

## BEACH SURVEY METHODS

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### INTRODUCTION:

Any reports of dead birds on beaches from a one-time visit are of value, but *standard*, repeated beach surveys yield several important pieces of information that cannot be easily obtained any other way including: the timing and duration of mortality, differences in timing and overall effects among species, some minimum, standardized estimate of total mortality (birds/km), and some idea of the geographic range of mortality. If you mark and re-sight carcasses on beaches (*Intensive Surveys*; a higher level of effort), this allows us to estimate deposition and disappearance rates of carcasses, and extrapolate maximum total mortality.

Even if you are seeing only a few seabird carcasses on local beaches at the present time, it would be good to start *Standard Surveys* as soon as possible— then if mortality increases later in the spring or summer, we'll have captured the initial effects and you can initiate some *Intensive Surveys* on a few beaches. If we end up showing that few seabirds are found on beaches despite other symptoms of a strong El Niño effect, that's interesting also, and makes it worthwhile to do beach surveys this summer in any case. Following is a simple protocol for doing beach surveys.

Methods described here are based on experience gained in assessing the mortality of seabirds after oil spills (Ford et al. 1996, Fowler and Flint 1997) and a large die-off of murrelets in Alaska in 1993 (van Pelt and Piatt 1997). We thank Harry Carter, Paul Flint, Glenn Ford, Richard MacIntosh, Vivian Mendenhall, and Lisa Saperstein for helpful suggestions on developing a survey protocol. If you have comments or suggestions to improve these methods, please let us know.

### LEVELS OF EFFORT:

There are basically two levels of effort you can put into beach surveys. On *Standard Surveys* you simply count total numbers of birds observed on beaches using protocols given below. To increase their value, standard surveys should be conducted repeatedly (e.g., once every 1-3 weeks) on a limited number of beaches, and opportunistically on a lot of beaches over a large geographic area. For example, you might be able to check 1-3 beaches near home, office or field camp on a weekly or bi-weekly basis, and also check irregularly many beaches to the north, then to the south, then on a trip to some other region, etc. If you have time to re-check the far-flung beaches, that's OK-- especially if you note a surge of mortality on your regular beaches. However, their value is limited compared to repetitive surveys of a few carefully selected beaches. See the attached figure for an example of a sampling strategy in event of a large die-off.

It is important to realize that accurate estimates of total deposition of carcasses on a beach can only be made from *Intensive Surveys*. Knowing deposition rates from a few beaches, you can extrapolate total deposition on other beaches that are surveyed *only once* (as long as you know the date they were visited). Visiting those other beaches once or twice again when you have limited time and resources **is largely a waste of effort** that would be better spent studying a few beaches really well.

On *Intensive Surveys*, you increase the level of information obtained from beach surveys by marking dead birds and then re-sighting them on subsequent surveys. This requires more time for marking of new carcasses on each survey, and documenting re-sighted carcasses, but allows us to calculate *rates* of carcass deposition and *cumulative* total mortality. These rates can then be applied to beaches visited only once, to extrapolate mortality over a much larger area. Following are written instructions for doing intensive surveys, but feel free to call us to discuss the methods in some detail. Also, we can send you supplies and references if needed.

***Standard Surveys can be initiated at any time and place, and provide good baseline data even if very few birds ever show up. Intensive Surveys should be initiated only if significant numbers (10's-100's) of fresh birds start showing up on your regularly patrolled beaches.***

## **SURVEY METHODS:**

1) For *Standard or Intensive Surveys*, choose a few stretches of representative beach types, e.g., sandy, cobble and boulder beach. It would be ideal to conduct surveys on at least one of each type of beach in an area, but if time allows for surveys on only one beach, then choose one that typically captures lots of debris and carcasses. To facilitate replication, beaches should be delineated by natural features, whether that's a point, a pier, or a pile of rusty drums. Make the beach transect as long as practical, but at least 0.5 to 1 kilometer.

2) Time of day for conducting surveys is not terribly important, but you may try to walk beaches near high tide to minimize the area you'll have to search. Main thing is to use a consistent search effort on every survey, and to carefully check the beach from waters edge to above the high tide line. Be sure to check among debris and seaweed carefully as carcasses are easily missed on casual searches. If you have help from volunteers (friends, kids, etc.), monitor their effort to ensure consistency.

