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Geologic Characteristics of Benthic Habitats in Glacier Bay, Southeast Alaska

Version 1.0

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Figure 1. Location map of Glacier Bay National Park and Preserve, southeast Alaska. To view a large version of Figure 1 in a new window, click on the image above.

Abstract

In April 2004, more than 40 hours of georeferenced submarine digital video was collected in water depths of 15-370 m in Glacier Bay to (1) ground-truth existing geophysical data (bathymetry and acoustic reflectance), (2) examine and record geologic characteristics of the sea floor, and (3) investigate the relation between substrate types and benthic communities, and (4) construct predictive maps of seafloor geomorphology and habitat distribution. Common substrates observed include rock, boulders, cobbles, rippled sand, bioturbated mud, and extensive beds of living horse mussels and scallops. Four principal sea-floor geomorphic types are distinguished by using video observations. Their distribution in lower and central Glacier Bay is predicted using a supervised, hierarchical decision-tree statistical classification of

geophysical data.

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Introduction

Geologic substrates of the sea floor in southeast Alaska provide benthic habitats for recreationally and commercially important species, including halibut, rockfish, shrimp, and king, Dungeness, and Tanner crabs. The study of benthic habitat structure, function, and change is particularly important in high latitudes, where fisheries and complex food webs serve as a global resource, and where signs of climate change are more conspicuous than in other parts of the world.

In Glacier Bay, historical rates of glacier retreat are among the highest documented worldwide: more than 45 km (28 miles) since 1899. Recent work with NASA LandSat7 imagery (http://landsat.gsfc.nasa.gov) revealed that Muir Glacier, at the head of the bay's east arm, retreated more than 7 km in the last 25 years (Hall et al. 1995). Large volumes of fine sediment associated with glacier meltwater can result in rapid proglacial sedimentation. For example, in front of Muir Glacier, the average rate of sediment accumulation between 1900 and 1979 was 37 mm/y (Koppes and Hallet, 2002). These data suggest that some sediment deposits that are meters thick can accumulate on the seafloor on decadal timescales. The effect of such substrate changes on the structure and function of benthic communities is not well understood, nor are the rates at which these processes and responses occur.

We use geophysical data, underwater video, and sedimentologic tools to understand the geologic characteristics of the seafloor and the present distribution of benthic communities in Glacier Bay. Seafloor morphologic features and sediment texture are revealed in high-resolution, multibeam bathymetry and acoustic reflectance (backscatter) data previously collected in lower Glacier Bay (Carlson et al. 2002, 2003).

Observations of seafloor video were logged real-time in the field by a team of geologists and biologists who examined areas of transition between contrasting substrate types, resolved and characterized unique seafloor features, and linked the geology and biology of benthic environments (Etherington et al. 2006; Harney et al. 2006). Common substrates observed include unsorted glacial till (boulders, cobbles, and sand), bioturbated mud, channelized mud, and rippled, coarse-grained sand. Common subtidal biota observed include benthic and demersal fish (including halibut, flounder, sole, pollock, cod, rockfish, and sculpin), several species of crabs, numerous shrimp, high-biomass beds of horse mussels and scallops, and sessile/less mobile invertebrates such as gorgonians, sea pens, echinoderms, anemones, sponges, and urchins.

Bathymetry and acoustic backscatter data were compiled with geologic and biologic video observations in an ESRI Geographic Information Systems database (ArcGIS) and used to construct maps of geologic substrate and habitat distribution in Glacier Bay. These maps are products that enable scientists, parks, and resource managers to better understand benthic habitat characteristics. This information is increasingly important in making decisions about the management of critical environments and resources, the design and utility of marine reserves, and policies on tourism and development. The integrated tools and techniques developed in Glacier Bay also serve as models to study other regions experiencing change on scales relevant to resource management and the function of benthic habitats. The purpose of this report is to make these data and imagery available for public use.

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Revisions and Updates

This GIS compilation may be revised and updated as new data become available, and changes will be posted online. Subsequent versions will be available at http://walrus.wr.usgs. gov/nearshorehab. Changes to the GIS will be described in the Revision History. section. The hosting site could change. If there is no forwarding link, go the USGS home page (usgs. gov) and search for keywords "Glacier Bay habitat."

File and Data Formats

Text files (.txt) on the web site may be viewed without special software. Hypertext mark-up language files (.html) require a browser such as Netscape Navigator or Internet Explorer. JPEG (.jpg) or TIFF (.tif) images may be viewed by many common image software packages. The data files require ESRI ArcExplorer, ArcView, or ArcInfo. ArcExplorer is an application that ESRI licenses without charge for Windows operating systems. ArcView and ArcInfo are licensed applications that must be purchased. Please note that any use of trade, product, or firm names is for descriptive purposes only and does not imply endorsement by the U.S. Government.

The data were compiled in ArcInfo (versions 8.0.2 and 9.0; ESRI 1982-2004), a commercial GIS, in the UTM Zone 8 coordinate system with datum NAD83. Raster data layers are in ArcInfo GRID format or are registered TIFF images. Point, line and polygon features are in ESRI shapefile format. Shapefiles were generated in geographic coordinates with datum NAD83. Each data layer is accompanied by Federal Geographic Data Committee (FGDC) compliant metadata and an overview map.

Acknowledgments

References

Anderson, T.J., Cochrane, G.R., Roberts, D.A., Chezar, H., and Hatcher, G., A systematic real-time method to characterize seafloor habitats and benthic macro-organisms: Habitat mapping with a side-scan sonar and towed camera-sled, in press. Proceedings, Geohab Conference, Victoria, British Columbia, 4-7 May 2005.

Carlson, P.R., Hooge, P.N., and Cochrane, G.R., 2005, Discovery of 100-160 year-old iceberg gouges and their relation to halibut habitat in Glacier Bay, Alaska. In: Barnes, P.W., and J.P. Thomas (eds.). Benthic Habitats and the Effects of Fishing. Proceedings of the American Fisheries Society Symposium 41, Tampa FL, Nov. 12-14, 2002. 890 p.

Carlson, P.R., Hooge, P.N., Cochrane, G.R., Stevenson, A. J., Dartnell, P., and Lee, K, 2002, Multibeam bathymetry and selected perspective views of main part of Glacier Bay, Alaska: USGS Open-File Report 02-391. Available online at http://geopubs.wr.usgs.gov/open-file/of02-391.

Carlson, P.R., Hooge, P.N., Cochrane, G.R., Stevenson, A.J., Dartnell, P., and Stone, J.C., 2003, Multibeam bathymetry and selected perspective views of Glacier Bay, Alaska: U.S. Geological Survey Water Resources Investigation Report 03-4141 (2 map sheets).

Chavez, P.S., Jr., 1984, U.S. Geological Survey mini image processing system (MIPS): U.S. Geological Survey Open-File Report 84-880, 12 p.

Cochrane, G.R., Carlson, P.R., Boyle, M.E., Gabel, G.L., and Hooge, P.N., 2000, Physical characteristics of Dungeness crab and halibut habitats in Whidbey Passage, Alaska: U.S. Geological Survey Open-File Report 00-032. Available online at http://geopubs.wr.usgs.gov/open-file/of00-032/.

Cochrane, G.R., Carlson, P.R., Denny, J.F., Boyle, M.E., Taggart, S.J., and Hooge, P.N., 1998, Physical characteristics of Dungeness crab and halibut habitats in Glacier Bay, Alaska: U.S. Geological Survey Open-File Report 98-791. Available online at http://geopubs.wr.usgs.gov/open-file/of98-791.

Dartnell, P., and Gardner J.V., 2004, Predicting seafloor facies

from multibeam bathymetry and backscatter data: Photogrammetric Engineering and Remote Sensing, v.70, no. 9, p. 1081-1091.

ERDAS Field Guide, 1999, ERDAS Inc., Atlanta, Georgia. p. 672

Etherington, L.L., Cochrane, G.R., Harney, J.N., Taggart, J., Mondragon, J., Andrews, A., Madison, E., Chezar, H., and de La Bruere, J., Glacier Bay seafloor habitat mapping and classification: first look at linkages with biological patterns. 2006. In: Piatt, J.F., and S.M. Gende (eds.). Proceedings of the Fourth Glacier Bay Science Symposium, Juneau, Alaska, October 2004. U.S. Geological Survey Scientific Investigation Report USGS/BRD/SIR-2006, Washington DC, 9 p.

Etherington, L.L., Hooge, P.N., and Hooge., P.N., 2004, Factors affecting seasonal and regional patterns of surface water oceanographic properties within a fjord estuarine system: Glacier Bay, AK. U.S. Geological Survey, Alaska Science Center, Anchorage, AK, p. 79.

Greene, G.H., Yoklavich, M.M, Starr, R.M., O'Connell, V.M., Wakefield, W.W., Sullivan, D.E., McRea, J.E., and Cailliet, G. M., 1999, A classification scheme for deep seafloor habitats: Oceanologica Acta, v. 22, p. 663-678.

Hall, D.K., Benson, C.S., and Field, W.O.,1995, Changes of glaciers in Glacier Bay, Alaska, using ground and satellite measurements: Physical Geography, 16(1):27-41.

Harney, J.N., Cochrane, G.R., Etherington, L.G., Dartnell, P., and Chezar, H., Geologic characteristics of benthic habitats in Glacier Bay, Alaska, derived from geophysical data, videography, and sediment sampling. 2006. In: Piatt, J.F., and S.M. Gende (eds.). Proceedings of the Fourth Glacier Bay Science Symposium, Juneau, Alaska, October 2004. U.S. Geological Survey Scientific Investigation Report USGS/BRD/ SIR-2006, Washington DC, 9 p.

Koppes, M.N., and Hallet., B., 2002, Influence of rapid glacial retreat on the rate of erosion by tidewater glaciers: Geology v. 30, no. 1, p. 47-50.

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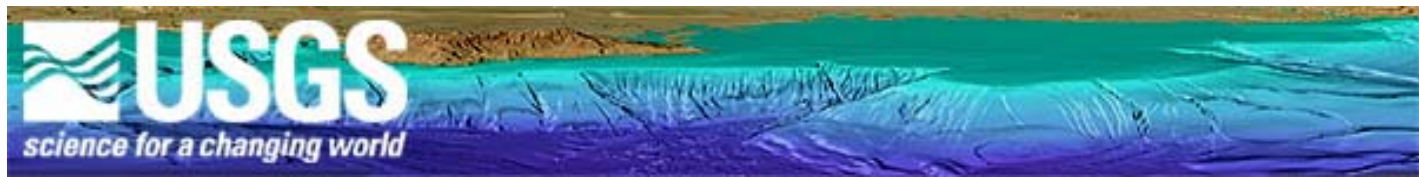gcochrane@usgs.gov
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Geologic characteristics of benthic habitats in Glacier Bay, southeast Alaska

METHODS

Sea Floor Video

Video imagery of the sea floor in Glacier Bay at depths of 15-370 m was obtained in April 2004 on a USGS research cruise aboard the R/V Alaskan Gyre. (The cruise report can be viewed online at http://walrus.wr.usgs.gov/infobank/g/g104gb/html/g-1-04-gb.meta.html). The principal objectives during seafloor video data collection were to: (1) record geologic and biologic characteristics of the seafloor real-time, (2) ground-truth geophysical data (bathymetry and backscatter) by resolving both common and unique features of the sea floor, and (3) examine regions of transition between different substrate types suggested in acoustic backscatter data. Video observations would eventually be used to construct maps of seafloor morphology, substrate type, and habitat distribution. Therefore transect locations were selected on the basis of the existence, quality, and complexity of geophysical data and on regions of geologic transition and/or biologic significance.

A towed video sled was used to collect sea floor data and imagery . The sled was constructed of welded aluminum with the following dimensions: length = 1.36 m (53.5"), width = 0.44 m (17.5"), height = 0.52 m (20.6"). The sled was equipped with forward- and downward-looking video cameras, lights, altimeter, pressure sensor, and pitch and roll sensors. Two down-pointing lasers spaced 20 cm apart provided scale on the seafloor. As equipped (including ballast for deep marine operations), the sled weighed ~57 kg (125 lbs) in air. The rigging consisted of a four-point bridle assembly attached to a swivel. A 14-mm (0.56") electromechanical cable with a strain-relief grip was threaded through the rigging and connected to the electronic components mounted on the sled frame. A 1000-kg (~2200 lb) winch was mounted on the deck of the vessel and used to deploy the camera sled with ~600 m (~2000') of spooled electromechanical cable.

The sled was towed behind the vessel at speeds of 0.5-1.5 knots, and the winch operator maintained its altitude above the seafloor at 1-2 m as much as possible. Video footage was recorded to digital mini-DV tape and then copied to DVD. Ship position was determined by a CSI Wireless

differential geographic positioning system (dGPS). All instrument data were multiplexed through a sub-sea housing and transmitted by the 12-conductor cable to a topside console. Latitude, longitude, height above the seafloor, pitch, roll, water depth, ship speed, ship heading, and Greenwich Mean Time (GMT) were continuously imprinted on the digital video tape while recording. These data were also automatically recorded once per second in a navigational text file.

Positional accuracy of the sled relative to the ship's dGPS position varied with water depth, current speed and direction, and environmental conditions. Cable layback was not measured directly but was estimated to be approximately equal to the water depth during most deployments. For example, along the deepest transects (370 m water depth), video observations may have positional uncertainties of ~200 m relative to the ship's location.

Visually observed sea floor characteristics (geomorphology, sediment texture, and biota) were digitally recorded in real time at 30 second intervals by a geologist and a biologist watching the towed video (after Anderson et al. in press). Observation codes were entered as "events" in G-Nav navigation software (see acknowledgments) using an "X-Keys" programmable keypad and a Dell Inspiron 8100 laptop computer. Time (GMT), dGPS position, and other ship data for were automatically recorded in the text file each time an observation event was entered. Observations at each event included:

- primary and secondary substrate type (e.g. boulder/cobble, rock/sand, mud/mud)
- substrate complexity (rugosity)
- seafloor slope
- benthic biomass (low, medium, or high)
- the presence of benthic organisms and demersal fish
- small-scale sea-floor features (e.g., ripples, tracks, and burrows).

Nearly 42 hours of underwater video were collected and logged real-time in this manner on 52 transects in the lower and central bay, in the Beardslee and Marble Islands, offshore of Tlingit Point, and in parts of the east and west arms (view a location map of video observations).

Processing and Analytical Methods

Seafloor observations and geophysical data were co-registered, integrated, and analyzed using ArcGIS, ArcGrid, and ERDAS Imagine software to formulate predictions of benthic habitat distribution in the central and lower bay (Dartnell and Gardner 2004; Chavez 1984).

All grid calculations were performed using ArcGrid. (Commands and code are available on request.) Multibeam bathymetry and acoustic reflectance data grids (each composed of more than three million pixels) were first de-sampled from 5 m to 20 m pixel resolution. ArcGrid calculations were then performed on both 20-m data grids to quantify the variance of

bathymetry and backscatter values within each "kernel" (in this case, 3x3 group of pixels).

"Maximum" acoustic images were calculated for each grid by running a filter that returned the maximum value within a kernel to the center cell of that kernel. "Minimum" acoustic images were similarly calculated such that the center cell of each kernel was the minimum value observed in that kernel. The "variance" was then calculated as the difference between the maximum and minimum images. Results were binned and assigned relative index values of 1-5 using an unsupervised classification in ERDAS. The central pixel of each kernel was assigned the index value which corresponded to the level of variance observed in the surrounding 8 pixels (Table 1). These calculations and steps were performed on four raster images: bathymetric variance, backscatter variance, backscatter intensity, and seafloor slope.

Index value	Relative variance, intensity, or slope
1	very low
2	low
3	moderate
4	high
5	very high

Table 1. Index of values assigned to the central pixel of each kernel in the raster images to express the relative variability in acoustic data observed within each 3x3 group of pixels.

Bathymetric variance (depth variability)
A measure of the variance in water depth observed in the kernel. When depths were homogeneous within a kernel, the bathymetric variance of the central pixel was low (1); when depths were more variable within a kernel, the index of the central pixel was high (5). For example, high bathymetry variance values resulted for areas of seafloor having a wide range of depths over relatively small area, such as rocky outcrops. Low bathymetry variance values resulted for smooth, flat, or homogeneous areas of seafloor.

Backscatter variance (textural variability)
A measure of the variance in acoustic reflectance (backscatter) observed in the kernel. When the range of backscatter values within a kernel was low, the textural variability index of the central pixel was low (1); when the backscatter values were more variable within a kernel, the index of the central pixel was high (5). For example, high backscatter variance values resulted for areas of seafloor having a wide range of backscatter values, such as a rocky outcrop with pockets of fine sediment (mixed patches of high and low backscatter). Low backscatter variance values resulted for homogeneous areas of seafloor, such as in muddy basins.

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Geomorphic Classification

We defined four principal geomorphic classes on the basis of our analysis of acoustic data combined with video observations (Table 2). We constructed a hierarchical decision tree using ERDAS Imagine 8.4 software. The decision-tree framework consists of hypotheses, variables, and rules that use a conditional hierarchy to parse and classify the input data (ERDAS 1999):

- hypothesis = the geomorphic class into which the pixel will be classified
- variable = input data; raster image of derived values (e.g. bathymetry variance)
- rule = a conditional statement about the variable's pixel (data) values that describes the hypothesis.

Because the variables (raster images) were co-registered, rules are established that compared and tested pixel values within and between images. Multiple rules and hypotheses could be placed in a hierarchy that best described the hypothesis.

Hypotheses were formulated that correlated general substrate type observed in video with bathymetric variance, backscatter variance, backscatter intensity, and slope. Rules were first made to correctly classify the (known) substrate type along video transect lines. These rules were then applied to acoustic data in other areas for which no video observations existed.

We tested each hypothesis by running its set of rules through the supervised decision-tree classification and comparing the geomorphic class output to known substrate type at ~30,000 data points. The final classification scheme that produced the best fit to observational data is summarized in Table 2. These hierarchical rules were eventually used to produce maps of substrate type and sediment texture in Glacier Bay. Further details on how this was accomplished in ArcGIS are provided in the following sections.

Geomorphic class	Seafloor characteristics	Bathymetric variance	Backscatter variance	Backscatter intensity	Slope
1	high complexity, high slope boulder or rock	3 - 5	2 - 5	1 - 5	2 - 5
2	high complexity, low slope boulder or rock	3 - 5	2 - 5	1 - 5	1
	fine-grained				

3	homogeneous mud	1	1 - 3	1 - 3	1
4	unsorted, unconsolidated sediment (sand- to boulder- sized), glacial till	1 - 2	1 - 5	1 - 5	1

Table 2. Characteristics of principal geomorphic classes used to define "rules" in a supervised ERDAS decision-tree classification of acoustic data in Glacier Bay.

Bathymetric Classification

Depth is an important factor in the distribution and life history of benthic organisms. Gridded multibeam bathymetry data were sorted into three classes, converted to isobaths, and used to subdivide habitat polygons (Table 3). Bathymetric classes were selected on the basis of biological and geological observations, as well as with an understanding of oceanographic patterns in the bay (Etherington et al. 2004). Depths less than 75 m represent environments with the highest energy and a well-mixed surface layer, particularly those areas south of Sitakaday Narrows and toward the mouth of Glacier Bay. The 200 m boundary was selected on the basis of observed transitions in seafloor geology, benthic community structure, and oceanographic properties that occur bay-wide at this depth and represent a shift to conditions typical of deep-sea environments. Bathymetry values in the ArcGIS data table are in the form of negative elevations relative to sea level.

Isobath depth range
<= 75 m
75 - 200 m
>= 200 m

Table 3. Depth range of bathymetric class isobaths used to subdivide habitat polygons.

Seafloor Slope and Complexity

Slope and complexity refer to the bathymetric characteristics of a polygon as observed in sonar data. The degree of slope (0-90°) was

calculated from the multibeam bathymetry grid. Complexity is a relative description of seafloor rugosity (roughness), where low values are characteristic of flat, homogeneous sea beds and high values are characteristic rocky, rough, and variable sea beds. Relative values of complexity were assigned to GIS polygons on the basis of video observations, original ERDAS classification, and geomorphic variability within the polygon. For polygons in which bathymetry data did not exist or were inconclusive, slope and complexity fields in the ArcGIS data table were intentionally left blank. Table 4 defines the range of values applied, which are consistent with the Greene et al. (1999) classification system.

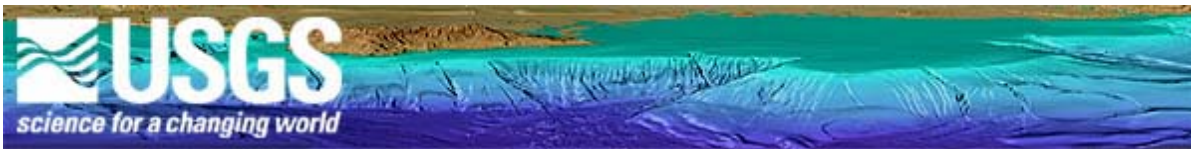| Slope value	Degree of slope
1	</= 1°
2	1° to 30°
3	> 30°
Complexity value	Degree of complexity
B	Low complexity
C	Moderate complexity
D	High complexity

Table 4. Index of seafloor slope and complexity values. Degree of slope was calculated from multibeam bathymetry and binned into three classes (consistent with Greene et al. (1999)). Seafloor complexity was recorded in video observations and is an attribute of those point features. Seafloor complexity is also an attribute of habitat polygon features that was assigned on the basis of bathymetry, backscatter, and video ground-truthing.

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Geologic characteristics of benthic habitats in Glacier Bay, southeast Alaska

USGS video sled aboard the R/V Alaskan Gyre in Glacier Bay (April 2004). The sled is equipped with forward- and downward-looking video cameras, lights, altimeter, pressure sensor, and pitch and roll sensors. Two down-pointing lasers spaced 20 cm apart provide scale on the seafloor. Position is tracked using ship navigation and an estimate of sled layback.

Geologic characteristics of benthic habitats in Glacier Bay, southeast Alaska - Image 1

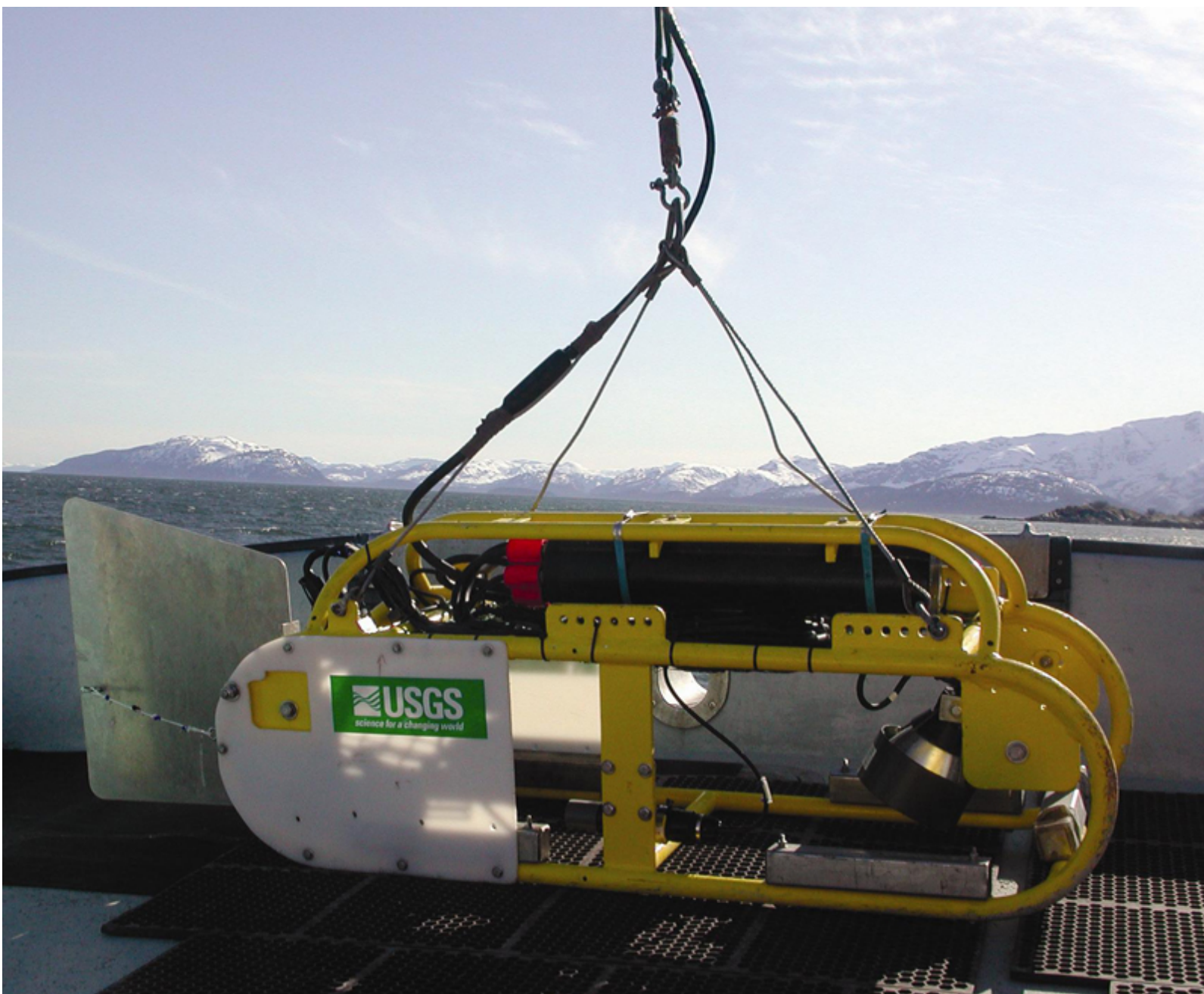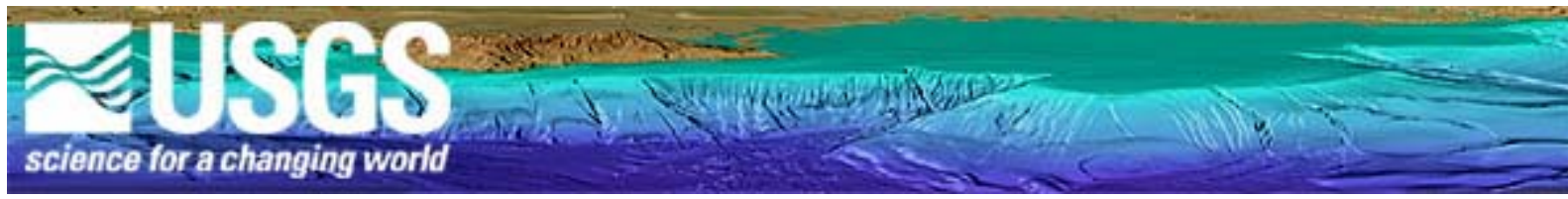[Accessibility](#) | [FOIA](#) | [Privacy](#) | [Policies and Notices](#)
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Geologic characteristics of benthic habitats in Glacier Bay, southeast Alaska

RESULTS

Seafloor Features

Sediment Type

Acoustic reflectance (backscatter) of the seafloor in Glacier Bay is shown in Figure 2 with symbols denoting primary substrate type observed in seafloor video. Coarse grain sizes (e.g. sand, pebbles, cobbles, and boulders) dominate the seafloor of the lower bay (brighter areas). Mud is the dominant sediment type in the deeper central bay (darker areas).

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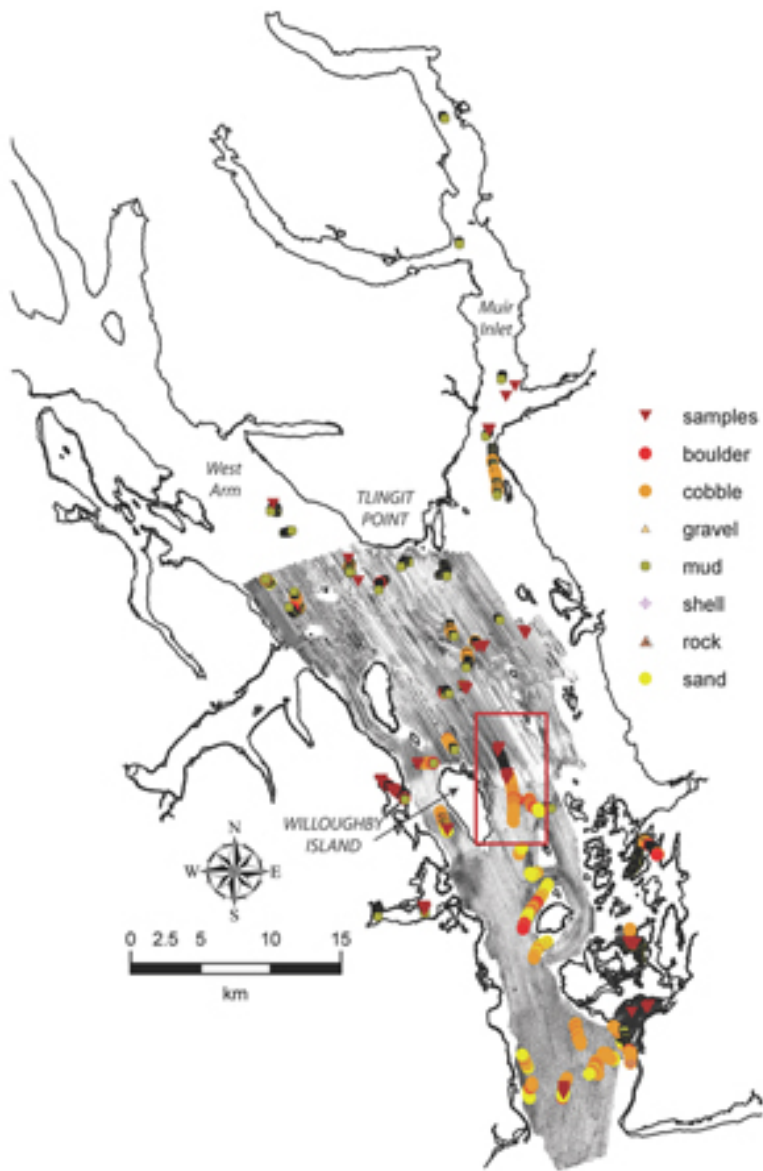**Data Catalog**

Revision History

Figure 2. Multibeam acoustic reflectance in Glacier Bay , with symbols denoting primary substrate type from video observations. The boxed area corresponds to the region of transition east of Willoughby Island discussed below. To view a large version of Figure 2 in a new window, click on the image above.

Our classification of sonar data does not distinguish between boulder-dominated glacial till and rock reefs because video observations in Glacier Bay revealed no complex rock outcrops. The four-class geomorphic output from ERDAS (described in Methods) served as a basemap for delineating and characterizing polygons of benthic substrates and habitat types in ArcGIS. Polygons were assigned a "bottom induration" of either "mixed" (for glacial till and coarse-sized sediments) or "soft" (for sand-sized and finer sediments). Sediment texture details (such as "sand" and "mud") were

assigned to polygons where grain size was reasonably known or inferred from video observations. Sediment texture follows the Wentworth grain-size scale (Table 5).

Meso/Macrohabitats

Seafloor features between 1 meter and 1 kilometer in scale are defined as "Meso/Macrohabitat" types in the Greene classification system. Several interesting seafloor features were identified in acoustic data and ground-truthed using towed video, including sand waves, gullies, mud mounds, slumps, and depressions (flat basins). Codes for these features follow the Greene et al. (1999) classification system except where noted (codes we created specifically for this environment are shown in Table 6). For example, in the Greene classification system, mounds and depressions are described by the same code ("m"). Because we felt it was important to distinguish bathymetric highs and lows, we employed Greene's "m" class for mounds (high features) and created a unique "v" class for large depressions and flat-floored basins. We created a unique "x" class for polygons in nearshore settings within ~200 m of the high-tide shoreline. These nearshore polygons were also assigned an underscored descriptor to specify the bathymetric class ("x_x" for polygons shallower than 75 m water depth; "x_y" for those in 75-200 m water depth). This distinguishes shallow, more energetic nearshore settings (such as those around the Marble Islands) from shoreline margins that are steeper and deeper (such as those surrounding Tlingit Point).

Meso/ Macrohabitat	Code	Description
gully	g	deep, muddy channels, often bounded by with steep walls of channelized mud
mud slump	s	mud deposit at the base of a sloping surface, appearing talus-like in bathymetry.

mound	m	bathymetric "highs" (large-scale features that are shallower than the surrounding seafloor)
depression (flat basin)	v	bathymetric "lows" (large-scale features that are deeper than the surrounding seafloor)
nearshore	x_x	polygons within 200 m of the high-tide shoreline, having water depths $\leq$ 75 m
nearshore	x_y	polygons within 200 m of the high-tide shoreline, having water depths > 75 m
biomodal sediment	b	mixture of two distinct grain-size classes
interface	i	distinct contact between different substrate or sediment types

Table 6. Codes created in this study to characterize meso-scale and macro-scale seafloor features.

