruited and mentored new volunteers during the second year. In addition to the research conducted we gave talks about the project to the Corvallis, Salem, and Kalmiopsis (2 talks) Audubon chapters. We also spoke in Cannon Beach (invited by the Haystack Rock Awareness Program) and spoke on Nov. 3 2007 at the Lincoln City Breakfast and Birds event (invited by the Lincoln City Audubon chapter).

Despite low numbers of adult oystercatchers in Oregon, it does not appear that reproductive success is substantially lower than other areas within this species range (Table 2). However, given the longevity of this species and the variability in reproductive success seen during our study, it would certainly be worthwhile to continue this study for additional years. We have a strong volunteer base that is interested in continuing their monitoring efforts so it would not require a huge effort for federal agencies to continue this study for another year or two.

Our data indicates that nests on the mainland are less successful than off-shore nests but it is not entirely clear whether vulnerability to human disturbance further reduces reproductive success. In addition to being vulnerable to avian predators, especially ravens and gulls, nests on land or even nests that are connected to land at a extreme low tides are vulnerable to predation by mammalian land predators, such as raccoon, skunks, foxes, coyote, mink, and river otter (Andres and Falxa 1995). Tracks of many predator species were commonly seen on beaches near nest rocks, but we do not know what the cause of failure was for specific nests. Nests located close to high recreation areas may be more vulnerable to predation if human activity distracts adults from guarding their eggs and chicks. Our data were not sufficient to support this hypothesis, but further research should be done to examine the effect of disturbance. Although statistical comparisons are not easy, nests that were found in close proximity to high recreation centers all failed and often failed quickly (i.e., a nest on land at Seal Rock; a woman was walking her dog on the nest rock during a second visit to the site after the nest had

already failed). In 2006 and 2007 several Black Oystercatcher broods on nest rocks near high human-use areas in Curry Co. failed for unknown reasons.

Given that recreation is only likely to increase along the coast, it would be worthwhile to further study its affects on oystercatcher reproduction and try to minimize its negative impacts. Signs are present in some areas warning visitors not to disturb nesting birds, but in many areas signs are not present in proximity to Black Oystercatcher nest sites. Volunteer monitors (community members) often reported frustration after nest failures because they saw human activity in close proximity to nest sites. On multiple occasions I was asked by volunteers if we could increase signage or do anything else to discourage visitors from climbing on rocks. Areas where recreation was observed in proximity to nests and where increased signage (or docents, law enforcement, etc.) might be helpful are Cape Kiwanda, Road's End, Yaquina Head, Seal Rock, Bandon Beach, Meyers Creek, Lone Ranch beach, and Harris Beach State Park.

Besides surveying and monitoring, additional research on Black Oystercatchers in Oregon will help us better understand their status, habitat requirements, threats to persistence, and capacity for recovery should there be a sudden decline (from a stochastic perturbation, such as an oil spill). Banding and radio-telemetry planned for 2008 will improve our understanding of natal philopatry, breeding site fidelity, seasonal migration patterns, home range size, and habitat use patterns. Increased surveying using call-playbacks would help us estimate the number of sub-adults in the population, which would give us an indication of first overwinter survival rates (which are often low for avian species) and also provide a measure of the reserve population that may be able to take the place of current breeding adults. Genetic analyses and predation studies would also be worthwhile to determine if Oregon oystercatchers are closely related to the more numerous Alaska birds, and to determine specific threats to reproductive success.

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APPENDIX A. 2007 BLACK OYSTERCATCHER REPRODUCTIVE STUDY GUIDELINES

This year we will be continuing a study to assess Black Oystercatcher reproductive success on the Oregon coast, in addition to the annual survey. Many thanks to those of you who are assisting with the survey and find nests for us to monitor! Since there is a lot of work in obtaining information on reproductive success, we understand that the commitment may be too great for most volunteers.

However, since we are trying to monitor at least 25 nests and broods this year, we would greatly appreciate volunteer assistance. If you haven't already done so, please let us know as soon as possible if you are available to conduct weekly site visits to collect reproductive data. If you are unsure of whether you can commit to weekly visits please contact Elise Elliott-Smith. We can work around brief absences, but we must know in advance if there is a week when you will not be able to visit the site/nest that you volunteer to monitor.