3) Get out for the first series of beach surveys as soon as possible. After the initial surveys, it would be good to focus on a few beaches and do repeated *Standard Surveys* about once every 2 weeks. For geographic coverage, use standard methods to survey distant beaches at least once during summer. For *Intensive Surveys*, a working minimum would be to do the initial survey, then repeat after 2-3 days, then repeat 7 days after the initial survey, then continue on a weekly schedule until deposition of fresh carcasses appears to have diminished greatly, then sample every 2-3 weeks thereafter.

4) For each beach surveyed, record: *your name(s) and affiliation, date/time, beach name and location, linear distance of beach searched*, and record any general observations (birds nearshore appear sick, presence of predators, amount of debris on beaches, etc.). Indicate where the beach survey actually *started and stopped* (in enough detail so that someone else could repeat your survey). Record approximate *wind speed and direction* during past few days (deposition is strongly influenced by winds). Record *beach type* (sandy, gravel, cobble, boulder, rock platform), *beach orientation* (compass direction) and the *type of habitat backing the beach* (bluff/cliff, sand dunes, marsh, mud flat, forest, urban). Different beach types tend to collect debris at different rates, and this also varies with prevailing currents, winds, and orientation of the beach. Adjacent habitats may support a suite of different scavengers. Noting these details helps in the interpretation of deposition and disappearance data. All these parameters can be described on the attached beach survey form.

5) On each *standard* beach survey, record for each bird found dead: *Species, condition (freshness) of the carcass, degree of oiling or scavenging (if any), and degree of emaciation*. **For condition**, use codes: 'A'= fresh specimen (possibly still damp, eyes still intact, dead less than a day), 'B'= dead less than a week (somewhat dessicated, eyeballs present but sunken, perhaps partially buried by sand/debris, but body still limp and flexible), 'C'=week to a month old (dessicated, body rigid, eyeballs gone or sunken and completely hardened, parts missing), and 'D'=very old (more than a month, completely dessicated, brittle, may be just parts like wings and breastbone only). **For degree of oiling**, use codes: 0=no obvious oil on body, 1=light spots of oil, 2= moderate patches over body, 3=heavily oiled over much of body. **For degree of scavenging**, use codes: 0=no evidence of scavenging, 1=light scavenging (skin broken, some guts removed), 2=heavy scavenging (guts completely eviscerated, breast meat consumed). To assess whether birds were starving (emaciated) or not, feel the breast muscles on relatively fresh carcasses (code A or B). In normal birds, the breast is rounded like a lifeboat and you can barely feel the keel of the breastbone. In somewhat starved birds, the breast slopes evenly away from an obvious keel like the roof of a house. In extremely emaciated birds, the breast is concave inwards from a sharply defined keel like the hull of a sailboat. Thus, **for breast condition (degree of emaciation)** use codes: S=Sailboat (very emaciated), R=Roof (slightly emaciated), L=Lifeboat (normal).

6) If you are *not* going to conduct Intensive Surveys (below), then you should remove every carcass you find from the beach (e.g., throw well above the high high tide line). These carcasses should be marked somehow so that you do not count them again on later surveys (e.g., cut off the tips of wings with a knife, clip off right toe, etc.).

7) On *Intensive Surveys*, all carcasses are marked with a numbered tag. Tags can be made from many materials, but need to be waterproof and resilient to weathering and abuse— we recommend you contact us to discuss options, and we can supply tags if needed. Birds should be tagged through the wings where they attach to the body. You *should not remove* carcasses from beaches if you are conducting Intensive Surveys. So in addition to noting the information above (5), you would also record the unique identification number for that bird. With a time series of data from marked and re-sighted carcasses, we can calculate the deposition rate of new carcasses, and the disappearance rate of old carcasses, and estimate the total number that were deposited during the length of time you surveyed beaches.

8). On Intensive Surveys, it is important to ensure that other folks are not removing birds from your study beaches. You may want to notify the public (newspaper, radio) or erect a sign on the beach.