Substrate Map

The distribution of bathymetric classes, sediment type, and meso-scale and macro-scale seafloor features in Glacier Bay is illustrated in Figure 3. In general, mixed, unsorted glacial till (boulder-sized to sand-sized sediment), dominates the lower bay. The seafloor in deeper waters of the central bay is comprised of homogeneous, bioturbated mud.
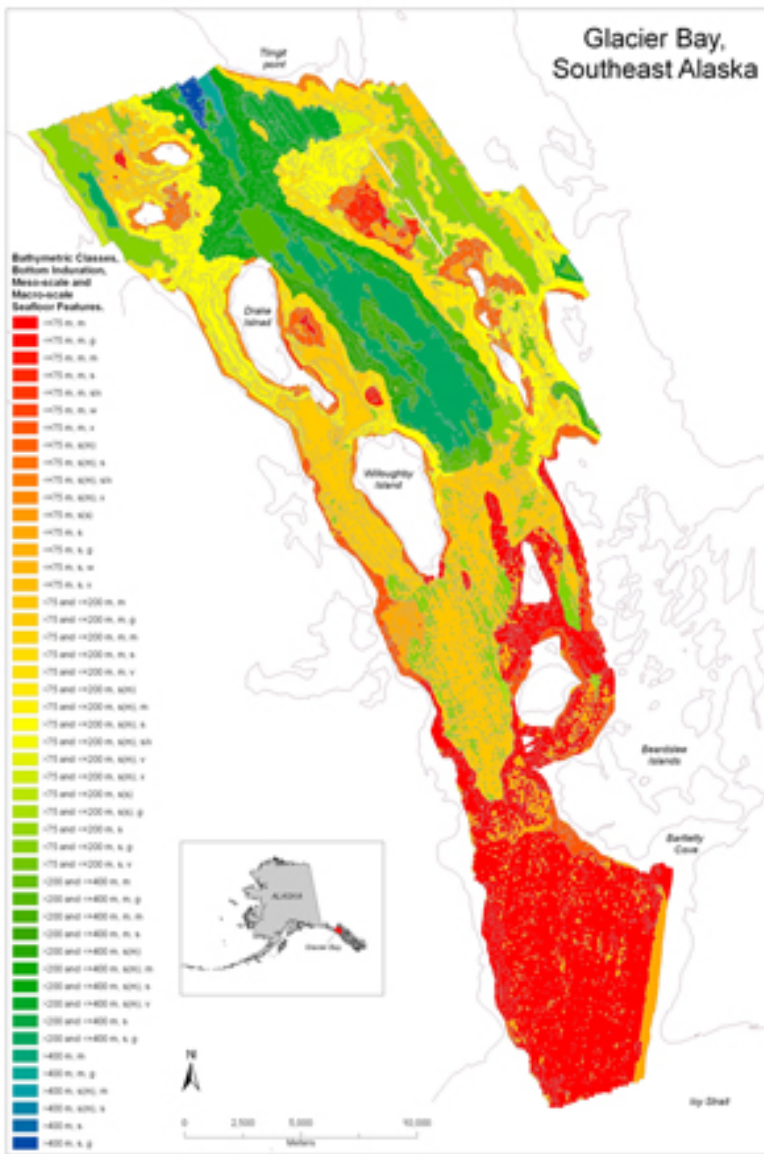
Figure 3. Map of bathymetric classes, bottom induration, and meso-scale and macro-scale seafloor features in Glacier Bay. To view a large version of Figure 3 in a new window, click on the image above.

Regions of Transition

Transitional areas exist between geomorphic end-members, as shown in the acoustic data and video transect just east of Willoughby Island (Figures 2 and 4). Acoustic reflectance of the seafloor is low in the deeper, northern part of the transect, appearing dark in sonar imagery (200 m water depth). Video confirms the seafloor is low in relief and comprised of soft, muddy, bioturbated sediment (image A). Southward along the transect, acoustic reflectance increases (brightens) as seafloor sediment coarsens to cobbles and

boulders (images B-C; 50-90 m water depth). These complex substrates provide habitat for gorgonians, mollusks, and other benthic organisms (images D-E).
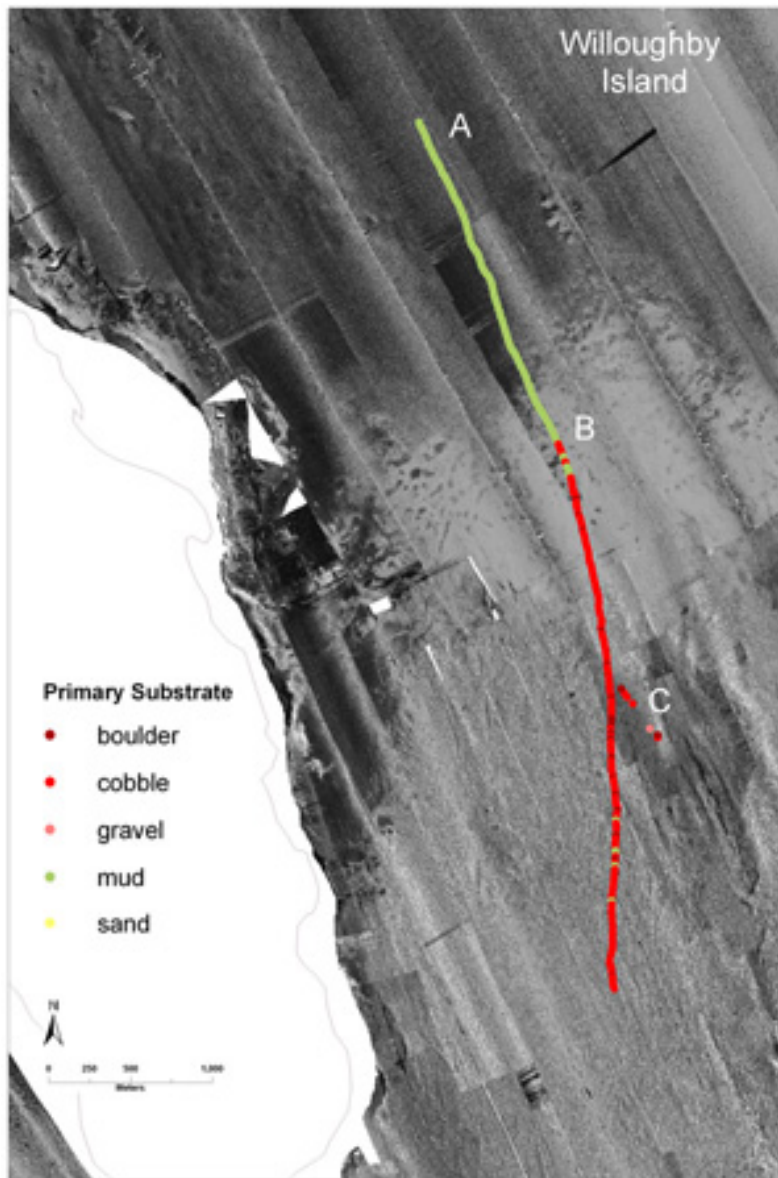

Figure 4. Acoustic backscatter data and video observations illustrate a region of transition in seafloor properties east of Willoughby Island, from soft, muddy sediment in the north (top) to coarse-grained boulders and cobbles in the south. To view a large version of Figure 4 in a separate window, click on the image above. Letters A, B, C, indicate the location of images A-C below. The field of view of these images captured from video is approximately 1-2 meters.

Image A. Soft, muddy, bioturbated sediment observed in seafloor video at location A in Figure 4. To view a large version of Image A in a new window, click on the image above.

Image B. Mixed coarse sediment observed in seafloor video at location B in Figure 4. To view a large version of Image B in a new window, click on the image above.

Image C. Cobbles and boulders observed in seafloor video at location C in Figure 4. To view a large version of Image C in a new window, click on the image above.

Image D. Living scallops on sand-cobble substrate observed in seafloor video collected south-east of Willoughby Island (location not shown). To view a large version of Image D in a new window, click on the image above.
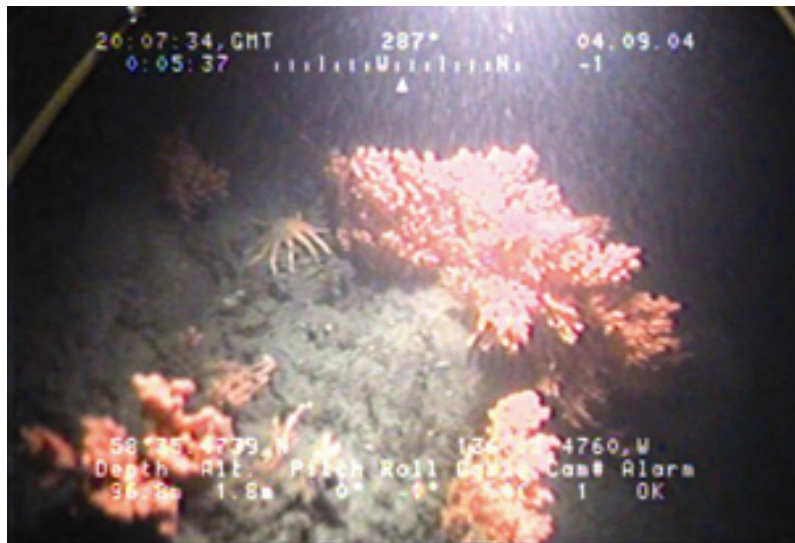
Image E. Gorgonians on complex boulder-cobble substrate observed in seafloor video collected south-east of Willoughby Island (location not shown). To view a large version of Image E in a new window, click on the image above.

Sand Waves

In the lower central bay (~50 m water depth), a series of obliquely-oriented features revealed in multibeam bathymetry data were observed in video ground-truthing to be steep sand waves 1-2 m in height (Figure 5). The interface between coarse cobbles and sand ripples is abrupt (image F). Pebbles, cobbles, and shells are abundant in the troughs between ripples (image G).
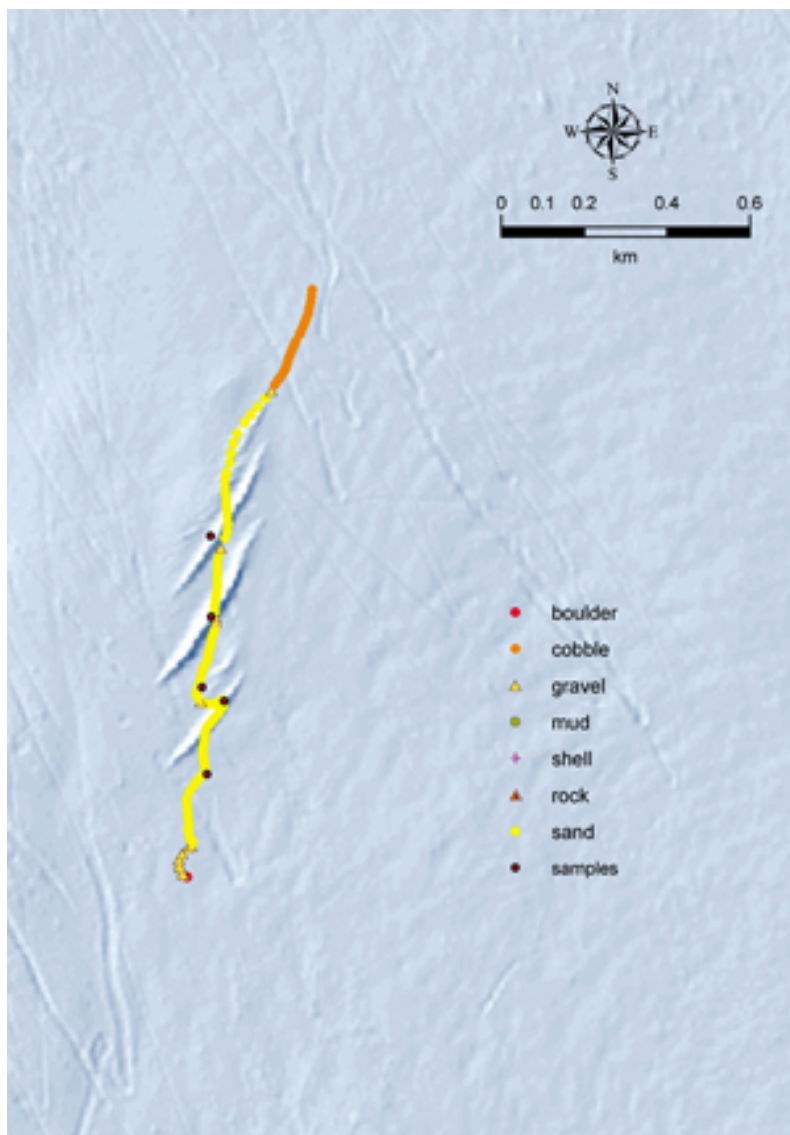
Figure 5. Obliquely-oriented features in multibeam bathymetry of lower Glacier Bay. Video observations reveal these features are sand waves 1-2 m in height. Linear features also observable in the figure are gouges in sediment caused by iceberg movement (Carlson et al. 2005). To view a large version of Figure 5 in a separate window, click on the image above.
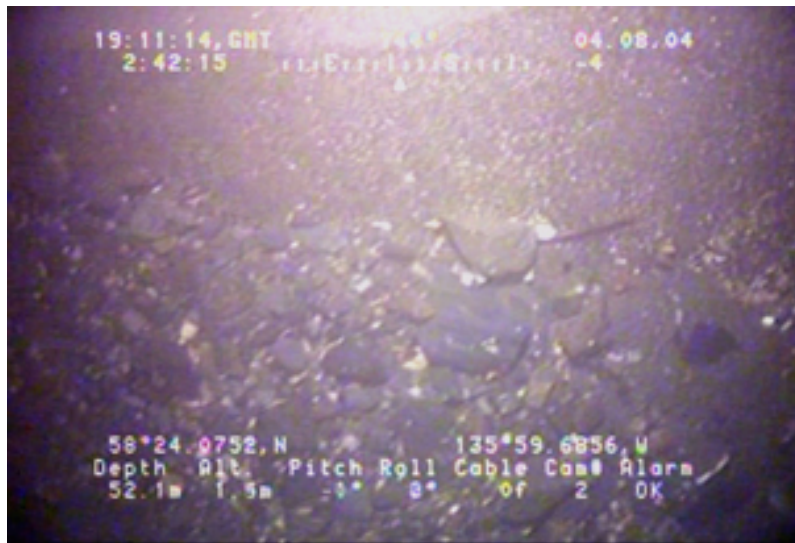
Image F. Abrupt transition between coarse cobbles and sand waves of the lower bay shown in Figure 5. To view a large version of Image F in a new window, click on the image above.
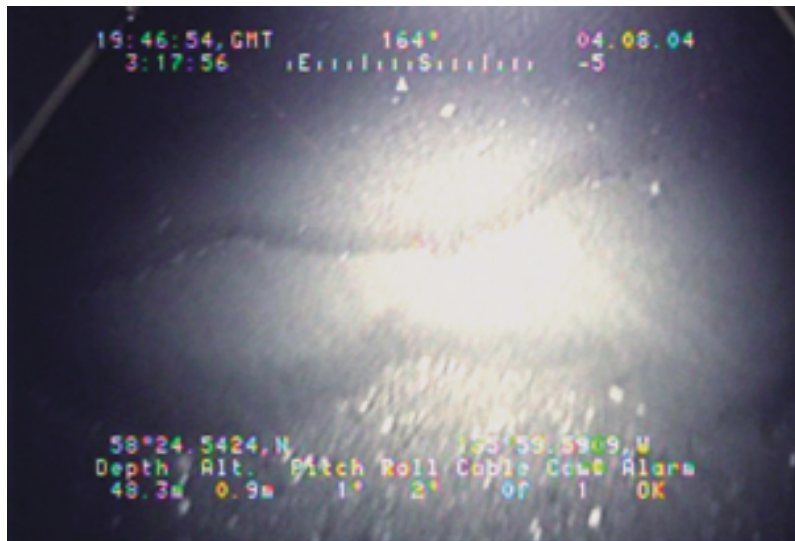

Image G. Pebbles, cobbles, and shells are abundant in the troughs between sand waves of the lower bay shown in Figure 5. To view a large version of Image G in a new window, click on the image above.

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Habitat Classification

Habitat Classification Map

Geomorphic features, sediment types, and bathymetric classes are delineated as polygons in this habitat map, owing

to their unique characteristics of sediment texture, physical morphology, and energetic setting, all of which are important to benthic organisms. Suspension-feeding organisms such as mussels, scallops, sponges, and corals were found on mixed substrates in areas of high current, particularly in the lower central Bay. Soft sediment benthic environments were host to halibut, flounder, Tanner crabs, shrimp, other small crustaceans, and infaunal worms. Figure 6 illustrates the distribution of benthic habitat types in Glacier Bay. Table 7 provides a translation of the benthic habitat codes used in this study. Details of the classification methodology can be found in Greene et al. (1999).
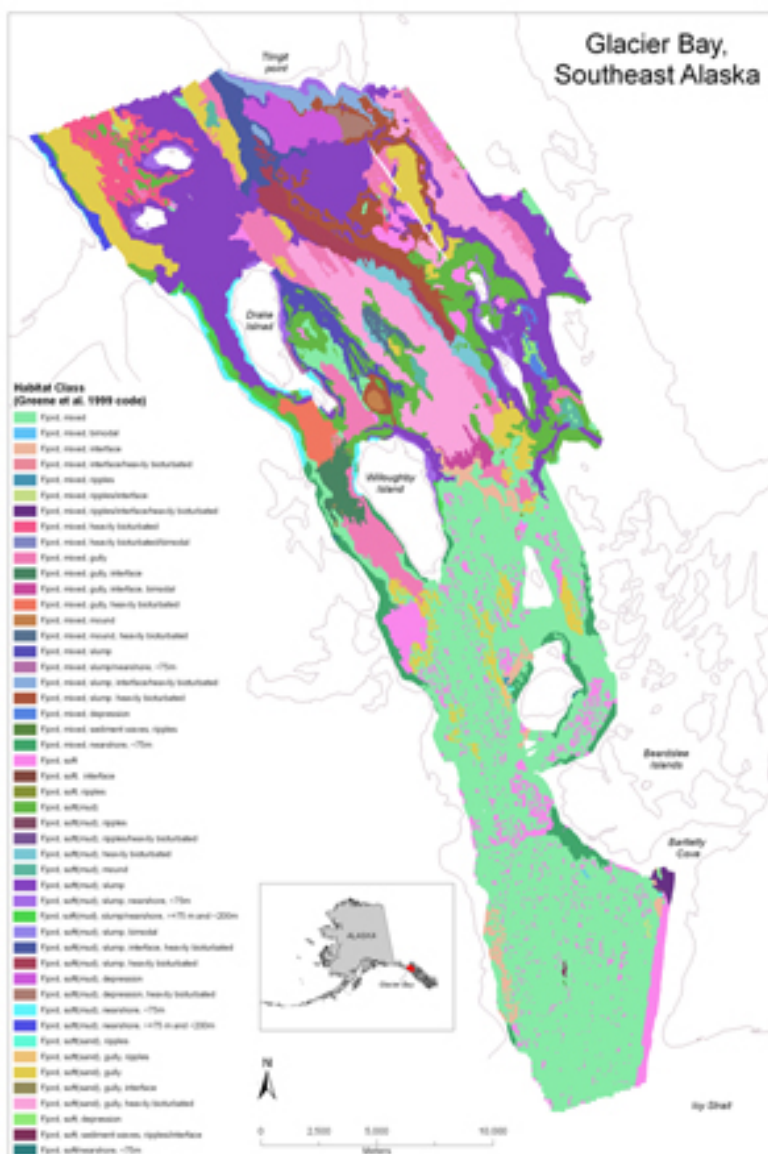

Figure 6. Benthic habitats in Glacier Bay, southeast Alaska. Classification follows Greene et al. (1999). To view a large version of Figure 6 in a new window, click on the image above.

Habitat Classification Table

Code	Habitat description	Area (m2)	Area (%)
Im	Fjord mixed	135,787,405	31
Im _b	Fjord mixed bimodal	48,000	0.01
Im _i	Fjord mixed interface	4,815,053	1
Im _i_t	Fjord mixed interface heavily bioturbated	195939.0409	0.05
Im _r	Fjord mixed ripples	8,1834	0.02
Im _r_i	Fjord mixed ripples interface	120,000	0.03
Im _r_i_t	Fjord mixed ripples interface heavily bioturbated	845,745	0.21
Im _t	Fjord mixed heavily bioturbated	9,066,893	2
Im _t_b	Fjord mixed heavily bioturbated bimodal	44,582	0.01
Img	Fjord mixed gully	22,623,546	5.2
Img_i	Fjord mixed gully interface	3,547,276	0.81
Img_i_b	Fjord mixed interface heavily bioturbated	1,594,900	0.37
Img_t	Fjord mixed gully heavily bioturbated	3,522,000	0.81
Imm	Fjord mixed mound	497,025	0.11

Imm_t	Fjord mixed mound heavily bioturbated	1,371,600	0.31
Ims	Fjord mixed slump	5,414,590	1.24
Ims/x_x	Fjord mixed slump nearshore bathy class >-75m	563,342	0.13
Ims_i_t	Fjord mixed interface heavily bioturbated	4,236,882	0.1
Ims_t	Fjord mixed slump heavily bioturbated	17,424,569	4
Imv	Fjord mixed depression	833,925	0.2
Imw_r	Fjord mixed ripples	15,600	0.01
Imx_x	Fjord mixed nearshore bathy class >-75m	9,593,602	2.1
Is	Fjord soft	25,927,354	5.941
Is _i	Fjord soft interface	3,200	0.00071
Is _r	Fjord soft ripples	17,200	0.004
Isg	Fjord soft (sand) gully	25,587,410	5.87
Isg_i	Fjord soft (sand) gully interface	144,400	0.03
Isg_t	Fjord soft (sand) gully heavily bioturbated	32,482,503	7.45
Isv	Fjord soft depression	614,265	0.14
Isw_r_i	Fjord soft ripples interface	86,399	0.012

Isx_x	Fjord soft nearshore bathy class >-75m	91,100	0.02
Is(m)	Fjord soft (mud)	26,688,575	6.12
Is(m) _r	Fjord soft (mud) ripples	17,272	0.003
Is(m) _r_t	Fjord soft (mud) ripples heavily bioturbated	25,317	0.01
Is(m) _t	Fjord soft (mud) heavily bioturbated	3,587,580	0.82
Is(m) s/x_x	Fjord soft (mud) nearshore bathy class >-75m	5,199	0.001
Is(m)m	Fjord soft (mud) mound	1,961,018	0.45
Is(m)s	Fjord soft (mud) slump	65,448,806	15
Is(m)s/x_x	Fjord soft (mud) slump nearshore bathy class >-75m	476,735	1.1
Is(m)s/x_y	Fjord soft (mud) slump nearshore bathy class <= -75m and >-200m	1,723,051	0.4
Is(m)s_b	Fjord soft (mud) slump bimodal	27,329	0.01
Is(m)s_i_t	Fjord soft (mud) slump interface heavily bioturbated	5,410,350	1.24

Is(m)s_t	Fjord soft (mud) slump heavily bioturbated	6,277,790	1.44
Is(m)v	Fjord soft (mud) depression	5,888,071	1.35
Is(m)v_t	Fjord soft (mud) depression heavily bioturbated	1,397,369	0.32
Is(m)x_x	Fjord soft (mud) slump interface nearshore bathy class >-75m	3,650,170	0.84
Is(m)x_y	Fjord soft (mud) nearshore bathy class <= -75m and >-200m	1,744,902	0.40
Is(s) _r	Fjord soft (sand) ripples	119,152	0.02
Is(s)g_r	Fjord soft (sand) gully ripples	266,359	0.06

Table 7. Definition of benthic habitat codes in Glacier Bay, southeast Alaska. Classification follows Greene et al. (1999).
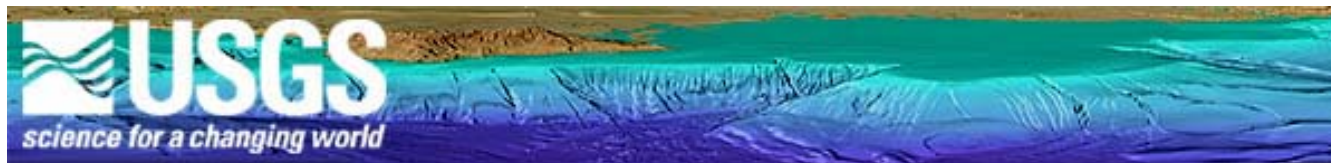
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last modified April 4, 2006 (mfd)

Geologic characteristics of benthic habitats in Glacier Bay, southeast Alaska

DATA CATALOG

Each GIS data file is listed with a brief description, links to figures, metadata files, and downloadable files. The data were compiled in ArcInfo (version 9.1 ESRI, 2005). Raster data layers are registered TIFF images are in the UTM Zone 8 coordinate system with datum NAD83. Point, line and polygon features are in shapefile format, and are projected in UTM Zone 8 coordinates with horizontal datum NAD83. We recommend you create a single new folder within which to unzip the files you want to use.

The downloadable files have been compressed with the UNIX "tar" and '"zip" commands and can be unzipped by "g unzip" on UNIX systems or with Winzip on Windows systems. The numbers following ".tgz" are the file size when compressed and uncompressed. The .tgz file for a TIFF image includes the image (.tif), the world registration file (.tfw), and the metadata file (.txt). The .tgz for a shape file

includes a .aux, .dbf , .shp, .shx, .sbx, and .sbn file, and the metadata .txt file as well as an .html metadata version of the .txt file.

Some virus-detection software will misinterpret the compressed format as virus-bearing. Use the override option (for example, "Stop" in McAfee VirusScan) to complete the file transfer.

ArcGIS Project File

Save this ArcGIS Project file glacierbay.tgz (compressed, 71K; uncompressed, 451 K) to the directory you created for this GIS to view with ArcGIS.

GIS data files

ArcGIS Theme Description	Quick view	Metadata	Compressed Files Right-click (Windows) or click-and-hold (Macintosh) to download files from web
Basemaps			
Bathy Contours at 75m, 200m, and 400m	bathy_contours_75m_200m_400m.html	text FAQ	bathy_contours_75m_200m_400m.tgz 393K (1.3M)
Glacier Bay Coast Line	glacierbay_coastline.html	text FAQ	glacierbay_coastline.tgz 223K (630K)
Glacier Bay Place Names	place_names.html	text FAQ	place_names.tgz 5K (17K)
Video habitat observations			

Assorted visual observations of benthic habitat from video of the central bay	video_obs_centralbay.html	text FAQ	video_obs_centralbay.tgz 105K (238K)
Assorted visual observations of benthic habitat from video of the Whidbey area.	video_obs_willoughby.html	text FAQ	video_obs_willoughby.tgz 484K (21M)
Multibeam Bathymetry			
The multibeam bathymetry data in XYZ ASCII and ArcInfo formats.	Multibeam Bathymetry Glacier Bay, Alaska	OF02-391	Delimited XYZ format 92M (442M) ArcInfo GRID format 50M (198M)
Hill shaded image of the multibeam bathymetry data	multibeam_hs.html	text FAQ	multibeam_hs.tgz 6M (42M)
The acoustic backscatter data	backscatter.html	text FAQ	backscatter.tgz 13M (48M)
Slope image of the multibeam bathymetry data	slope.html	text FAQ	slope.tgz 13M (48M)

Benthic habitat polygon shape file			
Glacier Bay Habitat Polygon Shapefile	gbhab.html	text [FAQ](FAQ)	gbhab.tgz 5M (18M)

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Geologic characteristics of benthic habitats in Glacier Bay, southeast Alaska

Figure 1. Location map of Glacier Bay National Park and Preserve, southeast Alaska.

URL: http://walrus.wr.usgs.gov/2006/1081/fig1.html
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last modified 12 December 2005 (ng)

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Geologic characteristics of benthic habitats in Glacier Bay, southeast Alaska

Figure 2. Multibeam acoustic reflectance in Glacier Bay, with symbols denoting primary substrate type from video observations. The boxed area corresponds to the region of transition east of Willoughby Island discussed below.

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Geologic characteristics of benthic habitats in Glacier Bay, southeast Alaska

Figure 3. Map of bathymetric classes, bottom induration, and meso-scale and macro-scale seafloor features in Glacier Bay.

URL: http://walrus.wr.usgs.gov/2006/1081/fig3.html
maintained by Michael Diggles
last modified 12 December 2005 (ng)

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Geologic characteristics of benthic habitats in Glacier Bay, southeast Alaska

Figure 4. Acoustic backscatter data and video observations illustrate a region of transition in seafloor properties east of Willoughby Island, from soft, muddy sediment in the north (top) to coarse-grained boulders and cobbles in the south.

URL: http://walrus.wr.usgs.gov/2006/1081/fig4.html
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Geologic characteristics of benthic habitats in Glacier Bay, southeast Alaska

Figure 5. Obliquely-oriented features in multibeam bathymetry of lower Glacier Bay. Video observations reveal these features are sand waves 1-2 m in height. To view a large version of Figure 5 in a separate window, click on the image above.

URL: http://walrus.wr.usgs.gov/2006/1081/fig5.html
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Geologic characteristics of benthic habitats in Glacier Bay, southeast Alaska

Figure 6. Benthic habitats in Glacier Bay, southeast Alaska. Classification follows Greene et al. (1999).

URL: http://walrus.wr.usgs.gov/2006/1081/fig6
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Geologic characteristics of benthic habitats in Glacier Bay, southeast Alaska

Glacier Bay coast line

ALASKA

Glacier Bay

N

| 0 | 2,500 | 5,000 | 10,000 |

Meters

Bartlett Cove

Icy Strait

Map showing coast line of Glacier Bay including inset of the State of Alaska.

![USGS logo](science for a changing world)

U.S. Geological Survey
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Geologic characteristics of benthic habitats in Glacier Bay, southeast Alaska

Bathymetric Contour

- — -75
- — -200
- — -400

ALASKA

Glacier Bay

N

| 0 | 2,500 | 5,000 | 10,000 |

Meters

Bartlett Cove

Icy Strait

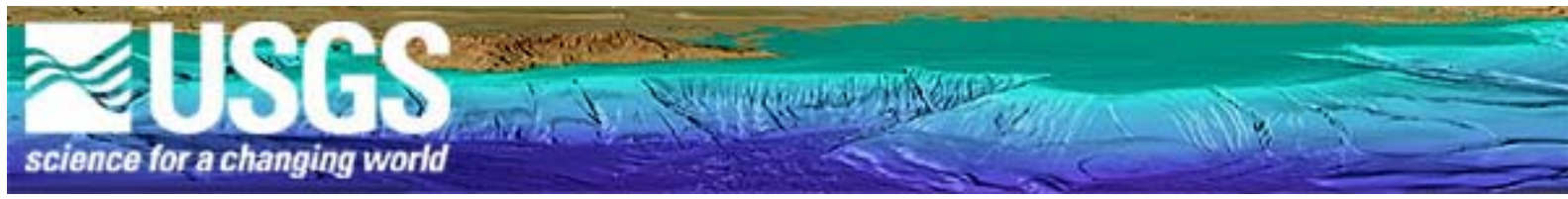Map showing bathymetric contours at 75m, 200m, and 400m in Glacier Bay including an inset of the State of Alaska.

Accessibility | FOIA | Privacy | Policies and Notices
U.S. Department of the Interior   U.S. Geological Survey

URL: http://walrus.wr.usgs.gov/
maintained by Michael Diggles
last modified April 5, 2006 (mfd)

http://pubs.usgs.gov/of/2006/1081/images/bathy_contours_75m_200m_400m.html (2 of 2)2/21/2007 5:43:18 AM

Glacier Bay Habitat polygons Edition: (Volume I, Version 1.0, 2005)

Metadata also available as

Frequently-anticipated questions:

- [What does this data set describe?](#)
  1. [How should this data set be cited?](#)
  2. [What geographic area does the data set cover?](#)
  3. [What does it look like?](#)
  4. [Does the data set describe conditions during a particular time period?](#)
  5. [What is the general form of this data set?](#)
  6. [How does the data set represent geographic features?](#)
  7. [How does the data set describe geographic features?](#)
- [Who produced the data set?](#)
  1. [Who are the originators of the data set?](#)
  2. [Who also contributed to the data set?](#)
  3. [To whom should users address questions about the data?](#)
- [Why was the data set created?](#)
- [How was the data set created?](#)
  1. [From what previous works were the data drawn?](#)
  2. [How were the data generated, processed, and modified?](#)
  3. [What similar or related data should the user be aware of?](#)
- [How reliable are the data; what problems remain in the data set?](#)
  1. [How well have the observations been checked?](#)
  2. [How accurate are the geographic locations?](#)
  3. [How accurate are the heights or depths?](#)
  4. [Where are the gaps in the data? What is missing?](#)
  5. [How consistent are the relationships among the data, including topology?](#)
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  3. [What's the catalog number I need to order this data set?](#)
  4. [What legal disclaimers am I supposed to read?](#)
  5. [How can I download or order the data?](#)
- [Who wrote the metadata?](#)

What does this data set describe?

