

# **COASST PROTOCOL**

## **A Guide for COASST Participants**

**Version 3.1**

**April 2017**



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# **COASST**

## **INTRODUCTION**

### **& INTENT**

## COASST VISION

Realizing the pressing needs for marine natural resource management, coastal conservation, good science and a stewardship ethic among citizens, the Coastal Observation and Seabird Survey Team (COASST) sees a future in which all coastal communities contribute directly to monitoring local marine resources and ecosystem health through the establishment of a network of citizens engaging in science, collecting rigorous and valuable data. Through their individual efforts, and the translation of their collective data into baselines against which any impact—from human or natural origins—can be assessed, nearshore ecosystems worldwide will be actively known, managed and protected.

## INTRODUCTION

Originally established to track the deposition of beached bird carcasses along the coast of the Pacific Northwest, COASST has expanded geographically and now reaches from northern California north to the Arctic Circle and west to the Commander Islands in Russia. COASST includes two different data collection modules: 1) beached birds and 2) marine debris. Both modules focus on the creation of a baseline pattern against which any change, from any source, can be measured. For example, if there is an oil spill, COASST beached bird data will serve as the baseline, indicating which species normally wash up and in what abundance. COASST marine debris data will allow us to evaluate impacts of natural disasters like tsunamis or changes in human behavior like plastic bag bans. We will also create maps of debris concentrations with a focus on harm to wildlife.

COASST recognizes three basic forms of change through time, all of which we are interested in documenting:

- ***Cyclic change*** occurs regularly over time; for instance, every fall/winter the amount of flotsam increases and both beached bird and marine debris counts on the beach increase. As winter storms subside in spring, the ocean calms and the air temperature warms, and beached bird numbers go down. This regular, seasonal cycle is expected. It is the baseline.
- ***Catastrophic change*** occurs every now and then and is marked by a large increase in the objects of interest. A mass mortality event (a “wreck” of beached birds) or a disruption of the Pacific Gyre “Garbage Patch” can wreak havoc on COASST beaches as participants attempt to document everything. The good news is that these events don’t happen very often, and usually don’t last very long (weeks to a few months).
- ***Chronic change*** is the hardest to recognize, and that’s because the “signal”—a very small increase (or decrease) from the normal baseline

that is persistent over time—is very hard to distinguish given the natural variability of the system. Are there really fewer beached birds than normal or is it just a quiet year? Is the number of plastic water bottles increasing or did we just experience a disturbance of the garbage patch? Chronic signals take years to suss out. And that's one reason COASST is a long-term monitoring program!

Documentation of pattern, and the departures from it, takes time and energy. It also takes precision and accuracy. Everyone working in COASST—participants, scientists, staff, student interns—is well-trained and dedicated! Our data need to be high quality, and we need to be able to prove it. COASST adheres to a very high standard of data collection and data quality, which we refer to as a “court of law” standard. In short, we have to be able to prove our data collectors are correct. There is no guessing in COASST. Our protocols are designed to be “evidence first, deduction second” when participants are asked to make deductions. And the same evidence collected in the field—things like measurements, photographs, or debris source clues—are used back in the COASST office by our verifiers. Bottom line? If you're a COASST data collector, you know you're right, we can prove you're right (or tell you if you've missed something), and science recognizes our data as high quality.

In COASST, participants attend an expert-led training in their local communities. After signing up for the program, participants receive a COASST kit and pledge to survey “their” beach at least monthly. Survey data are recorded on module-specific data sheets, which are then sent to COASST along with any required photographs. Many participants also enter their data directly into the COASST website after their survey to help speed up the data verification process, although this is completely optional. Either way, COASST requires the receipt of a hand-written data sheet, either hard copy or a scan, for COASST records. Simple statistics are available on the COASST website: [www.coasst.org](http://www.coasst.org). Data are also analyzed and assembled into COASST Reports, which are disseminated to all participants as well as to natural resource agencies, scientists, funders and other interested parties. Special interest stories are presented on our blogs. Detailed COASST data are provided to individuals and organizations on request.

Science is a team sport, and COASST believes that citizens of coastal communities are essential scientific partners in monitoring marine ecosystem health. By working together, citizens and scientists can collect, collate, analyze and report out high quality environmental information from a large geographic region. By collaborating with citizens as well as natural resource management agencies and environmental organizations, COASST works to translate this information into effective marine conservation solutions.

## Contacts

### COASST CONTACTS

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School of Aquatic and Fishery Sciences	Seattle, WA 98195-5020
UW Box 355020	206-221-6893
Seattle, WA 98195-5020	<i>coasst@uw.edu</i>
206-221-5787	
<i>jparrish@uw.edu</i>	

### ADDITIONAL CONTACTS

To report a dead, injured or stranded marine mammal

Alaska	877-925-7773
Washington and Oregon	866-767-6114
Northern California (Live Animals)	707-951-4722
Northern California (Dead Animals)	707-826-3650

Wildlife Enforcement—to report illegal or suspicious activity

NOAA Hotline	800-853-1964
Alaska	800-478-3377
Washington	877-933-9847
Oregon	800-452-7888
California	888-334-2258

To report an oil spill

US Coast Guard Hotline	800-424-8802
Alaska	800-478-9300
Washington	800-OILS-911
Oregon	800-452-0311
California	800-852-7550

To report illegal dumping and hazardous waste (EPA)

Alaska, Washington, Oregon	800-424-4372
California	415-947-8713

This protocol is intended for use as a reference document by COASST participants. Don't worry! We don't expect you to read it cover-to-cover with the intent to memorize everything. We have designed it to be your first source of information when trying to figure out how to fill in a particular form, or when you forget exactly what we said about tagging birds in the training session or what the cut-off is between small and medium debris. We have attempted to be as thorough as possible—from becoming a COASST participant to submitting your data on a regular basis.

This protocol is divided into six parts, and each part is paginated separately so that we can update individual sections without having to reprint the entire document. And that's also why this protocol is in a 3-ring binder, so that you can easily insert any updates.

#### ***Part One—Post-Training, Pre-Survey***

Information on the COASST Contract and deposit system, as well as instructions on how to fill out the Beach Directions and Beach Characteristics Forms if you are establishing a new survey beach.

#### ***Part Two—Guidelines***

Important safety information to help you in planning your surveys, and in knowing what the risks are before you go.

#### ***Part Three—Conducting Surveys***

Specific information on how to survey your beach, such as when to survey. It also includes detailed instructions on how to fill out the COASST Cover Sheet—this is the form that you fill out every time you conduct a survey and is common to all data types.

#### ***Part Four—Module Specific: Beached Birds***

Details on how to collect beached bird data, including how to work through *Beached Birds: A COASST Field Guide* and *Beached Birds: A COASST Field Guide to Alaska* to make species identifications, how to fill out the data sheet, and how to tag and photograph the birds.

#### ***Part Four—Module Specific: Marine Debris***

Details on how to collect marine debris data, with sub-sections on each of the three marine debris data collection size categories: small, medium and large. This section also includes information on how to fill out the data sheet, and how to mark large debris pieces to minimize recounting.

#### ***Part Five—Taking Photographs***

Details on photographic best practices no matter what the subject is.

#### ***Part Six—Submitting Your Data & Photos***

Details on how to get your data and photographs to COASST.

We have used a few formatting conventions to help you navigate. In all sections where we are providing specific instructions on how to fill out a form, each field (or blank) on the form is listed in the text in ***BOLD-ITALIC ALL CAPS***, or as a section heading. The possible answers for each field are then described in the text in **BOLD ALL CAPS**. Additional descriptors and keywords used in *Beached Birds: A COASST Field Guide* and *Beached Birds: A COASST Field Guide to Alaska* appear in **bold**. Really important information that we don't want you to miss is in ***bold italics***. In addition, we have provided extra room in the margins on each page so that you can write notes right on the pages.

Think we're missing something? We'd love to hear from you—please give us feedback on what you find useful and parts that are confusing so that we can improve future versions.

**PART ONE—  
POST-TRAINING,  
BUT PRE-SURVEY**

## COASST CONTRACT

Before starting, all COASST participants are required to read and sign the COASST contract. In signing this document, you are committing to survey at least once a month for COASST. In return, we are committing to provide you with the necessary tools, supplies, training and information you need, as well as regular updates, so you can see how your own findings compare with those of participants surveying other beaches. Each team of COASST participants is required to pay a deposit to help cover the cost of supplies. The amount varies depending on whether you receive the basic kit or a more advanced set of supplies. If you choose to leave the program, your deposit will be returned when you return the equipment in usable condition. You may also choose to leave all or part of your deposit as a donation to help support COASST.

<p style="text-align: center;"><b>COASST</b></p> <p style="text-align: center;"><b>Participant Contract</b></p> <p>By joining the COASST program I agree to:</p> <p class="list-item-l1">1) Carefully read the COASST protocol and adhere to the procedures outlined in the protocol during my surveys. <i>Note: Please pay special attention to the safety guidelines and salvage rules.</i></p> <p class="list-item-l1">2) Perform surveys on a <b>monthly basis</b>. I will notify COASST (206-221-6893 or <a href="mailto:coasst@uw.edu">coasst@uw.edu</a>) to arrange a substitute if I am unable to complete a survey due to illness, extended absence, or other circumstances.</p> <p class="list-item-l1">3) Submit my data online or through the mail within one week of each survey. If I submit my data online, I will also submit the original datasheet by mail or email for archiving within one week.</p> <p class="list-item-l1">4) Submit all survey photos by mail or email within one week of each survey. I acknowledge that all survey photos become property of COASST and may be used in future publicity, advertising, and web content.</p> <p class="list-item-l1">5) Take good care of COASST equipment and return it if I should leave the program.</p> <p class="list-item-l1">6) Begin monitoring my selected beach on or before _____</p> <p>I submit \$_____ as a deposit for COASST survey equipment. I understand this deposit is refundable upon returning the equipment to COASST in usable condition (normal wear and tear is expected).</p> <p><i>Please make check payable to the University of Washington.</i></p> <p>Deposit amounts:</p> <p class="list-item-l1"><input type="checkbox"/> Beached Bird Survey Supplies: \$20</p> <p class="list-item-l1"><input type="checkbox"/> Marine Debris Survey Supplies: \$20</p> <p class="list-item-l1"><input type="checkbox"/> Digital camera: \$20</p> <p>_____ <i>Participant signature</i> _____ <i>Date</i></p> <p>_____ <i>Print name</i></p> <p>_____ <i>COASST signature</i> _____ <i>Date</i></p> <p style="text-align: center;">Coastal Observation and Seabird Survey Team University of Washington School of Aquatic and Fishery Sciences ■ 1122 NE Boat St. ■ Seattle, WA 98195 ■ (206) 221-6893 <a href="http://www.coasst.org">www.coasst.org</a></p>	
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All  
participants  
sign the  
COASST  
Contract.

**DEPOSITS**

- |      |                               |
|------|-------------------------------|
| \$20 | Beached Bird Survey Supplies  |
| \$20 | Marine Debris Survey Supplies |
| \$30 | Digital Camera                |

**Deposits help defray the cost of COASST materials, including field guides, protocols and sampling tools. Participants can also borrow a digital camera for an additional deposit. Should you withdraw from the program and return your supplies, we'll return your deposit.**

## RECONNOITERING THE BEACH

If you are taking over an existing COASST beach, we will provide you with beach directions telling you:

1. How to get to the beach.
2. Where to park.
3. The start and turnaround points of the survey.

If there are any idiosyncrasies—for instance a parking permit is required, a ranger or private landowner must be contacted, or there is a trail between the parking location and the beach—this information will be provided to you as well.

To establish a new beach, you will need to visit the beach and fill out a Beach Directions Form and a Beach Characteristics Form. If you are starting surveys on an unfamiliar beach or one you have only walked a few times casually, you will definitely need to reconnoiter first. Visit the beach and walk its length and/or the area considered for surveying. The minimum length for a new beach is one kilometer (approximately 2/3 of a mile)—with certain exceptions for large marine debris surveys in debris-strewn areas. Beaches less than one kilometer in length should be discussed with COASST staff before set-up; Pacific Ocean-facing beaches longer than one kilometer should also be discussed, as those may be difficult to survey during peak bird or debris deposition periods.

Be on the lookout for potential hazards and features that might make doing a survey difficult—for instance, having to ford a stream that cuts across the beach. Realize that you may need to modify your original plans, including doing a shorter segment, or accessing or ending your survey at different points from those you originally envisioned. You may even need to abandon the beach and choose another site. This is not a problem, simply contact the COASST office to discuss other open and available beaches nearby.

## Beach Directions Form

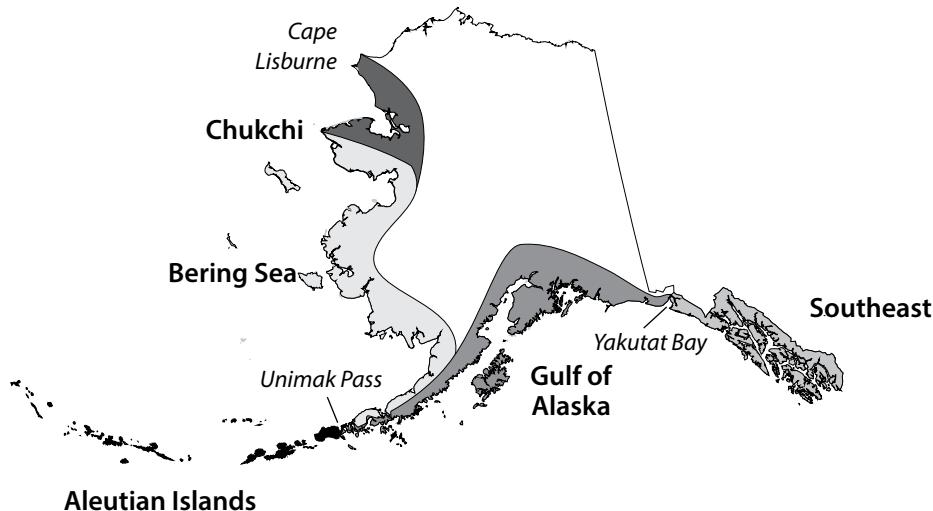
Establishing a new COASST beach requires completion of the Beach Directions Form. This form contains essential information in case COASST staff, agency partners or other COASST participants need to perform surveys of your beach (such as in the case of an oil spill) or in case you need a substitute in order to maintain the integrity of the COASST data set. You may want to start filling out this form before you leave home, as COASST needs driving directions from the closest town or major highway, as well as information on where to park.

On the front side of the Beach Directions Form, fill out the **BEACH NAME** with the official COASST beach name (as given to you in post-training materials). There are 5 COASST regions in Alaska and another 9 in the Lower 48. Circle the appropriate **REGION**.

Front	Back																								
<p><b>COAST Official Beach Directions</b></p> <p>This questionnaire is designed to provide COASST staff with detailed information about the location of COASST beaches. As you complete this form, please imagine you are providing directions for someone who has never visited your beach.</p> <p><b>Beach Name:</b> _____ <b>Date:</b> _____</p> <p><b>Participant Name(s):</b> _____</p> <p><b>Region:</b> (please circle one)</p> <table><tr><td>Alaska:</td><td>Southeast</td><td>Gulf of Alaska</td><td>Aleutian Islands</td><td>Bering Sea</td><td>Chukchi</td></tr><tr><td>Washington:</td><td>San Juan Islands</td><td>Puget Sound</td><td>Strait of Juan de Fuca</td><td>North Coast</td><td>South Coast</td></tr><tr><td>Oregon:</td><td>Oregon North</td><td>Oregon South</td><td></td><td></td><td></td></tr><tr><td>California:</td><td>Humboldt</td><td>Mendocino</td><td></td><td></td><td></td></tr></table> <p><b>Driving directions:</b> (please provide detailed driving directions to your beach from the closest town or major highway)</p> <p><b>Parking:</b> (please provide detailed information on where to park while conducting your COASST survey)</p> <p><b>Getting to the beach:</b> (please provide detailed information on how to get to your survey start point from the parking area)</p> <p style="text-align: center;">(please turn over)</p> <p><small>Coastal Observation and Seabird Survey Team University of Washington School of Aquatic and Fishery Sciences • 1122 NE Boat St. • Seattle, WA 98195 • (206) 221-6893 <a href="http://www.coast.org">www.coast.org</a></small></p>	Alaska:	Southeast	Gulf of Alaska	Aleutian Islands	Bering Sea	Chukchi	Washington:	San Juan Islands	Puget Sound	Strait of Juan de Fuca	North Coast	South Coast	Oregon:	Oregon North	Oregon South				California:	Humboldt	Mendocino				<p>Official COASST Beach Directions, page 2</p> <p><b>Survey start point:</b> COASST surveys are conducted from the same start point each time. Please describe the start point using landmarks visible year-round such that someone visiting your beach for the first time would know exactly where to start the survey—feel free to provide a sketch and/or photograph if it would help.</p> <p><b>Survey turnaround point:</b> COASST surveys have a designated turnaround point such that they cover the exact same stretch of beach each time. Please describe the turnaround point using landmarks visible year-round such that someone visiting your beach for the first time would know exactly where to turn around—feel free to provide a sketch and/or photograph if it would help.</p> <p><b>Additional Information:</b> Please use the remaining space to provide any additional information you feel would be useful to a COASST staff member or new volunteer in locating your COASST beach and survey route.</p>
Alaska:	Southeast	Gulf of Alaska	Aleutian Islands	Bering Sea	Chukchi																				
Washington:	San Juan Islands	Puget Sound	Strait of Juan de Fuca	North Coast	South Coast																				
Oregon:	Oregon North	Oregon South																							
California:	Humboldt	Mendocino																							

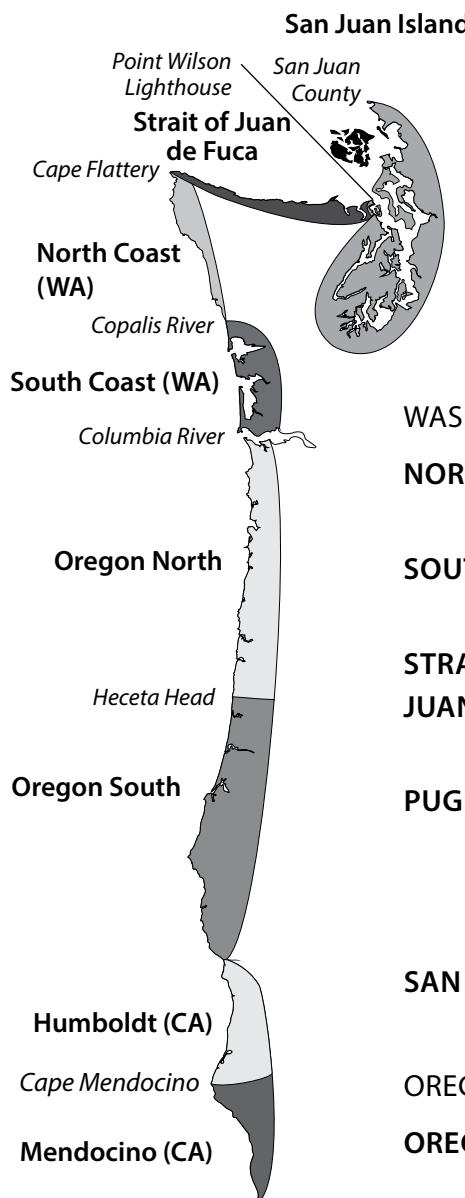
All beaches must have a Beach Directions Form on file in the COASST office. If you are establishing a new beach, COASST provides this form to fill out before conducting your first survey.

## 5 COASST regions in Alaska

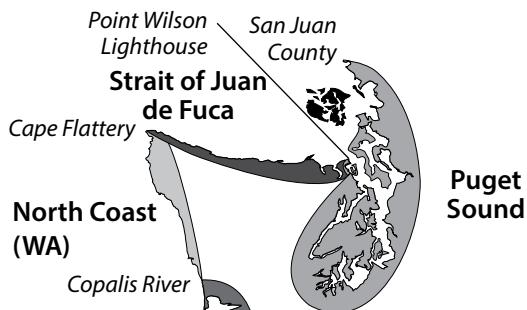


<b>CHUKCHI</b>	from the Bering Strait north along the coast of the Chukchi Sea to Cape Lisburne.
<b>BERING SEA</b>	from Unimak Pass along the north side of the Alaska Peninsula and north along the coast to the Bering Sea on the Seward Peninsula (northwest of Nome).
<b>ALEUTIAN ISLANDS</b>	from the western side of Unimak Pass at Akutan Island, including all the islands in the Aleutian chain.
<b>GULF OF ALASKA</b>	northwest from Yakutat Bay along the coast to the end of the Alaska Peninsula at Unimak Pass, including all areas of Prince William Sound, Cook Inlet, and Kodiak Island. On the Alaska Peninsula, beaches on the south side are in the Gulf of Alaska region.
<b>SOUTHEAST</b>	from the British Columbia border north to Yakutat Bay.

## **9 COASST regions in Washington, Oregon and California**



### **San Juan Islands**



**WASHINGTON** is divided into five regions:

- |                               |  |
|-------------------------------|--|
| <b>NORTH COAST</b>            | extends from Cape Flattery south to the Copalis River.   |
| <b>SOUTH COAST</b>            | includes all beaches south of Copalis River to the Columbia River  |
| <b>STRAIT OF JUAN DE FUCA</b> | from Cape Flattery east to Point Wilson Lighthouse (slightly north of Port Townsend).  |
| <b>PUGET SOUND</b>            | extends east of Point Wilson, including all islands of the inside waters, such as Whidbey, Vashon, and Bainbridge, excepting the San Juan Islands. |
| <b>SAN JUAN ISLANDS</b>       | includes all of the islands inside the San Juan County line.   |

**OREGON** is divided into two regions:

- |                     |   |
|---------------------|---|
| <b>OREGON NORTH</b> | includes all beaches from the Columbia River south to Heceta Head (just north of Florence). |
| <b>OREGON SOUTH</b> | includes all beaches south of Heceta Head to the California border.                         |

**CALIFORNIA** has two regions:

- |                  |  |
|------------------|--|
| <b>HUMBOLDT</b>  | includes all beaches from the Oregon border south to Cape Mendocino. |
| <b>MENDOCINO</b> | includes all beaches between Cape Mendocino and Point Arena.         |

If you are at all uncertain about which region your beach is in, please contact the COASST office for assistance.

Record the **PARTICIPANT NAME(S)** along with the current **DATE**.

As you are writing the **DRIVING DIRECTIONS**, imagine that you are providing directions to someone who has never visited your beach and is unfamiliar with the area. Make sure you start your directions from a town or major highway that can be easily found on a map. Provide detailed information on **PARKING**. If there is a parking, user or entrance fee, please be sure to note this. If you walk to your beach and there is no public parking in the area, be sure to note this as well. Also, please provide detailed information on **GETTING TO THE BEACH**. Is there a path down to the beach? Be sure to include exactly how to get to the start point of your survey.

On the back side of the Beach Directions Form, please describe in detail the **SURVEY START POINT**. COASST surveys are conducted from the same start point each time. This is crucial for maintaining standard data collection. For short, pocket beaches, the survey start point will likely be obvious—one end of the beach. However, for long sandy stretches along the Pacific Coast without natural separations, it is much more difficult to figure out the start point. In your description, be sure to use landmarks that are clearly visible year-round, like signs, streets or buildings. Remember, the idea is that someone who has never been to your beach will be able to accurately conduct a survey with the information that you provide. Feel free to sketch a picture and/or take a photograph to augment your written description.



**Good start points  
are often where  
beach access paths  
meet the beach.**

A clear description of the ***SURVEY TURNAROUND POINT*** is equally as important as the start point. Again, on naturally short beaches (such as in a small bay) this will not be difficult to describe, however, many COASST beaches are part of a longer stretch of coastline. In this situation, it is critical to describe the turnaround point in detail in order to ensure standard data collection. Obvious landmarks, trailheads and access roads make good survey turnaround points. A sketch or photo may be helpful here as well.



**Permanent landmarks,  
such as signs or buildings  
make useful turnaround  
points.**

At the bottom of the back side of the form, please provide any ***ADDITIONAL INFORMATION*** that would be helpful in orienting someone to your beach.

Lastly, providing a hand drawn or printed map is also very helpful to COASST!

Official COASST Beach Directions, page 2

**Survey start point:** COASST surveys are conducted from the same start point each time. Please describe the start point using landmarks visible year-round such that someone visiting your beach for the first time would know exactly where to start the survey—feel free to provide a sketch and/or photograph if it would help.

The start point is on the north side of the rocky outcrop.

**Survey turnaround point:** COASST surveys have a designated turnaround point such that they cover the exact same stretch of beach each time. Please describe the turnaround point using landmarks visible year-round such that someone visiting your beach for the first time would know exactly where to turn around—feel free to provide a sketch and/or photograph if it would help.

The turnaround point is at the north end of the beach at another rocky outcrop.

**Additional information:** Please use the remaining space to provide any additional information you feel would be useful to a COASST staff member or new volunteer in locating your COASST beach and survey route.

check tides before you go to make sure you can access the beach.

**Sketching a diagram  
of your beach and its  
landmarks can be very  
helpful.**

## Beach Characteristics Form

If you are starting a new survey beach for COASST, you will need to fill out the COASST Beach Characteristics Form. Without this form, data from your beach cannot be entered into the COASST database. At the top of the form, please fill out the **BEACH NAME** with the official COASST beach name (as given to you after the training). Also record the **PARTICIPANT NAME(S)** along with the **DATE** you are completing the form.

Circle the appropriate beach type:

- YEAR-ROUND**      Can be surveyed all months of the year.
- SEASONAL**      Some months are impossible due to weather, tides, darkness, access, and/or because there are no residents on the island (for instance, some of the Alaska Maritime National Wildlife Refuge colony summer field sites).

Circle the appropriate **REGION**.

Front	Back		
<p>( O A S T Official Beach Characteristics</p> <p><b>Beach Name:</b> _____ <b>Date:</b> _____</p> <p><b>Participant Name(s):</b> _____</p> <p><b>Beach Type:</b> Year-round   Seasonal</p> <p><b>Region:</b> (please circle one)            Alaska: Southeast   Gulf of Alaska   Aleutian Islands   Bering Sea   Chukchi            Washington: San Juan Islands   Puget Sound   Strait of Juan de Fuca   North Coast   South Coast            Oregon: Oregon North   Oregon South            California: Humboldt   Mendocino</p> <p><b>Physical Characteristics</b></p> <p><b>Substrate:</b> (circle only one—pick the one that describes the majority condition of the beach)            Sand   Cobble   Bedrock   Mud   Manmade</p> <p><b>Beach Width:</b> (distance from surfline to vegetation, large dunes, or cliff wall)   <b>Time:</b> (24:00)            Thin (&lt;5m)   Medium (5-20m)   Wide (&gt;20m) _____</p> <p><b>Amount of large woody debris along survey route:</b> (circle only one)            Little-to-none   Patchy   Continuous</p> <p><b>Is there a freshwater outflow along your survey route?</b>: Yes   No            If Yes, list type and/or name _____</p> <p><b>Is your beach backed by a vertical bluff?</b>: Yes   No</p> <p><b>Beach wrack composition:</b> (circle all that apply)            Seaweeds/Seagrasses   Wood debris   Shells   No wrack            Trash   Grass   Other _____</p> <p><b>Amount of human visitation:</b> (e.g., litter, evidence of dogs/people/vehicles)   Low   Medium   High</p> <p><b>Are vehicles permitted to drive on the beach?</b>: Yes   No   Don't know            If yes, during which months? _____</p> <p><b>Are dogs permitted on the beach?</b>: Yes   No   Don't know</p> <p style="text-align: right;">(please turn over)</p> <p style="font-size: small; text-align: center;">           Coastal Observation and Seabird Survey Team            University of Washington School of Aquatic and Fishery Sciences • 1122 NE Boat St. • Seattle, WA 98195 • (206) 221-6893  <a href="http://www.coast.org">www.coast.org</a> </p>		<p>Official COASST Beach Characteristics, page 2</p> <p><b>Safety</b></p> <p><b>Exit Points:</b> One   Several   Continuous</p> <p><b>Isolation/Remoteness:</b> Low   Medium   High</p> <p><b>Cell phone coverage:</b> Yes   No   Don't know</p> <p><b>Other</b></p> <p><b>Is your beach close to:</b> (If yes, please describe)            Seabird colonies   Yes   No   Don't know _____            Bird wintering sites   Yes   No   Don't know _____            Migration sites   Yes   No   Don't know _____            Industrial area(s)   Yes   No   Don't know _____            Other _____</p> <p><b>Comments</b> (Please describe any other features of your beach you think COASST should know)</p> <p><b>For COASST use only</b></p> <p><b>Beach Length (km):</b> _____</p> <p><b>Orientation:</b> (beach primarily faced what direction?)            N   S   E   W   NE   NW   SE   SW</p> <p>Bay:   Yes   No</p> <p>Headland:   Yes   No</p> <p>Spit:   Yes   No</p> <p style="font-size: small; text-align: center;">           Coastal Observation and Seabird Survey Team            University of Washington School of Aquatic and Fishery Sciences • 1122 NE Boat St. • Seattle, WA 98195 • (206) 221-6893  <a href="http://www.coast.org">www.coast.org</a> </p>	

If you have started a new beach, the Beach Characteristics Form should be sent in either with or before your first survey. COASST needs this information to enter your beach into our system so that data can be entered online.

The physical characteristics section includes a range of information from substrate type to beach wrack composition and human visitation.

Circle the predominant **SUBSTRATE**. Some beaches have a mix of substrates (for example, sand and cobble)—in this case, choose the most common. Although beach substrates can be divided into many categories (Washington Department of Natural Resources lists 30 different types), COASST uses a simplified five categories. The vast majority of COASST beaches will be **SAND** or **COBBLE** because they are the easiest to access and walk.

### Five Most Common Substrates

SUBSTRATE	DESCRIPTION	ABUNDANCE
Sand	smaller than 1 mm	Common
Cobble	pea gravel (mm–cm) to river rock (tens of cm)	Common
Bedrock	continuous rock slab	Rare
Mud	silt, clay, fines (smaller than sand)	Rare
Man-made	artificial substrates (e.g., rip-rap, concrete)	Rare

The five most common substrates of COASST beaches.



Cobble substrate.



Sand substrate.

**BEACH WIDTH** refers to the distance between the surf and the start of upland vegetation, dunes or a cliff that backs your beach. Circle the distance that most closely approximates the width:

- NARROW**      The beach is less than 5 meters in width. Only steeply sloped beaches and pocket beaches will be narrow.
- MED**           The beach is between 5 and 20 meters in width. Many beaches in inside waters will be medium.
- WIDE**          The beach is more than 20 meters in width. Beaches along the outer coast of the lower 48 are most often wide.

Obviously, the beach width varies with the tide, and tidal height varies with the time of day and date. COASST uses tide tables and the exact time of your record to standardize beach widths. Therefore, it is important to fill in the **TIME** when you estimate beach width.



Narrow beach.



Wide beach.

Some beaches, particularly along the outer coast, accumulate enormous amounts of **LARGE WOODY DEBRIS**, during the winter months. Wood, especially large logs, can pose a danger for surveyors and can hide carcasses and debris. Circle the amount of wood present on your beach:

- LITTLE-TO-NONE**      A log here and there.
- CONTINUOUS**          A fairly unbroken line of wood—usually of all sizes—typically higher on the beach.
- PATCHY**                The intermediate choice—COASST’s description for multiple logs interspersed by open stretches of beach.

The presence of wood is also recorded during regular surveys, as amounts can change from month to month. For a more detailed description of wood, refer to page 3-17.

**FRESHWATER INPUTS**—seeps, streams and even storm water outflows can pose difficulties to surveying; particularly after storms, when flow volume is high. Please circle **YES** if your beach has a freshwater input and list the type and/or name of the outflow. Use the **COMMENTS** section on the back side of the Beach Characteristics Form to describe the input in more detail. Is it large or small? In your estimation, does it pose a hazard? Does it require you to wear boots during all/select months in order to cross safely?



This isolated North Coast (WA) beach requires an extensive hike to reach and is backed by a vertical bluff. Isolation/remoteness is high; human visitation is low.

Is your beach backed by a **VERTICAL BLUFF**, or cliff? Circle **YES** or **NO**.

For **BEACH WRACK COMPOSITION**, please describe the things found in the wrack zone of your beach, if present. The wrack zone is the area of floating material washed in from successive high tide(s). For nearly all beaches, the wrack contains a mixture of organic matter and man-made materials. Please circle all the things that you see in the wrack. If you see any item not on the list, please specify it in the **OTHER** category. If there is no wrack present on your beach, circle **NO WRACK**. The amount of wrack is seasonally dependent. Therefore, COASST also records the presence of wrack on all regular surveys. For more details on wrack, refer to page 3–18.

The amount of **HUMAN VISITATION** tells us something about the amount of disturbance on your beach, whether beached birds might be more likely to be carried away by dogs or marine debris is more likely to be removed by people. If you see multiple people, or lots of footprints, circle **HIGH**. If your beach is remote, there are few people present, and there is only the occasional track of footprints, circle **LOW**. Otherwise, circle **MEDIUM**. If privately owned **VEHICLES** (ATVs, cars, trucks) are legally permitted to drive on your beach, circle **YES** and state which months of the year they are allowed. **DOGS** are not allowed on some beaches. If



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Pristine beach with minimal human visitation.



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Tire tracks and abundant footprints indicate recreational vehicles and lots of foot traffic.

dogs are legally permitted on the beach, circle YES. If you don't know whether there are specific regulations allowing vehicles or dogs on your beach, circle DON'T KNOW.

The back side of the Beach Characteristics Form includes information about safety. First, we would like to know something about **EXIT POINTS** on your beach. Exit points tell us how easy it is to get off the beach to higher ground. If there is only one entry/exit—for instance, a pocket beach backed by a cliff, or a spit, circle ONE. If you can exit the beach anywhere, for instance, over dunes or into forest, circle CONTINUOUS. Otherwise, if there are intermittent exit points, circle SEVERAL and make sure to note them in the comments section and on any sketch/map you include.

**ISOLATION/REMOTENESS** refers to the proximity and availability of help. Is your beach frequented by people? Are there regular access points (i.e., exit points) along your survey route? Are you relatively near a town? Some beaches in Alaska are accessible only by plane or boat, or are many miles from the nearest town—for these, you would definitely put HIGH.

Please note if your beach has **CELL PHONE** coverage.

Finally, you are asked to describe your beach's location with regard to known bird areas and human activities. If you know of **SEABIRD COLONIES**, **AQUATIC BIRD WINTERING** or **MIGRATION SITES**, or **INDUSTRIAL AREAS** that are near your beach, please describe them and note their approximate distance. For instance, is the beach part of, or adjacent to, snowy plover nesting areas?

Please use the **COMMENTS** section to include any other features of your beach not covered by the Beach Characteristics Form that you think might be pertinent for COASST and/or future participants to know (e.g., eroding bluff, ice prevents surveys in winter season, eagle nest over beach).

Take a photograph of your beach from the start point, looking down the length of your beach. Make sure to include the edge of the water to the dunes or vegetation—in other words, the entire width of the beach.

If you are unsure about whether the beach you have chosen will make a good COASST survey site, please contact us.

Otherwise, once you have completed the Beach Directions Form and the Beach Characteristics Form, we'll determine **BEACH LENGTH**, in kilometers (km). This is the distance from one end of the beach to the other, usually from the **START POINT** to the **TURNAROUND POINT** (occasionally an access point is in the middle of the beach, so the technical start point isn't at an end). We'll enter the information into the COASST database and let you know the length of your beach.



K.Sowl



Surfin\_Rox/StockThinkstock

**The comments section of the Beach Characteristics Form is a great place to note additional beach hazards, such as bears or unstable cliffs !**

## PACES PER METER

Paces are a relatively easy way to measure a variety of things. In COASST, using paces allows everyone to determine large measurements with ease.

### Who Measures What?

For all COASST data participants:

- The width of each beach zone.

For small and medium debris surveyors only:

- The distance from the survey start point to the first sampling rectangle (medium debris) and sampling squares (small debris).
- The distance from the first sampling rectangle to the next one, and on until all rectangles have been located and surveyed.

In COASST, a pace is the same as a single step, literally from one foot-fall to the next. Walk normally. Because each person has a unique pace length, it is important to know how many of your paces make up a meter. Each person will have a different paces per meter (paces/m) measurement.

*It's also essential to measure your paces per meter on your survey beach* because your stride walking on cobble or sand may be different from what it is on hard surfaces.

Use the paces per meter worksheet on the next page. This value will be stored by COASST and should be updated annually.



H. Burgess

Using a known length (here, a five-meter rope), calculate your paces per meter on the beach that you survey using your normal stride.

## PACES PER METER WORKSHEET

- Step 1 Using a measuring device of a known length that is a **minimum of 5 meters** (if you are a marine debris participant, use the measuring rope), stretch it out and orient it in the direction you will walk. Enter the length of your rope (in meters) or other measuring device in the first box below.
- Sept 2. Starting with your toes up at one end of the measuring rope, walk the length counting your paces as you go. Remember, **walk** don't stride! Enter your count in the second line below, first box.
- Sept 3. Repeat Step 2 twice, entering these counts in the next two boxes.
- Step 4. Average your pace count. Simply add all three pace counts together and divide by 3.
- Step 5. Convert from paces to paces per meter by dividing your average number of paces by the length of the measuring device you walked. Round to the nearest single significant digit (one past the decimal point). Enter this number in the final box.

*Remember that every person will have a different measurement of paces per meter, so make sure that you know your own value.*

<input type="text"/>	<input type="text"/>	Length of Measuring Device (m)
<input type="text"/>	<input type="text"/>	Number of Paces You Made for Each of 3 Passes
<input type="text"/>		Average Number of Paces
<input type="text"/>		Paces per Meter

Here is an example:

<input type="text"/> 8	<input type="text"/> 9	<input type="text"/> 8	<input type="text"/> 5	Length of Measuring Device (m)
$8 + 9 + 8 = 25$			Number of Paces You Made for Each of 3 Passes	
$25 / 3 = 8.3$			<input type="text"/> 8.3	Average Number of Paces
$8.3 / 5 = 1.7$			<input type="text"/> 1.7	Paces per Meter

Use this worksheet to determine your paces per meter. Be sure to let COASST know this value via email, mailing the worksheet, or updating your profile on our website.

# **PART TWO— GUIDELINES**

This section contains general information to help you survey safely. It also provides information and contacts for special situations you might encounter on the beach.

## SAFETY

***If your safety is in doubt, don't go out!*** Thunderstorms, high winds, big waves, extreme temperature, or snow and ice can make a survey difficult, and occasionally dangerous. And then there are animals to contend with—moose, bears, and even coyotes and dogs can be threatening. If conditions become unsafe during a survey for any reason, stop your work and leave the beach. Your safety is COASST's most important concern.

COASST covers a wide range of beaches, from urban environments to truly wild and pristine coastline. The farther from civilization your beach is, the more care you need to take with regard to health and safety. Take a cell phone and make sure the battery is fully charged.

As a general precaution, COASST recommends filing a "flight plan" with a family member or friend, including:

- Where you are going, where your vehicle will be parked, and the exact access point you will use to get to your beach.
- When you are leaving home and how long you expect to be out.

When you return, be sure to let your contact person know you are back.

## Weather

When planning your survey date, it's always a good idea to consult a local weather report. Rain can be at least an inconvenience, and at most a threat to health and safety. And same for wind. If it's snowing, or it has just snowed, don't survey—snow may make things beautiful, but it also covers up carcasses and debris.

COASST also strongly recommends adopting a layered approach to clothing. Make sure you have the right gear for sudden changes in temperature and precipitation, especially if your beach requires a hike to access.



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**At a minimum, we recommend:**

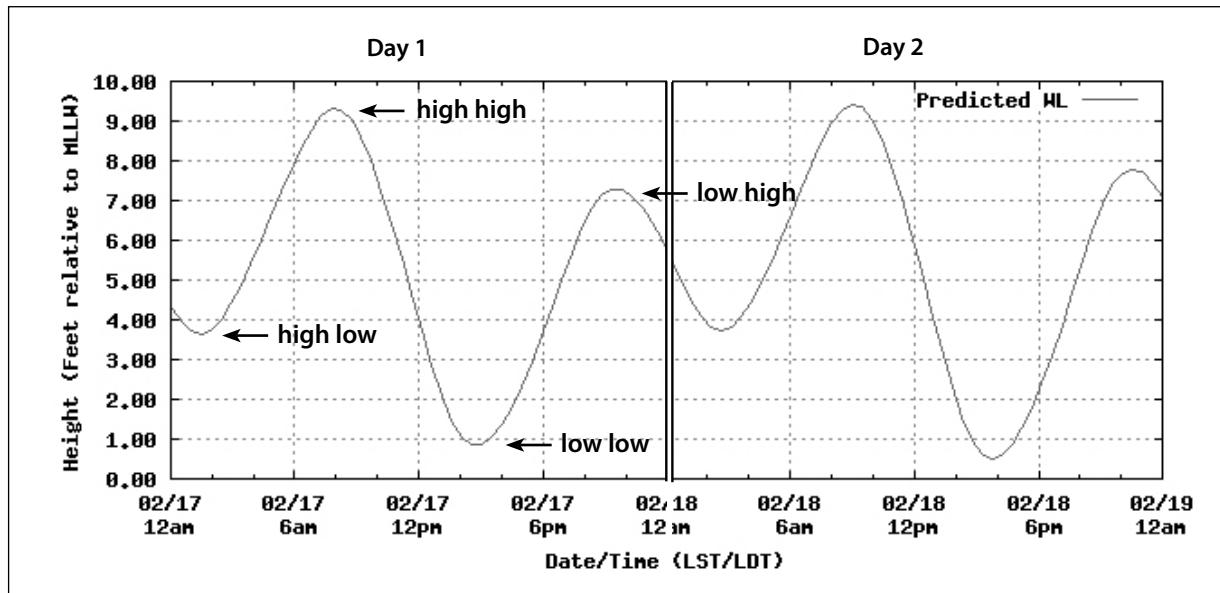
- Waterproof footgear, like rubber boots.
- Rain gear—coat and pants.
- Gloves.
- Hat: during winter months, keeps you warm and dry; during summer months, blocks sun and rain.
- Warm jacket.

An umbrella is very useful for sudden downpours.

## Tides

When planning your survey date and time, consult a tide guide. Tidal information can be obtained from the NOAA website: [www.co-ops.nos.noaa.gov](http://www.co-ops.nos.noaa.gov), links on the COASST website or mobile phone tide prediction applications.

The Pacific Northwest has semi-diurnal tides—two highs and two lows each day (actually it takes slightly more than one day, about 25 hours, for a single tidal cycle).



**The highs and the lows aren't equal. There is a higher high tide and a lower high tide (and the same for the lows) each day. Make sure you can interpret the tide charts correctly.**

It is also important to apply any correction factors properly, for instance, noting if the chart uses daylight savings time or not. Tides at different places, even within easy driving range of each other, can be several hours apart. When reading the tide schedule, make sure to choose the closest location to your beach.

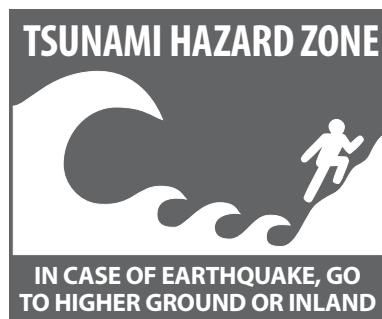
Surveys should be conducted during an outgoing tide if at all possible—this minimizes the chance of getting caught by an incoming tide or sandwiched between the tide and large wood or steep bluffs on your beach. Some beach segments can be cut in half by high tides or extreme surf conditions, so plan carefully or you could find yourself stranded.

January					February				
	Time	Height		Time	Height		Time	Height	
	h m	ft cm		h m	ft cm		h m	ft cm	
<b>1</b>	12:33 AM	7.7 235		<b>16</b>	01:08 AM	7.2 219	<b>1</b>	01:39 AM	8.6 262
W	05:57 AM	3.3 101		Th	06:33 AM	3.8 116	Sa	07:28 AM	1.7 52
	11:54 AM	9.9 302			12:26 PM	8.4 256		01:26 PM	9.3 283
●	06:48 PM	-2.2 -67		O	07:10 PM	-0.2 -6		07:57 PM	-1.3 -40
<b>2</b>	01:19 AM	8.0 244		<b>17</b>	01:40 AM	7.4 226	<b>2</b>	02:21 AM	8.8 268
Th	06:49 AM	3.0 91		F	07:11 AM	3.6 110	Su	08:18 AM	1.4 43
	12:44 PM	9.8 299			01:01 PM	8.3 253		02:17 PM	8.8 268
	07:34 PM	-2.2 -67			07:41 PM	0.0 0		08:39 PM	-0.6 -18
<b>3</b>	02:05 AM	8.2 250		<b>18</b>	02:11 AM	7.5 229	<b>3</b>	03:04 AM	8.8 268
F	07:41 AM	2.7 82		Sa	07:48 AM	3.5 107	M	09:10 AM	1.4 43
	01:35 PM	9.5 290			01:37 PM	8.1 247		03:09 PM	8.1 247
	08:19 PM	-1.8 -55			08:12 PM	0.2 6		09:22 PM	0.4 12
<b>4</b>	02:51 AM	8.4 256		<b>19</b>	02:43 AM	7.6 232	<b>4</b>	03:47 AM	8.7 265
Sa	08:34 AM	2.5 76		Su	08:26 AM	3.4 104	Tu	10:04 AM	1.5 46
	02:27 PM	9.0 274			02:13 PM	7.7 235		04:04 PM	7.4 226
	09:04 PM	-1.1 -34			08:43 PM	0.6 18		10:05 PM	1.5 46
<b>5</b>	03:37 AM	8.5 259		<b>20</b>	03:14 AM	7.6 232	<b>5</b>	04:32 AM	8.5 259
Su	09:30 AM	2.5 76		M	09:06 AM	3.3 101	W	11:01 AM	1.7 52
	03:22 PM	8.2 250			02:52 PM	7.3 223		05:04 PM	6.6 201
	09:50 PM	-0.2 -6			09:15 PM	1.1 34		10:52 PM	2.6 79
<b>6</b>	04:25 AM	8.5 259		<b>21</b>	03:47 AM	7.7 235	<b>6</b>	05:21 AM	8.3 253
M	10:29 AM	2.5 76		Tu	09:51 AM	3.2 98	Th	12:05 PM	1.9 58
	04:22 PM	7.4 226			03:35 PM	6.9 210		06:13 PM	6.1 186
	10:38 PM	0.9 27			09:50 PM	1.7 52	●	11:45 PM	3.6 110
<b>7</b>	05:15 AM	8.4 256		<b>22</b>	04:22 AM	7.8 238	<b>7</b>	06:16 AM	8.0 244
Tu	11:34 AM	2.4 73		W	10:41 AM	3.0 91	F	01:14 PM	2.0 61
	05:28 PM	6.7 204			04:29 PM	6.4 195		07:30 PM	5.8 177
	11:29 PM	2.0 61			10:29 PM	2.4 73	●	11:49 PM	4.1 125

Tide charts show when and how big the high and low tides will be each day. For most COASST beaches, there are two highs and two lows.

## Tsunamis

Tsunamis are large waves that are generated by earthquakes. The danger is that the wave can travel hundreds, even thousands, of kilometers from the site of the earthquake, giving coastal occupants little warning of the approaching threat. Tsunami warning information is broadcast on the NOAA Weather Radio and Emergency Alert System. In addition, some low-lying coastal regions have tsunami warning sirens. The sound may vary in different locations. If you hear a siren and are unsure of what to do, check with local law enforcement for the latest warning information. Tsunami signs, posted at many beaches and along coastal highways, indicate the shortest route to high ground and safety.



Tsunami signs.

If a tsunami is very large, the water will flood out before the wave comes ashore, such that the beach experiences an extreme low tide—meters and meters out from the lowest tide of the year. In fact, this phenomenon has been responsible for elevated tsunami mortality because curious beach-goers walk way out to look at exposed shells and organisms, only to fall prey to the oncoming wave. If you are ever on the beach and the tide starts to recede to lows you have never seen, immediately make for high ground.