9) On all beach surveys, incidental observations are always valuable. For example, you could note how many eagles you see in the vicinity of your study beaches; note observations of actual predation; note tracks of mammalian predators on beaches (fox, mink, bears, etc.); how many live seabirds are seen on inshore waters; how many of those appear to be lethargic or sickly; evidence of other unusual mortality (e.g., fish, urchins or bivalves) or ocean conditions (plankton bloom, water temperatures, recent storms, etc.). If seabird mortality appears significant, try to collect some fresh specimens and store them in a freezer until they can be shipped to us in Anchorage.

10) Finally, seabirds may be killed by a variety of other means, for example by drowning in fishing nets (fresh carcasses are usually soaking wet, and feathers around the neck are abraded showing skin below), entanglement in fishing line (usually still attached), disease, sewage, paralytic shellfish poisoning (which usually affects a lot of different species at the same time), or shooting (often lots of blood on feathers, broken wing, etc.). Please note unusual observations on the beach survey recording forms, and provide as much detail as possible.

11) If you want more information, or have data or specimens to send, please contact us below:

<b>All Die-off Reports</b> <b>Vivian Mendenhall or Lisa Saperstein</b> <b>1 800-368-8890 or 907 786-3517</b> <b>Migratory Bird Management</b> <b>US Fish and Wildlife Service</b> <b>1011 E. Tudor Rd.</b> <b>Anchorage AK 99503</b> <b>vivian_mendenhall@mail.fws.gov</b>	<b>Beach Surveys</b> <b>Tom van Pelt, Paul Flint, or John Piatt</b> <b>907 786-3512 (fax 786-3636)</b> <b>Alaska Biological Sciences Center</b> <b>BRD/USGS 1011 E. Tudor Rd.</b> <b>Anchorage AK 99503</b> <b>thomas_van_pelt@usgs.gov</b> <b>john_piatt@usgs.gov</b>
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The following 2 pages provide you with a beach survey form. Copy both pages to a single page (front and back) for convenient use in the field.

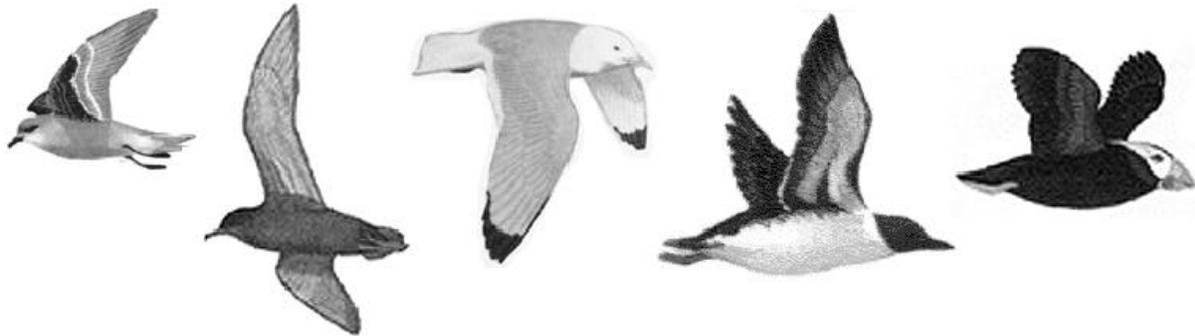


**BEACH SURVEYS 1998 (back page)**

<p><b>Condition codes:</b>                  'A'= fresh specimen (possibly still damp, eyes still intact, dead less than a day).                  'B'= dead less than a week (somewhat dessicated, eyeballs present but sunken, perhaps partially buried by sand/debris, but body still limp and flexible).                  'C'=week to a month old (dessicated, body rigid, eyeballs gone or sunken and completely hardened, parts missing).                  'D'=very old (more than a month, completely dessicated, brittle, may be just parts like wings and breastbone only).</p>	<p><b>Please deliver to: John Piatt</b>                  Alaska Biological Sciences Center                  BRD/USGS 1011 E. Tudor Rd.                  Anchorage AK 99503 Ph: 907 786 3512 john_piatt@usgs.gov</p>
<p><b>Breast emaciation codes (for birds in condition A or B only):</b>                  To assess whether birds were starving or not, feel the breast muscles.  <b>L=</b>Lifeboat (normal): the breast is rounded like a lifeboat and you can barely feel the keel of the breastbone.  <b>R=</b>Roof (slightly emaciated): the breast slopes evenly away from an obvious keel like the roof of a house.  <b>S=</b>Sailboat (very emaciated): the breast is concave inwards from a sharply defined keel like the hull of a sailboat.</p>	<p><b>Degree of oiling codes:</b>  <b>0</b>=no obvious oil on body.  <b>1</b>=light spots of oil.  <b>2</b>=moderate patches over body.  <b>3</b>=heavily oiled all over.</p> <p><b>Degree of scavenging codes:</b>  <b>0</b>=no evidence of scavenging.  <b>1</b>=light scavenging (skin broken, some guts removed).  <b>2</b>=heavy scavenging (guts completely eviscerated, breast meat consumed).</p>