Title:
> Glacier Bay Habitat polygons Edition: (Volume I, Version 1.0, 2005)

Abstract:
> This file is a subset of the original data collected during May 29 - June 6, 2001, by contract with Thales Geosolutions (<http://www.thales-geopacific.com/>) aboard the R/V Davidson as part of a cooperative survey conducted by the U.S. National Park Service and the U.S. Geological Survey (Biological Resources and Coastal and Marine Geology). The instrument was a Reson 8111 multibeam echosounder (<http://reson.com/sb8111.htm>).

Supplemental_Information:
> Additional information about the field activities from which this data set was derived are available online at
>
> Any use of trade, product, or firm names is for descriptive purposes only and does not imply endorsement by the U.S. Government.
>
> Although this Federal Geographic Data Committee-compliant metadata file is intended to document the data set in nonproprietary form, as well as in ArcInfo format, this metadata file may include some ArcInfo-specific terminology.

1. **How should this data set be cited?**

   > Cochrane, Guy R. , Harney, Jodi, Dartnell, Pete, Golden, Nadine, and Chezar, Hank, 2005, Glacier Bay Habitat polygons Edition: (Volume I, Version 1.0, 2005):.
   >
   > Online Links:
   >
   > - <http://pubs.usgs.gov/of/2006/1081/catalog.html/gbhab.tgz>

   This is part of the following larger work.

   > Cochrane, Guy R. , Harney, Jodi, Dartnell, Pete, Golden, Nadine, and Chezar, Hank, 2005, Geologic Characteristics of Benthic Habitats, Glacier Bay, Southeast Alaska, Volume I Edition: 1.0: Open-File Report USGS OFR 2006-1081, U.S. Geological Survey, Coastal and Marine Geology Program, Western Coastal and Marine Geology, Santa Cruz, CA.
   >
   > Online Links:

❍ <http://pubs.usgs.gov/of/2006/1081/index.html>

2. **What geographic area does the data set cover?**

   West_Bounding_Coordinate: -136.398760
   East_Bounding_Coordinate: -135.964910
   North_Bounding_Coordinate: 58.756052
   South_Bounding_Coordinate: 58.353225

3. **What does it look like?**

   <http://pubs.usgs.gov/of/2006/1081/images/bathy_contours_75m_200m_400m.html> (JPEG)
   JPEG image bathymetry contours at 75m, 200m, and 400m in Glacier Bay, Alaska.

4. **Does the data set describe conditions during a particular time period?**

   Calendar_Date: 2005
   Currentness_Reference: Ground Condition

5. **What is the general form of this data set?**

   Geospatial_Data_Presentation_Form: map

6. **How does the data set represent geographic features?**

   a. **How are geographic features stored in the data set?**

      This is a Vector data set. It contains the following vector data types (SDTS terminology):

      ■ String (595)

   b. **What coordinate system is used to represent geographic features?**

      The map projection used is NAD_1983_UTM_Zone_8N.

      Projection parameters:
          Straight-Vertical_Longitude_from_Pole: -135
          Standard_Parallel: 0.999600
          False_Easting: 500000.000
          False_Northing: 0.000

Planar coordinates are encoded using coordinate pair
Abscissae (x-coordinates) are specified to the nearest 0.000064
Ordinates (y-coordinates) are specified to the nearest 0.000064
Planar coordinates are specified in meters

The horizontal datum used is North American Datum of 1983.
The ellipsoid used is Geodetic ReferenceSystem 80.
The semi-major axis of the ellipsoid used is 6378137.
The flattening of the ellipsoid used is 1/298.2572222.

7. **How does the data set describe geographic features?**

Entity_and_Attribute_Overview:

FID Alias: FID Data type: OID Width: 4 Precision: 0 Scale: 0 Definition: Internal feature number. Definition Source: ESRI

Shape Alias: Shape Data type: Geometry Width: 0 Precision: 0 Scale: 0 Definition: Feature geometry. Definition Source: ESRI

ID Alias: ID Data type: Number Width: 10

CONTOUR Alias: CONTOUR Data type: Number Width: 14

Entity_and_Attribute_Detail_Citation: none

Who produced the data set?

1. **Who are the originators of the data set?** (may include formal authors, digital compilers, and editors)

   - Guy R. Cochrane
   - Jodi Harney
   - Pete Dartnell
   - Nadine Golden
   - Hank Chezar

2. **Who also contributed to the data set?**

This file is a subset of the original data collected during May 29 - June 6, 2001, by contract with Thales Geosolutions (<http://www.thales-geopacific.com/>) aboard the R/V Davidson as part of a cooperative survey conducted by the U.S. National Park Service and the U.S. Geological Survey (Biological Resources and Coastal and Marine Geology). The instrument was a Reson 8111 multibeam echosounder (<http://reson.com/sb8111.htm>).

3. **To whom should users address questions about the data?**

Guy R. Cochrane
United States Geological Survey (USGS)
Geophysicist
USGS, 400 Natural Bridges Drive
Santa Cruz, CA 95060-5792
USA

(831) 427-4754 (voice)
(831) 427-4748 (FAX)
gcochrane@usgs.gov

Why was the data set created?

These data are intended for science researchers, students, policy makers, and the general public. The data can be used with geographic information systems (GIS) software to display geologic and oceanographic information.

How was the data set created?

1. **From what previous works were the data drawn?**

2. **How were the data generated, processed, and modified?**

Date: 22-Nov-2005 (process 1 of 4)
    Download from NOAA Coastline Extractor,<http://rimmer.ngdc.noaa.gov/coast/>.

Date: 22-Nov-2005 (process 2 of 4)
    Nadine Golden edited and reduced number of features to study area boundaries.

Date: 22-Nov-2005 (process 3 of 4)
Converted from datum NAD27 to NAD83

Date: 22-Nov-2005 (process 4 of 4)
First draft of metadata created by Nadine Golden using USGS metadata tool "MP".

3. **What similar or related data should the user be aware of?**

United States Geological Survey, Coastal and Marine Geology (CMG), 2005, USGS CMG Glacier Bay, Alaska Habitat Metadata.

Online Links:

- [<http://pubs.usgs.gov/of/2006/1081/>](http://pubs.usgs.gov/of/2006/1081/)

This is part of the following larger work.

United States Geological Survey, Coastal and Marine Geology (CMG), 2005, USGS CMG InfoBank.

Online Links:

- [<http://walrus.wr.usgs.gov/InfoBank>](http://walrus.wr.usgs.gov/InfoBank)

How reliable are the data; what problems remain in the data set?

1. **How well have the observations been checked?**

   dervived in ArcGIS 9.1 from a georefereced bathymetry grid.

2. **How accurate are the geographic locations?**

3. **How accurate are the heights or depths?**

4. **Where are the gaps in the data? What is missing?**

   complete

5. **How consistent are the relationships among the observations, including topology?**

No additional checks for topological consistency were performed on this data.

How can someone get a copy of the data set?

Are there legal restrictions on access or use of the data?

Access_Constraints: None
Use_Constraints: Not suitable for navigation

1. **Who distributes the data set?** (Distributor 1 of 1)

United States Geological Survey (USGS)
c/o Guy R. Cochrane
Geophysicist
USGS, 400 Natural Bridges Drive
Santa Cruz, CA 95060-5792
USA

(831) 427-4754 (voice)
(831) 427-4748 (FAX)
gcochrane@usgs.go

2. **What's the catalog number I need to order this data set?**

3. **What legal disclaimers am I supposed to read?**

Please recognize the U.S. Geological Survey (USGS) as the source of this information.

Although these data have been used by the U.S. Geological Survey, U.S. Department of the Interior, no warranty expressed or implied is made by the U.S. Geological Survey as to the accuracy of the data.

The act of distribution shall not constitute any such warranty, and no responsibility is assumed by the U.S. Geological Survey in the use of this data, software, or related materials.

4. **How can I download or order the data?**

Who wrote the metadata?

Dates:
    Last modified: 2005
    Last Reviewed: 2005
Metadata author:
    United States Geological Survey (USGS)
    c/o Guy R. Cochrane
    Geophysicist
    USGS, 400 Natural Bridges Drive
    Santa Cruz, CA 95060-5792
    USA

    (831) 427-4754 (voice)
    (831) 427-4748 (FAX)
    gcochrane@usgs.gov

Metadata standard:
    FGDC Content Standards for Digital Geospatial Metadata ("CSDGM version 2") (FGDC-STD-001-1998)

Generated by [mp] version 2.8.6 on Tue Nov 29 11:51:44 2005

U.S. Geological Survey
Open-file Report 2006-1081

Geologic characteristics of benthic habitats in Glacier Bay, southeast Alaska

Place Name

ALASKA

Glacier Bay

N

| 0 | 3,250 | 6,500 | 13,000 |

Meters

Beardslee Islands

Bartletty Cove

Gustavus

Icy Strait

Map showing location of 10 reference place names in Glacier Bay area including an inset of the State of Alaska.

Glacier Bay Place Names Edition: (Version 1.0, 2005)

Metadata also available as

Frequently-anticipated questions:

- What does this data set describe?
    1. How should this data set be cited?
    2. What geographic area does the data set cover?
    3. What does it look like?
    4. Does the data set describe conditions during a particular time period?
    5. What is the general form of this data set?
    6. How does the data set represent geographic features?
    7. How does the data set describe geographic features?
- Who produced the data set?
    1. Who are the originators of the data set?
    2. Who also contributed to the data set?
    3. To whom should users address questions about the data?
- Why was the data set created?
- How was the data set created?
    1. From what previous works were the data drawn?
    2. How were the data generated, processed, and modified?
    3. What similar or related data should the user be aware of?
- How reliable are the data; what problems remain in the data set?
    1. How well have the observations been checked?
    2. How accurate are the geographic locations?
    3. How accurate are the heights or depths?
    4. Where are the gaps in the data? What is missing?
    5. How consistent are the relationships among the data, including topology?
- How can someone get a copy of the data set?
    1. Are there legal restrictions on access or use of the data?
    2. Who distributes the data?
    3. What's the catalog number I need to order this data set?
    4. What legal disclaimers am I supposed to read?
    5. How can I download or order the data?
- Who wrote the metadata?

What does this data set describe?

Title: Glacier Bay Place Names Edition: (Version 1.0, 2005)

Abstract:

This file is a small set of points associated to place names for Glacier Bay, southeast Alaska. This file was created for the sole purpose of enhancing the display of the Glacier Bay polygon and coastline data..

Supplemental_Information:

Additional information about the field activities from which this data set was derived are available online at

Any use of trade, product, or firm names is for descriptive purposes only and does not imply endorsement by the U.S. Government.

Although this Federal Geographic Data Committee-compliant metadata file is intended to document the data set in nonproprietary form, as well as in ArcInfo format, this metadata file may include some ArcInfo-specific terminology.

1. **How should this data set be cited?**

   Cochrane, Guy R. , Harney, Jodi, Dartnell, Pete, Golden, Nadine, and Chezar, Hank, 2005, Glacier Bay Place Names Edition: (Version 1.0, 2005):.

   Online Links:

   - <http://pubs.usgs.gov/of/2006/1081/catalog.html/place_names.tgz>

   This is part of the following larger work.

   Cochrane, Guy R. , Harney, Jodi, Dartnell, Pete, Golden, Nadine, and Chezar, Hank, 2005, Geologic characteristics of benthic habitats, Glacier Bay, southeast Alaska Edition: 1.0: Open-File Report USGS OFR 2006-1081X, U.S. Geological Survey, Coastal and Marine Geology Program, Western Coastal and Marine Geology, Santa Cruz, CA.

   Online Links:

   - <http://pubs.usgs.gov/of/2006/1081/index.html>

2. **What geographic area does the data set cover?**

   West_Bounding_Coordinate: -136.497887
   East_Bounding_Coordinate: -135.742928
   North_Bounding_Coordinate: 58.944617
   South_Bounding_Coordinate: 58.333702

3. **What does it look like?**

   <http://pubs.usgs.gov/of/2006/1081/images/place_names.html> (JPEG)
           JPEG image of place manes for Glacier Bay, Alaska.

4. **Does the data set describe conditions during a particular time period?**

   Calendar_Date: 2005
   Currentness_Reference: Ground Condition

5. **What is the general form of this data set?**

   Geospatial_Data_Presentation_Form: map

6. **How does the data set represent geographic features?**

   a. **How are geographic features stored in the data set?**

      This is a Vector data set. It contains the following vector data types (SDTS terminology):

      - point (10)

   b. **What coordinate system is used to represent geographic features?**

      The map projection used is NAD_1983_UTM_Zone_8N.

      Projection parameters:
              Straight-Vertical_Longitude_from_Pole: -135
              Standard_Parallel: 0.999600
              False_Easting: 500000.000
              False_Northing: 0.000

      Planar coordinates are encoded using coordinate pair
      Abscissae (x-coordinates) are specified to the nearest 0.000128

Ordinates (y-coordinates) are specified to the nearest 0.000128
Planar coordinates are specified in meters

The horizontal datum used is North American Datum of 1983.
The ellipsoid used is Geodetic ReferenceSystem 80.
The semi-major axis of the ellipsoid used is 6378137.
The flattening of the ellipsoid used is 1/298.2572222.

7. **How does the data set describe geographic features?**

Entity_and_Attribute_Overview:

FID Alias: FID Data type: OID Width: 4 Precision: 0 Scale: 0 Definition: Internal feature number. Definition Source: ESRI

Shape Alias: Shape Data type: Geometry Width: 0 Precision: 0 Scale: 0 Definition: Feature geometry. Definition Source: ESRI

name Alias: name Data type: String Width: 50

Entity_and_Attribute_Detail_Citation: none

Who produced the data set?

1. **Who are the originators of the data set?** (may include formal authors, digital compilers, and editors)

   ❍ Guy R. Cochrane
   ❍ Jodi Harney
   ❍ Pete Dartnell
   ❍ Nadine Golden
   ❍ Hank Chezar

2. **Who also contributed to the data set?**

   This file is a small set of points associated to place names for Glacier Bay, southeast Alaska. This file was created for the sole purpose of enhancing the display of the Glacier Bay polygon and coastline data created by Nadine Golden.

3. **To whom should users address questions about the data?**

> Guy R. Cochrane
> United States Geological Survey (USGS)
> Geophysicist
> USGS, 400 Natural Bridges Drive
> Santa Cruz, CA 95060-5792
> USA
>
> (831) 427-4754 (voice)
> (831) 427-4748 (FAX)
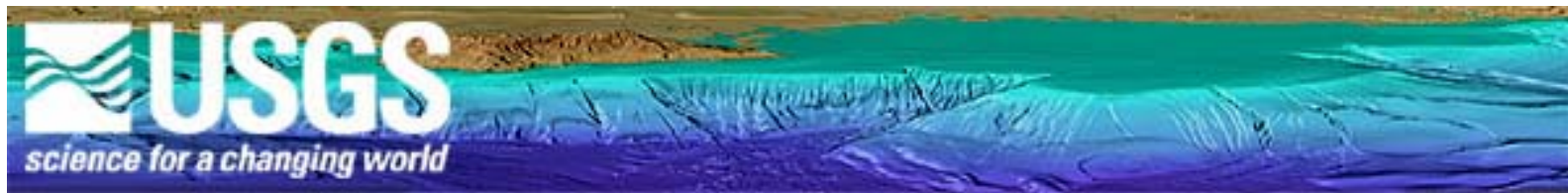> gcochrane@usgs.gov

Why was the data set created?

These data are intended for science researchers, students, policy makers, and the general public. The data can be used with geographic information systems (GIS) software to display geologic and oceanographic information.

How was the data set created?

1. **From what previous works were the data drawn?**

2. **How were the data generated, processed, and modified?**

Date: 22-Nov-2005 (process 1 of 3)
    Nadine Golden created point features and added place name attribute.

Date: 22-Nov-2005 (process 2 of 3)
    Created at projection datum NAD83

Date: 22-Nov-2005 (process 3 of 3)
    First draft of metadata created by Nadine Golden using USGS metadata tool "MP".

3. **What similar or related data should the user be aware of?**

> United States Geological Survey, Coastal and Marine Geology (CMG), 2005,

USGS CMG Glacier Bay, Alaska Habitat Metadata.

Online Links:

- <http://pubs.usgs.gov/of/2006/1081/>

This is part of the following larger work.

United States Geological Survey, Coastal and Marine Geology (CMG), 2005, USGS CMG InfoBank.

Online Links:

- <http://walrus.wr.usgs.gov/InfoBank>

How reliable are the data; what problems remain in the data set?

1. **How well have the observations been checked?**

   Data was created to match NOAA data with sufficient precision 1 m changes along the ground.

2. **How accurate are the geographic locations?**

3. **How accurate are the heights or depths?**

4. **Where are the gaps in the data? What is missing?**

   complete

5. **How consistent are the relationships among the observations, including topology?**

   No additional checks for topological consistency were performed on this data.

How can someone get a copy of the data set?

Are there legal restrictions on access or use of the data?

Access_Constraints: None
Use_Constraints: Not suitable for navigation

1. **Who distributes the data set?** (Distributor 1 of 1)

   United States Geological Survey (USGS)
   c/o Guy R. Cochrane
   Geophysicist
   USGS, 400 Natural Bridges Drive
   Santa Cruz, CA 95060-5792
   USA

   (831) 427-4754 (voice)
   (831) 427-4748 (FAX)
   gcochrane@usgs.go

2. **What's the catalog number I need to order this data set?**

3. **What legal disclaimers am I supposed to read?**

   Please recognize the U.S. Geological Survey (USGS) as the source of this information.

   Although these data have been used by the U.S. Geological Survey, U.S. Department of the Interior, no warranty expressed or implied is made by the U.S. Geological Survey as to the accuracy of the data.

   The act of distribution shall not constitute any such warranty, and no responsibility is assumed by the U.S. Geological Survey in the use of this data, software, or related materials.

4. **How can I download or order the data?**

Who wrote the metadata?

Dates:
   Last modified: 2005
   Last Reviewed: 2005
Metadata author:

United States Geological Survey (USGS)
c/o Guy R. Cochrane
Geophysicist
USGS, 400 Natural Bridges Drive
Santa Cruz, CA 95060-5792
USA

(831) 427-4754 (voice)
(831) 427-4748 (FAX)
gcochrane@usgs.gov

Metadata standard:
FGDC Content Standards for Digital Geospatial Metadata ("CSDGM version 2") (FGDC-STD-001-1998)

Generated by <u>mp</u> version 2.8.6 on Tue Nov 29 12:19:44 2005

U.S. Geological Survey
Open-file Report 2006-1081

Geologic characteristics of benthic habitats in Glacier Bay, southeast Alaska

Map showing video observations locations in central Glacier Bay including an inset of the State of Alaska.

Glacier Bay Video Observations

Metadata also available as

Frequently-anticipated questions:

- [What does this data set describe?](#)
    1. [How should this data set be cited?](#)
    2. [What geographic area does the data set cover?](#)
    3. [What does it look like?](#)
    4. [Does the data set describe conditions during a particular time period?](#)
    5. [What is the general form of this data set?](#)
    6. [How does the data set represent geographic features?](#)
    7. [How does the data set describe geographic features?](#)
- [Who produced the data set?](#)
    1. [Who are the originators of the data set?](#)
    2. [Who also contributed to the data set?](#)
    3. [To whom should users address questions about the data?](#)
- [Why was the data set created?](#)
- [How was the data set created?](#)
    1. [From what previous works were the data drawn?](#)
    2. [How were the data generated, processed, and modified?](#)
    3. [What similar or related data should the user be aware of?](#)
- [How reliable are the data; what problems remain in the data set?](#)
    1. [How well have the observations been checked?](#)
    2. [How accurate are the geographic locations?](#)
    3. [How accurate are the heights or depths?](#)
    4. [Where are the gaps in the data? What is missing?](#)
    5. [How consistent are the relationships among the data, including topology?](#)
- [How can someone get a copy of the data set?](#)
    1. [Are there legal restrictions on access or use of the data?](#)
    2. [Who distributes the data?](#)
    3. [What's the catalog number I need to order this data set?](#)
    4. [What legal disclaimers am I supposed to read?](#)
    5. [How can I download or order the data?](#)
- [Who wrote the metadata?](#)

What does this data set describe?

Title: Glacier Bay Video Observations
Abstract:
> Point based visual observations of benthic habitat from a samples obtained with a video sled.

Supplemental_Information:
> Any use of trade, product, or firm names is for descriptive purposes only and does not imply endorsement by the U.S. Government. Metadata for this data set can also be found in the USGS Coastal and Marine Geology InfoBank, cruise ID G-1-04-GB, URL: http://walrus.wr.usgs.gov/infobank/g/g104gb/html/g-1-04-gb.meta.html

> Although this Federal Geographic Data Committee-compliant metadata file is intended to document the data set in nonproprietary form, as well as in ArcInfo format, this metadata file may include some ArcInfo-specific terminology.

1. **How should this data set be cited?**

   > Cochrane, Guy R. , Harney, Jodi, Dartnell, Pete, Golden, Nadine, and Chezar, Hank, 2005, Glacier Bay Video Observations:.

   > Online Links:

   > - [<http://pubs.usgs.gov/of/2006/1081/catalog.html>](http://pubs.usgs.gov/of/2006/1081/catalog.html)
   > - [<http://pubs.usgs.gov/of/2006/1081/observations/video_obs_centralbay.tgz>](http://pubs.usgs.gov/of/2006/1081/observations/video_obs_centralbay.tgz)

   This is part of the following larger work.

   > Cochrane, Guy R. , Harney, Jodi, Dartnell, Pete, Golden, Nadine, and Chezar, Hank, 2005, Geologic Characteristics of Benthic Habitats, Glacier Bay, Southeast Alaska, Volume I Edition: 1.0: Open-File Report USGS OFR 2006-1081, U.S. Geological Survey, Coastal and Marine Geology Program, Western Coastal and Marine Geology, Santa Cruz, CA.

   > Online Links:

   > - [<http://pubs.usgs.gov/of/2006/1081/index.html>](http://pubs.usgs.gov/of/2006/1081/index.html)

2. **What geographic area does the data set cover?**

   West_Bounding_Coordinate: -136.382434
   East_Bounding_Coordinate: -135.878131
   North_Bounding_Coordinate: 59.029898
   South_Bounding_Coordinate: 58.396455

3. **What does it look like?**

4. **Does the data set describe conditions during a particular time period?**

   Beginning_Date: 1998
   Ending_Date: 2004
   Currentness_Reference: Ground Condition

5. **What is the general form of this data set?**

   Geospatial_Data_Presentation_Form: map

6. **How does the data set represent geographic features?**

   a. **How are geographic features stored in the data set?**

      This is a Vector data set. It contains the following vector data types (SDTS terminology):

      - Entity point (5747)

   b. **What coordinate system is used to represent geographic features?**

      The map projection used is NAD_1983_UTM_Zone_8N.

      Projection parameters:
           Straight-Vertical_Longitude_from_Pole: -135
           Standard_Parallel: 0.999600
           False_Easting: 500000.000
           False_Northing: 0.000

      Planar coordinates are encoded using coordinate pair
      Abscissae (x-coordinates) are specified to the nearest 0.000064
      Ordinates (y-coordinates) are specified to the nearest 0.000064
      Planar coordinates are specified in meters

The horizontal datum used is North American Datum of 1983.
The ellipsoid used is Geodetic ReferenceSystem 80.
The semi-major axis of the ellipsoid used is 6378137.
The flattening of the ellipsoid used is 1/298.2572222.

7. **How does the data set describe geographic features?**

Entity_and_Attribute_Overview:

FID Alias: FID Data type: OID Width: 4 Precision: 0 Scale: 0 Definition: Internal feature number. Definition Source: ESRI

Shape Alias: Shape Data type: Geometry Width: 0 Precision: 0 Scale: 0 Definition: Feature geometry. Definition Source: ESRI

Lon Alias: Lon Data type: Number Width: 19 Number of decimals: 11

Lat Alias: Lat Data type: Number Width: 19 Number of decimals: 11

pri_subst Alias: pri_subst Data type: String Width: 254

sec_subst Alias: sec_subst Data type: String Width: 254

relief Alias: relief Data type: Number Width: 10

complexity Alias: complexity Data type: String Width: 254

biomass Alias: biomass Data type: String Width: 254

observ1 Alias: observ1 Data type: String Width: 254

observ2 Alias: observ2 Data type: String Width: 254

observ3 Alias: observ3 Data type: String Width: 254

observ4 Alias: observ4 Data type: String Width: 254

observ5 Alias: observ5 Data type: String Width: 254

geo_obs Alias: geo_obs Data type: String Width: 254

special Alias: special Data type: String Width: 254

Zpigm Alias: Zpigm Data type: Number Width: 19 Number of decimals: 11

comment Alias: comment Data type: String Width: 254

sample Alias: sample Data type: String Width: 254

depthm Alias: depthm Data type: String Width: 254

cam_hdg Alias: cam_hdg Data type: Number Width: 19 Number of decimals: 11

sog Alias: sog Data type: Number Width: 19 Number of decimals: 11

line Alias: line Data type: Number Width: 10

tape Alias: tape Data type: Number Width: 10

yyyydddhhm Alias: yyyydddhhm Data type: Number Width: 19 Number of decimals: 11

jday Alias: jday Data type: Number Width: 10

hhmmss Alias: hhmmss Data type: Number Width: 10

xval Alias: xval Data type: Number Width: 19 Number of decimals: 11

yval Alias: yval Data type: Number Width: 19 Number of decimals: 11

bathyg Alias: bathyg Data type: Float Width: 19 Number of decimals: 11

obs Alias: obs Data type: String Width: 25

Entity_and_Attribute_Detail_Citation: none

Who produced the data set?

1. **Who are the originators of the data set?** (may include formal authors, digital compilers, and editors)

- ❍ Guy R. Cochrane
- ❍ Jodi Harney
- ❍ Pete Dartnell
- ❍ Nadine Golden
- ❍ Hank Chezar

2. **Who also contributed to the data set?**

> A compilation of scuba and rov dive observations of benthic habitat. Divers include Russ Vetter, Cynthia Taylor, and other NOAA employed divers. ROV operated by John Butler, John Wagner, and other NOAA technicians. Some of the dives made on USGS field activity S-1-01-SC

3. **To whom should users address questions about the data?**

> Guy R. Cochrane
> United States Geological Survey (USGS)
> Geophysicist
> USGS, 400 Natural Bridges Drive
> Santa Cruz, CA 95060-5792
> USA
>
> (831) 427-4754 (voice)
> (831) 427-4748 (FAX)
> gcochrane@usgs.gov

Why was the data set created?

> These data are intended for science researchers, students, policy makers, and the general public. The data can be used with geographic information systems (GIS) software to display geologic and oceanographic information.

How was the data set created?

1. **From what previous works were the data drawn?**

2. **How were the data generated, processed, and modified?**

Date: 2005 (process 1 of 1)
    First draft of metadata created by using using

3. **What similar or related data should the user be aware of?**

How reliable are the data; what problems remain in the data set?

1. **How well have the observations been checked?**

    Visual observations of variable unknown accuracy

2. **How accurate are the geographic locations?**

    Highly variable on the order of 10 meters.

3. **How accurate are the heights or depths?**

4. **Where are the gaps in the data? What is missing?**

    Observations made without uniform protocol.

5. **How consistent are the relationships among the observations, including topology?**

    Point features present.

How can someone get a copy of the data set?

Are there legal restrictions on access or use of the data?

Access_Constraints: None
Use_Constraints: None

1. **Who distributes the data set?** (Distributor 1 of 1)

    United States Geological Survey (USGS)

> c/o Guy R. Cochrane
> Geophysicist
> USGS, 400 Natural Bridges Drive
> Santa Cruz, CA 95060-5792
> USA
>
> (831) 427-4754 (voice)
> (831) 427-4748 (FAX)
> gcochrane@usgs.gov

2. **What's the catalog number I need to order this data set?**

3. **What legal disclaimers am I supposed to read?**

> Please recognize the U.S. Geological Survey (USGS) as the source of this information.
>
> Although these data have been used by the U.S. Geological Survey, U.S. Department of the Interior, no warranty expressed or implied is made by the U.S. Geological Survey as to the accuracy of the data.
>
> The act of distribution shall not constitute any such warranty, and no responsibility is assumed by the U.S. Geological Survey in the use of this data, software, or related materials.

4. **How can I download or order the data?**

Who wrote the metadata?

Dates:
      Last modified: 22-Sep-2004
      Last Reviewed: 2004
Metadata author:
    United States Geological Survey (USGS)
    c/o Guy R. Cochrane
    Geophysicist
    USGS, 400 Natural Bridges Drive
    Santa Cruz, CA 95060-5792
    USA

(831) 427-4754 (voice)
(831) 427-4748 (FAX)
gcochrane@usgs.gov

Metadata standard:
FGDC Content Standards for Digital Geospatial Metadata ("CSDGM version 2") (FGDC-STD-001-1998)

Generated by mp version 2.8.6 on Wed Dec 07 16:12:58 2005

U.S. Geological Survey
Open-file Report 2006-1081

Geologic characteristics of benthic habitats in Glacier Bay, southeast Alaska

Video Observation Point

ALASKA

Glacier Bay

Bartlett Cove

Icy Strait

N

0   2,500   5,000   10,000
Meters

Map showing Willoughby region video observations of Glacier Bay including an inset of the State of Alaska.

Glacier Bay Video Observations

Metadata also available as

Frequently-anticipated questions:

- [What does this data set describe?](#)
    1. [How should this data set be cited?](#)
    2. [What geographic area does the data set cover?](#)
    3. [What does it look like?](#)
    4. [Does the data set describe conditions during a particular time period?](#)
    5. [What is the general form of this data set?](#)
    6. [How does the data set represent geographic features?](#)
    7. [How does the data set describe geographic features?](#)
- [Who produced the data set?](#)
    1. [Who are the originators of the data set?](#)
    2. [Who also contributed to the data set?](#)
    3. [To whom should users address questions about the data?](#)
- [Why was the data set created?](#)
- [How was the data set created?](#)
    1. [From what previous works were the data drawn?](#)
    2. [How were the data generated, processed, and modified?](#)
    3. [What similar or related data should the user be aware of?](#)
- [How reliable are the data; what problems remain in the data set?](#)
    1. [How well have the observations been checked?](#)
    2. [How accurate are the geographic locations?](#)
    3. [How accurate are the heights or depths?](#)
    4. [Where are the gaps in the data? What is missing?](#)
    5. [How consistent are the relationships among the data, including topology?](#)
- [How can someone get a copy of the data set?](#)
    1. [Are there legal restrictions on access or use of the data?](#)
    2. [Who distributes the data?](#)
    3. [What's the catalog number I need to order this data set?](#)
    4. [What legal disclaimers am I supposed to read?](#)
    5. [How can I download or order the data?](#)
- [Who wrote the metadata?](#)

What does this data set describe?

Title: Glacier Bay Video Observations
Abstract:

> Point based visual observations of benthic habitat from a samples obtained with a video sled.

Supplemental_Information:

> Any use of trade, product, or firm names is for descriptive purposes only and does not imply endorsement by the U.S. Government. Metadata for this data set can also be found in the USGS Coastal and Marine Geology InfoBank, cruise ID T-1-98-GB , URL: http:// walrus.wr.usgs.gov/infobank/t/t198gb/html/t-1-98-gb.meta.html.

> Although this Federal Geographic Data Committee-compliant metadata file is intended to document the data set in nonproprietary form, as well as in ArcInfo format, this metadata file may include some ArcInfo-specific terminology.

1. **How should this data set be cited?**

   > Cochrane, Guy R. , Harney, Jodi, Dartnell, Pete, Golden, Nadine, and Chezar, Hank, 2005, Glacier Bay Video Observations:.

   > Online Links:

   > - <http://pubs.usgs.gov/of/2006/1081/catalog.html>
   > - <http://pubs.usgs.gov/of/2006/1081/observations/video_obs_willoughby. tgz>

   This is part of the following larger work.

   > Cochrane, Guy R. , Harney, Jodi, Dartnell, Pete, Golden, Nadine, and Chezar, Hank, 2005, Geologic Characteristics of Benthic Habitats, Glacier Bay, Southeast Alaska, Volume I Edition: 1.0: Open-File Report USGS OFR 2006-1081, U.S. Geological Survey, Coastal and Marine Geology Program, Western Coastal and Marine Geology, Santa Cruz, CA.

   > Online Links:

   > - <http://pubs.usgs.gov/of/2006/1081/index.html>

2. **What geographic area does the data set cover?**

   West_Bounding_Coordinate: -136.382434
   East_Bounding_Coordinate: -135.878131
   North_Bounding_Coordinate: 59.029898
   South_Bounding_Coordinate: 58.396455

3. **What does it look like?**

4. **Does the data set describe conditions during a particular time period?**

   Beginning_Date: 1998
   Ending_Date: 2004
   Currentness_Reference: Ground Condition

5. **What is the general form of this data set?**

   Geospatial_Data_Presentation_Form: map

6. **How does the data set represent geographic features?**

   a. **How are geographic features stored in the data set?**

      This is a Vector data set. It contains the following vector data types (SDTS terminology):

      - Entity point (5866)

   b. **What coordinate system is used to represent geographic features?**

      The map projection used is NAD_1983_UTM_Zone_8N.

