Identification of monitoring projects and potential baselines among ongoing and former research in the parks of the Southeast Alaska Network

TRANSMITTAL LETTER **A-4**

PROCEDURE FOR CONSTRUCTING THE PROJECT EVALUATION TABLES **A-5**

EXPLANATORY COMPANION TO THE PROJECT EVALUATION TABLES **A-7**

IDENTIFYING BASELINE CANDIDATES & MONITORING FOR SEAN: DEFINITIONS AND RANKINGS **A-8**

GLBA PROJECT EVALUATION TABLE **A-9**

ATMOSPHERE A-9
FRESHWATER A-12
Streams –physical/general *A-12*
Hydrology/water quality *A-12*
Fish (incl. salmon) *A-13*
General ecology/succession *A-17*
Lakes *A-20*
Impacts (including fishing) *A-22*
TERRESTRIAL A-24
Bedrock geology *A-24*
Landform dynamics *A-24*
Isostatics/Tectonics *A-25*
Glaciers *A-27*
Soils *A-29*
Plants *A-30*
Birds *A-35*
Mammals *A-40*
Amphibians *A-46*
Invertebrates *A-47*
General (Incl ecology/succession) *A-49*
Impacts *A-50*
MARINE A-52
Oceanography/water quality *A-52*
Bathymetry/sediments *A-55*
Fish *A-58*
Birds *A-61*
Whales *A-65*
Pinnipeds/sea otters *A-69*
Invertebrates *A-76*
General marine (incl acoustics) *A-83*
Impacts *A-89*
INTERTIDAL A-93
Landforms/sediments *A-93*
Invertebrates/algae *A-94*
Fish *A-96*
Birds *A-97*
General/impacts *A-98*
GENERAL, OTHER A-99

KLGO PROJECT EVALUATION TABLE **A-103**

ATMOSPHERE A-103
BIRDS A-104
MAMMALS A-106
FISH A-106
PLANTS A-106

AMPHIBIANS A-107
VISITOR USE/ IMPACTS A-108
GEOMORPHOLOGY A-108
WATER QUALITY A-109
GENERAL ECOLOGY A-109
PHOTOGRAPHY A-110

SITK PROJECT EVALUATION TABLE A-111

ATMOSPHERE A-111
BIRDS A-111
MAMMALS A-112
LAND PLANTS A-112
MARINE/INTERTIDAL A-113
INDIAN RIVER A-114
GENERAL ECOLOGY A-115
LANDSCAPE A-116
HISTORY A-116
ASPHALT PLANT A-116
WATER QUALITY A-117

Transmittal Letter

10/17/06

MEMORANDUM
TO: Susan Boudreau, GLBA
FROM: Greg Streveler, ISES
SUBJECT: Transmittal of final products

Susan, per our agreement, here on this CD (and on the park web) are copies of the final drafts of all work I have done related to identification of monitoring projects and potential baselines among ongoing and former research in the park. On this CD, you should find:

- Procedure for construction project evaluation tables, final
- Identifying baselines and monitoring candidates, final
- Explanatory companion to tables
- GLBA Project evaluation table, final
- GLBA monitoring project summaries, final
- SITK Project evaluation table, final
- KLGO project evaluation table, final

If all these documents meet with your satisfaction, my work on this project is hereby terminated. Thank you for the opportunity to work on this worthwhile project.

Procedure for Constructing the Project Evaluation Tables

Greg Streveler

10/17/06

I began this project by first developing the task concept through a series of discussions with Chiska Derr. In a nutshell, the agreed objective was to review all past and ongoing research to identify work that can be classified as monitoring, or that could become the basis of monitoring in the future.

The next step was to put a draft procedure for identifying ongoing monitoring and baseline candidates through several drafts in consultation with Chiska and staff from SEAN parks. With the task and procedure clarified, webmaster Bill Eichenlaub acquainted me with the NPS intranet and pointed me toward the most productive sources for my purposes. We decided that the SEAN park's Project Tracking database (/Science/Resource Management/SEAN-data-management/project-tracking/project_tracking_database) would form the backbone of my review, but many supplementary databases (notably k/eco_data, naturebib, library/products/reports, and research/research projects/investigator files) were invaluable.

For SITK and KLGO, I asked the Resource Management Specialists to supplement the Project Tracking lists, after which I filled in as much detail as possible from sources available to me electronically on the park intranets. This work was followed by onsite visits with Geoff & Meg, reviewing all pertinent literature at their command and further gleaning their personal knowledge. The lists were finished after a further round of review with Meg (later, Theresa) & Geoff, in which the final details were emplaced and their views on monitoring/baseline determinations were fully integrated.

For GLBA, I first supplemented the Project Tracking list with notes on monitoring subjects from a RM workshop, then began to iteratively query and a number of sources, beginning with the electronic ones available on the park intranet. These were extensively supplemented from my personal library and that of the park, and the USGS hard copy files. All Project Tracking headings were examined, whether relevant or not; other work was cited if I went to some trouble to evaluate it. The vast GLBA literature was weeded down by eliminating out-of-hand:

- a variety of topics such as most of archaeology, sociology, and bedrock geology (except where a monitoring component suggested itself);
- most projects that on their face were very cursory or crudely done.

An attempt was then made to examine some form of report or data on all the rest. Many sources from the staff and elsewhere were then iteratively queried until there existed a credible first draft.

I then farmed the draft out to the park RM staff, the USGS staff, and a few key independent researchers for their formal input on details and references, which added very considerably to the breadth and accuracy of the document. The semi-final package

was then farmed out one last time to the staff, and final details were elicited from key non-staff. Results were compiled into the final.

Explanatory Companion to the Project Evaluation Tables
for
GLBA, KLGO and SITK
Greg Streveler 10/17/06

The purpose of these tables is to present in outline form the basic information on all past and present research for SEAN parks that is of potential interest from a standpoint of ecosystem monitoring. The master list of all such projects was constructed by me with periodic review by Park RM, USGS and selected independent research personnel during April – September, 2006.

Column 1 of each Table gives each project's name. If in regular print, this name is as it appears in the park's Project Tracking database; if in italics, it is a name invented to encapsulate material not in that database.

Column 2 gives an assessment of that project's status as ongoing monitoring. The code in that column refers to the companion document "Identifying Baseline Candidates & Ongoing Monitoring". There are only two possible answers here: "Yes" and "No", in most cases accompanied by an explanatory code. The lack of a coded explanation means that the reason is considered to be self-evident.

Column 3 gives an assessment of the project's status as potential baseline material. There are three possible answers here: "No", "Yes" and "PRIME". The "PRIME" category is reserved for projects that struck me as the most important baseline candidates. Again the codes accompanying these determinations are explained in "Identifying Baseline Candidates & Ongoing Monitoring". I have tended to be inclusive here when in doubt, so that potentially useful items do not fall off the radar screen prematurely.

Column 4 gives a telegraphic summary of the project, with key references.

Explanatory Companion
to the
GLBA Monitoring Project Summaries Table

This table is a distillate of the GLBA Project Evaluation Table. Its intent is to display two sorts of projects: 1) those which are ranked as "Ongoing Monitoring", and 2) those which are judged to present significant opportunities for additional monitoring, but for some reason have not risen to that status. Low ranking projects are removed as an aid to focus on the more important ones in a SEAN context.

Material in all columns is taken verbatim from the Project Evaluation Table in all cases except for Column 4. In that column, "Ongoing Monitoring" projects are re-crafted into prose statements as an aid to their inclusion into the upcoming SEAN Phase II report.

Identifying Baseline Candidates & Monitoring for SEAN: Definitions and Rankings

Reviewers: Chiska, Scott, Lewis, Rusty, Meg, Geof

Greg Streveler 10/17/06

The SEAN definition of Monitoring: "The collection and analysis of replicated observations or measurements to evaluate changes in condition and progress toward meeting a management objective."

Monitoring can have a great variety of sophistication levels, ranging from qualitative or casual observations that only grossly describe the status quo, to carefully structured and data rich programs that allow precise statistical evaluation &/or identification of small deviations from the status quo. It has been agreed that I am to focus on the upper levels of this spectrum. The following is a second attempt to define projects that rise to the level of "Baseline Candidate" or "Ongoing Monitoring". Projects that fail to fulfill these criteria will fall off the list, and will not receive further attention from me.

I. A project is a Baseline Candidate if all the following criteria are met:

A1 - It has sample sizes and data quality sufficient to permit some evaluation of confidence limits or level of detectable change,

or

A2 - It is sufficiently exhaustive, either alone or in concert with other data sets, to permit firm statements about a key phenomenon (for example, presence/absence of river otters in the Indian River estuary);

And

B - It has protocols sufficiently described to locate study localities and to replicate the mode of sampling/observation.

II. If a project that is ranked as a Candidate, will get a ranking of "Prime Candidate" if:

A - It clearly meets the SEAN Ecological Significance Criteria:
(a) important as a controller or integrator; (b) useful as an integrator; (c) linked to other vital signs

or

B - It meets SEAM Management Significance criteria:
(a) needed to make or implement a management decision or evaluate an outcome of a management action: (b) required by a legal mandate; (c) there is a formal mandate for monitoring; (d) resource is "listed" or otherwise of concern to an agency.

III. A project is "Ongoing Monitoring" if it:

A1 - Meets the above criteria for a Baseline Candidate,

or

A2 – Has been intended as monitoring

And

B1 - Has been repetitively sampled at least once in the last few years

or

B2 - There are firm plans for follow-up.

GLBA Project Evaluation Table 10/17/06 Final

Greg Streveler, in consultation with GLBA & USGS Staff

(for explanation of codes, see a companion document,"Identifying Baseline Candidates and Ongoing Monitoring")
Project names in *italics* are not in the *GLBA* Project Tracking *database.*

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
Atmosphere			
Air Quality Camera System	No	No	Never happened, according to Eichenlaub
Airborne Contaminants Assessment	Yes ? (A1,B2?)	Yes (A2, B)	What: Assessment of semi-volatile organics, persistent organic pollutants. How: Passive air filtration and vegetation sampling, using protocol developed for Western parks When: 2005 (sampler will be collected , 2006) Where: On face of Beartrack Mountain, below timberline Who: Dixon Landers (WACAP) Comments: We don't have the exact details of the analysis, but it is a likely candidate for replication.
Atmospheric Mercury *qnd Lead* Assessment	Yes (A1,B1)	Yes (A2, B)	What: Monitoring of atmospheric Hg (and Pb210), as a "pristine" benchmark against which to compare readings from more trammeled parts of the world. How: Passive monitoring of precipitation When: July 2003 – July 2005 Where: Bartlett Cove Who: Dan Engstrom Comments: Samples are being processed. Assume it is according to a national protocol.
Cruise ship stack Emission Opacity	Yes (A2,B1)	PRIME (Ba,b,c)	What: Measurement of cruise ship (and tour vessel) stack emissions for their compliance with opacity regs How: Opacity readings a minimum of twice per operating season for each cruise ship, and on an opportunistic basis for tour vessels. Where: Glacier Bay When 1991-present Who: NPS rangers Ref: GLBA Marine Vessel Emissions Program (2006 edition)

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			Comments: given length of baseline and volume of data, and interest to management, this is a key monitoring program
Weather Data, NCDC	Yes (A2,B1)	PRIME (Aa,c)	What: Weather data from 8 stations in region averaged How: Data obtained from National Climatic Data Center on daily avg air temp, daily precip, daily average wind speed. When: Jan 1993-July 2002 Where: Yakutat, Elfin Cove, Hoonah, Bartlett Cove, Gustavus, Auke Bay, Juneau and Haines Ref: Etherington, L., et al. 2004. Factors affecting Seasonal and Regional Patterns of Surface Water Oceanographic Properties within a Fjord Estuarine system: Glacier Bay, Alaska. USGS/BRD report to NPS, Gustavus. Comments: Very important data set. Could be extended backward for further elucidation of historical weather patterns. Up-to-date data also collected on continuous basis, and could be purchased at any time.
Bartlett Cove & Gustavus Weather Stations	Yes (A2,B1)	PRIME (Aa,c)	What: weather records How: NWS official stations Where: Bartlett Cove and Gustavus, the former in the same spot the latter moved a couple of times, now automated from airport. When: operated nearly continuously since the 1950's Refs: recent records synopsized in the NCDC weather summary per Etherington, but much more time depth available.
Lawson's Weather Stations	Yes (A2,B1)	PRIME (Aa,c)	What: Lowland weather patterns How: 24 automated stations that must be downloaded and serviced at least annually, measuring standard parameters as well as isotopic composition of oxygen in precipitation. When: For about a decade, and ongoing Where: Along Glacier Bay, numerous localities Who: Dan Lawson Comments: Lawson has the data; no synoptic report yet.
Other weather data	No (B1)	PRIME (Aa,c)	What: various short-term records from summer field stations; a major synthesis of regional weather records up to 1989 Where: Muir Inlet, Falls Creek; Dry Bay Who: up-Bay rangers, IPS, Gustavus Electric, Lewis Hunter; Chad Soiseth Refs: info in various NPS field logs and IPS reports

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			Hunter, L. 1994. Grounding-line Systems and Glacier Mass Balance of Modern Temperate Glaciers and their Effect on Glacier Stability. Ph.D. Thesis, Northern Illinois U. Lowe, F. 1966. Climate *in* Goldthwait, et. Soil Development and Ecological Succession In a Deglaciated Area of Muir Inlet, Alaska. IPS Rept #20. Comments: Hunter's work is of the first importance for the park, giving a regional synopsis very complementary to that of Etherington, above. Lowe gives a good summary of data for Muir Inlet as of the mid 60's. Soiseth advises that a station is now established at Dry Bay, and has bee functioning since May '05. I have not attempted to survey the info scattered in various logs and reports, but there are really quite a few data from the summer months, especially in Muir Inlet. An important record for Dixon Harbor was obtained during winters of 1973-4, & 1974-5 by Home (1977).
Glacier Bay Climate Model	No	No	What: First coherent, data-driven climate model for GLBA. Ref: Hunter, L & R. Powell. 1993. *in* Proceedings of the Third Glacier Bay Science Symposium , Engstrom, ed. NPS, Anchorage Comments: Of the first importance; based on data given in Hunter's thesis (see above), but not useful for monitoring.
Air pollution Potential, upper Fjords	No	No	What: Meteorological measurements to determine air pollution potential in upper fjords. How: Measured cloud cover, temp, humidity, radiation, wind speed. Where: Main measurements made at Goose Cove, stations at o and 127m ASL. When: Summer 1976 Who: Carl Benson, Gerd Wendler Ref: Benson, C. et al. 1978. On the Climate and Air Pollution Potential in GLBA, Alaska. Geophysical Inst. UAF rept to NPS Comments: A one-year sample of weather variables is not sufficient for use as a baseline in itself, but could be useful if patched together with other short records from Muir Inlet research camps and ranger stations.

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
Freshwater			**The Freshwater section is somewhat duplicative of the work of Eran Hood, Sonia Nagorski & Ginny Eckert. The reader is referred to their reports for further details on water quality issues.**
Streams – physical/general			
Streams GIS Layer			Not sufficient precision to document change on all but largest scale
Hydrology/water quality			**This subsection is only flagged, since it is the primary focus of the Eckert/Nagorski/Hood report, except for the geomorphological component.**
Abyss Lake Jökulhlaups, 1997-2001	No (B1)	Yes (A2,B)	What/where: Analysis of Outburst history of Abyss Lake area. Who: Chad Soiseth, Scott Grover. When: 1997, 2001 Refs: Grover, S. (1997). An investigation of the 1997 Abyss Lake Jokulhlaup in Glacier Bay National Park. Gustavus, Alaska, U.S. National Park Service, Glacier Bay National Park and Preserve**:** 11 pp. Grover, S. (2003). An investigation of glacial outburst floods from Abyss Lake, Glacier Bay National Park, Alaska. Fort Collins, Colorado, U.S. National Park Service, Water Resources Division**:** 14 pp. Comments: Added more detail here because of the geomorphological aspect of the work. The summary of drainage shifts and lake level changes is based on field obs and air photo analysis. I have called this monitoring on the basis of my understanding that the system is under surveillance for future changes.
Outburst lake mapping & Monitoring	Yes (A1,B1)	Yes (A2,B)	What: Mapping and monitoring of outburst lakes with objective of creating a predictive model of their behavior How: Mapping from photos and visits; measurement of depths and strandline changes, mapping of downstream effects Where: Throughout park and elsewhere When: 2005-2006 Who: Denny Capps Comments: PhD work in progress, U British Columbia
Abyss Lake Water-level	Yes (A2,B1)	Yes (A2,B)	What: Collection of 20 photos, 1997-present.

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			Who: Bill Eichenlaub Comments: Intended as a continuing collection for purpose of monitoring
Alsek River Gauging Station	Yes (A2,B1)		Dan Neal, USGS. Perennial gauging station. Important record.
East Alsek Water Quantity & Quality			Chad Soiseth. Summer of 2005 draft report available. Second year of data to be finalized in 2007.
Baseline Water Quality Data Inventory and Analysis			Chris Cofeen, Cathy Connor. According to project tracking, was supposed to happen in 2002-03. Some data from USGS Ed Neal exist with Chad Soiseth but project was not completed.
Kahtaheena River Gaging Station	Yes (A2,B1)		Station run for a couple of years around 2002-02 on Falls Creek by USGS, Juneau, for Gustavus Electric Co. Reestablished in 2006.
Air Temp and Water Temp Flux			Dan Lawson, Jim Taggart. Comparison of marine and atmospheric temperature records, Glacier Bay.
Dixon Harbor Area Hydrology			Dan Bishop, 1975-76. Has some potentially important data on pH & heavy metal concentrations from a number of water bodies. That latter are shown to approach toxicity levels for fish in some instances. Ref: . Bishop, D. M. (1977). Hydrology of coastal streams near Lituya Bay, Environaid**:** 30 pp. Dixon Hbr Biological Survey.
Burroughs Glacier Margin Geochemistry			Dave Mickleson. Good water chemistry data from sites, some of which are relocatable. Ref: Mickelson, D. M. and N. R. Ham (1995). Thirty years of glacier process studies at Burroughs Glacier, Wachusetts Inlet, Glacier Bay, Alaska. Proc. 3rd Glacier Bay Science Symp, 1993, Gustavus, Alaska, USNPS.
Fish (incl. salmon)			
Coastal Chinook Salmon Data Storage Tag Project	No	No	What :Exploration of utility of a tagging tool Who: James Murphy
East Alsek Sockeye Salmon Decline (*includes* East Alsek Monitoring)	Yes (A1,B1)	PRIME (Ab,Ba)	What/how: 1) map and quantify sockeye salmon spawning habitat and macrophyte beds to determine whether spawning habitat is limiting and how macrophytes are affecting habitat, 2) use archived adult scales and contemporary juvenile scales and otoliths to evaluate habitat change effects on growth, 3) quantify juvenile sockeye distribution, relative abundance, and growth to establish basic life history information and collect scale and otolith samples, and

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			4) Determine growth rate of aquatic vegetation and rate of sediment deposition in relation to activity of spawning sockeye. Project results will resolve questions regarding feasibility of large-scale habitat manipulation to improve fish returns and inform fisheries management. Where: East Alsek River When: 2005-06 Who: Derrek Faber, Chad Soiseth Ref: Faber, D, et al. 2006. Evaluation of Habitat and growth Trends for East Alsek Sockeye Salmon in Glacier Bay National Preserve, Alaska. UA Southeast, Juneau. Comments: Currentlly in progress with '06 as final of 2 y field season. This is UAF Master's student Derrek Faber's thesis work. Anticipated completion by end of 2007. Comments: Comprehensive study; most germane part to inventory/monitoring is objective 1, which is providing detailed map and quantitative description of habitat distribution & parameters.
Freshwater Fish Species	No	No	Empty category
Freshwater fish distribution database inventory: 1952-1994	No	No	What: This is an Access database table companion to the physical characteristics of streams database table. The data table indicates species and life stage presence among park streams as reported over recent history from a wide variety of sources. Data exist for perhaps half of the more than 300 streams in the park. Data quality are highly variable ranging from a single stream visit by a nonscientist to multiple and repeated visits to streams over several years (i.e. Milner at Berg Bay and Wolf Point Creek). Comments: Larger studies on individual creeks are reported under other headings
Post-Glacial Salmon Recolonization	No	Yes? (A1?,B)	What: Genetic variation among sockeys and pinks How: analysis of allozymes and mitochondrial DNA Who: Chris Kondzela, Tony Gharrett Where: four Glacier Bay systems, including Gull lake, Seclusion River, North Berg When: 1993-94? Refs. Kondzela, C & A. Gharrett. 2004. Post-Glacial Colonization of Pink and Sockeye Salmon in glacier Bay. Abstract, 4th GB Science Symposium, Juneau. Kondzela, C. & A. Gharrett. Draft. Sockey Salmon Colonization in Glacier Bay. Comments: Draft reviewed by Chad, but paper not available. Based on poster at science symposium, study designed to elucidate between-stream relationships at a point in time, and presumably could be replicated in the future to note genetic changes (say, due to infusion of hatchery fish or somesuch). I presume the work could be replicated in the future if done well enough to distinguish between-stream differences.

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
Salmon - Chinook - Dundas/Seclusion Study	No	No	What: Survey in search of Chinook salmon How: Visual surveys of adults; minnow trapping for juvs Where: main channels of Dundas/Seclusion complex When: Sept, 2002. Ref: Waltmeyer, D. & C. Soiseth. 2004. An Evaluationn of Chinook Salmon Freshwater Habitat Use in GLBA, Alaska. Tech Rept NPS?NRWRD/NTR-2004/321 Comments: Cursory; samples of fish small. Results for Chinook negative (but found lots of Dollies in Seclusion). Not useful for baseline
Salmon - Coho Fry	No	No	Dan Van Leeuwen Proposal for study that was aborted
Diet of Coho Juveniles as function of stream age	No	No	What: Diet of juvenile coho as function of stream age / ecosystem development. How: Stomach analysis of fish compared to invertebrate availability as demonstrated by sampling of aquatic and terrestrial streambank fauna. Where: Wolf Point Creek, Ice Valley Creek and Berg Bay South Creek. When: July/August, 2005 Who: Emily Greenall, under the supervision of Milner Ref: Greenall, E. 2005. A Study Comparing the Changes in Aquatic and Terrestrial Invertebrate Composition, and Juvenile Coho Salmon Diet Preferences Between Three Streams of Different Ages. M.S. Thesis, King's College, London. Comments: Based on relatively small samples [ex: stomachs (N=16-21/stream), pitfall traps (N=10-17/stream)]; sample sites not precisely located. Her hypothesis that there would be a correlation between stream age (therefore food choices) and fish diets was not borne out.
Salmon - Coho Genetics and Colonization	No (B1)	Yes (A1,B)	What: Documentation of metapopulation genetics in streams of various post-glacial ages. How: Genetic analysis of coho stocks, focusing on nine nuclear loci, using age, watershed size and inter-stream distance as variables Where: Known-age streams along the Glacier Bay chronosequence. When: 1997 Who: Kim Scribner, Chad Soiseth, George Sage, Lyman Thorsteinson, Eric Knudsen, Jennifer Neilsen. Ref: Scribner, K., et al. In prep. Coho Salmon Colonization in Recently Deglaciated Streams in Glacier Bay, Alaska: Implications for Pacific Salmon Restoration. To be submitted to J. Fisheries. Comment: Relatively large total sample (N=615) from a total of 17 streams, or an average of 36 fish/stream. This level of sampling allowed distinction among streams with a large degree of confidence; hence each stream can be considered well characterized genetically.

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			These data would allow comparison at some later date A resampling of streams could potentially indicate changes in gene freq. for specific loci sampled. However, one criticism of earlier drafts of this paper was that samples from juvenile fish could have been biased toward related individuals.
Falls Creek Resident Dolly Varden Genetics	No (B1)	Yes (A1,B)	What: Genetic characteristics of resident population How: Microsatellite analysis, using 5 loci; 27 fish sampled. Where: Falls creek above proposed hydro development When: 2000 Who: Erika Leder Ref: Leder, E. 2001. Genetic Affinities and Population Differentiation among Dolly Varden of the Falls Creek Area; a preliminary Investigation. Draft report to NPS and Gustavus Electric. U Wisconsin, Madison. Comments: Not an extensive study, but sample size and homogeneity of genetics at these loci make the results quite solid and replicable.
Salmon - Stream Surveys	No	No?	Repository for lots of stream surveys and related data gleaned from various sources by Chad Soiseth. See *Freshwater fish distribution database inventory*: 1952-1994, above.
Salmon-stream Surveys - Historical	No	No	What: Various notes and surveys on salmon escapements and stream characteristics How: Visual observation Where: Various streams in park When: 1901-1990 Refs: Soiseth, C. Undated. Summary of Stream Surveys in Glacier Bay National Park and Preserve: 1952-1994. NPS/RM report in Library/Products/Publications. Schroeder, M. 1990. The Salmon Resources of Seven Spawning Streams Within GLBA, Alaska. Also see these reports in Archives: Moser, 1901;Prather & Mow, 1989, Mattson et al,, 1959; Huneke & Owens, 1966; Johnston, 1965; Cebula, 1963; Blackie 1989; Baade, 1954-55. See also Murrell (1975, 1977) in the second & third Dixon Harbor Biological Survey reports, and Marriott (1980) in the Lituya Bay Environmental Survey report. Comments: Of various quality. Some, notably Murrell & Marriott (see elsewhere) are replicable but cursory. Not generally useful as baseline material. This describes Freshwater fish distribution database and inventory above.