**Beach types:** sandy, gravel, cobble, boulder, rock platform.  
**Type of habitat backing the beach:** bluff/cliff, sand dunes, marsh, mud flat, forest, urban.

**General Notes:** For example, you could note how many eagles you see in the vicinity of your study beaches; note observations of actual predation; note tracks of mammalian predators on beaches (fox, mink, bears, etc.); how many live seabirds are seen on inshore waters; how many of those appear to be lethargic or sickly; evidence of other unusual mortality (e.g., fish, urchins or bivalves) or ocean conditions (plankton bloom, water temperatures, recent storms, etc.).

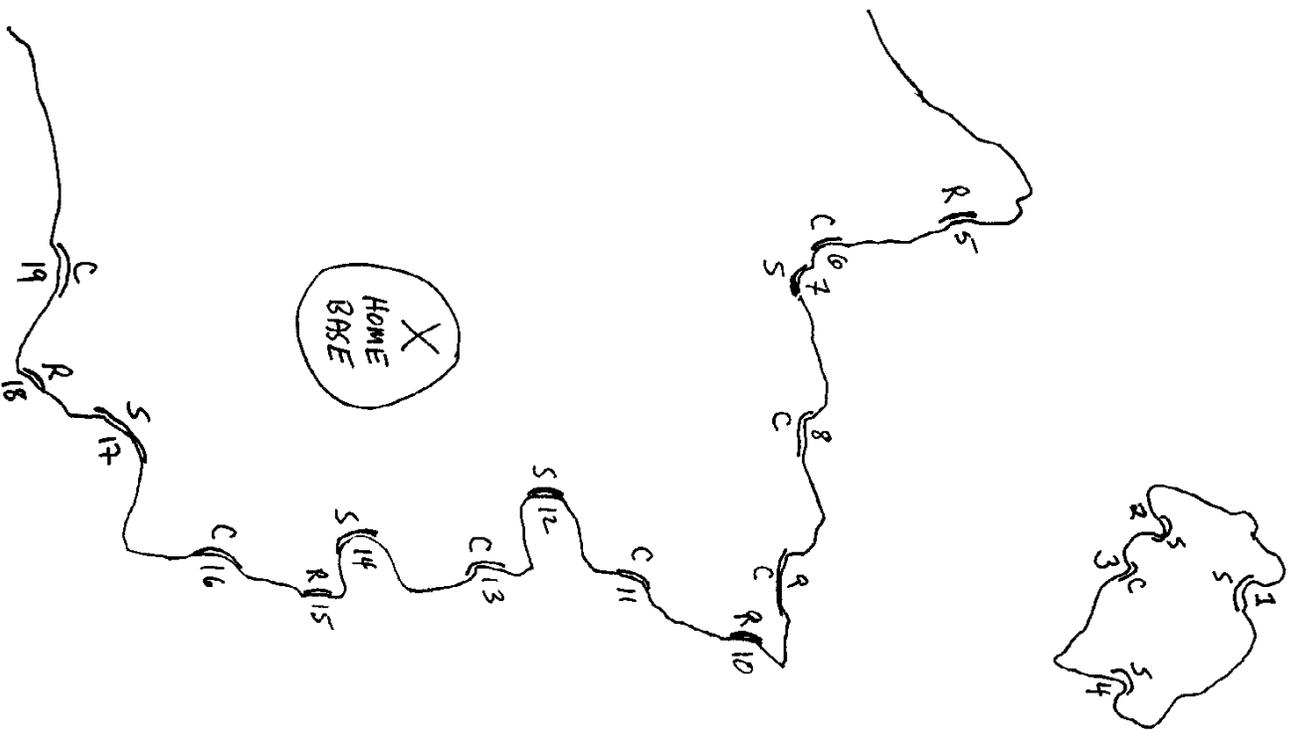


<p><i>Fork-tailed Storm Petrel</i> small size (8"), gray, black bill with tube-nose, delicate appearance</p>	<p><i>Short-tailed Shearwater</i> medium (16"), dark bill with tube-nose, long wings, body dark brown all over and slender, pale underwings. Note similar <i>Fulmar</i> is beefier, yellow bill, gray to white body</p>	<p><i>Black-legged Kittiwake</i> small (17") gull, white with smooth gray back, pure black wingtips, yellow bill, black feet</p>	<p><i>Common Murre</i> stocky (18", 2 lbs), penguin-like, dark brown back/head, white belly, sharply pointed black bill, throat/face white in winter. Note <i>Thick-billed Murre</i> similar, darker, white line on bill.</p>	<p><i>Tufted Puffin</i> stocky (15"), black/brown all over, white face, orange bill and feet, tuft of feathers on head. Note <i>Horned Puffin</i> similar, white belly, mostly yellow bill</p>
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Common seabirds found on beaches in Alaska (not scaled for relative sizes). Consult a bird guide for more details. Other possible species: Sooty Shearwater, Glaucous-winged Gull, cormorants, murrelets, and auklets.

<b>Beach Survey Data Form 1998</b>	Date: 5/21/98	Surveyors: Tom van Pett	Page: 1