For more information on tsunamis please visit:

International Tsunami Information Center:	<a href="http://itic.ioc-unesco.org">itic.ioc-unesco.org</a>
West Coast and Alaska Tsunami Warning Center:	<a href="http://wcawtc.arh.noaa.gov">wcawtc.arh.noaa.gov</a>

You may also sign up to receive tsunami alerts on your mobile phone at:

[www.tsunami-alarm-system.com](http://www.tsunami-alarm-system.com)

## Seaweed and Logs

During the fall and winter, kelp and driftwood accumulate along the upper portion of many beaches. In rare instances, this may block your usual entrance to the beach. Do not attempt to scramble over such obstacles if you risk falling or getting stuck. Wet logs tend to be very slick, so use your hands for extra stability—don't jump from log to log! Instead, if it seems safe, attempt to go around or crossover where obstacles are minimal.

COASST



Wikimedia Commons



Use caution when moving through logs and be aware of logs being tossed around in the surf.



**Wrack can be slippery,  
especially when formed  
by seaweed—avoid  
walking through large  
masses!**

## Avoiding Contamination

By dividing duties—one notetaker, one data collector—survey partners minimize contamination of items in their field packs and on their person. Divide supplies before the survey starts: guide and data sheets to the notetaker; measuring and marking supplies to the data collector. Regardless of the type of survey, take the following precautions against contamination:

1. Wear protective clothing, including a raincoat, boots, hat or hair tie and ***always wear disposable or rubber gloves.***
2. The data collector should avoid hand-eye and hand-mouth contact. Do not rub your eyes, chew your pencil, eat, drink, or smoke while surveying.
3. Post survey, wash with soap and water, or use an alcohol-based sanitizer.

## Bird-Borne Disease

For COASST participants who are collecting data on beached birds, this protocol includes the latest information (as of 2015) on Avian Influenza and West Nile Virus from the US Department of Health and Human Services Centers for Disease Control and Prevention (CDC), the World Health Organization, the US Geological Survey, and the Alaska, Washington, and Oregon Departments of Health and of Wildlife. In addition, we provide websites where you can find more information. As always, if you are concerned, do not hesitate to contact the COASST office for more information.

## West Nile Virus

West Nile Virus received wide media attention when it was having devastating effects on bird populations along the East Coast. By 2002, it had reached the West Coast (but not Alaska). Crows appear to be especially vulnerable. It is principally spread by mosquitoes, which become infected by feeding on a diseased bird. Mosquitoes pass the virus on to humans, horses and other hosts.

Of importance to COASST participants is the fact that mosquitoes are the only known vector for the disease. Dead birds have NOT been shown to be disease vectors. However, there is some evidence that infected birds may have higher concentrations of the virus in certain tissues. By following the standard COASST protocol, you will all but eliminate any chance of infection through this route. While there have been many transmissions of West Nile Virus from mosquitoes to humans, most people who become infected do not get sick. Some people develop mild flu-like symptoms, and in very few cases, there are more severe neurological symptoms. From 1999–2015, there were nearly 42,000 cases reported nationwide, resulting in 1,765 deaths, a fatality rate of about 4%. Deaths are typically highest among the less fit, elderly and infirm.

To minimize chances of being exposed to the virus, try to avoid mosquitoes. Stay away from stagnant fresh water or other locations where mosquito densities tend to be high. Simple precautions like wearing long-sleeved shirts or applying insect repellents are a good idea.

More information on West Nile Virus is available at the following websites:

- National: [www.cdc.gov/ncidod/dvbid/westnile/](http://www.cdc.gov/ncidod/dvbid/westnile/)
- Alaska: [www.epi.hss.state.ak.us/id/dod/wnileinfo.stm](http://www.epi.hss.state.ak.us/id/dod/wnileinfo.stm)
- Washington: [www.doh.wa.gov/YouandYourFamily/IllnessandDisease/WestNileVirus.aspx](http://www.doh.wa.gov/YouandYourFamily/IllnessandDisease/WestNileVirus.aspx)
- Oregon: [www.dfw.state.or.us/wildlife/health\\_program/westnile/](http://www.dfw.state.or.us/wildlife/health_program/westnile/)
- California: [www.westnile.ca.gov](http://www.westnile.ca.gov)

## **Avian Influenza (Bird Flu)**

Avian influenza is a large family of viruses normally found in wild birds, particularly waterfowl and shorebirds because many of these species congregate in dense flocks prior to and during migration, allowing the virus to spread more easily. Birds carry the virus within their intestines and generally do not show signs of the disease. Occasionally, a pathogenic strain appears that can cause illness, and sometimes death, in birds. Since 1997, and escalating in 2003, a particularly virulent strain of the virus known as H5N1 emerged among domestic poultry in Asia and resulted in the death and culling of millions of domestic birds.

Infected birds transmit the virus through fecal droppings, saliva and nasal discharges. Transmission of the H5N1 infection to humans to date has mainly resulted from contact with infected poultry, uncooked poultry products, or contaminated surfaces. People working in close association with bird fecal material (guano)—as is the case on poultry farms and in some poultry markets—are thought to be at higher risk than the general public.

Avian influenza viruses have been found around the world in more than 100 species of wild birds. The majority have been low pathogenic avian influenza A viruses. Aquatic birds including gulls, terns, and shorebirds, and waterfowl such as ducks, geese and swans are considered hosts for avian influenza A viruses.

In December 2014 and January 2015 the USDA and APHIS reported the presence of highly pathogenic avian influenza (HPAI) H5N2 and H5N8 in wild birds.

In January 2015, an HPAI H5N1 virus was detected in a wild duck in the United States. This was a new mixed virus (a reassortant) that is genetically different from the Asian avian H5N1 viruses that have caused human infections with high mortality in other countries. No human infections with this new H5N1 virus have been reported.

Thus far, wild birds have played a minor role in the spread of avian influenza, though wild waterfowl are known to carry avian influenza strains, often without visible symptoms. There are no known cases of transmission of avian influenza from beached birds to humans.

Follow the standard COASST safety protocol—wear gloves when surveying, minimize hand-mouth and hand-eye contact. Wash your hands immediately post survey.

For more information on the current status of Avian influenza in North America and around the world, please refer to the following websites:

- National: [www.who.int/influenza/human\\_animal\\_interface/en/www.flu.gov/about\\_the\\_flu/h5n1/](http://www.who.int/influenza/human_animal_interface/en/www.flu.gov/about_the_flu/h5n1/)
- Alaska: [www.hss.state.ak.us/pandemicflu/h5n1/](http://www.hss.state.ak.us/pandemicflu/h5n1/)
- Washington: [www.wdfw.wa.gov/conservation/health/avian\\_flu/](http://www.wdfw.wa.gov/conservation/health/avian_flu/)
- Oregon: [www.dfw.state.or.us/wildlife/health\\_program/avian-flu/](http://www.dfw.state.or.us/wildlife/health_program/avian-flu/)
- California: [www.dfg.ca.gov/wildlife/WIL/disease/avianflu/](http://www.dfg.ca.gov/wildlife/WIL/disease/avianflu/)

## Hazardous Materials

Many beach-goers may encounter hazardous materials or containers while walking the beach. Be alert! Hazardous materials include anything you believe may contain a chemical, pollutant or poison, including but not limited to oil or chemical drums, smaller metal or plastic containers, or other sealed containers. When in doubt, don't handle, and certainly don't open, any container.

Always err on the side of caution. If you think you have found a hazardous substance, in a sealed or an open container, report it immediately to the Hazardous Materials Hotline in your state listed in the Contacts table on page v, or call the COASST office. Make sure you take a photograph so we can log and verify the information.



Sometimes, hazardous materials will have a hazardous waste or biohazard label.



Hazardous materials may not have labels, signal words or symbols. Use caution around, and never open, unmarked containers.

## LIVE ANIMALS

COASST is not a rescue operation. If you find a live stranded bird, sea turtle or marine mammal, do not touch or disturb the animal. COASST does not recommend that participants intervene directly to save stranded animals. Because COASST does not possess the appropriate permits, it is illegal for participants to handle live birds or mammals.

For marine birds, the factors that led to the stranding, whether human-induced, storm-related, or other, are among the influences on bird populations that COASST monitors. Remember that many moribund birds, particularly the young of the year, are dying as part of the natural cycle of life. Although this may be distressing to witness, it shouldn't be prevented. There is also the small chance that a moribund bird is suffering from disease, so exercise caution.

Stranded marine mammals, including seals and sea lions, dolphins and whales, are monitored by the Marine Mammal Stranding Network (check the contacts table on page v). Notification of live stranded porpoises, dolphins, and whales should be made as soon as possible so that the stranding response team can mobilize rapidly. The network also asks for reports of dead cetaceans (whales, dolphins and porpoises).

Live seals, sea lions and sea otters should never be approached. Be aware that seals and sea lions regularly haul out on beaches. Baby seals are often left unattended on the beach while their mothers forage at sea, so keep a wide berth so as not to frighten the animal.

Unless stranded seals or sea lions are injured or entangled, prompt notification to the Stranding Network is unnecessary. Unlike the cetaceans and sea otters, these populations are doing well and the short-staffed Stranding Network cannot mobilize to rescue all of these animals.



**More often than not, seal pups seen on the beach are not stranded—their mothers leave them for up to 48 hours to forage at sea.**

Sea turtle strandings are incredibly rare in the Pacific Northwest, so there is no response network specifically for sea turtles. If you encounter a sea turtle on the beach, please call the Marine Mammal Stranding Network (see contact info on page v) to be transferred to the appropriate responder.

Although COASST strongly advocates that you do not attempt to rescue stranded animals, this is a personal choice. If you wish to attempt a rescue, you should call the appropriate rescue/rehabilitation center in your area. Handling stranded birds and mammals does present a risk to your safety! When caught, many long-necked birds (like Western Grebes) may try to strike at your eyes, and marine mammals can bite. These already stressed animals do not understand that you are trying to help, instead they may see you as a predator. Bite or puncture wounds can cause infection and even blood poisoning.

## OILED ANIMALS OR BEACHES

If you find fresh or weathered oil on the beach or on dead animals ***do not touch***.

Do not collect oil samples or oiled birds without hazardous materials training!

***Direct exposure to the oil and possible additives can be hazardous to your health.***

Special gloves, equipment and sampling procedures must be used to collect samples of oil to minimize health risks and contamination of the sample. Oil spill response, including rescue, rehabilitation and mortality counts, is handled by a team of professionals—led by federal or state on-site coordinators. If the amount of oil is large, stop surveying and contact the authorities as soon as possible. The numbers to call in the case of an oil spill or oiled wildlife are listed in the contacts table on page v.



This Common Murre (usually a white-chested bird) is covered in oil.

## INTERACTING WITH THE PUBLIC

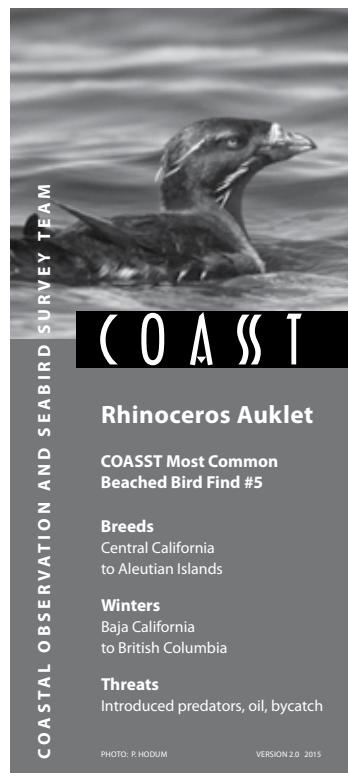
Many of the beaches COASST surveys are publicly accessible and are frequented by tourists as well as locals. Naturally, most casual beachcombers are curious when they see gloved, COASST participants huddled together on the beach. Feel free to spend a few minutes discussing the program with onlookers and take a few COASST flyers to hand out. COASST can always use more participants.

### Witnessing Illegal/Suspicious Human Activity

Compiling a comprehensive list of the possible illegal or suspicious activities witnessed during surveys is beyond the scope of this program. However, there are at least two situations that merit immediate attention:

#### *Harm to Wildlife*

Very rarely, COASST participants have witnessed individuals harassing wildlife, including throwing objects, shooting, and even attacking shorebirds with a vehicle. If you believe that someone is causing harm to wildlife, do NOT approach the individual. It is important that you and your survey partner remain safe at all times. Instead, take accurate notes on the situation, including a complete description of the individual(s), their activities and the outcome(s) of their activities. If a vehicle is involved and the license plate is visible, record the number. Make sure you also record the make, model and color of the vehicle.



**COAST**

**Rhinoceros Auklet**

**COASST Most Common  
Beached Bird Find #5**

**Breeds**  
Central California  
to Aleutian Islands

**Winters**  
Baja California  
to British Columbia

**Threats**  
Introduced predators, oil, bycatch

PHOTO: P. HODUM      VERSION 2.0, 2015

**COASTAL OBSERVATION AND SEABIRD SURVEY TEAM**

**Want to know what we're doing with dead birds?**

**Who?**  
Volunteers for COASST,  
a citizen science program

**What?**  
Counting and identifying beached birds

**Where?**  
From California to Alaska

**When?**  
Monthly

**Why?**  
COASST creates the "normal" baseline  
so that the effects of oil spills, disease,  
climate change, stressful breeding, and  
severe winters can be measured.

**How?**  
With a 5-hour training, a partner,  
field guide, protocol, and tool kit,  
you can be good to go.

**Find out more**

[coasst@uw.edu](mailto:coasst@uw.edu)  
206-221-6893  
[www.coasst.org](http://www.coasst.org)

**COASST**

**COASST  
participants  
who conduct  
beached bird  
surveys are  
provided  
with cards  
that describe  
the COASST  
program and  
natural history  
of seabirds to  
hand out  
to curious  
beach-goers.**

If the situation is serious, leave the beach and report the incident to local authorities immediately by dialing 911. Otherwise, you may contact the enforcement office in your area or send your report to COASST and we will transmit it to the proper authorities.

### ***Illegal Dumping***

Leaving trash or other debris on the beach is also illegal and can negatively impact wildlife. Reminding fellow beach-goers to clean up after themselves is fine; however, if you should witness a larger violation, use the same precautions and procedures listed on the previous page. Illegal dumping should be reported to relevant local authorities. Illegal dumping by boaters should be reported to the EPA, listed in the contacts table on page iv.



# **PART THREE— CONDUCTING SURVEYS**

This section covers everything you need to know about conducting a COASST survey regardless of the type of data—beached birds or marine debris—that you are collecting. In this section you will find specific information about how to fill in the COASST Cover Sheet, the form required on all COASST surveys.

## PAIRING UP

COASST surveys are best conducted in pairs. For ease, consistency in data collection, and health and safety reasons, one person should be in charge of the paperwork and data recording while the other makes measurements and collects the data. By switching roles occasionally (every other survey date, as a rule of thumb), COASSTers will develop all of the skills that each role requires. Partnerless? See if a friend or family member can help. Going in pairs provides a second set of eyes, enough hands to easily hold all of the gear and a safety buddy. Being able to talk through data collection, and proper identification in the case of beached birds, is not only good scientific practice, it can be more fun.



R. Rauch

**Teams of two or more people are safe and efficient.**



G. Lester

## FREQUENCY AND SCHEDULE OF SURVEYS

COASST is committed to maintaining regular surveys on all COASST beaches. Regularly and consistently collected data are crucial for generating a complete baseline. As part of the COASST contract, COASSTERS pledge to conduct at least one survey each month. More often is great, we'll definitely accept data from multiple surveys per month! If COASST does not hear from you or receive your data on a regular basis, we will call or email to check in.

OCTOBER						
SUN	MON	TUE	WED	THU	FRI	SAT
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

NOVEMBER						
SUN	MON	TUE	WED	THU	FRI	SAT
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

DECEMBER						
SUN	MON	TUE	WED	THU	FRI	SAT
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

In an ideal world, you would be able to do your survey in the same week each month.

Surveying on the same day each month is ideal, but practically impossible! The main thing is to conduct a survey every month, with survey dates spaced as far apart as possible. If you know in advance you will be out of town or otherwise unable to survey, please let the COASST office know. For many beaches, we can find a local substitute to fill a temporary vacancy—please call or email as soon as you know you need to miss a survey.

In northern latitudes, especially Alaska, regular winter surveys will be a physical impossibility. Snow, ice, sea ice, storms, tides, and darkness will conspire against even the most intrepid participant. Remember that safety always trumps data. It's also true that data collected in darkness or surveys on snow-covered beaches are not as reliable as daytime, snow-free conditions. You are the best judge of your beach, your local conditions, and your own abilities. If there are consistent access issues on your beach—for instance, during the low-light and high-water months of November through January, please note this on your Beach Characteristics Form and/or notify COASST.

During the middle of winter, when daylight hours are short, the high tide will occasionally occur at mid-day. On such occasions (especially during strong onshore winds or on particularly steep beaches), it may be nearly impossible to conduct a survey, even in the Lower 48, because the tide never falls sufficiently low enough to allow safe access during daylight hours. Pay close attention to the tide tables when scheduling surveys.

## TIME-OF-DAY: WHEN TO START

COASST surveys must be completed in a single day. The ideal time to start surveys is in the morning when there is still plenty of light left in the day; preferably after high tide. If you start when the tide is high, you may become stranded. Use your best judgment. Don't worry about the timing so much that you subject yourself to less favorable weather conditions or are forced to skip a survey altogether. Performing the survey safely, thoroughly, and on schedule (at least monthly) is the most important consideration.

## DATA TYPE COMBINATIONS: RULES OF THUMB

With more than one data type possible in a COASST survey (beached birds, small and medium marine debris, or large marine debris), the question comes up—how many different kinds of data is it possible to collect on the same survey? In most cases, the answer is only one.

Why?

Trying to look for very different things at the same time is difficult, especially if the search protocol is different. Also, COASST records the effort—the amount of time spent surveying a particular section of beach. Collecting multiple types of data simultaneously makes it impossible to assign an amount of effort to any one data type.

If you are trained and have the time to conduct multiple data types for COASST, please do these surveys *sequentially not simultaneously*, with the following exceptions:

<i>Small and medium marine debris</i>	Should be performed together.
<i>Large marine debris</i>	Can be appended to a small–medium survey.
<i>Large marine debris</i>	Can be appended to a beached bird survey only if the beach is narrow or your survey team is large, such that the beach doesn't require searching for beached birds both out and back.

Here are the rules of thumb for the sequence of data collection, depending on the data type, beach width, and number of people on the survey team:

<b>Outbound</b>	<b>Return</b>	<b>Beach Width</b>	<b>Team Size</b>
Medium and small marine debris	Human use	All widths	All group sizes
Large marine debris	Human use	All widths	All group sizes
Medium and small marine debris	Large debris; human use	All widths	All group sizes
Beached birds	Human use	Narrow	All group sizes
		Wide	3+ people (enough to cover a wide beach one-way)
Beached birds	Beached birds, Human use	Wide	1–2 people (enough to cover half the beach one-way)
Beached birds	Large debris; human use	Narrow	2+ people (enough to do all of the required surveying!)

Note that COASST recommends that the first large debris survey be performed without other data types (medium or small debris, beached birds) because it can take a long time to completely find and tag debris the first time out.

## COASST COVER SHEET

This section walks you through how to properly fill out the COASST Cover Sheet, the form required for every survey, regardless of data type (beached birds, small and medium debris, or large marine debris), or whether you find anything. Remember, zeroes are very important data in helping COASST set a proper baseline, so please return these data sheets even if you didn't find any birds or debris.

COASST COVER SHEET					Data Entry Code				
<b>SURVEY(S) COMPLETED</b> (circle appropriate) <input type="checkbox"/> beached birds <input checked="" type="checkbox"/> large debris <input type="checkbox"/> medium debris <input type="checkbox"/> small debris <b>PARTICIPANT(S)</b> _____ _____ _____ _____ _____ _____ <b>Travel Time</b> (roundtrip in minutes) _____ _____ _____ _____ _____ _____ <b>Pacer</b> _____ _____ _____ _____ _____ _____					<b>TIME &amp; LOCATION</b> <b>Beach Name:</b> _____ <b>Survey Date:</b> _____ (mm/dd/yyyy) <b>Data Collection Time:</b> (hr:min) Start _____ AM PM <b>Turnaround</b> (if applicable) _____ AM PM End _____ AM PM				
<b>ZONE WIDTHS (paces)</b> Surf    Wrack    Bare    Wood 					<b>WOOD</b> (if present, circle predominant) Frequency: none    patchy    continuous Diameter: small (<20cm)    med (20cm to 1m)    large (>1m)				
<b>ZONE WIDTHS (paces)</b> Surf    Wrack    Bare    Wood    Veg  (large debris only)					<b>WRACK</b> (if present, circle predominant) Frequency: none    patchy    continuous				
<b>WEATHER</b> (circle predominant) sun    clouds    fog    rain    snow					<b>OIL</b> (if present, circle all types) A Patch Every: 1km    100m    10m    1m Type: sheen    tarballs    goopy    mousse				
<b>HUMAN USE</b> Humans    Dogs    Motor Vehicles Count: _____ Tracks (Y/N): _____ N/A _____					<b>BEACHED MARINE MAMMALS</b> # of individuals _____ (describe in comments)				
<b>COMMENTS</b> (any additional information that could not be recorded above)									
<i>Enter data: www.coast.org COASST, University of Washington, Box 355020, Seattle, WA 98195-5020    coasst@uw.edu    206-221-6893</i>									

**The front side of the COASST Cover Sheet is for general survey information.**

All COASST data sheets have similar conventions, designed to make data collection as straightforward as possible. Here are a few general pointers:

***Italics*** All directions for filling out a particular part of the form will appear in italics, often in parentheses.

Camera Icon 

The camera icon signals the need to collect photographic evidence to add to the text and numeric data. How many photographs and specifics of scale (wide angle, close-up, etc.) are specific to the situation and are explained throughout this protocol.

The COASST Cover Sheet is divided into three sections. Each section should be accomplished at a different time during the survey:

- At the **START** of the survey top section
- At the **TURNAROUND** point and before starting back middle section
- During the **RETURN** leg bottom section

## Data Types

Circle the type(s) of data collected on the survey: **BEACHED BIRDS, LARGE DEBRIS, MEDIUM DEBRIS, and/or SMALL DEBRIS.**

	SURVEY(S) COMPLETED <i>(circle appropriate)</i>	<input type="checkbox"/> beached birds	<input type="checkbox"/> large debris <small>wood ?</small>	<input checked="" type="checkbox"/> medium debris	<input checked="" type="checkbox"/> small debris
---	---	--	--	---	--

## Bag & Tag

When surveying for medium and small debris, circle whether you are using the **BAG & TAG** option. The standard is no.

Bag & Taggers collect the debris, label the bags with the beach name, date, rectangle, zone, and for small debris, square number. Bags are then deposited at a predetermined collection point and are taken to Bag & Tag sorting locations where other COASST participants do object characterization.

Circling **N** means that you are doing both parts of the marine debris survey:

1. sampling within the rectangles (medium) and squares (small) for debris.
2. characterizing the debris.

In this case, complete and send to COASST a Cover Sheet, Mapping Your Survey Form, and Characterization Data Sheets.

Circling **Y** means that you are only finding and bagging debris—one bag for each sampling rectangle and zone (medium debris) or sampling square (small debris). In this case, complete and send COASST a Cover Sheet and Mapping Your Survey Form. The Characterization Data Sheets will be filled out by characterizers.

To participate in the Bag & Tag option, you must have signed up with the COASST office in advance. Interested? Let us know!

## Participants & Travel Time

Because all COASST surveys now include a section on measuring the width of the beach, and this is done via pacing, please enter the name of the **PACER** first. All other surveyors should be named below. If someone completing the survey is not a regular COASST participant (and does not plan to participate in future surveys consistently), please indicate this by writing "*guest*" next to her/his name.

PARTICIPANT(S)	Travel Time (roundtrip in minutes)	Pacer
Ruth Kazmerzak	120	<input checked="" type="checkbox"/>
Lauren Kowalski	120	<input type="checkbox"/>
		<input type="checkbox"/>

**TRAVEL TIME** is the round-trip time from your home to your COASST beach and back. We realize that some COASSTers have a significant amount of travel time just to get to some of our more remote beaches (accessed by plane, boat, or long hike!). Please estimate the round-trip travel time in hours and minutes.

## Time & Location

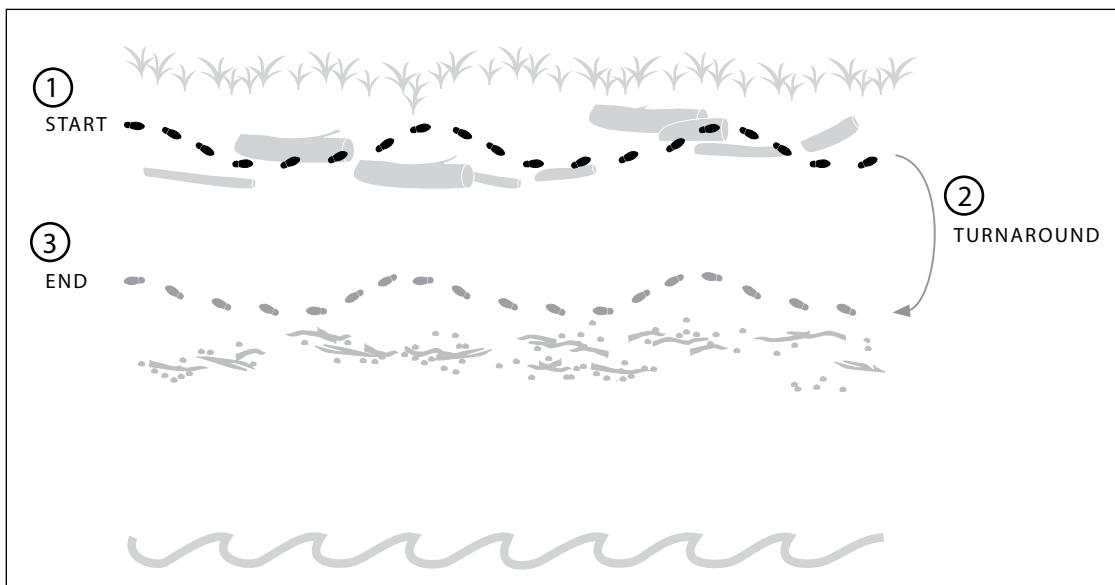
Each COASST beach has an official **BEACH NAME**. It is very important to use this assigned beach name on your data sheet as this is the finest spatial scale at which we keep track of all the COASST data. If you are uncertain of the official name of your beach, please contact the COASST office to double check.

The **SURVEY DATE** should be recorded as month/day/year (mm/dd/yyyy). For instance, February 10, 2018 should be recorded as 2/10/2018.

Record three data collection times during your survey: one when you **START**, the next when you reach the end of your outbound leg and **TURNAROUND**, and the third when you return to the start point and leave the beach—the **END** time.

TIME & LOCATION		
Beach Name:	Butter Clam	
Survey Date:	11/13/2015 (mm/dd/yyyy)	
Data Collection Time: (hr:min)		
Start	8:45	(AM) PM
Turnaround (if applicable)	11	(AM) PM
End	12	AM (PM) noon

Please record the **START**, **TURNAROUND** and **END** times in standard 12-hour clock time, making sure to circle morning (**AM**) or afternoon (**PM**).



This diagram shows a simplified beach with the start and end points, the path of the outbound leg of a survey (dark footprints), the turnaround point, and the return leg in gray footprints.

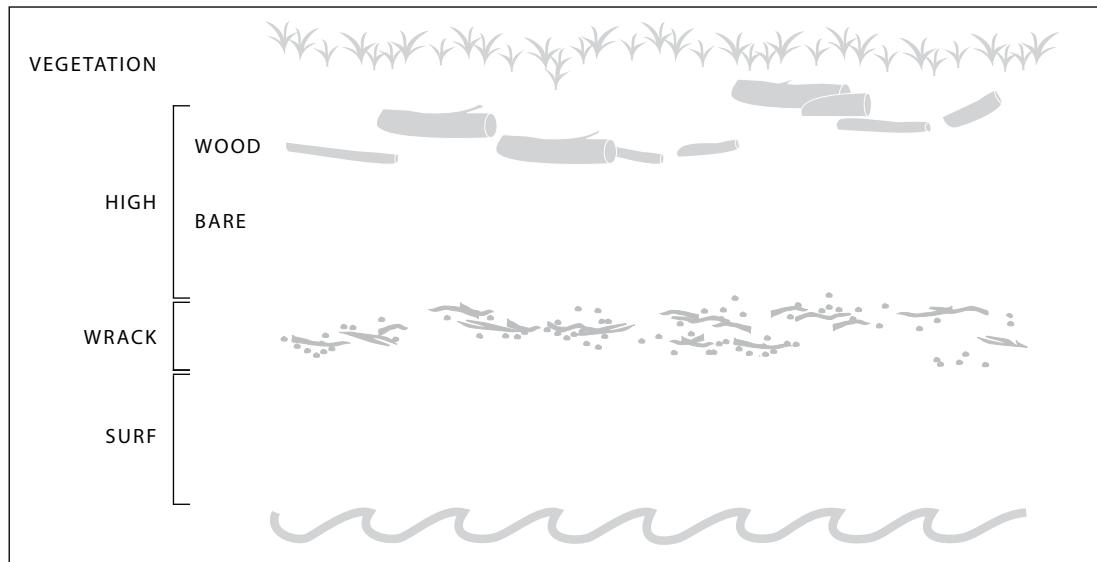
## COASST Beach Zones

The COASST approach to searching the beach for beached birds, or marine debris, or whatever else the tide may bring in, is based on the certainty that material is never deposited equally across the beach. Wrack (accumulation of dried seaweed, shells and other natural material often covering large swaths of the beach in fall and winter) and driftwood tend to be more "grabby" than bare sand, holding on to both carcasses and marine debris. Vegetation has a similar effect, snagging wind-blown material like plastic bags.

Searching the beach is more difficult in places where the substrate is uneven and where there is lots of material—like driftwood or wrack—to "draw the eye" and hide carcasses or debris. Finally, things get moved around after they are first deposited. Dogs, coyotes, bears, people and wind can move things up the beach.

The take home messages are:

1. Where you find things on the beach can tell us something about how long the object has been there.
2. The number or abundance of things can be beach zone specific, so knowing where things are and the area of each beach zone gives COASST the ability to estimate total density (objects per unit area) more accurately.



A beach can include various combinations of the beach zones. All beaches have a **SURF** zone and a **HIGH** zone.

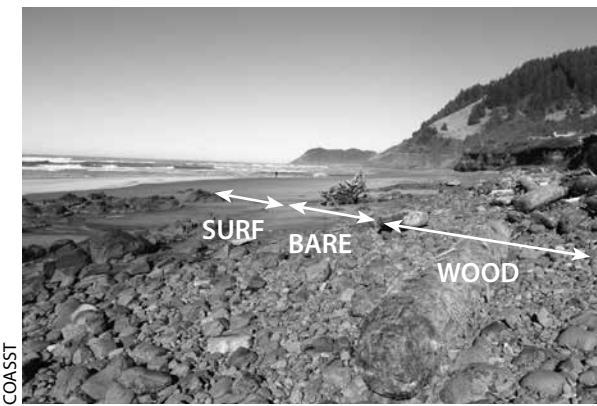
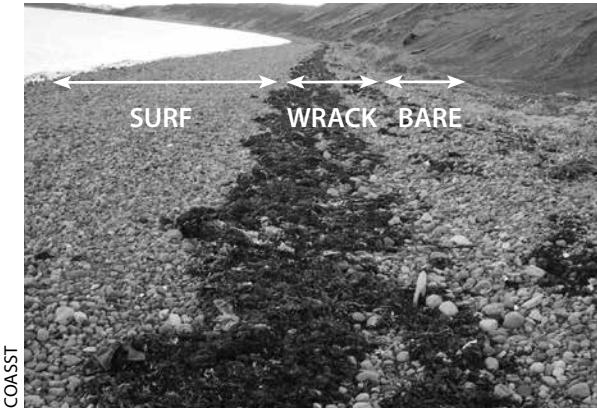
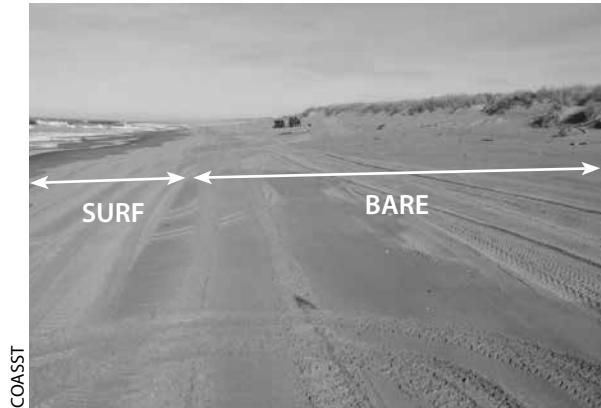
## Defining the Beach Zones

The **SURF** zone is the easiest to search because the sand has been flattened and packed by the waves, and it is easy to see anything that has been left by the last tide (or wave!). COASST measures the **SURF** zone from the edge of the active waves up the beach to the beginning of the upper beach where the substrate dries out or where wrack begins (if present).

The width of the **SURF** zone varies as a function of the type of beach (sand versus cobble), the location of the beach (beaches that front the ocean versus beaches in more secluded areas like Puget Sound or southeast Alaska), and the time of the tide. When the tide is out, the **SURF** zone can be quite wide. When the tide is in, the **SURF** zone can all but disappear.

The **WRACK** zone is the area where floating materials were deposited during previous high tides. There may be one to several wrack lines in this zone corresponding to the reach of the most recent tides. At some times of year and in some locations, the **WRACK** zone can take up the majority of the width of the beach. COASST measures the **WRACK** zone from the seaward edge of the most recently deposited wrack line up the beach to the top of the highest wrack.

If wrack is present on the beach, the **SURF** zone abuts the **WRACK** zone. If there is no wrack, the **SURF** zone abuts **BARE** or **WOOD**, depending on the presence (or absence) of driftwood.



The **HIGH** zone refers to the rest of the upper beach from the top of the wrack to the start of vegetation and/or cliff wall or other physical barrier. The **BARE** zone is the dry sand or cobble substrate above the **SURF** or **WRACK** zone and below any driftwood or vegetation.

The **WOOD** zone refers to the area where woody material—including downed trees, sawn logs and pieces of lumber—accumulated in the upper part of the beach. New deposits of wood can be scattered throughout the entire beach, but the **WOOD** zone is where wood has accumulated over time, above the reach of most high tides and waves. Exposure to the elements will smooth the texture of the wood (e.g., tree trunks lose their bark and branches). Massive accumulations of driftwood are indicators of past storms.

The **VEGETATION** zone refers to the area of the high beach where plants are growing. This zone expands seasonally down onto the beach as the weather warms in the spring. Finding the line between the **BARE** or **WOOD** zone and the **VEGETATION** zone can be tough, as growing plants rarely form a strict line parallel to the water. In some spots along the beach, plants will be quite low, whereas in



This beach lacks wrack and has a wide high zone consisting entirely of the **WOOD** zone.

There is no **BARE** zone.

others, the living plants will be pushed high up the beach into the dunes. Use your best judgment—if you see a single plant growing relatively far down the beach, exclude it from the **VEGETATION** zone. If there are many plants growing in and amongst old driftwood, you’re in the **VEGETATION** zone, not the **WOOD** zone.

Finally, know that the **VEGETATION** zone is often “open-ended” on the uphill side. On some beaches you could just keep on walking into the dune grass or forest. Where does this zone end? Measuring the **VEGETATION** zone is different from the others for this reason. COASST restricts the search width of the **VEGETATION** zone to a maximum of 5 meters for marine debris and this area is not searched at all for beached birds (see table on the next page). Thus, the **VEGETATION** zone width equals the area searched, not the actual width of area where plants are growing. If entering the **VEGETATION** zone is made difficult by the terrain—steep dunes, lots of moldering wood make footing unstable—search only whatever is safe and doable. Skip this zone entirely if it is not safe and easy to search. Because zone distinctions aren’t always “cut and dry,” here are some basic rules of thumb:

- **SURF** is always present.
- **HIGH** is always present.
- **WRACK**, **BARE**, **WOOD** and **VEGETATION** are variably present.
- When **WRACK** is present, it reduces the size of **HIGH**, specifically in the **BARE** zone.
- When **WOOD** is present, it reduces the size of **BARE**.
- If multiple plants are growing amongst the **WOOD**, the zone is **VEGETATION**.

COASST modules use different zones, even though all COASST surveys include measurement of the basic zones. Here is a table to help sort out the differences in nomenclature and survey protocol:

Zone	Beached Birds	Marine Debris
Vegetation		X
High	X	
Wood		X
Bare		X
Wrack	X	X
Surf	X	X

**Reference this table  
for a reminder of the  
beach zones that are  
surveyed for each  
COASST module.**



Zones on this beach are surf, wrack, high (beached birds) or bare (marine debris), and vegetation, which is unsurveyed in beached birds and surveyed up to 5 meters in marine debris.



Zones on this beach are surf, high (beached birds) or bare and wood (marine debris), and vegetation, which is unsurveyed in beached birds and surveyed up to 5 meters in marine debris.

## Measuring Beach Zone Width

When COASST estimates the number of beached bird carcasses or the amount of debris in an area, knowing the width of each zone is important because zone widths are dynamic—changing with tides, seasons, and storm events. Therefore, COASST measures zone widths on every survey.

If you have **NOT** circled medium/small debris, measure ZONE WIDTHS. Measure Veg **ONLY** if you have circled large debris. Enter 0 if zone not present and UM if present, but not measured.

ZONE WIDTHS (paces)				
Surf	Wrack	Bare	Wood	Veg
<input type="text"/>				

(large debris only)

Enter zone widths in paces. If a zone is not present enter 0. If a zone was unsafe to enter or otherwise present, but not measured, enter UM.

For medium debris and small debris surveys, zone widths are measured at each sampling rectangle. There is no need to make additional measurements. Please skip the **ZONE WIDTH** measurement gray box on the COASST Cover Sheet.

Beached Birds		Large Debris	Medium Debris & Small Debris
Vegetation		turnaround only	each sampling rectangle
Wood	start, turnaround	start, turnaround	each sampling rectangle
Bare	start, turnaround	start, turnaround	each sampling rectangle
Wrack	start, turnaround	start, turnaround	each sampling rectangle
Surf	start, turnaround	start, turnaround	each sampling rectangle

This table shows where and when to measure beach zones.

On large marine debris surveys, measure the zone widths of the four basic zones (if present on the beach) at the **START** and **TURNAROUND** points. If **VEGETATION**

is present, and you search within it, measure the estimated average search width (up to 5 meters) at the **TURNAROUND** point.

On beached bird surveys, measure the zone widths of the four basic zones: **SURF**, **WRACK**, **BARE** and **WOOD** (assuming they are present) twice—once at the beginning (**START**) of your survey and again once you reach the end of the outbound leg (**TURNAROUND**). There is no need to measure the **VEGETATION** zone because birds are not recorded in this zone.

If the start and turnaround are not representative of your beach, you may select two places that are.

## Steps for Measuring Beach Zone

### *Step 1: Choose the Pacer*

Identify who is going to be the **PACER**. If you don't know or can't remember the pacer's paces per meter, or if you haven't measured it in awhile, go to page 1-15 for step-by-step instructions.

### *Step 2: Choose the Start Point and Direction*

Start at either the water or the upland edge, pace in a straight line perpendicular to the waterline (across the width of the beach). If you start at the water, be mindful of waves behind you. It is not necessary to get your feet wet. Start at a point that is safe.

### *Step 3: Pacing and Counting*

It can be difficult to pace, count your paces, watch for zone transitions, and keep track of the water's edge. If you have one, use a clicker (pace counter) as you pace so that your attention is on what's in front of you rather than on counting. If you don't have a clicker, divide and conquer!! Have your partner call out the zone transitions by saying something like "Stop!" whenever you reach the edge of one zone and the start of another. Zone transitions, especially for the upland side of wrack, wood and vegetation, can be difficult to discern because they are rarely continuous, straight lines. Use your best judgment. Call out the number of paces for each zone once you reach the transition so that your partner can enter that number in the appropriate zone width box on the COASST Cover Sheet.

### *Step 4: Safety First*

If there is a **WOOD** zone, first assess whether it is safe to enter. Large, slippery or unstable logs that require you to scramble over them are not safe. If it is not safe, note this on your data sheet and proceed toward the next zone.

### *Step 5: Vegetation Zone*

Only measure this zone if you are doing a large marine debris survey. After completing the outbound leg of the survey, estimate how far—on average—you surveyed into the **VEGETATION** zone. The maximum width should be no more than 5 meters.



H. Burgess

Pacer walks perpendicular to the water through each beach zone counting with a clicker while the partner records paces for each zone.



H. Burgess

The vegetation zone is only measured by large marine debris surveyors and only up to 5 meters.

## Weather

**WEATHER** affects searching ability. On clear **SUNNY** days—not the most abundant weather type in some COASST regions!—finding objects on the beach is simply easier. **CLOUDY** days aren’t that much worse. **FOG** and light **RAIN** make searching more difficult because visibility is restricted.

WEATHER (circle predominant)				
sun	clouds	fog	<input checked="" type="radio"/> rain	snow

If it’s raining hard or snowing, choosing another day to survey is your best option for reasons of visibility and safety. If there is **snow** blanketing the beach **don’t survey** even if the weather is fine. Snow covers up everything; you won’t be able to see carcasses or debris.

When the outbound leg has been completed, circle the predominant **WEATHER** condition. More than one type of **WEATHER** blowing through during your survey? Select the more severe condition (e.g., **CLOUDS** not **SUN**).

## Whole Beach Measurements

COASST makes three general estimates of the amount of material on the entire beach—driftwood, seaweed or wrack, and oil. Because driftwood and wrack “occupy the eye” effectively obscuring the very objects you are searching for, knowing something about the presence of and amount of these materials on the beach can help COASST more accurately estimate the true abundance of carcasses or debris.

## Wood

Knowing the predominant size and amount of **WOOD** is important.

WOOD <i>(if present, circle predominant)</i>
Frequency: none <b>patchy</b> continuous
Diameter: small (<20cm) <b>med (20cm to 1m)</b> large (>1m)

### Frequency

Decide how frequently you encountered wood along the outbound leg of your survey. Is it **CONTINUOUS** or was wood restricted to patches here and there (**PATCHY**)? In reality, there are probably fine gradations, from completely covering the beach to large swaths of wood interspersed by small open areas to mostly open with only a few patches of driftwood here and there. Use your best judgment when characterizing your beach.

### Diameter

COASST measures wood size as the diameter of each log or branch, placing all wood on the beach into one of three categories:

- SMALL**    Wood is less than 20 centimeters in diameter (<20cm). These would be fairly easy pieces of wood to pick up.
- MEDIUM**    Wood is between 20 centimeters and one meter in diameter (20cm to 1m). You could sit on these logs and take a break from surveying.
- LARGE**    Wood is truly giant, greater than one meter in diameter (>1m). For many beaches COASST monitors, there won't be any large wood.

Having searched the beach in one direction on the outbound leg, you've had a chance to see all of the wood on the beach. Circle which size class constitutes the majority of the wood present. Mentally combine all of the wood on the beach into small, medium and large "piles," whichever pile is largest is the one you should circle. Even though large logs are really, well, large, abundant small or medium wood can form a larger total pile than 1–2 large logs.



L. Leyman

For this beach, you would record medium and continuous wood.



W. Newbegin

Wood on this beach would be recorded as medium and patchy.

## **Wrack**

Seaweed, sea grasses, shell and other natural material constitute the **WRACK**. At some times of year, kelp, rockweed and other seaweeds are ripped up by fall storms and wave action and deposited on the beach on each tidal cycle. If the high tide of each day is getting lower, successive lines of wrack will be deposited on the beach. In some locations, there is so much wrack that waves literally roll it into long cigar-like shapes parallel to the waterline.

Wrack contains many different objects, including bird carcasses and marine debris. Searching through large piles of wrack, or multiple wrack lines, can take forever. If the seaweed is fresh, climbing over and through the wrack can be a slippery, even dangerous, experience. Always think "**Safety First!**" Limit searching to a visual inspection—there is no need to paw through the wrack.

As with wood, decide how frequently you encountered wrack along the outbound leg of the survey. Think of a scanner line moving down the beach: Would it **CONTINUOUSLY** touch wrack? Or are there patches of wrack interspersed by bare sand (**PATCHY**)?

WRACK (if present, circle predominant)  
Frequency:  none   patchy   continuous



Wrack can be made-up of woody debris, feathers seaweed and a variety of organisms.



A single wrack line.



K.Sowl

A wrack zone composed of two wrack lines during low tide.



COASST

Although there isn't a single unbroken wrack line, there is wrack continuously present along the beach.



M.Goff

This beach shows a wide, patchy wrack zone.



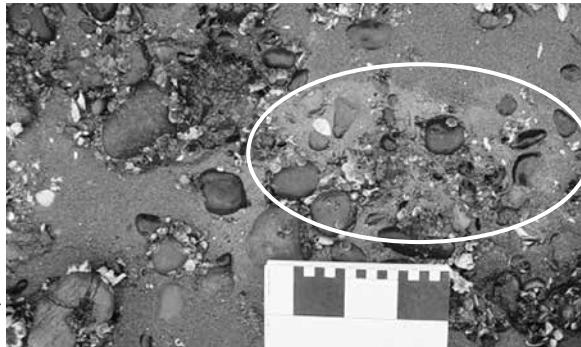
J.Dolliver

This beach shows a continuous wrack zone.

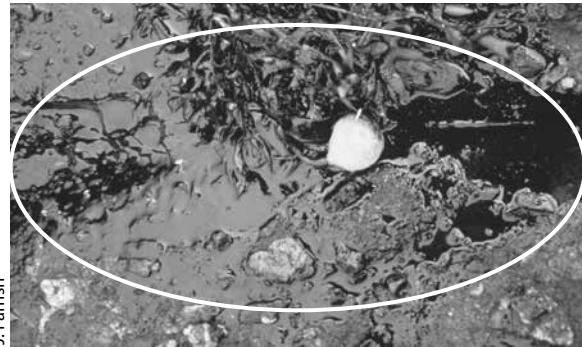
## ***Oil***

The occurrence of any **OIL** should be thoroughly documented. The camera icon (📷) means photographs are required! If you find oil on the beach, first assess whether it is safe to continue your survey. Fresh oil can be dangerous to humans and wildlife. Use your best judgment. Regardless of the amount and type of oil, report it! Please consider emailing, and/or calling the COASST office in addition to sending in your survey forms. Contacting the local authorities is also a good idea.

D. Beyers



J. Parrish



UPK Williamson



**Oil can occur as a sheen (above left, in oval),  
tarballs (lower left), goopy (right, in oval),  
and rarely as mousse (not pictured).**

Recognize that the presence of oil on a carcass or piece of beach debris does not necessarily mean that oil will be found on the beach and vice versa. If there is oil on the beach, take photographs both close-up (to aid in identification) and from a distance (to capture the extent of the oiling). Close-up photographs should contain a ruler for scale. Distant photographs should include a person for scale.

COASST records the frequency of occurrence of patches of oil and the type of oil encountered.

📷 **OIL** (*if present, circle all types*)

A Patch Every:  1km      100m      10m      1m  
Type:      sheen       tarballs      goopy      mousse

## A Patch Every

If there is any oil on the beach, it is important to assess the amount. Record how often you encountered oil:

- once in a kilometer (**1KM**), the length of many COASST beaches
- once every hundred meters (**100M**)
- once every ten meters (**10M**)
- once every meter (**1M**), this is a major oil spill!!!

## Type

COASST categorizes oil into four **TYPES: SHEEN, TARBALLS, GOOPY or MOUSSE**.

If there is oil present on the beach, circle all types encountered.

Oil can occur as a **SHEEN**, an extremely thin, translucent layer that coats objects along the beach. Sheens are often iridescent—like cellophane or soap bubbles. Inspect sheens carefully, though, as there are other sheen-like substances. For example, decomposing seaweed can produce a sheen. Fresh oil has a distinctive smell. If you are not sure, take photographs and send them in for verification.

Oil can also occur in the form of **TARBALLS**, chunky, dense or nearly solid accumulations of oil often coalesced with sand or seaweed, which can vary greatly in size from marbles to grapefruits.

The easiest oil to identify is fresh, **GOOPY** oil, and it is also the most uncommon. This thick liquid form lasts until exposure to the elements hardens it, breaks it up or mixes it into another form. Goopy oil is usually found in patches that range greatly in size. Goopy oil is indicative of an oil spill.

The last form of oil is quite unlikely to occur unless there is a major spill. **MOUSSE** is emulsified oil that literally resembles chocolate mousse in its consistency and color. It results when a large spill of fresh, goopy oil is exposed to heavy wave or surf action and is whipped into a foam/froth.