      Projection parameters:
      Straight-Vertical_Longitude_from_Pole: -135
      Standard_Parallel: 0.999600
      False_Easting: 500000.000
      False_Northing: 0.000

      Planar coordinates are encoded using coordinate pair
      Abscissae (x-coordinates) are specified to the nearest 0.000064
      Ordinates (y-coordinates) are specified to the nearest 0.000064
      Planar coordinates are specified in meters

The horizontal datum used is North American Datum of 1983.
The ellipsoid used is Geodetic ReferenceSystem 80.
The semi-major axis of the ellipsoid used is 6378137.
The flattening of the ellipsoid used is 1/298.2572222.

7. **How does the data set describe geographic features?**

Entity_and_Attribute_Overview:

FID Alias: FID Data type: OID Width: 4 Precision: 0 Scale: 0 Definition: Internal feature number. Definition Source: ESRI

Shape Alias: Shape Data type: Geometry Width: 0 Precision: 0 Scale: 0 Definition: Feature geometry. Definition Source: ESRI

Lon Alias: Lon Data type: Number Width: 19 Number of decimals: 11

Lat Alias: Lat Data type: Number Width: 19 Number of decimals: 11

pri_subst Alias: pri_subst Data type: String Width: 254

sec_subst Alias: sec_subst Data type: String Width: 254

relief Alias: relief Data type: Number Width: 10

complexity Alias: complexity Data type: String Width: 254

biomass Alias: biomass Data type: String Width: 254

geo_obs Alias: geo_obs Data type: String Width: 254

special Alias: special Data type: String Width: 254

bathyg Alias: bathyg Data type: String Width: 254

bathy_vid Alias: bathy_vid Data type: String Width: 254

comment Alias: comment Data type: String Width: 254

tape Alias: tape Data type: String Width: 254

yyydddhhmm Alias: yyydddhhmm Data type: Number Width: 19

Number of decimals: 11 jday Alias: jday Data type: Number Width: 10

hhmmss Alias: hhmmss Data type: Number Width: 10

obs Alias: obs Data type: String Width: 50

Entity_and_Attribute_Detail_Citation: none

Who produced the data set?

1. **Who are the originators of the data set?** (may include formal authors, digital compilers, and editors)

   ❍ Guy R. Cochrane
   ❍ Jodi Harney
   ❍ Pete Dartnell
   ❍ Nadine Golden
   ❍ Hank Chezar

2. **Who also contributed to the data set?**

   A compilation of scuba and rov dive observations of benthic habitat. Divers include Russ Vetter, Cynthia Taylor, and other NOAA employed divers. ROV operated by John Butler, John Wagner, and other NOAA technicians. Some of the dives made on USGS field activity S-1-01-SC

3. **To whom should users address questions about the data?**

   Guy R. Cochrane
   United States Geological Survey (USGS)
   Geophysicist
   USGS, 400 Natural Bridges Drive
   Santa Cruz, CA 95060-5792
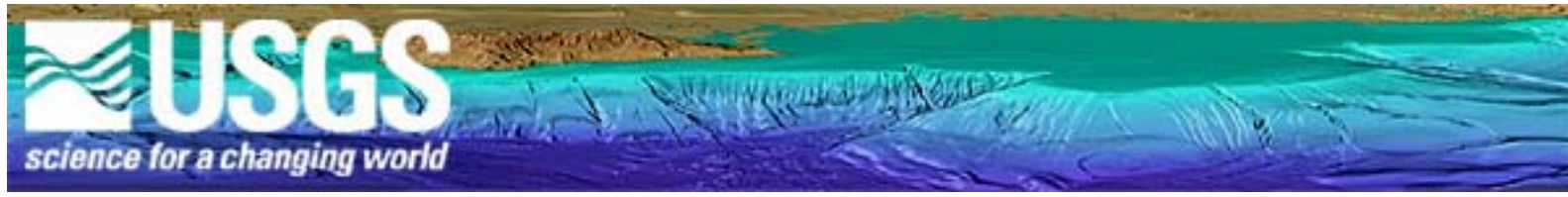   USA

   (831) 427-4754 (voice)
   (831) 427-4748 (FAX)

gcochrane@usgs.gov

Why was the data set created?

These data are intended for science researchers, students, policy makers, and the general public. The data can be used with geographic information systems (GIS) software to display geologic and oceanographic information.

How was the data set created?

1. **From what previous works were the data drawn?**

2. **How were the data generated, processed, and modified?**

Date: 2005 (process 1 of 1)
    First draft of metadata created by using using

3. **What similar or related data should the user be aware of?**

How reliable are the data; what problems remain in the data set?

1. **How well have the observations been checked?**

Visual observations of variable unknown accuracy

2. **How accurate are the geographic locations?**

Highly variable on the order of 10 meters.

3. **How accurate are the heights or depths?**

4. **Where are the gaps in the data? What is missing?**

Observations made without uniform protocol.

5. **How consistent are the relationships among the observations, including topology?**

   Point features present.

How can someone get a copy of the data set?

Are there legal restrictions on access or use of the data?

Access_Constraints: None
Use_Constraints: None

1. **Who distributes the data set?** (Distributor 1 of 1)

   United States Geological Survey (USGS)
   c/o Guy R. Cochrane
   Geophysicist
   USGS, 400 Natural Bridges Drive
   Santa Cruz, CA 95060-5792
   USA

   (831) 427-4754 (voice)
   (831) 427-4748 (FAX)
   gcochrane@usgs.gov

2. **What's the catalog number I need to order this data set?**

3. **What legal disclaimers am I supposed to read?**

   Please recognize the U.S. Geological Survey (USGS) as the source of this information.

   Although these data have been used by the U.S. Geological Survey, U.S. Department of the Interior, no warranty expressed or implied is made by the U.S. Geological Survey as to the accuracy of the data.

   The act of distribution shall not constitute any such warranty, and no responsibility is assumed by the U.S. Geological Survey in the use of this data, software, or related materials.

4. **How can I download or order the data?**

Who wrote the metadata?

Dates:

     Last modified: 22-Sep-2004

     Last Reviewed: 2004

Metadata author:

     United States Geological Survey (USGS)

     c/o Guy R. Cochrane

     Geophysicist

     USGS, 400 Natural Bridges Drive

     Santa Cruz, CA 95060-5792

     USA

     (831) 427-4754 (voice)

     (831) 427-4748 (FAX)

     gcochrane@usgs.gov

Metadata standard:

     FGDC Content Standards for Digital Geospatial Metadata ("CSDGM version 2") (FGDC-STD-001-1998)

Generated by [mp](#) version 2.8.6 on Wed Dec 07 16:11:15 2005

U.S. Geological Survey
Open-file Report 2006-1081

Geologic characteristics of benthic habitats in Glacier Bay, southeast Alaska

Multibeam hill shaded image of Glacier Bay including an inset of the State of Alaska.

URL: http://walrus.wr.usgs.gov/2006/1081/multibeam.html
maintained by Michael Diggles
last modified 12 December 2005 (ng)

Bathymetric xyz data for Glacier Bay at 5-meter intervals.

Metadata also available as

Frequently-anticipated questions:

- [What does this data set describe?](#)
    1. [How should this data set be cited?](#)
    2. [What geographic area does the data set cover?](#)
    3. [What does it look like?](#)
    4. [Does the data set describe conditions during a particular time period?](#)
    5. [What is the general form of this data set?](#)
    6. [How does the data set represent geographic features?](#)
    7. [How does the data set describe geographic features?](#)
- [Who produced the data set?](#)
    1. [Who are the originators of the data set?](#)
    2. [Who also contributed to the data set?](#)
    3. [To whom should users address questions about the data?](#)
- [Why was the data set created?](#)
- [How was the data set created?](#)
    1. [From what previous works were the data drawn?](#)
    2. [How were the data generated, processed, and modified?](#)
    3. [What similar or related data should the user be aware of?](#)
- [How reliable are the data; what problems remain in the data set?](#)
    1. [How well have the observations been checked?](#)
    2. [How accurate are the geographic locations?](#)
    3. [How accurate are the heights or depths?](#)
    4. [Where are the gaps in the data? What is missing?](#)
    5. [How consistent are the relationships among the data, including topology?](#)
- [How can someone get a copy of the data set?](#)
    1. [Are there legal restrictions on access or use of the data?](#)
    2. [Who distributes the data?](#)
    3. [What's the catalog number I need to order this data set?](#)
    4. [What legal disclaimers am I supposed to read?](#)
    5. [How can I download or order the data?](#)
- [Who wrote the metadata?](#)

What does this data set describe?

Title: Bathymetric xyz data for Glacier Bay at 5-meter intervals.
Abstract:

> This data set consists of 5-m gridded bathymetric data for Glacier Bay, Alaska, in xyz form. The data were interpolated across "nodata" gaps that were no more than 30 meters wide.

> Data were collected during May 29 - June 6, 2001, by contract with Thales Geosolutions (<http://www.thales-geopacific.com/>) aboard the R/V Davidson as part of a cooperative survey conducted by the U.S. National Park Service and the U.S. Geological Survey (Biological Resources and Coastal and Marine Geology). The instrument was a Reson 8111 multibeam echosounder (<http://reson.com/sb8111.htm>). The raw data were reduced by Thales.

Supplemental_Information:

> Additional information about the field activities from which this data set was derived are available online at <http://walrus.wr.usgs.gov/infobank/d/d101gb/html/d-1-01-gb.meta.html>

> Any use of trade, product, or firm names is for descriptive purposes only and does not imply endorsement by the U.S. Government.

> Specifications for the Reson SeaBat 8111 Multibeam Echosounder (<http://www.reson.com/sb8111.htm>)

```
 Operating frequency:  100 kHz
 Number of beams:  101
 Beamwidth across track:  1.5 degrees
 Beamwidth along track:  1.5 degrees
 Center-to-center beam separation:  1.5 degrees
 Pulse length:  Variable, operator selectable
 Depth range:  3 - 1000 meters
 Transducer depth rating:  100 meters
 Max. update rate:  35 swaths per second
 Max. vessel Speed:  20 knots
 Stabilization:  Pitch stabilization within +/- 10 degrees
 Projector beam control:  External pitch sensor
```

```
     Hydrophone size (Dia./arc/length):  640mm, 220 degrees,
   200mm
    Processor Dimensions (HWD):  177 x 483 x 434 mm
    Tranceiver Dimensions (HWD):  267 x 450 x 427 mm
    Weight: (with 15m cable):
      Hydrophone Dry: 42 kg Wet: 36 kg
      Projector Dry: 30 kg Wet: 23 kg
   Transceiver weight:  13.6 kg
   Processor weight:   20 kg
```

Although this Federal Geographic Data Committee-compliant metadata file is intended to document the data set in nonproprietary form, as well as in ArcInfo format, this metadata file may include some ArcInfo-specific terminology.

1. **How should this data set be cited?**

   Stevenson, A.J., and Wong, Florence L. , 2002, Bathymetric xyz data for Glacier Bay at 5-meter intervals.: USGS Open-File Report 02-391, U.S. Geological Survey, Menlo Park, California.

   Online Links:

   - <URL:http://geopubs.wr.usgs.gov/open-file/02-391>

2. **What geographic area does the data set cover?**

   West_Bounding_Coordinate: -136.40276708
   East_Bounding_Coordinate: -135.91167668
   North_Bounding_Coordinate: 58.75728909
   South_Bounding_Coordinate: 58.35942274

3. **What does it look like?**

   glacier.gif (GIF)
           index map of Glacier Bay multibeam bathymetry data

4. **Does the data set describe conditions during a particular time period?**

   Calendar_Date: 2002
   Currentness_Reference: Ground Condition

5. **What is the general form of this data set?**

   Geospatial_Data_Presentation_Form: map

6. **How does the data set represent geographic features?**

   a. **How are geographic features stored in the data set?**

      This is a Raster data set. It contains the following raster data types:

      - Dimensions 255 x 11339, type Pixel

   b. **What coordinate system is used to represent geographic features?**

7. **How does the data set describe geographic features?**

Who produced the data set?

1. **Who are the originators of the data set?** (may include formal authors, digital compilers, and editors)

   - A.J. Stevenson
   - Florence L. Wong

2. **Who also contributed to the data set?**

3. **To whom should users address questions about the data?**

   Florence L. Wong
   United States Geological Survey (USGS)
   Geologist, GIS Coordinator
   USGS, MailStop 999, 345 Middlefield Road
   Menlo Park, CA 94025-3561
   USA

   (650) 329-5327 (voice)
   (650) 329-5190 (FAX)
   fwong@usgs.gov

Why was the data set created?

These data are intended for science researchers, students, policy makers, and the general public. The data can be used with geographic information systems (GIS) software to display geologic and oceanographic information.

How was the data set created?

1. **From what previous works were the data drawn?**

2. **How were the data generated, processed, and modified?**

Date: 2001 (process 1 of 5)
> Raw data processed by contractor Thales Geosolutions and provided as 10-m and 5-m xyz values in UTM 8 coordinate system.

Date: 2001 (process 2 of 5)
> F.L. Wong converted xyz to ArcInfo grids. Data were processed in 50,000-point blocks. Each block of points was used to GENERATE a point coverage.

> The point coverage for each block was merged with adjoining blocks, the grid IDW function was applied with default options, and the resulting grid clipped to the boundary of the block. All the interpolated grids were merged into a continuous grid GLACIER05MIG that was corrected by a mask that omitted data in holes that exceed 30 meters in width.

> The masking grid was constructed as follows: a unit grid (data cells = 1, all others = nodata) was copied from a 5-m uninterpolated grid. The unit grid was converted to a polygon coverage from which polygons with areas of less than 1000 square meters were removed in bulk. The remaining interior polygons were inspected in Arcedit and removed if the width were about 30 meters or less. This polygon coverage was converted back to a grid to be applied as a mask to the merged grids described in the previous paragraph.

Date: 2002 (process 3 of 5)
> UTM grid was converted to a point coverage by Arc tool GRIDPOINT. Point coverage was projected to decimal degrees, and longitude, latitude, and depth values extracted.

Date: 18-Oct-2001 (process 4 of 5)

First draft of metadata created by curator using FGDCMETA.AML ver. 1.35 08/02/2000 on ArcInfo data set /arcdata/bathymetry/glacier05mg

Date: 05-Nov-2005 (process 5 of 5)
-------------------------Nadine Golden edited starting here--------------------- Used Spatial Analyst Tool Surface Analyst, Hillshade to convert to hillshade view.

3. **What similar or related data should the user be aware of?**

How reliable are the data; what problems remain in the data set?

1. **How well have the observations been checked?**

   Not applicable.

2. **How accurate are the geographic locations?**

   Navigation was multiple DGPS [differential global positioning systems] coupled up with 2 very precise DR [dead-reckoning] 3-axis accelerometers, all integrated in WinFrog (proprietary software from Thales Geosolutions <http://www.thales-geopacific.com/offshore/index.html>). The best functional test we did was crossties, which suggested that average navigational errors were on the order of 1 meter, with (rare) maximum errors being about 3 meters. (A.J. Stevenson, written communtication, October 2001)

3. **How accurate are the heights or depths?**

4. **Where are the gaps in the data? What is missing?**

   Data values are missing in and around shallow or emergent features (islands) and where adjoining trackline coverage was not overlapping.

5. **How consistent are the relationships among the observations, including topology?**

   Not applicable for raster data.

How can someone get a copy of the data set?

Are there legal restrictions on access or use of the data?

Access_Constraints: None.
Use_Constraints: Data not to be used for navigational purposes.

1. **Who distributes the data set?** (Distributor 1 of 1)

   United States Geological Survey (USGS)
   c/o Florence L. Wong
   Geologist, GIS Coordinator
   USGS, MailStop 999, 345 Middlefield Road
   Menlo Park, CA 94025-3561
   USA

   (650) 329-5327 (voice)
   (650) 329-5190 (FAX)
   fwong@usgs.gov

2. **What's the catalog number I need to order this data set?**

3. **What legal disclaimers am I supposed to read?**

   Please recognize the U.S. Geological Survey (USGS) as the source of this information.

   Although these data have been used by the U.S. Geological Survey, U.S. Department of the Interior, no warranty expressed or implied is made by the U.S. Geological Survey as to the accuracy of the data.

   The act of distribution shall not constitute any such warranty, and no responsibility is assumed by the U.S. Geological Survey in the use of this data, software, or related materials.

4. **How can I download or order the data?**

Who wrote the metadata?

Dates:
   Last modified: 10-Dec-2002

Last Reviewed: 2002

Metadata author:

United States Geological Survey (USGS)

c/o Florence L. Wong

Geologist, GIS Coordinator

USGS, MailStop 999, 345 Middlefield Road

Menlo Park, CA 94025-3561

USA

(650) 329-5327 (voice)

(650) 329-5190 (FAX)

fwong@usgs.gov

Metadata standard:

FGDC Content Standards for Digital Geospatial Metadata ("CSDGM version 2") (FGDC-STD-001-1998)

Generated by [mp](#) version 2.8.6 on Mon Dec 05 11:07:48 2005

U.S. Geological Survey
Open-file Report 2006-1081

Geologic characteristics of benthic habitats in Glacier Bay, southeast Alaska

Geologic characteristics of benthic habitats in Glacier Bay, southeast Alaska - backscatter map

Backscatter data image of Glacier Bay including an inset of the State of Alaska.

URL: http://walrus.wr.usgs.gov/
maintained by Michael Diggles
last modified 1April 5, 2006 (mfd)

U.S. Geological Survey
Open-file Report 2006-1081

Geologic characteristics of benthic habitats in Glacier Bay, southeast Alaska

Map showing Glacier Bay habitat polygons including an inset of the State of Alaska.

U.S. Geological Survey
Open-file Report 2006-1081

Geologic characteristics of benthic habitats in Glacier Bay, southeast Alaska

REVISION HISTORY

This is version 1. There have been no revisions.

Directory and File Listing

Filename	Kilobytes
./	
catalog.html	12
gbhab.mxd	768
gbhab.tgz	
index.html	19
methods.html	25
results.html	26
toc.html	10
version.html	15
basemaps/	
bathy_contours_75m_200m_400m.dbf	15
bathy_contours_75m_200m_400m.sbn	6
bathy_contours_75m_200m_400m.sbx	1
bathy_contours_75m_200m_400m.shp	1,398
bathy_contours_75m_200m_400m.shx	5
bathy_contours_75m_200m_400m.tgz	393
bathy_contours_75m_200m_400m.txt	11
bathy_contours_75m_200m_400mf.html	3
glacierbay_coastline.dbf	87
glacierbay_coastline.sbn	8
glacierbay_coastline.sbx	1
glacierbay_coastline.shp	515

glacierbay_coastline.shx	7
glacierbay_coastline.tgz	223
glacierbay_coastline.txt	11
glacierbay_coastlinef.html	16
place_names.dbf	1
place_names.sbn	1
place_names.sbx	1
place_names.shp	1
place_names.sbx	1
place_names.tgz	5
place_names.txt	10
place_namesf.html	15
habitat/	
gbhab.dbf	6,978
gbhab.sbn	104
gbhab.sbx	7
gbhab.shp	11,096
gbhab.shx	85
gbhab.tgz	5,472
gbhab.txt	16
gbhabf.html	22
images/	
backscatter.html	3
backscatter.jpg	107
bathy_contours_75m_200m_400m.html	3
bathy_contours_75m_200m_400m.jpg	80
bathymetry.html	3
bathymetry.jpg	86
fig1.html	3
fig1.jpg	181
fig1_3x4.jpg	117
fig2.html	3
fig2.jpg	163
fig2_3x4.jpg	131
fig3.html	3
fig3.jpg	148
fig3_3x4.jpg	81
fig4.html	6
fig4.jpg	242
fig4_3x4.jpg	200
gbhab.html	3
gbhab.jpg	164
glacierbay_coastline.html	3

glacierbay_coastline.jpg	90
imageA.html	3
imageA.jpg	36
imageA_3x2.jpg	28
imageB.html	6
imageB.jpg	51
imageB_3x2.jpg	48
imageC.html	3
imageC.jpg	50
imageC_3x2.jpg	39
imageD.html	6
imageD.jpg	53
imageD_3x2.jpg	41
imageE.html	3
imageE.jpg	51
imageE_3x2.jpg	45
imageF.html	3
imageF.jpg	51
imageF_3x2.jpg	42
imageG.html	3
imageG.jpg	51
imageG_3x2.jpg	45
place_names.html	3
place_names.jpg	146
usgs_banner.jpg	18
video_obs_centralbay.html	3
video_obs_centralbay.jpg	164
video_obs_willoughby.html	3
video_obs_willoughby.jpg	136
video_sled.html	3
video_sled.jpg	242
wentworth_tbl.html	9
observations/	
video_obs_centralbay.dbf	21,345
video_obs_centralbay.sbn	54
video_obs_centralbay.sbx	2
video_obs_centralbay.shp	158
video_obs_centralbay.shx	45
video_obs_centralbay.tgz	484
video_obs_centralbay.txt	12
video_obs_centralbayf.html	16
video_obs_willoughby.dbf	15,342
video_obs_willoughby.sbn	55

video_obs_willoughby.sbx	1
video_obs_willoughby.shp	161
video_obs_willoughby.shx	46
video_obs_willoughby.tgz	105
video_obs_willoughby.txt	11
video_obs_willoughbyf.html	15

Previous   Table of Contents   Western Coastal & Marine Geol.   WCMG Search

---

Identification_Information:
  Citation:
   Citation_Information:
     Originator: Guy R. Cochrane
     Originator: Jodi Harney
     Originator: Pete Dartnell
     Originator: Nadine Golden
     Originator: Hank Chezar
     Publication_Date: 2005
     Title: Glacier Bay Habitat polygons Edition: (Volume I, Version 1.0, 2005)
     Geospatial_Data_Presentation_Form: map
     Online_Linkage:
        http://pubs.usgs.gov/of/2006/1081/catalog.html/gbhab.tgz
     Larger_Work_Citation:
       Citation_Information:
           Originator: Guy R. Cochrane
           Originator: Jodi Harney
           Originator: Pete Dartnell
           Originator: Nadine Golden
           Originator: Hank Chezar
           Publication_Date: 2005
           Title: Geologic Characteristics of Benthic Habitats, Glacier Bay, Southeast Alaska, Volume I
Edition: 1.0
           Series_Information:
               Series_Name: Open-File Report
               Issue_Identification: USGS OFR 2006-1081
           Publication_Information:
             Publication_Place: Western Coastal and Marine
               Geology, Santa Cruz, CA
             Publisher: U.S. Geological Survey, Coastal and Marine
                Geology Program
           Online_Linkage:
             http://pubs.usgs.gov/of/2006/1081/index.html

  Description:
   Abstract:
     This file is a subset of the original data collected during May 29 - June 6, 2001,
     by contract with Thales Geosolutions (http://www.thales-geopacific.com/) aboard the
     R/V Davidson as part of a cooperative survey conducted by the
     U.S. National Park Service and the U.S. Geological
     Survey (Biological Resources and Coastal and Marine
     Geology). The instrument was a Reson 8111 multibeam

echosounder (http://reson.com/sb8111.htm).

Purpose:
These data are intended for science researchers, students, policy
makers, and the general public. The data can be
used with geographic information systems (GIS) software
to display geologic and oceanographic information.

Supplemental_Information:
Additional information about the field activities from
which this data set was derived are available online at

Any use of trade, product, or firm names is for descriptive purposes
only and does not imply endorsement by the
U.S. Government.

Although this Federal Geographic Data Committee-compliant metadata
file is intended to document the data set in nonproprietary form,
as well as in ArcInfo format, this metadata file may include some
ArcInfo-specific terminology.

Time_Period_of_Content:
  Time_Period_Information:
    Single_Date/Time:
      Calendar_Date: 2005
  Currentness_Reference: Ground Condition

Status:
  Progress: Complete
  Maintenance_and_Update_Frequency: As Needed

Spatial_Domain:
  Bounding_Coordinates:
    West_Bounding_Coordinate: -136.398760
    East_Bounding_Coordinate: -135.964910
    North_Bounding_Coordinate: 58.756052
    South_Bounding_Coordinate: 58.353225

Keywords:
  Theme:
    Theme_Keyword_Thesaurus: None
    Theme_Keyword: habitat
    Theme_Keyword: fisheries

    Theme_Keyword: seafloor
    Theme_Keyword: geology
  Theme:
   Theme_Keyword_Thesaurus: ISO 19115 Topic Category
   Theme_Keyword: biota
   Theme_Keyword: geoscientificinformation
   Theme_Keyword: imagereyBaseMapsEarthCover
   Theme_Keyword: oceans
  Place:
   Place_Keyword_Thesaurus: None
   Place_Keyword: Alaska
   Place_Keyword: Glacier Bay

Access_Constraints: None

Use_Constraints: Not suitable for navigation

Point_of_Contact:
  Contact_Information:
   Contact_Person_Primary:
    Contact_Person: Guy R. Cochrane
    Contact_Organization:
     United States Geological Survey (USGS)
     Coastal and Marine Geology Program (CMGP)
   Contact_Position: Geophysicist
   Contact_Address:
    Address_Type: mailing and physical address
    Address: USGS, 400 Natural Bridges Drive
    City: Santa Cruz
    State_or_Province: CA
    Postal_Code: 95060-5792
    Country: USA
   Contact_Voice_Telephone: (831) 427-4754
   Contact_Facsimile_Telephone: (831) 427-4748
   Contact_Electronic_Mail_Address: gcochrane@usgs.gov

Data_Set_Credit:
 This file is a subset of the original data collected during May 29 - June 6, 2001,
 by contract with Thales Geosolutions (http://www.thales-geopacific.com/) aboard the
 R/V Davidson as part of a cooperative survey conducted by the
 U.S. National Park Service and the U.S. Geological
 Survey (Biological Resources and Coastal and Marine
 Geology). The instrument was a Reson 8111 multibeam

    Process_Description:
      First draft of metadata created by Nadine Golden using USGS metadata tool "MP".
    Process_Date: 20051122

Spatial_Data_Organization_Information:
  Direct_Spatial_Reference_Method: Vector
  Point_and_Vector_Object_Information:
    SDTS_Terms_Description:
      SDTS_Point_and_Vector_Object_Type: String
      Point_and_Vector_Object_Count: 595

Spatial_Reference_Information:
  Horizontal_Coordinate_System_Definition:
    Planar:
      Map_Projection:
        Map_Projection_Name: NAD_1983_UTM_Zone_8N
        Polar_Stereographic:
          Straight-Vertical_Longitude_From_Pole: -135
          Standard_Parallel: 0.999600
          False_Easting: 500000.000
          False_Northing: 0.000
      Planar_Coordinate_Information:
        Planar_Coordinate_Encoding_Method: coordinate pair
        Coordinate_Representation:
          Abscissa_Resolution: 0.000064
          Ordinate_Resolution: 0.000064
        Planar_Distance_Units: meters
    Geodetic_Model:
      Horizontal_Datum_Name: North American Datum of 1983
      Ellipsoid_Name: Geodetic ReferenceSystem 80
      Semi-major_Axis: 6378137
      Denominator_of_Flattening_Ratio: 298.2572222

Entity_and_Attribute_Information:
  Overview_Description:
    Entity_and_Attribute_Overview:

      FID
      Alias: FID
      Data type: OID
      Width: 4
      Precision: 0

Scale: 0
Definition:
Internal feature number.
Definition Source:
ESRI

Shape
Alias: Shape
Data type: Geometry
Width: 0
Precision: 0
Scale: 0
Definition:
Feature geometry.
Definition Source:
ESRI

ID
Alias: ID
Data type: Number
Width: 10

CONTOUR
Alias: CONTOUR
Data type: Number
Width: 14

Entity_and_Attribute_Detail_Citation: none

Distribution_Information:
 Distributor:
  Contact_Information:
   Contact_Organization_Primary:
    Contact_Organization:
     United States Geological Survey (USGS)
     Coastal and Marine Geology Program (CMGP)
    Contact_Person: Guy R. Cochrane
   Contact_Position: Geophysicist
   Contact_Address:
    Address_Type: mailing and physical address
    Address: USGS, 400 Natural Bridges Drive
    City: Santa Cruz

         State_or_Province: CA
         Postal_Code: 95060-5792
         Country: USA
       Contact_Voice_Telephone: (831) 427-4754
       Contact_Facsimile_Telephone: (831) 427-4748
       Contact_Electronic_Mail_Address: gcochrane@usgs.go

 Distribution_Liability:
   Please recognize the U.S. Geological Survey (USGS) as the source of
   this information.

   Although these data have been used by the U.S. Geological Survey,
   U.S. Department of the Interior, no warranty expressed or implied
   is made by the U.S. Geological Survey as to the accuracy of the
   data.

   The act of distribution shall not constitute any such warranty,
   and no responsibility is assumed by the U.S. Geological Survey in
   the use of this data, software, or related materials.

 Metadata_Reference_Information:
   Metadata_Date: 2005
   Metadata_Review_Date: 2005
   Metadata_Contact:
     Contact_Information:
       Contact_Organization_Primary:
         Contact_Organization:
           United States Geological Survey (USGS)
           Coastal and Marine Geology Program (CMGP)
         Contact_Person: Guy R. Cochrane
       Contact_Position: Geophysicist
       Contact_Address:
         Address_Type: mailing and physical address
         Address: USGS, 400 Natural Bridges Drive
         City: Santa Cruz
         State_or_Province: CA
         Postal_Code: 95060-5792
         Country: USA
       Contact_Voice_Telephone: (831) 427-4754
       Contact_Facsimile_Telephone: (831) 427-4748
       Contact_Electronic_Mail_Address: gcochrane@usgs.gov
   Metadata_Standard_Name: FGDC Content Standards for Digital Geospatial Metadata ("CSDGM

version 2")
  Metadata_Standard_Version: FGDC-STD-001-1998
  Metadata_Access_Constraints: none
  Metadata_Use_Constraints: none

Identification_Information:
  Citation:
    Citation_Information:
      Originator: Guy R. Cochrane
      Originator: Jodi Harney
      Originator: Pete Dartnell
      Originator: Nadine Golden
      Originator: Hank Chezar
      Publication_Date: 2005
      Title: Glacier Bay Habitat polygons Edition: (Volume I, Version 1.0, 2005)
      Geospatial_Data_Presentation_Form: map
      Online_Linkage:
        http://pubs.usgs.gov/of/2006/1081/catalog.html/glacierbay_coastline.tgz
      Larger_Work_Citation:
        Citation_Information:
          Originator: Guy R. Cochrane
          Originator: Jodi Harney
          Originator: Pete Dartnell
          Originator: Nadine Golden
          Originator: Hank Chezar
          Publication_Date: 2005
          Title: Geologic Characteristics of Benthic Habitats, Glacier Bay, Southeast Alaska, Volume I
Edition: 1.0
          Series_Information:
            Series_Name: Open-File Report
            Issue_Identification: USGS OFR 2006-1081
          Publication_Information:
            Publication_Place: Western Coastal and Marine
              Geology, Santa Cruz, CA
            Publisher: U.S. Geological Survey, Coastal and Marine
                Geology Program
          Online_Linkage:
            http://pubs.usgs.gov/of/2006/1081/index.html

  Description:
    Abstract:
      This file is a subset of the original data extracted from the NOAA Coastline Extractor, http://rimmer.ngdc.noaa.gov/coast/.

    Purpose:
      These data are intended for science researchers, students, policy
      makers, and the general public. The data can be

used with geographic information systems (GIS) software
to display geologic and oceanographic information.

Supplemental_Information:
Additional information about the field activities from
which this data set was derived are available online at

Any use of trade, product, or firm names is for descriptive purposes
only and does not imply endorsement by the
U.S. Government.

Although this Federal Geographic Data Committee-compliant metadata
file is intended to document the data set in nonproprietary form,
as well as in ArcInfo format, this metadata file may include some
ArcInfo-specific terminology.

Time_Period_of_Content:
Time_Period_Information:
Single_Date/Time:
Calendar_Date: 2005
Currentness_Reference: Ground Condition

Status:
Progress: Complete
Maintenance_and_Update_Frequency: As Needed

Spatial_Domain:
Bounding_Coordinates:
West_Bounding_Coordinate: -137.150910
East_Bounding_Coordinate: -135.625164
North_Bounding_Coordinate: 59.097298
South_Bounding_Coordinate: 58.322444

Keywords:
Theme:
Theme_Keyword_Thesaurus: None
Theme_Keyword: habitat
Theme_Keyword: fisheries
Theme_Keyword: seafloor
Theme_Keyword: geology
Theme:
Theme_Keyword_Thesaurus: ISO 19115 Topic Category
Theme_Keyword: biota

      Theme_Keyword: geoscientificinformation
      Theme_Keyword: imagereyBaseMapsEarthCover
      Theme_Keyword: oceans
    Place:
      Place_Keyword_Thesaurus: None
      Place_Keyword: Alaska
      Place_Keyword: Glacier Bay

  Access_Constraints: None

  Use_Constraints: Not suitable for navigation

  Point_of_Contact:
    Contact_Information:
      Contact_Person_Primary:
        Contact_Person: Guy R. Cochrane
        Contact_Organization:
          United States Geological Survey (USGS)
          Coastal and Marine Geology Program (CMGP)
      Contact_Position: Geophysicist
      Contact_Address:
        Address_Type: mailing and physical address
        Address: USGS, 400 Natural Bridges Drive
        City: Santa Cruz
        State_or_Province: CA
        Postal_Code: 95060-5792
        Country: USA
      Contact_Voice_Telephone: (831) 427-4754
      Contact_Facsimile_Telephone: (831) 427-4748
      Contact_Electronic_Mail_Address: gcochrane@usgs.gov

  Data_Set_Credit:
    This file is a subset of the original data extracted from NOAA Coastline Extractor, http://rimmer.ngdc.
noaa.gov/coast/.