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
Salmonid Presence and Relative Abundance Survey	No	No	Seems to overlap with the above project. Has small amt. of data from Indian river and Wolf Point Creek minnow trapping in park database.
Boussole Lake & Valley Salmon – 1970-s	No (B1)	Yes (A1, B)	What: Salmonid populations and food habits How: systematic minnow trapping, stomach analysis; stream surveys; short-term use of weir Where: Boussole Valley & Lake, Dixon Harbor vicinity When: 1975 Who: Ed Murrell Refs: Murrell, E. 1977. Growth and August Foods of Juvenile Anadromous Dolly Varden and Coho Salmon in the Boussole Valley of GLBA. M.S. Thesis, University of Alaska, Fairbanks. Murrell, E. Freshwater and Anadromous Fishes. *In* Dixon harbor Biological Survey: final report on the summer phase of 1975 research. Streveler & Worley, eds. NPS, Juneau. Comments: Minnow trapping in Boussole Lake and Boussole Valley streams was done in a systematic fashion. In streams, each of 39 station were occupied twice in August about 20 days apart. In the Lake, 56 stations were trapped in August and a subset in September. Trap stations mapped with fair accuracy. Given the number and coverage of samples, this work would provide a reasonably good baseline. The escapement counts are not replicable.
Sockeye Salmon Mark & Recapture	No	No	What/where: Estimate escapement population estimates and sex ratios for East and Doame River sockeyes; construct correction factor for peak survey counts. How: Mark-recapture of adults to estimate escapement on East; visually assess sex ratio; on Doame, evaluate feasibility of providing similar program here. Ref: Tracy, M. 2004. East Alsek River Mark-recapture Experiment and Doame River Mark-recapture Feasibility Effort. Permit Appl'n to NPS Comments: Three years of data were collected to calibrate aerial survey estimates of sockeye escapement. Data exist in report form from ADFG. Results do not constitute a baseline.
General ecology/succession			
Stream Colonization	Yes (A1,B1)	Yes (A1,B)	What: Documentation of a number of biological & physical characteristics of at least 16 streams & their biotic communities Where: spread through the chronosequence

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			When: 1978-present. Who: Sandy Milner and a succession of students & collaborators Ref: Milner, A. 1983. The Ecology of Post-glacial Streams in GLBA, SE Alaska. Ph. D. Thesis. University of London. Sidle, R & A. Milner. 1989. Factors Influencing Stream Development in GLBA, AK. Arctic & Alpine Res. 21(4): 350-363. (nearly identical paper in 2nd Science Symposium). Milner, A. & R. Bailey. 1989. Salmonid Colonization of New Streams in GLBA, AK. Aquaculture & Fisheries Mgt 20:179-192. Adamson (Flory), L. 1996. Invertebrate Community Development in a New Stream in GLBA, Alaska. Phillips, I. 1999. The Influence of Wood on the Ecology of Stream Invertebrates. Ph. D Thesis, U Birmingham. Milner, A. & I. Phillips. 2000? The Role of Riparian Vegetation and Woody Debris in the Development of Macroinvertebrate Assemblages in Streams. Unpublished manuscript. Robertson, A. & A. Milner. 1999. Meiobenthic Arthropod Communities in New Streams in GLBA, Alaska. Hydrobiologia 397: 197-209. Milner, A. et al. 2000. Colonization and Development of Stream Communities Across A 200 Year Gradient In GLBA, Alaska. Can. J. Fish. Aquatic Sct. 57:2319-35. Milner, A.M. and I.T. Gloyne-Phillips (2005) The role of riparian vegetation and woody debris in the development of macroinvertebrate assemblages in streams. *Rivers: Research and Application* 21:403-420 Robertson, A. & A. Milner. 2006. The influence of Stream Age and Environmental Variables in Structuring Meiofaunal Assemblages in Recently Deglaciated Streams. Limnology, Oceanography 5(3): 1454-1465. Veal, A.J. (2004) The ecology of Stonefly Creek in Glacier Bay National Park. PhD thesis, University of Alaska. McDermott, M. (2006) The Lotic Meiofaunal Community of a Recently Deglaciated Stream. Ph. D. Thesis, Roehampton University. Comments: Some of these streams, notably Berg Bay North & South (numerous visits), Ice Valley (numerous visits) , several in Wachusett Inlet (Stonefly Creek,1997-present), and Vivid Lake Creek, have long-term data that can be repeated. Milner cites the existence of such sites on 5 streams in his 1987 paper. Sampling sites initially set up by Milner are located in his thesis; GPS coordinates now available. Other sites are described in several of

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			the above works.
Wolf Creek Watershed Monitoring;	Yes (A1, B1)	PRIME (Ab)	What: Long term monitoring of environmental and biotic variables within one watershed in connection with a study of stream development How: Various qualitative & quantitative measures Where: Wolf Point Creek along the W shore of Muir Inlet When: annually, 1977-present Refs: Milner, A. 1993. Community Development in Wolf Point Creek, GLBA, Alaska. *in* Proceedings of the Third Glacier Bay Science Symposium , Engstrom, ed. NPS, Anchorage. Milner, A.M. (1987) Colonization and ecological development of new streams in Glacier Bay National Park, Alaska. *Freshwater Biology*. 18:53-70. Milner, A.M. (1994) Colonization and succession of invertebrates in a new stream in Glacier Bay, Alaska. *Freshwater Biology*. 32:387-400 Adamson (Flory), E. 1996. Invertebrate Community Development in a New Stream in GLBA, Alaska. PhD Thesis, U of Sterling, UK. Milner, A et al. 1999. Invertebrate Community Development in a New Stream in GLBA, Alaska: a Long Term Record *in* Friberg & Carl (eds) Biodiversity in Benthic Ecology, Denmark. NERI Tech Rept No. 266.. [*includes discussion of fish colonization*] Flory, E. and A. Milner. 1999. Influence of Riparian Vegetation on Invertebrate Assemblages in a Recently formed Stream In GLBA, Alaska. J. N. Am. Benthol. Soc. 18(2):261-273. Flory, E. & A. Milner. 2000. Macroinvertebrate Community Succession in Wolf Point Creek, GLBA, Alaska. Freshwater Biol. 44:465-580. Flory, E.A. and A.M. Milner (1999) The role of competition in invertebrate community development in a recently formed stream in Glacier Bay National Park, Alaska. *Aquatic Ecology* 33:175-184 Monaghan, K. 2000. The Effects of Fish Colonization on the Invertebrate Community Succession in a New Stream, Alaska. Ph.D Thesis, U Birmingham. McDermott, J. The Lotic Meiofaunal Community of a Recently Deglaciated Stream. Ph. D. Thesis, Roehampton University. Milner, A. , et al. 2004. Ecological Development of the Wolf Creek Watershed from 1971 to 2001: a 25 year record. Abstract, 4th GB Science Symposium, Juneau. Comments: Milner's 2005 fish collecting permit refers to a long-term sampling site on Wolf Point Creek, at which most of the data from the cited reports were taken. Nearly annual

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			records exist of numerous stream characteristics from this stream, many of which have been quantitatively sampled. Changes over time have been sufficiently large to be portrayed with considerable confidence, providing perhaps the most data-rich & protracted baseline for any system in the park.
Falls Creek Aquatic Biota	Yes (A2,B))	PRIME (Ba)	What: Inventory of stream habitat types, fish populations and benthic invertebrate divedrsity/biomass index How: Stream surveys for adult salmonids, trapping; snorkeling and mark/recapture for juveniles and upland Dolly Varden population; systematic Surber sampling of aquatic invertebrates in lower Falls Creek as Where: Falls Creek and associated drainages When: 1999-2001 Who: Liz Flory Refs: Flory, E. 1999. Fish and Fish Habitats of the Falls Creek Area. Icy Strait Env. Svcs. Rept to Gustavus Electric, Gustavus. Flory, E. 2001. Resident Dolly Varden, Anadromous Fish Species and Benthic Invertebrates of the Falls Creek Area, 2000. Icy Strait Env. Svcs. Rept to Gustavus Electric, Gustavus. Comments: Extremely important study in area of future hydro site. Upland Dolly Varden population estimation, stream habitat map, and invertebrate index especially replicable.
Lakes			**Parts of this section are also directly related to work by Eckert, Nagorski & Hood water quality synopsis**
Lake Evolution	No (B1)	Yes (A1,B)	What: Compared modern chronosequence with a temporal record based on lake sediments, to define the sorts of trajectories lakes go through during watershed maturation How: Sampled ~ 30 lakes 3+ times over 3 years for water chemistry and diatoms; once each for a sediment core. : Measuring hydrologic, chemical and biotic parameters of lakes in chronosequence; sampling of diatoms, etc. in stratigraphy of lake bottoms. When: 1988-90 Where: Lakes throughout the park and on Pleasant Island. Refs: Engstrom, D, et al. 2000. Chemical and Biological trends during lake evolution in Recently Deglaciated Terrain. Nature 408:161-166. Fritz, S. et al. 2004. Patterns of Early Lake Evolution in Boreal landscapes: a Comparison of Stratigraphic Inference with a Modern Chronosequence at Glacier Bay, Ak. Engstrom, D., S.Fritz and S Juggins. 2004. Patterns of Early Lake Evolution in

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			GLBA: a comparison of sediment records with a classic chronoseqence. Abatract, 4th GB Science Symposium, Juneau. Comments: Lakes not precisely located in published materials but almost certainly available from investigators. Again, study not designed as baseline, but can be used as such over a larger scale, especially for differences in water chemistry that might occur on a regional scale, since these data can be controlled for succession.
Lake Extents GIS Layer	No(B1)	Yes (A2,B) (A2, B)	What: Layer of GLBA Lakes based on 1996 digital orthophoto quads (which cover ~80% of park) Who: Bill Eichenlaub Comments: This work by Bill is an example of the sort of precise mapping now possible electronically from georeferenced photography. It provides a precise baseline of lake extent as of the time of photography.
Lake algae, diatoms & Invertebrate successional history	No (B1)	Yes (A2,B)	What: documented algal, diatom (benthic, planktonic) and zooplanktonic populations in space and time, using the same set of lakes used by Engstrom et al. to study general lake chemical evolution. How: direct measurement of existing biota; inference from remains in lake sediments. When: 1988-90 (& possibly later) Where: Lakes throughout the park and on Pleasant Island. Who: Olaf Olson, Craig Williamson, the Engstrom team Refs: Olson, O. 1998. Mechanisms of Long-term Change in Periphytic Diatom Community Structure. PhD thesis, Lehigh U. (I haven't seen this ref.) Olson, O. G., D. R. Engstrom, et al. (1995). Long-term changes in zooplankton community structure inferred from chronosequence of lakes in Glacier Bay National Park, Alaska. Third Glacier Bay Science Symposium, Glacier Bay National Park & Preserve, AK, U.S. National Park Service. Williamson, C. et al. 2001. Ultraviolet radiation and Zooplankton Community Structure Following Deglaciation in Glacier Bay, Alaska. Ecology 82(6):1748-1760. Comments: Uses same lakes as does Engstrom. Lakes shown on map in sufficient detail to relocate. Careful work that is in large part replicable; could become critical if UV rates go up due to ozone depletion.
Lake Hydrology/Chemistry Relationships, Lester Island	No(B1)	Yes? (A1?,B?)	What: Details of water input type and pattern as determinant of water chemistry. How: Piezometers, and weirs on inlet streams Where: Three small lakes on Lester Island When: not specified, but probably 1988

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			Who: Jim Almendinger Ref: Almendinger, J. E. (1990). Hydrologic control of lake chemistry on Lester Island. Second Glacier Bay Science Symposium, Glacier Bay National Park & Preserve, AK, U.S. National Park Service. Comments: Lakes are specified, but details of design not specified, and only data summary presented. Water quality data given in Engstrom study (see above). If investigator can provide more details on hydrology & monitoring scheme, probably is a valuable baseline, especially in concert with other Engstrom stuff.
Lake Productivity with Relation to Sockeye production	No (B1)	Yes (A1,B)	What: Measurement of nutrient levels, light penetration, chlorophyll production and zooplankton populations How: Standard methodology for each parameter. When: 1990 (May & Aug) – 1991(4 times, June-Aug) Where: Berg bay north upper and lower lakes; Vivid lake. Who: Sandy Milner Ref: Milner, A. 1992. Lake Productivity with Relation to Sockeye Salmon Production in GLBA. UAA, Anchorage. Comments: Methods well spelled out. Sufficient samplings to allow use as baseline for summer conditions in the lakes.
Impacts (including fishing)			
Bartlett River Coho Creel Survey	No (B2)	Yes (A1,B)	What: Survey of coho catch How: Creel survey Where: Bartlett River When: 1996-98, 20 days/yr over ~45 day season. Who: Chad Soiseth, Kathy Smikrud Ref: Soiseth, C. and L. Adamson (1998). Glacier Bay National Park and Preserve Bartlett River Recreational Fishing survey and bear education campaign, 1996-1997 seasons, U.S. National Park Service, Glacier Bay National Park and Preserve. Comments: Draft in progress by Soiseth, currently incorporating NPS reviewer comment. Will likely be published as NPS WRD technical publication. Chad has calculated confidence limits for the catch data; major changes in total catch would have to occur to be noted by a re-survey. CPUE, however, is more tightly constrained, and may be a better

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			measure against which to contrast change.
Charter Sportfishing Logbook Program	Yes (A2,B2)	Yes? (A1?,B)	What: Survey of marine and freshwater charter and guided client effort, catch, and harvest. How: creel survey When: 1995-Present Where: Park-wide including Preserve Who: Chad Soiseth Ref: Access data table exists. Data queries exist but data has not yet been summarized and no final/annual summary exists Comments: If treated in aggregate, may give a reasonable sample of harvest and CPUE trends for period of record. Should allow some level of comparison to a future survey. Effort, catch and harvest are self-reported by charter captains with little independent assessment of accuracy. Data accuracy and reliability are suspect and information for some individuals is known to be inconsistent and probably not very reliable. Moreover, a significant recall bias likely exists.
Dundas/ Seclusion River Charter Harvest	Yes (B2)	Yes? (A1?,B)	What: Survey of coho and Dolly Varden catch How: creel survey When: 1997-2000, 7-26 visits/yr Where: Dundas/Seclusion River Who: Chad Soiseth Ref: Data in project tracking, summarized but not statistically treated Comments: 50-140 anglers contacted. If treated in aggregate, may well give a reasonable sample of harvest and CPUE for that general period. Should allow some level of comparison to a future survey. . This is part of a longer term (since 1995) and ongoing catch and harvest monitoring program of permitted charter operators. Catch and harvest reporting were self-reported by charter anglers and data accuracy and reliability is considered suspect by Chad.
Fisheries - Dry Bay	No	No	No data found. Seems to be a general category of Chad's for keeping track of literature and BOF activities relative to the fishery
Dry Bay Subsistence and Personal Use	No	No	Not a subject appropriate to present purposes

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
Terrestrial			
Bedrock geology			
Bedrock Geology	No	No	Purpose is to classify and map geologic formations
Tectonic Elements and Plutonic Belts	No	No	General description of regional tectonic history
Landform dynamics			
Collapsing Kame Terrace, Adams	No (B1)	Yes (A2, B)	What: Detailed measurement of a landform undergoing rapid change How: careful field mapping and fixing of elevations Where: SW Adams, White River watershed When,: Summer 1968. Who: Gary McKenzie Ref: McKenzie, G. 1969. Observations on a Collapsing Kame Terrace in GLBA, SE AK. J. Glaciology 8(54):413-425. Comments: Very well described and measured. Replicable. If the park were ever to get into monitoring the evolution of postglacial landforms, this would be a prime candidate
Casement& Burroughs Forelands Landforms	No (B1)	Yes (A2,B)	What: Detailed mapping of landforms How: aerial and foot recon; photos Where: Casement and Burroughs Glacier Forelands When: 1962-63; 1969-70 Who: Roy Welch, Robert Price, Dave Mickelson Refs: Welch, R. 1964. The Form and Origin of Landforms Produced During the Wastage of Casement Glacier, Alaska. M.S. Thesis, University of Oklahoma. Price, R. 1964. Land Forms Produced By Wastage of the Casement Glacier, Southeast Alaska. IPS Rept #9. Mickelson, D. 1971. Glacial Geology of the Burroughs Glacier Area, Southeastern Alaska. IPS Rept #40. Mickelson, D. M. and N. R. Ham (1995). Thirty years of glacier process studies at Burroughs Glacier, Wachusetts Inlet, Glacier Bay, Alaska. Proc. 3rd Glacier Bay Science Symp, 1993, Gustavus, Alaska, USNPS. Comments: Each of these studies produced detailed maps and photos of landforms which

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			could be monitored for changes over time. Mickleson (1993) pesents an important chronology of studies
Cave Inventory	No	No	What, where: Survey to locate caves/karst on "Little White Cap" mtn east of Dundas Who: Kevin Allred & Wayne Howell. mountain, Dundas. Ref: Report in: K:\Resource Mgmt\Cultural\Caves\Caves Report.doc
Interstadial Wood - Tree Ring Analyses	No	No	What, where: Purpose to reconstruct paleoclimate of glacier Bay How: analysis of tree rings Who: Dan Lawson. Ref: Lawson, D., G. Wiles, et al. (2005). A dendroclimatic record of paleoclimate of the last 10,000 years, Glacier Bay National Park and Preserve: 2005 Progress report. Hanover, New Hampshire, U.S. Army Cold Regions Research and Engineering Laboratory**:** 6 pp. Comments: baseline only in the most general sense.
Tidal Inlet Landslide	Yes (A2,B2)	PRIME (Aa, Ba)	What: history and present status of a rock mass poised to slip catastrophically and generate a giant wave, along with modeling of the likely wave. How: precise measurement and description of rock mass, with special reference to its size and exact position. Permanent GPS stations installed, allowing exact (to the cm) detection of incremental change in position. Where: Tidal Inlet, N shore When: First measurements made 2002; revisited at least once since then. Who: Gerald Weiszorek, Roman Motyka Ref: Weiczorek, G. et al. 2003. Preliminary Assessment of a Landslide-induced Wave Hazard: Tidal Inlet, GLBA, AK. USGS Open File Rept 03-100. Comments: The purpose of this work is to allow precise replication of measurements of the rock mass's behavior. And of course this is a critical management concern.
Isostatics/Tectonics			
Rapid Uplift of Southeast Alaska (*also includes* Tide Gauge Records of Uplift, Uplift and Seismicity)	Yes (A1,B2)	PRIME (Aa)	What: Ice unloading in Glacier Bay during Little Ice Age and subsequent landscape changes How: Precise GPS measurements of uplift rates; estimation of past rates by geomorph interpretation Where: Throughout park lowlands When: 1999-2004 Who: Chris Larsen, Roman Motyka

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			Ref: Larsen, C et al. 2004. Glacial isostatic Rebound Models for Rapid Uplift in Southeast Alaska. Geophys Inst, U Alaska. Powerpoint program and Abstract, 4th GB Science Symposium, Juneau. Also, Larsen's thesis is on his website. Comments: Most of this study is historical; however, the precise uplift measurements are highly replicable, even on a short timescale.
Gravity Measurements	No (B1)	Yes (A2,B)	What: Gravity measurements How: Portable gravimeter Where: Gustavus airport When: 1968-1988 Who: Dave Barnes Ref: Barnes, D. 1990. Gravity, gravity-change and other geophysical measurements in Glacier Bay National Park and Preserve. Second Glacier Bay Science Symposium, Glacier Bay National Park & Preserve, AK, U.S. National Park Service. Comments: Barnes says that the Gustavus measurements are the only ones in the park vicinity precise enough to detect decadal gravity changes, if any (none have been detected yet). (Gravity measurements are critical in sorting out isostacy from tectonics when interpreting uplift)
Plate Boundary Observatory at Cape Spencer	Yes (A2,B2)	Yes (A1,B)	What: Earthscope observatory installation to monitor plate boundary as part of global network How: Install precision GPS and strainmeter When: to be installed in 2006 and operated indefinitely Where: Cape Spencer Who: Michael Jackson, Kyle Bohnenstiehl, Ben Pauk Ref: Permit application in park electronic files Comments: An excellent monitoring subject
Fairweather Fault Monitoring – 1960's	No (1)	Yes? (A2?,B?)	What: Survey of landform changes and microearthquatke activity along fault trace How: site visit and seismograph recording When: June 1968. Where: East of Crillon Lake Who: Robert Page Refs: Page, R. The Fairweather Fault Ten Years After the Southeast Alaska EarthQuake of 1958. Unpublished report in Barco library Archives. Page, R. 1969. "The Fairweather fault ten years after the southeast Alaska earthquake of 1958." Seismological Society of America Bulletin 59(5): 1927-1936.

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			Comments: Observation site probably cannot be precisely relocated from printed descriptions & photos, and since scarp was cut into soil, traces of the fault would probably be very obscure. However, probably replicable record of microearthquake activity.
Fairweather Fault Monitoring – modern	Yes? (B2?)	Yes (A1,B)	What: lateral crustal motions relative to the Fairweather (and Chatham Strait) faults How: Precise GPS monitoring Where: Throughout park lowlands When: 1999-2004 Who: Chris Larsen, Roman Motyka, David Freymueller Ref: Larsen, C et al. 1994. Tectonics of Southeast Alaska. Geophys Inst, U of Alaska, Fairbanks. Powerpoint presentation at 4th GB Sci Symposium Comments: Precision work; definitely replicable. Note relationship to Jackson project, above
Glaciers			
Glacial Thinning	Yes (A1,B2)	PRIME (Ab)	What: precise documentation of the surface elevations of selected glaciers in the park to detect changes in their rates of ablation & accumulation. How: remote sensing from satellites and aircraft When: last several years & ongoing, with retrospective based on usgs topomaps Where: A series of glaciers around the park, including Muir, Casement, Margerie , Hopkins, Brady [and others]. Who: Keith Echelmeyer. Refs: Arendt, A., K. et al. 2002. Rapid wastage of Alaska glaciers and their contribution to rising sea level. Science 297:382-386. Comments: Data specific to Glacier Bay are "soon to be published" according to Etherington. This work is of the first importance as background to many sorts of drivers and changes in park ecosystems.
Glacier Change Photography	Yes (A1,B1)	PRIME (Aa,b)	What: Monitoring the position of glacier termini in the park] How: Establishment and reoccupation of ground-based photo stations; aerial photography When: 1926 – present Where: Many glaciers throughout park Who: W.O. Field & son, Austin Post, Bruce Molnia, David Harris, others. Refs: Field, W.O. Glacier Bay Ice Termini Photos & observations, 4 volumes many small reports in NPS Library Archives

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			Post, A. photo collection in his private library and USGS archives, Tacoma(?) Streveler, G & S. Brown. 1997. Recommendations for Continued Occupation of the W.O. Field Photostations. Icy Str. Env. Svcs. Rept to NPS Clague, J. & S. Evans. 1993. Historic Retreat of Grand pacific And Melbern Glaciers, St. Elias Mountains., Canada. J. Glaciology 39(133):619-624. Comments: Bruce Molnia has taken this project over; to my knowledge has not produced a report, but results are on a website.
Glacier Dynamics	No	No	What,where: History of glacial advance retreat in Glacier Bay during late Holocene Who: Dan Lawson; Cathy Connor, Greg Streveler Comments: not relevant to the present purposes
Glacier Mass Balance in relation to Climate and conditions at the terminus	No (B1)	PRIME (Aa,b,c)	What: Multivariate study of bathymetry, topography, climate and glacier mass balance. How: bringing together much existing data and collecting original data in Tarr and Muir Inlets on details of sediment flux and micro bathymetry. Where: Glaciated parts of park, with particular emphasis on Tarr & Muir Inlets When: 1990-1992 Who: Lewis Hunter, Ross Powell Ref: Hunter, L. 1994. Grounding-line Systems and Glacier Mass Balance of Modern Temperate Glaciers and their Effect on Glacier Stability. Ph.D. Thesis, Northern Illinois U. Hunter, L. E. and R. D. Powell (1995). Climatic controls on glacier mass balance in Glacier Bay National Park and Preserve, Alaska. Proceedings of theThird Glacier Bay Science Symposium, Glacier Bay National Park & Preserve, AK, U.S. National Park Service. Comments: synopsis of AAR positions over time is a very useful baseline complementary with the Echelmeyer work (see also comments in climate section).
Crillon Glacier Studies	No (B1)	Yes (A2, B)	What: Measurements of ice flow, air temperature, lake depths, frontal position How: flow rates by theodolite on fixed markers and ice frontal features; depths by direct soundings; temps by thermograph. Where: Crillon Lake vicinity When: 1933-34, 36; 1961. Who: Dick Goldthwait, Ian McKellar, Caspar Kronk, Brad Washburn Refs: Goldthwait, R. 1936 Crillon glacier Glacial motion sheets, graphs of motion and temperature thermograph sheets. Data in Barco Library archives. Goldthwait, R. et al. 1963. Fluctuations of Crillon Glacier System, Southeast Alaska. Int'l Assoc. Sci. Hydrol Bull. 8(1):62-74. (Manuscript in Barco library archives).

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			Comments: Methods well spelled out. The flow rates measured should, if summed, be comparable to measurements made today.
Relict Neoglacial Ice - Lituya	No	No	What: Investigated of a drunken forest How: Foot & aerial photo recon Where: near Fish Lake, Lituya When: 1973. Who: Austin Post & Greg Streveler Ref: Post, A. & G. Streveler. 1976. Tilted Forest: Glaicological-geologic Implications of Vegetated Neoglacial Ice at Lituya Bay, Alaska. Quaternary Research (6): 111-117. Comments: The itinerary and excavation site for ice is located reasonably precisely, as is the outer limit of drunken forest at that time. Replicable
Soils			
Soil Development & Chemistry	No (B1)	Yes (A2,B)	What: Soil development along the Glacier Bay (and outer coast) Chronosequence How: Soil description on surfaces of various ages When: over many years Where: Mostly along east side of Glacier Bay, but also on outer coast (Ugolini) Who: cast of thousands Refs: Crocker, R. & J. major. 1955. Soil Development in Relation to Vegetation and Surface Age at Glacier Bay, Alaska. J. Ecology 43:427-448. Ugolini, F. 1966. Soils. *in* Goldthwait, et. Soil Development and Ecological Succession In a Deglaciated Area of Muir Inlet, Alaska. IPS Rept #20. Ugolini, F & D. Mann. 1979. Biopedological Origin of Peatlands in Southeast Alaska. University of Washington. Ugolini, F. 1980. Soils. *In* Lituya Bay Environmental Survey, Streveler, Worley & Molnia, eds. NPS, Gustavus. Bormann, B. & R. Sidle. 1986. Changes in Productivity and Distribution of Nutrients in a Chronosequence at GLBA, Alaska. J. Ecol (78):561-78. Stottlemeyer, R. 1988. Effects of Ecosystem Succession on Soil and Streamwater Chemistry in Glacier Bay. *in* Proceedings of the Second Glacier Bay Science Symposium, Milner & Wood, eds. NPS, Anchorage. Hobbie, E. et al. 1993. A Stable Isotopic Investigation of Nitrogen Dynamics at Glacier Bay, Alaska. *in* Proceedings of the Third Glacier Bay Science Symposium ,

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			Engstrom, ed. NPS, Anchorage Fastie, C. 1994. Two Centuries of Primary Succession at Glacier Bay, Alaska: a Test of a Classic Glacial Retreat Chronosequence. Ph.D. Thesis. University of Alaska Chapin, F., et al. 1994. Mechanisms of Primary Plant Succession Following Deglaciation at Glacier Bay Alaska. Ecological Monographs 64 (2): 149-175. Comments: as a group, these works give a good picture of soil development, but the only ones whose work is located precisely enough (in the material available to me) to be approximately replicable are Ugolini (1966), Chapin, & Fastie. Ugolini (1980) may be, if the Weisbrod transects he used are relocatable.
Microbial Utilization of Salmon-derived Nutrients	No	No	What: Change in riparian microbial communities along chronosequence as a consequence of nutrient dynamics related in part to presence/absence of salmon How: Sample soils at one site each near mouths of 3 streams for biogeochemical and molecular analysis. When: 2006 Where: Wolf Point, Ice Valley and Berg Bay South creeks Who: Eran Hood, Scott Gende, Cory Cleveland Ref: project proposal in park electronic files Comments: intended as pilot study to inform a larger proposal to NSF
Plants			
Actinorhizal Rosaceae	No	No	What: Exploration of symbiosis between Dryas and commensal cyanobacteria Who: Van den Heuvel. Comments: not relevant in present context
Botrychium Collection	No	No	What: collections of the genus for park and elsewhere to work out systematics Who: Mary Stensvold, USFS Comments: not relevant in present context
Dry Bay Vegetation	Yes (B1)	Yes (A2, B)	What: Part of the GB landcover map effort (see below), with the addition of retrospective mapping. How: See landcover map, below; in addition, mapped from 1948 & 1966 photos using same protocols to make comparisons over that time period. When: 2004 Where: Preserve Who: Susan Klein did the mapping

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			Ref: The 1996 data is incorporated into the Park Landcover Map; earlier maps produced separately Comments: The coarse-grained, somewhat arbitrary (and mapper-specific) nature of community boundaries preclude use as baseline to detect minor change. Large change over time or space will be detected. Photos from ground-truthing are a valuable adjunct.
GLBA Plant Inventory	No	No	What: Vascular plant field inventory How: Directed site surveys Where: whole park When: 2001-03 Who: Rob Lipkin & crew Ref: Carlson, M & R. Lipkin. 2004. GLBA Vascular Plant Inventory; final technical report. ANHP, Anchorage. Comments: This is a key inventory reference, but does not lend itself to monitoring
Landcover Map	No (B1)	Yes (A2, B)	What: Map of plant communities How: Mapped from 1996 airphotos with ground-truthing to document species presence/abundance. Accurately located photos from ground-truthing. Where: In vegetated regions of park When: Field work, 2004 Who: Jess Grunblatt, Keith Boggs, several others (notably Susan Klein, the mapper from photos) and Koren Bosworth (taxonomy) Ref: Draft map produced as of 5/06. Comments: The coarse-grained, somewhat arbitrary (and mapper-specific) nature of community boundaries preclude use as baseline to detect minor change. Large change over time or space will be detected. Photos and notes from ground-truthing are a valuable adjunct.
Moss Colonization of the Walker Glacier	No	No	What: Survey level data in course of working on provenance of the Tat River "Iceman" Who: James Dickson. Comments: not relevant in present context
Permanent Quadrats at GB - Cooper	Yes (A2,B2)	Yes (A1,B)	What/where: total of nine $1m^2$ quadrats placed in Teacup Hbr vicinity (6) and on Island in Hugh Miller mouth (3). Hugh Miller quadrats expanded by Juday in 1991 to include a larger area for statistically valid monitoring of large woody plants. How: photography and mapping of plants in quadrat When: All monitored by Cooper through his 4th expedition in the late '30's. All but the two