## **Human Use**

On the **return leg**, you may or may not be searching depending on the type of survey you are performing and the width of your beach. If you are simply walking back, it will be fairly easy to assess **HUMAN USE** and note the presence of **BEACHED MARINE MAMMALS**. If you are continuing to search, do your best to also tally people, dogs and vehicles.

Signs of **HUMAN USE** vary across regions. At certain times of year, beach use swells to dozens, even hundreds, of people. By contrast, while on winter surveys, or when surveying in remote locations, wildlife might outnumber humans. Some beach-goers will always walk with dogs. And on some beaches, it is legal for people to drive their trucks or cars.



H. Burns

**Because of high human visitation at some COASST beaches, all COASSTers count humans, dogs and vehicles only on the return leg of their survey.**

- COUNT** Actual sightings—a count of all people, dogs and motorized vehicles you see on your return leg, not counting yourself and your team. People inside vehicles don't get counted, but their vehicles do. Motorized vehicles include ATVs, motorcycles, cars and trucks—anything with a motor.
- TRACKS** Indicating there was a person or vehicle in the recent past—counts aren't possible; simply indicate YES (Y) or NO (N).

Dog tracks are not recorded because many other prints, from coyotes to cougars, can be confused with dog tracks.

## **Beached Marine Mammals**

Although COASST does not (yet!) have a key to marine mammals, we are very interested in documenting all of the carcasses our participants find. The camera icon (  ) means photographs are required!

For all beached marine mammals, list the body count (most often one, rarely more), and provide a description in the **COMMENTS**. Because large carcasses often last several months, you may encounter the same animal several times. Please continue to log that animal, including a brief note that it's a refind. COASST is interested in documenting the disarticulation (or mummification!) of marine mammals to assist us in building a good identification guide.

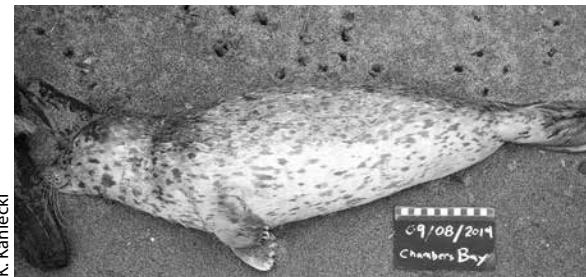
Not sure whether the carcass you've found is a marine or terrestrial mammal or simply curious about what terrestrial mammal you have found? Take the photographs explained below and describe your find; COASST will figure it out.

Photographs will be key to identifying the animal. For best results, take several:

- Entire organism, including a ruler or person for scale.
- Close-up of head, both top (or bottom) and side view.
- Close-up of front and/or hind limbs or flippers.
- Close-up of tail or fluke.

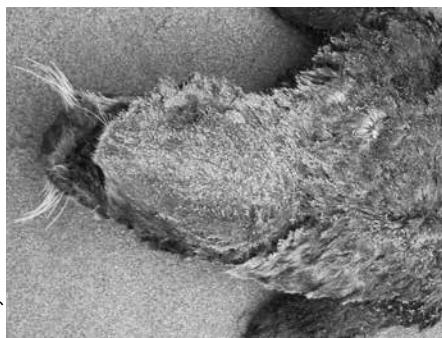


J. Parrish

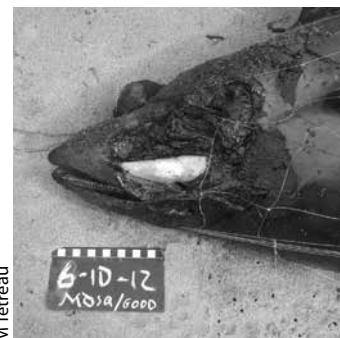


K. Kaniecki

**Wide angle photos showing the entire carcass, with a person or a ruler for scale depending on the size of the organism.**



D. Beyers



M. Tetreau



COASST

**Close-up of head: top, bottom and side view.**



COASST

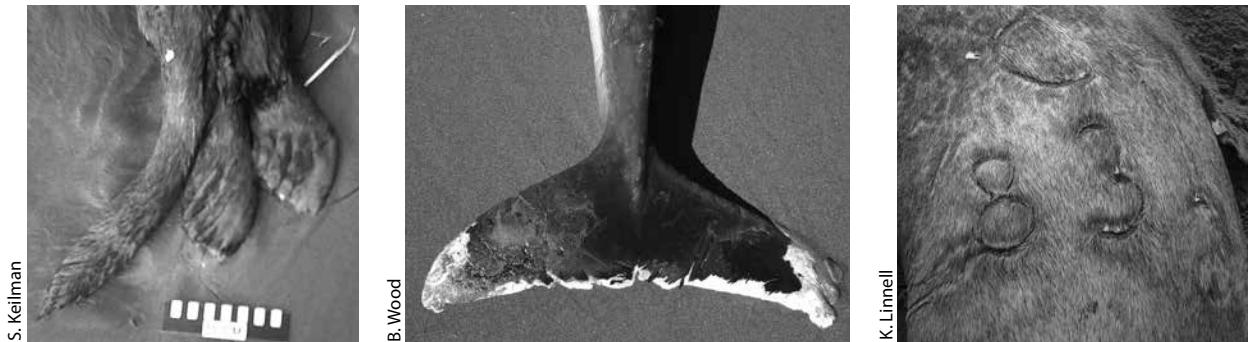


L. Winkler



N. Newmann

**Close-up of front or hind limbs or flippers.**



**Close-up of tail or fluke and any distinctive markings.**

## Comments

During surveys, you may find any number of interesting or unusual things. Containers of hazardous materials, rare deep-sea fish, giant squid and frozen moose have all been featured in the comments turned in by COASSTers. Don't know what something is? Take a photograph, make some measurements and write a brief description; we'll try our best to make an identification.

When die-offs seem extraordinary, either because you find a large number of dead organisms or because the carcasses you find are unfamiliar to you, note the event in the **COMMENTS**. However, don't get so sidetracked investigating the event that you neglect your survey. Organisms that often collect in great numbers include: fish, jellyfish, crabs and shellfish larvae.

Crustaceans such as crabs, shrimp and barnacles shed their shells annually, so make sure you are looking at a dead animal rather than a molted exoskeleton.

Low oxygen events do occur occasionally. If you find whole crustaceans (not just shells) or fish on shore in large numbers (e.g., >200) please report these to COASST so that we can notify the appropriate authorities, and please document the event with photographs.

For mass mortality events, please estimate the total number of washed-up organisms over the entire length of your beach and note how they are distributed. For instance, a survey at Ocean Park South in August noted about 20 *Velella velella* per meter ( $20 \times 1000$  meter long beach = 20,000 distributed evenly along the wrack line). Another survey two months later found approximately 50 small shark carcasses scattered over a 10-meter section of the beach.

S. Williams



Jellyfish-like organisms, *Velella velella*, known as “by-the-wind sailors” occasionally wash ashore in huge numbers.

S. Cadden



Close-up of *Velella velella*.



**PART FOUR—  
MODULE  
SPECIFIC:  
BEACHED BIRDS**

COASST's beached bird module started in 1999 and has run continuously since. Originally designed to create a baseline against which the impacts of an oil spill could be assessed, the dataset has been used for a myriad of science and natural resource management projects, from the likelihood of detecting seabird bycatch in fisheries, to the impacts of harmful algal blooms on coastal marine species, to understanding seabird resources used by indigenous coastal peoples.

Because oil spills and other impacts associated with human activities can be controversial, COASST makes sure that we can verify each carcass identification our participants submit on their data sheets. This level of care not only makes COASST data desirable for scientists and resource managers, it means that we can provide feedback to our data collectors. Wondering whether you got a new bird right? Just ask; we can let you know.

## PARTICIPANT SUPPLIES

COASST provides a set of specialized supplies to all participants who have signed the COASST contract and pledged to conduct surveys regularly. Several items in the beached bird kit are disposable, and you will use them up as you find, measure, and mark beached birds. These include data sheets, chalk and cable ties. Make sure you keep stock of your supplies, and let COASST know when you are running low, so that we can re-supply you. Permanent supplies can also be replaced if they malfunction or are lost.

### What's in Your Kit Provided by COASST?

**Beached Birds:** Our best seller (!), the field guide comes in two versions—

**A COASST Field Guide** one for Alaska and one for the lower 48 West Coast.

**Protocol** The COASST Protocol is a manual to everything you learned in training and more. Chances are if you have a question about how to conduct some part of your COASST survey you'll find it in this book. Because it's big and not printed on water-proof paper, it's probably better left at home. Before you attempt your first survey, skim through the sections that apply to you.

**Data Sheets** Every survey requires a COASST Cover Sheet (front side) and a Beached Birds Data Sheet (back side). For beaches that typically have more bird carcasses, COASST also provides a Beached Birds Data Sheet that is the same on both sides. At the training, you will receive data sheets that are appropriate for your location (birdy—some COASST Cover Sheet—Beached Birds, some Beached Birds double sided; not so birdy—only Cover Sheet—Beached Birds).

COASST uses two different types of paper when printing data sheets. Regular recycled paper is for days without significant precipitation. For misty to downright rainy days, use the data sheets provided by COASST on Rite-In-The-Rain paper. The feel of this paper is waxy; it is easy to distinguish from regular paper. Rite-In-The-Rain paper is super tough in wet conditions, but it's also expensive, so please refrain from using it on dry days.

Additional data sheets can be printed directly from the COASST website ([www.coasst.org](http://www.coasst.org)), or contact COASST and we will send you the file to print. We're also happy to send you printed data sheets in the mail.

#### PROVIDED BY COASST

- Beached Birds Field Guide*
- Protocol
- Data Sheets
- Measuring Tape
- Dividers and Metric Ruler
- Cable Ties
- Nail Clippers
- Chalk and Slate
- Yellow and Black Photographic Ruler
- Digital Camera\*

\* COASST can provide this item for an additional deposit



H. Burgess



COASST participant equipment.

#### PERSONAL EQUIPMENT

- Writing Utensil
- Clipboard
- Cell Phone
- Stiff Paintbrush
- Disposable or Rubber Gloves
- Alcohol Gel or Wipes
- Warm, Waterproof Clothes and Footwear
- Other Odds and Ends
- Headlamp
- Backpack
- Trash Bags
- Pruning Shears



J. Dolliver

Personal equipment participants are advised to carry.

<b>Measuring Tape</b>	Used for the longest of the three standard beached bird body measurements—the wing chord (or the distance from the wrist to the tip of the longest primary)—the measuring tape has a metric side and an English side. COASST exclusively uses the metric system.  Longer measurements, like those made with the tape, are made in centimeters, because more precision (for instance, millimeters) does not improve accuracy. The measuring tape is also extremely useful if you encounter a beached marine mammal or other large animal or any unknown object. Measure it, photograph it and describe it in the COMMENTS and COASST will try to figure out what it is.
<b>Dividers and Metric Ruler</b>	Traditionally used to measure the point-to-point distance on a map, dividers are excellent tools to measure the straight line distance between two points along a curvy surface, like a bird's bill or foot. Once the points are set in the right place on the carcass, transfer the outstretched divider to the metric ruler to measure these distances in millimeters.
<b>Cable Ties</b>	Each newly found (unmarked by COASST) carcass is tagged with a unique number created from colored cable ties. COASST is currently searching for a more environmentally friendly yet inexpensive tagging method that allows for unique tag sequencing (some beach sites log hundreds of birds in a year), and persists without fading or degrading for at least six months (our most persistent carcass was actually found 18 months after it was first tagged!). Got a good idea? Let us know.
<b>Nail Clippers</b>	Once a cable tie has been cinched as tight as possible, cut off the extra length (the tongue) with nail clippers. This helps remove unwanted plastic from the beach.
<b>Chalk and Slate</b>	Every photo of a beached bird, other organism or unknown object (sent to us for identification) should contain the "slate" (actually made from rubberized toe kick material) with the beach name, date, species (if known) and tag number written on it. The top of the slate has a centimeter ruler for scale. Let us know when you run out of chalk, and we'll send you some more.

Prewriting the beach name and date is a good idea. Then only the species name and tag number need to be changed. Forewarning! On non-rainy days the chalk works perfectly but on rainy days it can be problematic.

- Yellow and Black Photographic Ruler*** Just to make extra sure there is a clear scale in each photograph, place the photographic ruler along the wing in every carcass photograph.

In addition to the “standard” beached bird tool kit supplies, COASST can also provide participants with:

- Digital Camera*** Essential for photo-records of all beached birds, not to mention any other interesting or unusual find! If you don’t have a digital camera or smart phone handy, COASST has a limited number of digital cameras to loan out to participants for an additional deposit.

## Personal Equipment

With the standard supplies in the COASST beached bird tool kit, you’ll be ready to find, measure, and tag beached birds; however there are some essentials that you will need to provide to complete your kit:

- Writing Utensil*** Remember your pencil (and bring extras just in case). Pencils are very effective in mist or rain when using Rite-In-The-Rain paper. If you prefer writing with a pen, consider purchasing a weatherproof pen (\$13-\$15). They write in all kinds of weather and temperatures and even function well upside-down.
- Clipboard*** COASST data sheets are designed to be used with a clipboard. The hard surface makes it easy to write and the clip keeps data sheets from blowing away in the wind. If you don’t already have a clipboard, COASST is happy to provide you with one.
- Cell Phone*** Although many COASST beaches are outside of cell range, it’s always a good idea these days to grab your phone. The clock, compass and camera functions alone are worth it!
- Stiff Paintbrush*** An inch or two wide, a stiff bristle paintbrush is the best way to brush sand off a carcass and smooth feathers back down.
- Disposable or Rubber Gloves*** Handling beached birds is a safe, albeit occasionally messy, procedure. For the bird handler, using disposable (surgical) or rubber kitchen gloves is recommended. Be aware! Learning to cinch cable ties tight with gloves takes practice.

<b><i>Alcohol Gel or Wipes</i></b>	"At the end of a survey, wiping off your supplies is a good idea. In the absence of clean warm water and soap, always carry alcohol gel or wipes in your pack and in your car.
<b><i>Warm, Waterproof Clothes</i></b>	Anyone who walks the beach knows how quickly a warm day can turn rainy and cold. Always bring along a warm jacket, hat and gloves. If you tend to become easily chilled, chemical hand warmers are an excellent idea. Consider including a rain jacket and pants in your pack and conducting your survey in waterproof boots. A baseball cap is great for shading your eyes on a sunny day. If your hair is long, tying it out of your face into a baseball cap works well. Why tie your hair back? Handling beached birds then brushing hair out of your face, well, need we say more?
<b><i>Odds and Ends</i></b>	
<b><i>Headlamp</i></b>	Especially during winter surveys, light levels fall fast in the afternoon. A headlamp can be a lifesaver when getting back to the car. If you don't have a headlamp, consider bringing a small waterproof flashlight.
<b><i>Backpack</i></b>	A great way to keep your tools together.
<b><i>Trash Bags</i></b>	Quite a few COASSTers tell us they always pick up trash on their surveys.
<b><i>Pruning Shears</i></b>	Heavy-duty hand-held pruning shears allow COASSTers to easily clip-off a bird band or research tag.

## DEFINING A COASST BEACHED BIRD

How does COASST define a beached bird? Only carcasses with a measurable bill, foot, and/or wing count as a COASST bird. Why? Because carcasses without measurements are harder—sometimes impossible—to verify.

### *Beached Bird Measurable—Yes!*

COASST



An intact bird with bill, wing and tarsus all measurable.

COASST



The toes and ankle notch are intact.

COASST



It has a bill! with the feathers at the base intact.

COASST



The wings are intact from wrist to tips of primaries.

## *Beached Bird Measurable?—No!*



**Bones only. Never count as birds.**



**A portion of the body, but no measurable parts.**



**This bill is not measurable because the feathers and skin are missing from head and base of bill.**



**Feather piles never count as birds.**

Measurable means that the body parts are entirely present and not decomposed or disarticulated to the point that the start and stop points of the measurement are in doubt. If the skin or horny outer bill sheath has come away from the bone, or feathers have fallen out or pull away easily, don't measure!! If you find bird parts that cannot be measured, like piles of feathers, a skull, or a breastbone—you do not need to record them on the data sheet unless they are tagged remains from a previous survey.

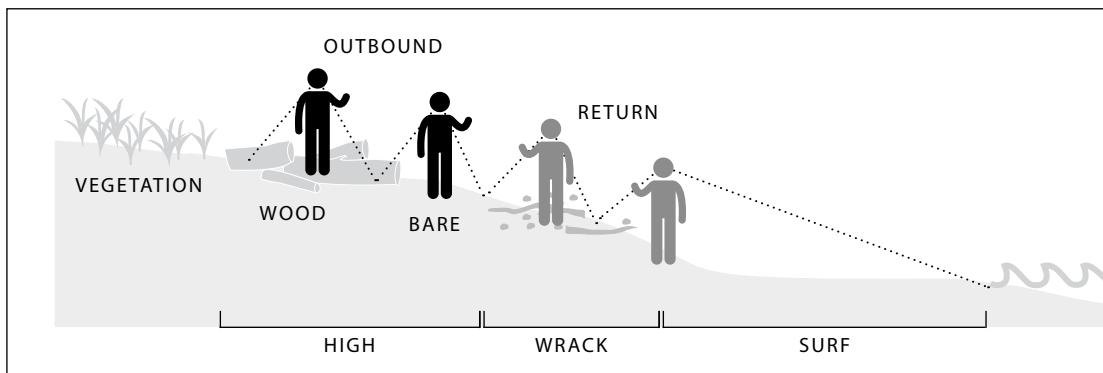
## WHERE AND HOW TO SEARCH

On wide, flat, sandy beaches, carcasses will be found in three areas. The **SURF** zone, as the tide washes material on shore. The majority will be found in the **WRACK** zone, where flotsam have accumulated during the most recent tide(s). Old, dried-up carcasses are found on the **HIGH** beach, where the highest tides of the month or occasional storms have deposited material. Predators and scavengers also move carcasses around. Beaches with steep slopes and/or rocky substrates may lack wrack or extreme high tide lines.

Here are five rules of thumb to maximize the chance of discovering a beached bird:

1. ***Spread out.*** Surveying is different from a walk on the beach with a friend.
2. ***Walk in an "S" curve—drunken sailor***—allowing each person to cover more ground than walking down the beach in a straight line
3. ***Look down, sweeping your gaze to the right and left*** as you move forward.
4. ***Search the entire beach area***—from the waterline to the beginning of the vegetation, and from the start to the turnaround point. Search it all, but do not go back over a previously searched area.
5. ***Vary your "S" curve by zone,*** surf is easier than any other zone of the beach, because waves flatten the substrate making it easy to see carcasses. For surf only, the S curve doesn't have to reach very far down, simply let your gaze sweep the area looking for a lump. This means that the person lowest on the beach can search a wider swath of beach than someone higher up where the substrate can be rutted and "cluttered" with wrack and wood.

SIDE VIEW (*wide beach example*)



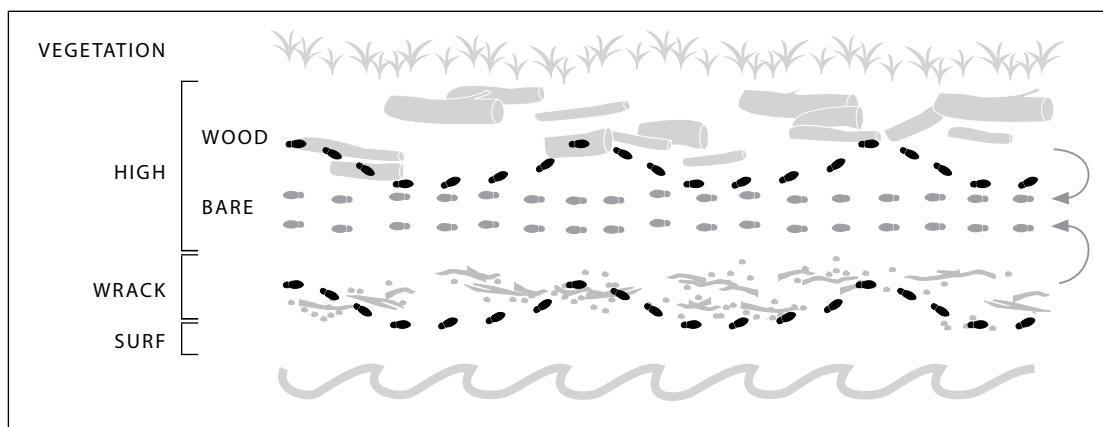
The beach is made up of multiple “zones”, some are easier to search, others require a narrower search pattern.

Note these rules apply to **all** beach widths.

SURF	one person can search <b>entire surf zone</b>
WRACK & HIGH	narrow your search to accommodate visual clutter
WOOD	search <b>only if it's safe</b>
VEGETATION	<b>no searching</b> unless high tides/waves have recently deposited fresh material

**Narrow Beach Pattern:** Whether you search only on the outbound leg, or also on the return leg depends on the width of the beach. For narrow beaches (6–10 meters wide), it is easy for two people to visually search (spread out and both using the S curve technique) the entire width of the beach. In this case, one person should center themselves in the wrack zone, with the lowest point of their S curve walk just dipping into the surf zone. The second person should search the high beach, with the top and bottom of their S curve spanning the wood and/or bare zones (depending on which zones are present). At the turnaround point, stop to fill in the COASST Cover Sheet information on weather, wood, wrack and oil, and then simply walk back, making sure to assess human use. See the narrow beach diagram for a visual representation of this search pattern.

### NARROW BEACH (*aerial view*)



**Search only on the outbound leg.**

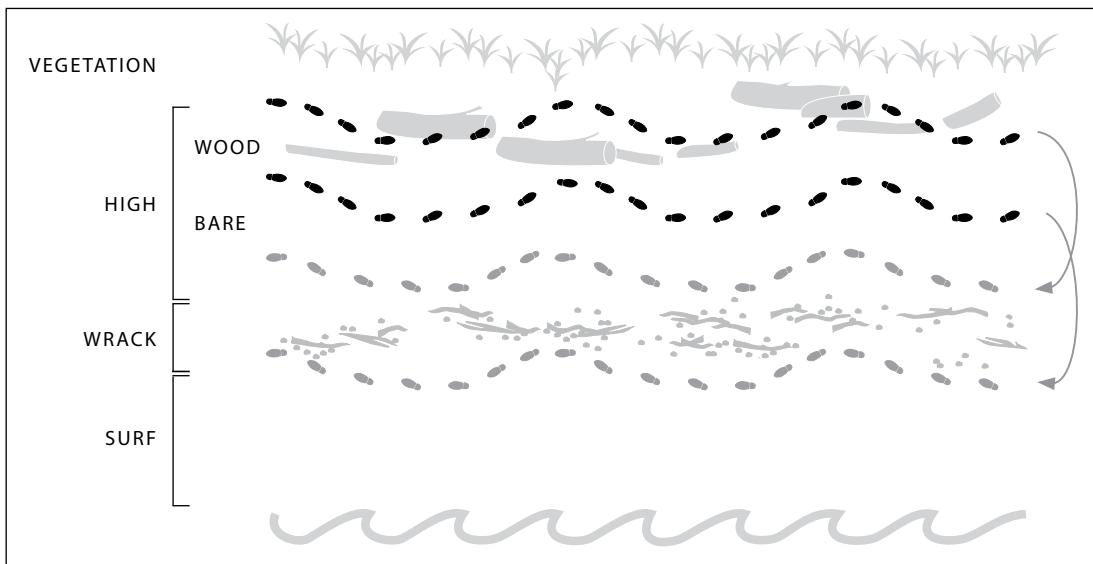
OUTBOUND LEG   

search **entire beach**

RETURN LEG   

walk straight back, **no searching**, collect human data

**Wide Beach Pattern:** For a wide beach, typical of the outer coast of southern Washington, Oregon and California, the beach is too wide for two people to search its entire width in one direction. Wide beaches require searching on both the outbound leg and the return leg (see the wide beach diagram). The low beach, including the wrack zone and the surf zone, can often be covered in one direction, even if the tide is out and the surf zone is extremely wide. This is because of rule #5—searching the surf zone is visually easy because this zone is flattened by the waves. The high beach, including the upper wrack zone, and the bare and wood zones (depending on what is present on the beach) require searchers to be closer together and the top and bottom extent of the S curve to be closer together.

WIDE BEACH (*aerial view*)

**Search in both directions.**

OUTBOUND LEG • —

*if tide going out, start high  
if tide coming in, start low*

RETURN LEG • —

*complete unsurveyed  
portion, collect human data*

Although it's possible to start a wide beach either on the upper beach or the lower beach, COASST advises choosing based on the tide. On an incoming tide, search the low beach first to maximize coverage. On an outgoing tide, reverse the order and search the high beach first.

If you are surveying in a team of more than two people, it may be possible to search in only one direction.



**Partners spread out on  
the beach to ensure they  
search the entire beach.**

## WHAT TO LOOK FOR

Many beached birds will be found easily by walking the wrack lines; however, there are several search techniques that can improve discovery of partially buried or hidden carcasses. Fresh carcasses in the surf zone will look like bumps on the flat beach—as do a lot of other things! In the wrack, carcasses are usually littered among the denser clumps of dried seaweed and sea grass, often with only a wing or foot sticking out. Pulling all of the wrack apart to physically search for carcasses would take way to long. Simply make sure you visually inspect all wrack piles and lines for the telltale presence of a wing, beak, or foot.

Above the wrack zone, where the sand is less compacted, carcasses are often partially to fully buried by blowing sand. Searching for wing-tips or long, stiff feathers is usually a very productive strategy. Many dead birds seem to “flag” themselves by sticking one wing above the sand, while at other times only their feet break the surface.

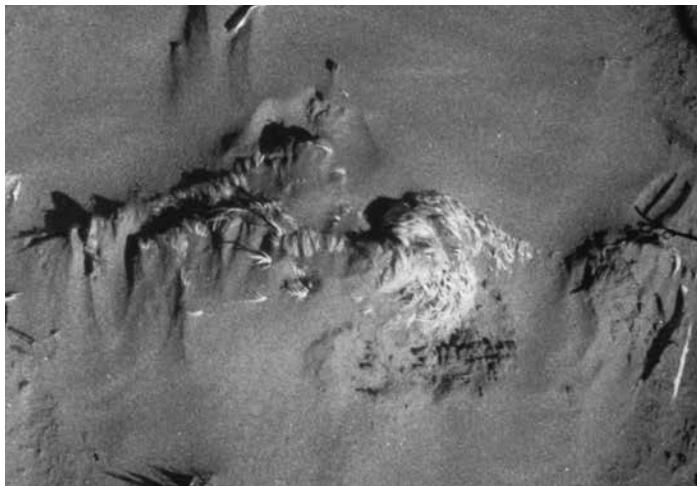
J. Dolliver



J. Dolliver



COASST



Carcasses are not always easy to see (top left); some may be hidden in wrack (top right) or buried in sand (bottom).

If a carcass is relatively fresh, scavengers (like crows, gulls and dogs) or predators (like eagles and falcons) will linger near carcasses and can sometimes be found standing on top of them. As you progress down the length of the beach, look ahead for predators and scavengers.

Body feathers are commonly found along beaches, but do not necessarily indicate the presence of carcasses. Flocks of gulls often preen while resting on the beach and leave behind scattered feathers. Windrows of feathers on the sand are not much help in tracking down carcasses. Wind-blown debris, including feathers, accumulates in sand troughs, providing no clue to the whereabouts of a carcass.



COASST

**Feather piles (left) often point to a freshly scavenged carcass, but it's only a COASST bird if there is at least one good measurement possible. Don't be fooled by windrows or wracklines filled with feathers (right) that can accumulate during periods of feather molt.**



R. Foster

At the same time, piles of feathers can signal that a predator or scavenger has recently torn a carcass apart, and you may find the rest of the remains nearby. These piles tend to look like a recent “explosion” of feathers rather than a windswept line of feathers. Note that COASST is only interested in actual carcasses. There must be a measurable wing, bill, or foot.

## WHAT TO DO WHEN YOU FIND A BEACHED BIRD

Before handling the carcass, make sure the data collector is gloved up and has the necessary tools—ruler, dividers, tape measure—at the ready. Carefully free the carcass from the substrate, brushing off sand and smoothing disheveled feathers back down against the body. It also helps to rearrange the carcass into a more “natural” orientation. The actions of predators and scavengers, plus wind and water, can twist a carcasses into odd positions, making even normally recognizable parts (legs, neck, head) difficult to “see” clearly.

If you think you know what species you have, don’t tell your partner! Keep your idea a secret until it is confirmed by the *Beached Birds* identification process. Even experienced birders have told us that they have come across a carcass where they were certain of the identification, only to go through *Beached Birds* and realize it was a different species after all.

## THE IDENTIFICATION PROCESS

When identifying beached bird carcasses, it is vital to be as accurate as possible. In other words, don’t guess. *Beached Birds: A COASST Field Guide*—both the West Coast and Alaska versions—is specially designed to guide everyone, from experts to beginners, through the deductive process of carcass identification. This tool, and this technique, are at the heart of the COASST approach to science.

Most birds have diagnostic characteristics that distinguish them from each other. Depending on the species, the wing alone may suffice for identification, through a combination of size and plumage (the color and pattern). However, the full set of characteristics may not be evident on every carcass encountered. Predation, scavenging, the nature of decomposition, and the actions of water, wind, sun and sand all obscure or remove diagnostic markings. Two-thirds of the carcasses found by COASSTers are missing one or more body parts due to predation and/or scavenging. For this reason, *Beached Birds* is designed to allow identification to proceed from the feet (1<sup>st</sup> choice) or wings, and each species page layout contains diagnostic characteristics found on different body parts.

Also keep in mind that the diagnostic characteristics for a given species can be variable across the age, sex or breeding status of the bird. Fortunately, *Beached Birds* highlights these differences, pin-pointing what to look for, and where on the body.

Step-by-step instructions for using *Beached Birds* and filling out the identification portion of the Beached Birds Data Sheet begin on page 4BB-25.

## BEACHED BIRDS: FILLING IN THE DATA SHEET

Oriented in landscape (long side up), look for the words **BEACHED BIRDS** in the upper right corner.

<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>Bird #:</td> <td colspan="2">Body Parts:</td> <td>Bill (mm):</td> <td>Foot Type Family:</td> <td>A or I</td> <td>Tag #:</td> <td># of Photos:</td> <td>Comments:</td> </tr> <tr> <td>WF:</td> <td colspan="2"></td> <td>Wing (cm):</td> <td>Species:</td> <td>M or F</td> <td colspan="2">Color Sequence:</td> <td></td> </tr> <tr> <td>RF:</td> <td>FC:</td> <td>Eyes:</td> <td>Tarsus (mm):</td> <td>If no species, list Group:</td> <td>B or NB</td> <td colspan="2">Body Part Tagged:</td> <td>B C  O  EN</td> </tr> </table>								Bird #:	Body Parts:		Bill (mm):	Foot Type Family:	A or I	Tag #:	# of Photos:	Comments:	WF:			Wing (cm):	Species:	M or F	Color Sequence:			RF:	FC:	Eyes:	Tarsus (mm):	If no species, list Group:	B or NB	Body Part Tagged:		B C  O  EN	<b>BEACHED BIRDS</b> Beach _____ Date _____ Page _____	
Bird #:	Body Parts:		Bill (mm):	Foot Type Family:	A or I	Tag #:	# of Photos:	Comments:																												
WF:			Wing (cm):	Species:	M or F	Color Sequence:																														
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Bird #:	Body Parts:		Bill (mm):	Foot Type Family:	A or I	Tag #:	# of Photos:	Comments:																												
WF:			Wing (cm):	Species:	M or F	Color Sequence:																														
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Bird #:	Body Parts:		Bill (mm):	Foot Type Family:	A or I	Tag #:	# of Photos:	Comments:																												
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Bird #:	Body Parts:		Bill (mm):	Foot Type Family:	A or I	Tag #:	# of Photos:	Comments:																												
WF:			Wing (cm):	Species:	M or F	Color Sequence:																														
RF:	FC:	Eyes:	Tarsus (mm):	If no species, list Group:	B or NB	Body Part Tagged:		B C  O  EN																												

On each side of the Beached Bird Data Sheet, there is room for four birds, each of which occupies one data box that runs the width of the page.

The **BEACH** name, **DATE** and **PAGE** number fields are located along the short right-hand edge of the data sheet.

**BEACH:** The official COASST name of the survey site.

**DATE:** Include month, day, and year as MM/DD/YY.

**PAGE:** There are two blanks to fill in. This first is simply a counter, going up as high as the number of Beached Bird Data Sheets used in a survey. The second blank records the highest number—the page number of the final data sheet. For instance, 7/13 would refer to the 7<sup>th</sup> page out of 13 total. Birdy beaches and surveys will require multiple data sheets.

To the immediate left is the key to data fields. Don't understand an abbreviation on the data sheet? Check the key.

There are four icons on this data sheet:

 The pencil icon indicates a "write in" data field.

 The camera icon indicates that additional photos—beyond belly and back—should be taken.

 The circle icon indicates the correct choice should be circled.

 The small black triangle in the lower right corner of some data fields indicates information to be collected on refound birds.

When referring to the data collected on a single beached bird, we use the term **data box**. Each data box contains all of the information about each bird. There are four data boxes per data sheet. Data fields on the left-hand side are likely to be filled in for all carcasses. Data fields on the right-hand side are uncommon characteristics, and will often be left blank. In the middle are the data particular to each bird body, and are variably filled in depending on the species and which body parts persist.

What if a common data field like a measurement or foot condition can't be filled in, because a body part is missing, or a plumage difference can't be made for a particular species? Put a slash diagonally through the data field. This indicates to the COASST verifier that you didn't simply skip a data field, or forget to enter the data; you are intentionally indicating that the data are impossible to collect. No head? Put a slash through the fields **EYES** and **BILL**. No feet? Put a slash through the fields **FC** and **TARSUS**.

Bird #: 2	Body Parts: 2W	Bill (mm):  Alcids	Foot Type Family:  A or I	Tag #: 2	# of Photos: 2	Comments:
WF: W		Wing (cm): 20.5	Species: COMU	M or F	Color Sequence: Red	
RF: N	FC: 	Eyes: 	Tarsus (mm): 	If no species, list Group: 	B or NB  Body Part Tagged: LW	B C  O  EN



Incomplete carcasses make some measurements and plumage distinctions impossible. Put a slash through these fields as shown in the example.

**BIRD #:** Number each bird in the order encountered, beginning at 1 for the first “bird of the day” and continuing on up to however many are found, including both new birds and refinds. On the next survey, this counter starts back at one.

**WHERE FOUND (WF):** There are three main zones on the beach that the COASST Beached Bird Protocol recognizes: **SURF**, **WRACK** and **HIGH**. Beach zones are described and shown in-depth beginning on page 3-10.

The **SURF** zone is the steeper part of the low beach where the sand is flattened by the waves. If wrack (seaweed, sea grass and other flotsam) is present, the surf zone runs from the water’s edge to the seaward edge of the wrack. If there is no wrack on the beach, the surf zone stops at the point where the beach changes angle (steepness) and becomes flatter. Unlike other zones, the surf zone is almost always present, and is extremely variable in width, depending on the time of tide and season. On beaches with a steep slope, the surf zone tends to be narrow (as does the entire beach), whereas for low slope beaches, the surf zone can be many meters wide. Searching for carcasses in the surf zone is easy, because waves have packed and flattened the substrate making any feathered lump easy to see.

The **WRACK** zone is the area where floating materials—seaweed, carcasses, trash and other flotsam—were deposited during successive high tides. This zone can be a single well-delineated wrack line—narrow or wide—or several distinct wrack lines each corresponding to the height of previous high-high tides. At some times of year and in some locations, the wrack can take up the majority of the width of the beach. COASST measures the wrack zone from the seaward edge of the most recently deposited wrack line up the beach to the top of the highest wrack. The seaward edge is easy to distinguish because it has been freshly deposited. The upper edge of this zone is often difficult to determine because scavengers, foot traffic and blowing sand rearrange the wrack and literally blur the line. Use your best judgment.

The **HIGH** zone refers to the rest of the upper beach, up to the start of the vegetation, dune face, cliff wall or other physical barrier. The high zone can contain two sub-zones: bare and wood, which are individually measured at the start and turnaround points. For purposes of carcass location, simply record any carcass found above the wrack zone as **HIGH**.

**REFOUND (RF):** COASST participants mark each new bird with unique combination of colored cable ties. Upon finding a beached bird, first check for COASST tags on the wing, feet or bill. A COASST-tagged bird is a refind. Write Y or YES in this data field. Note that any non-COASST tags are recorded in the **BANDED** field on the right side of the data box.

Bird #: 3	Body Parts: LW	Bill (mm):	Foot Type Family:	A or I	Tag #: 45	# of Photos:	Comments:		
WF:		Wing (cm):	Species: LICH	M or F	Color Sequence: green, blue				
RF: Y	FC:	Eyes:	Tarsus (mm): <i>If no species, list Group:</i>	B or NB	Body Part Tagged: LW	B	C	<input checked="" type="checkbox"/> O	<input checked="" type="checkbox"/> EN

For refinds, only the fields with dark triangles in the bottom right corner (shaded here) are required.

Because refinds already have data collected, and the measurements won't change, only a subset of the data box needs to be filled in for a **REFOUND** bird. Check the data fields for a small black triangle in the lower right corner—these are the essential fields.

Why these ones? **BODY PARTS** let us track scavenging rates as a function of season, location and bird species. Filling in the **SPECIES** (or **GROUP** if **SPECIES** is unknown) is a double check to make sure this is the same bird as before (sometimes tags will be lost, so **SPECIES** identity is the double check). **TAG #** and **COLOR SEQUENCE**, and **BODY PART** tagged also. Of course, if the carcass is **OILED** or **ENTANGLED**, we need to know. A post-mortem oiling or entanglement is certainly possible. And finally, in rare cases COASST will ask participants to **COLLECT** part or all of a carcass, even refinds.

Note that no standard (back and belly) photographs are required for refinds, as COASST verified the bird when it was first found.

**BODY PARTS:** Carcasses deposited on the last tide will often be **INTACT (I)**. However, many carcasses will not be whole, either because the bird was killed by a predator or because the carcass has been scavenged after deposition. A minority of the carcasses found by COASST participants are completely intact—not a scratch on them. If the body has been opened, the carcass is not intact even if all of the parts listed below are there. For instance, a carcass may have a wound in the head, back or breast.

Most of the time, carcasses will be missing one to several parts. Recording the presence of which **BODY PARTS** remain is useful for determining the cause of death as well as the frequency and sequence of scavenging.

If the carcass is not **INTACT** (i.e., there are holes in the body or actual body parts missing), record the part(s) that remain as:

<b>H</b> = HEAD	<b>2W</b> = BOTH WINGS
<b>B</b> = BREAST	<b>RW</b> = RIGHT WING
<b>2F</b> = BOTH FEET	<b>LW</b> = LEFT WING
<b>1F</b> = ONE FOOT	



An intact bird (left) has no visible wounds or punctures. The bird in the right photo is *not* intact because of the large gash where scavengers opened the breast cavity. It should be listed as H, 2W, 2F.

Use the same rules for distinguishing the bird's right side from its left as you would use with your own body. It helps to put the bird in the same front-to-back orientation as you are, rather than examine the carcass face-to-face.

**FOOT CONDITION (FC):** Because decomposition rates change over the seasons, it is difficult (nearly impossible) to judge the number of days that a beached bird has been dead. Instead, COASST categorizes carcass age by changes in carcass characteristics. As a carcass ages, it gradually dehydrates and stiffens. Wings are usually stiff—good for flying—but bad for assessing carcass freshness. However, feet are quite plastic in life and usually present in death. In a fresh carcass, the feet will be **PLIABLE (P)**. Older, especially dried out mummified carcasses will have **STIFF (S)** feet, which cannot easily be manipulated. If the carcass has been in the water it will decay faster. Scales and skin will fall off the foot as the carcass becomes **ROTTEN (R)**.

**EYES:** In very fresh carcasses, the eyes will be rounded and **CLEAR (C)**, as in life. Quite quickly, eyes dry out and become **SUNK (S)**. If scavengers have been active, the eyes are often **GONE (G)**.

Bird #: 2	Body Parts: Intact	Bill (mm): 46	Foot Type Family: Alcids	(A or I	Tag #: 2	# of Photos: 2	Comments: very fresh bird!
WF: S		Wing (cm): 20.5	Species: COMU	M or F	Color Sequence: orange		
RF: N	FC: P	Eyes: C	Tarsus (mm): 38	If no species, list Group: (B or NB	Body Part Tagged: RW	B C O EN	

In the example above, the feet were pliable and the eyes clear.

## Measurements

Be sure to write the measurements down as they are taken and **before beginning to identify the bird** as they are a critical first step in the identification process. Measurements are the evidence you will use to determine the species. (Already know the species? Record the measurements anyway!) COASST builds an ever more accurate database of wing, bill and foot measurements with each passing year.

### Metric System

COASST uses the metric system for all measurements. This system is based on multiples of ten.

$$\begin{array}{ll} 10\text{mm} = 1\text{cm} & 100\text{cm} = 1\text{m} \\ 1000\text{m} = 1\text{km} & 1\text{km} = .6 \text{ miles} \end{array}$$

At the largest scale, we measure beach lengths in kilometers (one kilometer equals approximately 0.6 mile). Physical characteristics of the beach, such as the extent of oil, wood and wrack are measured to the nearest meter (approximately equivalent to one yard or three feet). Smaller measurements (like bill length and tarsus) are recorded in millimeters and wing chord in centimeters. For centimeter measurements, estimate to the nearest 0.5cm. For instance, 21.5cm instead of 21 or 22cm. However, please do not make finer divisions (e.g., do not use millimeters for a centimeter measurement). Using the correct unit maximizes accuracy and maintains precision.

### Measuring Tools

Birds are measured using three tools: ruler, measuring tape, and dividers. Use of a ruler and measuring tape are self explanatory. Dividers are instruments usually used to read distances on nautical charts. One point is placed on where you are, and the second point is placed on where you want to go. Then the open divider can be carefully placed on a ruler to read the distance. COASST uses dividers in much the same way—to measure the distance between two points.

COASST requires three measurements on each carcass (assuming the relevant body part is present). Each measurement is point-to-point on a curvy surface. In geometry, this is known as a chord. Hence the term wing chord. Making precise, accurate measurements is very important, as even small differences can confuse an identification. Always check that you are using metric units (centimeters, millimeters) and make sure that you are taking the measurement correctly.



**Dividers are used for the bill and tarsus measurements, which are recorded in millimeters. Be sure to use the metric side of your ruler and measuring tape.**

**BILL** length is measured along the center line of the bill from the point where the feathers insert to the tip of the beak.

**WING** chord is measured from the wrist to the tip of the longest primary feather.

**TARSUS**, or the foot bone, is measured from the notch in the ankle joint to the top edge of the knuckles, where the toes begin.

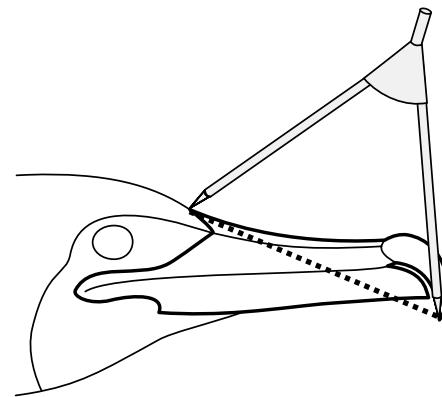
Be aware that each individual within a species will have slightly different measurements, a function of age, sex, health, and genetics. The range of each measurement listed in the species accounts in *Beached Birds* is typical for the populations along the West Coast or Alaska (depending on your guide version).

If any of your measurements fall outside the listed range, there are four potential explanations:

1. You have correctly identified the specimen and it is slightly larger (or smaller) than is typical for the species.
2. You have correctly identified the specimen, but the state of carcass (e.g., decomposition) prevents accurate measurements (see below).
3. You have incorrectly identified the specimen. Check the Similar Species list on the Species Page.
4. You have made a measurement error. Measure twice, just to make sure there is no error on your part. If the measurement is the same after re-measuring, make a note on the data sheet that indicates you checked the measurement for accuracy.

**BILL:** Make sure that the skin on the forehead is intact, and that the feathers are smoothed back towards the top of the head. In top-down view, the skin forms a V. Depending on the species, the point of the V will either point towards the bill or towards the head. Place one point of the dividers at the tip of the V and the other point on the tip of the bill, even if the bill curves down sharply. Without changing the angle between the arms, carefully place the dividers on the ruler and read the measurement in millimeters. If the carcass is old and the forehead skin is abraded, or the bill sheath (outer horny covering of the bone) is chipped or missing, the measurement will not be reliable. Do not measure it, put a slash through the **BILL** data field, and write a note in the **COMMENTS** line explaining why.

Occasionally, a carcass will have neck skin pulled entirely over the head, making a bill length measurement impossible. Although you may not get a measurement, you do have a good clue as to the cause of death. Raptors often pull the breast and neck skin back, inverting it over the head.

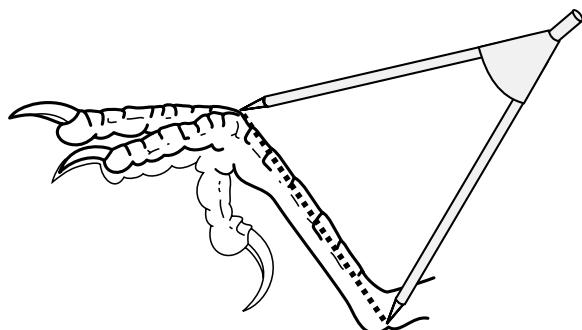


To measure the bill, place one point of the dividers on the top of the bill where the skin forms a V and the other point on the tip of the beak.

**TARSUS:** The tarsus measurement is a little tricky. First, find the ankle/heel joint. It is one joint back from the toes. Think about which way the joints bend in your own leg—birds are the same. They are actually walking on their toes. The ankle joint has a slight notch on the back side. You can feel it in a fresh carcass and often see it in a dried one. Place one point of the divider in this notch, against the lower (tarsus) bone. The notch is actually the joint where the tarsus (foot bone) and the shin (tibia) come together. Because many marine birds rest back on their heels when nesting, the heel is callused, accentuating the notch.

The other end of the tarsus measurement is the top of the foot where the bones of the toes connect to the tarsus bone. This location is most easily found in a fresh carcass by bending the toes down 90° to the tarsus and placing the divider point on the accentuated knuckle. Tarsus is a diagonal measurement, from back to front across the diagonal of the bone.

In an old, dried carcass, it may be difficult to know exactly where to place the second divider point on the foot joint, especially if the foot has dried in an extended position. Use your best judgment. If you are a novice measurer, consider taking two or three sequential measurements, to see whether they match. With practice you will be able to easily measure the tarsus.



COASST

**Tarsus is a diagonal measurement made by placing one point of the dividers at the heel notch and the other point at the top of the knuckles where the front toes fold over.**



J. Dolliver

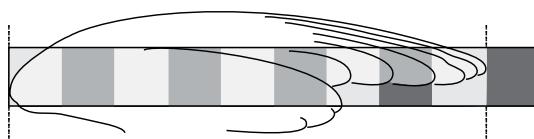
**WING CHORD:** The wing chord is the easiest of the three measurements. It is made in centimeters using the measuring tape. First find the wrist. It is the outermost joint on the wing. Not sure where the wrist is? Check the bird topography pages in *Beached Birds*.

Notice that the feathers extending out from the wrist—the stiff outer flight feathers known as the primaries (1°s in *Beached Birds West Coast*; PP in *Beached Birds Alaska*)—curve in two dimensions. Preserving the curves by not flattening the wing during the measurement, is the key to an accurate wing chord measurement. Place the measuring tape underneath the wing, and line up the zero mark on the centimeter side of the measuring tape with the wrist. Pinch the tape and bird wrist together between thumb and forefinger. This creates a pivot. With your other hand, stretch the tape taut under the wing and pivot the wing until the longest flight feather is over the tape. There should be a gap between the wing and the tape because the wing is slightly cupped. Use your thumbnail to mark the distance so you can set the bird down and easily read the tape.

**Warning!** The COASST measuring tape counts in digits to each of the ten multiples:

1 2 3 4 5 6 7 8 9 10  
1 2 3 4 5 6 7 8 9 20, etc.

Be careful you are reading the measurement accurately. So, 19, not 9.



The wing measurement is made by placing the "0" mark of the centimeter side of measuring tape under the "wrist" and reading where the longest primary feather touches.