  Native_Data_Set_Environment:
    SunOS, 5.8, sun4u UNIX
    ArcInfo version 9.1
  Cross_Reference:
    Citation_Information:
      Originator: United States Geological Survey (USGS), Coastal and Marine Geology (CMG)
      Publication_Date: 2005
      Title: USGS CMG Glacier Bay, Alaska Habitat Metadata

Online_Linkage: http://pubs.usgs.gov/of/2006/1081/
Larger_Work_Citation:
 Citation_Information:
  Originator: United States Geological Survey (USGS), Coastal and Marine Geology (CMG)
  Publication_Date: 2005
  Title: USGS CMG InfoBank
  Online_Linkage: http://walrus.wr.usgs.gov/InfoBank

Browse_Graphic:
 Browse_Graphic_File_Name: http://pubs.usgs.gov/of/2006/1081/images/glacierbay_coastline.html
 Browse_Graphic_File_Description: JPEG image of coast line for Glacier Bay, Alaska.
 Browse_Graphic_File_Type: JPEG

Data_Quality_Information:
 Attribute_Accuracy:
  Attribute_Accuracy_Report: NOAA data was stored with sufficient precision to resolve 1 m changes along the ground.
 Logical_Consistency_Report: No additional checks for topological consistency were performed on this data.
 Completeness_Report: complete

 Lineage:
  Process_Step:
   Process_Description: Download from NOAA Coastline Extractor,http://rimmer.ngdc.noaa.gov/coast/.
   Process_Date: 20051122
  Process_Step:
   Process_Description: Nadine Golden edited and reduced number of features to study area boundaries.
   Process_Date: 20051122
  Process_Step:
   Process_Description: Converted from datum NAD27 to NAD83
   Process_Date: 20051122
  Process_Step:
   Process_Description:
    First draft of metadata created by Nadine Golden using USGS metadata tool "MP".
   Process_Date: 20051122

Spatial_Data_Organization_Information:
 Direct_Spatial_Reference_Method: Vector
 Point_and_Vector_Object_Information:
  SDTS_Terms_Description:
   SDTS_Point_and_Vector_Object_Type: String
   Point_and_Vector_Object_Count: 796

Spatial_Reference_Information:
  Horizontal_Coordinate_System_Definition:
    Planar:
      Map_Projection:
        Map_Projection_Name: NAD_1983_UTM_Zone_8N
        Polar_Stereographic:
          Straight-Vertical_Longitude_From_Pole: -135
          Standard_Parallel: 0.999600
          False_Easting: 500000.000
          False_Northing: 0.000
      Planar_Coordinate_Information:
        Planar_Coordinate_Encoding_Method: coordinate pair
        Coordinate_Representation:
          Abscissa_Resolution: 0.000128
          Ordinate_Resolution: 0.000128
        Planar_Distance_Units: meters
    Geodetic_Model:
      Horizontal_Datum_Name: North American Datum of 1983
      Ellipsoid_Name: Geodetic ReferenceSystem 80
      Semi-major_Axis: 6378137
      Denominator_of_Flattening_Ratio: 298.2572222

Entity_and_Attribute_Information:
  Overview_Description:
    Entity_and_Attribute_Overview:

      FID
      Alias: FID
      Data type: OID
      Width: 4
      Precision: 0
      Scale: 0
      Definition:
      Internal feature number.
      Definition Source:
      ESRI

      Shape
      Alias: Shape
      Data type: Geometry
      Width: 0
      Precision: 0

Scale: 0
Definition:
Feature geometry.
Definition Source:
ESRI

FID_largen
Alias: FID_largen
Data type: Number
Width: 9

AREA
Alias: AREA
Data type: Number
Width: 15
Number of decimals: 3

PERIMETER
Alias: PERIMETER
Data type: Number
Width: 15
Number of decimals: 3

NOAA_GL_
Alias: NOAA_GL_
Data type: Number
Width: 11

NOAA_GL_ID
Alias: NOAA_GL_ID
Data type: Number
Width: 11

ACRES
Alias: ACRES
Data type: Number
Width: 19
Number of decimals: 5

PERIM_MILE
Alias: PERIM_MILE
Data type: Number
Width: 19

Number of decimals: 5

TIDEWATER
Alias: TIDEWATER
Data type: Number
Width: 11

Entity_and_Attribute_Detail_Citation: none

Distribution_Information:
 Distributor:
  Contact_Information:
   Contact_Organization_Primary:
    Contact_Organization:
      United States Geological Survey (USGS)
      Coastal and Marine Geology Program (CMGP)
    Contact_Person: Guy R. Cochrane
   Contact_Position: Geophysicist
   Contact_Address:
    Address_Type: mailing and physical address
    Address: USGS, 400 Natural Bridges Drive
    City: Santa Cruz
    State_or_Province: CA
    Postal_Code: 95060-5792
    Country: USA
   Contact_Voice_Telephone: (831) 427-4754
   Contact_Facsimile_Telephone: (831) 427-4748
   Contact_Electronic_Mail_Address: gcochrane@usgs.go

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  is made by the U.S. Geological Survey as to the accuracy of the
  data.

  The act of distribution shall not constitute any such warranty,
  and no responsibility is assumed by the U.S. Geological Survey in
  the use of this data, software, or related materials.

Metadata_Reference_Information:
  Metadata_Date: 2005
  Metadata_Review_Date: 2005
  Metadata_Contact:
    Contact_Information:
      Contact_Organization_Primary:
        Contact_Organization:
          United States Geological Survey (USGS)
          Coastal and Marine Geology Program (CMGP)
        Contact_Person: Guy R. Cochrane
      Contact_Position: Geophysicist
      Contact_Address:
        Address_Type: mailing and physical address
        Address: USGS, 400 Natural Bridges Drive
        City: Santa Cruz
        State_or_Province: CA
        Postal_Code: 95060-5792
        Country: USA
      Contact_Voice_Telephone: (831) 427-4754
      Contact_Facsimile_Telephone: (831) 427-4748
      Contact_Electronic_Mail_Address: gcochrane@usgs.gov
  Metadata_Standard_Name: FGDC Content Standards for Digital Geospatial Metadata ("CSDGM version 2")
  Metadata_Standard_Version: FGDC-STD-001-1998
  Metadata_Access_Constraints: none
  Metadata_Use_Constraints: none

Glacier Bay Habitat polygons Edition: (Volume I, Version 1.0, 2005)

Metadata also available as

Frequently-anticipated questions:

- What does this data set describe?
    1. How should this data set be cited?
    2. What geographic area does the data set cover?
    3. What does it look like?
    4. Does the data set describe conditions during a particular time period?
    5. What is the general form of this data set?
    6. How does the data set represent geographic features?
    7. How does the data set describe geographic features?
- Who produced the data set?
    1. Who are the originators of the data set?
    2. Who also contributed to the data set?
    3. To whom should users address questions about the data?
- Why was the data set created?
- How was the data set created?
    1. From what previous works were the data drawn?
    2. How were the data generated, processed, and modified?
    3. What similar or related data should the user be aware of?
- How reliable are the data; what problems remain in the data set?
    1. How well have the observations been checked?
    2. How accurate are the geographic locations?
    3. How accurate are the heights or depths?
    4. Where are the gaps in the data? What is missing?
    5. How consistent are the relationships among the data, including topology?
- How can someone get a copy of the data set?
    1. Are there legal restrictions on access or use of the data?
    2. Who distributes the data?
    3. What's the catalog number I need to order this data set?
    4. What legal disclaimers am I supposed to read?
    5. How can I download or order the data?
- Who wrote the metadata?

What does this data set describe?

Title:

Glacier Bay Habitat polygons Edition: (Volume I, Version 1.0, 2005)

Abstract:

This file is a subset of the original data extracted from the NOAA Coastline Extractor, <http://rimmer.ngdc.noaa.gov/coast/>.

Supplemental_Information:

Additional information about the field activities from which this data set was derived are available online at

Any use of trade, product, or firm names is for descriptive purposes only and does not imply endorsement by the U.S. Government.

Although this Federal Geographic Data Committee-compliant metadata file is intended to document the data set in nonproprietary form, as well as in ArcInfo format, this metadata file may include some ArcInfo-specific terminology.

1. **How should this data set be cited?**

   Cochrane, Guy R. , Harney, Jodi, Dartnell, Pete, Golden, Nadine, and Chezar, Hank, 2005, Glacier Bay Habitat polygons Edition: (Volume I, Version 1.0, 2005):.

   Online Links:

   ❍ <http://pubs.usgs.gov/of/2006/1081/basemaps/glacierbay_coastline.tgz>

   This is part of the following larger work.

   Cochrane, Guy R. , Harney, Jodi, Dartnell, Pete, Golden, Nadine, and Chezar, Hank, 2005, Geologic Characteristics of Benthic Habitats, Glacier Bay, Southeast Alaska, Volume I Edition: 1.0: Open-File Report USGS OFR 2006-1081, U.S. Geological Survey, Coastal and Marine Geology Program, Western Coastal and Marine Geology, Santa Cruz, CA.

   Online Links:

   ❍ <http://pubs.usgs.gov/of/2006/1081/index.html>

2. **What geographic area does the data set cover?**

West_Bounding_Coordinate: -137.150910
East_Bounding_Coordinate: -135.625164
North_Bounding_Coordinate: 59.097298
South_Bounding_Coordinate: 58.322444

3. **What does it look like?**

<http://pubs.usgs.gov/of/2006/1081/images/glacierbay_coastline.html> (JPEG)
         JPEG image of coast line for Glacier Bay, Alaska.

4. **Does the data set describe conditions during a particular time period?**

Calendar_Date: 2005
Currentness_Reference: Ground Condition

5. **What is the general form of this data set?**

Geospatial_Data_Presentation_Form: map

6. **How does the data set represent geographic features?**

   a. **How are geographic features stored in the data set?**

   This is a Vector data set. It contains the following vector data types (SDTS terminology):

   - String (796)

   b. **What coordinate system is used to represent geographic features?**

   The map projection used is NAD_1983_UTM_Zone_8N.

   Projection parameters:
            Straight-Vertical_Longitude_from_Pole: -135
            Standard_Parallel: 0.999600
            False_Easting: 500000.000
            False_Northing: 0.000

   Planar coordinates are encoded using coordinate pair
   Abscissae (x-coordinates) are specified to the nearest 0.000128

Ordinates (y-coordinates) are specified to the nearest 0.000128
Planar coordinates are specified in meters

The horizontal datum used is North American Datum of 1983.
The ellipsoid used is Geodetic ReferenceSystem 80.
The semi-major axis of the ellipsoid used is 6378137.
The flattening of the ellipsoid used is 1/298.2572222.

7. **How does the data set describe geographic features?**

Entity_and_Attribute_Overview:

FID Alias: FID Data type: OID Width: 4 Precision: 0 Scale: 0 Definition: Internal feature number. Definition Source: ESRI

Shape Alias: Shape Data type: Geometry Width: 0 Precision: 0 Scale: 0 Definition: Feature geometry. Definition Source: ESRI

FID_largen Alias: FID_largen Data type: Number Width: 9

AREA Alias: AREA Data type: Number Width: 15 Number of decimals: 3

PERIMETER Alias: PERIMETER Data type: Number Width: 15 Number of decimals: 3

NOAA_GL_ Alias: NOAA_GL_ Data type: Number Width: 11

NOAA_GL_ID Alias: NOAA_GL_ID Data type: Number Width: 11

ACRES Alias: ACRES Data type: Number Width: 19 Number of decimals: 5

PERIM_MILE Alias: PERIM_MILE Data type: Number Width: 19 Number of decimals: 5

TIDEWATER Alias: TIDEWATER Data type: Number Width: 11

Entity_and_Attribute_Detail_Citation: none

Who produced the data set?

1. **Who are the originators of the data set?** (may include formal authors, digital compilers, and editors)

   - ❍ Guy R. Cochrane
   - ❍ Jodi Harney
   - ❍ Pete Dartnell
   - ❍ Nadine Golden
   - ❍ Hank Chezar

2. **Who also contributed to the data set?**

   This file is a subset of the original data extracted from NOAA Coastline Extractor, [<http://rimmer.ngdc.noaa.gov/coast/>](http://rimmer.ngdc.noaa.gov/coast/).

3. **To whom should users address questions about the data?**

   Guy R. Cochrane
   United States Geological Survey (USGS)
   Geophysicist
   USGS, 400 Natural Bridges Drive
   Santa Cruz, CA 95060-5792
   USA

   (831) 427-4754 (voice)
   (831) 427-4748 (FAX)
   gcochrane@usgs.gov

Why was the data set created?

These data are intended for science researchers, students, policy makers, and the general public. The data can be used with geographic information systems (GIS) software to display geologic and oceanographic information.

How was the data set created?

1. **From what previous works were the data drawn?**

2. **How were the data generated, processed, and modified?**

   Date: 22-Nov-2005 (process 1 of 4)
     Download from NOAA Coastline Extractor,<http://rimmer.ngdc.noaa.gov/coast/>.

   Date: 22-Nov-2005 (process 2 of 4)
     Nadine Golden edited and reduced number of features to study area boundaries.

   Date: 22-Nov-2005 (process 3 of 4)
     Converted from datum NAD27 to NAD83

   Date: 22-Nov-2005 (process 4 of 4)
     First draft of metadata created by Nadine Golden using USGS metadata tool "MP".

3. **What similar or related data should the user be aware of?**

     United States Geological Survey, Coastal and Marine Geology (CMG), 2005,
     USGS CMG Glacier Bay, Alaska Habitat Metadata.

     Online Links:

     ❍ <http://pubs.usgs.gov/of/2006/1081/>

   This is part of the following larger work.

     United States Geological Survey, Coastal and Marine Geology (CMG), 2005,
     USGS CMG InfoBank.

     Online Links:

     ❍ <http://walrus.wr.usgs.gov/InfoBank>

How reliable are the data; what problems remain in the data set?

1. **How well have the observations been checked?**

   NOAA data was stored with sufficient precision to resolve 1 m changes along the ground.

2. **How accurate are the geographic locations?**

3. **How accurate are the heights or depths?**

4. **Where are the gaps in the data? What is missing?**

   complete

5. **How consistent are the relationships among the observations, including topology?**

   No additional checks for topological consistency were performed on this data.

How can someone get a copy of the data set?

Are there legal restrictions on access or use of the data?

Access_Constraints: None
Use_Constraints: Not suitable for navigation

1. **Who distributes the data set?** (Distributor 1 of 1)

   United States Geological Survey (USGS)
   c/o Guy R. Cochrane
   Geophysicist
   USGS, 400 Natural Bridges Drive
   Santa Cruz, CA 95060-5792
   USA

   (831) 427-4754 (voice)
   (831) 427-4748 (FAX)
   gcochrane@usgs.go

2. **What's the catalog number I need to order this data set?**

3. **What legal disclaimers am I supposed to read?**

   Please recognize the U.S. Geological Survey (USGS) as the source of this information.

Although these data have been used by the U.S. Geological Survey, U.S. Department of the Interior, no warranty expressed or implied is made by the U.S. Geological Survey as to the accuracy of the data.

The act of distribution shall not constitute any such warranty, and no responsibility is assumed by the U.S. Geological Survey in the use of this data, software, or related materials.

4. **How can I download or order the data?**

Who wrote the metadata?

Dates:
    Last modified: 2005
    Last Reviewed: 2005
Metadata author:
    United States Geological Survey (USGS)
    c/o Guy R. Cochrane
    Geophysicist
    USGS, 400 Natural Bridges Drive
    Santa Cruz, CA 95060-5792
    USA

    (831) 427-4754 (voice)
    (831) 427-4748 (FAX)
    gcochrane@usgs.gov

Metadata standard:
    FGDC Content Standards for Digital Geospatial Metadata ("CSDGM version 2") (FGDC-STD-001-1998)

Generated by mp version 2.8.6 on Tue Nov 29 11:58:38 2005
Revised July 31, 2006 (mfd)

Identification_Information:
  Citation:
   Citation_Information:
     Originator: Guy R. Cochrane
     Originator: Jodi Harney
     Originator: Pete Dartnell
     Originator: Nadine Golden
     Originator: Hank Chezar
     Publication_Date: 2005
     Title: Glacier Bay Place Names Edition: (Version 1.0, 2005)
     Geospatial_Data_Presentation_Form: map
     Online_Linkage:
        http://pubs.usgs.gov/of/2006/1081/catalog.html/place_names.tgz
     Larger_Work_Citation:
      Citation_Information:
          Originator: Guy R. Cochrane
          Originator: Jodi Harney
          Originator: Pete Dartnell
          Originator: Nadine Golden
          Originator: Hank Chezar
          Publication_Date: 2005
          Title: Geologic characteristics of benthic habitats, Glacier Bay, southeast Alaska Edition: 1.0
          Series_Information:
              Series_Name: Open-File Report
              Issue_Identification: USGS OFR 2006-1081
          Publication_Information:
            Publication_Place: Western Coastal and Marine
               Geology, Santa Cruz, CA
            Publisher: U.S. Geological Survey, Coastal and Marine
                Geology Program
          Online_Linkage:
            http://pubs.usgs.gov/of/2006/1081/index.html

  Description:
   Abstract:
      This file is a small set of points associated to place names for Glacier Bay, southeast Alaska. This file was created for the sole purpose of enhancing the display of the Glacier Bay polygon and coastline data..

   Purpose:
      These data are intended for science researchers, students, policy makers, and the general public. The data can be

used with geographic information systems (GIS) software
to display geologic and oceanographic information.

  Supplemental_Information:
    Additional information about the field activities from
    which this data set was derived are available online at

    Any use of trade, product, or firm names is for descriptive purposes
    only and does not imply endorsement by the
    U.S. Government.

    Although this Federal Geographic Data Committee-compliant metadata
    file is intended to document the data set in nonproprietary form,
    as well as in ArcInfo format, this metadata file may include some
    ArcInfo-specific terminology.

Time_Period_of_Content:
  Time_Period_Information:
    Single_Date/Time:
      Calendar_Date: 2005
  Currentness_Reference: Ground Condition

Status:
  Progress: Complete
  Maintenance_and_Update_Frequency: As Needed

Spatial_Domain:
  Bounding_Coordinates:
    West_Bounding_Coordinate: -136.497887
    East_Bounding_Coordinate: -135.742928
    North_Bounding_Coordinate: 58.944617
    South_Bounding_Coordinate: 58.333702

Keywords:
  Theme:
    Theme_Keyword_Thesaurus: None
    Theme_Keyword: habitat
    Theme_Keyword: fisheries
    Theme_Keyword: seafloor
    Theme_Keyword: geology
  Theme:
    Theme_Keyword_Thesaurus: ISO 19115 Topic Category
    Theme_Keyword: biota

      Theme_Keyword: geoscientificinformation
      Theme_Keyword: imagereyBaseMapsEarthCover
      Theme_Keyword: oceans
   Place:
     Place_Keyword_Thesaurus: None
     Place_Keyword: Alaska
     Place_Keyword: Glacier Bay

 Access_Constraints: None

 Use_Constraints: Not suitable for navigation

 Point_of_Contact:
   Contact_Information:
     Contact_Person_Primary:
       Contact_Person: Guy R. Cochrane
       Contact_Organization:
         United States Geological Survey (USGS)
         Coastal and Marine Geology Program (CMGP)
     Contact_Position: Geophysicist
     Contact_Address:
       Address_Type: mailing and physical address
       Address: USGS, 400 Natural Bridges Drive
       City: Santa Cruz
       State_or_Province: CA
       Postal_Code: 95060-5792
       Country: USA
     Contact_Voice_Telephone: (831) 427-4754
     Contact_Facsimile_Telephone: (831) 427-4748
     Contact_Electronic_Mail_Address: gcochrane@usgs.gov

 Data_Set_Credit:
       This file is a small set of points associated to place names for Glacier Bay, southeast Alaska. This
file was created for the sole purpose of enhancing the display of the Glacier Bay polygon and coastline
data created by Nadine Golden.

 Native_Data_Set_Environment:
   ArcInfo version 9.1
 Cross_Reference:
   Citation_Information:
     Originator: United States Geological Survey (USGS), Coastal and Marine Geology (CMG)
     Publication_Date: 2005
     Title: USGS CMG Glacier Bay, Alaska Habitat Metadata

Online_Linkage: http://pubs.usgs.gov/of/2006/1081
Larger_Work_Citation:
  Citation_Information:
    Originator: United States Geological Survey (USGS), Coastal and Marine Geology (CMG)
    Publication_Date: 2005
    Title: USGS CMG InfoBank
    Online_Linkage: http://walrus.wr.usgs.gov/InfoBank

Browse_Graphic:
  Browse_Graphic_File_Name: http://pubs.usgs.gov/of/2006/1081/images/place_names.html
  Browse_Graphic_File_Description: JPEG image of place manes for Glacier Bay, Alaska.
  Browse_Graphic_File_Type: JPEG

Data_Quality_Information:
 Attribute_Accuracy:
   Attribute_Accuracy_Report: Data was created to match NOAA data with sufficient precision 1 m changes along the ground.
 Logical_Consistency_Report: No additional checks for topological consistency were performed on this data.
 Completeness_Report: complete

 Lineage:
  Process_Step:
    Process_Description: Nadine Golden created point features and added place name attribute.
    Process_Date: 20051122
  Process_Step:
    Process_Description: Created at projection datum NAD83
    Process_Date: 20051122
  Process_Step:
    Process_Description:
      First draft of metadata created by Nadine Golden using USGS metadata tool "MP".
    Process_Date: 20051122

Spatial_Data_Organization_Information:
 Direct_Spatial_Reference_Method: Vector
 Point_and_Vector_Object_Information:
  SDTS_Terms_Description:
    SDTS_Point_and_Vector_Object_Type: point
    Point_and_Vector_Object_Count: 10

Spatial_Reference_Information:
 Horizontal_Coordinate_System_Definition:
  Planar:

  Map_Projection:
    Map_Projection_Name: NAD_1983_UTM_Zone_8N
    Polar_Stereographic:
      Straight-Vertical_Longitude_From_Pole: -135
      Standard_Parallel: 0.999600
      False_Easting: 500000.000
      False_Northing: 0.000
    Planar_Coordinate_Information:
      Planar_Coordinate_Encoding_Method: coordinate pair
      Coordinate_Representation:
        Abscissa_Resolution: 0.000128
        Ordinate_Resolution: 0.000128
      Planar_Distance_Units: meters
  Geodetic_Model:
    Horizontal_Datum_Name: North American Datum of 1983
    Ellipsoid_Name: Geodetic ReferenceSystem 80
    Semi-major_Axis: 6378137
    Denominator_of_Flattening_Ratio: 298.2572222

Entity_and_Attribute_Information:
  Overview_Description:
    Entity_and_Attribute_Overview:

      FID
      Alias: FID
      Data type: OID
      Width: 4
      Precision: 0
      Scale: 0
      Definition:
      Internal feature number.
      Definition Source:
      ESRI

      Shape
      Alias: Shape
      Data type: Geometry
      Width: 0
      Precision: 0
      Scale: 0
      Definition:
      Feature geometry.

Definition Source:
ESRI

name
 Alias: name
 Data type: String
 Width: 50

 Entity_and_Attribute_Detail_Citation: none

Distribution_Information:
 Distributor:
  Contact_Information:
   Contact_Organization_Primary:
    Contact_Organization:
     United States Geological Survey (USGS)
     Coastal and Marine Geology Program (CMGP)
    Contact_Person: Guy R. Cochrane
   Contact_Position: Geophysicist
   Contact_Address:
    Address_Type: mailing and physical address
    Address: USGS, 400 Natural Bridges Drive
    City: Santa Cruz
    State_or_Province: CA
    Postal_Code: 95060-5792
    Country: USA
   Contact_Voice_Telephone: (831) 427-4754
   Contact_Facsimile_Telephone: (831) 427-4748
   Contact_Electronic_Mail_Address: gcochrane@usgs.go

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  U.S. Department of the Interior, no warranty expressed or implied
  is made by the U.S. Geological Survey as to the accuracy of the
  data.

  The act of distribution shall not constitute any such warranty,
  and no responsibility is assumed by the U.S. Geological Survey in

the use of this data, software, or related materials.

Metadata_Reference_Information:
 Metadata_Date: 2005
 Metadata_Review_Date: 2005
 Metadata_Contact:
  Contact_Information:
   Contact_Organization_Primary:
    Contact_Organization:
     United States Geological Survey (USGS)
     Coastal and Marine Geology Program (CMGP)
    Contact_Person: Guy R. Cochrane
   Contact_Position: Geophysicist
   Contact_Address:
    Address_Type: mailing and physical address
    Address: USGS, 400 Natural Bridges Drive
    City: Santa Cruz
    State_or_Province: CA
    Postal_Code: 95060-5792
    Country: USA
   Contact_Voice_Telephone: (831) 427-4754
   Contact_Facsimile_Telephone: (831) 427-4748
   Contact_Electronic_Mail_Address: gcochrane@usgs.gov
 Metadata_Standard_Name: FGDC Content Standards for Digital Geospatial Metadata ("CSDGM version 2")
 Metadata_Standard_Version: FGDC-STD-001-1998
 Metadata_Access_Constraints: none
 Metadata_Use_Constraints: none

Identification_Information:
  Citation:
    Citation_Information:
      Originator: Guy R. Cochrane
      Originator: Jodi Harney
      Originator: Pete Dartnell
      Originator: Nadine Golden
      Originator: Hank Chezar
      Publication_Date: 2005
      Title: Glacier Bay Video Observations
      Edition: (Volume I, Version 1.0, 2005)
      Geospatial_Data_Presentation_Form: map
      Online_Linkage:
         http://pubs.usgs.gov/of/2006/1081/catalog.html
      Online_Linkage:
         http://pubs.usgs.gov/of/2006/1081/observations/video_obs_centralbay.tgz
      Larger_Work_Citation:
        Citation_Information:
            Originator: Guy R. Cochrane
            Originator: Jodi Harney
            Originator: Pete Dartnell
            Originator: Nadine Golden
            Originator: Hank Chezar
            Publication_Date: 2005
            Title: Geologic Characteristics of Benthic Habitats, Glacier Bay, Southeast Alaska, Volume I
Edition: 1.0
            Series_Information:
                Series_Name: Open-File Report
                Issue_Identification: USGS OFR 2006-1081
            Publication_Information:
              Publication_Place: Western Coastal and Marine Geology, Santa Cruz, CA
              Publisher: U.S. Geological Survey, Coastal and Marine Geology Program
            Online_Linkage: http://pubs.usgs.gov/of/2006/1081/index.html
  Description:

   Abstract:
     Point based visual observations of benthic habitat from a samples obtained with a video sled.

   Purpose:
     These data are intended for science researchers, students, policy
     makers, and the general public. The data can be

used with geographic information systems (GIS) software
to display geologic and oceanographic information.

  Supplemental_Information:
    Any use of trade, product, or firm names is for descriptive purposes
only and does not imply endorsement by the U.S. Government. Metadata for this data set can also be
found in the USGS Coastal and Marine Geology InfoBank, cruise ID G-1-04-GB, URL: http://walrus.wr.
usgs.gov/infobank/g/g104gb/html/g-1-04-gb.meta.html.

    Although this Federal Geographic Data Committee-compliant metadata
    file is intended to document the data set in nonproprietary form,
    as well as in ArcInfo format, this metadata file may include some
    ArcInfo-specific terminology.

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  Time_Period_Information:
   Range_of_Dates/Times:
    Beginning_Date: 1998
    Ending_Date: 2004
  Currentness_Reference: Ground Condition

 Status:
  Progress: Complete
  Maintenance_and_Update_Frequency: As Needed

 Spatial_Domain:
  Bounding_Coordinates:
   West_Bounding_Coordinate: -136.382434
   East_Bounding_Coordinate: -135.878131
   North_Bounding_Coordinate: 59.029898
   South_Bounding_Coordinate: 58.396455

 Keywords:
  Theme:
   Theme_Keyword_Thesaurus: None
   Theme_Keyword: benthic habitat
   Theme_Keyword: scuba observations
   Theme_Keyword: rov observations
   Theme_Keyword: fisheries
   Theme_Keyword: ecosystem
   Theme_Keyword: diving
   Theme_Keyword: U.S. Geological Survey
   Theme_Keyword: USGS

    Theme_Keyword: Coastal and Marine Geology Program
    Theme_Keyword: CMGP
  Theme:
   Theme_Keyword_Thesaurus: ISO 19115 Topic Category
   Theme_Keyword: biota
   Theme_Keyword: geoscientificinformation
   Theme_Keyword: imagereyBaseMapsEarthCover
   Theme_Keyword: oceans
  Place:
   Place_Keyword_Thesaurus: None
   Place_Keyword: Glacier Bay
   Place_Keyword: Alaska
   Place_Keyword: USA

Access_Constraints: None

Use_Constraints: None
Point_of_Contact:
  Contact_Information:
   Contact_Person_Primary:
    Contact_Person: Guy R. Cochrane
    Contact_Organization:
     United States Geological Survey (USGS)
     Coastal and Marine Geology Program (CMGP)
   Contact_Position: Geophysicist
   Contact_Address:
    Address_Type: mailing and physical address
    Address: USGS, 400 Natural Bridges Drive
    City: Santa Cruz
    State_or_Province: CA
    Postal_Code: 95060-5792
    Country: USA
   Contact_Voice_Telephone: (831) 427-4754
   Contact_Facsimile_Telephone: (831) 427-4748
   Contact_Electronic_Mail_Address: gcochrane@usgs.gov

Data_Set_Credit:
 A compilation of scuba and rov dive observations of benthic habitat. Divers include
 Russ Vetter, Cynthia Taylor, and other NOAA employed divers. ROV operated by John
 Butler, John Wagner, and other NOAA technicians. Some of the dives made on USGS field
 activity S-1-01-SC

Native_Data_Set_Environment:

SunOS, 5.8, sun4u UNIX
ArcInfo versions 9.1

Data_Quality_Information:
  Attribute_Accuracy:
    Attribute_Accuracy_Report: Visual observations of variable unknown accuracy
  Logical_Consistency_Report: Point features present.
  Completeness_Report: Observations made without uniform protocol.
  Positional_Accuracy:
    Horizontal_Positional_Accuracy:
      Horizontal_Positional_Accuracy_Report: Highly variable on the order of 10 meters.