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			at Hugh Miller subsequently lost (but possibly relocatable). Refs: Cooper, W. 1923. The Recent Ecological History of Glacier Bay, Alaska. (section III has plot locations Ecology 4: 93-128;223-246;355-365. Cooper, W. 1931. A Third Expedition to Glacier Bay, Alaska. Ecology 12: 61-95. Cooper, W. 1939. A fourth Expedition to Glacier Bay, Alaska. Ecol 20(2):130-155. Juday, G. et al. 1991. Ten Years of Successional Change on the Hugh Miller Inlet Plots. U Alaska Ag & Forest Expt Stn rept to NPS. Comments: These 9 plots are the longest monitored permanent quadrats of any sort in the region. Of great historical interest, being established by the "father" of the park, now all lost but two on an island in Hugh Miller Inlet (Is it possible that the others could be re-found?). Ian Worley most likely has the data from the interval 1941- 1975 (Lawrence's & Worley's data). Noble I believe did another occupation in the 1980's. Juday, Worley, Noble may have the post-Cooper data. Sue Hazlett may be working on this. On these, the Initially a small sample size (one square meter), has been greatly augmented by Juday's expansion. Given a prime ranking because I just had to based on the plots' longevity.
Permanent Vegetation Study Plots	Yes (A2,B2)	Yes (A2,B)	What: Variations in forest structure and history along the E shore of Glacier Bay and their historical/ecosystemic implications. How: 10ea 10ha areas used as study areas. 10ea 150m^2 plots sampled in each & permanently marked. Silvicultural measures made in each; cores from living and dead trees, among other, measures, used to reconstruct past stands and history of nutrient availability. Soil chemistry/structure documented Where: Ten localities from Bartlett Cove to Muir Inlet When: 1987-91; revisited in 1995-6; partially in 2004 - 2005 Refs:Fastie, C. 1994. Two Centuries of Primary Succession at Glacier Bay, Alaska: a Test of a Classic Glacial Retreat Chronosequence. Ph.D. Thesis. University of Alaska Fastie, C. 1995. Causes and Ecosystem Consequences of Multilpe Pathways of Primary Succession at Glacier Bay, Alaska. Ecology 76(6):1899-1916. Comments: Fastie's plots are marked with metal stakes. Great opportunity for add'l permanent plot establishment. Need to think how to compare with Carstensen/Noble and Eglitis/Schultz plot data.
Primula Biogeography	No	No	What: study looks at genetics of the genus over a broad geographic range, using small samples from GLBA Who :Guggisberg Comments: too cursory

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
Spruce Seedlings Survival	No	No	Seedlings from the Chapin/Fastie study, now all removed
Nitrogen Fixers in early Succession	No	Yes (A1,B)	What: mapping of nitrogen fixers on surfaces of two ages in comparison to soil parameters How: Plant mapping in circular plots along a transect along with soil description and chemistry. Where: N end of Wachusett Inelt When: Summer, 1991 Who: Steve Kohls, Don Lawrence Ref: Kohls, S. J. and D. B. Lawrence (1995). Nitrogen fixers in early primary succession on surfaces of two ages at Wachusett Inlet, Glacier Bay National Park and Preserve, Alaska. Third Glacier Bay Science Symposium, Glacier Bay National Park & Preserve, AK, U.S. National Park Service. Comments: Not a large study, but well described and executed. Site relocatable
Vegetation Mapping, Falls Creek	No (B1)	Yes (A2, B)	What: Plant community maps, inventory of notable species How: mapping from air photos with abundant ground truthing and plant identification Where: Lower Falls Creek watershed and vicinity, including parts of Gustavus and the park after the land trade. When: 1999-2000 Who: Koren Bosworth, Greg Streveler Refs: Bosworth, K & G.Streveler. 1999, 2001. Plant Communities, Rare or Sensitive Plant Species, and Wetlands of the Falls Creek Area. Icy Strait Env. Svcs. Repts to Gustavus Electric, Gustavus. Comments: Somewhat arbitrary (and mapper-specific) nature of mapped community boundaries preclude use as baseline to detect minor change. Large change over time or space will be detected; especially valuable given the changes wrought by hydro development.. Species list from the various communities gives baseline against which to compare arrivals of invasives and possible loss of rare/sensitives.
Plan Community Analysis – Dixon Harbor Area	No	No	What: classification and structure of plant communities How: Describe community types from visual impression; test types by ordination of species presence/abundance sampling of community types, using a protocol developed for this study. Where: Dixon habor – Torch Bay vicinity When: 1973-75 Who: Ian Worley, Greg Streveler Refs: Worley, I & G. Streveler. 1973. Plant Communities. *in* Dixon Harbor Biological

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			Survey: final report on the summer phase of 2003 research. Streveler, Worley, Terry, Gordon. NPS, Juneau. Worley, I & G. Streveler. 1975. Plant Community Analysis. . *in* Dixon Harbor Biological Survey: final report on the summer phase of 2004 research. Streveler & Worley, eds. NPS, Juneau. Worley, I. 1977. Plan Community Analysis. *in* Dixon Harbor Biological Survey: final report on the summer phase of 2005 research. Streveler & Worley, eds. NPS, Juneau. Comments: Thorough characterization, but not sufficiently tied to sites to replicate
Dryas studies	No(B1)	No? (A1?,B?)	What: nitrifiying effect of Dryas on surrounding vegetation How: series of obs & experiments on Dryas effects on growth rates of other plants, especially cottonwood. When: 1940's-1950's Where: bench between Goose and Nunatak Coves Who: Don Lawrence Ref: Lawrence, D. et al. 1967. The Role of *Dryas Drummondii* in Vegetational Development Following Ice Recession at Glacier Bay, with Special Reference to Nitrogen Fixation by Root Nodules. J. Ecol. 55:793-813 Comments: If plots relocatable, would allow revisitation of a number of cottonwood trees known since seedlings. Lewis Sharman has large packet of info about location of Lawrence "farm". behind Goose Cove.
Forest Community Responses to Bark Beetles	Yes (B1)	PRIME (Ac)	What: Documenting vegetational response to mortality of spruce dominants How: Established 100ea 1m^2 plots (for small scale features) & 9 ea 18m x 18m (for larger scale ones) When: Established in 1984; partially remapped & re-photographed in 1992 and 1997. Where: Lester, Young, Bartlett Cove, Bartlett River trail Who: Richard Carstensen, Mark Noble, Cathy Pohl Ref: Carstensen, R, et al. 1993. Forest Community Responses to the Bark Beetle Infestation at Glacier Bay, Alaska, 1984-1993. Unpublished ms in Streveler files. Comments: The 1997 data are unpublished. This work is meticulous and detailed; a very important adjunct to the USFS beetle effects work.
Mechanisms of Plant Succession	No (B1)	Yes (A1,B)	What: Sophisticated, multifaceted investigation of the relationships among seral dominants Where: along the classic east shore transect from Muir Inlet to Bartlett Cove. How: 4ea 2km^2 study areas, within each of which 10 intensive sites. Measured soil paramaters, radiation, life history & growth stage traits of dominants. Spruces & alders

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			planted in some experiments and later harvested. When: 1983-87; plantings harvest finished 2004 Who: Terry Chapin, Lars Walker, Chris Fastie, Lewis Sharman Ref: Chapin, F., et al. 1994. Mechanisms of Primary Plant Succession Following Deglaciation at Glacier Bay Alaska. Ecological Monographs 64 (2): 149-175. Comments: VERY IMPORTANT STUDY. Study areas relocatable. Soil measures, max plant height, max stem diameter replicable. Didn't give it a PRIME only because the replicable measures may not be of great interest.
Primary vs. Secondary Succession	No (B2)	No? (A2, B?)	What: Contains some data on nature of wave scar succession at Lituya. How: Verbal description and some quantitative data from a lowland site Where: Lituya Bay. When: 1977 Who: Don Lawrence Ref: Lawrence, D. 1979. Primary versus Secondary Succession at GLBA, SE Alaska. *In* proc. Of 1st Conf on Sci Res in the National Parks. New Orleans, LA. NPS, Washington, D.C. Comments: Based on one day's work. Study sites may have been permanently marked. This may be evident in Lawrence's field notes, which I think are at U Minn.
Eider Island Vegetation transect	No (B1)	Yes? (A2, B?)	What: Vegetation transect How: belt transect from top of island to lower limit of plants; transect marked by iron stakes Where: Eider Island, Beardslee Entrance When: about 1970 Who: Cliff Estabrook, seasonal ranger/nat Ref: Should be report and data in Estabrook's notes; haven't found Comments: If this work is still around, and if the stakes are still there, this would be a valuable though limited baseline against which to measure, for instance, the progress of invasive species. My recollection is that Estabrook had study sites also in the upper Beardslee islets N of Forxfarm Island and maybe also on what is now called Boulder Island (formerly Ascention Island).
Birds			
Bald Eagle Movement	No (B1)	No (A1)	What: Monitored eagle movements How: Tracked movements of 20 Adult and fledgeling eagles by satellite and conventional

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			telemetry. When: 1991-1993. Where: Eagles tagged in Glacier Bay; tracked within park and as far away as Haines and Prince Rupert. Who: Mary Kralovek Ref: Kralovek, M. 1994? Bald Eagle Movements In and From GLBA, Alaska. Virgina Poly, Blacksburg, VA. Comments: Reasonably good sample size and range of ages. If replicated by capture from the same general areas, should be fair inedicators of changes in eagle movement patterns.
Bald Eagle Nest Monitoring	Yes (A1,B1)	PRIME (Ab,Ba)	What: Eagle Nest location & productivity surveys How: Systematic vessel surveys from offshore, mostly from vessels, though Robards also used helicopter. All surveys enumerated active and inactive nests; most also recorded presence of eaglets and other immatures as indices of productivity. Where: Glacier Bay When: 1966 – 2002. Who: Mary Kralovek & other NPS (Bren Harrington, Jeff Mow, Steve Prather, Hank Lentfer, Annie Farrris); Fred Robards, Stanley Cain & other FWS Refs: Robards, F & J. King. 1966. Nesting and Productivity of Bald Eagles, Southeast Alaska – 1966. Bureau of Sport Fisheries & Wildlife, Juneau. Wik, O. 1971 field notes, containing survey of eagle nests in Glacier Bay. NPS, Gustavus. (I haven't found these). Cain, S. 1982. Eagle Population an dNest Survey of glacier Bay – Trip Report. USFWS, Juneau. Jones-Toscano, E et al. 1983. Eagle Nest Survey, GLBA. NPS, Gustavus. Harrington, b. 1975. Eagle Count. NPS, Gustavus. (Nest mlocation map apparently lost, but productivity data in report). Lentfer, H. & A. Meier. 1989. Survey of the 1989 Breeding Bald Eagle Population in the Beardslee Islands in GLBA, Alaska. NPS/RM, Gustavus. Mow, J. 1989. Bald Eagle Report – 1989. NPS, Gustavus (Also made annotations to Cain survey made as result of ranger obs.) Farris, A. 1990. 1990. Survey of the 1990 Breeding Bald Eagle population in the Beardslee Islands in Glacier Bay, Alaska. NPS, SCA Volunteer. Kralovek, M. 1989. Bald Eagle Nest Tree Survey and Database. NPS K/eco-data. Kralovek, M. 2002. Bald Eagle Productivity and Nest Distribution and

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			Characteristics in GLBA, 1994-2002. Abstract, 4th GB Science Symposium, Juneau. (Couldn't find other survey that has been done by NPS, (by Bren Harrington) Comments: The Robards survey was reasonably thorough. The Cain survey was very thorough and made moreso by ranger work in '89. Mow & Jones surveyed subset of nests. The Beardslees, especially, have been repetitively and thoroughly surveyed; these data especially are quite replicable.
Diversity and Relative Abundance of Songbirds	No	No? (A1?,B?)	What: breeding landbird surveys; in 1997, also include woody vegetation sampling. How: Standard breeding bird survey protocols (listening/viewing stations along transects); all woody stems enumerated in 20 5m circular plots along each census transect. Whan: 1997-98 Where: Upland vegetation of Wachusett, Adams, Mid-Lower Muir & Bartlett Cove, to illustrate a successional sequence (1997); Riparian vegetation to test for bird differences along salmon vs. non-salmon streams, Geikie, Fingers, Spokane (1998). Who: Mary Willson, Scott Gende, Jeff Nichols Ref: Willson, M. F. and S. M. Gende (1998). Breeding landbird survey, midbay region, GBNPP, U.S. National Park Service, Glacier Bay National Park and Preserve**:** 12 pp. Willson, M. F. and J. V. Nichols (1997). Breeding landbird survey, East Arm, Glacier Bay, U.S. National Park Service, Glacier Bay National Park and Preserve**:** 25 pp. Comments: Methods reasonably clear, location of study transects and sample sites are rather approximate in literature available, but may be better in investigator files. Brief but rigorous. Possibly reliable for baselines; in concert with Trautman, Spackman, and especially Saracco they provide a reasonable picture that could be duplicated in a larger sense.
Goshawk Habitat	No	No	Who: Mary Kralovek. Comments : study never happened
Landbird Abundance, Community Composition	No? (A1)	No? (A1?,B)	What: Bird abundance and community composition related to variables in lowland coastal forest habitats. How:57 variable circular plot point bird counts conducted along 10 transects selected by stratified random sampling; vegetative community composition and physiognomy measured along perpendicular transects centered on each point. Where: Transects scattered through bay and Excursion Ridge When: June 2004 Who: Jim Saracco, Scott Gende Comments: Methods rigorous and repeatable, but data rather thin. Was the inception of a

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			proposed larger study.
Landbirds in Riparian Vegetation	No (B1)	Yes (A1,B)	What: Bird species richness and abundance in relation to riparian plant communities along the American portions of trans-mountain rivers in SE Alaska How: Stratified random sampling of vegetation; point counts of birds using USFWS protocols Where: Major rivers, including the Alsek in GLBA When: Summer 2005? Who: Jim Johnson, Bob Christensen Ref: Johnson, J. 2005. Relationship between Breeding Bird Communities and Riparian Vegetation of Southeast Alaska. Powerpoint program supplied by Bob Christensen Comments: Data for plant community structure and bird distribution/abundance highly replicable. Sample sites are GPS'd
Burroughs Songbird survey	No	No	What: Brief survey of passerines How: 4 hr foot survey in 3 sample areas Where: Burroughs Glacier Forelands When, July 1991 Who: Susan Spackman Ref: Spackman, S. 1991. Distribution of Passerines along a 50 year Chronosequence in Glacier Bay, Alaska. (*Streveler files*) Comments: brief but rigorous. Transect approximately relocatable. One of our only bird studies from this critically shrinking habitat (But see Willson & Gende, above)
Outer Coast Upland Bird Surveys	No (B1)	Yes? (A1,B?)	What: Survey of avifauna How: General observation; occupation of 5ea. 500m transects 9 times, during which birds recorded according to a standard protocol at 50 m intervals & vegetation described Where: Dixon Harbor vicinity. Justice Creek to Topsy Creek; Lituya Bay. When: summer, 1974; early summer, 1976-77. Who: Sam Patten, Dick Weisbrod Ref: Patten, S. 1974. Birds. *In* Dixon Harbor Biological Survey, Streveler & Worley, eds. NPS, Gustavus. Weisbrod, A. 1980. Birds. *In* Lituya Bay Environmental Survey, Streveler, Worley & Molnia, eds. NPS, Gustavus. Comments: These are the most comprehensive and rigorous of several bird studies associated with the Dixon harbor & Lituya work. Nothing related to terrestrial birds is replicable at Dixon Harbor. The Lituya transects <u>may</u> be precisely relocatable, as their bases

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			were marked with permanent metal tags and related to mining claim boundaries. Methodology is well described and quite similar to modern FWS nation-wide survey protocols.
Marbled Murrelet Dawn Watches	No	No	What, Where: Surveys of murrelet nesting behavior at Bartlett Cove How: standard protocols Who: Rusty Yerxa, Judy Rice Refs: Rice, J. 1996. Marbled Murrelet Assessment for the Bartlett Cove Visitor Experience Enhancement and Opportunity Expansion. NPS, Denver. Yerxa, R. 1999. Report on Marbled Murrelet Dawn Watches Conducted July 18-20, 1999, at Bartlett Cove, GLBA, Alaska. NPS/RM, Gustavus Comments: Yerxa utilized some of the same sites, and the same established protocol used by Rice; the results are comparable, but based on scanty overlapping data (4 stations, 1-2 occupations). Purposes of work were to provide opportunity for a visitor activity and to assess potential road improvement impacts, not to provide a monitoring baseline. Also, most sites monitored have been subsequently altered by development.
Birds of the Falls Creek Area	No	No	What: Generally qualitative survey of upland birds; assessment of Murrelet nesting habitat and use How: keeping of general notes; directed survey of habitat potential and use along road route, using standard protocols. Where: Falls creek development area When: 1999-2000 Who: Hank Lentfer, Greg Streveler Refs: Lentfer, H. & G. Streveler. 1999. Birds of the Falls Creek Area. Icy Strait Env. Svcs. Rept to Gustavus Electric, Gustavus. Comments: Murrelet work replicable in theory, but most of area now disturbed or erased by construction.
Molting goose surveys	No	No	What, how: Counting & banding of molting geese Where: Adams, predominantly, but also elsewhere, such as in Weird Bay Who: USFWS banding effort in Adams in early ‘60’s by FWS and proceeding with counts by NPS over the years; also see Calambokidis. Refs: Robards, F. 1960. Construction of a Portable Goose trap. J. Wildl. Mgt. 24(3):329-331. (Some GB data, but I can’t find the main FWS report) Calambokidis, J. 1983. Biology and Behavior of Molting Canada geese in Glacier Bay, Alaska. Cascade Research collective, Olympia.

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			Taylor, M. 1984. Survey of Molting Canada Geese in Adams Inlet. NPS, Gustavus. Comments: This work has seriously lapsed, despite the possibility that Glacier Bay may remain one of the major molting grounds in SE. There are numerous counts from Adams, especially, in staff field notes (if these still exist).
Muir Inlet Upland Birds – 1960's	No (A1,B1)	No? (A1?,B?)	What: Bird distribution and abundance How: Numerous observations by 3 good observers. In case of Trautman, semi-rigorous reoccupation of a series of upland stations in various lowland habitats Where: eastern Muir Inlet When: summer, 1962-1967 Refs: Wik, O. 1967. Birds of Glacier Bay National Monument. NPS, Gustavus. Trautman, M. 1966. Birds *in* Goldthwait, et. Soil Development and Ecological Succession In a Deglaciated Area of Muir Inlet, Alaska. IPS Rept #20. Welch, R. 1965. Ecological Observations in the Muir Inlet Area, GLBA, Alaska. IPS Rept #15. Comments: The volume of observations, antiquity, and number of years involved make this record of considerable interest if not directly replicable. Trautman's major transect from Casement to Muir Point is grossly reoccupiable and is the closest thing to rigor on upland birds from that period.
Mammals			
Bear Activity and Habitat Assessment	Yes (A1,B1)	Yes (A2,B)	What: Assessment of bear habitrat and activity levels in areas of management concern; constructing a history of bear-human interactions How: Activity assessed by reading of sign, video camera installation, and hair traps. Habitat quality assessed by veg plots, scat analysis, plant nutrient analysis and isotopic analysis of hair. Spacio-temporal history constructed from park database Where: Eight areas of management concern along central and upper Glacier Bay, chosen due to suspected high human and bear use, long term camping closure areas, and/or high numbers of historical bear-human conflicts. Who: Tania Lewis, Steve Partridge, Tom Smith. When 2000-2005, repeated visits June-August Refs: Lewis, T. Bear Activity and Habitat Assessment Project; 2004 Progress Report. NPS/RM, Gustavus. Lewis, T. 2006. Bear Activity and Habitat Assessment Project 2005 Progress

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			Report. NPS/RM, Gustavus. (Final report in prep by Steve Partridge). Comments: Purpose is to inform park management decisions by quantifying habitat and activity levels in areas of concern, including Sandy Cove and Tarr Inlet camping closures. Some aspects, such as habitat mapping and sign distribution, are sufficiently precise that they could provide a general baseline if applied to larger areas rather than individual sites. Having said that, the site photos and vegetation plots are relocatable; the latter should be considered along with other relocatable veg plots (e.g., Cooper, Fastie, Gurnblatt) as a fabric of potential monitoring opportunities.
Bear Sightings and Incidents	No	No	What: RM database on bear sightings and incidents How: opportunistic (some, such as obs from tourboat are somewhat systematic) When: Going back to before the 1960's Where: Throughout park Who: anyone, but mainly park staff. Comments: Give very general insight into changes over time. Some of the synopses based on these data (see bear impact study for examples) sharpen the patterns. Can be considered monitoring in the context of such studies, but not stand-alone.
Moose Population Assessment	Yes (A1, B2)	PRIME (Aa, Ba)	What: Management background research on population dynamics, body condition, browse condition, and movements of moose How: coordinated fabric of aerial surveys checked by mark/recapture, direct measurement of body fat, analysis of reproductive tracts of hunted animals, monitoring of browse consumption on willow transects and plots, direct observation of food preferences, exclosures, tracking of GPS-tagged cows Where: on the Gustavus forelands and vicinity When: Surveys since the late "80's; intensive science since about 2000. Who: Kevin White, Neil Barten Refs: Barten, N. et al. 2002. Strategic Plan for Management of Moose on Gustavus Forelands, Unit 1(c), 2001-2005. AFG, Juneau. White, K et al. 2004. Effects of food-limitation on an Irruptive, High-density Moose Population in the Gustavus Forelands, Alaska. Abstract, 4th GB Science Symposium, Juneau. White, K. 2006. Powerpoint presentation provided by investigator Comments: Disciplined work. Willow mensuration data from permanent plots and transects highly repeatable, as are body condition indices; population censuses (within loose confidence limits, requiring mark/"recapture" of tagged animals) repeatable, especially as

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			index for total herd size (herd composition less so).
Patterns of Nest Predation by Red Squirrels	No	No	Who: Willson, Gende Comments: Study didn't happen here, though one in Juneau area is similar
Water Shrew Taxonomic Status	No	No	Who: Olson. Comments: Didn't catch any water shrews
Bear surveys, Falls Creek shore	Yes (B1)	Yes (A2,B)	What: Spring Black Bear (and other mammal) use of the shore zone How: Direct observation and track analysis Where: Super habitat NW of Falls Creek mouth, When: 1997-1999 Who: Greg Streveler Refs: Streveler, G. 1997,1998. Bear and Other Wildlife Usage of the Falls Creek Vicinity, spring 1997-98. Icy Strait Env. Svcs. Repts to Gustavus Electric, Gustavus. Lentfer, H. & G. Streveler. 1999. Mammals of the Falls Creek Area, may-september 1999. Icy Strait Env. Svcs. Rept to Gustavus Electric, Gustavus. Comments: Track analysis and # individuals seen provides a good 3-year index to bear use along that shore.
Endicott Gap Large Mammal Survey	No	No	What: General survey of large mammal distribution & abundance, with particular reference to trans-boundary movements How: sign analysis, sightings Where: Endicott Gap area When: late 1970's Who: Greg Streveler, Leigh Smith. Ref: Streveler, G. P. and L. Smith (1987). Endicott Gap large mammal survey, U.S. National Park Service, Glacier Bay National Park and Preserve**:** 13 pp. Comments:. Ballpark estimate of population sizes and movement patterns based on reading sign. Not intended to be replicable, and it ain't
Brown Bears of the upper West Arm	No(B1)	Yes (A1,B)	What: Habitat descriptions, estimate of the abundance of brownies Where: The Tarr/Hopkins area How: Scat collection and analysis, sign interpretation; track size analysis; direct obs When: summer, 1988 1989, 1991 Who: Janet Warburton, David Wolfe Refs: Warburton, J. 1988. A background Survey of the Distribution, Abundance & Habitats of Brown Bears in the West Arm of Glacier Bay. NPS/RM

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			Wolfe, D. 1989. Brown Bears of the Upper West Arm of Glacier Bay: Shoreline numbers, Movement patterns and Habitat Usage. NPS/RM Duncan, T. & L. Climo. 1991. Brown Bear Use of Beacher in the West Arm Closure Area, GLBA, in 1991. NPS/RM Comments: Warburton methods not sufficiently constrained to be replicable. Did as good a job as is possible with track analysis. Result treated statistically. Protocols described well. Replicable, and would be a useful extension of baseline of later studies. Duncan's work more cursory, but track analysis directly comparable to first two studies. Overall, this work provides a reasonably repeatable view of bear populations in this area.
Dixon Harbor Large Mammal Survey	No	Yes (A2,B)	What: Survey of mammals weasel sized & up How: Observation, track & scat analysis Where: Dixon Harbor – Torch Bay vicinity When: 1973-75; 1991 Who: Greg Streveler, Lewis Sharman, Hank Lentfer Refs: Streveler, G. 1973. Larger Mammals. *in* Dixon Harbor Biological Survey: final report on the summer phase of 2003 research. Streveler, Worley, Terry, Gordon. NPS, Juneau. Streveler. 1975. Larger Mammals. *in* Dixon Harbor Biological Survey: final report on the summer phase of 2004 research. Streveler & Worley, eds. NPS, Juneau. Streveler, G. 1977. Larger Mammals. *in* Dixon Harbor Biological Survey: final report on the summer phase of 2005 research. Streveler & Worley, eds. NPS, Juneau. Sharman, L & H. Lentfer. 1991. 1991Dixon Harbor Biological Survey. NPS, Gustavus. Comments: Most material too qualitative to repeat. However, for Brown bears, wolves and goats, the population estimates, derived over three years for a small number of individuals (and in the case of wolves, corroborated by Home's winter work) are pretty reliable. Sharman's & Lentfer's work provides good comparisons for wolves and brown bears, but not goats. They make many comparisons of behavior, distribution and diet of these and other species that allow at least general conclusions about decadal changes in cases where such changes have been substantial.
Wolf Pack Ecology/Sensitivity	No (A1)	Yes? (A2?, B)	What: Detailed snapshot of one wolf pack's use of Adams Inlet How: Extensive foot travel along wolf use routes, observation of wolves, field analysis of scats. Where: South half of Adams Inlet watershed

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			When, July 1993 Who: Brad Meiklejohn Ref: Meiklejohn, B. 1993. Ecology and Sensitivity to Human Disturbance of a Wolf Pack at GLBA< Alaska. U. Vermont Field Naturalist Program Report. Comments: Our only coherent data on wolves in the Glacier Bay watershed. Parts of the work are replicable if a pack should set up again in the same area: these include the sketch of the diet and the general use patterns.
Mountain Goat Surveys	No(B1)	PRIME (Bd)	What: Survey of most vegetated alpine, from timberline to 4000 ft How: 1983, snowshoe survey; 1985, systematic survey via helicopter per ADF&G protocol Where: 1983, Adams; 1985, Glacier Bay watershed & adjacent parts of Excursion area When: March, 1983; July 8-14, 1985 Who: Gary Vequist, Layne Adams Refs: Vequist, G. 1983. Population Changes of Mountain Goats in Adams Inlet. Report in BarCo library. Adams, L. & G. Vequist. 1986. Mountain Goat Survey, GLBA, 1985. NPS Nat Resource & Inventory Report. AR 86-03. Comments: 1985 work highly replicable. All data given in detail; each sighting mapped. Used protocols that allow direct comparison with ADF&G data from adjacent areas. 1983 report gives figures for Adams going back to 1968, for valleys that today have few or no goats in them.
Wolf predation on Mountain Goats	No(A1)	No? (A2?,B)	What: Analysis of several hundred wolf scats Where: from park (mostly outer coast) and elsewhere How: analysis done by eyeball in field for most part When: late ‘70’s & early ‘80’s Who: Joe Fox, Greg Streveler Ref: Fox, J. & G. Streveler. 1986. Wolf Predation on Mountain Goats in SE Alaska. J. Mamm. 67(1):192-195. Comments: paints a picture of wolf food habits that is replicable only in a gross sense; minor dietary items could have been missed.
Moose Survey, Adams Inlet	No(B1)	Yes (A2, B)	What: History of Moose in Adams, notably including description of surveys How: Aerial surveys, Protocol described reasonably well. Gives data from Adams Island, which was totally censused. Where: Adams Inlet watershed. When: Late winter 1984,85,86.