If the wing is mummified or rotten, and the primary feathers are falling out the measurement will not be reliable. Do not measure it. Put a slash through the **WING** data field and write a note in the **COMMENTS** line explaining why.

Wing chord measurements may be smaller than the published range in *Beached Birds* if the bird was molting its flight feathers when it died. Birds typically lose and regrow (or molt) their flight feathers annually, as flying creates wear and tear that degrades the feathers. Just before the molt begins, the flight feathers will be broken along the tips, such that the wing chord measurement can be up to a centimeter shorter in some species. Immediately after feather loss, the wing chord will be much shorter. This is because the new feathers haven't yet grown out. Check for feather shafts—white stirring straw-sized sheaths the primary feathers grow out of. In a few species, juveniles leave the nest at less than adult body size. Common Murres are the most prevalent example. For this reason, *Beached Birds* devotes two separate "species page" accounts to adult and juvenile murres.

## CARCASS IDENTIFICATION

Now you are ready to identify the carcass. Even if you are **sure** what species you have, **force yourself** to follow the correct procedure. Experienced birders and ornithologists can have difficulty identifying a dead bird when they are used to identifying live birds. Carefully address each aspect of carcass identification before you reach a conclusion. Remember that the COASST procedure is evidence first, deduction second.

The COASST identification system relies on six steps:

1. Measure the bill (mm), wing (cm) and tarsus (mm), and write those measurements on the data sheet.
2. Use the Foot Key to identify the Foot Type Family (if feet missing, see #6).
3. Follow the Family Page flowchart to a final list of possibilities.
4. Test the carcass against those possibilities using:
  - Measurements
  - Diagnostic characters (enumerated on the Species Pages, left side)
  - Bill profile (Species Pages, right side)
5. If possible, identify the bird as juvenile, adult-breeding or adult-nonbreeding, and male or female.
6. If the feet are missing, start with the Wing Key and proceed directly to the Species Pages.

## Basic Use of the Foot Key

The first step in determining a bird's foot type is to answer the questions in the Foot Key of *Beached Birds* sequentially. When using the Foot Key, be sure to read each question and all of the possible answers carefully and completely. The drawings provide a general guide; ***it is the words that are most important.***

Unlike many keys of this type which give two choices after each question, *Beached Birds* provides two, three or occasionally four choices for consideration. Note that each subsequent question will reference the character from the previous answer, providing a built-in double check. When you reach a red stop sign (STOP), you've come to a Foot Type Family.

Pay attention to the type style:

**Bold print** = This Foot Type Family is in *Beached Birds*. Turn to the Family Page (listed next to the Foot Type Family name) and continue keying out the carcass.

*Italic print* = This Foot Type Family is not further refined in *Beached Birds*. There are no Species Pages for this family. Why not? In almost two decades of work, COASSTers have found 175 species—way too many to include in *Beached Birds*. The majority of the carcasses found by COASST belong to a relatively short list of “regulars.” And then there is a long list of occasionals and the truly rares. The *Beached Birds* Foot Key contains all of the wild bird Foot Type Families COASSTers have found. The table on page 4BB-31 lists most of the Foot Type Families found by COASSTers, whether or not they are represented in *Beached Birds* or *Beached Birds: Alaska*.

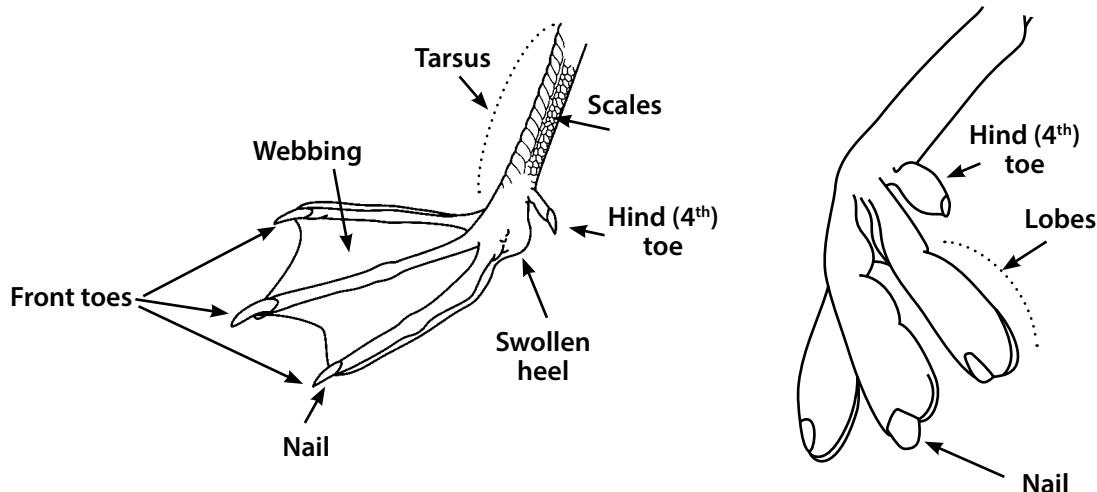
After entering the **FOOT TYPE FAMILY** on the data sheet, proceed to the correct family page in *Beached Birds* (if the family is represented in the guide). Note that Foot Type Families are presented in alphabetical order. Check the Table of Contents for the two-letter abbreviation for each family represented in the guide.

Bird #: ♂	Body Parts: H, 2F, 2W		Bill (mm): 47	Foot Type Family: perching birds	A or I	Tag #:	# of Photos:	Comments:		
WF: VV	Wing (cm): 28.5				Species:	M or F	Color Sequence:			
RF: N	FC: S	Eyes: S	Tarsus (mm): 49	If no species, list Group:	B or NB	Body Part Tagged:	B	C	O	EN

Foot Type Family here is perching birds: four free toes with the fourth clawed.

### Parts of the Foot

COASST separates species into Foot Type Families based on simple characteristics such as number, size and arrangement of toes; degree of webbing; relative length of toenails; and tarsus length or width. All species will have 3 or 4, and very occasionally 5, toes. Make sure to check both the front and back of the foot. Hind (4<sup>th</sup>) toes can be quite small—some are only a nail poking out of the skin.



Front toes can be either:

- WEBBED (W)**, including **PARTLY WEBBED (PW)**
- FREE (F)**
- LOBED (L)**, including **MULTI-LOBED (ML)**

Examples of front toe nomenclature:

- 3W** = **THREE WEBBED TOES**
- 3ML** = **THREE MULTI-LOBED TOES**

COASST describes the number and shape of the front toes first and hind toe second, *except* in cases where all four toes share the same characteristics. In these cases, all toes are grouped despite the fact that 3 face forward and the 4<sup>th</sup> (and 5<sup>th</sup>) may face backward or angle to the side.

Examples of “all same” nomenclature:

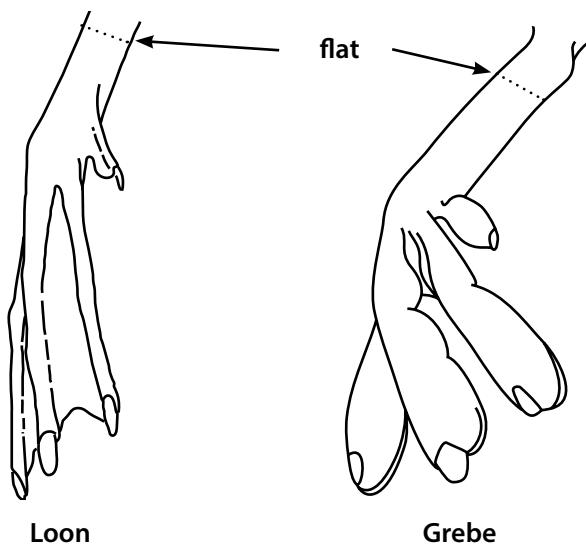
- 4W** = **FOUR WEBBED TOES**
- 4FC** = **FOUR FREE AND CLAWED**

Example of front versus hind toe nomenclature:

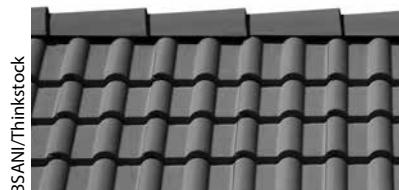
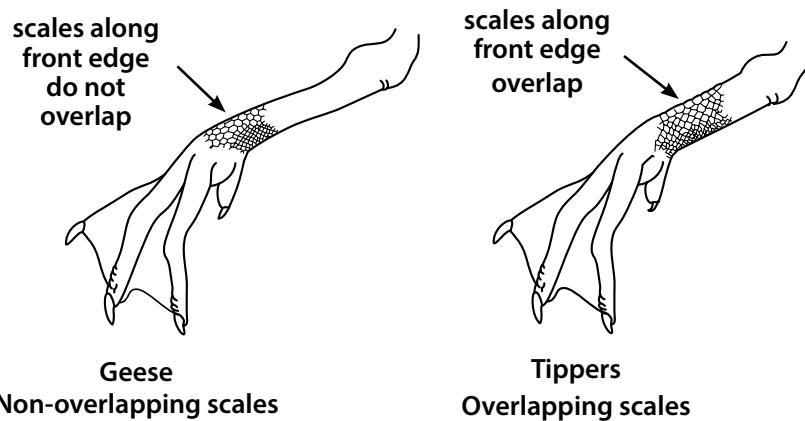
**3W, 4F** = **THREE WEBBED FRONT TOES, HIND TOE (4<sup>TH</sup>) FREE**

Depending on the species, you may have to evaluate additional foot characteristics, including:

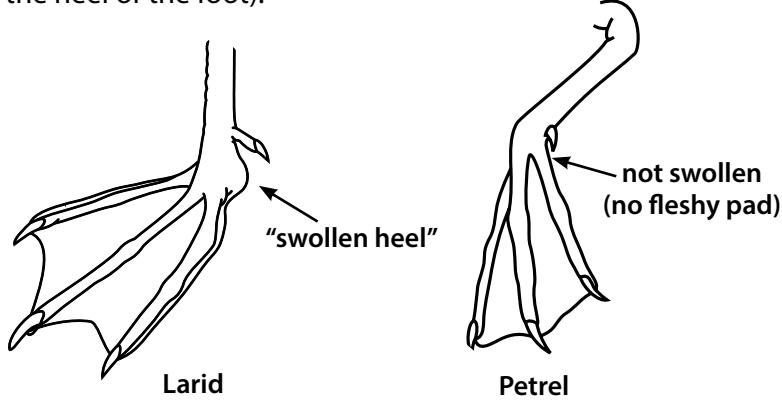
**Tarsus shape:** The tarsus (foot bone) may be rounded (normal condition) or flattened. Don't be fooled, flattened means extremely flat.



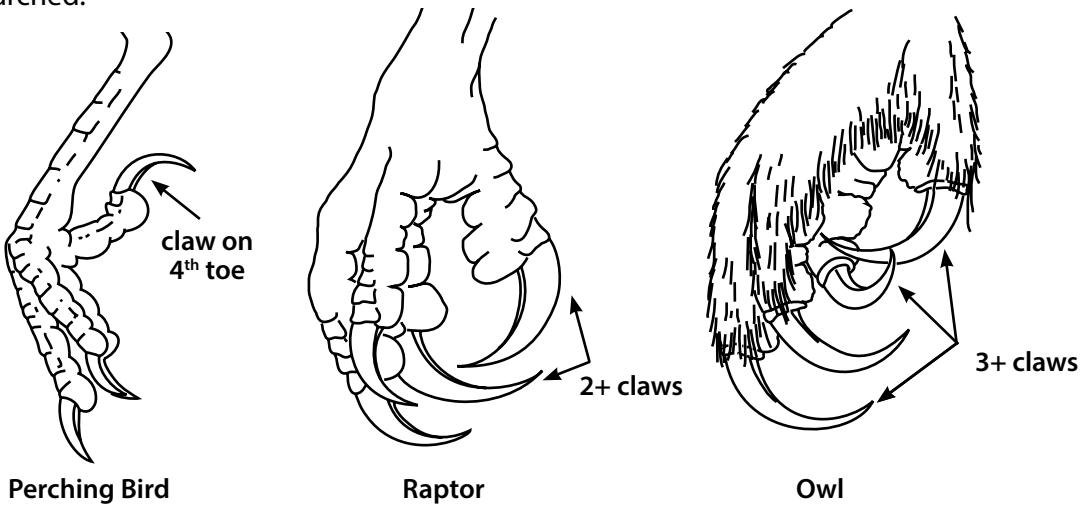
**Scale Pattern:** The scales along the front edge (the "shin") of the foot may be non-overlapping (like tiles on a bathroom floor) or overlapping (like tiles on a roof).



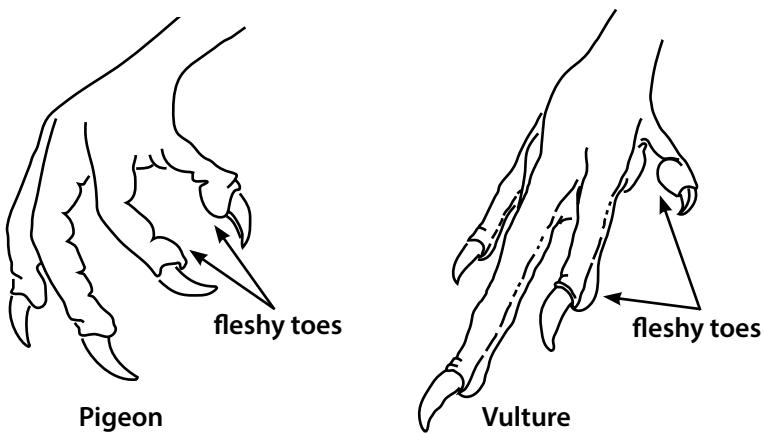
**"Heel" Shape:** The heel may or may not be swollen. A "swollen heel" has a fleshy pad under the base of the toes, right where the bird walks (note that this is not actually the heel of the foot).



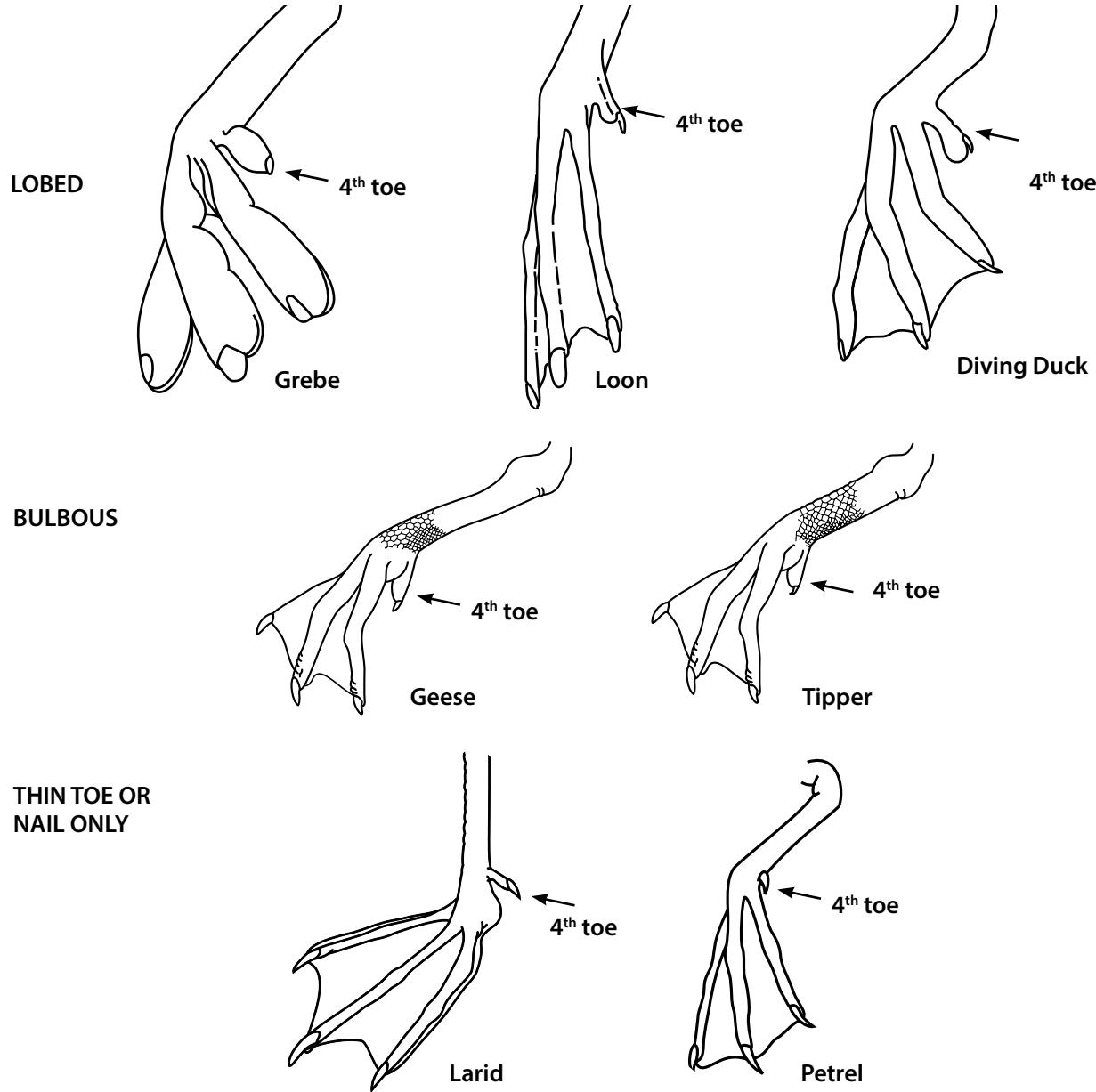
**Toenail Shape:** The length and arch of the toenails, either on the 4<sup>th</sup> toe, or also on the front toes may or may not count as claws. COASST defines claws as toenails that are approximately the length of the toe and are sharpened and strongly arched.



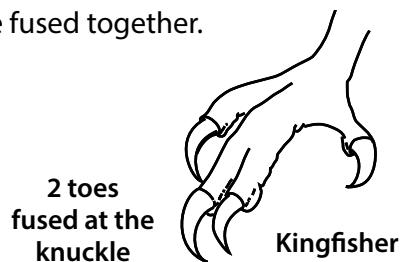
**Toe Shape:** Toe pads may be fleshy, literally with exaggerated calluses along the toes.



**4<sup>th</sup> Toe Shape:** The hind (4<sup>th</sup>) toe may be lobed (the skin is extended in a thin flap that reaches in some species to or even beyond the nail), bulbous (the toe appears "extra fleshy" or swollen), or simply thin. (Caution! In some species, the 4<sup>th</sup> toe is very small and only the nail is poking out of the skin.)



**Toe Separation:** Some toes may be fused together.



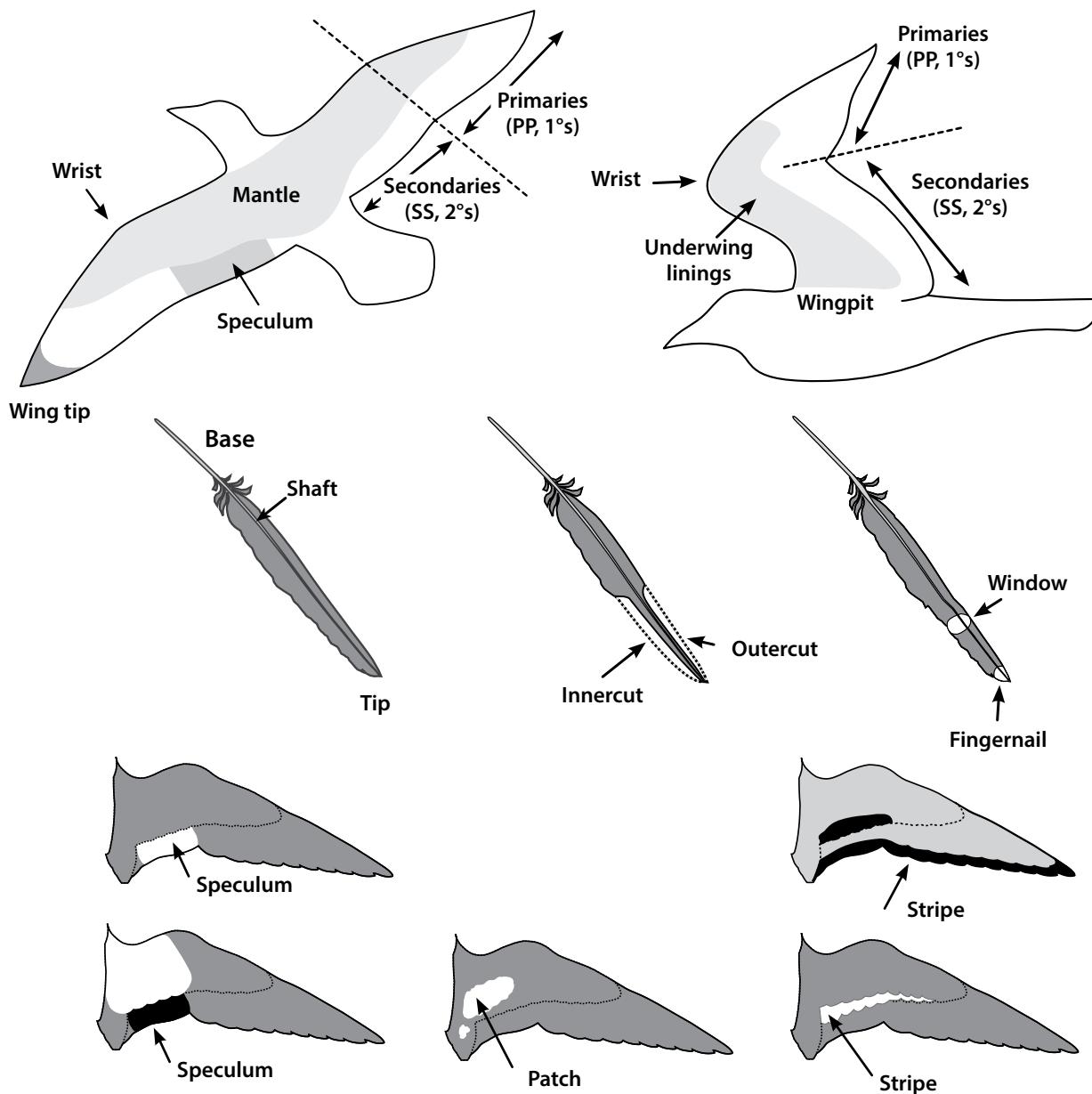
Abbreviation	Foot Type Description	Foot Type Family
3W	3 webbed (no 4 <sup>th</sup> toe)	Alcids
3ML, 4L, LF	3 multi-lobed, 4 <sup>th</sup> lobed, large foot	Coots
4F, 4M, HF	4 free, 4 <sup>th</sup> minute, huge foot	Cranes
4L	4 lobed (note: <i>flat tarsus</i> )	Grebes
4F, 2F	4 free, 2 fused	<i>Kingfishers</i>
4FC, FT	4 free, 3–4 claws, feathered tarsus	<i>Land Birds: Owls</i>
4F, 4C	4 free, 4 <sup>th</sup> toe clawed (or very strongly arched nail)	<i>Land Birds: Perching Birds</i>
4F=, FF	4 free and ~equal in length, fleshy pads	<i>Land Birds: Pigeons</i>
4FC	4 free, 3–4 claws	<i>Land Birds: Raptors</i>
4F≠, FF	4 free, unequal in length, fleshy pads	<i>Land Birds: Vultures</i>
4F, LF, 5S	4 free, large foot, 5 <sup>th</sup> spurred (note: 5 <sup>th</sup> toe—males only)	<i>Land Birds: Game Birds</i>
3W, 4F, SH	3 webbed, 4 <sup>th</sup> free, swollen heel	Larids
3W, 4L, FT	3 webbed, 4 <sup>th</sup> lobed, flat tarsus	Loons
4W	4 toes all webbed	Pouchbills
3F	3 free (no 4 <sup>th</sup> toe)	Shorebirds: 3-Toed
3PW, 4F	3 partly-webbed, 4 <sup>th</sup> free	Shorebirds: Partly Webbed
3ML, 4F, SF	3 multi-lobed, 4 <sup>th</sup> free, small foot	Shorebirds: Phalaropes
4F	4 free	Shorebirds: 4-Toed
3W, HF	3 webbed, huge foot (note: <i>occ. vestigial 4<sup>th</sup> toe</i> )	Tubenoses: Albatrosses
3W, 4F	3 webbed, 4 <sup>th</sup> free (note: <i>flat heel</i> )	Tubenoses: Petrels
4F=, HF	4 free and ~equal in length, huge foot (note: “comb” structure on front middle toe, inside)	<i>Waders</i>
3W, 4L	3 webbed, 4 <sup>th</sup> lobed	Waterfowl: Diving Ducks
3W, 4B, NOS	3 webbed, 4 <sup>th</sup> bulbous, scales non-overlapping (note: <i>like bathroom floor tiles</i> )	Waterfowl: Geese
3W, 4B, OLS	3 webbed, 4 <sup>th</sup> bulbous, scales overlapping (note: <i>like roof tiles</i> )	Waterfowl: Tippers
4F, 2/2	4 free: 2 front, 2 back	Woodpeckers

**Foot Type Families Found by COASSTers.** All families with species pages in either guide (Alaska, West Coast) are listed by name in bold print. Families resolved in any Foot Key but without species pages are listed in italics. Some families occur in one guide but not the other (e.g., Coots—West Coast; Bald Eagles—Alaska). Extremely rare families (e.g., Land Birds: Parrots) are not listed.

## What If There Aren't Any Feet?

You may find a carcasses without feet, such as a pair of wings. If at least one "good" wing (primary feathers firmly attached such that wing chord can be measured, plumage characteristics on the mantle and underwing linings preserved), use the Wing Key (Wing Table in older versions of *Beached Birds*).

Before starting the Wing Key, measure and record the **WING CHORD** and **BILL**, if present. If the **TARSUS** is measurable, use the Foot Key.



**Parts of the Wing:** Using the Wing Key necessitates knowing some basic parts of the wing, both on the upper (back) side and on the under (belly) side. In addition, there are several characters that pertain to individual flight feathers.

On the beach, use the glossary and Bird Topography pages in *Beached Birds* to remind yourself of the definition and location of characteristics called out in the Wing Key.

## Basic Use of the Wing Key

Like the Foot Key, the Wing Key presents a series of choices based on different characteristics or features of the wing. And just like the Foot Key, the drawings in the Wing Key are meant to help illustrate a particular characteristic; *the wing in front of you will not look exactly like the drawing*. In fact, notice that almost all of the wings in the Wing Key are the same shape and orientation.

The default drawing is of the right upperwing in a semi-open (not fully stretched out) position.

If the characteristic called out in the question is on the *underwing*, note that the drawing is reversed (that is, the tip of the wing is pointing to the left).

There are no “Wing Type Families” because plumage characteristics found on the wings are common to many different types of birds. This makes the Wing Key more difficult than the Foot Key, because it has more questions, and some characteristics are subtle. Be patient! Read each question and *all of the possible answers* carefully and completely. Notice that some parts of some answer descriptions include ***bold italic print*** (e.g., “***outstretched***” in the final answer in Q1). This should alert you to pay special attention. Some species have highly variable plumage that doesn’t map onto age, sex or breeding status; examples include Northern Fulmars, jaegers and pigeons. Variable-plumage species occur in several places in the Wing Key, to account for bird-to-bird differences in the wing.

When you reach a red stop sign (), you’ve come to a final list of species. Use the wing chord measurement to narrow your choices.

Species in the Wing Key are listed by their four-letter abbreviation (see page 4BB-37 for how these codes are constructed) and may be further divided into plumage-specific subspecies categories noted by smaller letters following the species code:

M = MALE	I = IMMATURE
F = FEMALE	J = JUVENILE
A = ADULT	SA = SUBADULT
NB = NONBREEDING	LT = LIGHT MORPH
	DK, D = DARK MORPH
	NB = NONBREEDING

Note that all abbreviations are not present in each version of the Wing Key (Alaska, West Coast).



The same species, but different plumage morphs. These photos show dark morph (left) and light morph (right) Northern Fulmars.

If the species is uncommon and not represented in the guide, the word "rare" in *italicized print* (Alaska guide) or **bold print** (West Coast guide) will follow the species code.

For species represented in the guide, use the Species Code Pages (where codes are listed in alphabetical order) or the Table of Contents (where Foot Type Families are listed in alphabetical order) to find the relevant Species Pages. Once the bird has been definitively identified, remember to also write the Foot Type Family on the data sheet, even though the feet are not present.

To the left of the species code in the Wing Key is the wing chord measurement range in centimeters (cm). This represents the vast majority of the wing chord measurements for each species. Instructions for how to correctly measure the wing chord can be found on page 4BB-24. If all of the plumage characteristics match, but the wing in front of you is slightly smaller or larger (usually less than a centimeter difference), it is possible that you have the correct species. Check the Species Pages for other relevant characteristics.

Remember that late in the breeding season, the wings of adult birds will be worn and faded. This means that the colors of the feathers will be less saturated—they will appear dull or faded. The flight feathers—the primaries (1°s in *Beached Birds West Coast*, PP in *Beached Birds Alaska*) and secondaries (2°s in *Beached Birds West Coast*, SS in *Beached Birds Alaska*)—will be abraded at the tips, making the wing chord measurement shorter than normal. During this time of year, it can also be difficult to discern plumage characteristics in these locations, for instance "white trailing edge on the secondaries" or "fingernails" on the tips of the primaries.

All species of birds molt their feathers—both flight feathers and body feathers—on a regular basis. Some species of birds, like murres, loons, grebes and scoters, go through a "catastrophic molt," literally losing all of their flight feathers

simultaneously. During this brief window of time, the bird cannot fly. Thus, it is an especially stressful time of year. If the bird is not in good body condition or early winter storms blow through, molting birds become beached birds. If the wing chord measurement is smaller (occasionally much smaller) than the range listed in *Beached Birds*, examine the wing for molt.

## Wing Table

Older versions of *Beached Birds* contain the precursor of the Wing Key, the Wing Table.

### Wing Table

SIZE	DARK UPPERWING	with PALE UNDERWING STRIBE	with WHITE LININGS	with 1° OUTER CUT	PATCH/ SPECULUM	STRIBE
TINY WC<18	MAMU KIMU LESP CRAU FTSP WHAU PAAU	CAAU LEAU	COMU-j ANMU		BUFF HOGR	DUNL SAND REPH
SMALL WC=18-20	RHAU TUPU AMCO		COMU-j COMU		PIGU GWTE	
MEDIUM WC=21-24	BLSC SUSC		COMU		GRSC STEI	RODO
MED-LG WC=25-28	STSH KIEL-j,f COEI-j,f SPEI-j,f		RTLO	PECO BRCO	NOPI MALL WWSC KIEL-m	
LARGE WC=29-32	NOFU-dk AMCR PAJA LTJA		SOSH PALO	DCCO	NOFU-lt	
EXTRA LARGE WC=33-43	CAGO PFSH POJA		COLO			SPSK
HUGE WC>43	CAGO BFAL STAL-j	LAAL		BRPE		STAL

j=juvenile, f=female, m=male, dk=dark, lt=light

**Dark Upperwing** = Upperwing is uniformly dark brown, dark gray or black

**Pale Underwing Stripe** = Gray underwing has a paler central band

**White Linings** = Underwing linings are white or nearly white

**1° Outer Cut** = 3 outermost 1° feathers are cut away on the front edge near the feather tip (see PB1)

**Patch** = Upperwing contains a contrasting color area, often white

**Speculum** = Like patch, but always found in 2°'s, often iridescent with lighter bordering stripes

**Stripe** = Upperwing contains a white (black) stripe

### Wing Table

SIZE	RECURRED	GRAY MANTLE	with WHITE LININGS	with WHITE LININGS & BLACK TIPS	MOTTLED BROWN MANTLE	WHITE MANTLE
TINY WC<18						
SMALL WC=18-20	RNGR WEGR					
MEDIUM WC=21-24					WHIM	
MED-LG WC=25-28						COEI-m SPEI-m
LARGE WC=29-32				BLKI RLKI	PAJA-j LTJA-j	
EXTRA LARGE WC=33-43		HEEG	GWGU	MEGU RBGU CAGU WEGU HEGU CATE	LIGU SPSK-j POJA-j HEEG-j	
HUGE WC>43						

j=juvenile, f=female, m=male, dk=dark, lt=light

**Recurred** = Outerwing shaped like a gentle "S" when folded

**Gray Mantle** = Area of uniform color on back and upperwings, often contrasting with darker wing-tips (diagram p21)

**Mottled Brown** = Upperwing and back are variably blotched with brown to gray

**White Mantle** = Upperwing and back are mostly white

Because all measurements are variable, any one individual can be slightly larger or smaller than the published range in the Wing Table. If the bird in hand has a wing chord measurement that is a centimeter larger or smaller than a listed row, check the next row up (down) just to be sure.

Size Category	Wing Chord Measurement Range
Tiny	< 18 cm
Small	18–20 cm
Medium	21–24 cm
Medium-Large	25–28 cm
Large	29–32 cm
Extra Large	33–43 cm
Huge	> 43 cm

Each row of the Wing Table divides species by wing chord measurements, from tiny to huge.

Each column of the Wing Table lists **exclusive** characteristic choices—you must select one column or another, not multiple columns. It is important to read all of the choices before selecting one. Because some columns have secondary choices, the primary divisions alternate in shading from darker gray to light. These primary choices are:

- Dark Upperwing
- Patch or Speculum
- Stripe
- Recurved
- Gray Mantle
- Mottled Brown Mantle
- White Mantle

Explanations for each of these major plumage patterns is listed under the Wing Table. They can also be found in the Glossary. If the column has secondary choices, as is the case for both Dark Upperwing and for Gray Mantle, follow the arrows and select the most appropriate secondary choice.

The intersection of a row and a column is a set of species choices. Notice that some intersections are blank—literally there are no species with these plumage characters in this size range. If your bird falls into one of these blank spaces, check the rows above (below) and make sure that you have selected the most obvious plumage choice.

Species listed in the Wing Table, and in the Wing Key in more recent versions of *Beached Birds*, are abbreviated as four letter codes.

## Species Codes

COASST uses four letter abbreviations for each species. Depending on which version (Alaska, West Coast) and edition (2002, 2013) you have, four letter species codes will be variably present in the Wing Table, Wing Key, Species Code pages, Table of Contents, and Species Pages (as underlines of the relevant letters in the common name).

If you are familiar with this naming system, feel free to use it; however, take the time to check the Species Code pages or the table on page 4BB-38 of this protocol. There are a few irregularities from the standard codes maintained by the American Ornithological Union.

If you are not familiar with this naming system, it is perfectly fine to write out the entire name of the species in the *SPECIES* field of the data sheet. However, COASST encourages all participants to learn the abbreviations, as *Beached Birds* is based on these codes.

The letters are taken from the common name of each species. For species named with a single word, this is simply the first four letters:

<u>Dunlin</u>	=	DUNL
<u>Mallard</u>	=	MALL
<u>Bufflehead</u>	=	BUFF

For two-word species, the code is the first two letters of the first name followed by the first two letters of the second name:

<u>Red Phalarope</u>	=	REPH
<u>Mew Gull</u>	=	MEGU
<u>Common Murre</u>	=	COMU

Occasionally a species has a complex name, with hyphenated first and/or second names, or three names. In these cases, the first and sometimes second letter of each word is used:

<u>Red-necked Grebe</u>	=	RNGR
<u>Leach's Storm-Petrel</u>	=	LESP
<u>South Polar Skua</u>	=	SPSK

A few species have four-word names, with a letter drawn from each:

<u>Greater White-fronted Goose</u>	=	GWFG
<u>Fork-tailed Storm-Petrel</u>	=	FTSP

There are some species that would have identical abbreviations using the rules outlined above. For most of these species there is no problem, because only one occurs within the COASST georegion. An example is:

<u>Brandt's Cormorant</u>	=	BRCO
<u>Bronzed Cowbird</u>	=	BRCO

In these cases, COASST uses our naming rules even if they conflict with the naming conventions published by the American Ornithological Union. So:

Brandt's Cormorant = BRCO not BRAC

In cases where both species are found within the COASST range, we diverge from our rules. This is the case for Herring and Heermann's Gulls:

Herring Gull = HEGU

Heermann's Gull = HEEG

There are two other differences from the conventional American Ornithological Union four letter codes.

First, because COASST does not identify most immature gulls to species, but instead lumps them into a single composite category—Large Immature Gulls—the abbreviations follow the naming rules above, but will not be familiar to birders or ornithologists:

Large Immature Gull = LIGU

Second, because Common Murres are such a prevalent species in the eastern North Pacific, this species is identified and named by age class as well as species:

Common Murre (adult) = COMU

Common Murre juvenile = COMU-j

In fact, Common Murre juveniles merit their own “species” account in *Beached Birds*.

The table below has all of the species listed in either guide. If the species appears only in the wing key, or as a similar species, it is listed in the table as “rare.”

Code	Species	<i>Beached Birds</i> (2013)	<i>Beached Birds-Alaska</i> (2009)
AMCO	American Coot	CO2	
AMCR	American Crow	PE2	
ALTE	Aleutian Tern		LA24
AMWI	American Wigeon	rare	rare
ANMU	Ancient Murrelet	AL16	AL15
ARLO	Arctic Loon		rare
ARTE	Arctic Tern		LA22
BAEA	Bald Eagle	rare	LB6
BAGO	Barrow's Goldeneye		WF33
BFAL	Black-footed Albatross	TN13	TN11
BLGU	Black Guillemot		AL7
BLKI	Black-legged Kittiwake	LA13	LA14
BLOY	Black Oystercatcher		SB10

<b>Code</b>	<b>Species</b>	<i>Beached Birds (2013)</i>	<i>Beached Birds—Alaska (2009)</i>
BLSC	Black Scoter	WF17	WF7
BOGU	Bonaparte's Gull	rare	LA18
BRAN	Brant	rare	WF41
BRCO	Brandt's Cormorant	PB2	
BRPE	Brown Pelican	PB8	
BTCU	Bristle-thighed Curlew	rare	
BTPI	Band-tailed Pigeon	rare	rare
BUFF	Bufflehead	WF15	WF29
BUSH	Buller's Shearwater		rare
CAAU	Cassin's Auklet	AL8	AL21
CACG	Cackling Goose	WF19	WF39
CAGO	Canada Goose	WF19	WF39
CAGU	California Gull	LA9	
CATE	Caspian Tern	LA19	rare
CLGR	Clark's Grebe	GR2	
COEI	Common Eider		WF23
COGO	Common Goldeneye	rare	WF31
COLO	Common Loon	LO4	LO6
COME	Common Merganser		WF35
COMU	Common Murre	AL2	AL3
COMU-j	Common Murre Juvenile	AL4	AL3
CORA	Common Raven	rare	LB4
COTE	Common Teal		rare
CRAU	Crested Auklet	rare	AL25
DCCO	Double-crested Cormorant	PB6	PB6
DOVE	Dovekie		rare
DUNL	Dunlin	SB6	rare
EAGR	Eared Grebe	rare	
EMGO	Emperor Goose		rare
FTSP	Fork-tailed Storm-Petrel	TN9	TN15
GADW	Gadwall	rare	rare
GBHE	Great Blue Heron	rare	
GLGU	Glaucous Gull		LA10
GOEA	Golden Eagle		rare
GRSC	Greater Scaup	WF13	WF15
GWFG	Greater White-fronted Goose	rare	rare
GWGU	Glaucous-winged Gull	LA7	LA6
GWTE	Green-winged Teal	WF7	WF13

<b>Code</b>	<b>Species</b>	<i><b>Beached Birds</b></i> (2013)	<i><b>Beached Birds-Alaska</b></i> (2009)
HADU	Harlequin Duck	rare	WF19
HEEG	Heermann's Gull	LA21	
HEGU	Herring Gull	LA15	LA8
HOGR	Horned Grebe	GR6	GR4
HOPU	Horned Puffin	AL12	AL11
IVGU	Ivory Gull		rare
JAMU	Japanese Murrelet		rare
KIEI	King Eider		WF21
KIMU	Kittlitz's Murrelet		AL19
LAAL	Laysan Albatross	TN17	TN9
LBCU	Long-billed Curlew	rare	
LEAU	Least Auklet		AL29
LESA	Least Sandpiper		rare
LESC	Lesser Scaup	rare	rare
LESP	Leach's Storm-Petrel	TN11	TN17
LIGU	Large Immature Gull	LA3	LA4
LTDU	Long-tailed Duck		WF17
LTJA	Long-tailed Jaeger	rare	LA30
MAGO	Marbled Godwit	rare	
MALL	Mallard	WF11	WF11
MAMU	Marbled Murrelet	AL14	AL17
MEGU	Mew Gull	LA17	LA12
MOPE	Mottled Petrel		rare
NOCR	Northwestern Crow		LB4
NOFU	Northern Fulmar	TN3	TN3
NOPI	Northern Pintail	WF9	rare
NOSH	Northern Shoveler	rare	
PAAU	Parakeet Auklet	AL18	AL23
PAJA	Parasitic Jaeger	rare	LA26
PALO	Pacific Loon	LO2	LO2
PECO	Pelagic Cormorant	PB2	PB2
PFSH	Pink-footed Shearwater	TN15	rare
PIGU	Pigeon Guillemot	AL10	AL7
PINT	Pintail	rare	
POJA	Pomarine Jaeger	rare	LA28
RBGU	Ring-billed Gull	LA11	
RBME	Red-breasted Merganser		WF37
REPH	Red Phalarope	SB2	SB4

<b>Code</b>	<b>Species</b>	<i>Beached Birds</i> (2013)	<i>Beached Birds—Alaska</i> (2009)
RFCO	Red-faced Cormorant		PB4
RHAU	Rhinoceros Auklet	AL6	AL13
RLKI	Red-legged Kittiwake	rare	LA16
RNDU	Ring-necked Duck	rare	
RNGR	Red-necked Grebe	GR4	GR2
RNPH	Red-necked Phalarope	rare	SB2
RODO	Rock Dove	PI2	LB8
ROPI	Rock Pigeon	PI2	LB8
ROGU	Ross' Gull		rare
ROSA	Rock Sandpiper		SB8
RTLO	Red-throated Loon	LO6	LO4
SACR	Sandhill Crane		rare
SAGU	Sabine's Gull		LO20
SAND	Sanderling	SB4	rare
SBGU	Slaty-backed Gull		rare
SNGO	Snow Goose	rare	WF43
SOSH	Sooty Shearwater	TN5	TN7
SPEI	Spectacled Eider		WF27
SPPL	Semi-palmated Plover		rare
SPSA	Semi-palmated Sandpiper		rare
STAL	Short-tailed Albatross	TN19	TN13
STEI	Steller's Eider		WF25
STSH	Short-tailed Shearwater	TN7	TN5
SUSC	Surf Scoter	WF5	WF9
TBMU	Thick-billed Murre		AL5
TUPU	Tufted Puffin	AL12	AL9
TUSW	Tundra Swan		rare
WEGR	Western Grebe	GR2	
WEGU	Western Gull	LA5	
WESA	Western Sandpiper	rare	SB6
WHAU	Whiskered Auklet		AL27
WHIM	Whimbrel	SB8	
WHPE	White Pelican	rare	
WWSC	White-winged Scoter	WF3	WF5
YBLO	Yellow-billed Loon		LO8

## Family Pages

If your starting point was the feet, you will have selected a Foot Type Family, and will have arrived at the relevant Family Pages. Notice that the Family Pages are the start of the alpha-numeric page numbering system in the guides. The letters correspond to the family and the numbers simply count up to however many pages are needed to present all of the relevant species. Confused about the page numbering system? Check the Table of Contents for an overview of the letter codes for each family, and notice that they are in alphabetical order, from AL (Alcids) to WF (Waterfowl).

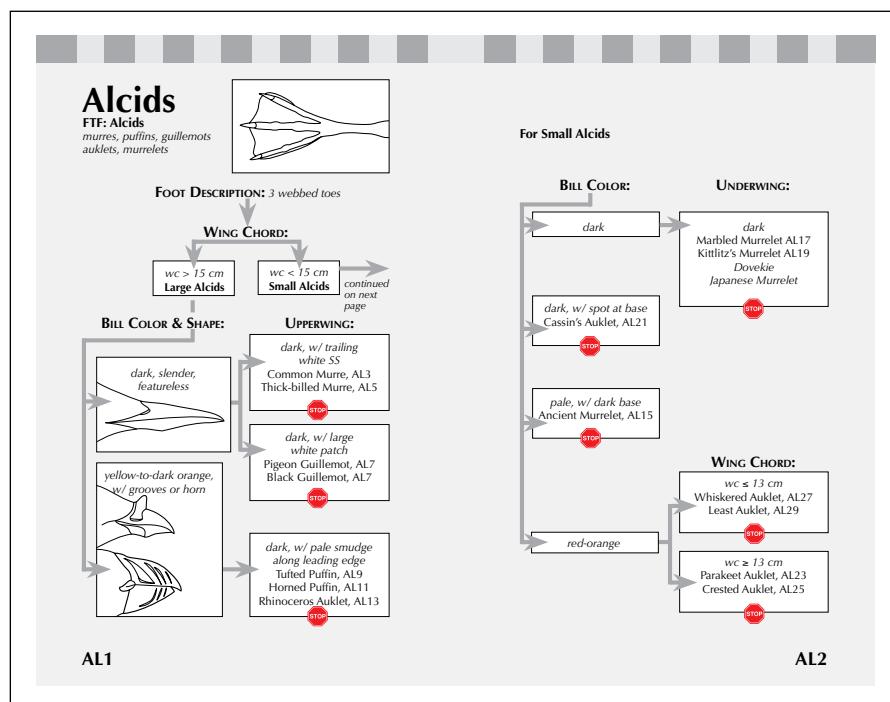
If your starting point was the wings, you will be directed to a set of species, and will skip over the relevant Family Page(s).

Orient yourself on the Family Page. At the upper left is the Family name in large letters. Underneath is the COASST Foot Type Family (FTF) name. Most of the time these are the same, but occasionally they are different. For example:

Family	=	Waterfowl
FTF	=	Diving Ducks
FTF	=	Geese
FTF	=	Tippers

Just underneath the Foot Type Family name is a list of the major types of birds found in the family.

To the right and/or below is the foot drawing and foot description. Use these to confirm that you have the correct foot type.



An example of a family page from *Beached Birds-Alaska*.

Once the foot type is confirmed, follow the arrows on the Family Page, answering the questions until you reach a box with a stop sign (STOP). As with all of the drawings in the Foot and Wing Keys, use any drawings on the Family Pages as a general guide. Read all of the answers out loud to make sure you have assessed all of the potential choices. If none of the choices make sense given the bird-in-hand, consider the possibility that you have selected an incorrect foot type. Return to the Foot Key.

Within a “stop sign box” is a short list of species. Start with the first one (usually the most common) and work your way through all of the possibilities.

## Species Accounts

The Species Pages contain lots of information to confirm an identification. Four of the most important sources of information are:

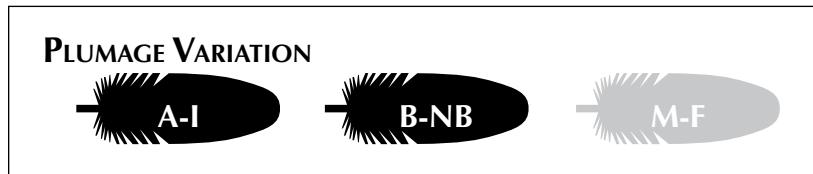
1. **Definitive characteristics** (left-hand page) enumerated and pointed out in the photographs (note the letter in the upper left corner of each photograph).
  - Make sure the carcass-in-hand matches these particular features.
2. The species **Description** (right-hand page), starting with a brief description of the main morphological (size, shape) and plumage (feather color and pattern) features shared by the family, and proceeding to ever more specific (narrow) choices—the group, the species, and any sub-species differences—age, sex, and breeding status.
  - Make sure the carcass-in-hand matches the description.
3. **Measurements** (right-hand page), which you have already taken!
  - Make sure the carcass-in-hand has measurements within range or meets an exception such as molting.
4. The **bill outline(s)**, in pale red at the bottom of the right-hand page.
  - Lay the bill down directly lining up the base of the bill and head with that of the illustration to check whether the shape and size is similar.

For some birds, plumage characteristics will differ as a function of:

age: ADULTS (A) versus JUVENILES (J), or IMMATURES (I),  
depending on the guide for adults

breeding status: BREEDING (B) versus NON-BREEDING (NB)

sex: MALES (M) versus FEMALES (F)



To help sort through these differences in plumage variation, *Beached Birds* has three feather icons located at the top of the left-hand page, just below the species name(s). If a feather is black, there is an obvious plumage difference between the choices. If the feather is gray, there is no difference, or the difference is too subtle for most people to easily discern.