	Time: 030-1410	Mike Litzen USGS	
Location: Kachunah Bay	Beach: Mac Donald Spit	Distance: 2.3 km	
Recent Wind Sp/Dir: 15-30 SW	Beach type: Sand		
Beach backing: Dunes / Urban	Beach orientation: faces NW		
Start/Stop details: From NE Point to large rock pile			
Comments: measured distance walked by pacing, walked outer (K-Bay) side of spit, saw 4 eagles scavenging carcasses, 1 set fox tracks			

Species	Condition	Oil	Scavenging	Breast	ID #	Notes
Common Murre	A	0	1	S	18	Tagged today
C. Murre	B	0	2	S	3	
C. Murre	A	0	0	R	19	Tagged today,
C. Murre	B	0	1	S	7	
C. Murre	A	0	1	R	20	Tagged today
C. Murre	B	0	1	S	2	
C. Murre	B	1	1	R	9	
C. Murre	C	0	2		21	Tagged today (Half-buried)
C. Murre	A	0	1	S	10	
Harlequin Duck	D	2	2		—	Didn't tag, obviously very old & covered in oil
C. Murre	B	0	1	S	6	
C. Murre	B	0	2	S	5	
Kittiwake	B	0	1	R	22	Tagged today
C. Murre	B	0	2	R	14	
C. Murre	B	0	2		13	
C. Murre	B	0	2		17	
Shearwater	B	0	2		11	
C. Murre	A	0	1	S	23	Tagged today - found at edge of sand dunes - carried by scavenger? Threw back on back for expt.



**Sampling strategy for beach surveys**

Beach #	Type	Number of times to survey				
		Month 1	Month 2	Month 3	Month 4	Month 5
1	Sandy			1		
2	Sandy			1		
3	Cobble			1		
4	Sandy			1		
5	Rocky			1		
6	Cobble			1		
7	Sandy			1		
8	Cobble			1		
9	Cobble			1		
10	Rocky			1		
11	Cobble		1			
12	Sandy		1			
13	Cobble		1			
14	Sandy	2	6	4	2	2
15	Rocky	2	6	4	2	2
16	Cobble	2	6	4	2	2
17	Sandy		1			
18	Rocky		1			
19	Cobble		1			

Scenario: Start Standard Surveys on 3 types of beaches close to home base. Large no's of birds show up (die-off), and you begin Intensive Surveys (marking carcasses) on the 3 original beaches, but manage to also survey a few other beaches close to home. Next month, you continue Intensive Surveys and try to get out to some distant beaches as well. If no new die-offs occur, you keep doing Standard Surveys on 3 beaches.