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			Who: Gary Vequist Ref: Vequist, G. 1986. Colonization of Post-glacial Plant Communities by Moose in Adams Inlet, GLBA. Paper given at Interagency Moose Conference, Anchorage, March 1986. NPS/RM Comments: I once saw a copy of Gary's flight-lines in the files. If that still exists, the entire survey would be replicable; if not, then at least the survey of Adams Island remains so.
Space/habitat use by moose in relation to OHV's	No	No	What: How do OHV trails and use affect moose distribution & habitat use How: compared 9,752 collared moose locations with trail distribution with and without heavy OHV use. Where: Forelands outside preserve to the northwest When: data from 2003-04 Who: Sanjay Pyare & Winston Smith Refs: Pyare, S & W. Smith. 2005. Space use and habitat Use by Moose in Relation to OHV routes on the Yakutat Forelands: preliminary results of a GIS-Based analysis conducted for th US Forest Service. Comments: Not directly relevant to park, except that some collared moose also had locations the preserve.
Moose Effects on Soil Nutrient Dynamics	No	No	What: Soil differences in browsed and unbrowsed willow thickets How: Soil assays in ADF&G browse monitoring sites and exclosures (two sets of paired plots) Where: Gustavus When: 2004 Who: Eran Hood, Amy Miller, Kevin White Ref: Hood, E. et al. 2004. Effects of Moose Foraging on Soil Nutrients in the Gustavus Forelands, Alaska. Abstract, 4th GB Science Symposium, Juneau. Comments: Reconniassance level study with not enough replicates to be considered a baseline.
Small mammal studies (mice, voles, shrews)	No	Yes? (A1,B?)	What: Survey of mammals on East side of Muir Inlet, the lower outer coast, the Beardslee and Sandy Cove Islands & associated mainland. How: generally based on trapping, with varying degrees of rigor Where, when: various park localities & times Who: Gene Good, Carol Terry, Cliff Estabrook, Bea VanHorne, Steve Antell Refs: Good, E. 1966. Mammals. *in* Goldthwait, et. Soil Development and Ecological

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			Succession In a Deglaciated Area of Muir Inlet, Alaska. IPS Rept #20. Estabrook. C. 1968. Summary of Small mmmals Collected during 1968 Summer Season, GLBA. Seasonal Ranger Report Terry, C. 1977. Small Mammals *in* Dixon Harbor Biological Survey; final report on the summer phase of 1975 research. Streveler & Worley, eds, NPS, Juneau (she also produced a Ph.D thesis from the U Kansas) Van Horne, B. 1977. Small Mammal Populations in Glacier Bay, Alaska; summary of results for summer, 1976. Draft report, Oregon State U. Terry, C. 1980. Small Mammals *in* Lituya Bay Environmental Survey. Streveler, Worley, & Molnia, eds. NPS, Juneau Terry, C. 1981. Population Fluctuation in the Arvicolidae (Rodentia) and their relationships to "microtine cycles". Ph.D. Thesis, U. Kansas. Antell, S 1987. Systematics and Zoogeography of Mammals in S. E. Alaska. Ph.D. Dissertation, Washington State U. Comments: Study by Terry in the Dixon harbor area is particularly thorough, being based on 3 years' data and related to approximately relocatable sites; it is replicable in a general sense. The other studies cannot be considered replicable, though they give very interesting insights into the small mammals of their respective areas. Antell's work is based mostly on reviewing specimens of Terry's.
Amphibians			
Western Toad Inventory	No (B1)	Yes? (A2?,B)	What: Toad survey of four areas in park. How: Foot survey, filling out forms on potential habitat for 19 ponds Where: Taylor-Dundas lowland, Ripple cove moraine, lower Bartlett River, When: June, 2004 Who: Richard Carstensen, Bob Christensen, Cheryl Van Dyke,Pyare Refs: Carstensen, R. 2004. Summary Thoughts on Glacier Bay Toad Survey, 6/04. Notes to NPS Christensen, B. 2004. Monitoring Western Toad Populations in GLBA. Abstract, 4th GB Science Symposium, Juneau. Comments: Small sample of the park, but searched systematically for presence/absence and gross abundance.
Opportunistic amphibian survey	No	No	What/how: Collection of amphibian distribution/abundance records from GLBA &

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			environs. When: principally 2001-03, but also looking at historical records Who: Blain Anderson. Refs: Anderson, B. 2004. an Opportunistic Survey of Amphibians in Alaska's National Parks. NPS, Anchorage Anderson, B. 2004. An Opportunistic Amphibian Inventory of Alaska's National Parks, 20001-03. Abstract, 4th GB Science Symposium, Juneau. Comments: Compilation of records; not intended to be replicable, but a valuable compendium of records as adjunct to the Carstensen study (see above).
Boareal Toad as a Successional Animal	No	No	What: Ecological characterization, with particular reference to habitat selection and dispersal capability. How: general observation and some experimentation on tolerance to salt water. Where: Glacier Bay watershed When: 1981-82. Ref: Taylor, M. 1983. The Boreal Toad as a Successional Animal in Glacier Bay, Alaska. M.S. Thesis, U Cal Hayward. Comments: Many interesting qualitative observations, useful for presence/absence and rough abundance in a number of generally described localities, but not useful for quantification.
Invertebrates			
Spruce Beetle Effects	Yes (B1)	PRIME (Aa)	What: Monitoring progress of beetle infestation in terms of tree mortality and changes in stand structure & understory composition. How: fourty five 1/5 acre permanent plots in lower GB, within which many silvicultural and beetle density measures made. When: Work begun 1982; revisits yearly until 1988, then 1992 & 1998. Revisited in 04, 05; GPS'd then. Refs: Eglitis, A. 1982. Biological Evaluation R10-82-1, Spruce Beetle, GLBA. USFS, Anchorage. Eglitis, A. 1988. Spruce Beetle in GLBA: 1987 update. USFS Forest Pest Mgt. Rept. R10-89-1. Schultz, M. 2001. Changing Forest Structure & Composition in GLBA long-term Spruce Beetle Mortality Plots. USFA Biological Eval. R10-TP-93.

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			Schultz, M. 2004. Spruce Beetle and Forest Structure in GLBA: Results from long term plots. Abstract. 4th GB Science Symposium, Juneau. Comments: Especially in conjunction with Carstensen/Noble's work (see above, in "plants" section") this forms an extremely important baseline. As in many cases, need to get plot location data from investigators.
Insects along Muir Inlet Chronosequence	No	No	What: Insect survey How: general collecting When: 1965 Where: along Muir Inlet Who: David DeLong Ref: DeLong, D. 1966. *in* Goldthwait, et. Soil Development and Ecological Succession In a Deglaciated Area of Muir Inlet, Alaska. IPS Rept #20. Comments: Our earliest and still broadest & most detailed study of terrestrial insects (but also see Mann, below, from the outer coast), but unfortunately not keyed to relocatable sites
Ice worm ecology/physiology	No	No	What: Iceworm distribution, behavior, physiology, food habits. How: Disciplined observation and measurement of rel. densities on well-located spots on & near glacier. Densities on one quadrat observed quantitatively over time of day Where: Casement Glacier When: Summer 1967 Who: Dan Goodman Ref: Goodman, D. 1971. Ecological Investigation of Ice Worms on Casement Glacier, SE Alaska. Inst. Polar Studies Rept #39. Comment: If the glacier weren't changing so rapidly, some of the density measurements would be replicable. Perhaps the most useful thing is his delimitation of places on the glacier where iceworms were noted; these could be checked to see if the worms are still there, but the answer is probably trivial, as they will eventually be below the firn line.
Outer Coast Insects& Spiders	No	No	What: surveys of Carabid beetles and spiders. How: general collecting; pit traps When: 1977-1981 Where: Lituya Forelands Who: Dan Mann Refs: Mann, D. 1980. Terrestrial Arthropods. *In* Lituya Bay Environmental Survey, Streveler, Worley & Molnia eds. NPS, Gustavus Mann, D. 1983. The Quaternary History of the Lituya Glacial Refugium, Alaska.

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			Ph.D. Thesis, University of Washington. Comments: Our only information on terrestrial inverts for the outer coast, but not designed to be replicable.
General (Incl ecology/succession)			
Johns Hopkins Inlet Landslide	No	No	Documentation of a single mass wasting event by a park visitor
Park and Wilderness Boundaries	No	No	A map exercise
Vegetation & Wildlife of Gustavus	No	Yes (A2, B)	What: surveys of birds and mammals along Gustavus shores; general assessment of wildlife/habitat relationships; observations of crane numbers & habitat use during fall migration; detailed vegetation mapping; mapping of human trails, streams and ditches. How: Repeated foot surveys along shore at low and high tide, using standard routes relative to the tide. Fall counts of cranes and their habitat selection. Where: All of Gustavus, with special attention to the Critical Habitat Area When: fall/winter 1981-81; fall 1982; summer/fall 2002-03 Who: Greg Streveler, Craig matkin, Judy Brakel Ref: Streveler, G. & C. Matkin. 1983. A preliminary Eavaluation of Wildlife Populations & Habitats on Gustavus Beaches and Dude Creek Uplands. Gulf Coast Oceanic Society, Gustavus, Rept to ADF&G. Streveler et al. 2003. Gustavus Plant Communities: their Composition, History and Use by Fish, Wildlife and People. Icy Strait Env. Svcs. rept to The Nature Conservancy, Gustavus. Streveler et al. Sandhill Crane Use of the Dude Creek CHA During Fall Migration. Icy Strait Env Svcs rept to ADF&G, Gustavus. Comments: Protocols generally well described. Crane counts and beach surveys systematic but not structured to allow calculation of confidence limits. Veg, stream/ditch and trail mapping is constrained by reference to many natural landmarks; these are the most replicable parts of this work.
Biological Inventory of Selected NPS & Adjacent Lands	No	No	What, how: General Biological inventory Where: non-marine portions of the Bartlett Cove, Gustavus and Indian Point vicinities When: 1995 Who: Greg Streveler, Bruce Paige, Koren Bosworth.

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			Ref: Streveler, G et al. 1995. Biological Inventory of Selected Portions of the Bartlett Cove, Gustavus and Indian Point Areas, Southeast Alaska. Icy Strait Env. Svcs rept to NPS, Denver. Comments: General synopsis of vegetation & vertebrates of these areas.
Winter Birds & Mammals, Dixon Harbor	No	No	What: Presence, general abundance and habits of Birds and Mammals How: Daily observation Where: Dixon harbor vicinity When: Nov 1993 – March 1994, November 1994 – May 1995 Who: Scott (Sappington) Home Ref: Home, W. 1977. Ecology of Overwintering Mammals and Birds on the Pacific Coast of GLBA, Alaska. University of Alaska, Fairbanks rept to NPS Comments: Observations, though protracted and careful, are not carried out in ways that allow replication. However, they do provide good estimates for the numbers and activity patterns of certain species, notably canids and birds generally in Thistle Cove vicinity.
Impacts			
Camper Impacts	No (B1)	Yes (A2,B)	What: Survey of campsite areas to determine relative degree of degradation from a social point of view How: Chose areas most frequented by campers; developed a protocol for measuring detractions from wilderness character. (Attempted but largely abandoned quantification of ecological impacts) When: 2001-2002 Where: Throughout Glacier Bay Who: Tania Lewis & Nat Drumheller Ref: Smith, et al. 2002? Bear-Human Interactions at GLBA: Conflict Risk Assessment. USGS/NPS, Anchorage. Lewis, T & N. Drumheller. 2003. Wilderness Camp Impacts: Assessing Human Impacts On the Shoreline of Glacier Bay. Draft Final Rept, NPS/RM. Lewis, T, et al. 2004. Wilderness Camping in Glacier Bay: assessing human Impacts to Shoreline habitat. Abstract, 4th GB Science Symposium, Juneau. Comments: Sample sites located precisely in park database; protocols spelled out well and avoid observer-specific judgements to a large degree. Should be replicable; site photos are especially useful. In many sites, vegetative conditions will rapidly alter the site

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			configuration & desirability; thus site-specific comparisons will have to be made in the short term. However, overall campsite conditions could be compared over time.
Dry Bay ATV Impacted Wetlands Inventory	No (B1)	Yes (A2,B)	What: Inventory of ATV effects on wetlands How: 40 GPS's point locations where trails cross wetlands photographed, veg sampled in 30 m plots, soil examined Where: Dry Bay When: 2006 Who: Bud Rice Comments: No report yet, but based on conversation with Bill E, sounds like replicable work; point photos especially useful.
Off Highway Vehicle Tracks Inventory	Yes (A1,B1)	Yes (A2,B)	What: GIS layer mapping ATV tracks How: plotting them to ~3m accuracy from air photos with ground truthing When: 2001-03-06 Where: Dry Bay Who: Bill Eichenlaub Comments: Precise work that is highly replicable
Exotic Plant Inventory & Control-GLBA	Yes (A2,B2)	Yes (A2,B)	What: Invasive plant surveys and limited eradication How: Systematically and opportunistically searched for invasives; eradicated where practicable; described and delimited all exotic patches by GPS with sufficient accuracy to detect annual changes. When: 2003 - ongoing Where: Focused on the Bartlett Cove area with secondary emphasis on Dry Bay & the Beardselee Islands; and visits to other sites included Dundas Bay, Berg-Fingers, the West Arm, and mid-bay islands. Who: Jeff Heys, Whitney Rapp Refs: Heys, J. & C. McKee. 2004. Exotic Plant Survey of GLBA: Summer 20004 Field Season Report. NPS/RO & USGS/BRD Rapp, W. 2005. Invasive Plant Management in GLBA, Gustavus AK: Summer 2005 Field Season Report. NPS/RM.
Man-made disturbances inventory	No (B1)	Yes (A2,B)	What/how: Brief report and 30 or so photos of various vegetative disturbances, structures and refuse. Where: scattered along shore of the bay When: 1970-71

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			Who: Ole Wik, seasonal ranger Ref: Wik, O. Undated. Man-made Distrubances in Glacier Bay and their Regeneration; a photographic report. NPS, Gustavus Comments: At least a dozen of the photos are of relocatable sites. Several are of old structures of historic interest. Wik is a superb observer. There is another report in the library by Kim Heacox of some interest in this context.
Bear Campsite Assessment	No (B1)	Yes (A1,B)	What: Habitat & encounter risk assessment for bears & people at well-used campsites How: Mine park records for distribution of incidents, camper distribution; rank 162 campsites in terms of quality of bear habitat, encounter potential and potential for bear displacement Where: Glacier Bay When: 2001-02. Who: Tom Smith, Terry DeBruyn, Tania Lewis, Allison Banks, Rusty Yerxa, Steve Partridge, Nat Drumheller. Ref: Smith, T & T. Lewis. 2002. Risk Assessment of Bear-Human Interactions at Campsites within GLBA, Alaska: 2001 year end report. . USGS, Anchorage, Smith, T. et al. 2004. Bear-Human Interaction at GLBA: Conflict Risk assessment Abstract. 4th GB Science Symposium, Juneau. Comments: No final report prepared yet. Based on the abstract and attendance at the talk, I'd judge that at a minimum the site photos, habitat evaluations and mapping of "permanent" wildlife trails are useful in the present context. Statistical analysis has not been reported yet, but in Tania's view, the work is replicable.
Marine			
Oceanography/water quality			**This sub-section is somewhat duplicative of the work of Eran Hood, Sonia Nagorski and Ginny Eckert.**
Bartlett Cove Water Temperatures	--	--	Refers to water temperature loggers that were deployed as part of the sea otter effects study (Donnellan, Fisher, Barber). See comments under that study
Bartlett cove Oceanography	No	No	What: Water quality and current velocity in vicinity of proposed sewage outfall site. How: CTD measurements, current velocity readings. Where: Bartlett Cove When: Two days, Aug-Sept 1998

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			Who: Dan lawson Ref: Lawson, D et al. 1998. Oceanographic Investigation of the Proposed Outfall Location in Bartlett Cove, GLBA, Alaska. Contract report to NPS by CRRREL, Hanover, NJ. Comments: Gives basic idea of patterns in these parameters, but too cursory for baseline.
Fjord Oceanography	Yes (A1,B1,B2)	PRIME (Aa,c)	What: USGS program of oceanographic work, emphasizing water mass characteristics, currents, waves & fronts. How: Principal focus is on results of CTD & chlorophyll-a measured at repeatedly occupied stations. Also temperature loggers moored at various locations throughout the Bay. Where: midchannel throughout the bay and off the bay mouth When: 1992-present. Who: Hooge, Etherington (Arimitsu since Lisa left) Refs: Hooge, P & E. Hooge. 2002. Fjord Oceanographic Processes in Glacier Bay, Alaska. USGS/BRD, Juneau. Etherington, L. 2003. Monitoring of Oceanographic Properties of Glacier Bay, Alaska. USGS/BRD, Gustavus. Etherington, L., et al. 2004. Factors affecting Seasonal and Regional Patterns of Surface Water Oceanographic Properties within a Fjord Estuarine system: Glacier Bay, Alaska. USGS/BRD report to NPS, Gustavus. Etherington, L. et al. In Review. Oceanography of Glacier Bay, Alaska: Implications for biological patterns and productivity in a glacial fjord estuary. Esutaries and Coasts. Comments: Three of the most important papers ever generated for the park. Methods carefully specified; highly replicable (and in fact, the stations have been systematically reoccupied by Etherington up through 2005, and Arimitsu on a reduced schedule since then.
Frontal Zones in Glacier Bay	No (B1)	Yes (A1,B)	What: Investigate structure, distribution, timing of frontal zone structures How: Surface temperature mapping via satellite; oceanographic measurements of various sorts; surface drifters Where: lower and mid bay north of Sitakaday When: 2004 Who: Lisa Etherington, Erika Madison, Dave Douglas Ref: Etherington, E. 2004. Research on Oceanographic Currents: physical-biological coupling at frontal zones in GLBA. USGS/BRD Research Permit application Comments: Data have not been written up yet. This study relates closely to “ocean current measurements” below. Dave Douglas has produced surface temp maps that by proxy indicate frontal structures. Metadata has been turned over to the park. A poster was

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			generated.
Ocean Current Measurements	No (B1)	Yes (A1, B1)	What: Examine oceanographic current patterns with specific reference to location & characteristics of frontal boundaries How: ADCP, CTD and surface drifter data Where: Lower & Mid Glacier Bay, adjacent Icy strait (+ 2 ADCP/salinity lines up the bay & Icy Strait by Cokelet) When: ADCP & CTD transects/stations: April-Oct 2001; July 2002, July-August 2004. . (Drifters deployed: twice during summer 2002. Who: Lisa Etherington, Phillip Hooge, Mondragon, Jennifer Fisher, Erika Madison Refs: Etherington, L. 2005. Research on Ocean Currents: Physical-biological coupling at frontal zones in GLBA. Project summary for NPS Comments: Data synopsis in K/eco-data. Fisher sampled set locations in Sitakaday April-October 2001: samples were collected weekly during both flood and ebbing conditions, with a total of 22 days samples. This effort could be considered a baseline.
Oceanography/ Currents - GNOME Model	No	No	What: NOAA model that predicts oil spill spread in surface waters Where: Glacier Bay Ref: Cheng, R. R., S. J. Taggart, and J. K. Nielsen. 2006. Preliminary hydrodynamic modeling of tidal circulation in Glacier Bay, Alaska. *in* The 7th Intternational Conference on Hydroscience and Engineering. Comments: First generation model has been developed. This is not based on unique data, and so is not a baseline candidate
Oceanography of Muir Inlet-1960's	No (B1)	Yes? (A1?,B1)	What: General oceanography with particular ref to summer/winter characteristics. How: Standard measurements Where: Muir Inlet When: ~13 times, from Aug 1965-July 1967. Who: Matthews & Quinlan Refs: Matthews, J. and A. Quinlan. 1975. Seasonal Characteristics of Water Masses in Muir Inlet, a Fjord with Tidewater Glaciers. J. Fish. Res. Bd. Canada 32(10):1693-1703. Quinlan, A. 1970. Seasonal and Spatial Variations in the Water Mass Characteristics of Muir Inlet, Glacier Bay, Alaska. M.S. Thesis, University of Alaska. Comments: Data presented as means for sketchily located stations at 5km intervals from glacier. Figures averaged for whole inlet probably replicable. If so, valuable baseline for comparison with Hooge & Hooge and later work by Etherington..

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
Oceanography of Muir Inlet- 1990's	Yes (A1,B1)	Yes (A1,B)	What: Oceanographic parameters in the vicinity of Muir Glacier to assess proglacial environment. How: CTD, Oxygen, Turbidity; one sample run/yr at a grid along three transects, July; single visits at other times of year. Where: uppermost Muir Inlet When: 1994-2000 Who: Susan Bigl, Dan Lawson Ref: Bigl, S et al. .Fjord Oceanographic Processes, Muir Inlet, Glacier Bay, Alaska, 1994-2000. Comments: Adds data to the Hooge oceanographic stations 19 & 20 and could be integrated with same. As such, important baseline, critical to Cheng's current model.
Tide Station Data	Yes (A1,B1)	Yes (A1,B)	What: continuous records of tidal height How: fixed tidal stations. When: Early Record by Reid, 1890's, Tidal Inlet; 3 year record at Bartlett Cove, mid 1960's; shorter records at Johnson Cove, Muir Inlet, Geikie Inlet 1950's – 1960'; partial year record at Point Gustavus, 1999. Who:Harry Reid, NOAA Comments: Only existing tidal records for Glacier Bay.
Bathymetry/sediments			
Multibeam Sonar	No (B1)	Yes? (A2?, B)	What/how: 3-D projections of the submarine topography Where/when: much of the main trunk of Glacier Bay done by USGS 200-2003. Ross Powell has done some multibeam sampling within Muir Inlet in 2004. Who: Paul Carlson and several local USGS personnel, notably Phillip Hooge; Ross Powell. Ref: Carlson, P. et al. 2003. Multibeam Bathymetry and Selected Perspectives & Views of Glacier Bay, Alaska. USGS Water Resources Investigation. Rept 03-4141. Comments: Purpose is mapping surface topography. Highly replicable. Gives picture of the ocean floor in sufficient detail that, if replicated, would detect major changes in surface topography. Will not detect small changes.
Seafloor Mapping and Classification	No	No	What: Map of benthic habitats How: Ground truthed existing bathymetric and reflectance data by reference to submarine digital video footage of substrate character, biota and geomorphic complexity, and stratified these against depth to make a classification of habitat types.

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			When: 1996-2005 Where: In the offshore portions of the middle and lower bay Who: Phillip Hooge, Lisa Etherington, Jodi Harney Refs: Hooge, P., et al. 2004. Sea Floor Habitat Mapping and Classification in Glacier Bay, Alaska, Phase 1&2, 1996-2004. Harney, J, et al. 2005. Geologic Characteristics of Benthic Habitats in glacier Bay, Southeast Alaska. USGS Open File Rept. 2006-1081. Comments: Product is a habitat map, extremely important basic information, but neither the classification nor the type boundaries are sufficiently exact to permit use as a baseline. Similar in scale and scope to terrestrial plant communities map.
Sidescan Sonar	No (B1)	Yes (A2,B)	What: high resolution sea floor mapping. How: This is a high resolution sonar technique for mapping benthic substrate. Where: Glacier Bay Who: same as above Comments: The side-scan sonar data is included in the Hooge et al. 2004 report above, but was not used in producing the habitat map (Harney et al. 2006). Side-scan sonar was used in mapping smaller coves in Glacier Bay, whereas the multibeam was used for the main Bay. This technique produces fine-grained benthic maps that will illustrate moderate-scale sea floor changes.
Queen Inlet Channels and Sediments	No (B1)	Yes (A2, B)	What: Delimitation and description of features that relate to sediment transport from the delta front to a fan in the bay proper. Where: on the Floor of Queen inlet and adjacent parts of Bay How: Sidescan and multibeam sensing. When: 1988-99. Who: Paul Carlson in conjunction with Ross Powell, Ellen Cowan, A. Phillips & D. Rearic. Early work by Chuck Hoskin & Dave Burrell. Refs: Burrell, D. 1971. Suspended Sediment Distribution Patterns within an Active Turbid -Outwash Fjord. Proc. Is Int'l.Conf. on Port and Ocean Engineering under Arctic Conditions, Vol 1:227-245. Hoskin, C. & D. Burrell. 1972. Sediment Transport and Accumulation in a Fjord Basin, Glacier Bay Alaska. J. Glaciol. 80(5):539-550. Carlson, P. et al. 1989. Turbidity Current Channels in Queen Inlet, Glacier Bay Alaska. Can. Jour. Earth Sci. 26:807-820. Carlson, P. et al. 1988. *in* Proceedings of the Second Glacier Bay Science

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			Symposium. NPS, Anchorage. Carlson, P et al. 1992. Submarine Sedimentary Features on a Fjord Delta Front, queen Inlet, Glacier Bay Alaska. Can. Jour. Earth Sci. 29.:565-573. Carlson, P, et al. 1999. Growth of a Post-Little Ice Age Submarine Fan, Glacier Bay Alaska. Geo-marine Letters (1999):227-236. Comments: Detailed descriptive work designed to describe sedimentation character & rates; map the topography; and elucidate processes generating it. Much of the work, especially the most recent, is quite detailed and exact, allowing detection of topographic changes on the order of 10m. Measures of sedimentation rates and character are also roughly replicable. Queen Inlet has the best studied combo of subsurface topography and generative processes in the park, along with McBride Inlet, below.
Tarr SedimentTtransport/ Deposition	No (B1)	Yes (A2,B)	What: Measurement and characterization of sediment flux How: Sediment traps, seismic reflection profiles. Where: Tarr Inlet When: Summers 1989-1991 Who Jinqui Kai (Ross Powell's advisee) Kai, J. 1994. Sediment Yields, Lithofacies Architecture and Mudrock Characteristics in Glacimarine Environments. Ph.D Thesis, Northern Illinois U. Comments: Methods of sediment trapping described quite well; locations of traps shown with fair accuracy on map of Tarr. Replication of all or a subset of sampling stations seems doable for indicating moderate-great change
McBride SedimentTtransport/ Deposition	No (B1)	Yes (A2,B)	What: Measurement of sedimentation rates How: Sediment traps; bathymetry; water column characteristics Where: McBride Inlet When: 1984-1987 Who: Ellen Cowan, Ross Powell Refs: Cowan, E. 1988. Sediment Transport and Deposition in a Temperate Glacial Fjord, Glacier Bay, Alaska. Ph.D. Thesis, Northern Illinois U. Cowan, E. & R. Powell. Circulation and Suspended Sediment Dynamics in McBride Inlet, a Tidewater Glacial Fjord. *in* Proceedings of the Second Glacier Bay Science Symposium. NPS, Anchorage. Cowan, E. & R. Powell. 1990. Suspended Sediment Transport and Deposition of Cyclicly Interlaminated Sediments in a Temperate Glacial Fjord, Alaska USA. In: Dowdeswell, J & J.Scoukse (Eds). Glacimarine Environments. Geol. Soc. London.