Occasionally, a species will have a wide range of plumages that are not age, breeding or sex-specific. If the differences are definitive, COASST refers to them as morphs. An example is light morph and dark morph in Northern Fulmars.

Two other sections of the Species Pages can help narrow the choices.

**Similar Species**—zooms in on particular parts of the bird, comparing the features for the Similar Species (in normal print) to the species on the Species Page (in brackets[ ] and bold print). If the bird-in-hand doesn't seem quite right, be sure to check the Similar Species for better matches. Note that when measurements are mentioned, they will be non-overlapping:

Shorter means absolutely smaller.

Longer means absolutely larger.

**Did You Check...?**—is a simple checklist taking you sequentially through characters defining the species and sub-species plumages. If you can answer the questions, you have done due diligence in identifying the bird to the species listed on the page.

## What If It Isn't A Match?

If the definitive characteristics do NOT match the bird-in-hand, because a listed characteristic is missing, an obvious characteristic on the bird-in-hand is not depicted or referred to in the Description, or the measurements don't (quite) match, here are the choices:

1. Check the Similar Species listed on the lower half of the right-hand page. Occasionally *Beached Birds* will list species that are not covered with a full species account, and are rarely found as beached birds along the West Coast and/or in Alaska. Be prepared to document a rare find with a careful set of measurements, foot type description, photographs (back and belly views), and description of any distinctive plumage or morphological (size, shape) characteristics in the **COMMENTS** field.
2. If the Similar Species don't check out, proceed to the next choice listed on the Family Page, in the Wing Key or in the Wing Table (remembering to check the size categories immediately smaller and larger than your bird).
3. Having exhausted choices on the Family Page(s), consider returning to the Foot Key if the carcass has a foot. Pay particular attention to the presence/absence, size and shape of the 4<sup>th</sup> toe.

4. Very occasionally, a species washes up that does not have a set of Species Pages in *Beached Birds*. Groups of birds largely uncovered in the guide include most of the land birds (songbirds, gamebirds, raptors), wading birds and shorebirds.

If the carcass can't be identified because too few parts remain, make all possible measurements, making sure they are "good" (bill sheath intact, no pulled out feathers, or rotting skin), take back and belly-view photographs, record **UNKNOWN (UNK)** in the **SPECIES** field, and provide a detailed description in the **COMMENTS** line to assist the verifier in making an identification.

## **Group**

In between Species and Foot-Type Family, COASST defines a variable number of groups—more than one species, but less than an entire family. Sometimes **GROUP** aligns with the taxonomic category genus, but more often a COASST **GROUP** is either a subset, or conversely more than one genera.

Why is **GROUP** important? A partial carcass can often not be identified to **SPECIES**, but it can be identified to **GROUP**, especially if the carcass has feet, allowing determination of the Foot-Type Family.

- In Alaska with a headless murre? Impossible to tell a Thick-billed Murre from a Common Murre, but easy to tell a murre from a guillemot, or from the other large Alcids (true puffins).
- In the lower 48 with a grebe that has fallen victim to an eagle, with the telltale "cowl-neck" inside-out skin dried over the head and obscuring the facial plumage? You will never know whether the bird is a Western Grebe or a Clark's Grebe, but you can easily tell that it is a Large Grebe.

There are two ways to figure out **GROUP**:

1. Using *Beached Birds*, check the Family Pages for the farthest stop sign box you could reliably determine. If you are on a Species Page, the **GROUP** is often listed as a category in the Description immediately below the Foot-Type Family and above the Species.
2. Refer to the laminated "Quick Sheet"—*How To Search The Beach For Beached Birds*. On the backside is a "Species Map" that connects all species found in a particular guide (West Coast, Alaska) to the relevant Foot-Type Family through the right **GROUP**.

Be sure to describe which characteristic(s) (e.g., wing chord > 15cm; hooked bill with plates) allowed determination of the **GROUP** in the **COMMENTS** field.

## **Age, Breeding Status and Sex**

For many carcasses found on COASST beaches, determination of the “sub-species” identity is possible because there are distinctive differences in the color and/or pattern of the feathers (the plumage) depending on whether the bird is a:

**A ADULT      or      I IMMATURE**  
**B BREEDING    or    NB NONBREEDING**  
**M MALE       or      F FEMALE**

To determine whether it is possible to distinguish among these plumage categories, check the Plumage Box for highlighted (blacked in) feather icons.

If the feather icon in *Beached Birds* is blacked in, circle the appropriate sub-species plumage category. If the feather icons are greyed out, indicating a distinction is not possible, put a slash through the relevant data field to show that you intentionally did not—because you could not—fill in this field.

## **Tagging**

COASST tags all “finds”—birds found for the first time during surveys. A tagged bird found on subsequent surveys can be used in three ways:

1. Preventing Double-Counting—a tagged bird immediately signals the carcass has previously washed ashore and been found. COASST doesn’t use data from tagged birds when determining the encounter rate, or the number of new finds per kilometer.
2. Persistence Rate—how long a carcass lasts on the beach is important information. COASST uses these data to infer rates of scavenging, and also to back-calculate the deposition rate, or how quickly birds float to shore.
3. Scavenging—COASST also assesses scavenging by tracking whether body parts subsequently disappear from a carcass found a month (or more) ago. In addition to persistence, this information contributes to updated versions of *Beached Birds*, as we fine-tune which body parts last the longest in particular COASST georegions.

Over the 17 years that COASST has been collecting information, carcasses have persisted more than 6 months on some beaches. In fact, the record is 18 months!

COASST currently uses plastic cable ties to tag birds. Of the many types of tagging systems, cable ties afford the best intersection of size (minimal), stability (very rugged and colorfast), and price (inexpensive). Other systems we have tested, have either been the victims of too much weathering (paper-based tags, biodegradable plastics, nail polish and other paints) or they were too expensive (metal tags). We are constantly looking for a more acceptable replacement. If you have a good idea, let us know!

## Tagging Number System

COASST builds numbers by assigning each digit (0, 1, 2, ..., 9) a specific color. The digit "0" is assigned the color "white." The digit "4" is assigned the color "green." A beached birds kit includes cable ties, nail clippers for cutting off excess tie so it can be removed from the beach, and a "cheat sheet" listing the color for each digit (see below). Taping the sheet to the inside cover of *Beached Birds* is an easy way to ensure you never forget which color stands for which digit.

Using this system, any number—from 1 to however high you wish to count—can be represented as a series of colors, for example:

- 34 = yellow-green
- 592 = blue-black-orange
- 10 = red-white

Number	Color
0	White
1	Red
2	Orange
3	Yellow
4	Green
5	Blue
6	Gray
7	Brown
8	Purple
9	Black

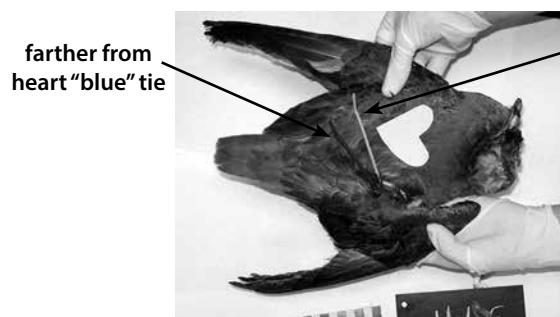
Body Part Tagging Priority	
1 <sup>st</sup>	Right Wing
2 <sup>nd</sup>	Left Wing
3 <sup>rd</sup>	Leg
4 <sup>th</sup>	Bill

**Left:** Each color corresponds to a number from 0 to 9. Use different color combinations to tag birds from #1 to #999.

**Above:** Always tag the right wing if it is present. If it is not, then go down the list for the next available part.

Once tagged, any refound carcass can be read as a number, whether you were the person who tagged the carcass or not.

Reading a COASST tag necessitates knowing which tie to "start" the number on. That is, would the sequence yellow-green be read as 34, or 43? COASST uses the **Heart Rule:** Always read the color sequence starting with the tie closest to the heart and moving outwards towards the wingtip, toes or tip of beak



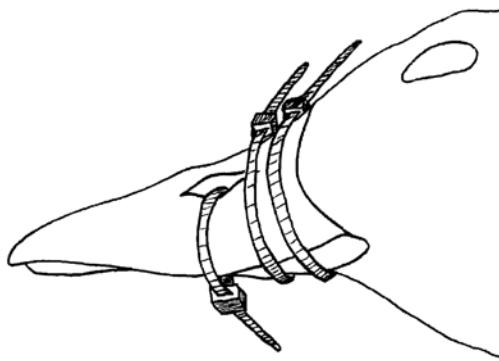
**Heart Rule:** Read a tag beginning with the color closest to the heart and work outwards.

## Which Body Part?

COASST prioritizes tagging on the right wing towards the body, between the wrist and the elbow (note that the shoulder joint is inside the body of the bird). If the right wing is absent, tag the left wing.

Regardless of location on the body, it is important to make sure the cable tie is correctly attached, that it is cinched as tight as possible, and that the remaining "tongue" has been clipped and removed. When tagging a bird, follow these simple steps:

1. Remember the Heart Rule—start the number you are creating closest to the heart and work outwards.
2. On the upper wing, separate the secondaries, creating a gap to thread the ties through.
  - ▶ Only wings left? Cinch them together with the cable ties, to minimize the chance of finding separated wings where only one is tagged on the next survey.
  - ▶ No wings? Tag the leg. If the carcass is falling apart, consider cinching the legs together.
  - ▶ Only a head? Attempt to thread the **outermost** tie through the nostrils, or tightly around the bill above the hook of the beak (if present). This anchors the ties so that they don't slide off.
3. Make sure the tongue is threaded correctly through the head of the tie. The rough (zippered) side should be on the inside of the loop. You should hear a "zip" sound, feel some resistance, and not be able to loosen or unthread the tie. If you can pull the tongue back out reverse the direction of the loop.
4. Pull the tie as tight as possible, cinching it down to the bone so that the tag will not move laterally or rotate around the bone. Don't be afraid to tighten through the feathers.
5. Place each tie right next to the previous one, creating a row of ties. There should be little-to-no space in between ties.
6. Clip off the remaining tongue, leaving minimal plastic in the environment.

**CORRECT TAGGING****INCORRECT TAGGING**

**Correct cable tie attachment for a winged bird (top) and a head only (bottom).**



**Incorrectly tagged birds: cable ties too loose (top). Tie tails left in place (bottom).**



**Make sure to clip off the excess tail of the tie to minimize plastic left in the environment.**

On the Beached Birds Data Sheet, fill in the **TAG #** with the "translated" number.

Record the actual **COLOR SEQUENCE** in the data field below. If abbreviating, remember that there are three Bs—blue, black and brown!!

Record where you tagged the carcass in the **BODY PART TAGGED** field.

The small black triangle in the lower right corner indicates that these three tagging fields must be filled in if you encounter a refound (COASST-tagged) bird. This information, together with **BODY PARTS** and **SPECIES** (or **GROUP** if **SPECIES** is unknown) alerts the verifier that the carcass is already in the database.

Bird #:	Body Parts:		Bill (mm):	Foot Type Family:	A or I	Tag #: 84	# of Photos:	Comments:		
WF:			Wing (cm):	Species:	M or F	Color Sequence: yellow-green				
RF:	FC:	Eyes:	Tarsus (mm):	If no species, list Group:	B or NB	Body Part Tagged: LW	B	C	<input checked="" type="checkbox"/> O	<input checked="" type="checkbox"/> EN

Bird 84 was tagged on the left wing with the yellow tag closest to the heart.

## Photographs

The standard for most carcasses is two photographs, one of the back of the bird, showing outstretched wings, a head in profile, and visible feet; and a second of the belly of the bird. For a complete description of how to take these photographs, refer to Part 5.

Log the number of photographs of the carcass in the **# OF PHOTOS** data field. For most new finds, this will be "2." If there are oddities about the carcass, for instance entanglement or oiling (see below), you may take additional photographs. If the bird is a refind (has a COASST tag already on it), photographs are not necessary unless something untoward (like oiling, etc.) has happened to the carcass. Put a slash through the data field to indicate photos are irrelevant.

## Unusual Finds

The four data fields to the extreme right of the data row, under the **COMMENTS** field, will most often be left unused. These are extremely important pieces of information that will very rarely occur.

## Other Bands and Tags

Very rarely, COASSTers find birds that are **BANDED** on their leg(s) with stamped metal and/or plastic color bands; or tagged on their wings, leg or back with specialized pieces of equipment capable of recording information such as location, date, time, dive depth, temperature, or light level. Recovery of the information from the bands or contained in the tags is extremely valuable to ongoing bird ecology and conservation research. Bands and tags are variable in material, color, shape, size and placement—so documenting their location, arrangement and appearance carefully is a must.

Just like COASST tags, where sequence conveys specific information (the tag number), many colorized bird bands convey unique information—the age, sex or location where the bird was banded. Be sure to note the color, number and placement of bands in relation to one another. Because only COASST uses the Heart Rule, make sure to document band order on a multi-banded leg.

P.Hodum



J.Dolliver



Occasionally birds will have non-COASST bands or tags such as a U.S. Fish and Wildlife band (right), plastic colored bands (left), and very rarely a data logger (left).

Bird #:	Body Parts:		Bill (mm):	Foot Type Family:	A or I	Tag #:	# of Photos:	Comments:
WF:			Wing (cm):	Species:	M or F	Color Sequence:		Metal band on right tarsus, number 1847-62565, removed—mailing to COASST
RF:	FC:	Eyes:	Tarsus (mm):	If no species, list Group:	B or NB	Body Part Tagged:		(B)      C      (O)      (EN)

If the bird-in-hand has a non-COASST band or tag:

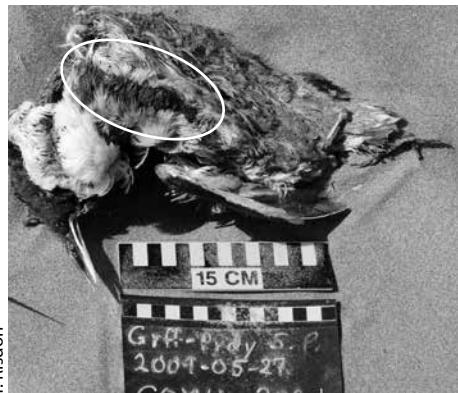
1. Circle **B** in the **BANDED** data field and provide details (see below) in the **COMMENTS** field.
2. Record where on the bird the tag was found (e.g., right or left leg, right or left wing, back, etc.), and the relative placement of multiple bands (e.g., red band on inside, black band in center, blue band on outside).
3. Record the color of each band.
4. Record all of the information (usually numbers and letters, occasionally researcher contact information) on the band or tag.
5. If you have proper equipment with you, collect the band or tag by cutting the leg or skin of the carcass to remove it. Don't feel squeamish—the carcass won't feel a thing and the data are extremely valuable. If you can't remove the band or tag, take a close-up photograph.
6. Send the band(s) or tag to COASST. We'll figure out who tagged the bird, return the tags to the researchers as appropriate, and make sure to report that information back to you.

**COLLECTED:** On rare occasions, participants who are listed on COASST's Federal and State salvage permits may collect carcasses—that is, remove them from the beach. Participants with permits will be kept informed about the conditions under which certain species are needed for collection. If you do have special permission from COASST and collect a bird, circle **C** for **COLLECTED**.

**OILED:** Birds can become oiled before or after death, as carcasses and oil can accumulate in the same currents before washing ashore. Birds that swim (in life) or float (in death) through an oil sheen will have a "bath-tub ring" of oil marking the floatline of the bird. Birds or carcasses encountering thicker patches may be splotched-to-covered in brown-black oil. If the oil was fresh when the bird/carcass came to shore, sand or other fine debris will stick to the oil. COASSTers have found carcasses not visibly contaminated by oil, but smelling of oil.

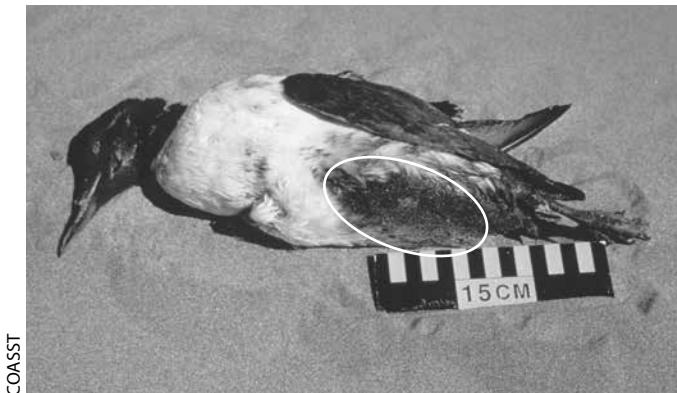
Remember that oil is a hazardous material and should not be touched (even with gloves on). If you find an oiled carcass and you can move or measure parts of the carcass without touching the oil, do so. If not, do not touch it unless you have received specific training in oiled bird recovery and chain-of-custody procedures. Record the oiling by circling **O** and note the extent of **OIL** on the carcass in the **COMMENTS** field. Do your best to identify and document the carcass without contacting the oil. If driftwood or other material is available, cover the carcass to prevent scavengers from becoming oiled. If multiple birds in a single survey are found oiled, mark their locations with markers, such as sticks or branches,

photograph the carcasses and leave them on the beach. When you return from your survey, phone COASST as well as local authorities (listed in the Contacts table on page vii) immediately to report what you encountered. As denoted by the camera icon (  ) on the data sheet, be sure your photographs capture the location and extent of oil on the bird(s).



T. Risdon

***Classic bath-tub ring of oil on the breast of this Common Murre.***



COASST

***An oiled Common Murre.***



***A Surf Scoter nearly covered in oil.***

Bird #:	Body Parts:	Bill (mm):	Foot Type Family:	A or I	Tag #:	# of Photos:	Comments:
WF:		Wing (cm):	Species:	M or F	Color Sequence:		confirmed oil by scent on belly, no signs of oil elsewhere on the beach or in the water
RF:	FC:	Eyes:	Tarsus (mm):	If no species, list Group:	B or NB	Body Part Tagged:	B      C   EN

***For oiled birds, be sure to circle the “O”, describe the oiling and circumstances in the comments, and take photographs that can later be used to confirm oil presence and extent.”***

**ENTANGLEMENT:** Birds can become entangled in fishing gear or other floating material before, and after, death. Seabird bycatch in fishing gear can be a significant source of mortality in certain small or restricted populations. However, bycaught birds rarely wash ashore in nets. More often, floating carcasses become entwined in line or other “ghost” fishing gear as currents concentrate floating material in windrows, and waves wash everything to shore.

In wavy conditions, carcasses, kelp wrack, fishing gear and any number of other natural and manmade items may end up in piles along the wrack, making it difficult to determine whether a carcass is actually entangled, or simply part of the same wrack pile. (A carcass “entangled” in wrack does not count as entangled.) If you find a carcass entangled in any sort of man-made material, take a photograph (as signaled by the camera icon (📷) on the data sheet) of the carcass before you unravel it and circle EN on your data sheet. Record the type of material such as fishing net, monofilament fishing line, hooked, or plastic and note which body part(s) are entangled, and any other aspects you find significant and/or particular. For instance, one COASSTer found a Common Murre entangled in a kite string!



B. Blackie

A Sooty Shearwater with its right wing entangled in a net.



B. Baccus

A Common Murre entangled in a hook and line.

## SPECIAL SITUATIONS

COASST beached bird participants commit to monthly surveys of their beaches and to performing diligent collection of carcass identity information (both evidence and deduction) of all new carcasses. However, there are occasional circumstances in which COASST alters the normal routine to accommodate impending or actual disaster.

### Oil Spill Warnings

When COASST receives word that a spill has happened, we contact all participants surveying beaches within the area surrounding projected landfall of the oil. This georegion may change if currents and wind push the oil into new areas.

If COASST contacts you about an oil spill warning, we ask that you:

1. Survey your beach as soon as possible. Making sure that COASST has the most current pre-spill data is essential should oil, and oiled wildlife, hit the beach. These are literally the very last baseline data points we will collect.
2. Survey your beach multiple times over the next week, ideally every day, if possible, unless COASST recontacts you to specify otherwise (which we will do if we receive official word that the oil has made landfall). This heightened level of data collection allows COASST to pinpoint oil spill effects.
3. If the threat of oil turns out to be real, and your beach is not ruled off limits by spill authorities, survey your beach once a week for the remainder of the month. This intermediate level of data collection allows COASST to assess longer-term effects of the spill.

We realize that not everyone can commit to such an increase in survey frequency. Simply do your best. Together, across all of the COASST beaches within the affected area, we will gather enough data to characterize the short- and longer-term effects of any spill.

If you find oil or oiled wildlife, immediately contact COASST. Do NOT TOUCH the oil. This is because forensic analysis of oil—from the beach or on wildlife—can be compromised by plasticized or latex gloves (such as the ones you are wearing!). Instead, take multiple photographs, mark the spot with driftwood or other nearby material, and take notes as to the location so authorities can check it out.

The vast majority of spill alerts will turn out to be minor. Oil will drift offshore instead of towards the beach, be broken up by wind and wave action before significant damage can be done, or the alert will be downgraded. For instance, when vessels are reported sinking, there is the potential for a spill, and COASST decides moment-to-moment whether to contact participants in the area.

Very rarely, a spill will be large. In the last 30 years, several spills have impacted beaches and wildlife along the outer coastline of the Pacific Northwest and Alaska, with oiled marine bird counts above 1,000:

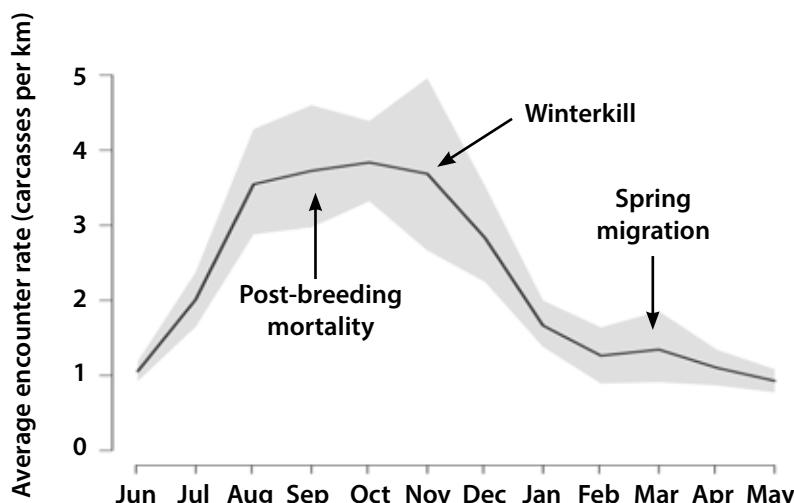
Year	State	Vessel Name	Marine Bird Count*	Major Species
1989	Alaska	<i>Exxon Valdez</i>	31,000	Common Murre
2004		<i>Selendang Ayu</i>	1,600	Crested Auklet
1985	Washington	<i>Arco Anchorage</i>	1,900	Red-necked Grebe
1988		<i>Nestucca</i>	12,500	Common Murre
1991		<i>Tenyu Maru</i>	4,100	Common Murre
1999	Oregon	<i>New Carissa</i>	1,500	Rhinoceros Auklet
1985	California	<i>Puerto Rican</i>	1,300	Common Murre
1986		<i>Apex Houston</i>	4,200	Common Murre

\* including oiled beached birds and live oiled birds removed to rehabilitation centers.

Should another large spill happen, rest assured that the data COASST has collected month-after-month and year-after-year will provide the definitive baseline against which catastrophic spill effects will be compared.

## Wrecks

Depending on the COASST region, beaches can get quite “birdy” at certain times of year, most especially just after the breeding season—when Common Murre adults and fledglings wash ashore—and once the fall/winter storms start rolling in—when Alaska migrants like Northern Fulmars hit the beaches.



In each COASST region, the “normal” amount of birds expected at a given time and place is associated with the natural history and life history of the birds that make up that pattern. (Line is average, gray area is normal variation.)

On some beaches, the “normal” carcass encounter rate will peak at above 15–20 new finds per kilometer. In other regions, “normal” is no carcasses—an encounter rate of zero. Knowing the normal or baseline pattern of your beach is important, so that you can determine when unusual, even catastrophic, beaching is occurring.

Large numbers of a single species, or occasionally a set of related species, washing up in a concentrated space and time is known in the seabird lingo as a wreck (like a shipwreck). Seabird wrecks are significant elevations above the normal beaching rate for that location and time of year. During the post-breeding mortality peak along the outer coast of the lower 48, a wreck would be 40+ carcasses per kilometer. In the quiet waters of Puget Sound or Southeast Alaska, a wreck at the same time of year would be 10 carcasses per kilometer. Over the decades COASST has been collecting data, some beaches have seen encounter rates in the hundreds. These are Massive Mortality Events (MME), the most extreme of wrecks.

In birdy areas, wrecks require lots of extra effort. Even if all of the carcasses aren’t individually processed it is simply impossible to get through a survey in the number of daylight hours available. At the same time, collecting information during a wreck is essential. It is these data that allow us to estimate the true deposition (how many total carcasses came to shore) and mortality (how many birds died) rates.

To help split the difference between high quality data and the realistic ability to process tens to hundreds of carcasses, COASST has devised the following “three-tiered” protocol to help speed up the data collection process during wreck situations.

**Normal**—Depending on the location, the “normal” encounter rate can vary from zero to upwards of 20-30 carcasses per kilometer. You will get to know your beach.

**Wreck**—If the carcass encounter rate tops 30 carcasses per kilometer and the number of a single species has topped 20, switch to the wreck protocol (see table, page 4BB-59).

**Massive mortality event (MME)**—Extremely rarely, the encounter rate of a single species or group (see above) will spike to hundreds of carcasses per kilometer. This situation should be immediately apparent when you arrive on your beach—there will be carcasses all along the beach, concentrated in the lower wrack zone, where the tide has most recently deposited them. There may also be moribund (near death) birds in the surf zone. Switch to massive mortality protocol (see below). During a massive mortality event, it is crucial to take excellent

photographs, paying attention to the number and arrangement of carcasses, and to the resolution of the image (high!). This is because the verifier must be able to see each individual carcass clearly in order to determine species and intactness. To aid COASST in collecting these data:

1. Collect the carcasses into different piles by beach zone (surf, wrack, high).
2. Pre-label the photo slate with the appropriate zone.
3. Within each pile, sort by species.
4. Within each species, sort by intactness.
5. Take species-specific photographs.
6. For species where there are many individuals, lay out carcasses in sets of 9, in a 3-3-3 (3 square) pattern—all back side up (photo 1) then turned belly side up (photo 2).
7. Clip the wing tips straight across the tip at ~2cm up from the longest primary. Do not bother tagging the carcasses.



**MME photograph example: "3 x 3"**

**This is the ventral (belly side up) photo.**

T. Taylor

Data Fields	Normal	Wreck	MME
Measurements	Measure all birds.	Measure 1 <sup>st</sup> 10 of each species, and every 4 <sup>th</sup> bird thereafter (at least 1 per photo taken).	Do not measure unless your team is sufficiently large for massive processing, then adopt Wreck procedure.
Zone	Record as usual.	Record as usual.	Collect carcasses by zone and photograph accordingly. Label the zone on the photo slate.
Freshness (BP, FC, E)	Record body parts, foot condition and eyes as usual.	Record freshness data fields for the 1 <sup>st</sup> 10 of each species only. Thereafter, make sure carcasses are clearly visible in the photos so the verifier can determine body parts.	Do not record freshness data fields. In photographs, organize the carcasses by body parts so the verifier can determine body parts.
Species	Determine using Beached Birds.	Determine using Beached Birds. Sort by species for photos.	Determine using Beached Birds. Sort by species for photos.
Age, Breeding Status, Sex	Determine using Beached Birds.	If time is constrained, leave blank.	Leave blank.
Tagging	Tag as usual.	Tag as usual. If time is constrained, use MME tagging protocol.	Do not tag with cable ties. Cut off each wing tip ~2 cm above the longest primary. For carcasses without wings, clip off the outer toe ~1 cm above the nail.
Photographs	One carcass per photograph. Two photographs (back, belly). Slate and photo ruler included.	Group carcasses by species. Include up to 4 carcasses of the same species in each photo, arranged in a 4-square. Photo 1—back side up. Photo 2—belly side up. Slate and photo ruler included. High resolution!	Group carcasses by zone. Include the zone on the photo slate. Within zone, group by species. Within species, organize by intactness, from most to least. Include up to 9 carcasses of the same species in each photo, arranged in a 9-square (3-3-3). Photo 1—back side up. Photo 2—belly side up. Slate and photo ruler included. High resolution!

**When encountering elevated carcass numbers, refer to this table as a guide to streamline data collection.**



**PART FOUR—  
MODULE  
SPECIFIC:  
MARINE DEBRIS**

## PARTICIPANT SUPPLIES

For a nominal deposit, COASST provides a specialized set of tools and materials to all participants who have attended a training and signed the COASST contract pledging to conduct monthly surveys. Some supplies, like data sheets, will be used up in the process of conducting your surveys, and you will need to let COASST know when you are running low. The photos and lists below show the supplies that come with the marine debris kit, as well as those items COASST recommends that you bring.

### PROVIDED BY COASST

Protocol  
Data Sheets  
Zone Flags  
Pace Clicker  
Measuring Tape  
Measuring Rope  
Sampling Square  
Chalk and Slate  
Large Debris Marking Supplies  
Digital Camera\*

\* COASST can provide this item for an additional deposit

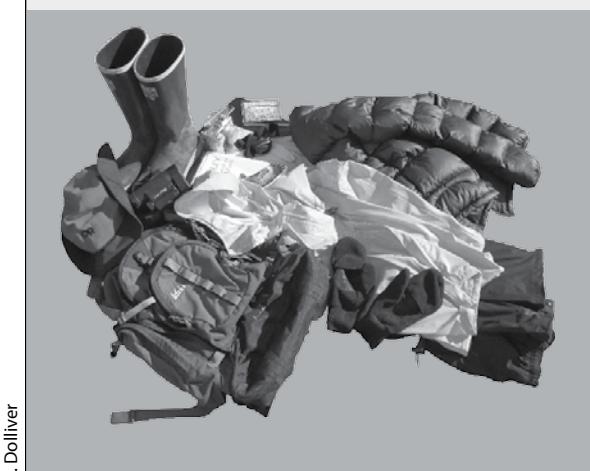


COASST participant equipment.

H Burgess

### PERSONAL EQUIPMENT

Writing Utensil  
Debris Bags  
Clipboard  
Cell Phone  
Disposable or Rubber Gloves  
Alcohol Gel or Wipes  
Warm and Waterproof Clothing and Footwear  
Other Odds and Ends  
Headlamp  
Backpack  
Binoculars



Personal equipment participants are advised to carry.

J. Dolliver

## What's in Your Kit Provided by COASST?

- Protocol** You're reading it now. The COASST Protocol is a manual to everything you learned in training and more. Chances are if you have a question about how to conduct some part of your COASST survey, you'll find it in this manual. Use the protocol as a reference guide—you do not need to bring it on every survey. Before you attempt your first survey, skim through the sections that apply to you.
- Data Sheets** Every survey requires a COASST Cover Sheet and a Mapping Your Survey Form. If debris is characterized on site, Debris Characteristics Forms (large, medium and/or small) will be needed.  
  
COASST uses two different types of paper when printing data sheets. Regular (recycled!) paper is for days without significant precipitation. For misty to downright rainy days, use the data sheets specially printed by COASST on "Rite-In-The-Rain" paper. The feel of this paper is waxy; it is easy to distinguish from regular paper. "Rite-In-The-Rain" is super tough in wet conditions but it's also expensive, so please refrain from using these sheets on dry days.  
  
Additional data sheets can be printed directly from the volunteer toolbox on the COASST website ([www.coasst.org](http://www.coasst.org)). We're also happy to send you printed data sheets in the mail.
- Zone Flags** These brightly colored flags are used to mark the border between beach zones: vegetation to wood, wood to bare, bare to wrack, and wrack to surf.
- Pace Clicker** Rather than counting out loud (or in your head) use the pace clicker to keep track of the number of paces from one rectangle to the next, as well as the paced measurement of each zone width.
- Measuring Tape** To adequately characterize debris, COASST requires several measurements, all in centimeters.
- Measuring Rope** Marked at each meter (dark marks) and at its center with bright flagging, the rope is used during medium debris surveys to maintain the width and placement of each survey rectangle. The measuring rope can also be used to measure **PACES PER METER**.

***Sampling Square*** Practically an all-in-one tool, the assembled square is used to sample small debris. It has several other useful features. The inside length of one side is 50cm, the cutoff between medium and large debris. One side contains a single 2.5cm orange bar, the cutoff between medium and small debris. Another side contains the color bar—the spectrum of colors used to match object color. Each distinct COASST color is delineated by black lines and the color abbreviation is included. Finally, the square contains a guide to each of the materials states, or options, from which to choose.

***Chalk and Slate*** Every photo of marine debris should contain the slate with the beach name, date and debris information specific to the survey type (large, medium or small debris) written on it. The top of the slate has a centimeter ruler for scale.

In addition to the "standard" marine debris tool kit supplies, COASST can also provide participants with:

***Digital Camera*** Essential for photo records of all debris, not to mention any other interesting or unusual find! If you don't have a digital camera or smart phone handy, COASST has a limited number of digital cameras to loan out to participants for a deposit of \$20.

## **Personal Equipment**

With the standard supplies in the COASST marine debris kit, you'll be ready to find, measure, mark (for large debris) and collect (Bag & Tag option) debris; however there are some essentials that you will need to provide:

***Writing Utensil*** Remember your pencil (and bring extras just in case). Pencils are very effective in mist or rain when using Rite-In-The-Rain paper. If you prefer writing with a pen, consider purchasing a weatherproof pen (\$13-\$15). They write in all kinds of weather and temperatures and even function well upside-down.

***Debris Bags*** For characterizing debris off-site (in the parking lot or at home), reusable bags for gathering debris according to beach zone and sampling rectangle are a must. Either choose bags, like large heavy-duty 20-gallon freezer bags, where you can write the rectangle number, zone and date on the front of the bag, or create a tag with the same information to place in the

bag. If you are characterizing debris on the beach, you may still want to consider bringing one or more bags to collect debris and remove it from the beach.

**Clipboard** COASST data sheets are designed to be used with a clipboard. The hard surface makes it easy to write and the clip keeps data sheets from blowing away in the wind.

**Cell Phone** Although many COASST beaches are outside of cell range, it's always a good idea these days to bring a cell phone. The clock, compass and camera functions alone are worth it!

**Disposable or Rubber Gloves** Handling debris is almost always a safe, albeit occasionally messy, procedure. However, some debris does pose risks—for instance, a container of hazardous material. To be on the safe side, a pair of reusable rubber kitchen gloves will ensure you maintain a clean layer between you and whatever you find.

**Alcohol Gel or Wipes** At the end of a survey, wiping of your supplies is a good idea. In the absence of clean warm water and soap, considering carrying alcohol gel or wipes.

**Warm, Waterproof Clothes** Anyone who walks the beach knows how quickly a warm day can turn rainy and cold. Always bring along a warm jacket, hat and gloves. If you tend to become easily chilled, hand warmers are an excellent idea. Consider including a rain jacket and pants in your pack and conducting your survey in waterproof boots.

### **Other Odds and Ends**

**Headlamp** Especially during winter surveys, light levels fall fast in the afternoon. A headlamp can be a lifesaver in getting back to the car. If you don't have a headlamp, consider bringing a small waterproof flashlight.

**Backpack** A great way to keep your tools together.

**Binoculars** Useful for viewing wildlife on the water, in the air, or down the beach.

## DEFINING DEBRIS

Marine debris can generate a lot of press, as was the case after the 2011 Japanese tsunami swept millions of tons of man-made objects into the Kuroshio Current, which transported that material to beaches from Alaska to California and eventually throughout the North Pacific. Beyond such disasters, marine debris is constantly accumulating from a vast array of sources, some at sea and others from land. Rivers disgorge fresh water laden with debris from storm water and other sources. Boats constantly lose items off the decks. And even though it's illegal, some trash is intentionally dumped at sea.

There is another important source of debris, namely what people bring to the beach and discard there—that is, litter. In some places, litter vastly outnumbers marine-origin debris. COASST records information about debris objects to help determine whether the object came from the land or floated in.

Understanding which objects are debris and which objects aren't is important for data quality. COASST defines marine debris as all man-made, manufactured and human-altered objects excepting natural items that were subsequently used by beach-goers on site (e.g., driftwood used to make a fire or create a sculpture).

Here are some practical examples:

### *Marine Debris?—Yes!*

COASST



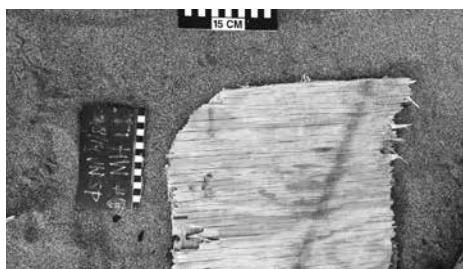
Anything made of plastic, metal or glass.

COASST



Any cement-like or ceramic material.

COASST

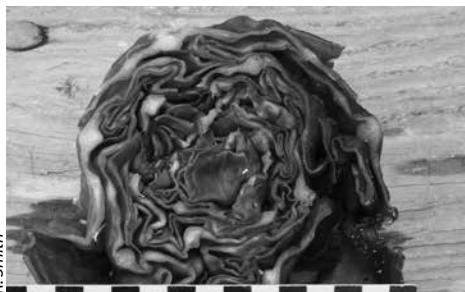


Any natural material that has been manufactured (cut, woven, joined, painted), including lumber, even if only rough sawn.

D. Bilderback



Any fragment or piece of a manufactured object, including beach glass.

**Marine Debris?—No!**

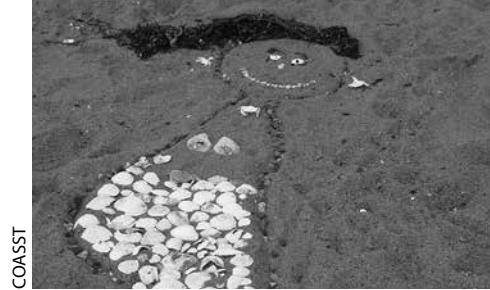
All foodstuffs, from floating fruits to leftover chicken bones, even though they came to shore as a consequence of human activity.



Any carcasses, including hunted animals left on site.



Driftwood sculptures.



Natural materials used to make beach sculptures or shelters.

## THE COASST APPROACH TO MARINE DEBRIS

The COASST Marine Debris program is focused on assessing the characteristics of marine debris—those attributes that collectively speak to the source, transport, and potential impact to people, wildlife and local coastal ecosystems.

Why not simply record the identity of each object?

### The List Is Too Long

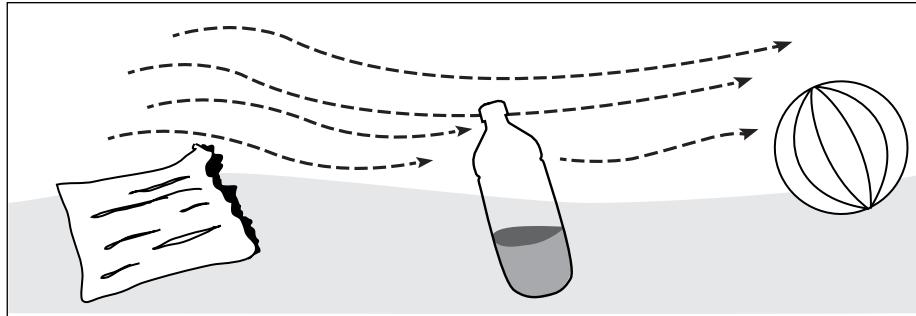
Most natural things that wash up on a beach can be classified by taxonomic group (for instance, family or species) into a finite number of categories. Whether you are looking for beached birds, crab carapaces or sea stars, there are only so many species and no more.

Not so with marine debris! People are constantly inventing and constantly discarding things. From water bottles to seat cushions to cigarette lighters to fishing gear—there are a million things and a million versions of each, making a comprehensive debris list infinite.

### Identity Doesn't Equal Impacts

Once it's been discarded, marine debris has a particular life cycle that speaks to oceanography, ecology and conservation. No longer just a fish tote, two by four, or water bottle, each piece of debris is now a floating object (flotsam) that moves according to the currents and the wind, picking up "hitchhiking" organisms as it travels, weathering and disintegrating into fragments, and potentially presenting a threat to wildlife or humans. How it floats and how it interacts with the living marine environment is not dependent on its identity, but on its characteristics—things like size, material or color. Here are two examples:

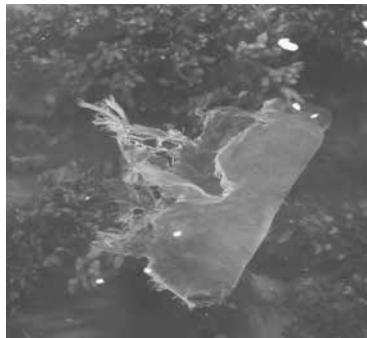
Large hollow objects (or in COASST lingo, containers of air) will float very high in the water so that their movements are subject to winds as well as currents; that is, they have high windage. Smaller, denser objects float lower—sometimes just under the surface—they have low-to-no windage, literally meaning that the wind doesn't push them around. Who cares? Oceanographers do. Knowing the windage of an object indicates a lot about how long it might have traveled at sea and potentially from where it came.



**The impact of wind on an object in the ocean is dependent on how high it floats.**

Floppy mid-sized (5–50cm) objects in the color spectrum ranging from clear to white through light yellow, are especially attractive to sea turtles—who may mistake this debris as jellyfish prey. And if the object is plastic, ingestion can mean impairment and even death. Plastic bag, shredded birthday balloon, cellophane wrapper or condom—the identity doesn't matter, but the characteristics do.

COASST



**Bag fragment, rubber or mylar balloon: all of these floppy objects could be mistaken for jellyfish prey by sea turtles.**

## **Characteristics, Clues & Consequences**

COASST records data on up to 19 characteristics of each object, that together help define two clues to transport, four consequences to wildlife and/or humans, as well as sourcing. Look for the icons in the Characteristics Guide starting on page 4MD-48.

### ***Harm to Wildlife***



Beyond the potential impact of toxins (see Hazardous to Humans), marine debris can pose a threat from entanglement, ingestion or trapping. Some animals are attracted to debris because they mistake it for food. Characteristics that help differentiate potential of harm to specific groups of wildlife include color, material, size, and whether the object is crumbly, sharp, shiny, floppy, or contains loops. An indication that wildlife may have already interacted with a debris object is the presence of beak, bite or claw marks. Any large open container or pot fishing device (crab pot, shrimp pot) can become a trap.

### ***Invasive Potential***



Most debris will not have any hitchhiking organisms attached. Objects that have been in the water for a long time may, however, become biofouled by marine organisms that grow on hard surfaces. Mussels, gooseneck barnacles, kelp, sponges, and even scummy films of diatoms are all examples. In rare cases, organisms already attached to a large object—like a dock or a boat—from one coastal marine environment will be transported with it to a new coastline. Even more rarely, some of these organisms may be invasive or “weedy” species that, once arrived, will multiply and take over, crowding out native species and potentially upsetting the local marine ecology. Characteristics that help determine invasive potential include amount of biofouling, size, material and time at sea.

### ***Harm to Humans***



Most debris is not dangerous to humans, but occasionally objects can be quite harmful, including containers with toxic chemicals or other hazardous material. Telltale characteristics include poison or other toxin or hazardous material warnings, containers with unknown contents, and any object that is sharp and could inflict a puncture wound.

***Boating Safety***

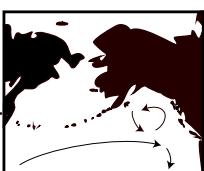
Large debris is a potential hazard to boats. Size, material, windage and color can all contribute to the relative safety of marine traffic.

***Windage***

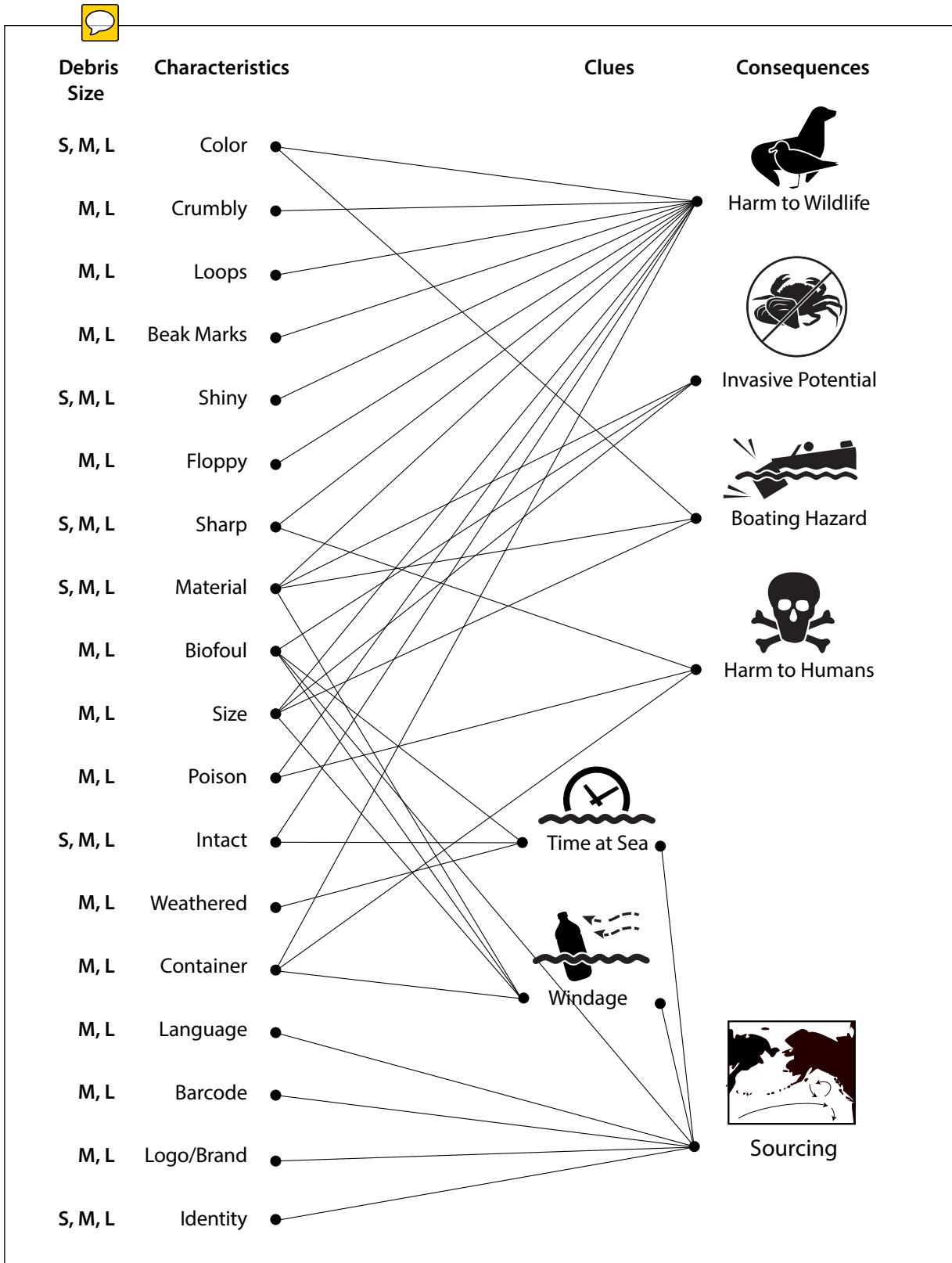
A measure of surface exposed to the wind, or how high an object sits in the water. Windage characteristics include size, material and whether the object is a container. For containers, number and size of openings, and filling are also important.

***Time at Sea***

The length of time something has been at sea can help determine its point of entry. Characteristics indicating extended time in the water include intactness and weathering, and extent and type of biofouling.

***Sourcing***

Literally, where the object came from—where it was manufactured, where it was sold and used, and even where it was lost. Source characteristics include language, logos or other branding, barcodes, and—of course—printed information indicating where something was made or used. The identification of the object along with size and material can also provide crucial clues to the source, as many objects are culturally specific. Occasionally, the type of biofouling organism(s) can help determine the origin of an object. Two other source clues—windage and time at sea—can help shed light on the starting point of an object and its route traveled from point of loss to beach where found.