  Lineage:
    Process_Step:
      Process_Description:
        First draft of metadata created by using
        using
      Process_Date: 2005

Spatial_Data_Organization_Information:
  Direct_Spatial_Reference_Method: Vector
  Point_and_Vector_Object_Information:
    SDTS_Terms_Description:
      SDTS_Point_and_Vector_Object_Type: Entity point
      Point_and_Vector_Object_Count: 5747
Spatial_Reference_Information:
  Horizontal_Coordinate_System_Definition:
    Planar:
      Map_Projection:
        Map_Projection_Name: NAD_1983_UTM_Zone_8N
        Polar_Stereographic:
          Straight-Vertical_Longitude_From_Pole: -135
          Standard_Parallel: 0.999600
          False_Easting: 500000.000
          False_Northing: 0.000
      Planar_Coordinate_Information:
        Planar_Coordinate_Encoding_Method: coordinate pair
        Coordinate_Representation:
          Abscissa_Resolution: 0.000064
          Ordinate_Resolution: 0.000064
        Planar_Distance_Units: meters
    Geodetic_Model:
      Horizontal_Datum_Name: North American Datum of 1983

    Ellipsoid_Name: Geodetic ReferenceSystem 80
    Semi-major_Axis: 6378137
    Denominator_of_Flattening_Ratio: 298.2572222

Entity_and_Attribute_Information:
  Overview_Description:
    Entity_and_Attribute_Overview:

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      Precision: 0
      Scale: 0
      Definition:
      Internal feature number.
      Definition Source:
      ESRI

      Shape
      Alias: Shape
      Data type: Geometry
      Width: 0
      Precision: 0
      Scale: 0
      Definition:
      Feature geometry.
      Definition Source:
      ESRI

      Lon
      Alias: Lon
      Data type: Number
      Width: 19
      Number of decimals: 11

      Lat
      Alias: Lat
      Data type: Number
      Width: 19
      Number of decimals: 11

pri_subst
Alias: pri_subst
Data type: String
Width: 254

sec_subst
Alias: sec_subst
Data type: String
Width: 254

relief
Alias: relief
Data type: Number
Width: 10

complexity
Alias: complexity
Data type: String
Width: 254

biomass
Alias: biomass
Data type: String
Width: 254

observ1
Alias: observ1
Data type: String
Width: 254

observ2
Alias: observ2
Data type: String
Width: 254

observ3
Alias: observ3
Data type: String
Width: 254

observ4
Alias: observ4
Data type: String

Width: 254

observ5
Alias: observ5
Data type: String
Width: 254

geo_obs
Alias: geo_obs
Data type: String
Width: 254

special
Alias: special
Data type: String
Width: 254

Zpigm
Alias: Zpigm
Data type: Number
Width: 19
Number of decimals: 11

comment
Alias: comment
Data type: String
Width: 254

sample
Alias: sample
Data type: String
Width: 254

depthm
Alias: depthm
Data type: String
Width: 254

cam_hdg
Alias: cam_hdg
Data type: Number
Width: 19
Number of decimals: 11

sog
Alias: sog
Data type: Number
Width: 19
Number of decimals: 11

line
Alias: line
Data type: Number
Width: 10

tape
Alias: tape
Data type: Number
Width: 10

yyyydddhhm
Alias: yyyydddhhm
Data type: Number
Width: 19
Number of decimals: 11

jday
Alias: jday
Data type: Number
Width: 10

hhmmss
Alias: hhmmss
Data type: Number
Width: 10

xval
Alias: xval
Data type: Number
Width: 19
Number of decimals: 11

yval
Alias: yval
Data type: Number
Width: 19

   Number of decimals: 11

   bathyg
   Alias: bathyg
   Data type: Float
   Width: 19
   Number of decimals: 11

   obs
   Alias: obs
   Data type: String
   Width: 25

 Entity_and_Attribute_Detail_Citation: none

Distribution_Information:
 Distributor:
  Contact_Information:
   Contact_Organization_Primary:
     Contact_Organization:
       United States Geological Survey (USGS)
       Coastal and Marine Geology Program (CMGP)
     Contact_Person: Guy R. Cochrane
   Contact_Position: Geophysicist
   Contact_Address:
     Address_Type: mailing and physical address
     Address: USGS, 400 Natural Bridges Drive
     City: Santa Cruz
     State_or_Province: CA
     Postal_Code: 95060-5792
     Country: USA
   Contact_Voice_Telephone: (831) 427-4754
   Contact_Facsimile_Telephone: (831) 427-4748
   Contact_Electronic_Mail_Address: gcochrane@usgs.gov

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data.

The act of distribution shall not constitute any such warranty,
and no responsibility is assumed by the U.S. Geological Survey in
the use of this data, software, or related materials.

Metadata_Reference_Information:
 Metadata_Date: 20040922
 Metadata_Review_Date: 2004
 Metadata_Contact:
  Contact_Information:
   Contact_Organization_Primary:
    Contact_Organization:
     United States Geological Survey (USGS)
     Coastal and Marine Geology Program (CMGP)
    Contact_Person: Guy R. Cochrane
   Contact_Position: Geophysicist
   Contact_Address:
    Address_Type: mailing and physical address
    Address: USGS, 400 Natural Bridges Drive
    City: Santa Cruz
    State_or_Province: CA
    Postal_Code: 95060-5792
    Country: USA
   Contact_Voice_Telephone: (831) 427-4754
   Contact_Facsimile_Telephone: (831) 427-4748
   Contact_Electronic_Mail_Address: gcochrane@usgs.gov
 Metadata_Standard_Name: FGDC Content Standards for Digital Geospatial Metadata ("CSDGM
version 2")
 Metadata_Standard_Version: FGDC-STD-001-1998
 Metadata_Access_Constraints: none
 Metadata_Use_Constraints: none

Identification_Information:
 Citation:
  Citation_Information:
   Originator: Guy R. Cochrane
   Originator: Jodi Harney
   Originator: Pete Dartnell
   Originator: Nadine Golden
   Originator: Hank Chezar
   Publication_Date: 2005
   Title: Glacier Bay Video Observations
   Edition: (Volume I, Version 1.0, 2005)
   Geospatial_Data_Presentation_Form: map
   Online_Linkage:
      http://pubs.usgs.gov/of/2006/1081/catalog.html
   Online_Linkage:
      http://pubs.usgs.gov/of/2006/1081/observations/video_obs_willoughby.tgz
   Larger_Work_Citation:
    Citation_Information:
        Originator: Guy R. Cochrane
        Originator: Jodi Harney
        Originator: Pete Dartnell
        Originator: Nadine Golden
        Originator: Hank Chezar
        Publication_Date: 2005
        Title: Geologic Characteristics of Benthic Habitats, Glacier Bay, Southeast Alaska, Volume I
Edition: 1.0
        Series_Information:
            Series_Name: Open-File Report
            Issue_Identification: USGS OFR 2006-1081
        Publication_Information:
          Publication_Place: Western Coastal and Marine Geology, Santa Cruz, CA
          Publisher: U.S. Geological Survey, Coastal and Marine Geology Program
        Online_Linkage: http://pubs.usgs.gov/of/2006/1081/index.html
  Description:

  Abstract:
   Point based visual observations of benthic habitat from a samples obtained with a video sled.

  Purpose:
   These data are intended for science researchers, students, policy
   makers, and the general public. The data can be

used with geographic information systems (GIS) software
to display geologic and oceanographic information.

  Supplemental_Information:
    Any use of trade, product, or firm names is for descriptive purposes
    only and does not imply endorsement by the U.S. Government.
    Metadata for this data set can also be found in the USGS Coastal and Marine Geology InfoBank,
cruise ID T-1-98-GB , URL: http://walrus.wr.usgs.gov/infobank/t/t198gb/html/t-1-98-gb.meta.html.

    Although this Federal Geographic Data Committee-compliant metadata
    file is intended to document the data set in nonproprietary form,
    as well as in ArcInfo format, this metadata file may include some
    ArcInfo-specific terminology.

  Time_Period_of_Content:
    Time_Period_Information:
      Range_of_Dates/Times:
        Beginning_Date: 1998
        Ending_Date: 2004
    Currentness_Reference: Ground Condition

  Status:
    Progress: Complete
    Maintenance_and_Update_Frequency: As Needed

  Spatial_Domain:
    Bounding_Coordinates:
      West_Bounding_Coordinate: -136.382434
      East_Bounding_Coordinate: -135.878131
      North_Bounding_Coordinate: 59.029898
      South_Bounding_Coordinate: 58.396455

  Keywords:
    Theme:
      Theme_Keyword_Thesaurus: None
      Theme_Keyword: benthic habitat
      Theme_Keyword: scuba observations
      Theme_Keyword: rov observations
      Theme_Keyword: fisheries
      Theme_Keyword: ecosystem
      Theme_Keyword: diving
      Theme_Keyword: U.S. Geological Survey
      Theme_Keyword: USGS

      Theme_Keyword: Coastal and Marine Geology Program
      Theme_Keyword: CMGP
    Theme:
      Theme_Keyword_Thesaurus: ISO 19115 Topic Category
      Theme_Keyword: biota
      Theme_Keyword: geoscientificinformation
      Theme_Keyword: imagereyBaseMapsEarthCover
      Theme_Keyword: oceans
    Place:
      Place_Keyword_Thesaurus: None
      Place_Keyword: Glacier Bay
      Place_Keyword: Alaska
      Place_Keyword: USA

Access_Constraints: None

Use_Constraints: None
Point_of_Contact:
  Contact_Information:
    Contact_Person_Primary:
      Contact_Person: Guy R. Cochrane
      Contact_Organization:
        United States Geological Survey (USGS)
        Coastal and Marine Geology Program (CMGP)
    Contact_Position: Geophysicist
    Contact_Address:
      Address_Type: mailing and physical address
      Address: USGS, 400 Natural Bridges Drive
      City: Santa Cruz
      State_or_Province: CA
      Postal_Code: 95060-5792
      Country: USA
    Contact_Voice_Telephone: (831) 427-4754
    Contact_Facsimile_Telephone: (831) 427-4748
    Contact_Electronic_Mail_Address: gcochrane@usgs.gov

Data_Set_Credit:
  A compilation of scuba and rov dive observations of benthic habitat. Divers include
  Russ Vetter, Cynthia Taylor, and other NOAA employed divers. ROV operated by John
  Butler, John Wagner, and other NOAA technicians. Some of the dives made on USGS field
  activity S-1-01-SC

Native_Data_Set_Environment:

SunOS, 5.8, sun4u UNIX
ArcInfo versions 9.1

Data_Quality_Information:
 Attribute_Accuracy:
  Attribute_Accuracy_Report: Visual observations of variable unknown accuracy
 Logical_Consistency_Report: Point features present.
 Completeness_Report: Observations made without uniform protocol.
 Positional_Accuracy:
  Horizontal_Positional_Accuracy:
   Horizontal_Positional_Accuracy_Report: Highly variable on the order of 10 meters.

 Lineage:
  Process_Step:
   Process_Description:
    First draft of metadata created by using
    using
   Process_Date: 2005

Spatial_Data_Organization_Information:
 Direct_Spatial_Reference_Method: Vector
 Point_and_Vector_Object_Information:
  SDTS_Terms_Description:
   SDTS_Point_and_Vector_Object_Type: Entity point
   Point_and_Vector_Object_Count: 5866
Spatial_Reference_Information:
 Horizontal_Coordinate_System_Definition:
  Planar:
   Map_Projection:
    Map_Projection_Name: NAD_1983_UTM_Zone_8N
    Polar_Stereographic:
     Straight-Vertical_Longitude_From_Pole: -135
     Standard_Parallel: 0.999600
     False_Easting: 500000.000
     False_Northing: 0.000
   Planar_Coordinate_Information:
    Planar_Coordinate_Encoding_Method: coordinate pair
    Coordinate_Representation:
     Abscissa_Resolution: 0.000064
     Ordinate_Resolution: 0.000064
    Planar_Distance_Units: meters
  Geodetic_Model:
   Horizontal_Datum_Name: North American Datum of 1983

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     Ellipsoid_Name: Geodetic ReferenceSystem 80
     Semi-major_Axis: 6378137
     Denominator_of_Flattening_Ratio: 298.2572222


Entity_and_Attribute_Information:
  Overview_Description:
    Entity_and_Attribute_Overview:

      FID
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      Data type: OID
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      Precision: 0
      Scale: 0
      Definition:
      Internal feature number.
      Definition Source:
      ESRI

      Shape
      Alias: Shape
      Data type: Geometry
      Width: 0
      Precision: 0
      Scale: 0
      Definition:
      Feature geometry.
      Definition Source:
      ESRI

      Lon
      Alias: Lon
      Data type: Number
      Width: 19
      Number of decimals: 11

      Lat
      Alias: Lat
      Data type: Number
      Width: 19
      Number of decimals: 11

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Alias: pri_subst
Data type: String
Width: 254

sec_subst
Alias: sec_subst
Data type: String
Width: 254

relief
Alias: relief
Data type: Number
Width: 10

complexity
Alias: complexity
Data type: String
Width: 254

biomass
Alias: biomass
Data type: String
Width: 254

geo_obs
Alias: geo_obs
Data type: String
Width: 254

special
Alias: special
Data type: String
Width: 254

bathyg
Alias: bathyg
Data type: String
Width: 254

bathy_vid
Alias: bathy_vid
Data type: String
Width: 254

comment
Alias: comment
Data type: String
Width: 254

tape
Alias: tape
Data type: String
Width: 254

yyydddhhmm
Alias: yyydddhhmm
Data type: Number
Width: 19

Number of decimals: 11
jday
Alias: jday
Data type: Number
Width: 10

hhmmss
Alias: hhmmss
Data type: Number
Width: 10

obs
Alias: obs
Data type: String
Width: 50

Entity_and_Attribute_Detail_Citation: none

Distribution_Information:
  Distributor:
    Contact_Information:
      Contact_Organization_Primary:
        Contact_Organization:
          United States Geological Survey (USGS)
          Coastal and Marine Geology Program (CMGP)
        Contact_Person: Guy R. Cochrane

      Contact_Position: Geophysicist
      Contact_Address:
        Address_Type: mailing and physical address
        Address: USGS, 400 Natural Bridges Drive
        City: Santa Cruz
        State_or_Province: CA
        Postal_Code: 95060-5792
        Country: USA
      Contact_Voice_Telephone: (831) 427-4754
      Contact_Facsimile_Telephone: (831) 427-4748
      Contact_Electronic_Mail_Address: gcochrane@usgs.gov

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  data.

  The act of distribution shall not constitute any such warranty,
  and no responsibility is assumed by the U.S. Geological Survey in
  the use of this data, software, or related materials.

Metadata_Reference_Information:
 Metadata_Date: 20040922
 Metadata_Review_Date: 2004
 Metadata_Contact:
  Contact_Information:
   Contact_Organization_Primary:
    Contact_Organization:
     United States Geological Survey (USGS)
     Coastal and Marine Geology Program (CMGP)
    Contact_Person: Guy R. Cochrane
   Contact_Position: Geophysicist
   Contact_Address:
    Address_Type: mailing and physical address
    Address: USGS, 400 Natural Bridges Drive
    City: Santa Cruz
    State_or_Province: CA
    Postal_Code: 95060-5792
    Country: USA

    Contact_Voice_Telephone: (831) 427-4754
    Contact_Facsimile_Telephone: (831) 427-4748
    Contact_Electronic_Mail_Address: gcochrane@usgs.gov
 Metadata_Standard_Name: FGDC Content Standards for Digital Geospatial Metadata ("CSDGM version 2")
 Metadata_Standard_Version: FGDC-STD-001-1998
 Metadata_Access_Constraints: none
 Metadata_Use_Constraints: none

Identification_Information:

 Citation:
  Citation_Information:
    Originator: A.J. Stevenson
    Originator: Florence L. Wong
    Publication_Date: 2002
    Title: Bathymetric xyz data for Glacier Bay at 5-meter intervals.
    Edition: Version 1.0, December 10, 2002
    Geospatial_Data_Presentation_Form: map
    Series_Information:
      Series_Name: USGS Open-File Report
      Issue_Identification: 02-391
    Publication_Information:
      Publication_Place: Menlo Park, California
      Publisher: U.S. Geological Survey
    Online_Linkage: <URL:http://geopubs.wr.usgs.gov/open-file/02-391>

 Description:

  Abstract:

    This data set consists of 5-m gridded bathymetric data for Glacier
    Bay, Alaska, in xyz form.
    The data were interpolated across "nodata" gaps that
    were no more than 30 meters wide.

    Data were collected during May 29 - June 6, 2001, by
    contract with Thales Geosolutions
    (http://www.thales-geopacific.com/) aboard the
    R/V Davidson as part of a cooperative survey conducted by the
    U.S. National Park Service and the U.S. Geological
    Survey (Biological Resources and Coastal and Marine
    Geology). The instrument was a Reson 8111 multibeam
    echosounder (http://reson.com/sb8111.htm). The raw
    data were reduced by Thales.

  Purpose:

    These data are intended for science researchers, students, policy
    makers, and the general public. The data can be

used with geographic information systems (GIS) software
to display geologic and oceanographic information.

 Supplemental_Information:

Additional information about the field activities from
which this data set was derived are available online at
http://walrus.wr.usgs.gov/infobank/d/d101gb/html/d-1-01-gb.meta.html

Any use of trade, product, or firm names is for descriptive purposes
only and does not imply endorsement by the
U.S. Government.

Specifications for the Reson SeaBat 8111 Multibeam Echosounder
(http://www.reson.com/sb8111.htm)

> Operating frequency: 100 kHz
> Number of beams: 101
> Beamwidth across track: 1.5 degrees
> Beamwidth along track: 1.5 degrees
> Center-to-center beam separation: 1.5 degrees
> Pulse length: Variable, operator selectable
> Depth range: 3 - 1000 meters
> Transducer depth rating: 100 meters
> Max. update rate: 35 swaths per second
> Max. vessel Speed: 20 knots
> Stabilization: Pitch stabilization within +/- 10 degrees
> Projector beam control: External pitch sensor
> Hydrophone size (Dia./arc/length): 640mm, 220 degrees, 200mm
> Processor Dimensions (HWD): 177 x 483 x 434 mm
> Tranceiver Dimensions (HWD): 267 x 450 x 427 mm
> Weight: (with 15m cable):
>   Hydrophone Dry: 42 kg Wet: 36 kg
>   Projector Dry: 30 kg Wet: 23 kg
> Transceiver weight: 13.6 kg
> Processor weight: 20 kg

Although this Federal Geographic Data Committee-compliant metadata
file is intended to document the data set in nonproprietary form,
as well as in ArcInfo format, this metadata file may include some
ArcInfo-specific terminology.

Time_Period_of_Content:

  Time_Period_Information:
    Single_Date/Time:
      Calendar_Date: 2002
  Currentness_Reference: Ground Condition

Status:
  Progress: In work
  Maintenance_and_Update_Frequency: As Needed.

Spatial_Domain:
  Bounding_Coordinates:
    West_Bounding_Coordinate: -136.40276708
    East_Bounding_Coordinate: -135.91167668
    North_Bounding_Coordinate: 58.75728909
    South_Bounding_Coordinate: 58.35942274

Keywords:
  Theme:
    Theme_Keyword_Thesaurus: None
    Theme_Keyword: bathymetry
    Theme_Keyword: multibeam
    Theme_Keyword: echosounder
  Place:
    Place_Keyword_Thesaurus: None
    Place_Keyword: Glacier Bay
    Place_Keyword: Alaska

Access_Constraints: None.

Use_Constraints: Data not to be used for navigational purposes.

Point_of_Contact:
  Contact_Information:
    Contact_Person_Primary:
      Contact_Person: Florence L. Wong
      Contact_Organization:
        United States Geological Survey (USGS)
        Coastal and Marine Geology (CMG)
    Contact_Position: Geologist, GIS Coordinator
    Contact_Address:
      Address_Type: mailing and physical address
      Address: USGS, MailStop 999, 345 Middlefield Road
      City: Menlo Park

          State_or_Province: CA
          Postal_Code: 94025-3561
          Country: USA
        Contact_Voice_Telephone: (650) 329-5327
        Contact_Facsimile_Telephone: (650) 329-5190
        Contact_Electronic_Mail_Address: fwong@usgs.gov

  Native_Data_Set_Environment:
    SunOS, 5.7, sun4u UNIX
    ArcInfo version 8.0.2

  Browse_Graphic:
    Browse_Graphic_File_Name: glacier.gif
    Browse_Graphic_File_Description:
      index map of Glacier Bay
      multibeam bathymetry data
    Browse_Graphic_File_Type: GIF

Data_Quality_Information:
  Attribute_Accuracy:
    Attribute_Accuracy_Report: Not applicable.

  Logical_Consistency_Report: Not applicable for raster data.

  Completeness_Report:
    Data values are missing in and around shallow or emergent
    features (islands) and where adjoining trackline coverage was
    not overlapping.

  Positional_Accuracy:
    Horizontal_Positional_Accuracy:
      Horizontal_Positional_Accuracy_Report:
        Navigation was multiple DGPS [differential global
        positioning systems] coupled up with 2 very precise DR
        [dead-reckoning] 3-axis accelerometers, all integrated in
        WinFrog (proprietary software from Thales Geosolutions
        http://www.thales-geopacific.com/offshore/index.html).
        The best functional test we did was crossties, which
        suggested that average navigational errors were on the
        order of 1 meter, with (rare) maximum errors being about 3
        meters. (A.J. Stevenson, written communtication, October
        2001)

Lineage:

  Process_Step:
   Process_Description:
    Raw data processed by contractor Thales Geosolutions and
    provided as 10-m and 5-m xyz values in UTM 8 coordinate
    system.
   Process_Date: 2001

  Process_Step:
   Process_Description:
    F.L. Wong converted xyz to ArcInfo grids. Data were
    processed in 50,000-point blocks. Each block of points
    was used to GENERATE a point coverage.

    The point coverage for each block was merged with
    adjoining blocks, the grid IDW function was applied
    with default options, and the resulting grid clipped
    to the boundary of the block. All the interpolated
    grids were merged into a continuous grid GLACIER05MIG
    that was corrected by a mask that omitted data in
    holes that exceed 30 meters in width.

    The masking grid was constructed as follows: a unit grid
    (data cells = 1, all others = nodata) was copied from
    a 5-m uninterpolated grid. The unit grid was converted to a polygon
    coverage from which polygons with areas of less than
    1000 square meters were removed in bulk. The remaining
    interior polygons were inspected in Arcedit and removed
    if the width were about 30 meters or less. This polygon
    coverage was converted back to a grid to be applied as
    a mask to the merged grids described in the previous
    paragraph.

   Process_Date: 2001

  Process_Step:
   Process_Description:
    UTM grid was converted to a point coverage by Arc tool GRIDPOINT.
    Point coverage was projected to decimal degrees, and longitude,
    latitude, and depth values extracted.

   Process_Date: 2002

Process_Step:
  Process_Description:
   First draft of metadata created by curator using
   FGDCMETA.AML ver. 1.35 08/02/2000 on ArcInfo data set
   /arcdata/bathymetry/glacier05mg
  Process_Date: 20011018

Process_Step:
  Process_Description:
   ------------------------Nadine Golden edited starting here---------------------
   Used Spatial Analyst Tool Surface Analyst, Hillshade to convert to hillshade view.
  Process_Date: 20051105

Spatial_Data_Organization_Information:
 Direct_Spatial_Reference_Method: Raster
 Raster_Object_Information:
  Raster_Object_Type: Pixel
  Row_Count: 255
  Column_Count: 11339

Distribution_Information:
 Distributor:
  Contact_Information:
   Contact_Organization_Primary:
    Contact_Organization:
     United States Geological Survey (USGS)
     Coastal and Marine Geology (CMG)
   Contact_Person: Florence L. Wong
   Contact_Position: Geologist, GIS Coordinator
   Contact_Address:
    Address_Type: mailing and physical address
    Address: USGS, MailStop 999, 345 Middlefield Road
    City: Menlo Park
    State_or_Province: CA
    Postal_Code: 94025-3561
    Country: USA
   Contact_Voice_Telephone: (650) 329-5327
   Contact_Facsimile_Telephone: (650) 329-5190
   Contact_Electronic_Mail_Address: fwong@usgs.gov

 Distribution_Liability:
  Please recognize the U.S. Geological Survey (USGS) as the source of

this information.

Although these data have been used by the U.S. Geological Survey,
U.S. Department of the Interior, no warranty expressed or implied
is made by the U.S. Geological Survey as to the accuracy of the
data.

The act of distribution shall not constitute any such warranty,
and no responsibility is assumed by the U.S. Geological Survey in
the use of this data, software, or related materials.

Metadata_Reference_Information:
 Metadata_Date: 20021210
 Metadata_Review_Date: 2002
 Metadata_Contact:
  Contact_Information:
   Contact_Organization_Primary:
    Contact_Organization:
     United States Geological Survey (USGS)
     Coastal and Marine Geology (CMG)
    Contact_Person: Florence L. Wong
   Contact_Position: Geologist, GIS Coordinator
   Contact_Address:
    Address_Type: mailing and physical address
    Address: USGS, MailStop 999, 345 Middlefield Road
    City: Menlo Park
    State_or_Province: CA
    Postal_Code: 94025-3561
    Country: USA
   Contact_Voice_Telephone: (650) 329-5327
   Contact_Facsimile_Telephone: (650) 329-5190
   Contact_Electronic_Mail_Address: fwong@usgs.gov
 Metadata_Standard_Name: FGDC Content Standards for Digital Geospatial Metadata ("CSDGM
version 2")
 Metadata_Standard_Version: FGDC-STD-001-1998
 Metadata_Access_Constraints: none
 Metadata_Use_Constraints: none

Identification_Information:

 Citation:
  Citation_Information:
    Originator: A.J. Stevenson
    Originator: Florence L. Wong
    Publication_Date: 2002
    Title: Bathymetric xyz data for Glacier Bay at 5-meter intervals.
    Edition: Version 1.0, December 10, 2002
    Geospatial_Data_Presentation_Form: map
    Series_Information:
      Series_Name: USGS Open-File Report
      Issue_Identification: 02-391
    Publication_Information:
      Publication_Place: Menlo Park, California
      Publisher: U.S. Geological Survey
    Online_Linkage: <URL:http://geopubs.wr.usgs.gov/open-file/02-391>

 Description:

  Abstract:

    This data set consists of 5-m gridded bathymetric data for Glacier
    Bay, Alaska, in xyz form.
    The data were interpolated across "nodata" gaps that
    were no more than 30 meters wide.

    Data were collected during May 29 - June 6, 2001, by
    contract with Thales Geosolutions
    (http://www.thales-geopacific.com/) aboard the
    R/V Davidson as part of a cooperative survey conducted by the
    U.S. National Park Service and the U.S. Geological
    Survey (Biological Resources and Coastal and Marine
    Geology). The instrument was a Reson 8111 multibeam
    echosounder (http://reson.com/sb8111.htm). The raw
    data were reduced by Thales.

  Purpose:

    These data are intended for science researchers, students, policy
    makers, and the general public. The data can be

used with geographic information systems (GIS) software
to display geologic and oceanographic information.

  Supplemental_Information:

  Additional information about the field activities from
  which this data set was derived are available online at
  http://walrus.wr.usgs.gov/infobank/d/d101gb/html/d-1-01-gb.meta.html

  Any use of trade, product, or firm names is for descriptive purposes
  only and does not imply endorsement by the
  U.S. Government.

  Specifications for the Reson SeaBat 8111 Multibeam Echosounder
  (http://www.reson.com/sb8111.htm)

  > Operating frequency: 100 kHz
  > Number of beams: 101
  > Beamwidth across track: 1.5 degrees
  > Beamwidth along track: 1.5 degrees
  > Center-to-center beam separation: 1.5 degrees
  > Pulse length: Variable, operator selectable
  > Depth range: 3 - 1000 meters
  > Transducer depth rating: 100 meters
  > Max. update rate: 35 swaths per second
  > Max. vessel Speed: 20 knots
  > Stabilization: Pitch stabilization within +/- 10 degrees
  > Projector beam control: External pitch sensor
  > Hydrophone size (Dia./arc/length): 640mm, 220 degrees, 200mm
  > Processor Dimensions (HWD): 177 x 483 x 434 mm
  > Tranceiver Dimensions (HWD): 267 x 450 x 427 mm
  > Weight: (with 15m cable):
  >   Hydrophone Dry: 42 kg Wet: 36 kg
  >   Projector Dry: 30 kg Wet: 23 kg
  > Transceiver weight: 13.6 kg
  > Processor weight: 20 kg

  Although this Federal Geographic Data Committee-compliant metadata
  file is intended to document the data set in nonproprietary form,
  as well as in ArcInfo format, this metadata file may include some
  ArcInfo-specific terminology.

Time_Period_of_Content:

  Time_Period_Information:
    Single_Date/Time:
      Calendar_Date: 2002
  Currentness_Reference: Ground Condition

Status:
  Progress: In work
  Maintenance_and_Update_Frequency: As Needed.

Spatial_Domain:
  Bounding_Coordinates:
    West_Bounding_Coordinate: -136.40276708
    East_Bounding_Coordinate: -135.91167668
    North_Bounding_Coordinate: 58.75728909
    South_Bounding_Coordinate: 58.35942274

Keywords:
  Theme:
    Theme_Keyword_Thesaurus: None
    Theme_Keyword: bathymetry
    Theme_Keyword: multibeam
    Theme_Keyword: echosounder
  Place:
    Place_Keyword_Thesaurus: None
    Place_Keyword: Glacier Bay
    Place_Keyword: Alaska

Access_Constraints: None.

Use_Constraints: Data not to be used for navigational purposes.

Point_of_Contact:
  Contact_Information:
    Contact_Person_Primary:
      Contact_Person: Florence L. Wong
      Contact_Organization:
        United States Geological Survey (USGS)
        Coastal and Marine Geology (CMG)
    Contact_Position: Geologist, GIS Coordinator
    Contact_Address:
      Address_Type: mailing and physical address
      Address: USGS, MailStop 999, 345 Middlefield Road
      City: Menlo Park

  State_or_Province: CA
  Postal_Code: 94025-3561
  Country: USA
 Contact_Voice_Telephone: (650) 329-5327
 Contact_Facsimile_Telephone: (650) 329-5190
 Contact_Electronic_Mail_Address: fwong@usgs.gov

Native_Data_Set_Environment:
 SunOS, 5.7, sun4u UNIX
 ArcInfo version 8.0.2

Browse_Graphic:
 Browse_Graphic_File_Name: glacier.gif
 Browse_Graphic_File_Description:
  index map of Glacier Bay
  multibeam bathymetry data
 Browse_Graphic_File_Type: GIF

Data_Quality_Information:
 Attribute_Accuracy:
  Attribute_Accuracy_Report: Not applicable.

 Logical_Consistency_Report: Not applicable for raster data.

 Completeness_Report:
  Data values are missing in and around shallow or emergent
  features (islands) and where adjoining trackline coverage was
  not overlapping.

 Positional_Accuracy:
  Horizontal_Positional_Accuracy:
   Horizontal_Positional_Accuracy_Report:
    Navigation was multiple DGPS [differential global
    positioning systems] coupled up with 2 very precise DR
    [dead-reckoning] 3-axis accelerometers, all integrated in
    WinFrog (proprietary software from Thales Geosolutions
    http://www.thales-geopacific.com/offshore/index.html).
    The best functional test we did was crossties, which
    suggested that average navigational errors were on the
    order of 1 meter, with (rare) maximum errors being about 3
    meters. (A.J. Stevenson, written communtication, October
    2001)

Lineage:

  Process_Step:
   Process_Description:
    Raw data processed by contractor Thales Geosolutions and
    provided as 10-m and 5-m xyz values in UTM 8 coordinate
    system.
   Process_Date: 2001

  Process_Step:
   Process_Description:
    F.L. Wong converted xyz to ArcInfo grids. Data were
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    The point coverage for each block was merged with
    adjoining blocks, the grid IDW function was applied
    with default options, and the resulting grid clipped
    to the boundary of the block. All the interpolated
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    The masking grid was constructed as follows: a unit grid
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    a 5-m uninterpolated grid. The unit grid was converted to a polygon
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    interior polygons were inspected in Arcedit and removed
    if the width were about 30 meters or less. This polygon
    coverage was converted back to a grid to be applied as
    a mask to the merged grids described in the previous
    paragraph.

   Process_Date: 2001

  Process_Step:
   Process_Description:
    UTM grid was converted to a point coverage by Arc tool GRIDPOINT.
    Point coverage was projected to decimal degrees, and longitude,
    latitude, and depth values extracted.

   Process_Date: 2002

  Process_Step:
   Process_Description:
    First draft of metadata created by curator using
    FGDCMETA.AML ver. 1.35 08/02/2000 on ArcInfo data set
    /arcdata/bathymetry/glacier05mg
   Process_Date: 20011018

Spatial_Data_Organization_Information:
 Direct_Spatial_Reference_Method: Point
 Point_and_Vector_Object_Information:
  SDTS_Terms_Description:
   SDTS_Point_and_Vector_Object_Type: Point
   Point_and_Vector_Object_Count: 16906963

Spatial_Reference_Information:
 Horizontal_Coordinate_System_Definition:
  Geographic:
   Latitude_Resolution: 0.00004910904
   Longitude_Resolution: 0.00004910904
   Geographic_Coordinate_Units: Decimal Degrees
  Geodetic_Model:
   Horizontal_Datum_Name: nad83
   Ellipsoid_Name: GRS1980
   Semi-major_Axis: 6378206.4
   Denominator_of_Flattening_Ratio: 294.98

Entity_and_Attribute_Information:
 Overview_Description:
  Entity_and_Attribute_Overview:
   Each record consists of three fields: longitude, latitude, and
   depth in meters. Example of records:

   > -136.26066,58.75442,-137.124
   > -136.26074,58.75438,-139.409
   > -136.26066,58.75438,-137.124
   > -136.26057,58.75438,-136.976

   Entity_and_Attribute_Detail_Citation: none

Distribution_Information:
 Distributor:
  Contact_Information:

    Contact_Organization_Primary:
     Contact_Organization:
       United States Geological Survey (USGS)
       Coastal and Marine Geology (CMG)
     Contact_Person: Florence L. Wong
    Contact_Position: Geologist, GIS Coordinator
    Contact_Address:
     Address_Type: mailing and physical address
     Address: USGS, MailStop 999, 345 Middlefield Road
     City: Menlo Park
     State_or_Province: CA
     Postal_Code: 94025-3561
     Country: USA
    Contact_Voice_Telephone: (650) 329-5327
    Contact_Facsimile_Telephone: (650) 329-5190
    Contact_Electronic_Mail_Address: fwong@usgs.gov

 Distribution_Liability:
  Please recognize the U.S. Geological Survey (USGS) as the source of
  this information.

  Although these data have been used by the U.S. Geological Survey,
  U.S. Department of the Interior, no warranty expressed or implied
  is made by the U.S. Geological Survey as to the accuracy of the
  data.

  The act of distribution shall not constitute any such warranty,
  and no responsibility is assumed by the U.S. Geological Survey in
  the use of this data, software, or related materials.