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			Cowan, E & R. Powell. 1991. Ice-proximal Sediment Accumulation Rates in a Temperate Glacial Fjord, Southeastern Alaska. GSA Spec. paper 261. Cowan, E & R. Powell. 1994. High Frequency Climate Signals in Fjord Sediments of GLBA, Alaska. Abstract, 4th GB Science Symposium, Juneau Comments: Positions of sampling stations mapped reasonably precisely. In all, oceanography & sedimentology of this small inlet documented exhaustively. Good baseline candidate (but change in geometry of inlet due to ice recession is a confounding factor).
Johns Hopkins Sediment Deposition	No (B1)	Yes (A2,B)	What: Rates of sediment accumulation in basins How: inference from seismic-reflection data. When: 1979 Where: Johns Hopkins Inlet Who: Jinqui Cai & Ross Powell Ref: 1993. Glacier Fluctuations and Sediment Yields Interpreted from Seismic-reflection Profiles in Johns Hopkins Inlet, Alaska *in* Proceedings of the Third Glacier Bay Science Symposium , Engstrom, ed. NPS, Anchorage Comments: Careful estimation of volumes and accretion rates on decadal scale; replicable on that basis.
Fish			
Halibut Diet	No (B1)	Yes? (A1,B?)	What: Document halibut diet (+ size distribution & sex ratio) of sport- & commercial-caught halibut How: Stomach analysis of over 700 fish; length measurement, sex determination (on the same number?). Preliminary stomach analysis finished. When: Aug 1991, June-Aug 1992 & 1993. Where: in Glacier Bay Who: Liz Chilton, Gretchen Bishop Ref: Bishop, G.. 1993. Pacific Halibut Diet. Fisheries Program Annual Accomplishment Report. NBS, Glacier Bay. Chilton, L , et al. 1993. *in* Proceedings of the Third Glacier Bay Science Symposium , Engstrom, ed. NPS, Anchorage Comments: The sample size looks promising for approximate replication if done on a large scale, approximately duplicating the sites from which the fish were procurred.
Halibut Movement	No (B1)	Yes	What: Home ranges and movement patterns

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
		(A1, B)	How: deploying 110 sonic and 1598 IPHC harvest tags; plotting tag recoveries Where: Glacier Bay When: 1991-1996, with tagging starting in 1992. Ref: Hooge, P., et al. Draft. Home Range and Movement Patterns of Pacific Halibut: Site Fidelity Within and Between Years. USGS/BRD, Juneau. Comments: Though not designed as baseline, precision of tagging and recovery sites for sonic tags could allow use as such if the monitoring question were related to home range. IPHC harvest tags were attached to a large number of halibut. Although the recovery locations were imprecise these types of data could be extremely valuable if replicated during fisheries closures to estimate whether more halibut more out of the Bay when the size and/or density of halibut increases in closed areas.
Halibut (*and other demersal fishes*) distribution, abundance population structure	No (B1)	Yes? (A1?, B)	What: Distribution and relative abundance of halibut (and other demersal fishes) in Glacier Bay. Part of the above study How: Systematic, precisely located grid of skates. All halibut were measured. All fish caught were recorded. Where: throughout the bay. When: 1992-93 Who: Phillip Hooge, Jim Taggart, Jennifer Mondragon, Gretchen Bishop Ref: Mondragon, J et al. 2004. The Distribution and Relative Abundance of Pacific Halibut in a Recently Deglaciated Fjord: the role of glacial inputs and ecosystem age. Abstract, 4th GB Science Symposium, Juneau. Bishop, G. & SG Taggart. 1993. Habitat Correlates of Pacific Halibut and other Groundfish Species in GLBA. *in* Proceedings of the Third Glacier Bay Science Symposium, Engstrom, ed. NPS, Anchorage Comments: Methods and locations clear & replicable. Important pre-closure data on size structure of the population. This is may be a valuable baseline if viewed on a Glacier Bay sub-regional scale; for smaller scales the data are too sparse, especially for some of the nine incidentally caught species. The papers available do not provide details on distribution of fish, but these data exist in USGS databases.
Halibut Synthesis	No	No	What: A general, non-technical summary of several projects Who: Phillip Hooge. Comments: too general and qualitative to be useful in the present context
Small Schooling Fish	No (B2)	Yes? (A1?,B)	What: documents presence and relative abundance of ~90% of expected demersal marine fishes

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			How/when: Beach seine (1999-2000), midwater & bottom trawl (2001-02); hoop & line. Where: in GB proper Who: John Piatt, Mayumi Arimitsu, Martin Robards, Gary Drew Refs: Robards, M., et al. 2002. Glacier Bay Small Schooling Fish Project. USGS/BRD Rept, Anchorage. Arimitsu, M, et al. 2003. Inventory of Marine and Estuarine Fishes in Southeast and Central Alaskan National Parks. USG S/BRD Final Report, Anchorage. Robards, M., et al., 2003. Ecology of Selected Marine Communities in Glacier Bay: Zooplankton, Forage Fish, Seabirds and Marine Mammals. USGS/BRD, Anchorage. Comments: sampling systematic and relocatable; a rigorous study that is not intensive enough locality-by-locality to be replicable on that scale, but valuable on a larger scale if the whole study or major parts of it were replicated.
Spatial Patterns of Outer Coast Rockfish	Yes? (A1?,B1)	Yes? (A1?,B)	What: Preliminary assessment of the nearshore black rockfish community and associated habitats within the outer coast region of Glacier Bay National Park How: SCUBA visual and video surveys. Etherington: Stratified random sampling of transects within 3 exposure strata: exposed, outer Bay, inner Bay. Fish abundance and size by species. Benthic habitat data also collected. Bodkin: capture/measure/release. Where: Lower outer coast; Bodkin mentions three sites, but not sure whether these are the same as Etherington's. He also sampled three fished sites along Yakobi outside the park. Who: Lisa Etherington, Jim Bodkin. When: Etherington, Summer, 2003; Bodkin, May 2006 Comments: Data not written up yet. Etherington thinks the methods are good and repeatable, but her work was planned as a pilot study, so sample size is not large enough for a baseline. Bodkin has picked up this work beginning in 2006; his total sample of 800 fish should begin to provide a rigorous comparison . It is likely that this will become an important baseline.
Sleeper Shark Distribution & Movements	No	No	What: Sleeper shark distribution, residence times & home ranges, and food habits How: implanted sonic tags in three individuals (Muir); examined 3 sharks caught in pot survey for crabs (Hopkins). Where: Upper Muir, Mouth of Hopkins When: 1990's; checked for tag relocations over three years (sharks not relocated after one year) Who: Hooge, Taggart & shop Ref: Hooge, P & S.J. Taggart. Review draft. Movements of Sonic-tagged Sleeper Sharks in

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			Glacier Bay, Ak. USGS/BRD, Juneau. Taggart, S. J., A. G. Andrews, J. Mondragon, and E. A. Mathews. 2005. Co-occurrence of sleeper sharks, *Somniosus pacificus*, and harbor seals, *Phoca vitulina*, in Glacier Bay. Alaska Fishery Research Bulletin **11**:113-117. Taggart, SJ et al. 2004. Co-occurrence of Pacific Sleeper Sharks & Harbor Seals: are sleeper sharks predators, competitors or scavengers of harbor seals? In Taggart, SJ et al. 2004. Testing the Effectiveness of a high latitude Marine Reserve Network. USGS/BRD, Juneau. Progress Report. Comments: sample sizes too small for baseline, but is our only info on a key predator. Taggart reports that some fishermen have reported a large increase (in Glacier Bay) in sleeper sharks in recent years, which adds to the relevance of this information.
Ichthyoplankton study	No (B1)	Yes (A1,B)	What: Ichthyoplankton distribution & abundance How: vertical tows in 4 segments, 0-100 m. When: May-June, 2000 Where: 11 of Hooge's stations (even numbered ones) Who: Martin Robards Ref: Robards, M. et al. 2003. Ecology of Selected Marine Communities in Glacier Bay: Zooplankton, Forage Fish, Seabirds & Marine Mammals. USGS/BRD, Anchorage Comments: Cumulative total of 76 precisely located samples makes this study replicable at a reasonable level for early summer conditions.
Birds			
Foraging Ecology and Monitoring of Kittiwakes	No (B2)	PRIME (Ab)	What: Surveys of kittiwake numbers and productivity at various nesting sites, most notably the Margery colony. When: numerous years going back to the late 1960's Where: The upper and mid bay; outer coast Refs: Gordon, R. 1973. *in* Dixon Harbor Biological Survey: Final Report on Summer Phase of 1973 Research, Streveler & Worley, eds. . NPS, Gustavus. Patten, S. 1995. Birds. *in* Dixon Harbor Biological Survey: Final Report on Summer Phase of 1974 Research, Streveler & Worley, eds. . NPS, Gustavus. Weisbrod, A. 1978. Lituya Bay Mining Impact: Avifaunal Survey. NPS, U Washington CPSU, Seattle. Acuna, C & L. Selig. 1983. Population Observations at Lituya Bay: Kittiwake, Sea

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			Lion, harbor Seal. NPS/RM, Gustavus. Heacox, K. 1983. The Margerie Glacier Kittiwake Colony, GLBA, Alaska. NPS/RM, Gustavus. Jettmar, K. The Lituya Bay Kittiwake Colony, GLBA: a Census. NPS/RM, Gustavus. Climo, L. & T. Duncan. 1991. The Status of Black Legged Kittiwakes in GLBA, 1991. NPS/RM, Gustavus Sharman, L. & H. Lentfer. 1991. 1991 Dixon Harbor Biological Survey. NPS/Rm, Gustavus. Lentfer, H. 1992. Census of Breeding and Productivity of Selected Black Legged Kittiwake Colonies in GLBA, Alaska in 1992. NPS/RM, Gustavus Hooge, E. 1993. Census Methodologies of Black-legged Kittiwakes in GLBA. *in* Proceedings of the Third Glacier Bay Science Symposium , Engstrom, ed. NPS, Anchorage Yerxa, R & E. Hooge. 1994. Status of Selected Black-legged Kittiwake Colonies in Glacier Bay, Alaska: census and productivity report, 1994. NPS/NBS, Gustavus Yerxa, R, M. Kralovek & E. Hooge. 1995. Status of Selected Black-legged Kittiwake Colonies in Glacier Bay, Alaska: census and productivity report, 1995. NPS/NBS, Gustavus. Hooge, E et al. 1998. Black Legged Kittiwake Monitoring Handbook. USGS, Gustavus. Comments: In aggregate, this is one of the most thoroughly surveyed species in the park; the Margerie & Lituya colonies particularly have excellent and repeated data on bird numbers and productivity. The methodology since the early 1990's is on a very rigorous basis.
Gull Egg Environmental Assessment, S Marble island	No (B2)	PRIME (Aa,Bd)	What: Population sizes and fecundity of seabirds with particular reference to glaucous-winged gulls How: Protocols per Byrd (1989), well spelled out for each species. When/where: Summer 1999 on S Marble Island Who Stephanie Zador, John Piatt Ref: Zador, S & J.Piatt. 1999. Populations and Productivity of Seabirds at South Marble island, Glacier Bay, During May-July, 1999. USGS/BRD Comments: This is a highly disciplined study with clear protocols and good stats. Purpose was to construct exploitation model, but highly replicable
Gull Egg Predation Simulation Model	No	No	Ref: Zador, S. & J. Piatt. 2006. Balancing Predation and Egg harvest in a Colonial Seabirds: a Simulation Colony. Ecological Modeling 195: 318-326.

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			Comments: This is a model, based in part of information from S Marble Island; see above study for ecological specifics relative to S Marble Island.
Gulls of N Marble Island	No (B1)	Yes (A1,B)	What: Breeding ecology of gulls (and other bird species) on N marble island How: Extended onsite observation, mapping of colonies, measurement of productivity, timing. When: May-August, 1972; April-August, 1973. Who: Sam & Renee Patten Ref: Patten, S. 1974. The Breeding Ecology of the Glaucous-winged Gull in Glacier Bay, Alaska. M.S Thesis, U Washington. Comments: A thorough and careful study; important background to Zador's work, from the neighboring island.
Kittlitz's *and Marbled* Murrelets - Distribution, Abundance	Yes (A1, B1)	PRIME (Ba,b)	What: determine the seasonal, at-sea habitat use of murrelets within Glacier Bay National Park, including both East and West Arms of Glacier Bay Proper. How: Systematic vessel-based counts on strip transects using standard protocols; radio telemetry data from birds captured and tagged in 2004. Where: Glacier Bay Who: Marc Romano, John Piatt, Yumi Arimitsu, Alison Agness, Gary Drew When: June-August surveys, 2003; two 10-day cruises during the summer of 2004 Ref: Romano, M., et al. 2004. At-sea Density and Distribution of Kittlitz's and marbled Murrelets in Glacier Bay, Alaska, Summer, 2003. Romano, M & John Piatt. 2004. Temporal and Spatial Variability in Distribution of Kittlitz's Murrelets in Glacier Bay. Abstract, 4th GB Science symposium, Juneau. Comments: Careful, repeatable work of the utmost importance, given the species declining status. 2004 paper cites data from 1991 & 1999/2000, which allow decadal comparisons.
Kittlitz's Murrelet Population	--	--	Included in *FWS Birds & Mammal surveys – 2000's*
Behavioral Ecology of Kittlitz's Murrelets	No	No	What: Murrelet movements, foraging behaviors How: Telemetry on 15 tagged birds Where: Glacier Bay When: 2004 Who: Marc Romano, John Piatt Ref: Romano, M & J. Piatt. 2004. Behavioral Ecology of Kittlitz's Murrelets as Determined by Radio Telemetry. Abatract, 4th GB Science Symposium, Juneau. Comments: This study is not designed to provide a replicable baseline, but to elucidate

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			aspects of life history.
Scoter surveys	No (B1)	No? (A1?,B)	What: Counts of scoter flocks How: Usually just by eyeballing When: late 60's to 80's Where: Generally on the middle west side of GB, where most big scoter flocks used to be concentrated Who: Susanne Carter, Barb Blackie, Lewis Sharman, Ole Wik, Jerry Hok and other rangers/biotechs. When: Various times, going back at least to 1967 Refs: Carter, S. 1985. Census and Behavior of Surf and Whitewinged Scoters in the Hugh Miller Inlet Area of Glacier Bay, Alaska. Cascadia Research Collective, Olympia Wa. Comments: I did not make a concerted search for the various inhouse reposts and field notes that previously existed. One can only hope that they are still around somewhere.
FWS Outer Coast aerial surveys	No (B1)	PRIME (Ab,Bd)	What: survey of nearshore marine birds How: low aerial flights over nearly entire outer coast shoreline Where: Spencer-Dry Bay When: 8 surveys, June-October, 2001, 2002. Who: Bruce Conant, Jack Hodges, Russ Oates, Mike Jacobson, Jim King. Ref: Conant, B & D. Groves. 2002. Gulf of Alaska Shoreline Waterbird Surveys. USFWS, Juneau. Comments: Repeated surveys done by very seasoned observers. Gives reliable index to bird numbers & distribution. Valuable work.
FWS SE-Wide Aerial Waterbird Survey	No (A1,B1)	No (A1)	What: Aerial survey of all SE Alaskan coastal waters for waterbirds How: Via aircraft @ 150ft, 2 observers, covering ¼ mi strip of water starting at shore. Where: all park coastline except outside coast N of Spencer When: late 1990's (1997 for parts of park) once in winter, once in summer Who: Jack Hodges, Debbie Groves Ref: data in FWS files, according to Debbie Groves. Hodges is preparing a report Comments: This one-time survey is a useful baseline on a regional scale, but for a locality there is too much variation for a one-time survey to be useful in that context. May however, take on more significance in concert with the above project, and with the marine predator survey of Piatt et al. Also useful in placing park fauna in a regional context.

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
Whales			
Humpback Whale Entanglement	No (B1)	PRIME (Ab, Ba,d)	What: Documents rates of whale entanglement in gear How: Analysis of scarring on peduncle evident on photos Where: Northern SE Alaska, including Glacier Bay When: Photographs taken 2003-04 Who: Janet Neilson Ref: Neilson, J. 2006. Humpback Whale Entanglement in Fishing Gear in Northern Southeastern Alaska. M.S. Thesis, UAF Comments: The large sample size (n >160) allows high degree of confidence in results, and therefore in its use as monitoring rates of entanglement.
Killer Whale Acoustics	No	No	What: Document occurrence of transient killer whales & acoustic communications associated with predatory behavior How: photo I.D; follow whales to record communications in assn with predation events When: 2004-present Where: Glacier Bay Who: Volker Deecke, Jan Straley Ref: Deecke, V. 2006. Predatory Behaviour and Acoustic Communication of Mammal-eating Killer Whales in GLBA. Permit appln to NPS in park electronic files Comments: elegant study, but designed to elucidate relationship between certain behaviors and related acoustics rather than provide a baseline. However, it will add to Matkin's long-term efforts to document the number, behaviour and timing of use by these whales (see below)
Killer Whale Population Assessment	Yes (A1, B2)	PRIME (Aa,b, Bd)	What: Population & feeding ecology, and relationships with other marine mammals How: Repeated photographic identification and observation Where: Glacier Bay and Icy Strait, with comparisons elsewhere in the range of local pods When: Summer, with occasional checks other seasons. Summer effort 1989-2001 ~ two days/week; 2002-present, 40-45 days/season. Who: Dena matkin Refs: Matkin, D., et al. in press. Killer Whale Feeding Ecology and Non-predatory Interactions with Other Marine Mammals in the Glacier Bay Region, Alaska. Fourth Glacier Bay Science Symposium. Matkin, D. 1992. Summary of Killer Whale Research in Glacier Bay and Icy Strait,

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			Alasks, 1983-1990. Rept to NMFS, Seattle. Comments: Seminal work on a charismatic top predator. Methods simple and well spelled-out. Degree of confidence in population figures analyzed. Demographics highly repeatable.
Whale Foraging & Prey Concentrations *(1)*	Yes (A1,B1)	Yes (A1,2)	What: Relationship between foraging whales and concentrations of prey How: Sonic and net sampling of prey in vicinities of feeding whales. Krieger's work based on obs of 44 whales; Piatt/Gabriele study based on obs of 20 whales for 3-6 hrs each. Who: Ken Krieger, John Piatt, Chris Gabriele When: 1984 (Krieger); 2001-02 (Piatt & Gabriele) Where: Glacier Bay & adjacent Icy Strait Refs: Krieger, K. 1988. *in* Proceedings of the Second Glacier Bay Science Symposium. NPS, Anchorage. Comments: Piatt/Gabriele data partially analyzed but not reported yet. Both works have sufficient sample size to give good picture of whale foraging habits during the study periods, and therefore should be replicable, at least in a general sense
Whale Foraging & Prey Concentrations (2)	Yes (A1,B1)	Yes? (A2?,B)	What: Take Hydroacoustic signature of vicinity of feeding whales each time they are encountered during whale census activities How: Each time feeding whale encountered, take & archive reading of echo-sounding of prey mass in the vicinity When: 1996 – present Where: Glacier Bay – Icy Strait Who: Chris Gabriele, Janet Neilson Refs: Gabriele, C et al. 1996, 1997, 1999. Population Characteristics of Humpback Whales in Glacier Bay and Adjacent Waters - annual reports. NPS/RM, Gustavus. Comments: Data are summarized in the abovementioned reports; have been collected annually since then but not reported. These date are not truthed by net sampling. The hope is that one day it will be possible to retroactively identify the types of feed documented on these records.
Humpback Whale Monitoring - *1990's to present*	Yes (B2)	PRIME Ab, Ba,b,d)	What: Humpback distribution, abundance, population ecology How: Vessel-based observation Where: Glacier Bay and adjacent parts of Icy Strait When: 1991 – Present Who: Chris Gabriele, Janet Doherty (Neilson) Refs: Gabriele, C et al. 1993. Variability in Counts of Individually Identified Humpback Whales in glacier Bay and Icy Strait. *in* Proceedings of the Third Glacier Bay Science

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			Symposium , Engstrom, ed. NPS, Anchorage Gabriele, C. 2004. Age At First Calving of Female Humpback Whales in Southeastern Alaska. Abstract, 4th GB Science Symposium, Juneau. Neilson. J & C. Gabriele. 2005. Results of Humpback Whale Population Monitoring in Glacier Bay and Adjacent Waters:2005. NPS/RM, Gustavus Comments: This long-term study, especially when combined with similar (though not always as rigorous) ones going back to the mid '70's, provide one of the most valuable baselines related to the park biota. The 2004 ref illustrates the detail and quality of life history information now provided by this long term data set. The 1993 analysis sets parameters for replicability of survey data – one of the few GLBA data sets that are this rigorously constrained.
Whale Population & Behavior - 1980's	No (B1)	PRIME (Ab,Bab,d)	What: Series of natural history studies prior to Gabriele's, covering the gamut of demographics, distribution, behavior, and relationship to vessels How: Methods & coverages of surveys described in each of these papers Where: Glacier Bay & environs When: 1980's Who: Scott Baker, Anjenette Perry, Gary Vequist, Jan Straley Refs: Perry, A., et al. 1985. The Natural History of Humpback Whales in Glacier Bay, Alaska. NPS/RM Baker, et al. 1986. Population Characteristics of Humpback Whales in Glacier Bay and Adjacent Waters: 1986. NPS, Gustavus Vequist, G. & C. Baker. 1987. Humpback Whales in Glacier Bay, Alaska: a long-term history of habitat use. NPS/RM, Gustavus Straley, J. 1989,90. Population Characteristics of Humpback Whales in Glacier Bay and Adjacent Waters. Rept to NPS, Gustavus. Straley, J. 1994. Seasonal Characteristics of Humpback Whales in Southeastern Alaska. M.S. Thesis. University of Alaska. (also see 3rd symposium paper of same title) Comments: The basic demographic info is quite repeatable, and in fact forms the foundation for Gabriele's subsequent work. The Vequist paper is the best summary of all work done in Glacier Bay during the decade 1976-86.
Whale Populations and Behavior-1970's	No (B1)	Yes (A1,B)	What/how: Whale population behavior, distribution, abundance, age structure, based on extended observation & photography; followed up by Dean's statistical analysis, especially of blow interval data as index of stress. When: 1970's

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			Who: Chuck Jurasz, Ginny Palmer, Fred Dean Refs: Dean, F et al. 1985. Analysis of Humpback Whale Blow Interval Data, 1976-1979. Final Rept on Contract to NPS, Au Alaska, Fairbanks. Jurasz, C & V. Palmer. 1981. Censusing and Establishing Age Composition of Humpback Whales, Employing Photodocumentation in GLBA, Alaska. Rept to NPS, Anchorage. Comments: Exhaustive statistical analysis of blow intervals as indicator of stimuli responses, notably to vessels. Important baseline, especially given its antiquity. Many other data in the cited Jurasz report and several others by these authors give a less rigorous view of whale populations and behaviors during the 1970's.
Humpback Whale Genetics	Yes (A1,B1)	Yes (A1, B)	What: Determining whale sex and genetic population structure How/where: Molecular markers for paternity; analysis of mitochondrial haplotypes at elevenmicrosatelite loci for population differentiation. 139 whales sampled from SE Alaska, California and Gulf of Maine. When: Samples procured in SE, 2000-present Who: Denny Vant, Chris Gabriele, Janet Neilson Ref: Vant, MD. 2002. Population Structure and Genetic Diversity of Humpgack Whales in the North Bacific: a multi loci Approach. MS Thesis, U Aukland, NZ. Comments: Careful and thorough study that identifies population structure with statistically reliable clarity. Good baseline. Much data in recent years remains unreported.
Humpback Whale distribution vs. vessels & oceanography	No (B1)	Yes (A1,B)	What: Whale distribution and behavior in relation to boats, tides and time of day How: Documentation of whale and vessel distribution in time and space, from land and kayak-based platforms. Comparison of distributional data with synopses of oceanography (notably tidal stage and satellite measurements of sea surface temperatures as proxy for frontal locations). Where: the Point Adolphus area When: 1999-2001 Who: Nikki Koehler, Chris Gabriele, Mia Grifalcone Ref: Koehler, N. 2004. Humpback Whale and Vessel Use Patterns and Interactions at Point Adolphus. Abstract, 4th GB Science Symposium, Juneau. Comments: Distributional data for whales and boats highly replicable. Not given a PRIME only because the data are entirely outside the park., but of course many "Glacier Bay" whales are involved.
Harbor Porpoise Censuses	Yes	Yes	What: Censusing harbor porpoise numbers

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
	(A1, B1)	(A1,B)	How: Calambokidis and Taylor – obs from shore. Prather and Dahlheim – boat transects. In the case of Prather, too cursory to be useful. Dahlheim – line transect protocols well described in 1994 paper. When: 1979 – present; Dahlheim's censuses spring/summer/fall 1991-93, and 2006. Refs: Taylor, B & P. Dawson. 1984. Seasonal Changes in Density and Behavior of Harbor Porpoise Affecting Census Methodology in GLBA, Alaska. Rep. Int. Whal. Commission. 34. Calambokidis, J. 1983. The Behavior of Harbor Porpoises in Glacier Bay, with emphasis on marked Individuals. Cascadia Research Collective. Prather, S. et al. 1989. Harbor Porpoise Baseline Survey, 1989. NPS/RM Dahlheim, M. 1994. Abundance and Distribution of Harbor Porpoises in Southeast Alaska, Cook Inlet and Bristol Bay, Alaska. NMFS Marine Mammal Lab, Seattle Dahlheim, M. in prep. *Porpoise survey just completed at this writing; results not reported yet.* Comments: All work prior to Dahlheim's not sufficiently extensive &/or rigorous to provide a credible baseline. Taylor's work in Sitakaday Narrows is repeatable but confined to a small area. Dahlheim's surveys are statistically and methodologically rigorous; they cover enough territory to give a rough index to porpoise abundance, but can hardly be said to census the park.
Pinnipeds/sea otters			
Harbor Seal Diet and Foraging Areas	Yes (A1, B1)	Yes (A1,B)	What: What and where are seals eating in Glacier Bay? Multi-agency study of possible factors in seal decline How: Scat analysis; stable isotope analysis of shed hair; tracking seals via VHF transmitters and TDR recorders; fine-scale hydroacoustics surveys in areas where seals show foraging behavior Where: Throughout bay, but mostly Spider Is & Hopkins vicinities When: 1996-2002 by Matthews' crew; 2004-06 by Blundell/Gende/Womble's crew Who: Beth Matthews; Gail Blundell, Jamie Womble, Scott Gende, Mike Sigler Refs: Matthews, E. 2002. Diet of Harbor Seals at a Glacial Fjord and a Terrestrial Haulout in Glacier Bay, 1996-2001. Progress Report. UAS Matthews, E. 2004. Trophic Differences in Harbor Seals from a glacial Fjord and a Terrestrial Haulout in Glacier Bay Inferred from Stable Carbon and Nitrogen Isotopes from

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			Molted Hair. Abstract, 4th GB Science Symposium, Juneau. Womble, J. et al. 2006. Harbor Seal Foraging Ecology Investigations in GLBA. 2005 Annual Report To NPS Comments: This is a large and complicated set of studies with several facets. Sample sizes for hair were large, especially from Hopkins (N=101), less so for Spider (N=30); Matthews' scat sample size was smaller (N=86) and spread widely in space & time. The isotope data can be considered a reasonably good baseline. Matthews considered scat analysis provisional pending more samples, but that is being amplified by Womble as of 2006, when 44 samples were collected from Spider, Flapjack & Adams. TDR's retrieved (n~30) over three years, 04-06, will provide considerable data on dive location & interval when analyzed, and the sample size is approaching adequate for a baseline. Large scale acoustic surveys were carried out monthly in 2005 at transects in Beardslee Entrance & Hopkins (3 replicates/ site); small scale surveys were done opportunistically (n=40).
Harbor Seal Genetics	Yes (A1,B1)	Yes (A1,B)	What: Characterizing genetics of Glacier Bay harbor seals in comparison with others in region to clarify metapopulation structure. Where: a number of Glacier Bay sites. How: Blood, hair, serum, tissue analysis When/who: 1996-2002 (Beth Matthews); 2004-2006 (Gail Blundell, Jason Herreman). Comments: Not sure of Matthews' sample sizes; Blundell: over 400. No results have been published yet, but sample sizes should allow high confidence in results. Womble advises that early results suggest that stocks are structured on a much finer scale than the three currently recognized for Alaska.
Harbor Seal Monitoring - Locations and Counts	Yes (A1, B1)	PRIME (Ab, Ba,d)	What: Censusing seals in Glacier Bay How: Mostly land-based counts of hauled-out seals, using various protocols; Streveler tried and discarded aerial counting; Matthews used it as adjunct to land counts. Streveler used vessel counts in winter. Womble has continued aerial counts of terrestrial haulouts as part of region-wide trend surveys. When: Streveler, 1973-78; Calambokidis, 1982-84; Matthews, 1996-2002**?** Womble et al, 2004-present. Where: Particular emphasis on the major natal areas, but some counts during molting and winter.