COASST records characteristics of marine debris that provide information about potential sources and impacts. Not all characteristics are recorded for all marine debris sizes.

## SAMPLING MARINE DEBRIS

COASST has three different size classes of marine debris, accommodating everything from very small particles like plastic pellets up through derelict boat hulls and even the occasional dock or shipping container.

**Large Debris** larger than 50cm

If it doesn't fit inside the small debris *sampling square*, it is classified as large.

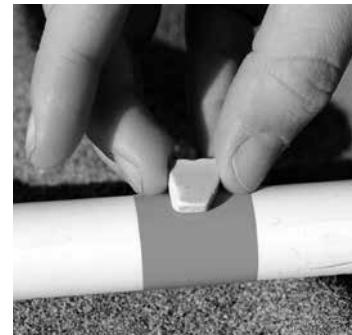
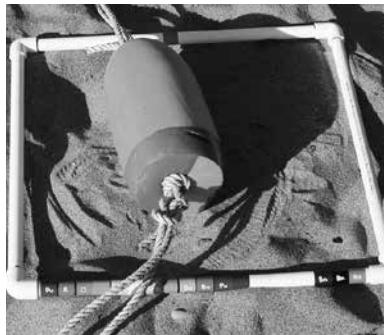
**Medium Debris** 2.5cm–50cm

The length of a side of the small debris *sampling square* is 50cm. Everything you find that fits inside the square (but isn't small debris) is classified as medium.

**Small Debris** 2.5mm–2.5cm

The *orange stripe* on the small debris *sampling square* is 2.5cm. Everything you find that is equal to or less than this measurement is classified as small.

COASST

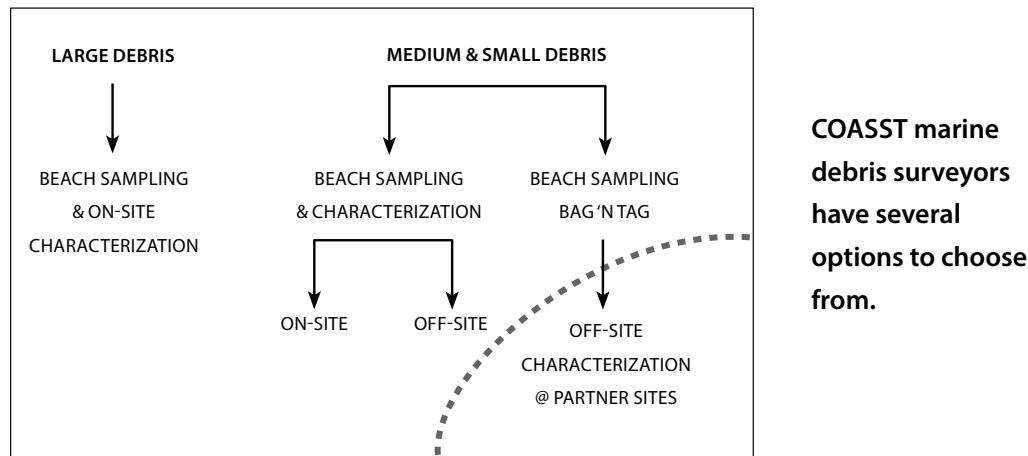


COASST samples debris according to size; examples left to right: large, medium and small.

While large debris can be sampled over the entire beach—just like the COASST beached bird survey—it would be difficult to downright impossible to sample small or even medium debris throughout the entire beach area. There are simply too many objects on most beaches. Therefore, COASST subsamples the beach for medium and small debris.

Unlike large debris, medium and small debris can be removed from the beach. In fact, many COASSTers (even those conducting surveys for beached birds) take a garbage bag with them to pick up trash as they search. Because the COASST marine debris protocols do not require participants to leave surveyed debris in place for next time, feel free to remove it if you choose.

This also means that characterizing debris off site is a possibility, and this option can certainly afford greater comfort and protection from the wind and weather. COASST recognizes three different options for participants engaged in medium and small debris surveys: on-site characterization, off-site characterization, and off-site characterization by others (so called “Bag & Tag”). The first two are interchangeable—each team can choose to characterize on- or off-site once at the beach. The third option, Bag & Tag, is a special program that you must sign up for before you start surveying.



## Large Debris: Sampling the Entire Beach

In this section you will learn:

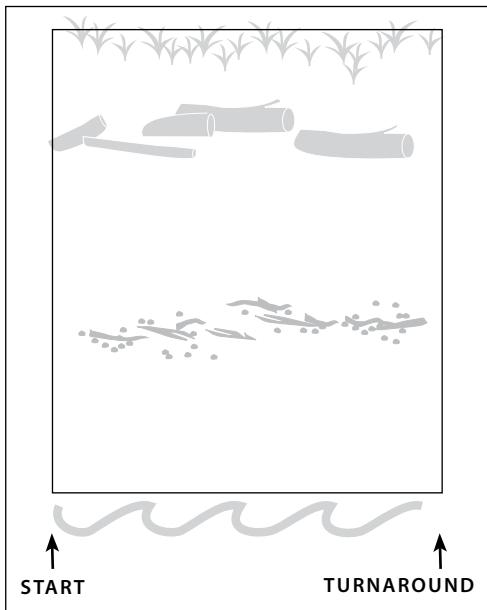
1. How to search the beach for large debris.
2. How to fill in non-characteristic info on the Large Debris Data Sheet.
3. When objects can be tallied versus require new data boxes.
4. Where to find information on object characterization and photography.

### What to Search For

Recall the definition of marine debris on 4MD-6. Ignore man-made objects that are “permanent fixtures on the beach”—that is barring a major disturbance like a landslide or a tsunami, these items will remain in place (e.g., seawalls, pilings, long-term shipwrecks).

### Search Frequency

Non-wood large debris should be searched for and characterized monthly. Because marine debris made of processed wood can be abundant and persistent on some beaches, it can be searched for every 3 months (quarterly). Note: if you searched for wood, circle **WOOD?** below **Large Debris** on the COASST Cover Sheet.



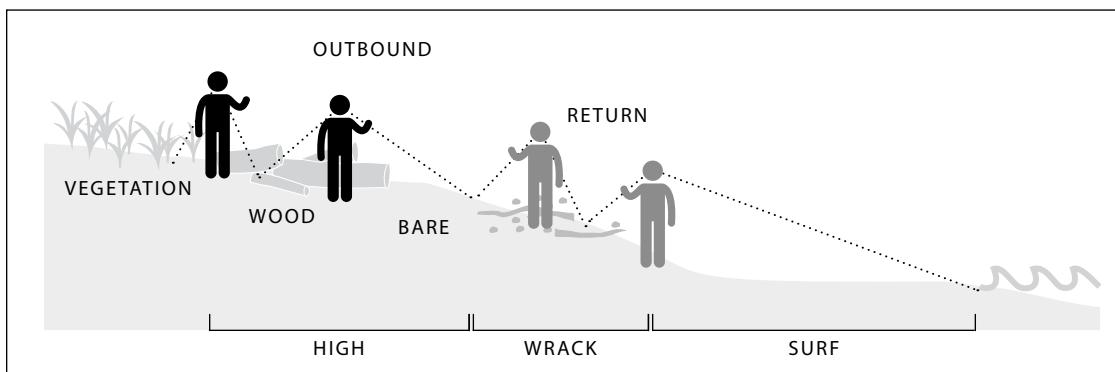
**Large debris (>50cm)**  
is sampled over the  
entire beach.

### ***Search Pattern***

Except for very large or very recently deposited objects, most large debris will be found on the high beach in the vegetation, wood and bare zones, and occasionally in the wrack zone. To search for large debris, fan out in the upper portion of the beach, walking in a loose search line where no one is too far in front or behind.

The uppermost surveyor should walk along the edge of the vegetation zone, looking into this zone no farther than 5m. If the vegetation zone is narrower than 5m, or it is impossible/unsafe to access in to 5m, use your best judgment to estimate the average width actually searched and enter that distance (in paces!) on the COASST cover sheet.

The distance between surveyors is dependent on how many people are searching, the width of the entire beach, and the relative width of each zone. Wood zones can be more difficult to search because there is so much to look



at, and clambering over logs can be challenging and tiring. If the wood zone is relatively sparse, the second surveyor should walk through this zone, zig-zagging in a “drunken sailor” pattern. If this zone has a lot of wood, multiple surveyors are best (especially the first time!), each searching in a fairly straight line.

Bare, wrack and surf zones can be relatively easy to search because large debris sticks out on a substrate otherwise devoid of three-dimensional material. At the turnaround point, switch to the lower (as yet unsurveyed) portion of the beach.

For a **narrow** beach, searching the entire width of the beach in a single pass—the outbound leg—is possible.

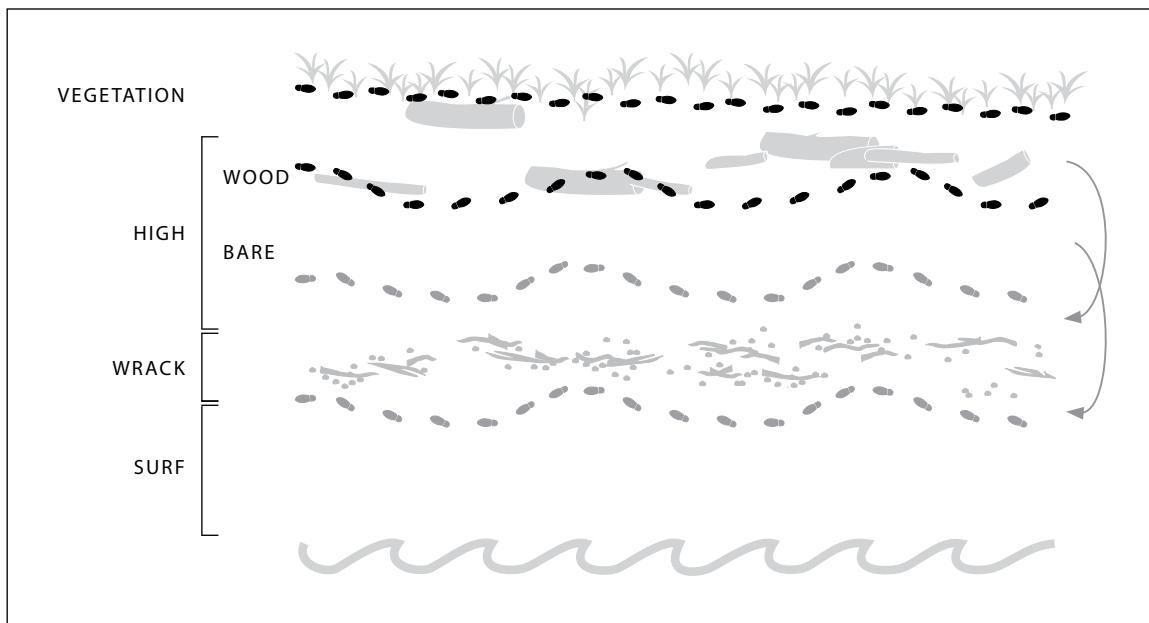
For a **wide** beach, searching out and back is a must.

These rules apply to *all* beach widths:

SURF	<i>one person can search entire surf zone.</i>
WRACK & HIGH	<i>narrow your search to accommodate visual clutter.</i>
WOOD	<i>search only if it's safe.</i>
VEGETATION	<i>search only to 5m in.</i>

When searching, the important points are:

- Only search 5m into the vegetation zone and no farther.
- Make sure all parts of the beach are examined.
- Never search back over an area—no “double searching” even if you spy a “new to you” untagged object.



A “drunken sailor” or zig-zag search pattern will ensure every piece of large debris is found.

## Large Debris: Filling in the Characterization Data Sheet

Small, medium and large debris each have a different data sheet for entering object characteristics. Make sure the data sheet you are using is the correct one.

In landscape orientation (horizontal), look for the words **LARGE DEBRIS** in the upper right corner.

The **BEACH** name, **DATE** and **PAGE** number fields are located along the short right-hand edge of the data sheet.

**BEACH:** The official COASST name of the survey site.

**DATE:** Include month, day and year as MM/DD/YY.

**PAGE:** There are two blanks to fill in. The first is simply a counter, going up as high as the number of Characteristics Data Sheets used per debris size and survey. The second blank records the highest number—the page number of the final data sheet. For instance, 7/13 would refer to the 7<sup>th</sup> page out of 13 total pages. For

LARGE DEBRIS											
											Beach _____
											Date _____
											Page _____
#:	Id: rope		Comments:						Collected	Logo/Brand	Language
Veg:	L (cm):	W (cm):	H (cm):	Color: yellow	Material: Plastic	Biofoul:	Loops	1 2-10 10s 100s	Container: openings: 0	Barcode	Poison
Wood:	54	3	3	Complex: N Y	if plastic: hard foam soft	(○)	Crumbly	uniform varied	filling: air other		
Bare:	Weathering:			Intact: whole part frag		(○)	Beak	diam: (cm) 14	diam: (cm)		
Wrack:						(○)	Sharp				
Surf:						(○)	Shiny				
						(○)	Floppy				
#:	Id:		Comments:						Collected	Logo/Brand	Language
Veg:	L (cm):	W (cm):	H (cm):	Color:	Material:	Biofoul:	Loops	1 2-10 10s 100s	Container: openings: 0	Barcode	Poison
Wood:				Complex: N Y	if plastic: hard foam soft	(○)	Crumbly	uniform varied	filling: air other		
Bare:	Weathering:			Intact: whole part frag		(○)	Beak	diam: (cm)	diam: (cm)		
Wrack:						(○)	Sharp				
Surf:						(○)	Shiny				
						(○)	Floppy				
#:	Id:		Comments:						Collected	Logo/Brand	Language
Veg:	L (cm):	W (cm):	H (cm):	Color:	Material:	Biofoul:	Loops	1 2-10 10s 100s	Container: openings: 0	Barcode	Poison
Wood:				Complex: N Y	if plastic: hard foam soft	(○)	Crumbly	uniform varied	filling: air other		
Bare:	Weathering:			Intact: whole part frag		(○)	Beak	diam: (cm)	diam: (cm)		
Wrack:						(○)	Sharp				
Surf:						(○)	Shiny				
						(○)	Floppy				
#:	Id:		Comments:						Collected	Logo/Brand	Language
Veg:	L (cm):	W (cm):	H (cm):	Color:	Material:	Biofoul:	Loops	1 2-10 10s 100s	Container: openings: 0	Barcode	Poison
Wood:				Complex: N Y	if plastic: hard foam soft	(○)	Crumbly	uniform varied	filling: air other		
Bare:	Weathering:			Intact: whole part frag		(○)	Beak	diam: (cm)	diam: (cm)		
Wrack:						(○)	Sharp				
Surf:						(○)	Shiny				
						(○)	Floppy				

On each side of the Large Debris Characterization Data Sheet, there is room for four unique objects, each of which occupies one data box that runs the width of the page.

"trashy" beaches, multiple data sheets will be needed. This will definitely be the case on the first large debris survey performed on a survey beach and may be the case after winter storms have rearranged the beach and its debris.

### ***Large Object—Specific Information***

**OBJECT NUMBER (#):** Given to each ***unique object type*** during a survey, object numbers are used to help keep track of which photos go to which data box. Begin at 1 for the first "object of the day" and count up to whatever the eventual total is.

#:	
Veg:	_____
Wood:	_____
Bare:	_____
Wrack:	_____
Surf:	_____

The first time each ***unique object type*** is encountered during a survey, record the object number of the day and the zone in which it was found.

How are unique large object types defined? In COASST, all debris objects are defined by the various combinations of their characteristics. Unique ***large*** object types have a character set, including object identity, that receive one data box per large debris survey. Each object type is recorded in a different data box, while multiples of a type can be tallied within a box according to zone.

The purpose of COASST's approach to marine debris is to uncover patterns of source and potential harm to the environment. Some beaches accumulate certain types of large debris in abundance. And yet, some beaches with a lot of lumber could take days to characterize if each piece were independently photographed, measured and characterized.

### ***When to tally versus fill out a new data box***

The first time a unique object type is encountered during a large marine debris survey, it should receive its own complete characterization box. Subsequent finds that share the same state of all characteristics, with the exception of size and weathering, must be the same—that is, they are nearly identical" if color, source clues, biofouling or other characteristics differ, a unique object type must be recorded in a new data box.

#:	3
Veg:	
Wood:	
Bare:	
Wrack:	1
Surf:	

The third object type of the day was found in two zones—there were three items in the wood zone and one item in the wrack zone.

#:	4
Veg:	
Wood:	1
Bare:	
Wrack:	
Surf:	

The fourth object type of the day was found in the wood zone—this item was unique—only one was found on the survey.

**ZONE TALLY:** For each piece of large debris found, put a hash mark (vertical slash) by the zone (**SURF, WRACK, BARE, WOOD or VEGETATION**) where it was found. Each data box should have at least a single hash mark indicating where that unique object was found. If several objects of the same type are found are found on a survey, use the same data box to tally any additional (beyond the first) object. Eight 2-meter-long 2-by-4s scattered throughout the wood zone? Make 8 hash marks.

The remainder of the Large Debris Data Sheet focuses on the debris characteristics. For specifics on characterizing debris, go to page 4MD-48.



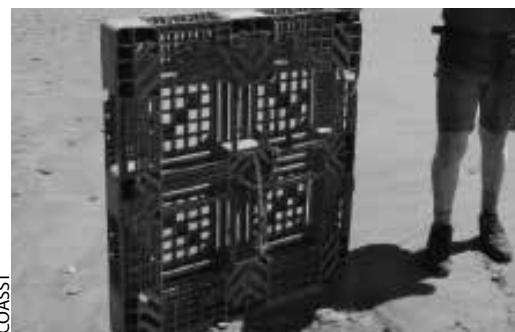
COASST



COASST



COASST



COASST

All four objects are pallets. The top two and bottom left can be tallied—all characteristics aside from size are the same, but the bottom right, which has different source clues (language) and material (plastic) is a unique object type.

## Photos

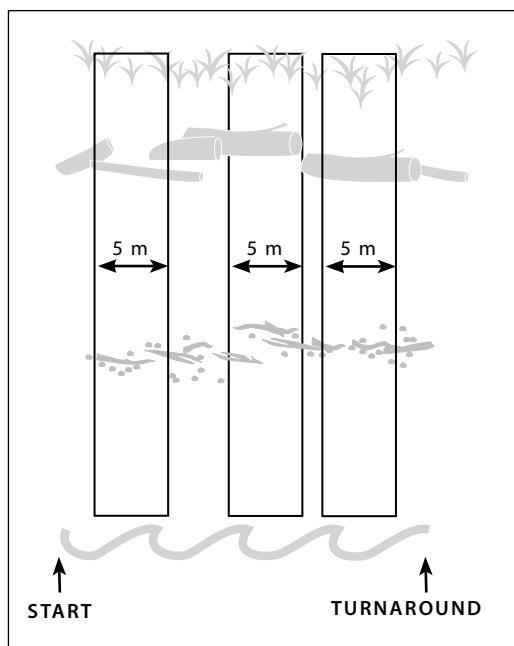
Take one photo of each unique large debris object type, with additional photos to capture any characteristics with a camera icon (📷). For a detailed explanation of how to take photos and what to include in each photo, go to page 5-5. For multiple, identical objects, only the first of its kind should be photographed.

## Medium and Small Debris: Subsampling the Beach

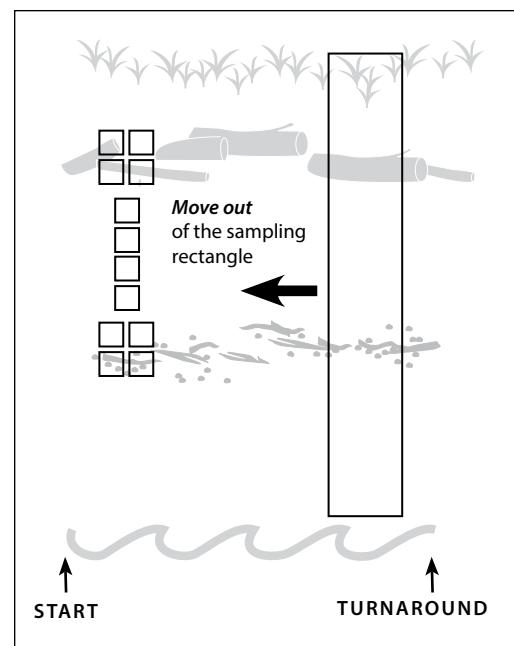
In this section, you will learn:

1. On-site, off-site and “Bag & Tag” sampling.
2. How to sub-sample the beach for medium and small debris, including how to fill out the Mapping Your Survey Form.
3. When objects can be tallied versus require new data boxes.
4. How to fill in non-characteristic information on the Medium and Small Debris Characterization Data Sheets, respectively.
5. Where to find information on object characterization and photography.

Attempting to find and record information about all objects less than 50 cm in longest length on a beach would take an army of searchers more than a tidal cycle! Instead, COASST subsamples up to 5 locations along the beach—sampling rectangles—each oriented from the waterline up into the vegetation. Total amount of debris on the beach is estimated by averaging across samples within each zone applying that number to the entire zone area on the beach.



Medium debris (2.5cm–50cm) 3–5 randomly located sampling rectangles.



Small debris (2.5<cm) sampling squares associated with sampling rectangles.

## ***Assembling Objects for Characterization on the Beach***

### ***Who & Where***

You and your partner(s) are doing a complete survey including searching for, collecting and characterizing the debris on the beach.

### ***What to Do***

Medium debris: For each rectangle–zone combination (e.g., rectangle 1 surf zone, rectangle 3 wood zone), gather all debris in a single pile to characterize at once.

Small debris: Same as above, except specific to square-zone.

After all debris within a rectangle-zone combination, or square-zone combination, has been characterized, feel free to bag it up for disposal.

### ***Advantages and Disadvantages***

Characterizing on site can be expedient if the number of objects is manageable and the weather is cooperative. In cold, damp or windy situations, or when darkness threatens, additional time on the beach may not be best.

## ***Off-site Characterization***

### ***Who & Where***

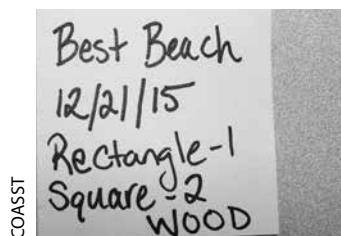
You and your partner(s) are doing a complete survey, but you are saving the debris you find to characterize off site, (e.g., in the garage).

### ***What to Do***

Within each sampling rectangle–zone combination (medium debris) or square–zone combination (small debris), gather together all of the objects that meet the definition of marine debris (see page 4MD-6) and meet the size criteria (use your sampling square), and bag them. Use one bag for each rectangle-zone. For instance, a medium debris rectangle with debris found in all five zones should have five bags, one for each zone. Make sure to include a tag with the following:

Medium debris: ***RECTANGLE, ZONE, DATE, BEACH NAME***

Small debris: ***SQUARE, RECTANGLE, ZONE, DATE, BEACH NAME***



Left: A tag for the second small debris square sampled in the wood zone adjacent to rectangle #1. Right: Place the tag inside the bag. "Post-its" and masking tape work well.

### ***Advantages and Disadvantages***

Taking the debris off-site to a warm, dry and well-lit location can very much improve the data collection experience. Of course, not everyone is okay with marine debris on their kitchen table (or even on their picnic table). And, there is always a temptation to say, "Let's finish tomorrow, or next week," leaving data sheets half filled and debris literally piling up. If you characterize off-site, make sure you are extremely organized about labeling your bags, and that you follow through and complete the data sheets.

### ***Bag & Tag + Partner Characterization***

#### ***Who & Where***

You and your partner(s) are only performing the search and bag portion of the survey. Others will characterize the debris you find. (Note: Bag & Tag is only available in some locations.)

#### ***What To Do***

Indicate to the COASST office that you would like to be a Bag & Tag collection team. If COASST has a partner in your area, we'll figure out the best method to get your samples to that partner on a regular basis. This may involve:

1. You deliver bags to the partner.
2. You deliver bags to a centralized "characterization site" for redistribution.
3. Someone comes to your location to retrieve tagged bags.

Make sure you pick up (or receive) another set of bags for your next survey.

Within each sampling rectangle-zone combination (medium debris) or square-zone combination (small debris), follow the instructions above for off-site characterization, gathering all of the objects, bagging them and tagging each bag with the date, beach name, rectangle, zone, and square (small debris).

When you return home, submit only the COASST Cover Sheet and the Mapping Your Survey Form and any site-specific photographs as quickly as possible, so that we can match all the survey pieces together.

### ***Advantages and Disadvantages***

For survey sites that require a lot of time to access and/or survey, Bag & Tag offers an easy way for the intrepid field team to concentrate their effort on what matters—getting out there and collecting the debris. On the other hand, walking out with a "Santa's bag" of bag & tagged debris might tax even the fittest surveyors.

Finally, if you Bag & Tag, make sure you are extremely organized about labeling and that you send COASST the completed COASST Cover Sheet and Mapping Your Survey Form.

## Medium and Small Debris: Mapping Your Survey

This section walks through the Mapping Your Survey Form and explains how to fill in the boxes and make the required calculations. This form will allow you to select 5 random locations between your start point and your turnaround point.

### Before Section

Before starting any **medium** or **small debris** survey, you will need to complete the Mapping Your Survey Form top portion, including the boxes in the upper right corner, and the section labeled “**Before**. In the **Before** section of this form you will:

1. Select the location of the 5 survey rectangles for **medium debris**.
2. Calculate the distance—in paces—from the start point to the first rectangle.
3. Calculate the distance—in paces—from the first rectangle to the second and so on until you reach the final (5<sup>th</sup>) rectangle.

MAPPING YOUR SURVEY																																																																																																																																																	
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Order from smallest to largest.</p> <table style="margin-left: auto; margin-right: auto; border: none;"> <tr> <td style="text-align: center; padding: 2px;">m</td> <td style="border: 1px solid black; width: 20px; height: 20px;"></td> <td style="text-align: center; padding: 2px;">m</td> <td style="border: 1px solid black; width: 20px; height: 20px;"></td> <td style="text-align: center; padding: 2px;">m</td> <td style="border: 1px solid black; width: 20px; height: 20px;"></td> <td style="text-align: center; padding: 2px;">m</td> <td style="border: 1px solid black; width: 20px; height: 20px;"></td> <td style="text-align: center; padding: 2px;">m</td> <td style="border: 1px solid black; width: 20px; height: 20px;"></td> </tr> <tr> <td style="text-align: center; padding: 2px;">m</td> <td style="border: 1px solid black; width: 20px; height: 20px;"></td> <td style="text-align: center; padding: 2px;">m</td> <td style="border: 1px solid black; width: 20px; height: 20px;"></td> <td style="text-align: center; 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If a zone is missing or unsafe to survey, put a slash through the box. If wrack is present, circle percent cover.</p> <table style="margin-left: auto; margin-right: auto; border: none;"> <tr> <td style="width: 10%;">DURING</td> <td style="width: 10%; text-align: center;">Paces</td> <td style="width: 10%; text-align: center;">Debris?</td> <td style="width: 10%; text-align: center;">Paces</td> <td style="width: 10%; text-align: center;">Debris?</td> <td style="width: 10%; text-align: center;">Paces</td> <td style="width: 10%; text-align: center;">Debris?</td> <td style="width: 10%; text-align: center;">Paces</td> <td style="width: 10%; text-align: center;">Debris?</td> <td style="width: 10%; text-align: center;">Paces</td> <td style="width: 10%; text-align: center;">Debris?</td> </tr> <tr> <td></td> <td style="text-align: center; padding: 2px;">Veg</td> <td style="text-align: center; padding: 2px;">med</td> <td style="text-align: center; padding: 2px;">/</td> <td style="text-align: center; padding: 2px;">med</td> <td style="text-align: center; padding: 2px;">/</td> <td style="text-align: center; padding: 2px;">med</td> <td style="text-align: center; padding: 2px;">/</td> <td style="text-align: center; padding: 2px;">med</td> <td style="text-align: center; padding: 2px;">/</td> <td style="text-align: center; padding: 2px;">med</td> </tr> <tr> <td></td> <td style="text-align: center; padding: 2px;">Wood</td> <td style="text-align: center; padding: 2px;">med</td> <td style="text-align: center; padding: 2px;">sm</td> <td style="text-align: center; padding: 2px;">med</td> <td style="text-align: center; padding: 2px;">sm</td> <td style="text-align: center; padding: 2px;">med</td> <td style="text-align: center; padding: 2px;">sm</td> <td style="text-align: center; padding: 2px;">med</td> <td style="text-align: center; padding: 2px;">sm</td> <td style="text-align: center; padding: 2px;">med</td> </tr> <tr> <td></td> <td style="text-align: center; padding: 2px;">Bare</td> <td style="text-align: center; padding: 2px;">med</td> <td style="text-align: center; padding: 2px;">sm</td> <td style="text-align: center; padding: 2px;">med</td> <td style="text-align: center; padding: 2px;">sm</td> <td style="text-align: center; padding: 2px;">med</td> <td style="text-align: center; padding: 2px;">sm</td> <td style="text-align: center; padding: 2px;">med</td> <td style="text-align: center; padding: 2px;">sm</td> <td style="text-align: center; padding: 2px;">med</td> </tr> <tr> <td></td> <td style="text-align: center; padding: 2px;">Wrack</td> <td style="text-align: center; padding: 2px;">med</td> <td style="text-align: center; padding: 2px;">sm</td> <td style="text-align: center; padding: 2px;">med</td> <td style="text-align: center; padding: 2px;">sm</td> <td style="text-align: center; padding: 2px;">med</td> <td style="text-align: center; padding: 2px;">sm</td> <td style="text-align: center; padding: 2px;">med</td> <td style="text-align: center; padding: 2px;">sm</td> <td style="text-align: center; padding: 2px;">med</td> </tr> <tr> <td></td> <td style="text-align: center; padding: 2px;">Surf</td> <td style="text-align: center; padding: 2px;">med</td> <td style="text-align: center; padding: 2px;">/</td> <td style="text-align: center; padding: 2px;">med</td> <td style="text-align: center; padding: 2px;">/</td> <td style="text-align: center; padding: 2px;">med</td> <td style="text-align: center; padding: 2px;">/</td> <td style="text-align: center; padding: 2px;">med</td> <td style="text-align: center; padding: 2px;">/</td> <td style="text-align: center; padding: 2px;">med</td> </tr> </table>					A	B	C	D	E	m		m		m		m		m		m		m		m		m		m		m		m		m		m		m		m		=		=		=		=		m		=		=		=		=		paces		x		x		x		x		paces		=		=		=		=		DURING	Paces	Debris?		Veg	med	/	med	/	med	/	med	/	med		Wood	med	sm	med	sm	med	sm	med	sm	med		Bare	med	sm	med	sm	med	sm	med	sm	med		Wrack	med	sm	med	sm	med	sm	med	sm	med		Surf	med	/	med	/	med	/	med	/	med								
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The Mapping Your Survey Form is used to determine where your sampling rectangles will be located for medium and small debris surveys and for recording information about each zone within a sampling rectangle.



Follow the step-by-step instructions below to help you fill in the ***Before*** section of the Mapping Your Survey Form correctly. After one or two times, filling out this form will become a matter of course.

MAPPING YOUR SURVEY	Beach Length 1200 m	Beach Length – 25 1175 m	Paces per Meter 1.3 (步行 /m)
---------------------	------------------------	-----------------------------	--------------------------------

COASST will tell you your beach length. Be sure to put the pacer's paces per meter here.

#### Upper Right Measurements

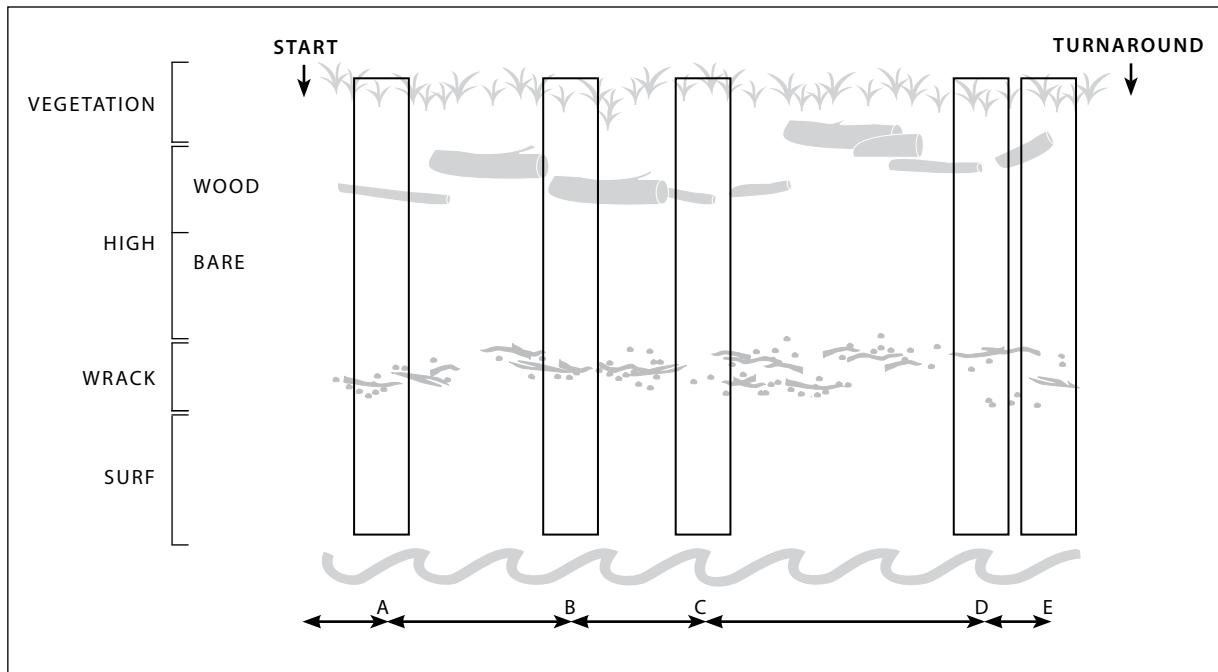
Fill in each of the required numbers. If you don't know your beach length, call or email COASST.

**BEACH LENGTH:** This measurement, in meters, has been provided to you by COASST. If you are starting a new beach to COASST, this measurement (from start to turnaround) will need to be made before starting a survey. COASST can help.

**[BEACH LENGTH—25]:** This measurement, in meters, needs to be calculated. It will be the **outer limit** of potential locations for medium and small debris sampling. Why subtract 25 meters from the length of the beach? Because everyone's paces vary slightly from day to day and across the various substrates (hard sand, soft sand, cobble), a 25-meter buffer at the turnaround ensures that all randomly selected rectangle locations will be within the boundaries of your beach. (COASST creates a second 25-meter buffer at the start as well.)

**PACES PER METER:** This measurement, in paces per meter, should be known before starting the survey. If this is the first survey, or it has been more than a year since you and your partner or survey team measured paces per meter, go to the Paces Per Meter Worksheet on page 1-16 for instructions.

**Important!!** Everyone has a different paces per meter measurement. Please use the one for the person designated as the pacer for that particular survey. The name of the pacer will also be entered on the COASST Cover Sheet.

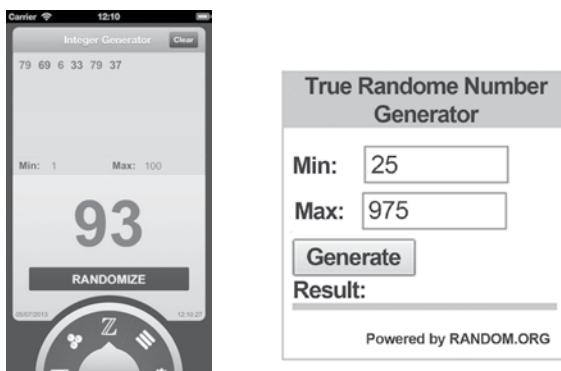


The “Before” section of the Mapping Your Survey Form allows you to determine the number of paces from the start to your first rectangle (A), from A to B, B to C and so on.

### ***Choosing Random Locations for Sampling Rectangles***

For medium and small debris surveys, each survey requires selecting 3 to 5 locations along the entire length of the beach to conduct sampling. These locations are chosen randomly and are different each time the beach is surveyed.

Why not simply survey the same place every time? And why choose randomly? Random sampling removes the bias people might introduce by selecting certain sites (like places they know debris accumulates, or places they know are relatively debris free and easier to survey). Random sampling also allows COASST to get a “slice” across the different types of conditions present on a single beach, both within a single survey date and across months and years of time.



**Mobile apps and websites that allow you to set a maximum and minimum work well for generating random numbers.**

**Step 1.** Generate 5 random numbers that:

- Are whole numbers (no decimals).
- Fall between the values 25 and [Beach Length—25]. Why not less than 25? Because this is the start point buffer, ensuring that sampling starts beyond the main beach access point.
- Are more than 10 apart from each other. If two numbers fall within 10, discard the second value and generate another random number until all 5 are 10 or more apart

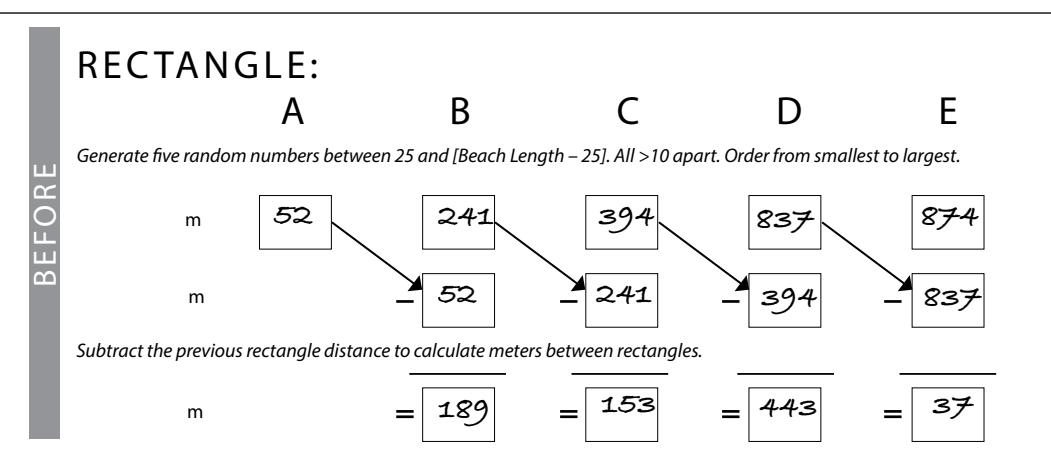
*To generate random numbers you can:*

- A. Use a **phone app** such as Random Number Generator Plus.
- B. Use a **website** such as random.org.  
Be sure to specify the minimum and maximum values needed. The minimum is always 25. The maximum is the calculation: [Beach Length—25].
- C. Alternatively, contact COASST prior to your first survey, and we will send a supply of random numbers that will last for many months of surveying.

**Step 2.** Once you have 5 random numbers, more than 10 apart from each other, order them on the form from smallest to largest in the top row of the **Before** section.

**Step 3.** Copy the first 4 values into the second row, following the arrows. For instance, in the example, the number 52 in the first row under Sampling Rectangle A moves to Sampling Rectangle B in the second row.

**Step 4.** Subtract the second row from the first row. In the example, the number 52 is subtracted from the number 241. These are the distances, in meters, between each rectangle. The distance to the first sampling rectangle is simply the value entered on the top line.



The numbers in the first row, your random numbers, are locations along the length of your beach. The numbers in the third row are the distances, in meters, between each of these locations.

**Step 5.** Enter the **PACES PER METER**, copied from the upper right corner into the fourth line—the same value for all 5 sampling rectangles.

<b>BEFORE</b>	<p><b>RECTANGLE:</b></p> <p>A      B      C      D      E</p> <p>Generate five random numbers between 25 and [Beach Length – 25]. All &gt;10 apart. Order from smallest to largest.</p> <table style="margin-left: auto; margin-right: auto;"> <tr> <td>m</td> <td>52</td> <td>241</td> <td>394</td> <td>837</td> <td>874</td> </tr> <tr> <td>m</td> <td>-</td> <td>52</td> <td>-</td> <td>241</td> <td>-</td> <td>394</td> <td>-</td> <td>837</td> </tr> </table> <p><i>Subtract the previous rectangle distance to calculate meters between rectangles.</i></p> <table style="margin-left: auto; margin-right: auto;"> <tr> <td>m</td> <td>= 189</td> <td>= 153</td> <td>= 443</td> <td>= 37</td> </tr> <tr> <td> /m</td> <td>x 1.3</td> <td>x 1.3</td> <td>x 1.3</td> <td>x 1.3</td> <td>x 1.3</td> </tr> </table> <p><i>Multiply by paces per meter to calculate paces to each rectangle.</i></p> <table style="margin-left: auto; margin-right: auto;"> <tr> <td>paces</td> <td>= 68</td> <td>= 246</td> <td>= 199</td> <td>= 576</td> <td>= 48</td> </tr> </table>					m	52	241	394	837	874	m	-	52	-	241	-	394	-	837	m	= 189	= 153	= 443	= 37	/m	x 1.3	paces	= 68	= 246	= 199	= 576	= 48				
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paces	= 68	= 246	= 199	= 576	= 48																																

Converting from meters on the beach to paces between rectangles is done by multiplying these number by paces per meter.

**Step 6.** To convert from meters to paces, multiply the distance to each rectangle by the **PACES PER METER**. Round these numbers (in paces) to the nearest whole number. That is, no partial paces!

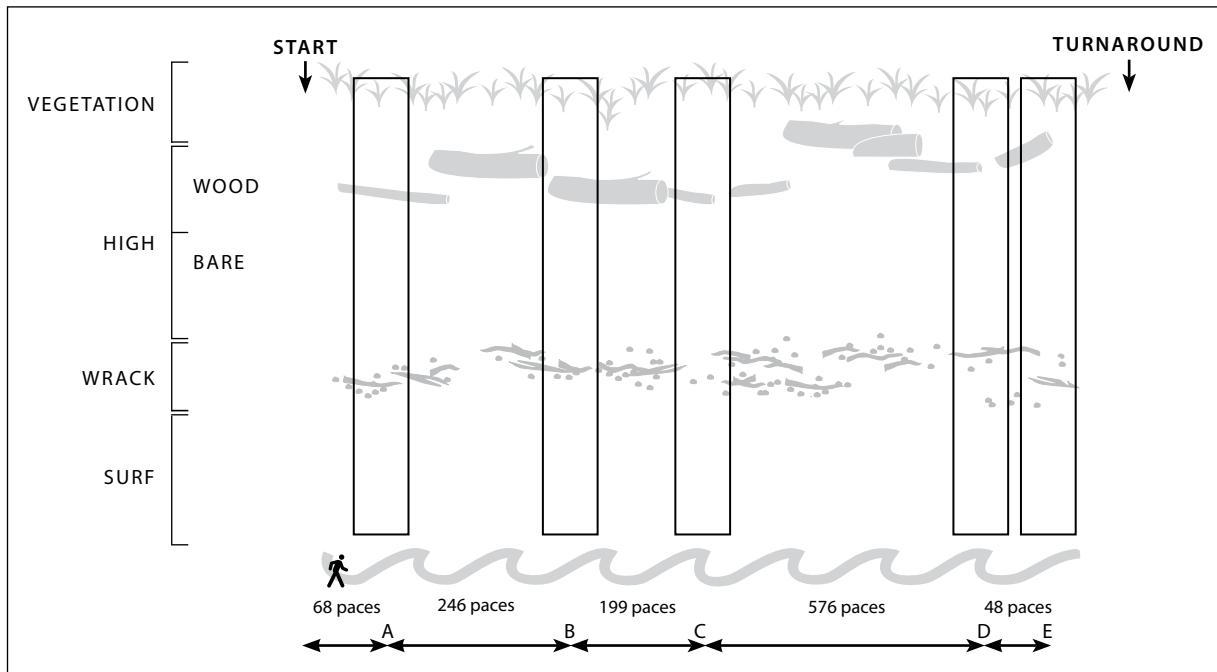
- For Sampling Rectangle A only, multiply paces/m (line 4) by the number of meters on line 1. In the example, this is:

$$1.3 \text{ paces/m} \times 52\text{m} = 68 \text{ paces}$$

- For Sampling Rectangles B through E, multiply paces/m (line 4) by the number of meters on line 3. In the example, under Sampling Rectangle B, this is:

$$1.3 \text{ paces/m} \times 189\text{m} = 246 \text{ paces.}$$

Now you know the location, in paces (for the designated pacer for your survey) of each of the sampling rectangles for medium debris.



The fifth and final row of the Mapping Your Survey Form is the number of the pacer's paces required to walk from the starting point to the first sampling rectangle (A), from A to B, B to C and so on.

### **During Section**

Fill in the bottom portion of the Mapping Your Survey Form labeled "*During*" as you complete each sampling rectangle.

In the *During* section of this form you will:

1. Fill in the width, in paces, of each zone.
2. Put a slash through any zone that is not present.
3. Circle the relevant debris size (med = **medium**; sm = **small**)—at each rectangle location and zone sampled **where debris was found**—even one item counts!
4. In the wrack zone only, circle the closest percent cover of wrack:

$\leq 25\%$

26–50%

51–75%

$\geq 76\%$

### **Zone Widths**

COASST measures zone width at each rectangle on every survey date for four reasons:

1. Zone width changes from place to place along a beach so measuring only once doesn't really capture the diversity of the beach.
2. Depending on the time of tide, the surf zone can vary greatly in size.
3. Depending on the time of year and day in the tidal cycle, the wrack zone can vary greatly in size.
4. Marine debris accumulates at different rates in different zones. Knowing the zone widths allows COASST to more accurately estimate the total amount debris present on the beach.



**Here the pacer places a flag at the transition between the bare and wrack zone.**

Zone widths are measured and recorded in paces. There is no need to convert to meters, the COASST database does this automatically (using the paces/m calculation entered on the Mapping Your Survey Form).

		Paces	Debris?
Veg	<input type="text" value="6"/>	med	
Wood		med sm	
Bare	<input type="text" value="67"/>	med sm	
Wrack	<input type="text" value="30"/>	med sm	
Surf	<input type="text" value="45"/>	med	

**DURING**

**Here in Rectangle A, the vegetation was 6 paces wide, the bare 67, wrack 30 and surf 45. There was no wood zone.**

On a calm day, starting at the water's edge and pacing up the beach is fine. On a windy, wavy day ***be careful*** of turning your back to the ocean. If the pacer starts low on the beach on a windy day, take care to start above the reach of the waves and make sure your partner is scouting waves.

The pacer should have the zone flags and the clicker in hand when pacing the zone widths. Use the clicker to count the paces so that you don't have to remember the number you're on. Remember to reset the clicker (turn the knob until all of the number wheels register zero) after each zone paced.

Use the zone flags to identify the boundaries between zones:

Surf—Wrack  
Wrack—Bare  
Bare—Wood  
Wood—Vegetation

Remember to walk in a straight line up the beach, as the flag line the pacer sets will be used as the center line of the medium debris sampling rectangle. If a zone is missing, put a slash through it and skip to the next zone.

Measuring the width of the wrack zone can be difficult, particularly when there is more than one wrack line. Often the wrack most distant from the water—the wrack laid down by the highest tide of the previous 14-day tidal cycle—has been disturbed by the actions of feet (human and not), vehicle wheels, and wind. The width of the wrack zone includes the freshest line closest to the water all the way up to the most disturbed wrack, and may include portions that are relatively wrack free. See page 3-18 for examples of wrack zones.

The wood zone, when present, may occasionally be difficult to sample or even transit through on beaches where medium and large driftwood has accumulated. Use your best judgment and always be safe. Better to skip a zone than twist an ankle. If you do skip a zone other than the vegetation zone, write a comment so that COASST will know the zone was present but unsafe. If you skip the wood zone, please estimate the zone width in paces.

The vegetation zone, if present, is the only beach zone that can literally go on and on—up the dune, into a forest, there are many possibilities. For this reason, COASST only surveys in the vegetation up to a maximum of 5 meters.

It is important to measure the width of the vegetation zone that your team actually surveyed. If that is less than 5 meters—no worries!—simply enter the width surveyed (in paces).

### *Debris Presence*

Not every zone in every rectangle on every COASST survey beach will contain debris (this is a good thing!). Some will contain small debris but not medium debris. Others will contain both.



	Paces	Debris?	
Veg	6	med	
Wood		med sm	
Bare	67	med sm	
Wrack	30	med sm	
Surf	45	med	

**Here in Rectangle A, debris was only found in the wrack zone. Both medium and small debris were found.**

Once you have completed search a rectangle-zone or square-zone for debris, circle which type(s) you found. This helps the COASST office match on-the-beach data with debris characterization data.