 Metadata_Reference_Information:
  Metadata_Date: 20021210
  Metadata_Review_Date: 2002
  Metadata_Contact:
   Contact_Information:
    Contact_Organization_Primary:
     Contact_Organization:
       United States Geological Survey (USGS)
       Coastal and Marine Geology (CMG)
     Contact_Person: Florence L. Wong
    Contact_Position: Geologist, GIS Coordinator
    Contact_Address:
     Address_Type: mailing and physical address

      Address: USGS, MailStop 999, 345 Middlefield Road
      City: Menlo Park
      State_or_Province: CA
      Postal_Code: 94025-3561
      Country: USA
    Contact_Voice_Telephone: (650) 329-5327
    Contact_Facsimile_Telephone: (650) 329-5190
    Contact_Electronic_Mail_Address: fwong@usgs.gov
  Metadata_Standard_Name: FGDC Content Standards for Digital Geospatial Metadata ("CSDGM version 2")
  Metadata_Standard_Version: FGDC-STD-001-1998
  Metadata_Access_Constraints: none
  Metadata_Use_Constraints: none

Bathymetric xyz data for Glacier Bay at 5-meter intervals.

Metadata also available as

Frequently-anticipated questions:

- [What does this data set describe?](#)
    1. [How should this data set be cited?](#)
    2. [What geographic area does the data set cover?](#)
    3. [What does it look like?](#)
    4. [Does the data set describe conditions during a particular time period?](#)
    5. [What is the general form of this data set?](#)
    6. [How does the data set represent geographic features?](#)
    7. [How does the data set describe geographic features?](#)
- [Who produced the data set?](#)
    1. [Who are the originators of the data set?](#)
    2. [Who also contributed to the data set?](#)
    3. [To whom should users address questions about the data?](#)
- [Why was the data set created?](#)
- [How was the data set created?](#)
    1. [From what previous works were the data drawn?](#)
    2. [How were the data generated, processed, and modified?](#)
    3. [What similar or related data should the user be aware of?](#)
- [How reliable are the data; what problems remain in the data set?](#)
    1. [How well have the observations been checked?](#)
    2. [How accurate are the geographic locations?](#)
    3. [How accurate are the heights or depths?](#)
    4. [Where are the gaps in the data? What is missing?](#)
    5. [How consistent are the relationships among the data, including topology?](#)
- [How can someone get a copy of the data set?](#)
    1. [Are there legal restrictions on access or use of the data?](#)
    2. [Who distributes the data?](#)
    3. [What's the catalog number I need to order this data set?](#)
    4. [What legal disclaimers am I supposed to read?](#)
    5. [How can I download or order the data?](#)
- [Who wrote the metadata?](#)

What does this data set describe?

Title: Bathymetric xyz data for Glacier Bay at 5-meter intervals.
Abstract:

This data set consists of 5-m gridded bathymetric data for Glacier Bay, Alaska, in xyz form. The data were interpolated across "nodata" gaps that were no more than 30 meters wide.

Data were collected during May 29 - June 6, 2001, by contract with Thales Geosolutions (<http://www.thales-geopacific.com/>) aboard the R/V Davidson as part of a cooperative survey conducted by the U.S. National Park Service and the U.S. Geological Survey (Biological Resources and Coastal and Marine Geology). The instrument was a Reson 8111 multibeam echosounder (<http://reson.com/sb8111.htm>). The raw data were reduced by Thales.

Supplemental_Information:

Additional information about the field activities from which this data set was derived are available online at <http://walrus.wr.usgs.gov/infobank/d/d101gb/html/d-1-01-gb.meta.html>

Any use of trade, product, or firm names is for descriptive purposes only and does not imply endorsement by the U.S. Government.

Specifications for the Reson SeaBat 8111 Multibeam Echosounder (<http://www.reson.com/sb8111.htm>)

```
 Operating frequency:  100 kHz
 Number of beams:  101
 Beamwidth across track:  1.5 degrees
 Beamwidth along track:  1.5 degrees
 Center-to-center beam separation:  1.5 degrees
 Pulse length:  Variable, operator selectable
 Depth range:  3 - 1000 meters
 Transducer depth rating:  100 meters
 Max. update rate:  35 swaths per second
 Max. vessel Speed:  20 knots
 Stabilization:  Pitch stabilization within +/- 10 degrees
 Projector beam control:  External pitch sensor
```

```
      Hydrophone size (Dia./arc/length):  640mm, 220 degrees,
  200mm
   Processor Dimensions (HWD):  177 x 483 x 434 mm
   Tranceiver Dimensions (HWD):  267 x 450 x 427 mm
   Weight: (with 15m cable):
     Hydrophone Dry: 42 kg Wet: 36 kg
     Projector Dry: 30 kg Wet: 23 kg
  Transceiver weight:  13.6 kg
  Processor weight:   20 kg
```

Although this Federal Geographic Data Committee-compliant metadata file is intended to document the data set in nonproprietary form, as well as in ArcInfo format, this metadata file may include some ArcInfo-specific terminology.

1. **How should this data set be cited?**

   Stevenson, A.J., and Wong, Florence L. , 2002, Bathymetric xyz data for Glacier Bay at 5-meter intervals.: USGS Open-File Report 02-391, U.S. Geological Survey, Menlo Park, California.

   Online Links:

   - [<URL:http://geopubs.wr.usgs.gov/open-file/02-391>](http://geopubs.wr.usgs.gov/open-file/02-391)

2. **What geographic area does the data set cover?**

   West_Bounding_Coordinate: -136.40276708
   East_Bounding_Coordinate: -135.91167668
   North_Bounding_Coordinate: 58.75728909
   South_Bounding_Coordinate: 58.35942274

3. **What does it look like?**

   glacier.gif (GIF)
           index map of Glacier Bay multibeam bathymetry data

4. **Does the data set describe conditions during a particular time period?**

   Calendar_Date: 2002
   Currentness_Reference: Ground Condition

5. **What is the general form of this data set?**

   Geospatial_Data_Presentation_Form: map

6. **How does the data set represent geographic features?**

   a. **How are geographic features stored in the data set?**

   This is a Point data set. It contains the following vector data types (SDTS terminology):

   - Point (16906963)

   b. **What coordinate system is used to represent geographic features?**

   Horizontal positions are specified in geographic coordinates, that is, latitude and longitude. Latitudes are given to the nearest 0.00004910904. Longitudes are given to the nearest 0.00004910904. Latitude and longitude values are specified in Decimal Degrees.

   The horizontal datum used is nad83.
   The ellipsoid used is GRS1980.
   The semi-major axis of the ellipsoid used is 6378206.4.
   The flattening of the ellipsoid used is 1/294.98.

7. **How does the data set describe geographic features?**

   Entity_and_Attribute_Overview:
   Each record consists of three fields: longitude, latitude, and depth in meters. Example of records:

   ```
   -136.26066,58.75442,-137.124
   -136.26074,58.75438,-139.409
   -136.26066,58.75438,-137.124
   -136.26057,58.75438,-136.976
   ```

   Entity_and_Attribute_Detail_Citation: none

Who produced the data set?

1. **Who are the originators of the data set?** (may include formal authors, digital compilers, and

editors)

- ❍ A.J. Stevenson
- ❍ Florence L. Wong

2. **Who also contributed to the data set?**

3. **To whom should users address questions about the data?**

> Florence L. Wong
> United States Geological Survey (USGS)
> Geologist, GIS Coordinator
> USGS, MailStop 999, 345 Middlefield Road
> Menlo Park, CA 94025-3561
> USA
>
> (650) 329-5327 (voice)
> (650) 329-5190 (FAX)
> fwong@usgs.gov

Why was the data set created?

> These data are intended for science researchers, students, policy makers, and the general public. The data can be used with geographic information systems (GIS) software to display geologic and oceanographic information.

How was the data set created?

1. **From what previous works were the data drawn?**

2. **How were the data generated, processed, and modified?**

Date: 2001 (process 1 of 4)
> Raw data processed by contractor Thales Geosolutions and provided as 10-m and 5-m xyz values in UTM 8 coordinate system.

Date: 2001 (process 2 of 4)

F.L. Wong converted xyz to ArcInfo grids. Data were processed in 50,000-point blocks. Each block of points was used to GENERATE a point coverage.

The point coverage for each block was merged with adjoining blocks, the grid IDW function was applied with default options, and the resulting grid clipped to the boundary of the block. All the interpolated grids were merged into a continuous grid GLACIER05MIG that was corrected by a mask that omitted data in holes that exceed 30 meters in width.

The masking grid was constructed as follows: a unit grid (data cells = 1, all others = nodata) was copied from a 5-m uninterpolated grid. The unit grid was converted to a polygon coverage from which polygons with areas of less than 1000 square meters were removed in bulk. The remaining interior polygons were inspected in Arcedit and removed if the width were about 30 meters or less. This polygon coverage was converted back to a grid to be applied as a mask to the merged grids described in the previous paragraph.

Date: 2002 (process 3 of 4)

UTM grid was converted to a point coverage by Arc tool GRIDPOINT. Point coverage was projected to decimal degrees, and longitude, latitude, and depth values extracted.

Date: 18-Oct-2001 (process 4 of 4)

First draft of metadata created by curator using FGDCMETA.AML ver. 1.35 08/02/2000 on ArcInfo data set /arcdata/bathymetry/glacier05mg

3. **What similar or related data should the user be aware of?**

How reliable are the data; what problems remain in the data set?

1. **How well have the observations been checked?**

   Not applicable.

2. **How accurate are the geographic locations?**

   Navigation was multiple DGPS [differential global positioning systems] coupled up with 2 very precise DR [dead-reckoning] 3-axis accelerometers, all integrated in WinFrog (proprietary software from Thales Geosolutions <http://www.thales-geopacific.com/offshore/index.html>). The best functional test we did was crossties, which suggested that average navigational errors were on the order of 1 meter, with (rare) maximum errors being about 3 meters. (A.J. Stevenson,

written communtication, October 2001)

3. **How accurate are the heights or depths?**

4. **Where are the gaps in the data? What is missing?**

   Data values are missing in and around shallow or emergent features (islands) and where adjoining trackline coverage was not overlapping.

5. **How consistent are the relationships among the observations, including topology?**

   Not applicable for raster data.

How can someone get a copy of the data set?

Are there legal restrictions on access or use of the data?

Access_Constraints: None.
Use_Constraints: Data not to be used for navigational purposes.

1. **Who distributes the data set?** (Distributor 1 of 1)

   United States Geological Survey (USGS)
   c/o Florence L. Wong
   Geologist, GIS Coordinator
   USGS, MailStop 999, 345 Middlefield Road
   Menlo Park, CA 94025-3561
   USA

   (650) 329-5327 (voice)
   (650) 329-5190 (FAX)
   fwong@usgs.gov

2. **What's the catalog number I need to order this data set?**

3. **What legal disclaimers am I supposed to read?**

   Please recognize the U.S. Geological Survey (USGS) as the source of this information.

Although these data have been used by the U.S. Geological Survey, U.S. Department of the Interior, no warranty expressed or implied is made by the U.S. Geological Survey as to the accuracy of the data.

The act of distribution shall not constitute any such warranty, and no responsibility is assumed by the U.S. Geological Survey in the use of this data, software, or related materials.

4. **How can I download or order the data?**

Who wrote the metadata?

Dates:
> Last modified: 10-Dec-2002
> Last Reviewed: 2002

Metadata author:
> United States Geological Survey (USGS)
> c/o Florence L. Wong
> Geologist, GIS Coordinator
> USGS, MailStop 999, 345 Middlefield Road
> Menlo Park, CA 94025-3561
> USA
>
> (650) 329-5327 (voice)
> (650) 329-5190 (FAX)
> fwong@usgs.gov

Metadata standard:
> FGDC Content Standards for Digital Geospatial Metadata ("CSDGM version 2") (FGDC-STD-001-1998)

Generated by mp version 2.8.6 on Mon Dec 05 14:34:33 2005

U.S. Geological Survey
Open-file Report 2006-1081

Geologic characteristics of benthic habitats in Glacier Bay, southeast Alaska

Degree of Slope
(calculated from multibeam bathymetry)

High : 86.610886

Slope data image of Glacier Bay including an inset of the State of Alaska.

URL: http://walrus.wr.usgs.gov/2006/1081/slope_map.html
maintained by Michael Diggles
last modified 12 December 2005 (ng)

Identification_Information:

 Citation:
  Citation_Information:
    Originator: A.J. Stevenson
    Originator: Florence L. Wong
    Publication_Date: 2002
    Title: Bathymetric xyz data for Glacier Bay at 5-meter intervals.
    Edition: Version 1.0, December 10, 2002
    Geospatial_Data_Presentation_Form: map
    Series_Information:
      Series_Name: USGS Open-File Report
      Issue_Identification: 02-391
    Publication_Information:
      Publication_Place: Menlo Park, California
      Publisher: U.S. Geological Survey
    Online_Linkage: <URL:http://geopubs.wr.usgs.gov/open-file/02-391>

 Description:

  Abstract:

    This data set consists of 5-m gridded bathymetric data for Glacier
    Bay, Alaska, in xyz form.
    The data were interpolated across "nodata" gaps that
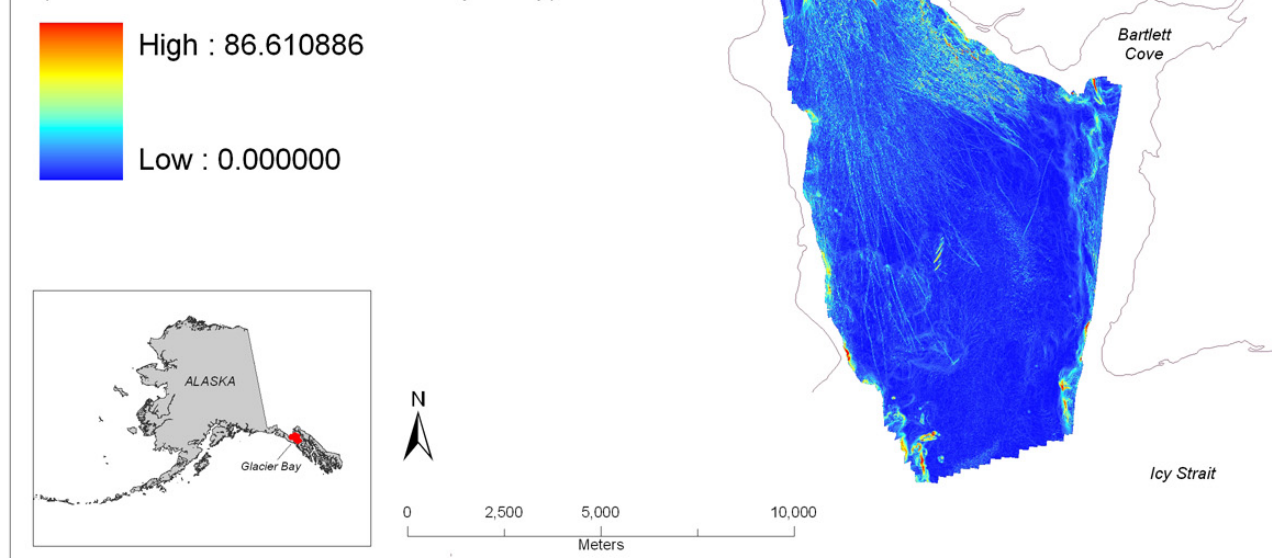   were no more than 30 meters wide.

    Data were collected during May 29 - June 6, 2001, by
    contract with Thales Geosolutions
    (http://www.thales-geopacific.com/) aboard the
    R/V Davidson as part of a cooperative survey conducted by the
    U.S. National Park Service and the U.S. Geological
    Survey (Biological Resources and Coastal and Marine
    Geology). The instrument was a Reson 8111 multibeam
    echosounder (http://reson.com/sb8111.htm). The raw
    data were reduced by Thales.

  Purpose:

    These data are intended for science researchers, students, policy
    makers, and the general public. The data can be

used with geographic information systems (GIS) software
to display geologic and oceanographic information.

  Supplemental_Information:

  Additional information about the field activities from
  which this data set was derived are available online at
  http://walrus.wr.usgs.gov/infobank/d/d101gb/html/d-1-01-gb.meta.html

  Any use of trade, product, or firm names is for descriptive purposes
  only and does not imply endorsement by the
  U.S. Government.

  Specifications for the Reson SeaBat 8111 Multibeam Echosounder
  (http://www.reson.com/sb8111.htm)

  > Operating frequency: 100 kHz
  > Number of beams: 101
  > Beamwidth across track: 1.5 degrees
  > Beamwidth along track: 1.5 degrees
  > Center-to-center beam separation: 1.5 degrees
  > Pulse length: Variable, operator selectable
  > Depth range: 3 - 1000 meters
  > Transducer depth rating: 100 meters
  > Max. update rate: 35 swaths per second
  > Max. vessel Speed: 20 knots
  > Stabilization: Pitch stabilization within +/- 10 degrees
  > Projector beam control: External pitch sensor
  > Hydrophone size (Dia./arc/length): 640mm, 220 degrees, 200mm
  > Processor Dimensions (HWD): 177 x 483 x 434 mm
  > Tranceiver Dimensions (HWD): 267 x 450 x 427 mm
  > Weight: (with 15m cable):
  >   Hydrophone Dry: 42 kg Wet: 36 kg
  >   Projector Dry: 30 kg Wet: 23 kg
  > Transceiver weight: 13.6 kg
  > Processor weight: 20 kg

  Although this Federal Geographic Data Committee-compliant metadata
  file is intended to document the data set in nonproprietary form,
  as well as in ArcInfo format, this metadata file may include some
  ArcInfo-specific terminology.

Time_Period_of_Content:

```
 Time_Period_Information:
   Single_Date/Time:
     Calendar_Date: 2002
 Currentness_Reference: Ground Condition

Status:
 Progress: In work
 Maintenance_and_Update_Frequency: As Needed.

Spatial_Domain:
 Bounding_Coordinates:
   West_Bounding_Coordinate: -136.40276708
   East_Bounding_Coordinate: -135.91167668
   North_Bounding_Coordinate: 58.75728909
   South_Bounding_Coordinate: 58.35942274

Keywords:
 Theme:
   Theme_Keyword_Thesaurus: None
   Theme_Keyword: bathymetry
   Theme_Keyword: multibeam
   Theme_Keyword: echosounder
 Place:
   Place_Keyword_Thesaurus: None
   Place_Keyword: Glacier Bay
   Place_Keyword: Alaska

Access_Constraints: None.

Use_Constraints: Data not to be used for navigational purposes.

Point_of_Contact:
 Contact_Information:
   Contact_Person_Primary:
     Contact_Person: Florence L. Wong
     Contact_Organization:
       United States Geological Survey (USGS)
       Coastal and Marine Geology (CMG)
   Contact_Position: Geologist, GIS Coordinator
   Contact_Address:
     Address_Type: mailing and physical address
     Address: USGS, MailStop 999, 345 Middlefield Road
     City: Menlo Park
```

      State_or_Province: CA
      Postal_Code: 94025-3561
      Country: USA
     Contact_Voice_Telephone: (650) 329-5327
     Contact_Facsimile_Telephone: (650) 329-5190
     Contact_Electronic_Mail_Address: fwong@usgs.gov

Native_Data_Set_Environment:
  SunOS, 5.7, sun4u UNIX
  ArcInfo version 8.0.2

Browse_Graphic:
  Browse_Graphic_File_Name: glacier.gif
  Browse_Graphic_File_Description:
   index map of Glacier Bay
   multibeam bathymetry data
  Browse_Graphic_File_Type: GIF

Data_Quality_Information:
 Attribute_Accuracy:
  Attribute_Accuracy_Report: Not applicable.

 Logical_Consistency_Report: Not applicable for raster data.

 Completeness_Report:
  Data values are missing in and around shallow or emergent
  features (islands) and where adjoining trackline coverage was
  not overlapping.

 Positional_Accuracy:
  Horizontal_Positional_Accuracy:
   Horizontal_Positional_Accuracy_Report:
    Navigation was multiple DGPS [differential global
    positioning systems] coupled up with 2 very precise DR
    [dead-reckoning] 3-axis accelerometers, all integrated in
    WinFrog (proprietary software from Thales Geosolutions
    http://www.thales-geopacific.com/offshore/index.html).
    The best functional test we did was crossties, which
    suggested that average navigational errors were on the
    order of 1 meter, with (rare) maximum errors being about 3
    meters. (A.J. Stevenson, written communtication, October
    2001)

Lineage:

  Process_Step:
    Process_Description:
      Raw data processed by contractor Thales Geosolutions and
      provided as 10-m and 5-m xyz values in UTM 8 coordinate
      system.
    Process_Date: 2001

  Process_Step:
    Process_Description:
      F.L. Wong converted xyz to ArcInfo grids. Data were
      processed in 50,000-point blocks. Each block of points
      was used to GENERATE a point coverage.

      The point coverage for each block was merged with
      adjoining blocks, the grid IDW function was applied
      with default options, and the resulting grid clipped
      to the boundary of the block. All the interpolated
      grids were merged into a continuous grid GLACIER05MIG
      that was corrected by a mask that omitted data in
      holes that exceed 30 meters in width.

      The masking grid was constructed as follows: a unit grid
      (data cells = 1, all others = nodata) was copied from
      a 5-m uninterpolated grid. The unit grid was converted to a polygon
      coverage from which polygons with areas of less than
      1000 square meters were removed in bulk. The remaining
      interior polygons were inspected in Arcedit and removed
      if the width were about 30 meters or less. This polygon
      coverage was converted back to a grid to be applied as
      a mask to the merged grids described in the previous
      paragraph.

    Process_Date: 2001

  Process_Step:
    Process_Description:
      UTM grid was converted to a point coverage by Arc tool GRIDPOINT.
      Point coverage was projected to decimal degrees, and longitude,
      latitude, and depth values extracted.

    Process_Date: 2002

  Process_Step:
   Process_Description:
    First draft of metadata created by curator using
    FGDCMETA.AML ver. 1.35 08/02/2000 on ArcInfo data set
    /arcdata/bathymetry/glacier05mg
   Process_Date: 20011018

  Process_Step:
   Process_Description:
    ------------------------Nadine Golden edited starting here---------------------
    Used Spatial Analyst Tool "Surface Analyst-->Slope" to convert to slope view.
   Process_Date: 20051105

Spatial_Data_Organization_Information:
 Direct_Spatial_Reference_Method: Raster
 Raster_Object_Information:
  Raster_Object_Type: Pixel
  Row_Count: 255
  Column_Count: 11339

Distribution_Information:
 Distributor:
  Contact_Information:
   Contact_Organization_Primary:
    Contact_Organization:
     United States Geological Survey (USGS)
     Coastal and Marine Geology (CMG)
    Contact_Person: Nadine Golden
   Contact_Position: GIS Technician
   Contact_Address:
    Address_Type: mailing and physical address
    Address: USGS, 400 Natural Bridges Ave
    City: Santa Cruz
    State_or_Province: CA
    Postal_Code: 95060-5792
    Country: USA
   Contact_Voice_Telephone: (831) 427-4730
   Contact_Facsimile_Telephone: (837) 427-4709
   Contact_Electronic_Mail_Address: ngolden@usgs.gov

 Distribution_Liability:
  Please recognize the U.S. Geological Survey (USGS) as the source of

this information.

Although these data have been used by the U.S. Geological Survey,
U.S. Department of the Interior, no warranty expressed or implied
is made by the U.S. Geological Survey as to the accuracy of the
data.

The act of distribution shall not constitute any such warranty,
and no responsibility is assumed by the U.S. Geological Survey in
the use of this data, software, or related materials.

Metadata_Reference_Information:
  Metadata_Date: 20050701
  Metadata_Review_Date: 2006
  Metadata_Contact:
    Contact_Information:
      Contact_Organization_Primary:
        Contact_Organization:
          United States Geological Survey (USGS)
          Coastal and Marine Geology (CMG)
        Contact_Person: Nadine Golden
      Contact_Position: GIS Technician
      Contact_Address:
        Address_Type: mailing and physical address
        Address: USGS, 400 Natural Bridges Ave
        City: Santa Cruz
        State_or_Province: CA
        Postal_Code: 95060-5792
        Country: USA
      Contact_Voice_Telephone: (831) 427-4730
      Contact_Facsimile_Telephone: (650) 329-5190
      Contact_Electronic_Mail_Address: ngolden@usgs.gov
  Metadata_Standard_Name: FGDC Content Standards for Digital Geospatial Metadata ("CSDGM
version 2")
  Metadata_Standard_Version: FGDC-STD-001-1998
  Metadata_Access_Constraints: none
  Metadata_Use_Constraints: none

Identification_Information:
 Citation:
  Citation_Information:
    Originator: Guy R. Cochrane
    Originator: Jodi Harney
    Originator: Pete Dartnell
    Originator: Nadine Golden
    Originator: Hank Chezar
    Publication_Date: 2005
    Title: Glacier Bay Habitat polygons
    Edition: (Volume I, Version 1.0, 2005)
    Geospatial_Data_Presentation_Form: map
    Online_Linkage:
       http://pubs.usgs.gov/of/2006/1081/catalog.html
    Online_Linkage:
       http://pubs.usgs.gov/of/2006/1081/habitat.html/gbhab.tgz
    Larger_Work_Citation:
      Citation_Information:
         Originator: Guy R. Cochrane
         Originator: Jodi Harney
         Originator: Pete Dartnell
         Originator: Nadine Golden
         Originator: Hank Chezar
         Publication_Date: 2005
         Title: Geologic characteristics of benthic habitats in Glacier Bay, southeast Alaska Edition: 1.0
         Series_Information:
            Series_Name: Open-File Report
            Issue_Identification: USGS OFR 2006-1081
         Publication_Information:
            Publication_Place: Western Coastal and Marine
              Geology, Santa Cruz, CA
            Publisher: U.S. Geological Survey, Coastal and Marine
               Geology Program
         Online_Linkage:
            http://pubs.usgs.gov/of/2006/1081/index.html

 Description:
  Abstract:
    In April 2004, more than 40 hours of georeferenced submarine digital video was collected in water depths of 15-370 m in Glacier Bay to (1) ground-truth existing geophysical data (bathymetry and acoustic reflectance), (2) examine and record geologic characteristics of the sea floor, and (3) investigate

the relation between substrate types and benthic communities, and (4) construct predictive maps of seafloor geomorphology and habitat distribution. Common substrates observed include rock, boulders, cobbles, rippled sand, bioturbated mud, and extensive beds of living Modiolus (horse mussels) and scallops. Four principal sea-floor geomorphic types are distinguished by using video observations. Their distribution in lower and central Glacier Bay is predicted by using a supervised, hierarchical decision-tree statistical classification of geophysical data.

Purpose:
  These data are intended for science researchers, students, policy
  makers, and the general public. The data can be
  used with geographic information systems (GIS) software
  to display geologic and oceanographic information.

Supplemental_Information:
  Additional information about the field activities from
  which this data set was derived are available online at
  http://walrus.wr.usgs.gov/nearshorehab/

  Any use of trade, product, or firm names is for descriptive purposes
  only and does not imply endorsement by the
  U.S. Government.

  Although this Federal Geographic Data Committee-compliant metadata
  file is intended to document the data set in nonproprietary form,
  as well as in ArcInfo format, this metadata file may include some
  ArcInfo-specific terminology.

Time_Period_of_Content:
  Time_Period_Information:
    Range_of_Dates/Times:
      Beginning_Date: 19990301
      Ending_Date: 20000718
  Currentness_Reference: Ground Condition

Status:
  Progress: Complete
  Maintenance_and_Update_Frequency: As Needed

Spatial_Domain:
  Bounding_Coordinates:
    West_Bounding_Coordinate: -136.402813
    East_Bounding_Coordinate: -135.911540
    North_Bounding_Coordinate: 58.757356

South_Bounding_Coordinate: 58.349164

Keywords:
  Theme:
    Theme_Keyword_Thesaurus: None
    Theme_Keyword: habitat
    Theme_Keyword: fisheries
    Theme_Keyword: seafloor
    Theme_Keyword: geology
  Theme:
    Theme_Keyword_Thesaurus: ISO 19115 Topic Category
    Theme_Keyword: biota
    Theme_Keyword: geoscientificinformation
    Theme_Keyword: imagereyBaseMapsEarthCover
    Theme_Keyword: oceans
  Place:
    Place_Keyword_Thesaurus: None
    Place_Keyword: Alaska
    Place_Keyword: Glacier Bay

Access_Constraints: None

Use_Constraints: Not suitable for navigation

Point_of_Contact:
  Contact_Information:
    Contact_Person_Primary:
      Contact_Person: Guy R. Cochrane
      Contact_Organization:
        United States Geological Survey (USGS)
        Coastal and Marine Geology Program (CMGP)
    Contact_Position: Geophysicist
    Contact_Address:
      Address_Type: mailing and physical address
      Address: USGS, 400 Natural Bridges Drive
      City: Santa Cruz
      State_or_Province: CA
      Postal_Code: 95060-5792
      Country: USA
    Contact_Voice_Telephone: (831) 427-4754
    Contact_Facsimile_Telephone: (831) 427-4748
    Contact_Electronic_Mail_Address: gcochrane@usgs.gov

  Data_Set_Credit:
    The authors would like to thank Gerry Hatcher, and Paul Carlson of the USGS Western Region
Coastal and Marine Geology Program (in Santa Cruz and Menlo Park, CA) for field support and GIS
assistance. Kevin O'Toole, Mike Boyle, Jerry O'Brien, and others at the USGS Marine Facility
contributed equipment and logistical support. Ecologists Lisa Etherington, Jennifer Mondragon, and
Alex Andrews from the Alaska Science Center (Gustavus and Juneau, AK) provided invaluable
biological expertise during data collection. The R/V Gyre was expertly skippered by Jim De la Breure
(also of the Alaska Science Center in Gustavus). Student assistants in Janine Bird and Angela Lam (in
Santa Cruz, CA) contributed to GIS and laboratory analyses.

  Native_Data_Set_Environment:
    SunOS, 5.8, sun4u UNIX
    ArcInfo version 9.1
  Cross_Reference:
    Citation_Information:
      Originator: United States Geological Survey (USGS), Coastal and Marine Geology (CMG)
      Publication_Date: 2005
      Title: USGS CMG Glacier Bay, Alaska Habitat Metadata
      Online_Linkage: http://pubs.usgs.gov/of/2006/1081/
      Larger_Work_Citation:
        Citation_Information:
          Originator: United States Geological Survey (USGS), Coastal and Marine Geology (CMG)
          Publication_Date: 2005
          Title: USGS CMG InfoBank
          Online_Linkage: http://walrus.wr.usgs.gov/InfoBank

  Browse_Graphic:
    Browse_Graphic_File_Name: http://pubs.usgs.gov/of/2006/1081/images/fig2.html
    Browse_Graphic_File_Description: JPEG image of habitat polygons
    Browse_Graphic_File_Type: JPEG

Data_Quality_Information:
  Attribute_Accuracy:
    Attribute_Accuracy_Report: Habitat polygons dervived in ArcGIS 9.1 from a georefereced sidescan
sonar mosaic
      tiff.
  Logical_Consistency_Report: No additional checks for topological consistency were performed on this
data.
  Completeness_Report: % gravel, sand, silt and clay and % fine grain for 1144 samples

  Lineage:

    Process_Step:

Process_Description:
-----------------------------Pete Dartnell started here----------------------------------
Pete Dartnell prepared ERDAS image fourclass.img

Geomorphic Classification Methods:
The Glacier Bay multibeam data were first analyzed using a hierarchical decision-tree classification process.

The classification used four images, the original backscatter-intensity image, seafloor slope, and two derivative
raster images calculated from the original bathymetry and backscatter images; a 3x3-filtered bathymetry-variance
image and a 3x3-filtered backscatter-variance image. Variance was calculated as the variability of bathymetry or
backscatter within a kernel. An area with a large range of bathymetric relief, such as a rocky outcrop, would have a
large bathymetry variance. A smooth area would have low bathymetry variance. Backscatter was parsed in a similar
fashion; an area with high backscatter variability, such as an outcrop (high BS) with pockets of sediment (low BS)
would have a large backscatter variance, whereas a flat, uniformly sedimented seafloor would have a low backscatter
variance. The variance images were calculated by generating two intermediate images, a maximum image and a minimum
image. The maximum image was calculated by running a filter (3x3 cells) that returned the maximum value within a
kernel to the center cell. The minimum image was calculated by running a filter that returned the minimum value
within a kernel to the center cell. The variance images were created from the difference between the maximum and
minimum images. Unsupervised classifications run on the two variance images, on the original backscatter-intensity
image, and on the seafloor slope image clustered the pixels into five groups numbering one to five, with one
representing a very low variance/intensity/slope, 2 representing a low variance/intensity/slope, 3 representing a
medium variance/intensity/slope, 4 representing a high variance/intensity/slope, and 5 representing a very high
variance/intensity/slope.