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			Who: Greg Streveler, John Calambokidis, Beth Matthews, Jamie Womble Ref: Streveler, G. 1979. Distribution, population ecology and Impact Susceptibility of the Harbor Seal in Glacier Bay, Alaska. NPS, Juneau. Calambokidis, J., et al. 1987. Distribution and Haul-out Behavior of Harbor Seals in Glacier Bay, Alaska. Matthews, E. 1992. Harbor Seal Censuses in GLBA: a comparison of land-based and aerial censusing. UAS rept to NPS/NMFS, Juneau Matthews, E. 1993. Long-term Trends in Abundance of Harbor Seals and Development of Monitoring Methods in GLBA, Southeast Alaska. *in* Proceedings of the Third Glacier Bay Science Symposium , Engstrom, ed. NPS, Anchorage Matthews, E. & G. Pendleton. 2000. Declining Trends in harbor Seal Numbers at Glacial Ice and Terrestrial Haulouts in GLBA, 1992-1998. UAS/ADF&G Rept to NPS. Matthews, E et al. 2004. Declines in Harbor Seal Numbers in GLBA, 1992-2002. Abstract, 4th GB Science Symposium, Juneau. Womble, J, et al. 2005. Glacier Bay Harbor Seal Foraging Ecology Research, Final Report, 2005 field season. ADF&G report to NPS. Mathews, E. and G. Pendleton. 2006. Declines in harbor seal (Phoca vitulina) numbers in Glacier Bay National Park, Alaska, 1992-2002. Marine Mammal Science 22:167-189. Comments: Matthews has stitched together data from all these sources and has set a high standard for replicability and statistical treatment. Her work is highly repeatable, and provides one of the few data sets that is rigorously examined for replicability. Womble's work is also based on regional protocols, and provides a repeatable index, but (as she point out) such data are quite variable and must be looked at in aggregate to give a valid trend picture. The Hopkins work of Matthews has been discontinued, but is planned to resume in 2007 in some form.
Harbor Seal Pup Call Frequency	No	No	What: Documentation of frequency and temporal patterning of pup calling. How: keeping track of pup vocalizations in course of other seal work Where: Hopkins When: 1990's Who: Laura Dzinich, Beth Matthews Ref: Dzinich, L & E. Matthews. Unpublished ?(abstract 1999). A Diurnal Pattern to Variation in Rates of Harbor Seal Pup Calls in Johns Hopkins Inlet, GLBA, Alaska. NPS/UAS.

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			Comments: Postulated to be correlated with the timing of mothers' feeding periods, and if so might be an index to a time of mother/pup separation & thus impact susceptibility. But that correlation has not been demonstrated.
Harbor Seals 1998 - McBride	No (B2)	Yes (A1,B)	What: Evaluation of human/vessel disturbance of seals How: Systematic observation, using defined protocols Where: McBride Inlet When: 37 days during pupping season, 1998. Who: Tania Lewis Refs: Lewis, T. 1999. Distribution, Pupping Phenology, and haul-=out Patterns of Harbor Seals at McBride Glacier Fjord, GLBA. NPS/RM, Gustavus. Lewis, T. and E. Matthews. 2000. Effects of Human Visitors on the Behavior of harbor Seals at McBride Glacier Fjord, GLBA. UAS & NPS/RM Comments: Purpose is as title states. Gives general idea of # of seals using fjord, but not enough data to provide a baseline. Comments: Nice study, applicable so long as McBride remains an iceberg source.
Sea LionNumber, Movements and Metapopulation Structure (Includes "Sea Lion Brand Resighting" and "Sea Lion Pup Branding" from the project tracking database)	Yes (A2,B1)	PRIME (Ab,Bb)	What: Numbers; movements of individuals between rookery/haulouts, and interchange between regions; metapopulation structure of the species. How: Rookery counts; Branding and resightings of branded animals; genetic assays of individuals for comparison with selected loci in stocks from other regions Where: Various haulouts/rookeries in GLBA, with particular attention to S Marble and graves When: 1994 – present (with notes from 1975-77, 199697) Who: Beth Matthews, Ken Pitcher, Lori Jemison, Tom Gelatt, Andrew Trites, Kelley Hastings, Park staff Refs: Acuna, C & L. Selig. 1983. Population Observations at Lituya Bay: Kittiwake, Sea Lion , Harbor Seal. NPS/RM, Gustavus. Patten, R. 1975. Marine Mammals . *in* Dixon Harbor Biological Survey: final report on the summer phase of 2004 research. Streveler & Worley, eds. NPS, Juneau. Streveler, G. 1980. Larger Mammals. *In* Lituya Bay Environmental Survey, Sterveler, Worley & Molnia, eds. NPS, Gustavus [*Page on marine mammals is missing from archives copy!*] Calkins, D. et al. 1999. Steller Sea Lion Status and Trends in SE Alaska: 1979-1997. Mar. Mamm. Sci. 15(2):462-477. Matthews, E. 2003. Observations of Steller Sea Lions from the Western Population

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			at South Marble Island, GLBA. Jemison, L. 2005. Trip Report: Sightings of Branded Steller Sea Lions in Southeast Alaska, 1-25 July, 2005. ADF&G, Juneau Gelatt, T et al. 2004. Steller Sea Lion Population Trends, Diet, and Brand-resighting Observations in GLBA. Abstract, 4th GB Science Symposium, Juneau. Pitcher, K ,et al. in prep. Status and Trends in Abundance and Distribution of the Eastern Steller Sea Lion Population. Comments: The brand/resighting work, especially if the 03-05 work is lumped, provides an excellent index to occurrence of branded animals in the park, and thus to the provenance of our animals. The ADF&G reports also have data on the frequency and types of entanglement gear found on sea lions. Womble also has 4 years+ of data from aerial surveys. Survey data give good long-term trend indices. Pitcher advises that Greg O'Corry-Crowe has a paper in progress on sea lion genetics that covers the Graves Rocks rookery, which will show that ~70% of founding females came from the western North Pacific stock, even though it is nominally within eastern stock boundaries.
Sea Lion Scat Analysis	Yes? (A1?,B1)	Yes? (A1?,B)	What: Dietary analysis Where: Graves rocks, South Marble How: scat collection and analysis When: "a number of years" up to present, back at least to 1994 for Graves and 2001 for S Marble. Who: Laurie Jemison, Ken Pitcher, Andrew Trites, Dom Tollit (UBC) Comments: No data are published yet, but analyses were obtained from Pitcher for 1994 (Graves) and 2001 (S Marble & Graves). For those years, n~50 per site. Trites has the raw data. Analysis is backed up at the time of this writing.
Sea Lion Aerial Surveys in relation to Spring Fish Spawning Areas	No (B2)	Yes? (A1?,B)	What: Surveys of haulouts to determine seasonal distribution in relation to prey availability How: Systematic monthly aerial counts Where: 25 sites in SE AK, incl. Marble is, Graves Rocks, Pt. Carolus, Tarr Inlet in park When: March 2001-May 2004, for all but Tarr which was only surveyed in 2004. Adams Inlet, Dixon River, Alsek River, Excursion River included during April & early May Who: Jamie Womble, Mike Sigler, Mary Willson Refs: Womble, J. 2003. Seasonal Distribution of Steller Sea Lions in relation to High-quality Ephemeral Prey Species in SE Alaska. M.S. Thesis, UAF. Womble, J, et al. 2005. Distribution of Steller Sea Lions in Relation to Spring Spawning Fish in SE Alaska. Marine Ecology Prog. Series 294:271-282.

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			Womble, J. et al. in review. Season Specific foraging strategies of a marine predator: linking seasonal distribution patterns and prey availability. NOAA, Auke Bay. Comments: Studies well designed, but purpose was to demonstrate relationship between sea lion densities & fish resources, not provide population baseline. Aerial surveys of haulouts accompanied by photos are reliable means for spot checks, but do not always capture the variability at a site. Sampling density & duration appears sufficient to provide an order of magnitude baseline if aggregated over several haulouts and times.
Sea Otters and Benthic Marine Communities	Yes? (A1,B2?)	PRIME (Ab,Bd)	What: Document ecosystemic conditions in the shallow benthic of prior to sea otter invasion. How: 30 permanent study sites at which the biota (macroalgae, benthic diatoms, sea urchins, predatory snails, sea stars, crabs) resurveyed annually. At each site, did 1990ea. $1m^2$ and 1040ea. $10m^2$ quadrats. Assessed population structure for sea stars, snails and urchins. Where: Shallow subtidal, lower and mid Glacier Bay When: (1999 pilot) 2000-2003 Who: Mike Donellen, Jennifer Fisher, Julie Barber Ref: Donellen, M., et al. 2004. The Ecological Effects of Sea Otters on Shallow Marine Benthic Communities in GLBA, and Inventory and Monitoring of Shallow Subtidal Communities in Lower/Mid Glacier Bay, annual report 2004. NPS/RM Comments: This was envisioned as a pre-sea otter study, and is admirably configured for that, with lots of data and (Bill tells me) good statistical rigor. It would be critical to follow up on it as an adjunct to Bodkin's intertidal work.
Sea Otters and the Nearshore Communities	Yes (A1,B2)	PRIME (Ab, Bd)	What: Sea otter distribution and abundance, food habits, effects on intertidal clams and crabs How/where: aerial surveys in Glacier Bay and adjoining waters of two types: abundance and distribution. Direct foraging observations to document dietary preferences. Estimated species composition, density, biomass, and sizes of intertidal clams at 59 sites in Glacier Bay, 14 sites in Idaho Inlet, 12 sites in Port Althorp and 2 sites in Dundas Bay. Related MADS work on Dungeness crabs also cited here. Scheding's work based on MADS crab sampling data. When: boat-based surveys began soon after release of recolonists, in the early 1970's. Aerial surveys begun in 1994 and continued to present. Some clam beds sampled in 99-03,before otters. Done yearly up to present. MADS work (see elsewhere in this doc.) Who: Bodkin, Esslinger, Kloecker; Neilson (aerial surveys); Scheding (Crab work); park

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			staff Refs: Acuna C. & L. Selig. 1983. Sea Otter Observation on the Outer Coast, 1983. NPS, Gustavus. (in Sharman files) Perrelli, R. 1985. Sea Otter Outer Coast [& *Pt. Gustavus*] Observations, Summer, 1985. NPS, Gustavus (in Sharman files) Klinger, N. 1987. Sea Otter Outer Coast Observations, 1987. NPS, Gustavus. (in Sharman files) Vequist, G. 1987. Sea Otter Recolonization of Ancestral Range in GLBA. NPS, Gustavus. (in Sharman files) Shirley, T. C., G. Bishop, C. E. O'Clair, S. J. Taggart, and J. L. Bodkin. 1996. Sea otter predation on Dungeness crabs in Glacier Bay, Alaska. Pages 563-576 *in* High Latitude Crabs: Biology, Management, and Economics. Alaska Sea Grant College Program, AK-SG-96-02. Bodkin, J., et al. 2000. Sea Otter Studies in GLBA: aerial surveys, foraging observations and Intertidal Clam Sampling. USGS/BRD, Anchorage Scheding, K. 2004. The bathymetric distribution of Dungeness crabs, *Cancer magister,* in bays with and without sea otters. Masters of Science. University of Alaska, Fairbanks, Fairbanks. Bodkin, J. 2005. Sea Otter Movements and Life History in GLBA. 2004 Ann Report on Project 9353AOC Bodkin, J et al. 2004. Perspectives from an Invading Predator: sea otters in Glacier Bay. Abstract, 4th GB Science Symposium, Juneau. Comments: Based on the reports seen, Bodkin's and Scheding's work is procedurally and statistically tight, excellent for a baseline. Most of the earlier observations are less constrained, but provide a valuable historical background.
KelpBeds and Sea Otters	Yes (A1, B1)	PRIME (Ab, Bd)	What: Manipulated sea urchin and kelp densities to observe proxy effects of otter predation on urchins. How/when: Set up unspecified # of plots over 2 years, 1973-4; did various removals of urchins and kelp. Revisited and resampled more or less same sites in 1987 and 2003. Where: Torch Bay subtidal Refs: Duggins, D. 1979. Kelp Beds and Sea Otters: an experimental approach. Ecology 61(3):447-453. Duggins, D. 1980. Kelp Dominated Communities: Experimental Studies on the Relationship Between Sea Urchins, Their Predators and their Algal Resources. Ph.D.

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			Thesis, Universtiy of Washington Estes, J & D. Duggins. 1995. Sea Otters & Kelp Forests in Alaska: Generality and variation in a Community Ecological paradigm. Ecol. Monographs 65: 75-100. Duggins, D. 2003. Trip Report, Southeast Alaska, 2003. Report to NPS Comments: Very important baseline given its duration and rigor, especially now that the sample sites are GPS'd. (Duggins has this info) The 1970's-80's-90's comparisons are only approximate but still very valuable given the magnitude of changes over this period. Important adjunct to Bodkin's work.
Invertebrates			
Brachyuran Larvae Distribution & Abundance, Dungeness Crab Larval Dispersal	No(B1)	Yes? (A1,B?)	What: Is Glacier Bay a net sink or producer of crab larvae? E.g., what is the spatial and temporal distribution of crab larvae relative to tidal stage and oceanographic conditions? How/where: Year 1: sampled larvae at 5 stations in lower bay, 3 depths. Year 2: weekly in Sitakaday. Documented vertical distribution changes, day & night. Deployed drifters twice during summer, 2002. When: 2001-02 Who: Jennifer Fisher Refs: Fisher, J. 2004. Distribution, Abundance and Timing of Brachyuran Larvae in a High-latitude Fjord. Abstract, 4th GB Science Symposium, Juneau. Fisher, J. 2005. Larval Dynamics of Brachyuran Crabs in a High Latitude Fjord, Southeast Alaska. M.S. Thesis, San Jose State University. Comments: Jen's thesis covers the questions of larval temporal dynamics, but not the spatial aspects. Etherington's note in k/eco-data says that the drifter data is not in files available to her. Sampling was intended to elucidate timing and behavior, and appears not to have been sufficiently spread in space or time to provide a replicable picture suitable for a baseline. Might be a useful baseline on phenological changes, in concert with Eckert's work.
Dungeness Aggregation	No	No	What/where: Description of crab aggregations in pothole features in Bartlett Cove Diving on the potholes Who: Phillip Hooge Ref: Hooge, P., et al. 2004. Sea Floor Habitat Mapping and Classification in Glacier Bay, Alaska, Phase 1&2, 1996-2004. Comments: Reconiassance study. Not meant for replication.

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
Dungeness Crab Larval Abundance	Yes (A2, B1)	Yes? (A1?, B)	What: Settlement and recruitment of Dungeness crab. How: monitoring settlement bags and plankton collectors When: 2000-present Where: Bartlett Cove, Beardslee Islands. Who: Ginny Eckert, Heidi Herter. Refs: Permit appln in Project Tracking , 2005 Investigator's Annual Report Most recent meeting presentation: How Big is Big Enough? America's Largest Temperate Marine Reserve May Not Be Self Sustaining for Some Species: Recruitment of Dungeness Crabs in Glacier Bay, presented by G. Eckert at Ocean Sciences 2006, Honolulu, HI. Herter, H. defense in Fall 2006. Spatial variation in Dungeness crab larvae in Beardslee Islands and Bartlett Cove, GLBA. M.S. Thesis *Approximate title; work not seen.* Papers in progress. Comments: Study designed to document timing of life history phases and their spatial distribution in lower Glacier Bay. Based on IAR, could be used for monitoring if timing of such events was to be used as an index of phenological changes.
Dungeness Crab Larvae Spacio-temporal Distribution	Yes? (A1?,B1)	Yes? (A1?, B)	What: Patterns of larval abundance How/where: Light traps repetitively occupied at Bartlett Cove; 114 locations throughout Bay light trapped once each at two depths. When: Bartlett Cove 2000-2003; elsewhere, summer 2002 Who: Ginny Eckert, Jeff Douglas, Jim Taggart, Jennifer Fisher Ref: Eckert, G. et al. 2004. Temporal and spatial Patterns in Dungeness Crab Larval Abundance within Glacier Bay. Abstract, 4th GB Science Symposium, Juneau. Comments: The Bartlett Cove data have enough replicates to function as a baseline; the one-time samples elsewhere provide a general snapshot that, if replicated, could illustrate only a gross change in pattern.
Dungeness Crab Larval Movement *(better title: relationship between adult and larval crab abundance)*	Yes (A1,B1)	Yes (A1,B)	What: Relationship between adult and larval crab abundance How: Extensive pot survey of adult populations in concert with plankton tows Where: Lower Glacier Bay and Icy Strait When: 1996-2002 Who: Wongyu Park, Tom Shirley, Jim Taggart Ref: Relationship Between Abundance of Dungeness Crab Adults and Larvae: regional population increase or larval export from an MPA? Abstract, 4th GB Science Symposium,

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			Juneau. Comments: Large sample size, rigorous design. Highly replicable.
Dungeness Crab-pot Dive Experiment	No (B1)	Yes (A1,B)	What: Assess the effectiveness of pot surveys in population assessment. How: Sample crabs in with commercial crab pots, and a dive study that assesses populations in the same areas. Where: Lower Glacier Bay, Dundas Bay and Gustavus Flats When: April & September, 1993-2000 Who: Jim Taggart, Chuck O'Clair, Tom Shirley, Jennifer Mondragon Ref: Taggart, S. J., et al. 2004. Estimating Dungeness crab (*Cancer magister)* abundance: crab pots and dive transects compared. Fishery Bulletin **102**:488-497. Comments: This systematic and extensive work provides much data on crab abundance and population structure. Though the sampling density was not sufficient to document population parameters in a locality , it does so on a sub-regional scale. Highly replicable.
Dungeness Crab Distribution/Movements/Abundance in shallow water	No (B1)	Yes (A1,B)	What: Survey of crab density in shallow waters How: Census by divers on 2m x 100m transects, 0 to 18m depth, 15 randomly placed transects in each of 5 sites. Tracked 16 adult male, 8 non ovigerous adult female and 11 ovigerous female sonic-tagged crabs for a week. Where: Lower Glacier Bay & Icy Passage. When: 1992-93 Who: Chuck O'Clair, Tom Shirley, (the MADS group) Ref: O'Clair, C et al. 1993. Nearshore Distribution and Abundance of Dungeness Crabs in GLBA, Alaska. *in* Proceedings of the Third Glacier Bay Science Symposium , Engstrom, ed. NPS, Anchorage Comments: Carefully designed and described study. Highly replicable, except for the sonic tag component, which is based on a small sample for a short time.
Dungeness Fjord Oceanographic Gradient (FOG)	No(B1)	Yes (A1,B)	What: Survey of crab distribution throughout Glacier Bay in comparison to oceanographic parameters and distance from bay mouth How: 468 pots at 52 sites at -10m; CTD measurements made at each pot site; Hooge oceanographic transects also referred to. When: Aug-Sept, 1999. Who: Jim Taggart, Phillip Hooge, Jennifer Mondragon, Alex Andrews Ref: Taggart, SJ et al. 2003. Living on the Edge: the distribution of Dungeness Crab in a Recently Deglaciated Fjord. Marine Ecology Progress Series 246:241-252. Comments: Carefully planned study designed to exhibit general patterns and very replicable

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			on that scale. Taggart adds that monitoring animals such as this, that have disjunct distributions to see if their distributions change, would be a good indicator of ecosystem change.
Abundance of Male and Female Dungeness Crabs	No (B1)	Yes (A1,B)	What: Spatial variability in distribution of adult crabs by sex How: Systematic pot fishing Where: Lower Bay and Icy Passage When: 1992-93 Who:Erica Leder Ref: Leder, E.et al. 1993. Male Size and Female Reproduction in Dungeness Crab in Glacier Bay, alaska *.in* Proceedings of the Third Glacier Bay Science Symposium , Engstrom, ed. NPS, Anchorage Comments: As with the above study (to which it is related) the methods are careful and well described, and sample sizes are sufficient to allow confident replication.
Tanner & Red King Crab Pot Survey (*includes* "Tanner Crab Nurseries" *listed in project tracking database; also has an important multi-species component*)	No (B1)	PRIME (Ba)	What: Distribution, abundance, condition and population parameters of Red King & Tanner crabs; special attn. given to apparent nursery areas in Scidmore and Wachusett. How: Systematic pot survey, using commercial crab and shrimp gear. Substrate was grab-sampled during fall survey. Temperature measured at each pot. Where/when: Most of glacier Bay (excluding Hopkins, Adams, McBride and some side bays sampled (and in some cases re-sampled) during summer, 2002. Wachusett and Hugh Miller sampled again on finer scale, Fall, 2003. Who: Jim Taggart, Jennifer Mondragon, Alex Andrews, Julie Nielsen Refs: Taggart, SJ et al. 2003. Testing the Effectiveness of a high latitude Marine Reserve Network. Phase 1: Distribution of King and Tanner Crabs in Glacier Bay, Alaska. USGS/BRD, Juneau. Progress Report. Taggart, SJ et al. 2004. Testing the Effectiveness of a high latitude Marine Reserve Network. USGS/BRD, Juneau. Progress Report. Neilsen, J et al. 2004. Glacial Fjords in GLBA: Nursery areas for Tanner Crabs? Abstract, 4th GB Science Symposium, Juneau. Mondragon, J. et al. 2004. Spatial Distribution and Relative Abundance of Tanner and Red King Crab Inside and Outside Marine Reserves in Glacier Bay, Alaska. Abstract, 4th GB Science Symposium, Juneau. Nielsen, J. K. 2005. Distribution and movement of juvenile Tanner crabs *Chionoecetes bairdi* in Glacier Bay National Park. M. Sc. thesis. University of Alaska Fairbanks, Fairbanks.

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			Nielsen, J., et al. Submitted. Distribution of juvenile and adult Tanner crabs *Chionoecetes bairdi* in a glacial fjord ecosystem: implications for understanding recruitment processes. Canadian Journal of Fisheries and Aquatic Sciences **XX**:xx-xx. Comments: All species caught in pots were recorded as well as the target crabs. This survey should be viewed as a comprehensive of mobile benthic macroafauna. Will be very valuable for monitoring changes in relative abundance and distribution of shrimp, predatory gastropods, smaller crab species. The shrimp and crabs are indicators of regime shift. The commercially fished species are very important for monitoring the effects of the NPS decision to close commercial fishing (e.g. will blue king crabs recover now that the fishery is closed? Incidence of rizocephalan parasites was also carefully measured in 2002.
Movements of Red King & Tanner Crabs	Yes (A1, B1)	Yes (A1,B)	What: Estimate the movement of crab populations How: sonic tags attached to ~60 crabs, monitored 6 times by vessel; crossings of Muir sill monitored by fixed dataloggers. Where: near the boundary of the Muir Inlet reserve. When: Tagged Sept 02, Oct 03; tracked Nov 02-Feb 04 and 05 Who: Jim Taggart, Jennifer Mondragon, Alex Andrews, Julie Nielsen Ref: Taggart, SJ et al. 2004. Testing the Effectiveness of a High-latitude Marine Reserve Network in GLBA, Alaska. USGS/BRD/ Juneau Mondragon, J et al. 2004. Spatial Disrtribution and Relative Abundance of Tanner and Red King Crabs inside and Outside of Marine Reserves in Glacier Bay, Alaska. Mondragon, J. et al. 2004. Spatial Distribution and Relative Abundance of Tanner and Red King Crab Inside and Outside Marine Reserves in Glacier Bay, Alaska. Abstract, 4th GB Science Symposium, Juneau. Comments: data loggers have been only partially successful, but many relocations have been made by vessel. Large sample size makes it possible to estimate movement of populations and allows replication.
Bitter Crab Disease in Tanner Crabs	No	PRIME Aa?,Ba)	What: distribution & prevalence of bitter crab disease in Glacier Bay crabs How: testing blood of crabs caught during systematic pot survey for disease vectors Where: Glacier Bay When: 2002 Who: Kyle Moselle, Sherry Tamone, Jim Taggart, Jennifer Mondragon Ref: Moselle, K et al. 2004. The Distribution of Bitter Crab Disease in Tanner Crabs from Glacier Bay, Alaska.

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			Comments: large, systematic sample size, simple technique. Highly replicable and related to an important subject economically and (perhaps) ecologically.
Zooplankton studies	No (B1)	Yes? (A1,B?)	What: Zooplankton survey How: 50m vertical hauls at even numbered oceanongrapic station (per Hooge & Hooge 2002), and immediately offshore of beach seine sites (per Arimitsu, 2003) Where: Glacier Bay When: 1999-2002 Who: Martin Robards Ref: Robards, M. et al. 2003. Ecology of Selected Marine Communities in Glacier Bay: Zooplankton, Forage Fish, Seabirds & Marine Mammals. UDGD/BRD, Anchorage Comments: Sampling frequency and timing available in Glacier Bay database. Makes comparisons between authors' data and those of Wing 1963 (presumably unpublished), and Krieger & Wing, 1984. Given the point-in-time nature of sampling and lability of system, not likely to be an adequate baseline on a fine scale, but very useful on a regional scale and for average biomass determinations of the various surveyed species.
Ice-proximal Marine Invertebrate Concentrations	No (B1)	Yes? (A1?,B)	What: Distribution & abundance of benthic, epibenthic and planktonic invertebrates near tidewater glaciers How: Grabs, sediment traps; plankton tows When: 1984, 1986 Where: Near Riggs and McBride glaciers Ref: Simenstad, C. & R. Powell. 1988. *in* Proceedings of the Second Glacier Bay Science Symposium, Milner & Wood, eds. NPS, Anchorage. Comments: Zooplankton work potentially important adjunct to that reported in above ref., but paper at hand does not give sample size of tows. Benthic work also need clarification of sample sizes, but is clearly extensive and therefore valuable. Comparison with the Mueller work in the Dixon Harbor area should be possible. In both cases, station localities are approximately located.
Gustavus School Plankton Study	No	No	What: A school project to identify plankton Who: Chohla Dick. Comments: not designed to produce data
Invertebrate Predator Population Ecology	No	No	What: The distribution & ecology of Nucella Where: Glacier Bay Who: Gail Irvine.

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			Comments: According to Eichenlaub, Irvine did some preliminary work on *Nucella*, but her large proposal didn't get funded.
Multi-Agency Dungeness Study (MADS)	--	--	This is a general heading for a number of studies, reported in this table under several separate headings. Taken altogether, work done under this rubric is among the most extensive and replicable work done in the park. Despite the closure of the fishery in the park, it is of great relevance to the question of marine reserve design.
Red Tree Coral Exploration	No	No	What: Qualitative description of coral at a couple of localities Who: Tamone, Andrews, the other MADS crew Ref: Stone, R. P., J. Mondragon, and A. G. Andrews. 2005. Deepwater emergence of red tree coral, *Primnoa pacifica* in Glacier Bay, Alaska *in* 3rd International Symposium on deep-sea corals, Science and management. Poster Presentation, Miami, Florida. Comments: Not a monitoring subject per se, but the presence of coral provide the potential for reconstructing temperature, and gross trophics using isotope analysis of growth rings.
Tanner Crab Molt	No(B1)	PRIME (Ab,Ba)	What: Molt hormone analysis to document the presence of a terminal molt in crabs of various size. How: physiological analysis Where: Glacier Bay When: 2004 Who: Sherry Tamone, Jim Taggart, etc. Refs: Tamone, S., et al. In press. Ecdysteroid levels in Glacier bay Tanner crab: evidence for a terminal molt. Pages xx-xx *in* J. F. Piatt and S. M. Gende, editors. Fourth Glacier Bay Science Symposium. U. S. Geological Survey, Juneau. Tamone, S. T.,et al. 2006 Submitted. Ecdysteroid levels in Glacier Bay Tanner crab: evidence for a terminal molt. Canadian Journal of Fisheries and Aquatic Sciences **XX.** Comments: Found that a lot of terminally molted crabs are below legal size, which makes them immune from harvest mortality and likely sets them up for high reproductive success compared to their conspecifics that terminally molt above legal. This sets up a very strong selection favoring terminal molting below legal size. This study sets a baseline for determining whether the proportion of crabs terminally molting below legal size decreases after closure of commercial fishing. VERY IMPORTANT FISHERY IMPLICATIONS
Leather Chiton (Gumboot) studies	No (B1)	No? (A1?,B?)	What: Compared effects of *Katherina* removal on community structure How: removed gumboots from 2ea 25 sq m. plots and measured the result on kelps and selected macroinvertebrates in comparison to adjacent untreated plots.