## Wrack Percent Cover

If there is a wrack zone present at the sampling rectangle, you will need to measure the width and estimate the amount of wrack present, from the lowest and most intact wrack line up through the disturbed wrack at the upper end of the beach. Why? COASST is interested in discovering whether debris, and especially small debris, accumulates differently in wrack versus bare substrate.

	Paces	Debris?
Veg	6	med 
Wood		med sm
Bare	67	med sm
Wrack	30	med sm 
Surf	45	med

Here in Rectangle A, wrack comprised between 26–50% of the wrack zone.

To estimate the amount of wrack, or the **percent cover**, visualize the wrack zone inside the sampling rectangle. How much of that area is covered by wrack, and how much is bare substrate? COASST has four choices—use your best judgment to circle the percent cover that most closely matches your situation:

- $\leq 25\%$
- 26–50%
- 51–75%
- $\geq 76\%$



COASST

$\leq 25\%$

$\geq 76\%$

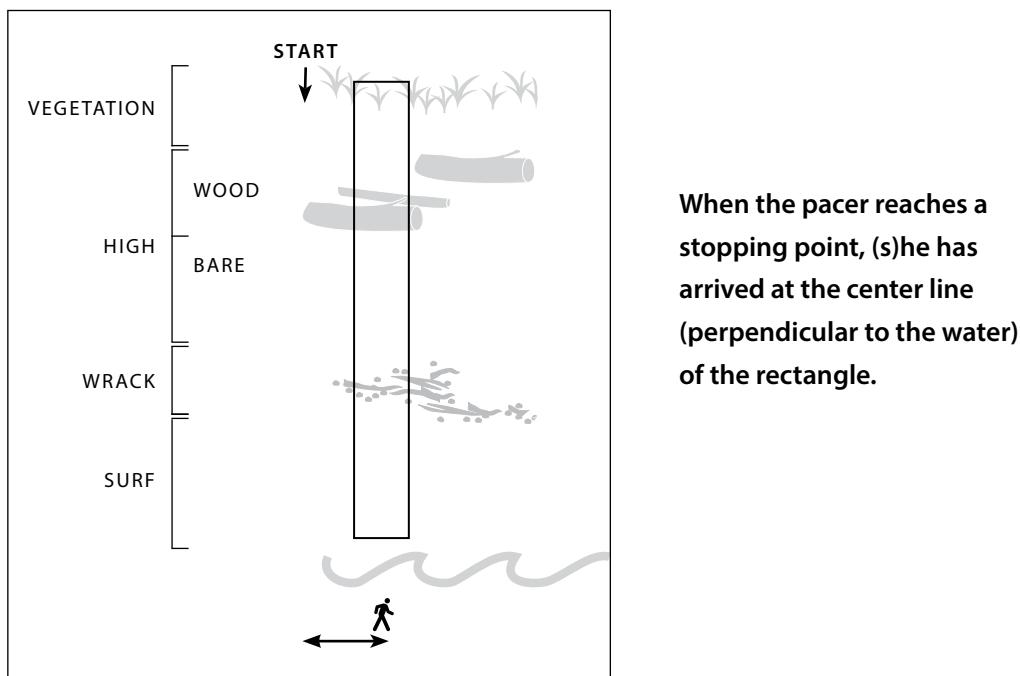
26–50%

### **Medium Debris Search Pattern**

The location of each sampling rectangle has already been determined by filling out the **Before** section of the Mapping Your Survey Form.

### **Finding Sampling Rectangles**

Check the Mapping Your Survey Form for the number of paces from the **Start Point** to the center line of **Sampling Rectangle A**. Walk on the part of the beach that is easiest to transit, the part used to measure the average paces per meter of the pacer. Use the pace clicker to keep an accurate count of paces. Counting out loud for the last 10 paces can be helpful. To reach each subsequent sampling rectangle, reset the pace clicker to zero and check the **Before** section of the Mapping Your Survey Form for the number of paces to the next sampling rectangle center line.

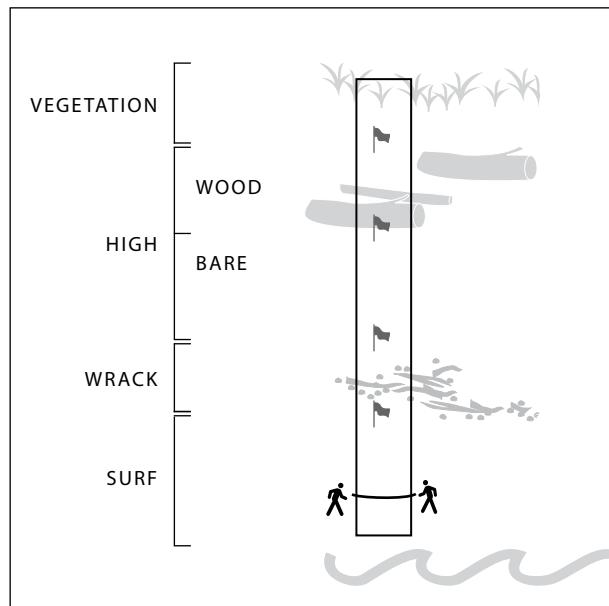


### **At the Sampling Rectangle**

Before beginning the search for medium debris, make sure to set the zone flags at each zone transition, pace the width of each zone, and determine the percent cover of wrack in the wrack zone (if present). These procedures are described in detail starting on page 4MD-30 in the Mapping Your Survey section. The object of this “pre-survey work” is to make sure the team is ready to search within each zone.

Medium debris sampling rectangles are best searched by at least two people. This is because the width of the rectangle (5m) is established by keeping the measuring rope taut between partners as you move up (or down) the beach.

Beginning at whichever end of the sampling rectangle works best given beach conditions, straddle the flagged center line, stretching the rope taut. Align the center of the measuring rope—flagged with orange ribbon woven into the weave of the rope—with the center line marked by the zone flags.



**The flag-line forms the center of the rectangle.**

When working alone, lay the rope on the ground bisecting the center line, and mark the perimeter of the sampling rectangle using extra zone flags.

Within each zone, surveyors should visually search the ground along the rope as the pair moves forward from one end of the zone to the other. Each person should primarily be responsible for the half closest to them, while still



**Be sure to hold  
the rope taut and  
align the center  
of the rope with  
the line of flags.**

reserving the right to spot debris on the other side. As the measuring rope passes over each marine debris object, lay it down and collect the debris. Use the measurement guides on the sampling square to make sure each piece isn't too small (less than the orange length) or too big (larger than the square side) (see page 4MD-13). If you are characterizing on site, pile together or temporarily bag each piece until the entire zone has been searched. If you are characterizing off-site or conducting a Bag & Tag survey, bag the objects, making sure to label each bag correctly. Re-center the measuring rope and continue the survey.

Although it might be tempting, please do not search the area you have already gone over. Like death and taxes—there are no “do-overs” in COASST surveys. Why? Because a “once-over” pass equalizes the search effort across all of our beaches, days and surveyors. This makes COASST data more comparable across sites.

If there is a vegetation zone, assess whether or not it is surveyable. If dunes are steep and eroding or if there are signs of nesting birds, note that it is not surveyable in the **COMMENTS** of your data sheet and put a slash through the relevant box on the Mapping Your Survey Form. The standard survey width of the vegetation zone is 5m. If this zone is narrower than 5m or it is difficult to survey up to 5m, enter the number of paces into the vegetation zone it was possible to search safely.

In the surf zone, stop above the high reach of the waves. The point of the survey is not to get swept away, or even wet. ***Stay safe!***

Once all marine debris within the appropriate size range has been found, processed or bag & tagged for later, , make sure to fill in which zones were present and which had medium debris on the Mapping Your Survey Form.

**The sampling square can be used as a guide to determine if an object is small, medium or large debris:**

**Small debris: anything smaller than the orange bar.**

**Medium debris: anything bigger than the bar, but less than the inside dimension of one side of the square.**

**Large debris: anything larger than an inside edge of one side of the square.**



Finished with Sampling Rectangle A?

Repeat the process to find the next sampling rectangle, establish the center line, set zone flags, measure zone widths and estimate percent cover of wrack in the wrack zone. And again, until all sampling 5 rectangles are completed.

Out-of-Time Warning! If you calculated 5 sampling rectangle locations, but find that time is running short after one or two, please use at least the first and fourth rectangles to ensure sufficient sampling spread across the survey beach.

### ***Filling in the Medium Debris Characterization Data Sheet***

Make sure the data sheet is landscape oriented (horizontal) and says **MEDIUM DEBRIS** in the upper right corner. The **BEACH** name, **DATE** and **PAGE** number blanks are located along this same short-side edge.

#: <b>7</b> Rectangle: <b>(A</b> B C D E	Comments: <b>hundreds scattered on beach today</b>				<b>Refind</b> <input type="checkbox"/> Logo/Brand <input type="checkbox"/> Language <b>Collected</b> <input type="checkbox"/> Barcode <input type="checkbox"/> Poison			
Veg: <b>1</b> Wood: <b>HTT</b> Bare: <b>HHII</b> Wrack: <b>37</b> Surf: <b>low med high</b>	Id: <b>firework</b>  <b>5</b>	L (cm): <b>5</b>	Color: <b>gray</b>  Complex: <b>(N Y</b>  <b>Intact:</b> whole part frag	Material: <b>plastic</b>  <b>if plastic:</b> hard foam soft	<b>Biofoul:</b> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	<b>Loops:</b> Crumbly  <b>Beak</b> <b>Sharp</b> <b>Shiny</b> <b>Floppy</b>	<b>1</b> 2-10 10s 100s  uniform varied  diam: (cm) diam: (cm)	<b>Container:</b> open  <b>openings:</b> <b>0</b>  <b>filling:</b> air other  <b>diam: (cm)</b>
#: <b></b> Rectangle: <b>A B C D E</b>						Comments:		
Veg: _____ Wood: _____ Bare: _____ Wrack: _____ Surf: _____	Id: _____	L (cm): _____	Color: _____	Material: _____	<b>Biofoul:</b> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	<b>Loops:</b> Crumbly  <b>Beak</b> <b>Sharp</b> <b>Shiny</b> <b>Floppy</b>	<b>1</b> 2-10 10s 100s  uniform varied  diam: (cm) diam: (cm)	<b>Container:</b> open  <b>openings:</b> <b>0</b>  <b>filling:</b> air other  <b>diam: (cm)</b>
#: <b></b> Rectangle: <b>A B C D E</b>						Comments:		
Veg: _____ Wood: _____ Bare: _____ Wrack: _____ Surf: _____	Id: _____	L (cm): _____	Color: _____	Material: _____	<b>Biofoul:</b> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	<b>Loops:</b> Crumbly  <b>Beak</b> <b>Sharp</b> <b>Shiny</b> <b>Floppy</b>	<b>1</b> 2-10 10s 100s  uniform varied  diam: (cm) diam: (cm)	<b>Container:</b> open  <b>openings:</b> <b>0</b>  <b>filling:</b> air other  <b>diam: (cm)</b>
#: <b></b> Rectangle: <b>A B C D E</b>						Comments:		
Veg: _____ Wood: _____ Bare: _____ Wrack: _____ Surf: _____	Id: _____	L (cm): _____	Color: _____	Material: _____	<b>Biofoul:</b> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	<b>Loops:</b> Crumbly  <b>Beak</b> <b>Sharp</b> <b>Shiny</b> <b>Floppy</b>	<b>1</b> 2-10 10s 100s  uniform varied  diam: (cm) diam: (cm)	<b>Container:</b> open  <b>openings:</b> <b>0</b>  <b>filling:</b> air other  <b>diam: (cm)</b>

MEDIUM DEBRIS    Beach **Best Beach**    Date **12/15/15**    Page **1/1**

On each side of the Medium Debris Characterization Data Sheet, there is room for four unique objects, each of which occupies one data box that runs the width of the page.

**BEACH:** The official COASST name of the survey site.

**DATE:** Include month, day and year as MM/DD/YY.

**PAGE:** There are two blanks to fill in. The first is simply a counter, going up as high as the number of Characteristics Data Sheets used per debris size and survey. The second blank records the highest number—the page number of the final data sheet. For instance, 7/13 would refer to the 7<sup>th</sup> page out of 13 total pages. For “trashy” beaches, multiple data sheets will be needed.

### Medium Debris Object-Specific Information

**OBJECT NUMBER (#):** Given to each *unique object type* during a survey, object numbers are used to help keep track of which photos go to which data boxes. Begin at 1 for the first object of the day and count up to whatever the eventual total is.

#:	Rectangle:
	A <input checked="" type="radio"/> B <input type="radio"/> C <input type="radio"/> D <input type="radio"/> E
Veg:	1
Wood:	HTT
Bare:	HHII
Wrack:	37
Surf:	

For the 7<sup>th</sup> unique medium object of the day within rectangle B, there were 50 identical objects: one (1) in the vegetation, 5 in the wood zone, 7 in the bare zone, and 37(!) in the wrack.

How are unique medium object types defined? In COASST, all debris objects are defined by the various combinations of their characteristics. Unique object types have a character set, including object identity, that receive a data box once per rectangle.

#### *When to tally versus fill out a new data box*

The first time a unique object type is encountered during a large marine debris survey, it should receive its own complete characterization box. Subsequent finds that share the same state of all characteristics, with the exception of size and weathering, must be the same—that is, they are “nearly identical.” If color, source clues, biofouling or other characteristics differ, a unique object type must be recorded in a new data box.

If the same object type is later encountered in a different rectangle, record it in a new data box.

On the Medium Debris Data Sheet, note which **RECTANGLE** is being searched by circling A through E.

**ZONE TALLY:** For each piece of medium debris found, mark the appropriate zone (**SURF, WRACK, BARE, WOOD or VEGETATION**) where it was found with a hash mark (vertical slash). At a minimum, each data box should have a single hash mark indicating where the object was found. If there are several identical objects found, use the same data box to tally any additional object beyond the first, as in the example above.

Identical objects can only be tallied within a **RECTANGLE**.

### **Photos**

Take one photo of each medium debris object, with additional photos to capture any characteristics with a camera icon (📷). A detailed explanation of how to take photos and what to include can be found in Part 5. For tallied objects, only photograph the first of its kind.

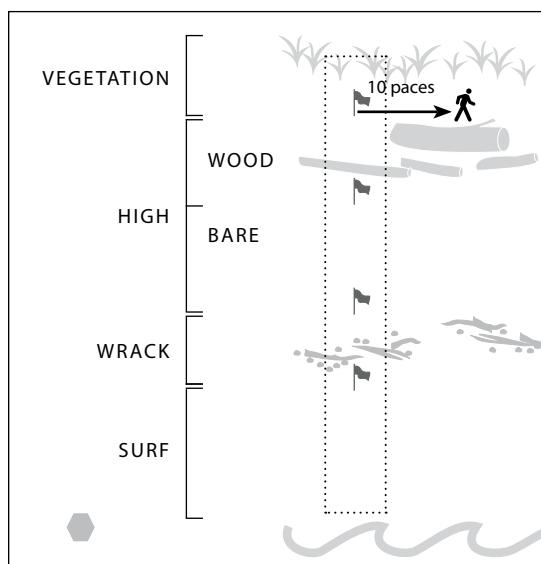
The remainder of the Medium Debris Data Sheet focuses on the characteristics of the debris. For specifics on characterizing debris, go to page 4MD-45.

### **Small Debris Search Pattern**

Small debris includes all man-made objects between 2.5mm (size of a plastic pellet) and 2.5cm at longest length, and is subsampled in zone-specific sampling squares that are 50cm on a side.

Small debris is sampled in three zones (if present):

1. Wood
2. Bare
3. Wrack



**To begin surveying small debris, walk 10 paces out from the center of the medium debris sampling rectangle.**

Why not sample all five zones?

It is too difficult to survey small debris in the vegetation zone. The surf zone is washed smooth of small debris by wave action. Note that a wood zone jam-packed with driftwood may also be too difficult to survey for small debris. Use your best judgment.

To establish a new, untrammeled survey area, stand at the upper (away from the water) edge of the highest small debris sampling zone present (e.g., wood) and move 10 paces to one side (your choice) of the flagged center line, walking parallel to the water. Make sure to place the sampling squares on undisturbed substrate.

It is important to sample small debris outside of the sampling rectangle used for medium debris because small debris may have been trampled and buried during the process of searching for medium debris.

### ***Wood and Bare Zones***

Survey 4 sampling squares, spanning the width of the zone that are equidistant apart (with flexibility to go around logs or other obstructions). If the zone is wide, the sampling squares should be one to several meters apart. If the zone is narrow, less than 4 squares wide, distribute the squares in a four-square or horizontally. See the example.

### ***Wrack Zone***

Place 2 sampling squares on the freshest wrack line, maximizing the amount of wrack within each sampling square. Attempt to get more wrack than substrate in the square.

Place the remaining 2 sampling squares on bare substrate (minimal to no wrack), found in between wrack lines. If wrack covers the entire zone so that there is no bare substrate in the wrack zone, omit these samples from the survey.



**After placing a sampling square, search within it for small debris.**

**Wrack zone** sampling squares can be side by side horizontally (parallel to the water) if the freshest wrack line is not wide enough to accommodate them vertically.

Within each sampling square, visually search for small debris. Do not dig into or otherwise disturb the surface of the substrate. If natural flotsam, like wrack, is present, sift through it and set it aside without digging into the substrate.

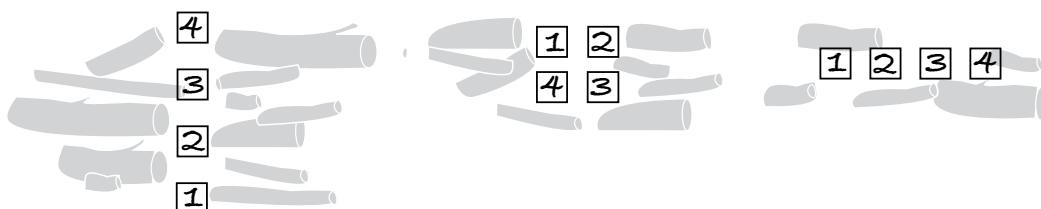
#### SAMPLING THE WOOD ZONE

If zone width is:

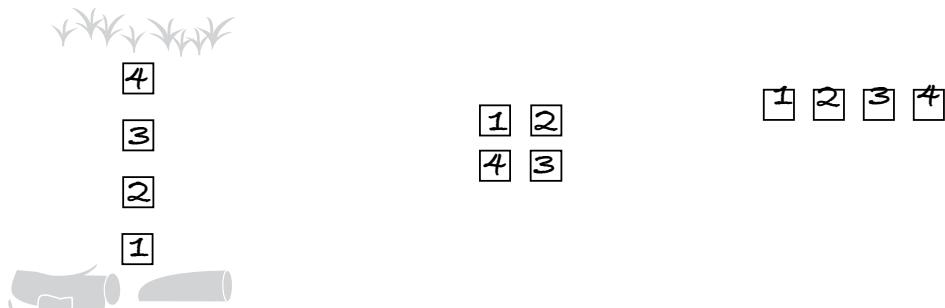
> 2m

1m-2m

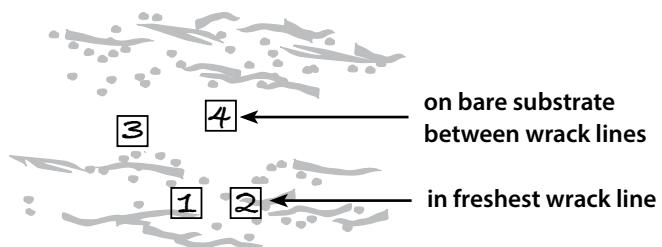
< 1m



#### SAMPLING THE BARE ZONE



#### SAMPLING THE WRACK ZONE



## Filling in the Small Debris Characterization Data Sheet

Although much of the information is identical, each data sheet is different. Make sure the data sheet you are using is portrait orientation and says **SMALL DEBRIS** in the upper right corner. The **BEACH** name, **DATE** and **PAGE** number blanks are located along the right-hand edge of the data sheet, following the same instructions as for large and medium debris data sheets page 4MD-17).

						SMALL DEBRIS													
						Beach _____ Best Beach _____													
						Date 12/15/15 Page 1/1													
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">Rectangle: A B C D E</td> <td style="width: 15%;">Square #: <b>3</b></td> <td style="width: 15%;">Id: <b>bottle</b></td> <td style="width: 15%;">Intact: whole part <input checked="" type="checkbox"/> frag <input checked="" type="checkbox"/> Sharp <input type="checkbox"/> Shiny</td> <td colspan="2"></td> </tr> <tr> <td rowspan="2">Zone: wood <input checked="" type="checkbox"/> bare wrackline wrack substrate</td> <td rowspan="2">Count: <b>3</b></td> <td>Material: <u>glass</u></td> <td colspan="3" rowspan="2">Comments: <i>beverage bottle rim, can tell by the "thread" ridges—3 pieces</i></td> </tr> <tr> <td><i>if plastic:</i> hard foam soft <input checked="" type="checkbox"/> _____</td> </tr> </table>						Rectangle: A B C D E	Square #: <b>3</b>	Id: <b>bottle</b>	Intact: whole part <input checked="" type="checkbox"/> frag <input checked="" type="checkbox"/> Sharp <input type="checkbox"/> Shiny			Zone: wood <input checked="" type="checkbox"/> bare wrackline wrack substrate	Count: <b>3</b>	Material: <u>glass</u>	Comments: <i>beverage bottle rim, can tell by the "thread" ridges—3 pieces</i>			<i>if plastic:</i> hard foam soft <input checked="" type="checkbox"/> _____	
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		<i>if plastic:</i> hard foam soft <input checked="" type="checkbox"/> _____																	

On each side of the Small Debris Characterization Data Sheet, there is room for five unique objects, each of which occupies one data box that runs the width of the page.

### *Small Debris Object-Specific Information*

Rectangle: <input checked="" type="radio"/> A   B   C   D   E	Square #: 3
Zone: wood <input checked="" type="radio"/> bare wrackline wrack substrate	Count: 3

In Rectangle A, square 3 in the bare zone, 3 identical objects were found.

A sub-set of information is recorded for small debris. Within each box, the left side contains information on the location and quantity of an object(s).

Note the **RECTANGLE** by circling A through E. For small debris also keep track of the **SQUARE #**. Finally, circle the appropriate **ZONE**.

Similar to tallying in large and medium debris surveys, each unique small object type found within a rectangle-square-zone combination receives a data box.

Multiple of a kind can be **COUNTed** within a sample.

For small debris, unique object types are defined by having identical characteristics recorded for small debris. That is, color, identity, material, intact, sharp and shiny states must all be the same. In situations where there is an overwhelming quantity of like objects, such as a pile of broken apart Styrofoam pieces or a wrackline riddled with pellets, estimate the quantity by the tens, hundreds, or thousands.

If the same object type is later encountered in a different rectangle, or zone, a new data line must be recorded.

The remainder of the Small Debris Characterization Data Sheet focuses on the characteristics of the debris. For specifics on characterizing debris, go to page 4MD-45.

Take one photograph of the contents of each sampling square that contains small debris. A detailed explanation of how to take photos and what to include in the photograph can be found in Part 5.

## CHARACTERIZING DEBRIS

Large debris can only be characterized on site, because most of these objects will be too unwieldy to pick up and remove. Medium and small debris can either be characterized on-site or off-site—in a sheltered location away from wind, rain or cold. Medium and small debris can also be characterized by other COASST participants working at another location. This is the Bag & Tag option.

If debris is **not** characterized on-site, it **must** be properly stored and labeled to ensure that all of the objects within a single zone and sampling rectangle or square are preserved together.

If you are characterizing on-site, assemble all of the objects found within a single zone and sampling rectangle (medium debris) or sampling square (small debris) and sort them according to uniqueness. All identical objects—for instance, more than one beer can from the same six-pack, or more than one piece of same-colored, same-weathering styrofoam—should be placed together. These can be tallied. All other objects that differ in any way should be counted and characterized individually.



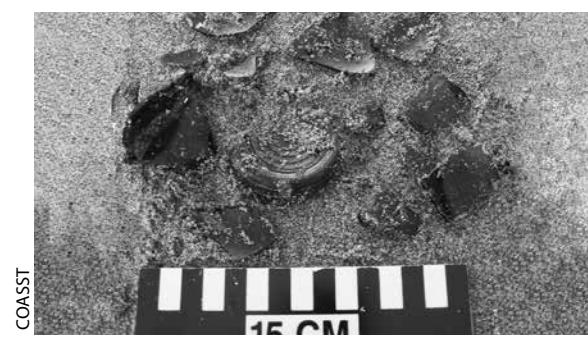
Each of these caps is unique in color, logo/brand, or language. These must be characterized individually.



Foam fragments of the same color can be tallied together.



Shotgun shells of the same color can be tallied together, same for the shotgun wads.



Broken pieces that are clearly from the same object can be tallied together.

Two plastic bags that differ in size or writing? Characterize them individually. Pieces of hard foam that are different colors? Characterize them individually as well.

The COASST approach to characterizing marine debris is a simple matter of describing those aspects of each object that might place it in a category of harm and/or help provide clues to its source. Each characteristic has two or more "states." The simplest are "Yes" and "No." For example:

Is the object ***SHINY***?

Is the object ***FLOPPY***?

Is the object a ***CONTAINER***?

Some characteristics have multiple states to choose from. For instance:

***INTACT*** has three (3) states:

**WHOLE, PART or FRAGMENT.**

***BIOFOUL*** has five (5) states corresponding to the percent of object area colonized by marine organisms:

none, ≤25% ●, 26–50% ○, 51–75% ◉, ≥76% ●

***COLOR*** has 13 states:

**RED, ORANGE, YELLOW/GOLD, GREEN, BLUE-GREEN, BLUE, PURPLE, WHITE, BROWN, BLACK, GREY/SILVER, CLEAR, MULTI**

Some characteristics are continuous measurements:

**LENGTH**

**WIDTH** and **HEIGHT** large debris only

Some characteristics require a specific written description.

If there is a camera icon (📷) a detailed photograph is required.

Some characteristics are required for all debris sizes. Color is an example.

Material is another. On the other hand, many characteristics are specific to medium and large debris.

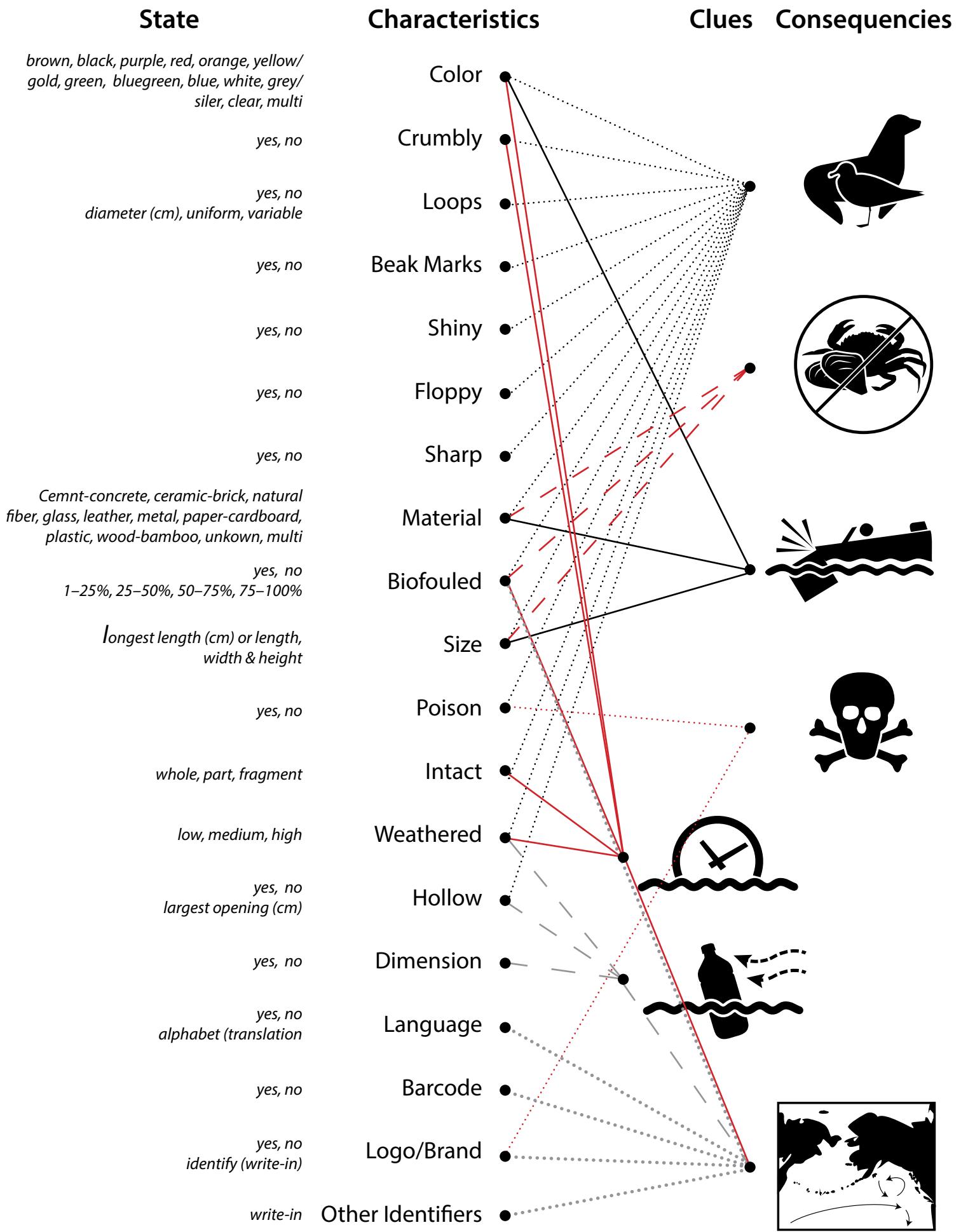
Following is an in-depth explanation of each characteristic that COASST records for debris objects. The usefulness of these data depends on assigning characteristics in the same way. It is very important to be consistent data collectors. Please refer to the instructions until characterizing objects becomes an easy matter of habit.

For all characteristics, except size, assign the state that best fits the object as you found it. That is, do not imagine what it was like in its pristine, unweathered or intact state.

Anything odd or unusual about the object? Describe it in the ***COMMENTS*** section. When in doubt, write COASST a comment!

SPECIAL INSTRUCTIONS FOR BAG & TAG DEBRIS  
CHARACTERIZERS ONLY

1. Characterize an entire survey before moving on to another one.
2. Start with the oldest survey for which you have samples.
3. Try to characterize the debris in the order that it was sampled (e.g., begin at Rectangle 1, with the “highest” zone in which debris was found). This will help keep the characterization data sheets organized and give you and COASST a clear picture of the survey.
4. Work through one bag (sample) at a time. If there are multiple bags of the same rectangle-zone combination, work through all of them before moving to the next sample.
5. When a survey has been completely characterized, dispose of the debris but keep the sampling bag—these can be re-used!
6. When a survey has been completely characterized, send the completed data sheets and photos directly to COASST (instructions on page 6-2) where our interns will be glad to enter your data.



# BARCODE



STATES: Yes–Circle, No–Leave Blank



## WHAT & WHY?

A BARCODE is a machine-readable representation of data about an object used by manufacturers and retailers. Like logos, barcodes can help decipher the identity and origin of debris. Some barcodes even contain information that can trace an object to the factory that made it, or the store that sold it.

## WHERE & HOW?

Square #:	Id:	Intact: whole part frag	Sharp	Shiny
Count:	Material: _____ <i>if plastic:</i> hard foam soft	Comments: _____		
Color:	_____			

#:	Comments: _____						<input checked="" type="checkbox"/> Logo/Brand <input checked="" type="checkbox"/> Barcode <input type="checkbox"/> Language <input type="checkbox"/> Poison
Id:	L (cm):	Color:	Material: _____ <i>if plastic:</i> hard foam soft	Biofoul:     	Loops → Crumbly Beak Sharp Shiny Floppy	1 2-10 10s 100s uniform varied	Container: openings: 0 filling: air other diam: (cm)
Weathering: low med high			Intact: whole part frag			diam: (cm) diam: (cm)	1 2+ diam: (cm)

Id:	Comments: _____						<input checked="" type="checkbox"/> Logo/Brand <input checked="" type="checkbox"/> Barcode <input type="checkbox"/> Language <input type="checkbox"/> Poison	
L (cm):	W (cm):	H (cm):	Color:	Material: _____ <i>if plastic:</i> hard foam soft	Biofoul:     	Loops → Crumbly Beak Sharp Shiny Floppy	1 2-10 10s 100s uniform varied	Container: openings: 0 filling: air other diam: (cm)
Weathering: low med high				Intact: whole part frag			diam: (cm) diam: (cm)	1 2+ diam: (cm)



## RULES OF THUMB

1. Data Sheet: Circle if a barcode is present. Leave blank if not.
2. Photo close-up: Barcode photos should be "zoomed-in."  
Wipe the barcode clean to improve visibility.

# BEAK MARKS

STATES: Yes—Circle, No—Leave Blank



## WHAT & WHY?

When birds peck at or bite into debris, or mammals bite or claw objects, recognizable marks are left behind—literal evidence of wildlife interaction. Not to be confused with scrapes or punctures objects might acquire when smashed against the shore, rocks or other debris, BEAK MARKS have telltale shapes and patterns. They are most commonly found on rigid foam.

## WHERE & HOW?

Square #:	Id:	Intact: whole part frag	Sharp	Shiny
Count:	Material: _____ <i>if plastic:</i> hard foam soft ↓ _____	Comments:		
Color:				

#:	Comments:						<input type="checkbox"/> Logo/Brand	<input type="checkbox"/> Language
Id:	L (cm):	Color:	Material: _____ <i>if plastic:</i> hard foam soft ↓ _____	<input type="checkbox"/> Biofoul:	Loops → Crumbly <b>Beak</b> Sharp Shiny Floppy	1 2-10 10s 100s uniform varied	<input type="checkbox"/> Barcode	<input type="checkbox"/> Poison
Weathering:	low med high	Intact: whole part frag			diam: (cm)	diam: (cm)		
						Container: openings: 0 filling: air other	1 2+ diam: (cm)	

Id:	Comments:						<input type="checkbox"/> Logo/Brand	<input type="checkbox"/> Language	
L (cm):	W (cm):	H (cm):	Color:	Material: _____ <i>if plastic:</i> hard foam soft ↓ _____	<input type="checkbox"/> Biofoul:	Loops → Crumbly <b>Beak</b> Sharp Shiny Floppy	1 2-10 10s 100s uniform varied	<input type="checkbox"/> Barcode	<input type="checkbox"/> Poison
Weathering:	low med high	Intact: whole part frag				diam: (cm)	diam: (cm)		
						Container: openings: 0 filling: air other	1 2+ diam: (cm)		



A signature beak mark.



Birds have partially consumed this buoy.



A coastal brown bear attacked this fuel can.



Beak marks range in size depending on the bird responsible.



This foam has a combination of peck marks and scrapes.

## RULES OF THUMB

1. Data Sheet: Circle if present. Leave blank if no beak marks.
2. Look for these common shape signatures:
  - Deep puncture(s) in a chevron or curved pattern.
  - Beak scrapes, as if the bird was taking a bite and scooping out a portion of the object.
  - 3–4 large parallel scrapes indicating clawing.
3. Be sure to check all sides, including edges, of foam objects.
4. If you are uncertain whether the mark is a scrape or a BEAK MARK, take a close-up photo.

# BIOFOUL



STATES:  ≤25%  26–50%  51–75%  ≥76%



## WHAT & WHY?

BIOFOUL is when organisms attach to and grow on an object. These can include algae (seaweed); mussels, barnacles and other invertebrates; and even single-celled organisms called diatoms that produce slightly slimy brown films. Biofouling can pose a hazard to coastal ecosystems when organisms from one location "hitch-hike" and arrive in new locations. Some introduced species may be invasive, becoming established in new locations and outcompeting or preying on local species. Fortunately, most hitch-hiking organisms will not be invaders. Biofouling organisms have a specific length of time their planktonic larvae can live in the water before needing to find a hard surface to settle on and metamorphose into an adult. Therefore, the type and size of biofouling organisms can indicate a range of time that something has been floating in the ocean.

## WHERE & HOW?

Square #:	Id:	Intact: whole part frag	Sharp	Shiny
Count:	Material:	Comments:		
	<i>if plastic:</i> hard foam soft ↓ 			
Color:				

#:	Comments:						<input type="checkbox"/> Logo/Brand <input type="checkbox"/> Language <input type="checkbox"/> Barcode <input type="checkbox"/> Poison
M	Id:	L (cm):	Color:	Material: _____ <i>if plastic:</i> hard foam soft ↓ 	<input type="checkbox"/> Biofoul:  Loops → Crumbly Beak Sharp Shiny Floppy	1 2-10 10s 100s uniform varied ↓ diam: (cm) ↓ diam: (cm)	Container: openings: 0 1 2+ ↓ filling: air other diam: (cm)
Weathering: low med high							

Id:		Comments:						<input type="checkbox"/> Logo/Brand <input type="checkbox"/> Language <input type="checkbox"/> Barcode <input type="checkbox"/> Poison
L (cm):	W (cm):	H (cm):	Color:	Material: _____ <i>if plastic:</i> hard foam soft ↓ 	<input type="checkbox"/> Biofoul:  Loops → Crumbly Beak Sharp Shiny Floppy	1 2-10 10s 100s uniform varied ↓ diam: (cm) ↓ diam: (cm)	Container: openings: 0 1 2+ ↓ filling: air other diam: (cm)	
Complex: N Y ↓ Intact: whole part frag								
Weathering: low med high								



$\geq 76\%$  ●



$\geq 76\%$  ●



51–75% ● Little biofouling on the half floating out of the water.



26–50% ○



26–50% ○ No biofouling on the “up” side.



$\leq 25\%$  ○

## RULES OF THUMB

1. Data Sheet: Circle the appropriate percent cover symbol. Leave blank if no biofouling.
2. Photo close-up: Identifying biofouling organisms to species is a task even experts find difficult, and good photographs are essential. Center the photo on the main organism(s) present so that the whole body is visible and include the photo ruler for scale.

# COLOR

**STATES:** R-Red, O-Orange, Y-Yellow/Gold, Gn-Green, BG-Blue-green, Bu-Blue, Pu-Purple, W-White, Bn-Brown, Bk-Black, GS-Grey/Silver, C-Clear, M-Multi



## WHAT & WHY?

COLOR can highlight or camouflage an object. Depending on the size and shape of an object, color might signal "food!" to wildlife. For both wildlife and humans, darker colors as well as clear material disappears against a dark ocean background, leading to potential boating hazard or entanglement.

Color is difficult to put into discrete categories. Is it orange, or gold, or red-orange? To make sure everyone answers the same way, COASST uses a color guide affixed to the small debris sampling square.

## WHERE & HOW?

Square #:	Id:	Intact: whole part frag	Sharp	Shiny
Count:	Material:	Comments:		
Color: <b>Red</b>	<i>if plastic:</i> hard foam soft ↓ ♻			

#:	Comments:					<input type="checkbox"/> Logo/Brand	<input type="checkbox"/> Language	
Id:	L (cm):	Color: <b>Red</b>	Material: _____	<input type="checkbox"/> Biofoul:	Loops → Crumbly Beak Sharp Shiny Floppy	1 2-10 10s 100s uniform varied	<input type="checkbox"/> Barcode	<input type="checkbox"/> Poison
Weathering: low med high	Complex: N Y ↓ Intact: whole part frag	<i>if plastic:</i> hard foam soft ↓ ♻				diam: (cm)	Container: openings: 0 1 2+	filling: air other diam: (cm)

Id:		Comments:					<input type="checkbox"/> Collected	<input type="checkbox"/> Logo/Brand	<input type="checkbox"/> Language
L (cm):	W (cm):	H (cm):	Color: <b>Red</b>	Material: _____	<input type="checkbox"/> Biofoul:	Loops → Crumbly Beak Sharp Shiny Floppy	1 2-10 10s 100s uniform varied	<input type="checkbox"/> Barcode	<input type="checkbox"/> Poison
Weathering: low med high	Complex: N Y ↓ Intact: whole part frag	<i>if plastic:</i> hard foam soft ↓ ♻					diam: (cm)	Container: openings: 0 1 2+ filling: air other diam: (cm)	



The predominant color is yellow.



The predominant color is yellow.



Pink is not on the color guide; red is the closest match.



Is it white? Or is it yellow? Comparing an object to each option will help you choose. The predominant color is yellow.



Blue-green is the only “in-between” color in the guide.



This wrapper is “Multi”—there is no predominant color.

## RULES OF THUMB

1. Data Sheet: Write in.
2. Record the predominant (>50% of the visible surface) color, using the sampling square color guide:
  - Each color, or color range, is separated by black lines and labeled with white abbreviations.
  - Match the object to the closest color (range) on the guide.
  - Focus on the current color, not the color the object might have been before fading.
3. When multiple colors are present in equal proportion, select “Multi.”

# COMPLEX

STATES: Y-Yes, N-No



## WHAT & WHY?

A COMPLEX object is made up of multiple individual objects that are put together after the fact, and for a single purpose, like fishing, construction or boating. For instance, a crab trap attached to buoys via swivel hardware and line is a complex object because each of these parts is separately manufactured, purchased and then assembled for a specific use—fishing for crab. Note that an object manufactured in several parts, like a boat or refrigerator, is not complex because all of the component parts were manufactured a priori especially for that object. Because an important aspect of understanding the origin and fate of marine debris is its state of decomposition and/or disarticulation, COASST follows the fate of complex objects and their parts.

## WHERE & HOW?

Square #:	Id:	Intact: whole part frag	Sharp	Shiny
Count:	Material: _____ <i>if plastic:</i> hard foam soft ↓ _____	Comments:		
Color:				

#:	Comments:					<input type="checkbox"/> Logo/Brand	<input type="checkbox"/> Language	
Id:		L (cm):	Color:	Material: _____ <i>if plastic:</i> hard foam soft ↓ _____	<input type="checkbox"/> Biofoul:	Loops → Crumbly Beak Sharp Shiny Floppy	<input type="checkbox"/> Barcode	<input type="checkbox"/> Poison
Weathering:		low med high	Complex: N Y ↓ Intact: whole part frag		1 2-10 10s 100s uniform varied ↓ diam: (cm) diam: (cm)	Container: openings: 0 1 2+ ↓ filling: air other diam: (cm)		

Id:		Comments:					<input type="checkbox"/> Logo/Brand	<input type="checkbox"/> Language
L (cm): W (cm): H (cm):		Color:	Material: _____ <i>if plastic:</i> hard foam soft ↓ _____	<input type="checkbox"/> Biofoul:	Loops → Crumbly Beak Sharp Shiny Floppy	<input type="checkbox"/> Barcode	<input type="checkbox"/> Poison	
Weathering: low med high		Complex: N Y ↓ Intact: whole part frag		1 2-10 10s 100s uniform varied ↓ diam: (cm) diam: (cm)	Container: openings: 0 1 2+ ↓ filling: air other diam: (cm)			

Complex



Not complex



## RULES OF THUMB

1. Data Sheet: Circle Y or N.  
If Y, ignore INTACT.  
If N, proceed to INTACT.
2. Make sure the object has several parts that were obviously manufactured separately and put together after the fact.

# CONTAINER

**STATES:** Yes–Circle, No–Leave Blank

If yes, what is the number of **openings**: 0, 1, 2+ ?

If 1 or more openings, what is the **diameter** (cm) of the largest opening?

If no openings, what is the container **filled with**?



## WHAT & WHY?

A CONTAINER is a rigid, three-dimensional object designed to hold something (and may still) including gas, liquid, solids, even shellfish. They can be closed, like a baseball, buoy or bottle with its cap; have intentional openings, like a fish tote or a crab trap; or have unintentional openings like a shipping container or barrel with a gash in it. Closed containers filled with gas (including air!) will sit higher in the water. Buoyant objects are subject to wind—they have higher windage which can effect the speed and trajectory of their movement across the ocean. Large containers with openings can act as traps for wildlife, like fish or birds, that can get in but not out.

## WHERE & HOW?

Square #:	Id:	Intact: whole part frag	Sharp	Shiny
Count:	Material: _____ <i>if plastic:</i> hard foam soft ↓ ♻️ _____	Comments:		
Color:				

#:	Comments:						<input type="checkbox"/> Logo/Brand	<input type="checkbox"/> Language	
Id:		L (cm):	Color:	Material: _____ <i>if plastic:</i> hard foam soft ↓ ♻️ _____	<input type="checkbox"/> Biofoul:	Loops → Crumbly Beak Sharp Shiny Floppy	1 2-10 10s uniform varied	<input type="checkbox"/> Barcode	<input type="checkbox"/> Barcode
M			Complex: N Y ↓				diam: (cm)	<input type="checkbox"/> Container: openings: 0 1 2+ ↓ filling: air other ↓ diam: (cm)	<input type="checkbox"/> Poison
Weathering: low med high			Intact: whole part frag				diam: (cm)	22	

Id:		Comments:						<input type="checkbox"/> Logo/Brand	<input type="checkbox"/> Language
L (cm): W (cm): H (cm):		Color:	Material: _____ <i>if plastic:</i> hard foam soft ↓ ♻️ _____	<input type="checkbox"/> Biofoul:	Loops → Crumbly Beak Sharp Shiny Floppy	1 2-10 10s uniform varied	<input type="checkbox"/> Collected	<input type="checkbox"/> Barcode	<input type="checkbox"/> Barcode
L			Complex: N Y ↓					<input type="checkbox"/> Container: openings: 0 1 2+ ↓ filling: air other ↓ diam: (cm)	<input type="checkbox"/> Poison
Weathering: low med high			Intact: whole part frag				diam: (cm)	22	



Container, 0 openings, air-filled.



Not a container (crushed).



Containers, 0 and 1 opening (the gash).



Container, 2+ openings (the "door" as well as the meshes).



Container, 1 opening (the "top").



Container, 2+ openings (the bait holes).



Container, 2+ openings (the "bung" holes).

## RULES OF THUMB

1. Data Sheet: Circle "Container" if object is rigid, 3 dimensional and designed to hold gas, liquid or solid. Follow the arrows.
2. For containers without openings, we ask you to circle whether it is predominantly filled with gas/air or something else (other).
3. We ask you to circle whether the container has 0, 1 or 2 or more openings.
4. For containers with openings, we ask you to measure the diameter, here defined as the smallest dimension of the largest opening.

# CRUMBLY

STATES: Yes–Circle, No–Leave Blank



## WHAT & WHY?

Debris that is disintegrating into ever smaller pieces is CRUMBLY or flaking to the touch. Crumbly material can pose hazards up and down the food chain as small pieces are ingested. This is particularly a problem for rigid foam objects which break down in prolonged outdoor environmental conditions. Crumbly objects may have crumbles (the smaller disintegrated pieces) around them.

## WHERE & HOW?

Square #:	Id:	Intact: whole part frag	Sharp	Shiny
Count:	Material: _____ <i>if plastic:</i> hard foam soft ↓ ♻️ _____	Comments:		
Color:				

#:	Comments:						Logo/Brand	Language	
Id:		L (cm):	Color:	Material: _____ <i>if plastic:</i> hard foam soft ↓ ♻️ _____	Biofoul:	Loops → <input checked="" type="checkbox"/> Crumbly Beak Sharp Shiny Floppy	1 2-10 10s 100s uniform varied	Barcode	Barcode
M						diam: (cm)	Container: openings: 0 1 2+	Language	
	Complex: N Y Weathering: low med high		Intact: whole part frag			diam: (cm)	filling: air other	Poison	

Id:		Comments:						Logo/Brand	Language
L (cm): W (cm): H (cm):		Color:	Material: _____ <i>if plastic:</i> hard foam soft ↓ ♻️ _____	Biofoul:	Loops → <input checked="" type="checkbox"/> Crumbly Beak Sharp Shiny Floppy	1 2-10 10s 100s uniform varied	Barcode	Barcode	
L						diam: (cm)	Container: openings: 0 1 2+	Language	
	Complex: N Y Weathering: low med high		Intact: whole part frag			diam: (cm)	filling: air other	Poison	



Many crumbles probably for one original piece.



Small crumbles found throughout the wrack.



A single piece of styrofoam that is actively crumbling.



A huge number of small and medium crumbles aggregated n the high intertidal.