Reproductive success is measured in two stages which include nest success and fledging success. A nest that hatches at least one chick is considered successful. Successful fledging is based on at least one chick reared to an age when it is capable of flying. Many tips on locating nests are found in the survey protocol (so please review), and methods for determining nest and fledging success are outlined below in these guidelines.

Please be sure to fill out a Reproductive Data Sheet when you find a nest and submit it to me as soon as possible. Although it would be great if you have the time to fill out a Reproductive Data Sheet for every visit, we understand that this may be difficult for some, and have developed a Nest Summary Sheet. Please keep track of every visit on the Nest Summary Sheet and submit that sheet after a successful fledging or failure. Also, if during a visit, you are unsure of the status of a nest or brood, please fill out a Reproductive Data Sheet for that visit and attach additional comments if necessary.

When monitoring nests and broods, please keep in mind that minimizing disturbance is our highest priority. Watch from as great a distance as possible. If you think there is any chance your presence may influence a birds behavior, limit the time you spend at the site, and do not visit the site more than twice a week (if it is a distant nest, feel free to visit more frequently and make notes about behavior). If at any time you think that a bird is flying or calling or is actively responding to your presence in any way, back away or leave the site if necessary and contact Elise Elliott-Smith for further guidance.

Nest Checks

During the month of May and June, most site visits will involve nest checks. Once a nest has been located we are interested in visiting it on at least a weekly basis to find out if it is still "active". Since both male and female oystercatchers incubate, you will often find a bird on the nest. If you are certain that you have a nest (i.e., you have seen eggs, have seen an incubation exchange, have seen a sitting bird fly off then return and sit in the exact same location), and you know approximately when eggs were laid, then simply

seeing an adult on the nest is confirmation that it is active. If you are watching from a distance and are confident that you are not disturbing birds, you may conduct a behavioral observation to provide data about behavior and incubation time (see protocol). However, in many cases your visit to the site can be extremely brief, and if you believe that there is any chance you are disturbing birds, please leave after you have confirmed that the nest is active.

If you do not see an adult on the nest and are unable to see eggs, please watch the nest for 30 minutes. If it appears that the nest is being incubated but you do not have any idea when eggs were laid, please watch the bird for 30 minutes or until chicks are seen. Black Oystercatchers incubate eggs for 26-32 days. If you know the approximate date the nest was initiated (saw nest building or copulation one week and saw an adult incubating on the following visit), you can calculate the approximate date the nest might hatch and begin watching for chicks a little before that date. However, since adults brood young chicks (essentially sit on top of chicks to keep then warm) almost continuously, you will need to watch the adult carefully if there is any chance that eggs may have hatched. After a nest has hatched you will be able to catch glimpses of the downy chicks poking their heads out from under an adult's wing or body.

Determining Fledging Success

To determine fledging success, weekly visits to sites will be necessary until chicks are capable of flight at approximately 38- 40 days old. If nest was located on a narrow ledge, adult and chicks may be seen close to the nest site. However, chicks are capable of walking almost immediately after hatching and become good climbers at about 2-3 weeks. So in situations where nest was located on a broad flat rock, cluster of low rocks, or gravel, it is likely that parents and chicks will move from the nest spot. In these situations you may need to watch the general area in which nest was located, until a parent is spotted. A parent brooding chicks will appear to be sitting. Occasionally both parents will brood simultaneously. You will want to watch brooding parent(s) for about 30 minutes or until you are confident that you have counted all chicks.

Black Oystercatchers will lay 1-3 eggs but usually only raise 1-2 chicks to fledging. After hatching, chicks will be brooded almost continuously for the first couple of days. Chicks are brooded at least intermittently for the first 23 days, and are brooded less often as they mature. When chicks are not being brooded they are almost always attended by at least one parent and will often be within a few feet of a parent (but are well camouflaged and can be difficult to see). As chicks mature and venture further away you will need to watch the general area around parents and may need to spend a little longer trying to locate and count all chicks.

What Do I Do If I Think A Nest or Brood Has Failed?

It is possible that you may return to a site and see parents but find that they do not seem to be incubating and/or do not see any chicks. Please conduct at least one additional survey within a week after not seeing nest/chicks to confirm that the nest/brood failed.