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			Where: Torch Bay intertidal When: 1979-1983. Who: Megan Dethier, Dave Duggins Ref: Dethier, M. & D. Duggins. 1988. Variations in Strong Interactions in the Intertidal Zone along a Geographic Gradient: A Washington- Alaska Experiment. Comments: plots were permanently marked; if authors can relocate plots and provide more details on experiment protocols, may be a potential baseline. However, sample size is small.
Ecology of urchin/kelp/starfish community	No (B1)	Yes? (A1,B?)	How: Urchin experiments: urchins & algae rigorously censused on 200-400 sq m plots; then various manipulations were performed on 50 sq m plots within these areas. Starfish plots: starfish removed in some; urchins caged in others, + controls. Where: 4 shallow subtidal sites in central Torch Bay When: over 3 years, 1975-78. Who: Dave Duggins Ref: Duggins, D. 1980. Kelp Dominated Communities: Sea urchins, their Predators and their Algal Resources. Ph.D. Thesis, University of Washington.136p. (plus several related papers.) Comments: Rigorous study; could be important baseline if exact study areas can be located by author.
General marine (incl acoustics)			
Marine Ecosystem Conceptual Model(*s*)	No	No	Hale & Wright's, Bodkin's lovely models. Comments: conceptual; not intended to present specific data
Beardslee Islands Bird and Mammal Surveys	No	No	What: bird and mammal surveys How: skiff-based observation along standard transects. When: Summer, 1988 (Matkin); Summer, 1991 (Duncan & Climo); December, many years, 1975-2005 (Streveler) Where: Beardslees Ref: Duncan, T & L. Climo. 1991. Beardslee Island Bird & Mammal Survey, 1991. NPS, Gustavus. Comments: Matkin (probably should be discounted; report not found); Climo & Duncan (text of report found but not data appendix, which is a shame because did repeated surveys and were good observers); Streveler (Many years of Audubon bird counts; Paige has the data)

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			In all, not good baseline material except in a general sense, as observers, routes and conditions were too variable.
Marine Mammal and Seabird Distribution Surveys *(marine predator surveys)USGS*	No (B1)	PRIME (Ab,c;Ba,d)	What: Systematic surveys of Marine Birds and Mammals How: Repeated boat surveys along a standard set of transects, using standard protocols Where: Glacier Bay, Dundas Bay('99) and eastern Icy Strait When: June, 1999-2001; subset of Glacier Bay in Nov 1999 and March 2000. Who: Jim Bodkin, John Piatt, Gary Drew, Martin Robards, others Refs: Bodkin, J. et al. 2000. Marine Predator Surveys in GLBA. USGS/BRD, Anchorage Robards, M. et al. 2003. Ecology of Selected Marine Communities in Glacier Bay: Zooplankton, Forage Fish, Seabirds & Marine Mammals. USGS/BRD, Anchorage Piatt, J et al. 2004. Hotspots in a Glacial Landscape: Patchiness of Marine Fish, Birds and mammals in Glacier Bay. Abstract, 4th GB Science Symposium, Juneau. Drew, G & J. Piatt. 2004. Marine Habitats and their Effects on Marine Bird and Mammal Distributions in GLBA. Abstract, 4th GB Science Symposium, Juneau. Drew, G & J. Piatt. 2004. Monitoring of Marine Predator Communities in GLBA, 1991-2003. Abstract, 4th GB Science Symposium, Juneau. Comments: Systematic, replicable and extensive in space and time. Probably enough data to portray moderate changes in the more abundant species. Authors compared their 99-00 data with unpublished 1991 data, and were able to place confidence limits on some species trends over that time period.
FWS Marine Bird and Mammal Surveys -1980's	No (B1)	Yes (A2,B)	What: Bird and mammal censuses Where: Cross Sound and lower outer coast (1981); Cross Sound and Glacier Bay (1982) How: vessel surveys, focusing on colonies and (in 1982) vessel transects When: 1981,82 Who: Art Sowls, Dave Nyswander, John Trapp, Jay Nelson, Bill Lenhausen Refs: Sowls, A. etal. 1982. Marine Bird and Mammal Surveys of the Outer Coast of SE Alaska, Summer 1981. USFWS, Anchorage Nelson, J. & W. Lenhausen. 1983. Marine Bird and Mammal Survey of the Outer Coast of SE Alaska, Summer 1982 Comments: Counts not done to modern, statistically treatable protocols, but made by very seasoned observers. Detailed field notes given for each colony in 1981; 1982 report refers to a data appendix not sent to park, that resides in FWS Anchorage office (PARK NEEDS COPY OF THIS!).
FWS Marine Bird and Mammal	Yes (A1,B1)	PRIME	What: census of marine bird and mammal populations, with particular emphasis on

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
Surveys -2000's		(Ab,Bd)	murrelets. How: Variety of vessel-based transects, including linear transects 1 km offshore and a zigzag transect of variable offshore distance, standard transects in the bays and Icy Strait. Add'l visits to hotspots in 2004. The two years' data coalesced into one set of population estimates. Also censuses of colonies. Where: Western Icy Strait and outer coast, from Carolus – Dry Bay, including Dundas, Taylor, lower outer coast fjords and Lituya. When: July 2003-04 Who: Michelle Kissling, Kathy Kuletz, Steve Brockman Ref: Kissling, M. et al. submitted. Distribution and Abundance of Kittlitz's Murrelets Along the Outer Coast of GLBA. 4th GB Sci Symposium Comments: Rigorous study intended to be repeated every 3-5 years.
Hydroacoustic Survey for Euphausiids & Fish (1)	No (B1)	Yes? (A1,B?)	What: Characterization of potential prey resources, in proximity to whale feeding activity How: hydroacoustics with truthing by netting Where: Glacier Bay and elsewhere outside park When: summers, 1981-84 Who: Ken Krieger, Bruce Wing Ref: Krieger, K. & B. Wing. 1986. Hydroacoustic Monitoring of Prey to Determine Humpback Whale Movements. NMFS, Juneau Comments: Pretty extensive work. Gives broad picture of whale feed, useful on regional scale. Utility as baseline greatly increased if survey tracks can be relocated. Transects used are approximately located in report: Wing says that's all the detail there is.
Hydroacoustic Survey for Euphausiids & Fish (2)	No (B1)	Yes (A1,B)	What: Survey for Plankton & fish biomass distribution How: systematic, vessel-based hydroacoustic scanning; 48 trawl tows at 38 stations to truth the fish related to acoustic readings; CTD data taken with each tow; relative measures of chlorophyll at some stations Where: Stations throughout Glacier Bay and Icy Strait in water column <100 m. When: June 1999 Who: Abookire, Piatt, Speckman Ref: Robards, M. et al. 2003. Ecology of Selected Marine Communities in Glacier Bay: Zooplankton, Forage Fish, Seabirds & Marine Mammals. UDGD/BRD, Anchorage Comments: Systematic and extensive, using predator survey tracks and trawl sites per fish inventory database. Given the point-in-time nature of sampling and lability of system, not likely to be an adequate baseline on a fine scale, but very useful on a regional scale and for

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			average biomass determinations of the various surveyed species. Unfortunately, these authors do not attempt to draw comparisons with Krieger & Wing's work. I presume that station data are in the USGS database.
Marine Mammal Sightings	Yes? (A1?, B2)	Yes? (A2?, B)	What: Kept track of non-humpback marine mammals in course of whale survey work. How: Rigorous protocol for sample area and obs/time. When: 1994-present Who: Chris Gabriele, Janet Neilson, Tania Lewis Ref: Gabriele, C. & T. Lewis. 2000. Summary of Opportunistic Marine Mammal Sightings, Glacier Bay and Icy Strait, 1994-1999. NPS/RM. Comments: Data have been gathered up to present, but not reported since 2000. The authors' intend work "to be primarily descriptive [and to] … complement or inform work of other researchers". I consider it replicable and valuable so long as it continues to be carried out in strict adherence to present protocols, and especially if by the same observers; there is some disagreement among the GLBA staff in this regard, however. These data are especially important for scarce species like Minke whales & Dall porpoises, and add importantly to the data for harbor porpoises & killer whales.
Marine Reserves Effectiveness	--	--	A general topic with Goals: "Measure transfer rate of halibut, Tanner crab and red King crab between the newly created [Glacier Bay] reserves and the adjancent area … A second long-term goal is to measure detailed movement patterns of crab and halibut to identify essential fish habitat, seasonal changes in distribution, migration patterns and changes in movement and habitat requirements with ontogeny." The halibut and crab studies are reported under more specific headings elsewhere in this table.
Underwater Acoustic Monitoring	Yes (A2,B1)	PRIME (Ab,Ba)	What: Attempt to model impact of ship underwater sound on humpback whales' hearing and behavior. How: Constructed model using GB specific data (measurement of 35 vessel signatures) and a number of assumptions, notably on whale responses to and uses of the acoustic environment; from the model, made predictions on the distances humpback whale social functions and hearing acuity would be affected by two specific vessels going a specific speed. Where/When: M/V Capelin sound output measured at Glacier Bay,October 2002; Cruise ship outputs measured at Ketchikan Naval range, 1999-2001 & 2004. Bartlett Cove baseline, 2000-2002.. The Bartlett Cove station has been recording more or less continuously up to present. Who: Erbe, Kipple, Gabriele

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			Refs: Kipple, B. & C. Gabriele. 2003. Glacier Bay Watercraft Noise: Underwater Acoustic Noise Levels of Watercraft Operated by GLBA as Measured in 2000 & 2002. Naval Surface Warfare Ctr., Carderock Div. Rept to NPS. Tech. Rept. NSWCCD-71-TR-2003/522. Erbe, C. 2003. Assessment of the Bioacoustic Impact of Ships on Humpback Whales in Glacier Bay, Alaska. (Incl Exec. Summary by C. Gabriele) Rept to NPS by Erbe. Kipple, B. 2002. Glacier Bay Underwater Noise – Interim Report. Naval Surface Warfare Ctr., Detachment Bermerton. Technical Report to NPS. Gabriele, C. 2002. Underwater Acoustic Monitoring Project. Abstract in Projects/Investigator files Kipple, B. 2004. Coral Princess Underwater Acoustic Levels. Naval Surface Warfare Ctr., Detachment Bermerton. Technical Report October 2004 to Princess and NPS. Kipple, B & C. Gabriele. 2004. How Loud are those Cruise Ships Anyway?: Underwater Noise – Skiffs to Ships. Abstract, 4th GB Science Symposium, Juneau. Comments: Purpose of study is to make a first generation model, not to provide replicable data. Erbe says that there are too many assumptions in model to be used for management at this time. From baseline standpoint, boat signatures replicable. The baseline for naturally occurring sound is based on 5200 noise samples from Bartlett Cove over nearly 2 years, and should be an excellent baseline for that spot.
Underwater Noise Research - 1980's	No (B1)	Yes (A2, B)	What: Characterized acoustic environment of the bay by a variety of direct measures. Correlated acoustic measures with individual whale behavior as documented by Baker, Herman. How/when: Summer, 1981: emphasized acoustic environment by measurements of sound at 38 stations around the bay. Summer, 1982: emphasized correlations with whale behavior. Where: Glacier Bay, emphasizing areas where whales frequent. Who: Miles, Malme Ref: Malme, C et al. 1982. The Acoustic Environment of Humpback Whales in Glacier Bay and Frederick Sound/Stephens Passage, Alaska. Bold, Baranek & Newman, Inc. Tech. Report 4848. Miles, P. & C. Malme. 1983. The Acoustic Environment and Noise Exposure of Humpback Whales in Glacier Bay, Alaska. Bold, Baranek & Newman, Inc. Tech. Memo #734. Comments: Stations are located in 1982 report to within 1 to .1mi. The methods are very

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			well described. Should be generally replicable.
Ecology of Selected Marine Communities	--	--	What: Synthesis of oceanography, plankton, forage fish, and marine predator studies. Does not include any benthic/demersal stuff. When: Various, but mostly in the last decade; refers to some earlier work Where: Glacier Bay Who: Robards, Drew, Piatt, Anson, Abookire, Bodkin, Hooge, Speckman Ref: Robards, M., et al., 2003. Ecology of Selected Marine Communities in Glacier Bay: Zooplankton, Forage Fish, Seabirds and Marine Mammals. USGS/BRD, Anchorage Comments: THIS IS A MAJOR SYNTHESIS of several important studies (all of which except the zooplankton study are reported elsewhere on this outline). Detailed studies summarized there will be reported under other headings.
Torch Bay-Dixon Harbor Benthic Fauna & sediment chemistry	No	Yes (A1,B)	What: survey of subtidal benthic fauna and sediment chemistry How: document species presence and estimate rel. abundance for 3 grabs each at 22 stations; one sample from each station analyzed for clast size and a number of chemical constituents, notably heavy metals. Where: Dixon Harbor and Torch Bay When: 1975-76 Who: George Mueller, A.S. Naidu and Doug Schamel. Mueller, G. et al. 1977. Benthic Marine Studies. *in* Dixon Harbor Biological Survey: final report on the summer phase of 2005 research. Streveler & Worley, eds. NPS, Juneau. Comments: detailed but only roughly quantitative analysis of fauna. Geochemical analysis extensive and quite repeatable, given the number of stations, even though the stations are not precisely located.
Juvenile fish/oceanography surveys	Yes (A1,B1)	PRIME (Aa,c)	What: Growth, distribution and abundance of juvenile salmon and associated fauna, with associated CTD parameters along standard transects in Icy Strait & near Icy Point (SECM program) When: Six times, May – October, 1997 to present Where: 4 Transects in Icy Strait & at Icy Point, respectively Who: Joe Orsi, Emily Fergusson, Molly Sturdevant, Burce Wing. Ref: Orsi, J. et al. 2005. Survey of Juvenile Salmon and Associated Epipelagic Ichthyofauna in the Marine Waters of Southeastern Alaska, May-August 2004. Report to the North Pacific Anadromous Fish Commission, 2005, Auke Bay Biological Lab Comments: A valuable long-term study with major tie-ins to other biologic and oceanographic work in the area. Methods apparently rigorous and well described.

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
Sedimentation & Composition of Fjord Wall Communities	No (B1)	No? (A1?,B?)	What: Correlation of rock wall shallow subtidal invertebrate communities with glacial influence (principally sediment in the water column) How: Suspended sediment amts and CTD measurements and evaluation of biota from photography of adjacent rock wall Where: 9 stations from Willoughby N to upper Tarr an Muir Inlets (as well as elsewhere in SE) When: 1990 Who: Diane Carney, John Oliver, Cynthia Armstrong Ref: Carney, D. et al. 1999. Sedimentation and Composition of Wall Communities in Alaskan Fjords. Polar Biol. 22:38-49 Comments: Sites may be precisely identifiable due to photography (and I presume GPS locations). Work is based on single occupations for oceanographic data. Emphasis on biotic sampling was extensive geographically and does not provide a very large data suite per site; therefore, the utility as a baseline is limited to change on a regional scale.
Impacts			
Vessel Effects on Marine and Nearshore Zone	No	No	What: Overview of vessel impact potentials When 2000 Who: James Wuebben, Lewis Hunter, Dan Lawson, Susan Bigl Ref: Wuebben, J. et al. 2000. Impact Study of Vessel Effects on the Marine and Nearshore zone, Glacier Bay, Alaska. CRREL report to NPS Comments: A broad but cursory overview of a large range of impact potentials. Presents little or no original data
Commercial Fisheries, *including* Commercial Tanner Crab Harvest	Yes (A2,B1)	Yes (A2,B)	What: Various data sets and talks assembled by Soiseth in "Project Tracking" on fisheries and catches. Includes IPHC Halibut catch in Glacier Bay and nearby areas, ADF&G harvest data for many species. ADF&G Tanner crab stock assessment surveys, Glacier Bay, Icy Strait and other areas in SE AK. Comments: these programs are certainly intended as monitoring of catch levels, and as crude indices to stock sizes & composition.
Commercial Fishing Compensation Project	No	No	Comment: Financial, political; not relevant in this context
Dungeness Crab Gear Distribution Survey	No	No	That fishery is now closed

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
Dungeness Injury	No	No	What: Frequency, causes and implications of injury to crabs in a pot fishery How: Experimental pot fishery backed up by lab study of injured crabs' competitive abilities Where: Bartlett Cove When: June-October 2002 Who: Julie Barber Ref: Barber, J. 2004. Factors Influencing Injury of Trapped Dungeness Crabs and Survival Consequences for Released Males. M.S. Thesis, U of Rhode island. (According to Taggart, there is another manuscript that was never finished.) Comments: Field portion designed to elucidate the effect of soak time on injury rate, of a fishery that no longer exists in the park. (But could be very important for fisheries in region. There is a very large data set on injury rates in Dungeness crabs both before and after commercial fishing closure.)
Kittlitz's Murrelets & Vessels	No (B1)	PRIME (Ba,d)	What: Effects of vessels on murrelet distribution, use patterns. How: Observation of murrelets in presence/absence, before/after, during vessel encounter, Where: 7 murrelet concentration sites in Glacier Bay When: 41 days during may-July, 2004. Who: Alison Agness, John Piatt Ref: Agness, A. 2006. Effects and Impacts of Vessel Activity on the Kittlitz's Murrelet in Glacier Bay, Alaska. M.S. Thesis, U Washington. Comments: Very careful and replicable work with much attention to statistical treatment.
Cross Sound and Icy Strait sport fishery harvest (includes Sport Fishing Interaction Survey*)*	Yes (A2,B1)	Yes? (A1?,B)	What: Survey of charter fishery effort and harvest How: Creel surveys; questioning of individual fishers When: 2002 and 2003, continued by ADF&G since then Who: Jason Gasper, Vince Gallucci, marc Miller; Bruce Kruger. Refs: Gaspar, J, et al. 2005. Sportfish Information for managing GLBA, vol 1, Catch, Harvest, and Effort for the Gustavus and Elfin Cove Sportfishery in the Cross Sound and Icy Strait Region of northern SE Alaska during 2003. NPS Tech. Rept, Seattle. Kruger annual data reports to ADF&G Comments: NPS study compares and contrasts effort and harvest among Gustavus and Elfin Cove based charter fleets. Documents seasonal local depletion of Pacific halibut. Calculates CPUE, HPUE. ADF&G work monitors catch characteristice of fish landed at Gustavus dock . Work generally sufficient to document major changes in catch characteristics, to some unknown level of accuracy (but at least the self-reporting bias is eliminated). This

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			Galluci/Gaspar work also has a sociological component.
Sea Lion Reaction to Vessels - Marble island	No (B1)	Yes? (A1?,B)	What: Observations of vessel approach distance and sea lion reaction How: Visual observation and gauging of vessel appprach distances; defined & measured disturbance rigorously Where: South Marble Island When: 23 days in summer, 1994,95,97. Refs: Matthews, E. 1997. Effects of Vessel Traffic on the Behabior of Steller Sea Lions at a Haulout in GLBA. UAS rept to NPS. Matthews, E. 2000. Reaction of Steller Sea Lions to Vessels at a Haulout in Glacier Bay. UAS rept to NPS Comments: This sample of 23 days and 88 vessel approaches is a reasonable sample of activity during those years; if replicated during approximately the same time of year, may be a fairly good baseline for disturbance as a function of approach distance then
Researcher Disturbance to Sea Lions	No (B1)	No?(A1?,B?)	What: Part of a regional study to determine the effects of research on sea lion haulouts & rookeries. How: Observers placed on selected sites for 2 weeks to document effects of research activities. Where: S Marble, Graves When: Summer, 2003 Who: Laura Kucey Ref: Kucey, L. 2005. Human disturbance and the hauling out behaviour of Steller sea lions. MS thesis, University of British Columbia, Vancouver. Comments: I've not reviewed this thesis, nor has the RM staff, but based on project description the work may be replicable.
Harbor Seal reaction to vessels	Yes? (A1?,B1)	PRIME (Ba)	What: documenting frequency, severity and timing of disturbance related to human (vessel) and other causes relative to aerial census overflights (Spider) and seismic surveys (Hopkins) How: Direct observation using defined protocols Where: Spider Island, Johns Hopkins Inlet, North Marble Island When: 1996- 1999, comparing back to 1991 data at Spider island; 1994 in Hopkins; 1998 at North Marble Who: Beth Matthews, Janene Driscoll Refs: Matthews, E. 1996. The Effects of Seismic Reflection Surveys and Vessel Traffic on Harbor Seals In Johns Hopkins Inlet, GLBA, Alaska. NPS, Gustavus. Matthews, E. 1997. Preliminary Assessment of Harbor Seal haulout Behavior and

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			Sources of Disturbance ath the Spider Island Reefs in GLBA. UAS rept to NPS. Matthews, E. 2000. Progeress Report: Measuring the Effects of Vessels on Harbor Seals at North Marble Island, a terrestrial Haulout in GLBA. UAS rept to NPS. Matthews, E. and J. Driscoll. 2000 Draft. Disturbance of Harbor Seals and Potential Effects on Counts from Aerial Surveys, GLBA, 1991-1999. Comments: Principal purpose of Spider Is work was to evaluate effects of disturbance on counts, but also quite useful as index of disturbance over that decade and a baseline for the future. Hopkins and Marble work was more cursory, but very systematic and replicable. Crucial info given the plight of seals lately.
Marine Mammal tissue analysis	No	No	What: analysis of one stranded whale's tissues for organochlorides When: 2002 Where: Pt. Gustavus stranded whale Ref: Letter from Gina Ylitalo to Chris Gabriele, 6/4/02. Comments: Another set of samples are "on the shelf" for the stranded 2004 calf, which are planned to be submitted for pathology analysis. Too few samples for baseline.
Cruise Ship Impact on Water Quality	No	No	What: Study is part of an ongoing program being conducted by the Alaska Department of Environmental Conservation to evaluate the impacts of the commercial cruise ship industry on Alaskan coastal waters. The study will collect bateriological and oceanographic samples at one sampline station in Bartlett Cove. When: 2003 Where: one station at Bartlett Cove Who: Gendron, ADEC Comment: Park has rec'd no data from this according to Rusty Yerxa. Judging from permit appln, was to be a small, cursory study.
Increase in male Dungeness after fishery closure	Yes (A1,B1)	Yes (A1,B)	What: Change in average size of male crabs How: Systematic pot fishery before and after closure, with outlier as control Where: Lower Glacier Bay; outlier in Icy Strait When: 1997-2001 Who: Jim Taggart , Tom Shirley, Chuck O'Clair, Jennifer Mondragon Refs: Taggart, SJ et al. 2004. Increase in the Relative Abundance of Large Male Dungeness Crabs Following Closure of Commercial Fishing in Glacier Bay, Alaska. Abstract, 4th GB Science Symposium, Juneau. Taggart, S. J., T. C. Shirley, C. E. O'Clair, and J. Mondragon. 2004b. Dramatic increase in the relative abundance of large male Dungeness crabs, *Cancer magister*,

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			following closure of commercial fishing in Glacier Bay, Alaska. Pages 243-253 *in* J. B. Shipley, editor. Aquatic protected areas as fisheries management tools. American Fisheries Society, Bethesda, MD. Comments: Carefully designed study. Highly replicable.
Survey of private vessel fishing license permit holders in Glacier Bay proper	No (B1)	Yes? A1?,B)	What: Survey of private angler fishery effort and harvest Where: in Glacier Bay How: Phone and mail, asking general info for # & species of fish caught. When: 2002 and 2003 Who: Sarah Osterhoudt, Jane Swanson, Darrell Johnson Ref: Osterhaudt, S. et al. 2005. Sportfishery Information for Managing GPBA, vol 2, A survey of Fishing License Holders Entering Glacier Bay on Private Vessel Permits. NPS Tech. Rept, Seattle Comments: Companion to Gasper et al report. Authors caution that data not field checked and "may not be representative of the intended population". Soiseth feels that the data are the best available on this subject..
Intertidal			
Landforms/sediments			
Dry Bay Shoreline Change	No	No	What: History of shoreline change at Dry Bay How: Compiling historic maps Who: Chad Soiseth Comments: Not enough detail on these various sketch maps to replicate.
Beach Characteristics, Icy Point-Sea Otter Creek	No (B1)	Yes? (A2,B?)	What: Character of shorelines How: 55 beach transects, documenting beach profile, ht of storm beach activity, and vegetation zones; 90 sediment samples along these transects. Where: Cape Fairweather-Icy Point (with aerial obs N of Cape Fairweather) When: 1975-1977 Who: Bruce Molnia & crew Refs: Molnia, B. 1978. Beach Dynamics, Geology and Oil spill Susceptibility of the Gulf of Alaska Coastline in GLBA – Sea Otter Creek to Icy Point. USGS Open File Report 78-284. (This report is in archives on microfiche – can't access). Molnia, B. 1980. Beach Characteristics and Physical Aspects of Oil Spill

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			Susceptibility. *in* Lituya Bay Environmental Survey, Streveler, Worley & Molnia, eds. NPS, Gustavus. Comments: Transects probably could be relocated within 100m or so. Profiles are sketches whose accuracy is based on survey data related to an estimate of MSL. The 1978 report may offer more detail, but I did not review it. I observed the field work, and feel that changes in elevation of >1m could be detected. Replicable on that level.
Invertebrates/algae			
Intertidal Bivalve Study	No (B1)	PRIME (Ab, Bd)	What: Survey of clam density and species composition How: Ten .25m quadrats sampled at 0 tide level, ~86 sites When: 1999-2000 Where: Many places along Glacier Bay, Idaho Inlet and Port Althorp. Who: Jim Bodkin, Kim Kloecker, Esslinger, DeGroot,, Monson Refs: Bodkin, J & K. Kloecker. 1999. Intertidal Clam Diversity, Size, Abundance in GLBA: 1999 Ann rept. USGS, Anchorage Bodkin, J et al. 2000. Sea Otter Studies in GLBA: Aerial surveys, foraging observations, and Intertidal Clam Sampling. USGS, Anchorage. Comments: A very important, rigorous study that provides a splendid baseline on a resource undergoing drastic change.
Intertidal Community Change	No	No	What: Assess biodiversity and temporal changes in rocky intertidal communities along the western coast of the United States, Where: This study will resample a site within Glacier Bay National Park which was initially studied in July of 2002. Who: Peter Raimondi Comments: Only thing found is a permit appln in project tracking. That appln suggests that sampling of the site will be done in a way to allow long-term monitoring. This needs to be corroborated. Project appears not to have occurred, so far as is known to Rusty Yerxa
Torch Bay Intertidal Community Studies – 1970's	No	No	What: Biotic characterization of intertidal biota; investigations of species interactions and response to disturbance. How: Careful mensuration, disturbance experiments, removal/addition experiments Where: Torch Bay When: 1993-94 Who: Dave Duggins, Jim Quinn

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			Refs: Duggins, D & J.Quinn. 1975. Rocky Intertidal Communities. *in* Dixon Harbor Biological Survey: final report on the summer phase of 1994 research. Streveler & Worley, eds. NPS, Juneau. Quinn, J & D. Duggins. 1977. Rocky Intertidal Communities. *in* Dixon Harbor Biological Survey: final report on the summer phase of 1995 research. Streveler & Worley, eds. NPS, Juneau. Comments: Much of descriptions, though detailed, are not pinned to precise sites. Several removal/addition experiments were initiated and monitored, but these are also not exactly located, and besides, since responses to disturbance are usually rapid, the value of monitoring them at this late date are nil.
Wachusett Intertidal Transects	No (B1)	Yes? (A2?,B?)	What: Intertidal Transects How: General desription AND PHOTOS of four intertidal transects Where: upper and central Wachusett Inlet When: summer 1971 & 1982 Who: Bill Garry, Lewis Sharman, Cathy Coghill Refs Garry, W. 1971. Intertidal Transects in Wachusett Inlet. Report & Photos in Barco library archives. Sharman, L. & C. Coghill. 1982. Wachusett Inlet Intertidal Sruveys, August 1982. Barco Library archives Comments: The transects are marked by cairns and are as well Field's photostations; this plus photos may well make them relocatable. The photos also will illustrate gross changes in cover by major organisms. Sharman & Coghill did reoccupy them in 1982. Work not done in great detail, but given the changes expected between now & then, it forms a useful if hazy "before" picture.
Intertidal Monitoring	No (B1)	Yes? (A1?,B)	What: Purposes are to develop monitoring protocols and to elucidate "dynamics of processes that contribute to variation" in rocky intertidal communities. How: Develop and use protocols for monitoring; sampled 25 rocky sites 4 times each When: 1997-2001 Where: Various sites along Glacier Bay Who: Gail Irvine Ref: Irvine, G. 2005. Development of Coastal Monitoring Protocols and Process-Based Studies for Intertidal Assemblages of Glacier Bay National Park and Preserve; Addendum to BRD-NRPP Project. Comments: The purpose was to develop rather than apply a protocol. Efficacy of that

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			protocol is under analysis; if the result is positive, then some or all of the 1997-2001 data can be used as a baseline for future monitoring
Marine Intertidal Community Development	No (B1)	Yes (A1,B)	What: Factors influencing biotic differences on bedrock-boulder shores How: Measured water chemistry & turbidity, distance from glacier; measured species presence & abundance in quadrats along vertical transects; did site-to-site boulder transplants. Where: along the east Glacier Bay chronosequence. When: summer, 1984. Who: Lewis Sharman Ref: Sharman, L. 1988. Marine Intertidal Community Development following Glacial Recession in Glacier Bay, Alaska. *in* Proceedings of the Second Glacier Bay Science Symposium. NPS, Anchorage. Comments: Not in paper, but Lewis has photos and notes that will allow reoccupation of his 6 study sites and re-measurement of the biotic & physical parameters. Significant adjunct to Gary/Sharman and Irvine work.
Fish			
Spawning Beaches	No	No	What: Opportunistic observations on beaches used by spawning forage fishes Who: several staff members. Comments: Related to next study
Capelin Spawning Ecology	No	No	What: Spawning ecology of capelin Where: Glacier Bay When: 1999-2004 How: based on midwater trawling/ beach seining/ oceanography. also did analysis of coastal inventory for potential spawning sites Who: Yumi Arimitsu, others Ref: Arimitsu et al. in review. Glacial influence on distribution, abundance and spawning dynamics of Pacific capelin. Comments: Have not seen draft paper, but assume it is based on a synthesis of data from other studies cited at various places above; therefore not listed separately here for its baseline potential.