## RULES OF THUMB

1. Data sheet: Circle if crumbly, leave blank if not.
2. Look for small crumbles of the larger piece of material.
3. If your medium sample includes an abundance of small crumbled debris, take a single photo with the scale ruler (see above), and estimate the quantity in the comments.
4. Occasionally, an entire wrack or wood zone will be covered with crumbled material. Estimate the quantity in your sample.

# FLOPPY

**STATES:** Yes–Circle, No–Leave Blank



## WHAT & WHY?

An object that is easily flexed, that literally “flops over” when you attempt to stand it upright or hold it, is FLOPPY. Some floppy objects can be prey mimics (plastic bags mimic jellyfish, a favorite prey of some sea turtles), whereas others can entangle animals (line, rope and netting).

## WHERE & HOW?

Square #:	Id:	Intact: whole part frag	Sharp	Shiny
Count:	Material: _____ <i>if plastic:</i> hard foam soft	Comments:		
Color:	_____			

#:	Comments:						<input type="checkbox"/> Logo/Brand	<input type="checkbox"/> Language
Id:	L (cm):	Color:	Material: _____ <i>if plastic:</i> hard foam soft	<input type="checkbox"/> Biofoul:	Loops → Crumbly Beak Sharp Shiny <b>Floppy</b>	1 2-10 10s 100s uniform varied	<input type="checkbox"/> Barcode	<input type="checkbox"/> Poison
Weathering:	low med high	Complex: N Y	Intact: whole part frag	<input type="checkbox"/>	diam: (cm)	diam: (cm)		

Id:	Comments:						<input type="checkbox"/> Logo/Brand	<input type="checkbox"/> Language	
L (cm):	W (cm):	H (cm):	Color:	Material: _____ <i>if plastic:</i> hard foam soft	<input type="checkbox"/> Biofoul:	Loops → Crumbly Beak Sharp Shiny <b>Floppy</b>	1 2-10 10s 100s uniform varied	<input type="checkbox"/> Barcode	<input type="checkbox"/> Poison
Weathering:	low med high	Complex: N Y	Intact: whole part frag	<input type="checkbox"/>	diam: (cm)	diam: (cm)			



## RULES OF THUMB

1. Data Sheet: Circle if floppy, leave blank if not.
2. Make sure to assess the current floppiness of an object, not imagine what it was like as a pristine thing before it went into the water. Some relatively rigid objects become floppy over time (like a shredded tire) while others become rigid and lose their floppiness (like a fused wad of well-weathered line).

# IDENTITY

STATES: Free write



## WHAT & WHY?

If you know what the object is, name it. The common name is its IDENTITY.

## WHERE & HOW?

Square #:	Id: <b>Unknown</b>	Intact: whole part frag	Sharp	Shiny
Count:	Material: _____ <i>if plastic:</i> hard foam soft	Comments:		
Color:	_____			

#:	Comments:					<input type="checkbox"/> Logo/Brand <input type="checkbox"/> Language <input type="checkbox"/> Barcode <input type="checkbox"/> Poison	
Id: <b>Unknown</b>	L (cm):	Color:	Material: _____ <i>if plastic:</i> hard foam soft	<input type="checkbox"/> Biofoul:     	Loops → Crumbly Beak Sharp Shiny Floppy	1 2-10 10s 100s uniform varied diam: (cm) diam: (cm)	Container: openings: 0 1 2+ filling: air other diam: (cm)
Weathering: low med high	Complex: N Y	Intact: whole part frag	_____				

Id: <b>Unknown</b>		Comments:					<input type="checkbox"/> Logo/Brand <input type="checkbox"/> Language <input type="checkbox"/> Barcode <input type="checkbox"/> Poison	
L (cm):	W (cm):	H (cm):	Color:	Material: _____ <i>if plastic:</i> hard foam soft	<input type="checkbox"/> Biofoul:     	Loops → Crumbly Beak Sharp Shiny Floppy	1 2-10 10s 100s uniform varied diam: (cm) diam: (cm)	Container: openings: 0 1 2+ filling: air other diam: (cm)
Weathering: low med high		Complex: N Y	Intact: whole part frag	_____				



Water bottle or beverage bottle,  
are both reasonable.



Rigid insulation



Fish Aggregating Device (FAD),  
Fishing Gear or buoy are all  
reasonable.



Crab floats, rope and tag.



Rope.



Unknown.



Basketball.

## RULES OF THUMB

1. Data Sheet: Write in.
2. Please be as specific as you can given the space. For instance, "soda can" instead of "can," or "water bottle" instead of "bottle."
3. Don't repeat characteristics listed elsewhere. For instance, "soda can" instead of "red, metal can with Coca-Cola on the label."
4. If you don't know what it is, write "unknown." Perhaps someone else will know once they see your photograph and read the other characteristics.

# INTACT

STATES: Whole, Part, Frag-Fragment



## WHAT & WHY?

INTACT describes whether an object is complete, disarticulated or broken. If a large or medium debris object is not complex, ascertain its state of INTACTness. Whole objects are completely intact, nothing missing and nothing broken. Parts are disarticulated components of a whole object—a bottle and its cap are both parts. Fragments are broken, crumbled or torn pieces of an object—the same bottle broken into shards. Objects that are fully intact may not have been in the ocean long (or may have come directly from the local land environment), whereas fragments may indicate the original object has been in the elements a longer time. Fragments and small parts pose ingestion risk to some wildlife.

## WHERE & HOW?

Square #:	Id:	Intact: whole <input checked="" type="radio"/> part <input type="radio"/> frag	Sharp	Shiny
Count:	Material: _____ <i>if plastic:</i> hard foam soft	Comments:		
Color:	_____			

#:	Comments:					<input type="checkbox"/> Logo/Brand	<input type="checkbox"/> Language	
Id:	L (cm):	Color:	Material: _____ <i>if plastic:</i> hard foam soft	<input type="checkbox"/> Biofoul:	Loops → Crumbly Beak Sharp Shiny Floppy	1 2-10 10s 100s uniform varied	<input type="checkbox"/> Barcode	<input type="checkbox"/> Poison
Weathering:	Complex: N Y	Intact: whole <input checked="" type="radio"/> part <input type="radio"/> frag	_____			diam: (cm)		
low med high						diam: (cm)	openings: 0 filling: air other	1 2+ diam: (cm)

Id:	Comments:					<input type="checkbox"/> Logo/Brand	<input type="checkbox"/> Language			
L (cm):	W (cm):	H (cm):	Color:	Material: _____ <i>if plastic:</i> hard foam soft	<input type="checkbox"/> Biofoul:	Loops → Crumbly Beak Sharp Shiny Floppy	1 2-10 10s 100s uniform varied	<input type="checkbox"/> Collected	<input type="checkbox"/> Barcode	<input type="checkbox"/> Poison
Weathering:	Complex: N Y	Intact: whole <input checked="" type="radio"/> part <input type="radio"/> frag	_____				diam: (cm)	openings: 0 filling: air other	1 2+ diam: (cm)	
low med high							diam: (cm)			



Fragment (the piece is ripped).



Whole (nothing missing from this chair).



Fragment (the piece is cracked off the former container).



Parts (not a single bottle has a cap!).



Part (here is a cap without a bottle).



Parts (in COASST, rope is almost always a part).



Whole (a bottle with its cap is a whole).

## RULES OF THUMB

1. Data Sheet: Circle the appropriate option. Leave blank if the object is complex.
2. Ropes can be challenging—whole, part or fragment? Because they are cut to length after manufacturing, COASST considers rope a “part” unless there is obvious fraying and tearing, indicating the rope has been shredded after it entered the environment. In that case only, the rope would be considered a fragment.

# LANGUAGE



STATES: Yes–Circle, No–Leave Blank



## WHAT & WHY?

In the United States, the writing on most objects will be English. However, occasionally marine debris will have writing that is not English, even including different scripts or alphabets, like Cyrillic, Hanzi or Hanja. Language can be an important source clue.

## WHERE & HOW?

Square #:	Id:	Intact: whole part frag	Sharp	Shiny
Count:	Material: <i>if plastic:</i> hard foam soft	Comments:		
Color:				

#:	Comments: <b>Korean</b>					<input type="checkbox"/> Logo/Brand	<input checked="" type="checkbox"/> Language	
Id:	L (cm):	Color:	Material:	<input type="checkbox"/> Biofoul:	Loops → Crumbly Beak Sharp Shiny Floppy	1 2-10 10s varied	<input type="checkbox"/> Barcode	<input checked="" type="checkbox"/> Poison
		Complex: N Y	<i>if plastic:</i> hard foam soft			diam: (cm)		
Weathering: low med high		Intact: whole part frag				diam: (cm)		

Id:		Comments: <b>Korean</b>					<input type="checkbox"/> Logo/Brand	<input checked="" type="checkbox"/> Language
L (cm): W (cm): H (cm):		Color:	Material:	<input type="checkbox"/> Biofoul:	Loops → Crumbly Beak Sharp Shiny Floppy	1 2-10 10s varied	<input type="checkbox"/> Barcode	<input checked="" type="checkbox"/> Poison
		Complex: N Y	<i>if plastic:</i> hard foam soft			diam: (cm)		
Weathering: low med high		Intact: whole part frag				diam: (cm)		



Russian.



Russian.



Japanese.



Japanese or Chinese (all characters shown here are used by both languages).



Japanese.



Chinese.



Korean.

## RULES OF THUMB

1. Data Sheet: Circle if the object has writing, leave blank if not.
2. Photo close-up: "zoom-in" on the writing so that it is clearly visible.
3. If the language is not English and you know what it is, please name it in the Comments section.  
If you are unsure, please write "unknown."
4. Examine all sides of an object for writing.
5. If the writing is embossed, consider making a rubbing, or a "reverse rubbing" by outlining the letters/characters with marker (see above).

# LOGOS and BRANDS



STATES: Yes—Circle, No—Leave Blank



## WHAT & WHY?

Manufacturers and marketers develop logos—iconic symbols that may contain the name of the product—to help create brand “identity” with their consumer public. Logos can provide clues to what an object is, and where it came from, especially in cases where the object is weathered, broken into pieces, or from a foreign country.

## WHERE & HOW?

Square #:	Id:	Intact: whole part frag	Sharp	Shiny
Count:	Material: _____ <i>if plastic:</i> hard foam soft	Comments:		
Color:	_____			

#:	Comments: <b>Coca-cola</b>					<input checked="" type="checkbox"/> Logo/Brand	<input type="checkbox"/> Language	
Id:	L (cm):	Color:	Material: _____ <i>if plastic:</i> hard foam soft	<input checked="" type="checkbox"/> Biofoul:	Loops → Crumbly Beak Sharp Shiny Floppy	1 2-10 10s 100s uniform varied	<input checked="" type="checkbox"/> Barcode	<input type="checkbox"/> Poison
Weathering: low med high		Complex: N Y ↓ Intact: whole part frag	_____	diam: (cm)	diam: (cm)	Container: openings: 0 1 2+ filling: air other	diam: (cm)	

Id:		Comments: <b>Coca-cola</b>					<input checked="" type="checkbox"/> Logo/Brand	<input type="checkbox"/> Language
L (cm): W (cm): H (cm):		Color:	Material: _____ <i>if plastic:</i> hard foam soft	<input checked="" type="checkbox"/> Biofoul:	Loops → Crumbly Beak Sharp Shiny Floppy	1 2-10 10s 100s uniform varied	<input checked="" type="checkbox"/> Barcode	<input type="checkbox"/> Poison
Weathering: low med high		Complex: N Y ↓ Intact: whole part frag	_____	diam: (cm)	diam: (cm)	Container: openings: 0 1 2+ filling: air other	diam: (cm)	



Nongfu Spring.



Rainier Beer.



Unknown.



Sanshin.



Fireball.



AR + COOK.



Bear Favorite (in Cyrillic).

## RULES OF THUMB

1. Data Sheet: Circle if a logo or brand is present, leave blank if not.
2. Photo close-up: "Zoom-in" on the logo so that it is clearly visible.
3. If you know what the logo or brand is, please write it in the Comments section.

# LOOPS

**STATES:** Yes–Circle, No–Leave Blank

If Yes, what is the number of loops: None, 1, 2–10, 10s, 100s

If 2 or more: Uniform or Varied in size?

If Uniform, what is the diameter (cm)?

If Varied in size, what are the diameters (cm) of the *smallest* (left side) and *largest* (right) loops?



## WHAT & WHY?

LOOPs are closed circles in a two-dimensional, flexible object (rigid objects have openings, not loops). One of the most common ways debris can harm wildlife is via entanglement, often when a head, foot, flipper, wing or fluke gets snagged by the loops of a flexible object and the animal can't wriggle free. Loops come in a wide range of sizes, which COASST denotes by the length (in cm) of the loop stretched taut (literally into a double line). Some objects, like nets, have a single size of loop; whereas others, like a tangle of rope, may have variably sized loops.

## WHERE & HOW?

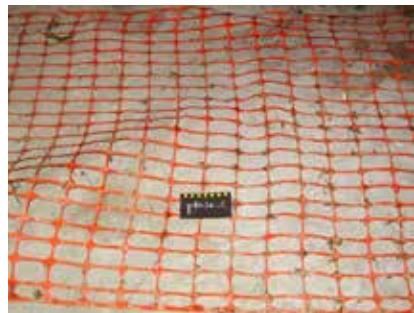
Square #:	Id:	Intact: whole part frag	Sharp	Shiny
Count:	Material: <i>if plastic:</i> hard foam soft	Comments:		
Color:				

#:	Comments:					<input type="checkbox"/> Logo/Brand	<input type="checkbox"/> Language	
Id:		L (cm):	Color:	Material: _____	<input type="checkbox"/> Biofoul:	Loops → Crumbly Beak Sharp Shiny Floppy	<input type="checkbox"/> Barcode	<input type="checkbox"/> Poison
				<i>if plastic:</i> hard foam soft		1 (2-10) 10s 100s (uniform) varied	Container: openings: 0 ↓ filling: air other	
M	Weathering: low med high		Complex: N Y ↓ Intact: whole part frag			diam: (cm) <b>12</b>	diam: (cm)	diam: (cm) 1 2+ ↓

Id:		Comments:					<input type="checkbox"/> Logo/Brand	<input type="checkbox"/> Language
L (cm): W (cm): H (cm):		Color:	Material: _____	<input type="checkbox"/> Biofoul:	Loops → Crumbly Beak Sharp Shiny Floppy	Collected	<input type="checkbox"/> Barcode	<input type="checkbox"/> Poison
		Complex: N Y ↓ Intact: whole part frag	<i>if plastic:</i> hard foam soft		1 (2-10) 10s 100s (uniform) varied	Container: openings: 0 ↓ filling: air other		
L	Weathering: low med high				diam: (cm) <b>12</b>	diam: (cm) <b>18</b>	diam: (cm)	1 2+ ↓



Not a loop (the circle isn't closed).



100s of uniform loops.



100s of variable loops.



A single loop (measuring the stretch length).



2–10 variable loops.



A single loop.



Not a loop (the object isn't floppy).

## RULES OF THUMB

1. Data Sheet:
  - Circle Loops.
  - Circle the number of loops.
  - If the loops are all the same size, or there is only one loop, measure the stretch length in cm.
  - If the loops are variable sizes, measure the stretch length, in cm, of the smallest and the largest.
2. For some objects, like net, or tangles of rope or line, it will be difficult-to-impossible to accurately count the loops. Make a reasonable estimation of whether there are tens (10s) or hundreds or more (100s).
3. For some objects, like tangles of rope or line, it will be difficult-to-impossible to accurately measure the stretch length, or even find the smallest and largest loops. Do your best without spending undue time on this one object.

# MATERIAL

**STATES:** Glass, Metal, Wood/Bamboo, Paper/Cardboard, Rubber, Cement/Ceramic, Plastic, Other, Multi, Unknown

If Plastic, is it **hard, foam or soft?** Is there a resin code:



## WHAT & WHY?

MATERIAL describes the substance of which an object is made or composed. Material properties relate to potential environmental harm and relative buoyancy in the water. For instance, plastic is long-lasting, often floats, and may shed harmful chemicals into the environment and the food chain. Material is an important factor in how quickly objects degrade in the environment.

## WHERE & HOW?

Square #:	Id:	Intact: whole part frag	Sharp	Shiny
Count:	Material: <u>Plastic</u>	Comments:		
	if plastic: <input checked="" type="radio"/> hard <input type="radio"/> foam <input type="radio"/> soft  <u>HDPE</u>			
Color:				

#:	Comments:					<input type="checkbox"/> Logo/Brand <input type="checkbox"/> Language <input type="checkbox"/> Barcode <input type="checkbox"/> Poison
Id:	L (cm):	Color:	Material: <u>Plastic</u>	Biofoul:	Loops → Crumbly Beak Sharp Shiny Floppy	Container: openings: 0 ↓ 1 ↓ 2+ ↓ filling: air other diam: (cm)
			if plastic: <input checked="" type="radio"/> hard <input type="radio"/> foam <input type="radio"/> soft  <u>HDPE</u>		1 2-10 10s 100s uniform varied ↓ ↓ ↓ ↓ diam: (cm) diam: (cm)	
Weathering:	low med high	Complex: N Y	Intact: whole part frag			

Id:	Comments:					<input type="checkbox"/> Logo/Brand <input type="checkbox"/> Language <input type="checkbox"/> Barcode <input type="checkbox"/> Poison
L (cm):	W (cm):	H (cm):	Color:	Material: <u>Plastic</u>	Biofoul:	Collected
				if plastic: <input checked="" type="radio"/> hard <input type="radio"/> foam <input type="radio"/> soft  <u>HDPE</u>	Loops → Crumbly Beak Sharp Shiny Floppy	<input type="checkbox"/> Logo/Brand <input type="checkbox"/> Language <input type="checkbox"/> Barcode <input type="checkbox"/> Poison
Weathering:	low med high		Complex: N Y	Intact: whole part frag	1 2-10 10s 100s uniform varied ↓ ↓ ↓ ↓ diam: (cm) diam: (cm)	Container: openings: 0 ↓ 1 ↓ 2+ ↓ filling: air other diam: (cm)



Plastic, soft.



Rubber.



Cement/Ceramic.



Plastic, hard, ☈, HDPE.



Plastic, hard, ☈ 2 .



Metal.



Paper/Cardboard.

## RULES OF THUMB

1. Data Sheet: Write in the predominant (by volume) material.
  - If the object is composed of multiple materials with no dominant (>50%) material, write "multi."
  - If the material is unknown to you, or you are not sure, write "unknown."
  - If the predominant material is plastic, circle the predominant type: hard (or rigid), foam (including Styrofoam, insulation, packing peanuts), or soft/flexible (including rope, line, netting, bags and sheeting).
  - Record the "resin code" if present. This can be a number or abbreviation in a triangle of arrows.
2. Most marine-use ropes are made from synthetic (plastic) materials.
3. Some rubbers are actually plastic, or a combination of natural rubber and plastic—no need to tell the difference, simply record rubber.
4. Clay and rock-based materials are grouped together into Cement/Ceramic.

# POISON



STATES: Yes–Circle, No–Leave Blank



## WHAT & WHY?

Containers of known chemical hazards or other toxic substances occasionally wash up on, or are dumped on the beach, including oil drums, fuel canisters and pesticide containers. COASST collectively refers to these as POISON and they can pose a threat to humans and wildlife alike. Signal words such as BIOHAZARD, CAUTION, DANGER, PELIGROSO, WARNING, FLAMMABLE, POISON and TOXIC are clues. Some containers may also have warning symbols, some of which are reproduced here.



## WHERE & HOW?

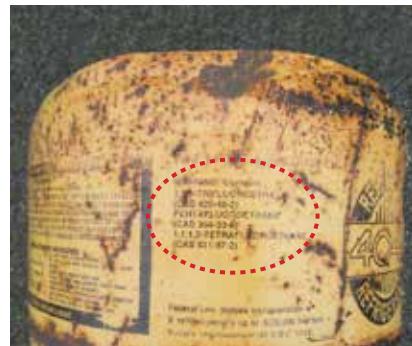
Square #:	Id:	Intact: whole    part    frag	Sharp	Shiny
Count:	Material: <i>if plastic:</i> hard foam soft	Comments:		
Color:				

#:	Comments:					<input type="checkbox"/> Logo/Brand	<input type="checkbox"/> Language
Id:	L (cm):	Color:	Material: _____ <i>if plastic:</i> hard foam soft	<input type="checkbox"/> Biofoul:	Loops → Crumbly Beak Sharp Shiny Floppy	1 2-10 10s 100s uniform varied	Container: openings: 0 1 2+
Weathering: low med high		Complex: N Y ↓ Intact: whole part frag		<input checked="" type="checkbox"/> Barcode	diam: (cm)	diam: (cm)	filling: air other 

Id:	Comments:					<input type="checkbox"/> Collected	<input type="checkbox"/> Logo/Brand	<input type="checkbox"/> Language
L (cm):	W (cm):	H (cm):	Color:	Material: _____ <i>if plastic:</i> hard foam soft	<input type="checkbox"/> Biofoul:	Loops → Crumbly Beak Sharp Shiny Floppy	1 2-10 10s 100s uniform varied	Container: openings: 0 1 2+
Weathering: low med high			Complex: N Y ↓ Intact: whole part frag		<input checked="" type="checkbox"/> Barcode	diam: (cm)	diam: (cm)	filling: air other 



Warning symbols.



"Warning!"



A closed, unmarked container is suspect.



Warning symbols.



"Materiel Dangereux."



"Danger-Inflammable."



"Danger" and a warning symbol.

## RULES OF THUMB

1. Data Sheet: Circle if the object contains signs of poison or toxicity, leave blank if not.
2. Photo close-up: Photos should "zoom-in" on the warning words and/or symbols.
3. Look for signal words and warning symbols.
4. Always be cautious and don't touch anything you can't read or aren't sure about.
5. Any container with unknown contents should be treated as a potential POISON.
6. Call local authorities, or COASST, for large containers with hazardous contents.

# SHARP

STATES: Yes—Circle, No—Leave Blank



## WHAT & WHY?

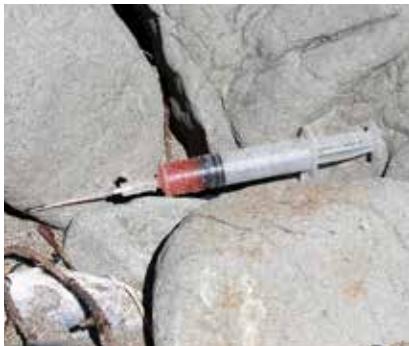
SHARP describes objects that have an edge or point that could cut or pierce flesh. Wire, hooks, thin metal edges, pointed hard plastic, nails in wood, and freshly broken glass fragments are all examples. Any of these could be harmful to wildlife and humans.

## WHERE & HOW?

Square #:	Id:	Intact: whole part frag	<input checked="" type="checkbox"/> Sharp	Shiny
Count:	Material: <i>if plastic:</i> hard foam soft	Comments:		
Color:				

#:	Comments:						<input type="checkbox"/> Logo/Brand	<input type="checkbox"/> Language
Id:	L (cm):	Color:	Material:	Biofoul:	Loops → Crumbly Beak	1 2-10 10s 100s	<input type="checkbox"/> Barcode	<input type="checkbox"/> Poison
			<i>if plastic:</i> hard foam soft	<input type="checkbox"/> Sharp	uniform varied	diam: (cm)		
Weathering:	Complex: N Y	Intact: whole part frag		<input type="checkbox"/> Sharp		diam: (cm)	Container: openings: 0 1 2+	
low med high				<input type="checkbox"/> Shiny			filling: air other	diam: (cm)
				<input type="checkbox"/> Floppy				

Id:	Comments:						<input type="checkbox"/> Logo/Brand	<input type="checkbox"/> Language	
L (cm):	W (cm):	H (cm):	Color:	Material:	Biofoul:	Loops → Crumbly Beak	<input type="checkbox"/> Collected	<input type="checkbox"/> Barcode	<input type="checkbox"/> Poison
				<i>if plastic:</i> hard foam soft	<input type="checkbox"/> Sharp	1 2-10 10s 100s			
Weathering:	Complex: N Y	Intact: whole part frag		<input type="checkbox"/> Sharp		uniform varied			
low med high				<input type="checkbox"/> Shiny			Container: openings: 0 1 2+		
				<input type="checkbox"/> Floppy			filling: air other	diam: (cm)	



## RULES OF THUMB

1. Data Sheet: Circle if the object is sharp, leave blank if not.
2. Always be cautious around sharp objects!

# SHINY

STATES: Yes–Circle, No–Leave Blank



## WHAT & WHY?

SHINY objects that are highly reflective and can literally flash in the sun are attractive to many animals, from fish (think fishing lure flashers) to birds, sometimes with dangerous consequences.

## WHERE & HOW?

Square #:	Id:	Intact: whole part frag	Sharp	<input checked="" type="checkbox"/> Shiny
Count:	Material: <i>if plastic:</i> hard foam soft	Comments:		
Color:				

#:	Comments:						<input type="checkbox"/> Logo/Brand	<input type="checkbox"/> Language
Id:	L (cm):	Color:	Material:	Biofoul:	Loops →	1 2-10 10s 100s	<input type="checkbox"/> Barcode	<input type="checkbox"/> Poison
				<input type="checkbox"/> Crumbly	uniform varied			
				<input type="checkbox"/> Beak				
				<input type="checkbox"/> Sharp				
				<input checked="" type="checkbox"/> Shiny				
				<input type="checkbox"/> Floppy				
Weathering:	Intact:	whole part frag		diam: (cm)	diam: (cm)			
low med high								

Id:	Comments:						<input type="checkbox"/> Logo/Brand	<input type="checkbox"/> Language
L (cm):	W (cm):	H (cm):	Color:	Material:	Biofoul:	Loops →	<input type="checkbox"/> Barcode	<input type="checkbox"/> Poison
					<input type="checkbox"/> Crumbly	1 2-10 10s 100s		
					<input type="checkbox"/> Beak	uniform varied		
					<input type="checkbox"/> Sharp			
					<input checked="" type="checkbox"/> Shiny			
					<input type="checkbox"/> Floppy			
Weathering:	Intact:	whole part frag		diam: (cm)	diam: (cm)			
low med high								

Shiny



Not Shiny



## RULES OF THUMB

1. Data Sheet: Circle if the object is shiny, leave blank if not.
2. The object must be highly reflective, flashing in the sun.
3. If the object was shiny, but now is dull because of weathering, COASST does not consider it shiny.

# SIZE

**STATES:** Length (cm), Width (cm), Height (cm)



## WHAT & WHY?

COASST defines the SIZE of an object by 1–3 orthogonal (at right angles to each other) measurements that describe the dimensions of a perfect packing box the object would just fit into. The longest dimension is the length, and this dimension also verifies whether the object is classified correctly into small, medium or large debris. Object size is relevant to many clues and consequences, from harm to wildlife to boating hazards to windage.

## WHERE & HOW?

Square #:	Id:	Intact: whole    part    frag	Sharp	Shiny
Count:	Material: _____ <i>if plastic:</i> hard foam soft	Comments: _____		
Color:	_____			

#:	Comments: _____						<input type="checkbox"/> Logo/Brand	<input type="checkbox"/> Language
Id:	L (cm): <b>5</b>	Color:	Material: _____ <i>if plastic:</i> hard foam soft	Biofoul: <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Loops → Crumbly Beak Sharp Shiny Floppy	1 2-10 10s 100s uniform varied	<input type="checkbox"/> Barcode	<input type="checkbox"/> Poison
Weathering:	low    med    high	Intact: whole    part    frag	_____			diam: (cm)    diam: (cm)	Container: openings: 0 filling: air    other	diam: (cm)

Id:	Comments: _____						<input type="checkbox"/> Logo/Brand	<input type="checkbox"/> Language	
L (cm): <b>67</b>	W (cm): <b>24</b>	H (cm): <b>13</b>	Color:	Material: _____ <i>if plastic:</i> hard foam soft	Biofoul: <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Loops → Crumbly Beak Sharp Shiny Floppy	1 2-10 10s 100s uniform varied	<input type="checkbox"/> Barcode	<input type="checkbox"/> Poison
Weathering: low    med    high	Intact: whole    part    frag	_____				diam: (cm)    diam: (cm)	Container: openings: 0 filling: air    other	diam: (cm)	



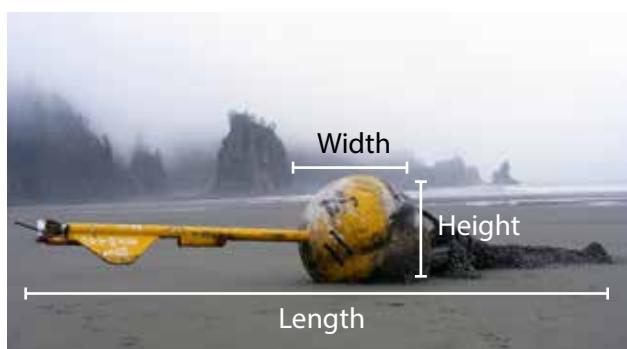
Length.



Width.



Height.



Large debris—measuring length, width and height.



Stretch length of a tangled, floppy object.



Stretch length of the rope plus the buoy.



Medium debris—measure length only.

## RULES OF THUMB

1. Data Sheet: Write in the appropriate measurement to the nearest cm.
2. Length is **NOT** the longest measurement (often the diagonal), instead, it is the longest length of the perfect box the object would fit into.
3. Small debris does not need to be measured, beyond verifying that it "fits" into the small size class.
4. For medium debris, only measure the length (in cm).
5. For large debris, measure the length, width and height of the "perfect box" (in cm).
6. For cylindrical objects, like pipes or drums, substitute the diameter (in cm) for the width and height.
7. For floppy objects, stretch the object out before measuring. Do not attempt to untangle any rope or netting.

# WEATHERING

STATES: Low, Medium, High



## WHAT & WHY?

WEATHERING is the process of degradation due to exposure to the elements: sun, wind, water and temperature. In beach environments, weathering can also occur due to blowing sand scouring the object. In general, things that have been out in the environment longer will be more weathered. Even though weathering is a continuous process, COASST places all objects into one of three categories: low, medium or high weathering.

## WHERE & HOW?

Square #:	Id:	Intact: whole part frag	Sharp	Shiny
Count:	Material: _____ <i>if plastic:</i> hard foam soft	Comments: _____		
Color:				

#:	Comments: _____						<input type="checkbox"/> Logo/Brand <input type="checkbox"/> Language <input type="checkbox"/> Barcode <input type="checkbox"/> Poison
Id:	L (cm):	Color:	Material: _____ <i>if plastic:</i> hard foam soft	<input checked="" type="checkbox"/> Biofoul:    	Loops → Crumbly Beak Sharp Shiny Floppy	1 2-10 10s 100s uniform varied	Container: openings: 0 filling: air other
Weathering: low <input checked="" type="radio"/> med <input type="radio"/> high			Intact: whole part frag		diam: (cm)	diam: (cm)	1 2+ diam: (cm)

Id:		Comments: _____						<input type="checkbox"/> Logo/Brand <input type="checkbox"/> Language <input type="checkbox"/> Barcode <input type="checkbox"/> Poison
L (cm):	W (cm):	H (cm):	Color:	Material: _____ <i>if plastic:</i> hard foam soft	<input checked="" type="checkbox"/> Biofoul:    	Loops → Crumbly Beak Sharp Shiny Floppy	1 2-10 10s 100s uniform varied	Container: openings: 0 filling: air other
Weathering: low <input checked="" type="radio"/> med <input type="radio"/> high			Intact: whole part frag		diam: (cm)	diam: (cm)	1 2+ diam: (cm)	

Low	Medium	High
 Bright, original color, no signs of abrasion or rust.	 Moderate abrasion and rusting	 Extreme rust and abrasion. Original surface and color undetectable.
 Shiny. Bright color and no abrasion.	 Dull, worn and abraded surface. Original color and text still visible.	 Pitted. Edges rounded and worn. Original color and surface undetectable.
 Bright, original color and texture intact.	 Color beginning to fade, texture worn.	 Original color completely faded, bleached in some areas. Brittle and cracked surface.

## RULES OF THUMB

1. Data Sheet: Circle the appropriate amount of weathering.
2. If the object looks new, has saturated colors, is shiny or otherwise unblemished, consider it LOW.
3. If the object is extremely sun-bleached, may be crumbling or otherwise falling apart, is severely pitted, rounded, abraded, rusted, or frayed, consider it HIGH.
4. MEDIUM objects fall in-between these two extremes.

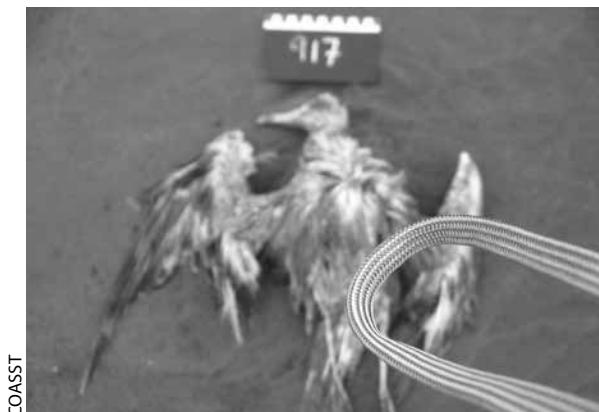
# **PART FIVE— TAKING PHOTOGRAPHS**

To help ensure accurate identification of wildlife and characterization of marine debris, photograph each subject encountered. In addition to the “whole object” photo, the camera icon (📷) indicates when special images need to be taken to capture certain features of the subject.

COASST uses photographs to verify data and prove that a particular species or object was found at a particular location. If COASST data are ever used in a court case, these photographs are essential evidence. So please take extreme care to photograph each specimen well and to label all photographs correctly.

## TAKING PHOTOGRAPHS

Shake or brush off the sand and debris from the subject as much as possible. A stiff paintbrush can be very useful. To the degree possible, make sure there is sufficient contrast between the subject and the background. If the background



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COASST



COASST

Poor quality photos: blurry (top left) and bad shadow (top right).

Good quality photos: (bottom row) good contrast and light, subject and slate centrally placed and fill the frame.

is not uniform (for instance, cobble beach instead of sandy beach), make sure detailed features are visible against the background. If contrast is a problem, try to find a flat rock or piece of wood to rest the subject (or part of it) against.

Contrast can also be a problem in low-light situations, especially in the winter or at high latitudes when the sunlight (such as it is) shines at low angles, creating long shadows.

Be aware of shadows, including the one created by your own body! Dark shadows next to a dark subject can often make it difficult to see an outline in a photograph. If the sun is low in the sky, try propping the subject up at an angle (against a rock or piece of wood), to decrease shadows. Using the flash can erase low sun-angle shadows and enhance colors.

Take care when shooting photos with a mobile phone—fixed lenses and sensors limit their performance in low-light conditions, and they are very sensitive to photographer movement.

Frame the subject so that it appears as large as possible. In other words, a “close-up.” For large objects, consider orienting the photograph diagonally, to make sure everything fits in the photograph. Never leave any part of the subject out of view.

Make sure the digital camera is set on the “medium” or “high” setting. This might be “fine” or “extra fine” depending on the camera. The image size should be approximately 21”x 15” at 72 pixels per inch (or approximately 4”x 5” at 300 pixels per inch). This resolution should result in a file size of at least 1MB. COASST can accept files up to 5 MB.

Place the 15cm black and yellow ruler in each photo. Also place the “slate,” with the beach name, date, and any required unique identifier visible. (See table below). If the weather is wet, pre-writing the beach name and date is a good idea.

Survey type	Slate Label
Beached Birds	Beach, Date, Tag number
Small Marine Debris	Beach, Date, Rectangle, Zone, Square
Medium Marine Debris	Beach, Date, Rectangle, Object ID Number
Large Marine Debris	Beach, Date, Object ID Number

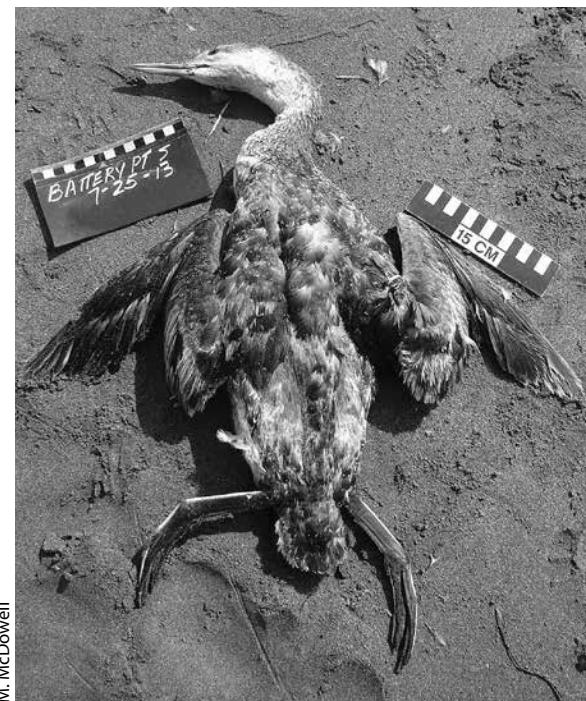
This table shows what information should be written on the slate for each photo, depending on survey type.

## Particulars for Photographing Birds

For birds, try to smooth feathers back into their “natural” direction. This is especially important with body feathers, so that the lighter colored under-feathers do not show through, which can confuse the verification. Do NOT wash the carcass off, as a wet carcass looks much darker, and water can occasionally look like an oil sheen in the right light.

Always “pose” the carcass to emphasize distinctive species characters. Arrange the wing(s) in an “M” or “W” shape; that is, not fully stretched out, but not folded into the body. Rest the head and bill in profile. If the carcass has been twisted into an unnatural shape, try to return it as much as possible to a normal condition (for raptor-kills, where the head may be inside-out, this will not be possible). Make sure at least one foot is visible. If the feet are pliable, spread them out so that COASST can clearly identify the foot-type from the photographs. If the carcass is slightly stiff, holding the wings open by the tips is fine.

Photograph both the dorsal (back) and ventral (belly) sides of the carcass. If you believe that you have a rare species, take a series of photographs, including close-ups of body parts such as the head and wing. Also, if you are photographing an oiled or entangled carcass, make sure that you take close up



Take two photos, one of the belly (ventral) and one of the back (dorsal) to capture all identification characters on both sides of the bird. The four-letter bird code is optional, but can be helpful when sorting photos later.

photos that show the area of oiling or entanglement. Good photos are essential in these cases!

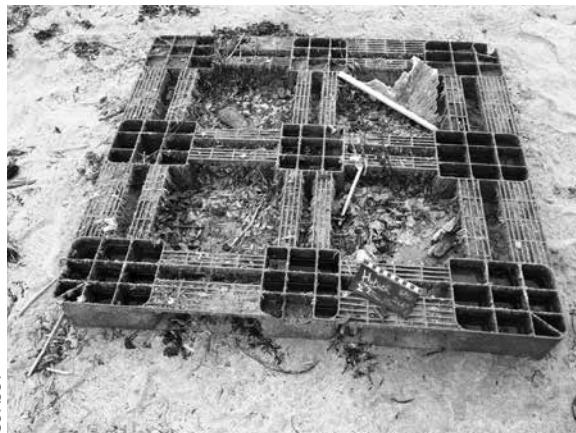
### Particulars for Photographing Marine Debris

**Large**—Take a single photograph of each unique large debris object. Some objects may require multiple photographs to ensure that the whole object is captured. Include the beach name, date and object number on the slate.

**Medium**—For medium debris, take a single photograph of each sample (rectangle zone combination). Arrange the objects so that all can be seen and are not overlapping and fill the frame. Include the beach name, date, rectangle and zone on the slate.

**Small**—Take a single photo of each sampling square either as found with the square forming the frame or arranged to fill the frame. Include the beach name, date, rectangle, zone and square number on the slate.

COASST



S. Sandoval

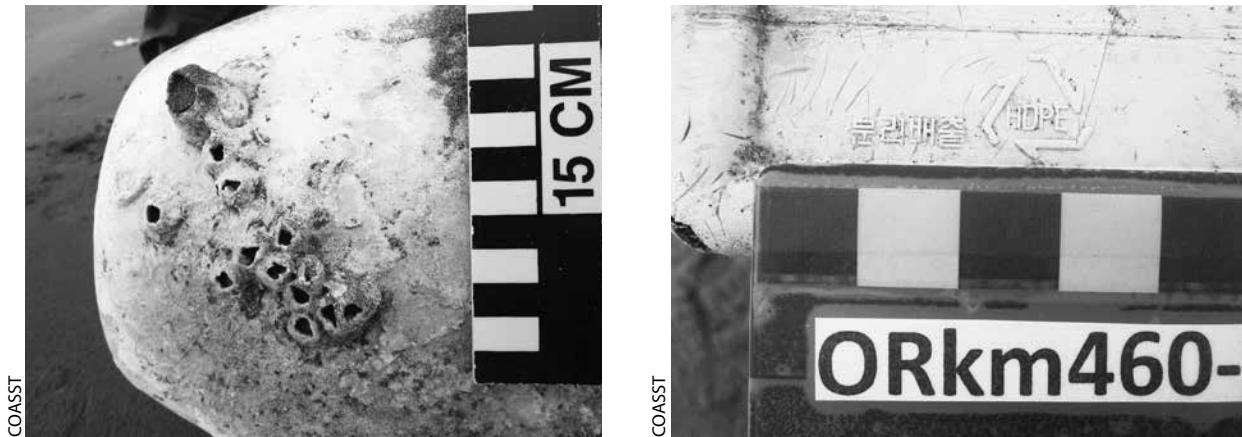


H. Burgess



Take a representative photo of each unique large (upper left) and each medium (upper right) or small sample that contains small debris (lower left).

Several debris characteristics are associated with a camera icon (📷) on the Characterization Data Sheets. If a debris object has one of these characteristics present, please ensure that at least one photograph of that object provides a clear, close-up of that particular characteristic. If the object is on the small side, this could be a single photograph, but if the object is larger, at least one photograph will be required to show the entirety of the object, and others to capture the details of a logo, barcode, or biofouling organism.



Take close-ups of characteristics of interest such as biofouling, logos, barcodes, writing and plastic symbols.

## Labeling Photographs

This task is only required if photos are not being directly uploaded to the data portal.

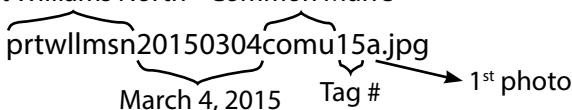
When submitting photos via email, dropbox, SkyDrive, Google, Drive, USB drive or memory card), please name files using the following conventions:

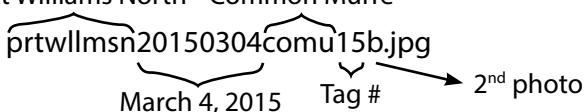
<b>Beach Name</b>	leave out the vowels and abbreviate North, South, East, and West as N, S, E, and W, respectively.
<b>Survey Date</b>	yyyymmdd.
<b>Species Code</b>	(for birds only) the standard four letter species code (refer to <i>Beached Birds</i> ) or UNK if you don't know the species.
<b>Identity</b>	(for large and medium debris only)—if unknown use UNK
<b>Unique identifier</b>	<b>tag number</b> (for birds only) <b>ID number</b> (for medium and large debris only) <b>rectangle, zone, square</b> (for small debris only)

**Lower case letter** If you took more than one photo of the same subject, please add an "a""b""c" etc. to the end of the file name to differentiate each photo.

Follow these examples:

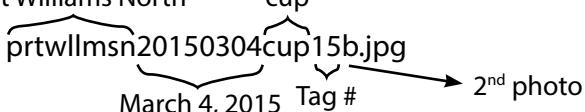
Two photos from Port Williams North taken on March 4, 2015 of a Common Murre, Tag #15 should be labeled:

Port Williams North Common Murre  
  
 March 4, 2015 Tag # → 1<sup>st</sup> photo

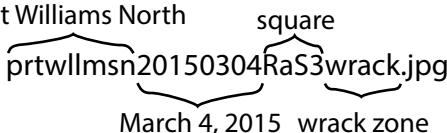
Port Williams North Common Murre  
  
 March 4, 2015 Tag # → 2<sup>nd</sup> photo

Two photos from Port Williams North taken on March 4, 2015 of a cup, debris object 15 of the day should be labeled:

Port Williams North cup  
  
 March 4, 2015 Tag # → 1<sup>st</sup> photo

Port Williams North cup  
  
 March 4, 2015 Tag # → 2<sup>nd</sup> photo

One photo from Port Williams North taken on March 4, 2015 of a small debris square 3 in the wrack zone of rectangle "A" should be labeled:

Port Williams North small debris square  
  
 March 4, 2015 wrack zone

Let us know if you have any questions. We know re-labeling photos can be a bit time-consuming, but this helps to make sure that no data are lost!



# **PART SIX— SUBMITTING YOUR DATA AND PHOTOGRAPHS**

Data and photographs are stored at COASST in the following ways: data are entered into a database, original copies of data sheets are digitized and archived, and photographs are linked to each survey and archived. This ensures that we have all original data sheets and photographs as legal evidence should COASST data ever need to be used in court.

We know that not everyone is a computer whiz. Some COASSTers have slow internet connections or no internet connection at all. Therefore, there are many ways to submit your data and digital photos, ranging from the most technologically savvy to the most basic. Please choose what works the best for you, and definitely don't hesitate to give us a call if you are at all confused.

	<b>Data Sheets</b>	<b>Photos</b>
Electronic	Clear scan or photograph via email, filesharing service or upload to data portal	Email, upload to data entry via data entry portal or send via free file-sharing services (e.g., dropbox, Flickr)
Mail	Send original data sheets to: COASST University of Washington UW Box 355020 Seattle, WA 98195-5020	Memory card, flash drive, CD or printed copies

## DATA ENTRY ONLINE

If you have access to the internet, you can enter your data directly into our database online at [www.coasst.org](http://www.coasst.org) in the toolbox section. For beached birds this system currently works for PCs using the Windows operating systems and Macs using Mac OSX. To access the online system, you will need to register using your email address and create a password for yourself. If you encounter problems, please contact us—we'll be happy to help you.

If you have any problems navigating the web data form (e.g., your beach's name is not included on your beach list), notify COASST of the difficulty and suspend data entry until the problem is resolved or simply send in your data by mail for COASST office interns to enter.

After pressing the "submit" button to send in your data online, the website will automatically generate a confirmation code —a notification that data were successfully transferred to the database. The confirmation code will appear on the computer screen. Make sure (!) to write the confirmation code from the online submission directly on the COASST Cover Sheet in the upper right-hand corner under **SURVEY CODE** so that we know it has already been entered.



COASST interns are happy to assist with online data entry.

## DATA SHEETS

Regardless of whether or not you submit data online, it is important to also send us the handwritten data sheets and photographs, either by mail or electronically. COASST interns will enter any data that has not already been entered online-- they will call or email you if they have any questions about your data.

***Electronically:*** A clear scan or photograph can be emailed to [coasst@uw.edu](mailto:coasst@uw.edu) or shared via a filesharing service such as dropbox.

***By Mail:*** To submit your data by mail, please send completed data sheets to:

COASST  
University of Washington  
UW Box 355020  
Seattle, WA 98195-5020

## DIGITAL PHOTOGRAPHS

As we receive lots of digital photos, make sure you save them with the COASST naming convention described in the Labeling Photographs section on page 5-6.

***During Online Data Entry:*** Photographs can be uploaded to your survey during data entry and "tagged" to individual birds or marine debris objects.

***Email:*** Emailing us digital files is always an option. Please follow the photo naming instructions under Labeling Photographs on page 5-6, then attach files to an email to [coasst@uw.edu](mailto:coasst@uw.edu).

***Online File Sharing:*** Some COASSTers find it convenient to upload their photos to a free online photo sharing program such as flickr, shutterfly or dropbox. This is a great option. Simply upload photos to an album or folder and send COASST an email with the link. We will then download these files from your site. It helps to notify COASST when photos have been added to a shared folder so that we know that they are available for download.

***Digital Media (CD, USB drive):*** If your internet connection is too slow to send us large files, they can be saved on a CD or USB drive and mailed to us with data sheets. Please follow the photo naming instructions under Photo Labeling on page 5-6. Make sure to label the CD or USB drive with your name, beach name and survey date. We are happy to return your USB drive so that it can be used again the next month.

***Digital Camera Memory Card:*** Lastly, you can send us your memory card and we'll download the files and send it back to you. In this case, you have to do a bit of extra work to let us know which photos are on the card (since you will not be downloading them onto your computer and renaming them according to the COASST naming convention). Please be sure to use a slate in your photos with all the pertinent information. Label the memory card with your name, beach name, and the survey date. After we download the photos, we'll send back the memory card so that you can use it again on your next survey.