The four unsupervised classified images were then analyzed using a hierarchical decision-tree classification that
is part of the ERDAS Imagine 8.4 software package (ERDAS, 1999). The classification is a rules-based approach that

uses a hierarchy of conditions to parse the input data into a set of classes. The decision-tree framework was developed
from empirically determined textural rules, variables, and hypotheses. An hypothesis is an output-geomorphic class,
such as fine-grained homogeneous mud, a variable is a raster image of derived values (i.e. bathymetry variance), and
a rule is a conditional statement about the variable's pixel (data) values that describes the hypothesis. Because the
four unsupervised classified images are co-registered with one another, rules can be established that relate pixel
values within or between images that will ultimately classify a new seafloor geomorphic image. Multiple rules and
hypotheses can be linked together into a hierarchy that describes the hypothesis.

Rules for the decision-tree classification process were based on seafloor video observations. Rules were developed to
correctly classify the seafloor over a camera transect. The areas that were previously unknown were similarly
classified based on these same rules.

Results:
The combination of hypotheses, rules, and variables in the hierarchical decision tree produced a map of the Glacier Bay
geomorphic provinces. Areas classified as 'High complexity/high slope/boulder or cobble" correlated with very low- to
very high-backscatter intensity (Table 1), low- to very high-backscatter variance, and medium- to very high-bathymetry
variance. Areas of "High complexity/low slope/boulder or cobble" correlated with very low- to very high-backscatter
intensity, low- to very high-backscatter variance, medium- to very high-bathymetry variance, and very low- slope.
Areas of "fine-grained homogeneous mud" correlated with medium- to very low-backscatter intensity, medium- to very
low-backscatter variance, and very high- to very low-bathymetry variance. Finally, areas of "unsorted, unconsolidated
sediment, sand to boulder-sized glacial till" correlated with very low- to very high-backscatter intensity, very low-
to very high-backscatter variance, and low- to very low-bathymetry variance.

References:
ERDAS Field Guide, 1999, ERDAS Inc, Atlanta Georgia. 672p.

Process_Date: 20051501

Process_Step:
  Process_Description:
    ----------------------------Nadine Golden started here----------------------------------
    //trim grid
    Trimmed fourclass_grid using spatial analyst "trim by mask" tool.
    Used the extent of the multibeam data as the extent mask.

    //nibble grid
    1) Reclassed data values:
    0 --> NoData
    1 --> 3 (hard)
    2 --> 4 (hard)
    3 --> 2 (mixed)
    4 --> 1 (soft)

    //filtered grid
    Used spatial analyst tool "filter" one pass on low.
    Reclassified with spatial analyst "reclassify tool" to assign grid range values back to 1 through 4.
    Assigned filter values grid map:
    .5 - -1.5 = 1
    1.5 - 2.5 =2
    2.5 - 3.3 = 3
    3.3 - 4.5 = 4

    //converted grid to poly
    Used spatial analyst tool "raster to feature" to convert grid to polygon shapefile.

    //created bathy polygon of 3 contour values: 75 meters, 200 meters, 400 meters.
    Created polygon file from bathymetry grid using spatial analyst "raster to feature" tool.
    Selected for contours of 75 meters, 200 meters, 400 meters.
    Exported selected data to new polygon shapefile.

    //merged fourclass poly and contour poly
    Used spatial analyst "union" tool to merge fourclass polygon and 3 value contour polygon. Note:
union intersects the polygons of the input grid_1 (fourclass) everywhere the input gid_2 (contour
polygon) intersects.

    //manual edit and clean polygons
    Added bathymetry column to new, merged fourclass polygon using "Hawth's Tools--> Intersect
Point Tool."
    Added all Green habitat code (1999) ID and definition columns to polygons.
    Used select by attribute, location, and manual tools to query and assign Green habitat code
attributes.

//eliminated border polygons remaining from filter
Selected polygons with areas less or equal to 10 sq meters (note: I selected for area <=1, <=2, etc...
up to <=10 and ran the eliminate tool for each selection set).
Used the "Eliminate" tool from the "Data Management Tools" --> "Generalation" --> "Eliminate."
Note: Eliminate tool merges the selected polygons with neighboring polygons with the largest area.
Process_Date: 2005

Spatial_Data_Organization_Information:
  Direct_Spatial_Reference_Method: Vector
  Point_and_Vector_Object_Information:
    SDTS_Terms_Description:
      SDTS_Point_and_Vector_Object_Type: G-polygon
      Point_and_Vector_Object_Count: 10744

Spatial_Reference_Information:
  Horizontal_Coordinate_System_Definition:
    Planar:
      Map_Projection:
        Map_Projection_Name: NAD_1983_UTM_Zone_8N
        Polar_Stereographic:
          Straight-Vertical_Longitude_From_Pole: -135
          Standard_Parallel: 0.999600
          False_Easting: 500000.000
          False_Northing: 0.000
      Planar_Coordinate_Information:
        Planar_Coordinate_Encoding_Method: coordinate pair
        Coordinate_Representation:
          Abscissa_Resolution: 0.000064
          Ordinate_Resolution: 0.000064
        Planar_Distance_Units: meters
    Geodetic_Model:
      Horizontal_Datum_Name: North American Datum of 1983
      Ellipsoid_Name: Geodetic ReferenceSystem 80
      Semi-major_Axis: 6378137
      Denominator_of_Flattening_Ratio: 298.2572222

Entity_and_Attribute_Information:
  Overview_Description:
    Entity_and_Attribute_Overview:

      FID

Alias: Shape
Data type: Geometry
Width: 0
Precision: 0
Scale: 0
Definition:
Feature geometry.
Definition Source:
ESRI

FID
Alias: FID
Data type: Number
Width: 6
Definition:
Internal feature number.
Definition Source:
ESRI

GRIDCODE
Alias: GRIDCODE
Data type: Number
Width: 10

MEGA_ID
Alias: MEGA_ID
Data type: String
Width: 10

BOTTOM_ID
Alias: BOTTOM_ID
Data type: String
Width: 10

MSO_MCR_ID
Alias: MSO_MCR_ID
Data type: String
Width: 10

MDFIR_ID
Alias: MDFIR_ID
Data type: String
Width: 10

SLOPE_ID
Alias: SLOPE_ID
Data type: String
Width: 10

COMPLEX_ID
Alias: COMPLEX_ID
Data type: String
Width: 10

Area
Alias: Area
Data type: String
Width: 200

COMMENT
Alias: COMMENT
Data type: String
Width: 25

bathyclass
Alias: bathyclass
Data type: String
Width: 50

MEGA
Alias: MEGA
Data type: Float
Width: 19
Number of decimals: 11

BOTTOM
Alias: BOTTOM
Data type: String

MSO_MCR
Alias: MSO_MCR
Data type: String
Width: 50

MDFR
Alias: MDFR

Data type: String
Width: 50

HAB_TYPE
Alias: HAB_TYPE
Data type: String
Width: 50

SLOPE
Alias: SLOPE
Data type: String
Width: 50

COMPLEXITY
Alias: COMPLEXITY
Data type: String
Width: 50

Benthic habitat classification attributes: megahabitat,
bottom induration, meso-macrohabitat, and modifiers from Green and others,
1999.
CODE is a combination of the habitat attributes.
MEGA_ID is I for "Inland seas, fjords."
BOTTOM_ID is h for hard bottom, m for mixed hard and soft bottom, or
s for soft sediment bottom
MSO_MRC_ID are macrohabitats described in Greene and others 1999.
MDFR_ID are modifiers to describe the texture or lithology of the seafloor
and appear in the code preceded by an underscore (_). Including; bimodal (_b),
interface (_i), ripples (_r), heavily bioturbated (_t), nearshore bathy class >-75m(_x), and nearshore
bathy class <= -75m and >-200m (_y).

  Entity_and_Attribute_Detail_Citation:
  Habitat attribute types are Modified after Greene, G.H., Yoklavich, M.M., Starr, R.M.,
  O'Connell, V.M., Wakefield, W.W., Sullivan, D.E., McRea, J.E., and Cailliet,
  G.M., 1999. A classification scheme for deep seafloor habitats. Oceanologica
  Acta, 22, 663-678.

Distribution_Information:
  Distributor:
    Contact_Information:
      Contact_Organization_Primary:

          Contact_Organization:
            United States Geological Survey (USGS)
            Coastal and Marine Geology Program (CMGP)
          Contact_Person: Guy R. Cochrane
        Contact_Position: Geophysicist
        Contact_Address:
          Address_Type: mailing and physical address
          Address: USGS, 400 Natural Bridges Drive
          City: Santa Cruz
          State_or_Province: CA
          Postal_Code: 95060-5792
          Country: USA
        Contact_Voice_Telephone: (831) 427-4754
        Contact_Facsimile_Telephone: (831) 427-4748
        Contact_Electronic_Mail_Address: gcochrane@usgs.go

  Distribution_Liability:
    Please recognize the U.S. Geological Survey (USGS) as the source of
    this information.

    Although these data have been used by the U.S. Geological Survey,
    U.S. Department of the Interior, no warranty expressed or implied
    is made by the U.S. Geological Survey as to the accuracy of the
    data.

    The act of distribution shall not constitute any such warranty,
    and no responsibility is assumed by the U.S. Geological Survey in
    the use of this data, software, or related materials.

  Metadata_Reference_Information:
    Metadata_Date: 2005
    Metadata_Review_Date: 2005
    Metadata_Contact:
      Contact_Information:
        Contact_Organization_Primary:
          Contact_Organization:
            United States Geological Survey (USGS)
            Coastal and Marine Geology Program (CMGP)
          Contact_Person: Guy R. Cochrane
        Contact_Position: Geophysicist
        Contact_Address:
          Address_Type: mailing and physical address
          Address: USGS, 400 Natural Bridges Drive

          City: Santa Cruz
          State_or_Province: CA
          Postal_Code: 95060-5792
          Country: USA
       Contact_Voice_Telephone: (831) 427-4754
       Contact_Facsimile_Telephone: (831) 427-4748
       Contact_Electronic_Mail_Address: gcochrane@usgs.gov
  Metadata_Standard_Name: FGDC Content Standards for Digital Geospatial Metadata ("CSDGM version 2")
  Metadata_Standard_Version: FGDC-STD-001-1998
  Metadata_Access_Constraints: none

Glacier Bay Habitat polygons

Metadata also available as

Frequently-anticipated questions:

- What does this data set describe?
    1. How should this data set be cited?
    2. What geographic area does the data set cover?
    3. What does it look like?
    4. Does the data set describe conditions during a particular time period?
    5. What is the general form of this data set?
    6. How does the data set represent geographic features?
    7. How does the data set describe geographic features?
- Who produced the data set?
    1. Who are the originators of the data set?
    2. Who also contributed to the data set?
    3. To whom should users address questions about the data?
- Why was the data set created?
- How was the data set created?
    1. From what previous works were the data drawn?
    2. How were the data generated, processed, and modified?
    3. What similar or related data should the user be aware of?
- How reliable are the data; what problems remain in the data set?
    1. How well have the observations been checked?
    2. How accurate are the geographic locations?
    3. How accurate are the heights or depths?
    4. Where are the gaps in the data? What is missing?
    5. How consistent are the relationships among the data, including topology?
- How can someone get a copy of the data set?
    1. Are there legal restrictions on access or use of the data?
    2. Who distributes the data?
    3. What's the catalog number I need to order this data set?
    4. What legal disclaimers am I supposed to read?
    5. How can I download or order the data?
- Who wrote the metadata?

What does this data set describe?

Title: Glacier Bay Habitat polygons
Abstract:

> In April 2004, more than 40 hours of georeferenced submarine digital video was collected in water depths of 15-370 m in Glacier Bay to (1) ground-truth existing geophysical data (bathymetry and acoustic reflectance), (2) examine and record geologic characteristics of the sea floor, and (3) investigate the relation between substrate types and benthic communities, and (4) construct predictive maps of seafloor geomorphology and habitat distribution. Common substrates observed include rock, boulders, cobbles, rippled sand, bioturbated mud, and extensive beds of living Modiolus (horse mussels) and scallops. Four principal sea-floor geomorphic types are distinguished by using video observations. Their distribution in lower and central Glacier Bay is predicted by using a supervised, hierarchical decision-tree statistical classification of geophysical data.

Supplemental_Information:

> Additional information about the field activities from which this data set was derived are available online at <http://walrus.wr.usgs.gov/nearshorehab/>
>
> Any use of trade, product, or firm names is for descriptive purposes only and does not imply endorsement by the U.S. Government.
>
> Although this Federal Geographic Data Committee-compliant metadata file is intended to document the data set in nonproprietary form, as well as in ArcInfo format, this metadata file may include some ArcInfo-specific terminology.

1. **How should this data set be cited?**

   > Cochrane, Guy R. , Harney, Jodi, Dartnell, Pete, Golden, Nadine, and Chezar, Hank, 2005, Glacier Bay Habitat polygons:.
   >
   > Online Links:
   >
   > - <http://pubs.usgs.gov/of/2006/1081/catalog.html>
   > - <http://pubs.usgs.gov/of/2006/1081/habitat.html/gbhab.tgz>

   This is part of the following larger work.

   > Cochrane, Guy R. , Harney, Jodi, Dartnell, Pete, Golden, Nadine, and Chezar, Hank, 2005, Geologic characteristics of benthic habitats in Glacier Bay, southeast

Alaska Edition: 1.0: Open-File Report USGS OFR 2006-1081, U.S. Geological Survey, Coastal and Marine Geology Program, Western Coastal and Marine Geology, Santa Cruz, CA.

Online Links:

- <http://pubs.usgs.gov/of/2006/1081/index.html>

2. **What geographic area does the data set cover?**

West_Bounding_Coordinate: -136.402813
East_Bounding_Coordinate: -135.911540
North_Bounding_Coordinate: 58.757356
South_Bounding_Coordinate: 58.349164

3. **What does it look like?**

<http://pubs.usgs.gov/of/2006/1081/images/fig2.html> (JPEG)
JPEG image of habitat polygons

4. **Does the data set describe conditions during a particular time period?**

Beginning_Date: 01-Mar-1999
Ending_Date: 18-Jul-2000
Currentness_Reference: Ground Condition

5. **What is the general form of this data set?**

Geospatial_Data_Presentation_Form: map

6. **How does the data set represent geographic features?**

a. **How are geographic features stored in the data set?**

This is a Vector data set. It contains the following vector data types (SDTS terminology):

- G-polygon (10744)

b. **What coordinate system is used to represent geographic features?**

The map projection used is NAD_1983_UTM_Zone_8N.

Projection parameters:
   Straight-Vertical_Longitude_from_Pole: -135
   Standard_Parallel: 0.999600
   False_Easting: 500000.000
   False_Northing: 0.000

Planar coordinates are encoded using coordinate pair
Abscissae (x-coordinates) are specified to the nearest 0.000064
Ordinates (y-coordinates) are specified to the nearest 0.000064
Planar coordinates are specified in meters

The horizontal datum used is North American Datum of 1983.
The ellipsoid used is Geodetic ReferenceSystem 80.
The semi-major axis of the ellipsoid used is 6378137.
The flattening of the ellipsoid used is 1/298.2572222.

7. **How does the data set describe geographic features?**

Entity_and_Attribute_Overview:

FID Alias: Shape Data type: Geometry Width: 0 Precision: 0 Scale: 0 Definition: Feature geometry. Definition Source: ESRI

FID Alias: FID Data type: Number Width: 6 Definition: Internal feature number. Definition Source: ESRI

GRIDCODE Alias: GRIDCODE Data type: Number Width: 10

MEGA_ID Alias: MEGA_ID Data type: String Width: 10

BOTTOM_ID Alias: BOTTOM_ID Data type: String Width: 10

MSO_MCR_ID Alias: MSO_MCR_ID Data type: String Width: 10

MDFIR_ID Alias: MDFIR_ID Data type: String Width: 10

SLOPE_ID Alias: SLOPE_ID Data type: String Width: 10

COMPLEX_ID Alias: COMPLEX_ID Data type: String Width: 10

Area Alias: Area Data type: String Width: 200

COMMENT Alias: COMMENT Data type: String Width: 25

bathyclass Alias: bathyclass Data type: String Width: 50

MEGA Alias: MEGA Data type: Float Width: 19 Number of decimals: 11

BOTTOM Alias: BOTTOM Data type: String

MSO_MCR Alias: MSO_MCR Data type: String Width: 50

MDFR Alias: MDFR Data type: String Width: 50

HAB_TYPE Alias: HAB_TYPE Data type: String Width: 50

SLOPE Alias: SLOPE Data type: String Width: 50

COMPLEXITY Alias: COMPLEXITY Data type: String Width: 50

Benthic habitat classification attributes: megahabitat, bottom induration, meso-macrohabitat, and modifiers from Green and others, 1999. CODE is a combination of the habitat attributes. MEGA_ID is I for "Inland seas, fjords." BOTTOM_ID is h for hard bottom, m for mixed hard and soft bottom, or s for soft sediment bottom MSO_MRC_ID are macrohabitats described in Greene and others 1999. MDFR_ID are modifiers to describe the texture or lithology of the seafloor and appear in the code preceded by an underscore (_). Including; bimodal (_b), interface (_i), ripples (_r), heavily bioturbated (_t), nearshore bathy class >-75m(_x), and nearshore bathy class <= -75m and >-200m (_y).

Entity_and_Attribute_Detail_Citation:
Habitat attribute types are Modified after Greene, G.H., Yoklavich, M.M., Starr, R.M., O'Connell, V.M., Wakefield, W.W., Sullivan, D.E., McRea, J.E., and Cailliet, G.M., 1999. A classification scheme for deep seafloor habitats. Oceanologica Acta, 22, 663-678.

Who produced the data set?

1. **Who are the originators of the data set?** (may include formal authors, digital compilers, and editors)

Glacier Bay Habitat polygons

- ❍ Guy R. Cochrane
- ❍ Jodi Harney
- ❍ Pete Dartnell
- ❍ Nadine Golden
- ❍ Hank Chezar

2. **Who also contributed to the data set?**

   The authors would like to thank Gerry Hatcher, and Paul Carlson of the USGS Western Region Coastal and Marine Geology Program (in Santa Cruz and Menlo Park, CA) for field support and GIS assistance. Kevin O'Toole, Mike Boyle, Jerry O'Brien, and others at the USGS Marine Facility contributed equipment and logistical support. Ecologists Lisa Etherington, Jennifer Mondragon, and Alex Andrews from the Alaska Science Center (Gustavus and Juneau, AK) provided invaluable biological expertise during data collection. The R/V Gyre was expertly skippered by Jim De la Breure (also of the Alaska Science Center in Gustavus). Student assistants in Janine Bird and Angela Lam (in Santa Cruz, CA) contributed to GIS and laboratory analyses.

3. **To whom should users address questions about the data?**

   Guy R. Cochrane
   United States Geological Survey (USGS)
   Geophysicist
   USGS, 400 Natural Bridges Drive
   Santa Cruz, CA 95060-5792
   USA

   (831) 427-4754 (voice)
   (831) 427-4748 (FAX)
   gcochrane@usgs.gov

Why was the data set created?

These data are intended for science researchers, students, policy makers, and the general public. The data can be used with geographic information systems (GIS) software to display geologic and oceanographic information.

How was the data set created?

1. **From what previous works were the data drawn?**

2. **How were the data generated, processed, and modified?**

Date: 01-Mar-2006 (process 1 of 2)

----------------------------Pete Dartnell started here---------------------------------- Pete Dartnell prepared ERDAS image fourclass.img

Geomorphic Classification Methods: The Glacier Bay multibeam data were first analyzed using a hierarchical decision-tree classification process. The classification used four images, the original backscatter-intensity image, seafloor slope, and two derivative raster images calculated from the original bathymetry and backscatter images; a 3x3-filtered bathymetry-variance image and a 3x3-filtered backscatter-variance image. Variance was calculated as the variability of bathymetry or backscatter within a kernel. An area with a large range of bathymetric relief, such as a rocky outcrop, would have a large bathymetry variance. A smooth area would have low bathymetry variance. Backscatter was parsed in a similar fashion; an area with high backscatter variability, such as an outcrop (high BS) with pockets of sediment (low BS) would have a large backscatter variance, whereas a flat, uniformly sedimented seafloor would have a low backscatter variance. The variance images were calculated by generating two intermediate images, a maximum image and a minimum image. The maximum image was calculated by running a filter (3x3 cells) that returned the maximum value within a kernel to the center cell. The minimum image was calculated by running a filter that returned the minimum value within a kernel to the center cell. The variance images were created from the difference between the maximum and minimum images. Unsupervised classifications run on the two variance images, on the original backscatter-intensity image, and on the seafloor slope image clustered the pixels into five groups numbering one to five, with one representing a very low variance/ intensity/slope, 2 representing a low variance/intensity/slope, 3 representing a medium variance/intensity/slope, 4 representing a high variance/intensity/slope, and 5 representing a very high variance/intensity/slope.

The four unsupervised classified images were then analyzed using a hierarchical decision-tree classification that is part of the ERDAS Imagine 8.4 software package (ERDAS, 1999). The classification is a rules-based approach that uses a hierarchy of conditions to parse the input data into a set of classes. The decision-tree framework was developed from empirically determined textural rules, variables, and hypotheses. An hypothesis is an output-geomorphic class, such as fine-grained homogeneous mud, a variable is a raster image of derived values (i.e. bathymetry variance), and a rule is a conditional statement about the variable's pixel (data) values that describes the hypothesis. Because the four unsupervised classified images are co-registered with one another, rules can be established

that relate pixel values within or between images that will ultimately classify a new seafloor geomorphic image. Multiple rules and hypotheses can be linked together into a hierarchy that describes the hypothesis.

Rules for the decision-tree classification process were based on seafloor video observations. Rules were developed to correctly classify the seafloor over a camera transect. The areas that were previously unknown were similarly classified based on these same rules.

Results: The combination of hypotheses, rules, and variables in the hierarchical decision tree produced a map of the Glacier Bay geomorphic provinces. Areas classified as 'High complexity/high slope/boulder or cobble" correlated with very low- to very high-backscatter intensity (Table 1), low- to very high-backscatter variance, and medium- to very high-bathymetry variance. Areas of "High complexity/low slope/boulder or cobble" correlated with very low- to very high-backscatter intensity, low- to very high-backscatter variance, medium- to very high-bathymetry variance, and very low- slope. Areas of "fine-grained homogeneous mud" correlated with medium- to very low-backscatter intensity, medium- to very low-backscatter variance, and very high- to very low-bathymetry variance. Finally, areas of "unsorted, unconsolidated sediment, sand to boulder-sized glacial till" correlated with very low- to very high-backscatter intensity, very low- to very high-backscatter variance, and low- to very low-bathymetry variance.

References: ERDAS Field Guide, 1999, ERDAS Inc, Atlanta Georgia. 672p.

Date: 2005 (process 2 of 2)
-----------------------------Nadine Golden started here-- // trim grid Trimmed fourclass_grid using spatial analyst "trim by mask" tool. Used the extent of the multibeam data as the extent mask.

//nibble grid 1) Reclassed data values: 0 --> NoData 1 --> 3 (hard) 2 --> 4 (hard) 3 --> 2 (mixed) 4 --> 1 (soft)

//filtered grid Used spatial analyst tool "filter" one pass on low. Reclassified with spatial analyst "reclassify tool" to assign grid range values back to 1 through 4. Assigned filter values grid map: .5 - -1.5 = 1 1.5 - 2.5 =2 2.5 - 3.3 = 3 3.3 - 4.5 = 4

//converted grid to poly Used spatial analyst tool "raster to feature" to convert grid to polygon shapefile.

//created bathy polygon of 3 contour values: 75 meters, 200 meters, 400 meters. Created polygon file from bathymetry grid using spatial analyst "raster to feature" tool. Selected for contours of 75 meters, 200 meters, 400 meters. Exported selected data to new polygon

shapefile.

//merged fourclass poly and contour poly Used spatial analyst "union" tool to merge fourclass polygon and 3 value contour polygon. Note: union intersects the polygons of the input grid_1 (fourclass) everywhere the input gid_2 (contour polygon) intersects.

//manual edit and clean polygons Added bathymetry column to new, merged fourclass polygon using "Hawth's Tools--> Intersect Point Tool." Added all Green habitat code (1999) ID and definition columns to polygons. Used select by attribute, location, and manual tools to query and assign Green habitat code attributes.

//eliminated border polygons remaining from filter Selected polygons with areas less or equal to 10 sq meters (note: I selected for area <=1, <=2, etc...up to <=10 and ran the eliminate tool for each selection set). Used the "Eliminate" tool from the "Data Management Tools" --> "Generalation" --> "Eliminate." Note: Eliminate tool merges the selected polygons with neighboring polygons with the largest area.

3. **What similar or related data should the user be aware of?**

   United States Geological Survey, Coastal and Marine Geology (CMG), 2005, USGS CMG Glacier Bay, Alaska Habitat Metadata.

   Online Links:

   ❍ <http://pubs.usgs.gov/of/2006/1081/>

This is part of the following larger work.

   United States Geological Survey, Coastal and Marine Geology (CMG), 2005, USGS CMG InfoBank.

   Online Links:

   ❍ <http://walrus.wr.usgs.gov/InfoBank>

How reliable are the data; what problems remain in the data set?

1. **How well have the observations been checked?**

Habitat polygons dervived in ArcGIS 9.1 from a georefereced sidescan sonar mosaic tiff.

2. **How accurate are the geographic locations?**

3. **How accurate are the heights or depths?**

4. **Where are the gaps in the data? What is missing?**

% gravel, sand, silt and clay and % fine grain for 1144 samples

5. **How consistent are the relationships among the observations, including topology?**

No additional checks for topological consistency were performed on this data.

How can someone get a copy of the data set?

Are there legal restrictions on access or use of the data?

Access_Constraints: None
Use_Constraints: Not suitable for navigation

1. **Who distributes the data set?** (Distributor 1 of 1)

United States Geological Survey (USGS)
c/o Guy R. Cochrane
Geophysicist
USGS, 400 Natural Bridges Drive
Santa Cruz, CA 95060-5792
USA

(831) 427-4754 (voice)
(831) 427-4748 (FAX)
gcochrane@usgs.go

2. **What's the catalog number I need to order this data set?**

3. **What legal disclaimers am I supposed to read?**

Please recognize the U.S. Geological Survey (USGS) as the source of this

information.

Although these data have been used by the U.S. Geological Survey, U.S. Department of the Interior, no warranty expressed or implied is made by the U.S. Geological Survey as to the accuracy of the data.

The act of distribution shall not constitute any such warranty, and no responsibility is assumed by the U.S. Geological Survey in the use of this data, software, or related materials.

4. **How can I download or order the data?**

Who wrote the metadata?

Dates:
  Last modified: 2005
  Last Reviewed: 2005
Metadata author:
  United States Geological Survey (USGS)
  c/o Guy R. Cochrane
  Geophysicist
  USGS, 400 Natural Bridges Drive
  Santa Cruz, CA 95060-5792
  USA

  (831) 427-4754 (voice)
  (831) 427-4748 (FAX)
  gcochrane@usgs.gov

Metadata standard:
  FGDC Content Standards for Digital Geospatial Metadata ("CSDGM version 2") (FGDC-STD-001-1998)

Generated by mp version 2.8.6 on Wed Dec 07 16:05:33 2005

U.S. Geological Survey
Open-file Report 2006-1081

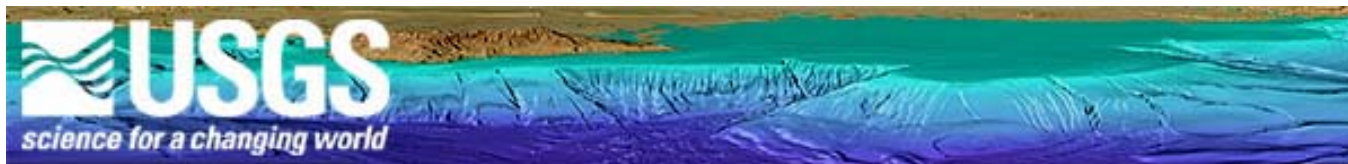# Geologic characteristics of benthic habitats in Glacier Bay, southeast Alaska

Wentworth Class	Size (mm)	Size (phi)	Fraction of mm
very fine silt	0.0039 mm 0.0078 mm	8.0 phi 7.0 phi	 1/256
fine silt	0.0078 mm 0.0156 mm	7.0 phi 6.0 phi	 1/128
medium silt	0.0156 mm 0.031 mm	6.0 phi 5.0 phi	 1/64
coarse silt	0.031 mm 0.0625 mm	5.0 phi 4.0 phi	 1/32
very fine sand	0.0625 mm 0.125 mm	4.0 phi 3.0 phi	 1/16
fine sand	0.125 mm 0.250 mm	3.0 phi 2.0 phi	 1/8

medium sand	0.250 mm	2.0 phi	
	0.500 mm	1.0 phi	1/4
coarse sand	0.500 mm	1.0 phi	
	1.00 mm	0.0 phi	1/2
very coarse sand	1.00 mm	0.0 phi	
	2.00 mm	−1.0 phi	1
granule	2.00 mm	−1.0 phi	
	4.00 mm	−2.0 phi	2
pebble	4.00 mm	−2.0 phi	4
cobble	> 16 mm	~−6 phi	16
boulder	> 256 mm	−8 phi	256

Table 5. Wentworth grain-size scale.

U.S. Geological Survey
Open-file Report 2006-1081

Geologic characteristics of benthic habitats in Glacier Bay, southeast Alaska

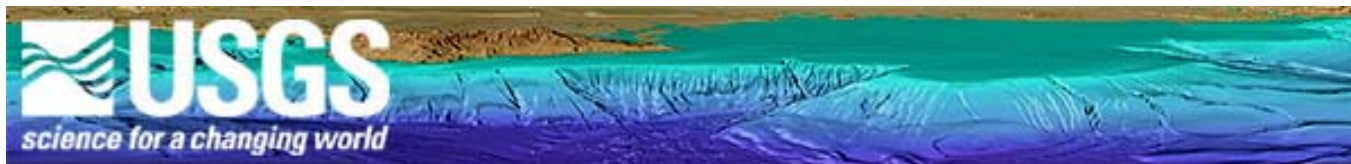Image A. Soft, muddy, bioturbated sediment observed in seafloor video at location A in Figure 4.

U.S. Geological Survey
Open-file Report 2006-1081

Geologic characteristics of benthic habitats in Glacier Bay, southeast Alaska

Image B. Mixed coarse sediment observed in seafloor video at location B in Figure 4.

URL: http://walrus.wr.usgs.gov/2006/1081/imageB.html
maintained by Michael Diggles
last modified 12 December 2005 (ng)

U.S. Geological Survey
Open-file Report 2006-1081

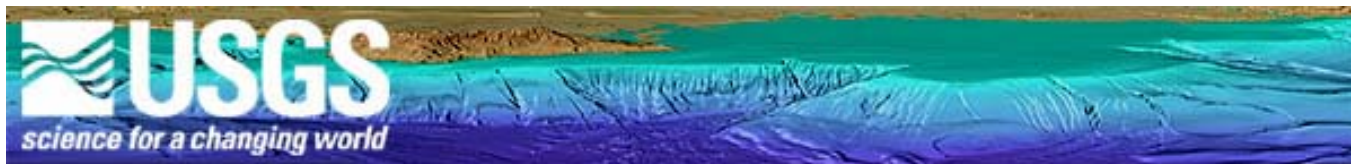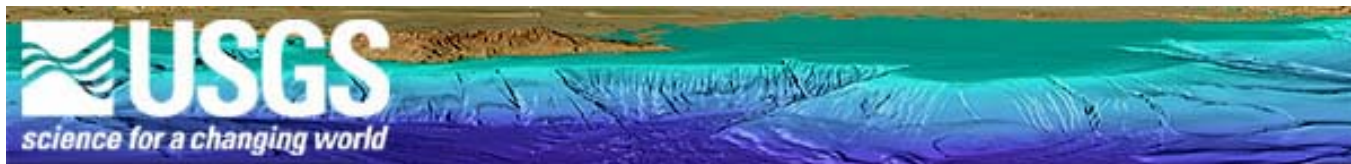# Geologic characteristics of benthic habitats in Glacier Bay, southeast Alaska

Image C. Cobbles and boulders observed in seafloor video at location C in Figure 4.

U.S. Geological Survey
Open-file Report 2006-1081

Geologic characteristics of benthic habitats in Glacier Bay, southeast Alaska

Image D. Living scallops on sand-cobble substrate observed in seafloor video collected south-east of Willoughby Island (location not shown).

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Image E. Gorgonians on complex boulder-cobble substrate observed in seafloor video collected south-east of Willoughby Island (location not shown).

URL: http://walrus.wr.usgs.gov/2006/1081/imageD.html

Geologic characteristics of benthic habitats in Glacier Bay, southeast Alaska - Image E

maintained by [Michael Diggles](#)
last modified 12 December 2005 (ng)

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Image F. Abrupt transition between coarse cobbles and sand waves of the lower bay shown in Figure 5.

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Image G. Pebbles, cobbles, and shells are abundant in the troughs between sand waves of the lower bay shown in Figure 5.

Geologic characteristics of benthic habitats in Glacier Bay, southeast Alaska - Image G