From our experience last year, it was fairly common for chicks to be "missing" at about three weeks but then reappear shortly before fledging, at about five weeks. If you suspect that there has been a predation event or failure during this time period, please continue visiting and checking for chicks.

If nests fail early in the season (May or June), birds will likely re-nest in the same location or nearby within one to two weeks. Your assistance would be greatly appreciated if you would like to monitor this replacement nest. At any time, please do not hesitate to call Elise Elliott-Smith and discuss any questions or concerns. If you will miss a week (more than 7 days between visits), please contact Elise in advance so that we can try to schedule someone else to visit your site.

THANKS SO MUCH FOR ALL YOUR HELP!

Appendix B. - 2007 Black Oystercatcher Reproductive Data Form

Survey Route Name:_____ Nest #:_____ Date:_____ Weather: temp:_____ wind (see p.15):____ (mph):_____

Observer name, email, and phone:_____ rain/ % clouds:_____

Are you monitoring more than one nest at this site?_____ If yes, please number nest above according to the order first observed.

Arrival Time: _____ Departure Time:_____ Low Tide Time: _____

On what date was copulation or nest building seen?_____ On what date did you first observe eggs or incubation?_____

Is this nest difficult to see?_____ Is it on land or off shore? (circle one) Was there a nest in this exact location last year?_____

Is there risk of human disturbance?_____ Please explain:_____

On this visit:

1. Were both adults (the pair) seen?_____
   Describe their activities (note timing if possible):_____
   _____
   _____

2. Were eggs seen?_____ How many eggs in nest?_____
   If no eggs were seen, do you think that there is an active nest?_____
   Please explain: _____
   _____
   _____

3. Were chicks seen?_____ How many chicks were seen?_____
   If no chicks were seen, do you think there is a possibility that there are chicks you were unable to see? (explain): _____
   _____
   _____
   If chicks were seen, what were they doing? _____
   _____
   _____

Please write additional comments on the back of this sheet. If this is a new nest, please provide directions and draw a picture of it's location.

Beaufort Wind Scale[1]

Beaufort Number	Wind Speed (mph)	WMO Description	Ocean Appearance- beyond break zone	Effects on Land	Should I Survey?
0	under 1	Calm	like glass	none	yes
1	1-3	Light Air	light ripples	smoke drifts	yes
2	4-6	Light Breeze	very small waves (< 1.0 ft) with glassy appearance	can feel wind on face, leaves rustle	yes
3	7-10	Gentle Breeze	waves increasing in size and scattered whitecaps	leaves and twigs in constant motion	yes
4	11-16	Moderate Breeze	larger waves and numerous whitecaps	small branches move, dust blows	not ideal
5	17-21	Fresh Breeze	waves 6-8 ft, many whitecaps, and some spray	small trees begin to sway	occasional gusts OK, but otherwise no
6	22-27	Strong Breeze	whitecaps everywhere, more spray	large branches in motion, whistling may be heard	no
7	28-33	Near Gale	white foam from breaking waves is blown in streaks, sea heaps up	larger trees in motion, walking is difficult	no

[1]Some classes with high Beaufort Numbers are not included in this table

Please return datasheets to: Elise Elliott-Smith, USGS FRESC, 3200 SW Jefferson Way, Corvallis, OR, 97331
eelliott-smith@usgs.gov; Phone # 541-750-7390; Fax # 541-758-8806

Appendix C. - 2007 Black Oystercatcher Nest Summary Sheet

Observer Name(s):_____

Nest Location/Survey Route:_____ **Nest Number:**_____

Date Initiated (lay date if known):_____

Please mark below the date and applicable code(s) for <u>each and every</u> site visit.

Date	Codes (see below)	#eggs/young	Comments

Codes:

N: nest building (rock tossing) observed
E: eggs seen
Y: young/chicks seen
I: adult seen incubating
F: failure confirmed (missing eggs or 2nd visit with no incubation/chicks)
UN: nesting status unknown

C: copulation observed
ES: eggs suspected
YS: young suspected
IE: incubation exchange observed
FS: failure suspected
PO: predation observed (predator at nest)