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
Birds			
Black Oystercatcher Ecological Assessment	Yes (A1, B21)	Yes (A1,B)	What: Breeding biology, overwintering survival and abundance/distribution of breeding territories How: Capture, banding/resighting, morphometric measurement, observation, with objectives of assessing population distribution, abundance, productivity. Where: Beardslee Islands When: 2004-ongoing Who: David Tessler, Lewis Garding, Yumi Arimitsu Ref: Tessler, D. 2005. Black Oystercatcher Distribution and Productivity in the Beardslee islands, GLBA, Alaska. ADF&G, Juneau. Comments: Part of an interagency study to document aspects of oystercatcher biology on a regional basis. Thorough, disciplined study, a valuable update and extension of Lentfer's baseline.
Breeding Ecology of Black Oystercatchers	Yes (A2, B1)	Yes (A2,B)	What: Survey of Oystercatcher nesting activity How: repeated visits of all shorelines by kayak Where: Beardslee Islands and adjacent mainland When: May 30 – July 10, 1989 Who: hank Lentfer & Anya Meier Ref: Lentfer, H. & A. Maier. 1989. Distribution & Biology of Black Oystercatchers in the Beardslee Islands, Glacier Bay, Alaska. NPS/RM Comments: Thorough survey which very likely noted all nesting pairs in the area. Important baseline against which to compare Tessler's recent work.
Shorebird GIS Data from the Bear Campsite Assessments Project	No	No? (A1?,B)	What: Noted shore-nesting bird occurrences as part of protocol for measuring visual impacts to campsites. How: visual observation Where: Many campsites along Glacier Bay When: 2001-02 Who: Tania Lewis, Nat Drumheller. Comments: data not worked up but possibly a useful adjunct to Arimitsu study.
Shorebird Surveys - NPS			Who: Mary Kralovek. Comments: Never happened

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
General/impacts			
Beach Surveys for Nesting Birds (*same as* "Human Disturbance of Coastal Marine Birds")	No (B1)	Yes (A2,B1)	What: Determine the near-shore distribution of the arctic tern, black oystercatcher, mew gull and glauous-winged gull, herring gull, parasitic jaeger, semipalmated plover and spotted sandpiper, with emphasis on coastal areas receiving high visitor use. Assessed oystercatcher breeding productivity in Beardslee Islands. How: Determined high use areas from NPS data. Did foot surveys of most heavily used sites: other shores were observed at close range from a boat, and followed up by foot if signs of nesting beharvior noted; some closed areas not surveyed. Areas with highest concentrations surveyed twice on successive years. Where: Glacier Bay When: 2003-05; oystercatcher breeding in Beardslees, May-July, 2004. Who: David Tessler, Yumi Arimitsu, Marc Romano, John Piatt Refs: Arimitsu, M., et al., 2004. Ground-Nesting Marine Bird Distribution and the Potential for Human disturbance in GLBA, Alaska: 2003 Annual Report. USGS/BRD, Anchorage Arimitsu, M. et al. 2004. Ground-neting Marine Bird Distribution and Potential for Human Impacts in GLBA. Abstract, 4th GB Science Symposium, Juneau. Arimitsu, M. et al. 2005. Ground-Nesting Marine Bird Distribution and Potential for Human Impacts in Glacier Bay. USGS (BRD), Anchorage. (Final report currently in review) Comments: Survey methods spelled out well in reports, but somewhat vague on exact boundaries of areas defined as "high use" and on the number & exact itineraries of observers (This may be remedied in the final report). The work did not include controls (since most concentrations were found to be in closed areas) and was based on one-time visits, so it provides more of an index than a population estimate. But as such, should be replicable for general patterns.
Beach Debris Surveys	No (B1)	Yes (A2,B)	What: Foot surveys of beaches to note amounts and types of beach debris How: Most or all using NOAA standard protocols. Where: Bartlett Cove, Lester & Young Islands, Taylor Bay, Outer coast When: 1988-1992 Who: Numerous investigators Refs: Streveler, G. 1989. Accumulation of Debris and Bird/Mammal Carcasses on GLBA

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			Beaches: a summary of existing data. Sharman, L. & H. Lentfer. 1991. 1991 Dixon Harbor Biological Survey. NPS, Gustavus. Rettew, J. Persistent Marine Beach Debris Survey, Lester & Young Islands, GLBA, Gustavus, Alaska. NPS/RN, Gustavus. Polasky, C. 1992. Bartlett Cove Beach Debris Survey, GLBA, Gustavus, Alaska. NPS, Gustavus Greer, Antaya, Schroeder 1991-1992. Raw Data in Sharman's files. Johnson, S. 1988. Surveys from Taylor Bay to Justice Creek (with NPS's Hager & Perry) NOAA Raw data in Sharman's files. (1992 data in same file presumably Rettew's) Comments: Generally done to NOAA protocols, and in all cases well enough described to replicate. Very useful baseline
Coastal Resources Inventory and Mapping Program; Coastal Inventory - Dynamic Segmentation	No (B1)	Yes (A2,B)	What: Systematic characterization of biota, substrate, morphology and exposure of shore How: Using standard coastwalker protocol developed at GLBA Where: Entire park intertidal zone with exception of outer coast N of Lituya When: 1997-2003 Who: Lewis Sharman et al. Ref: Data archived at GLBA/RM Comment: The coastwalker data are not sufficiently quantitative for baseline use, but the relocatable photos accompanying each shore segment can be used to document gross changes in plant and encrusting invertebrate cover, as well as in shore morphology.
Outer Waters Vessel Activity Surveys	Yes (B1)	Yes (A2,B)	What: vessel survey How: Aerial surveys, with a stratified sampling design; photos of individual vessels Where: Waters in GLBA outside Glacier Bay proper When: 2002-03 Who: Chad Soiseth Ref: Soiseth, C. 2004. Vessel Use and Activity in GLBA's Outer Waters. Abstract. 4th GB Science Symposium, Juneau. Comments: Multiple replicates of day of week and weekend strata over two summer (June-Sept) seasons. The design is replicable and established a baseline of use and activity in GLBA's outer waters from Excursion Inlet to Icy Point
General, Other			
Birds of Glacier Bay Nat'l Monument	No	No	What: Richly annotated checklists with much historical information.

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			How: Compiled by rangers based on a theirs' and others' observations Where: Glacier Bay mostly When: 1962, 1967 Refs: Jacot, F. 1962. Checklist of Birds for Glacier Bay National Monument. NPS, Gustavus. Wik, O. 1967. Birds of Glacier Bay National Monument. NPS, ranger division, Gustavus Comments: Wik is an excellent observer, and pulls together much relevant information. Should be considered important inventory material, and certainly allows conclusions to be drawn about changes in cases where these are major. Jacot's contribution is mostly subsumed into Wik's.
Climate-Glacial-Ocean Linkages	No	No	What: Ice-proximal sediment records as proxies for short-term climate change (as mediated through water column events and glacial discharge) How: Reading sedimentary record of such things as summer organic deposition, frequency of dropstones, proportions of seasonal rythmites. Where: upper Glacier Bay When: ongoing, dating back to Cowan/Powell's early work see elsewhere in this document) Ref: Cowan, E & R. Powell. 2004. High Frequency Climate Signals in Fjord Sediments of GLBA, Alaska. Abstract *In* 4th Glacier Bay Science Symposium, Juneau. Comments: This paper is a general treatise on the utility of such records, not a presentation of records themselves.
Falls Creek EIS	No	No	Specific parts thereof considered under other headings.
Gustavus *and lower Glacier Bay* Bird Data	No (A1)	No	What: Observations of local birders, including the Audubon Christmas counts (Paige) and owl surveys (Drumheller) When: for last 30 years or so Comments: don't follow replicable protocols & therefore are not good baseline material except in a general sense
Ranger Daily Logs	No	No?	Scattered observations generally; may contain elements that are replicable, especially from notes of Ole Wik & Jerry Hok in late '60's.
Digital Orthophotos	No (B1)	PRIME (Ba)	What: 1996 georeferenced black/white digital ortophoto coverage for park and Tongass. In case of GLBA, ~80% coverage. Comments: According to Bill E, these are the state-of-the-art photo collection now available for accurate GIS layer bases. Extremely important as the basis for future mapping

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			of all sorts
Visitor - Backcountry Surveys	No (B1)	PRIME (Ab,Ba)	What: Five survey projects done prior to 1990: - backcountry users, 1978 & 1984 - cruiseship passengers in 1979 & 1989 - Alsek River recreationists in 1984 Refs: Johnson, D et al. 1990. Social Science Perspectives On Visitor Use in GLBA. U Washingoton CPSU Littlejohn, M. GLBA Bartlett Cove Visitor Survey. Visitor Services Project Rept 114. U Idaho CPSU Comments: This work is included despite being sociological in nature, since it is virtually the only body of such literature for the park. The Johnson ref (Chap 6) gives an overview of 4 of the 5 sociological studies done in the park prior to 1990 (the 5th, a survey of cruiseship passengers, was being analyzed at the time of writing). Each was done by polling professionals and is therefore (likely) replicable; and in fact Johnson does make direct comparisons between studies in his report. The 1999 visitor survey is reputed to have design flaws according to Allison Banks.
Backcountry Visitor Use Data	Yes (A2,B)	PRIME (Ac,Ba)	What: use volumes, distribution & trends How: Data from park records When: 1996-2003 Where: Glacier Bay Who: Mary Kralovek, Allison Banks Ref: Kralovek, M et al. 2004. Distribution and Number of Backcountry Visitors in GLBA, 1996-2003. Abstract, 4th GB Science Symposium, Juneau. Comments: an exceedingly important baseline
Wildlife Sightings Database	No	No	What: park sighting records How: Opportunistic, unsystematic When: Going back to before the ‘60’s Where: park Who: whomever Comments: useful to provide very general impressions over the long term, but not valuable as a baseline per se.
Map for New Park Brochure- 2006	No	PRIME (Ab,Ba)	What: Map for new park brochure, which is based on latest /best topographic & bathymetric information.

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			Who: Tom Patterson Comments: Bill Eichenlaub says GIS data accumulated by Patterson is state of the art, and potential basis for any major GLBA mapping project.
Dry Bay Photo Mosaics	No (B1)	PRIME (Ba)	What: stitched-together collage of aerial photos from 1948, 1966, 1978, 1980 & 1996 Who: Bill Eichenlaub Comments: These photos provide superb baseline for following and documenting changes in vegetation, landforms, human works.
Historical photos	No (B1)	PRIME (Ab,Ba)	What: various aerial photography series for park, beginning with 1929 and 1948 sets. Many other sources, including: - Bill Field's collection, I think now archived at UAF, plus a large selection of prints at GLBA. - Harris's (1969) occupation of many Field photostations - Many Institute of Polar Studies geology reports have poor copies of repeatable historic photos in them; in a number of cases, the authors are still around and probably have the originals, from which good copies could be made. Key works with photos include: Taylor (IPS 3); Price (IPS 9); Welch (15); Mckenzie (25); Mickelson (40) and Larson (65,66). - Original photos in Cooper & Lawrence reports Mark Noble, U Minn and Richard Carstensen are all likely repositories for Cooper/Lawrence photos. Yerxa is accumulating historic photos for NPS archives. - Austin Post has large set of aerials he has taken personally; also has historical file. - Many early park employees have photos in their personal files - A series of photos from Icy Strait and Dundas from the '30's by a trap guard named Edberg, in GLBA archives. - Morgan DeBoer's and Jim Mackovjak's historical photo collections from Gustavus area. - Molnia's recent reoccupation of Field's stations SEE ESPECIALLY: Lawrence, et al. 1993. Repeat Photograohy and landscape Change at Glacier Bay, 1979-1993. *in* Proceedings of the Third Glacier Bay Science Symposium , Engstrom, ed. NPS, Anchorage

KLGO Project Evaluation Table **Final, 10/17/06**

Greg Streveler, in consultation with Meg Hahr & Theresa Thebault, KLGO

(Codes follow numerics in a companion document,"Identifying Baseline Candidates and Ongoing Monitoring for the SEAN parks")

Project	**Ongoing Monitoring?**	**Potential Baseline?**	**Comments**
Atmosphere			
Lichen-air quality pilot	Yes (A1, B2)	Yes (A2,B)	What? Survey lichens for indications of reduced air quality How? Tissue evaluation for heavy metals, Where? Two sites in Skagway Valley, 2 in Taiya Valley When? 1998-1999 Who? Linda Geiser, Elaine Furbish Refs: Furbish, E, L. Geiser and C. Rector. 2000. Lichen - Air Quality Pilot Study for KLGO and the City of Skagway, AK. NPS, RM. 48p. Hahr, M. 2004. Assess current status of lichens and develop air quality biomonitoring protocol. Proposal to NPS Air Resources Division. Comments: Canadian government installed passive air samplers (to measure mercury and other contaminants) in SKG for one year starting in 2006. Park will resample pilot study plots and install passive air samplers (PASDs) during two-year follow-up study (fy 07).
Dyea weather station	No (B1)	Yes?(A1?,B?)	3 summers' data from Dyea campground FTS weather station beginning in 2003. Monitoring may be continued.
NOAA weather, SKG	Yes (A1,B1)	Yes (A1,B)	What? Weather station Where? Skagway Airport (mouth of Skagway River) When? ongoing Who? National Weather Service
NRCS Snow Survey Site (Moore Creek snow course & automated weather station)	Yes(A1,B1)	Yes? (A1, B), (Snow yes; station after more time)	What? Snow depth and precip gage read manually; automated weather station (solar radiation, wind speed, air temp, snow depth). Where? Adjacent to the Klondike Highway at the Moore Creek Bridge, near treeline below White pass. When? Snow monitored since the '80's; weather station since 2004. Who? USDA-Nat Resource Cons Svs , NPS Ref? Data online at http://www.ak.nrcs.usda.gov/snow/
ADEC Cruise Ship emissions (opacity)	Yes?(A2,B2?)	No (A1)	What? Readings of visible emisions (opacity) from vessel smoke stacks How? Certified observers read the visible emissions from cruise ships to determine whether ships are in

Project	Ongoing Monitoring?	Potential Baseline?	Comments
monitoring			compliance with the State Marine Vessel Emission standard (18 AAC 50.070) Where? Skagway Harbor When? Once per year (random) Who? ADEC Comments: A pretty cursory program park collected this data in the past (via maintenance staff), but not clear where the info is kept. If we could locate the data, we'd need to evaluate quality. We are hoping to partner with tribe or other entity to continue this work
ADEC Fine Particulate Matter Pollution (PM2.5) Monitoring	No(B2)	Yes? (A1?,B?)	What? Monitoring of particulates How? PM2.5 Continuous Monitoring Station Where? 2 sample stations at Skagway When? Jan 2004-March 2005 Who? ADEC (vanVliet) Ref: No report; data at ADEC Comment: park has had hard time getting summary of results from ADEC, but in phone conversation with Hahr, vanVliet said that state standards were not exceeded
Birds			
Bald Eagle productivity	Yes(A1,B1)	Yes (A2,B)	What? monitored 3 nests annually How: repeated obs to note whether active Where? along the Taiya River When? 2002-06 Who? NPS; Ref: Data maintained by USFWS, JNU (Jacobson). Comment: Known nests have not been active in these years; nest to S outside of park active lately. One nest was destroyed due to erosion of riverbank (undercutting the tree). Two new nests were constructed and were recordedin 2006 as active nest structures.
Off-road Breeding Bird Surveys (ORBBS) - ALMS	Yes(A1,B1)	Yes (A2,B)	What? Offroad Breeding Bird Survey, expanded and subsumed into the Alaska Landbird Monitoring System How? ORBBS and ALMS protocols Where? 2 routes in Taiya Valley When? Since 1995 Who? NPS/FWS(Rudis) conducts survey Ref? data managed by USGS - Handel Handel, C. & M. Cady. 2004. Alaska Landbird Monitoring Survey: potentials for setting up and conducting point count surveys. USGS AK Sci Ltr. 50p.

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Project	Ongoing Monitoring?	Potential Baseline?	Comments
			Comment: data probably adequate for regional comparisons; needs to be reviewed for utility as park monitoring tool.
Christmas bird count	Yes (A2)	No (A1)	Counts not systematic nor strictly comparable from year to year
Breeding Landbird Inventory	Yes (A1,B1)	Yes (A1,B)	What: Includes the more quantitative surveys and other qualitative efforts; purpose is to refine park bird list How:. Twenty-eight new survey points were established throughout the park (across the elevational and ecological gradient) and sampled (following the ALMS protocol) for this inventory. When: 2003 Who: Colleen Handel (USGS) Comments: The protocol developed for this effort was peer-reviewed. These survey points were permanently marked, GPS'ed, and detailed habitat parameters were measured at each location. These 28 survey points can be relocated and resampled. This sampling network was designed to be used for long-term monitoring.
Nocturnal Owl Inventory	No	No	One winter's data. Followed BBS and USFWS protocol, but few owls encountered. Would take revised methodology to get enough data for reproducible results.
BBS bird survey	Yes (A,B1)	Yes(A2,B)	What? Breeding Bird Survey How? Per national BBS protocol (50 stops along a standard route, 3-minute obs/listen.) Where? 25 miles along Chilkoot Trail & Dyea; When? Since 1993 with a break from 1999-2004 Who? FWS (Andres, Rudis) Ref? USGS (Handel) manages data Comment: data probably adequate for regional comparisons; needs to be reviewed for utility as park monitoring tool.
Coastal Waterbird surveys	Yes (A2, B1)	Yes? (A1?,B)	What? Spring waterbird counts, as companion to the Breeding Landbird Inventory How? Spring, ~ weekly counts at specific points along road Numbers as well as species noted. Where? Offshore of road from SKG - Dyea Who? NPS When? Begun 2003, continued thru 06. Ref: Hahr, M. & T.Trapp. 2004. Waterbird and Breeding Landbird Inventories in KLGO. NPS, SEAN. 44p. Comment: Ranger reports from the 1980s and early 1990s indicated large numbers and diversity of waterbirds along the KLGO coast during spring migration. Those reports justified inclusion of coastal waterbirds in what was intended to simply be a Landbird Inventory for KLGO. Initiated as part of bird inventory, but have been continued. Sampling design exists, but not peer-reviewed. Would have to look at data to judge its suitability for baseline and trend detection.

Project	Ongoing Monitoring?	Potential Baseline?	Comments
Mammals			
Goat surveys	No (NPS part) ? on rest	No?	What? Surveying mountain goats How? Mostly aerial surveys, but Joly's: two ground-based surveys from standard overlooks, 1996 Where? in Taiya Watershed When? Various times and investigators Who? NPS (Joly& Canadian cooperator); BLM (Denton); USFS (Millstein); ADFG (Barten); Temsco Ref? Joly, K. 1996. Mountain Goat Survey of Upper Taiya River Drainage. NPS, RM. 10p Comment: NPS - Joly's work repeatable but too cursory; for others, word is that there are competing data sets and ideas about goats vs. helicopters. I have not seen the data or reports, and so cannot really evaluate this work personally
Bear scat survey	No	No	Small sample size. Scat surveys are inexact indices of bear population sizes. At most, they tell you centers of bear activity and could be useful from a management perspective, but not for population-level monitoring.
Fish			
Eulachon genetics study	No (B2)	Yes? (A2,B)	What? Comparison of Eulachon genetics among "populations" to gauge the relationships among them. How? Measure frequency of alleles at selected microsatellite loci of 100 fish from numerous river systems across their Alaska range. Where? Samples obtained from Taiya and Skagway rivers. When? Samples collected 2003 (Taiya and Skagway) and again in 2005 (Taiya) (not yet analyzed) Who? USFS (Rob Spangler) Ref? No report yet Comment: May allow changes in genetic structure of populations over long run.
SEAN marine/estuarine fish inventory	No	No	Litzow, M., J. Piatt, and M. Arimitsu. 2002. Inventory of Marine and Estuarine Fishes in Southeast Alaskan National Parks during summer, 2001. NPS, ANC. Structured to extend species list; not rigorously quantitative.
Plants			
Exotic plant surveys	Yes (A2,B1)	PRIME (A2, Ba)	What? Surveys of introduced plants in Dyea and along Chilkoot trail How? Systematically recorded identities & extents of exotics. First survey: divided trail/Dyea area into polygons and recorded species presence/abundance in each. Last two: GPS'd extent of individual patches along trail/Dyea and the White pass unit, following NPS Exotic Plan Management Team protocols. When? 2000, 2004, 2005 2006 Who? NPS (Furbish, Delost, Schultz) Refs? Furbish, E. 2001. Exotic Plant Survey of the Chilkoot Trail, KLGO. NPS/RM, 49p. Delost, J. 2004. Exotic Plant Survey of KLGO. NPS/RM. 17p.

Project	Ongoing Monitoring?	Potential Baseline?	Comments
			Schultz, D. 2005. Exotic Plant Survey of KLGO. NPS/RM. 14p. Comments: 2006 report will be completed September 2006
Vascular plant inventory (ANHP)	No	No	Purpose is for constructing an annotated checklist and evaluating presence of species of interest/concern
Subalpine fir mortality	Yes (A1,B1)	Yes? (A2?, B)	What? Monitoring balsam bark beetle infestation of fir How? 02: Set up 6 ea. 9 ha relocatable plots on which beetle density indexed (pheromone traps) and tree mortality recorded. More plots since then near Skagway (outside park). Where? The upper Skagway valley (White Pass City area). When? Started 2001 Who? USFS (Schultz) Ref: Mark Schultz memo to Meg Hahr 3/8/06 Comment: Memo gives general idea on progress of infestation; haven't seen data to judge its quality
Sitka Spruce, tomentosus and bark beetle infestation	No (B1)	Yes? (A1?,B)	What? Monitoring Sitka Spruce tomentosus and relationship to subsequent bark beetle infestation How? Installation of plots in Dyea (details forthcoming), taged 142 for continued monitoring/sampling Where? Dyea When? August 2006 Who? Mark Schultz, Lori Trummer (USFS) Ref: Mark Schultz, Lori Trummer personal communication August 2006 to Theresa Thibault Comment: Preliminary report due September 2006 describing monitoring purpose/implementation.
Amphibians			
SEAN amphibian opportunistic inventory	No	No	Qualitative and opportunistic; intended for inventory level summary of existing observations
Western toad monitoring pilot study	Yes? (A1?,B)	Yes? (too soon to tell but USGS is optimistic)	What? Mark-recapture study of western toads – ARMI Apex-level Monitoring Site How? Systematic marking of adult western toads at breeding ponds using PIT tags (microchips) to estimate population size, determine population trends, and describe metapopulation dynamics. Where? Western toad breeding ponds in Dyea area When? Initiated in 2004 Who? NPS/USGS ARMI (Adams, Payne) Ref: Hahr, M. 2005. Southeast Alaska Cluster Program Request for funding for Establishment of an ARMI Apex Monitoring Site. Proposal to SE AK Coastal Cluster Program Comment: USGS arrived in KLGO to train NPS staff in toad tagging techniques at the tail end of the breeding season so an estimate of the breeding population could not be obtained in 2005. The 2006 tagging efforts will span the entire breeding season allowing for a complete dataset with which to determine

Project	Ongoing Monitoring?	Potential Baseline?	Comments
			whether the breeding population is sufficiently large to satisfy the requirements of the Apex-level ARMI monitoring program.
Amphibian habitat surveys	Yes (A1, B2)	PRIME (Ab)	What? Systematic survey of toad presence/absence – ARMI mid-level monitoring pilot study. Purpose is to provide landscape level index of changes in toad occupancy of suitable habitat. In order to determine whether KLGO is an appropriate area for an ARMI mid-level monitoring site. Characterized habitat quality and toad presence/absence, life stage and general abundance in 129 surveys of 39 wetlands. How? According to USGS Amphibian Research & Monitoring Initiative Mid-level monitoring protocol. Where? Throughout Taiya and Skagway watersheds. When? 2004-2006. Potential amphibian breeding sites were surveyed in 2004 & 2005 to document amphibian species occurrence and reproduction. Who? NPS, USGS ARMI (Adams, Payne) Ref: Payne, K. 2005. Amphibian Productivity Monitoring and Habitat Assessment in KLGO. NPS/ RM.46p. Comment: will be continued in 2006 by Kevin Payne with direction from Mike Adams (USGS ARMI)
Visitor Use/ Impacts			
Chilkoot trail visitor use	Yes (A2, B)	PRIME (Ba)	Overnight users of the Chilkoot trail are closely monitored by the NPS through the permit system
Dyea Social Science Survey.	No (B1)	PRIME (Ba)	What? Survey of volumes of various types and volumes of visitor use How? Physical counts of day use of Chilkoot Trail and Dyea Townsite Trail (by infrared beam); Surveys of Dyea users and polling a sample thereof to determine their experience and reactions thereto. Vehicle traffic counters at 3 locations in Dyea Townsite. Monitoring protocol also developed. Where? at Dyea and the base of the chilkoot trail Who? Van de Kamp, Sekamp Ref: (Van de Kamp and Seekamp. 2005. Visitation and Visitor Use Experience at Dyea (and the Chilkoot Trail). Visitor use of the Dyea area and day use of the lower Chilkoot Trail were quantified and described for the first time in the history of the park, for the 2004 season.
Geomorphology			
Taiya erosion – Dyea Townsite	Yes (A2, B1)	Yes (A2,B)	Measurement of Taiya River bank erosion in the Dyea townsite, 1967-present; long baseline Ref Inglis, R. 2002. Assessment of Bank Retreat Monitoring Data from 1979-2002 for the Taiya River at KLGO (*but only deals with Dyea area*). USGS,WRD. 16p. Comment: Designed to inform townsite protection questions; probably too small a sample of river behavior

Project	Ongoing Monitoring?	Potential Baseline?	Comments
			to be of interest for SEAN.
Taiya Watershed Reconnaissance Geohazards Survey	No	No	Capps 2003 study; descriptive
Nourse Lake Moraine-dam assessment	No	No	BLM 2004-05 study (Denton et al). Purpose to sound morainal dam for buried ice. Comment: Problems with equipment developed during the study. Current status: study in review, already determined a need for followup visit to site for additional information.
Water Quality			**Items in this section only flagged. For more information, see Nagorski & Hood's & Eckert's reports on Water Quality**
Water quality investigation/analysis			USGS/WRD took baseline WQ measurements at stream gage sites on Taiya and West Creek, 2004
Streamflow Gages			USGS & NPS- historic gages on Taiya and West Creek. New gage on Taiya since 2003.
General Ecology			
Ecological recon inventory	No	No	This extensive USFS inventory of park resources has a great deal of reconaissance-level data, but the sample sites are pinned down only to the quarter-section.
Coastwalker project	No (B1)	Yes (A2,B) (A2,B)	What? Systematic characterization of biota, Substrate, morphology and exposure of shore How? Using standard coastwalker protocol developed at GLBA Where? Entire park intertidal zone When? 1999 Ref? Data archived at GLBA/RM with copy at KLGO Comment: The coastwalker data are not intended for baseline use, but the relocatable photos accompanying each shore segment can be used to document gross changes in plant and encrusting invertebrate cover, as well as in shore morphology.
Ecological surveys	No	No	Comment: Reports and notes by Streveler provide background on geology, fire history, river history, etc., but do not contain repeatable data
Dyea Wetland inventory	No (B1)	Yes? (A2?,B)	What? Characterized and mapped wetlands in the Dyea area of KLGO How? Using FWS wetland inventory protocol Where? in the lower Taiya valley When? 1999 Who? Koren Bosworth Ref: Bosworth, K. 2000. Wetlands of the Dyea area of the lower Taiya River Valley. By Bosworth for

Project	Ongoing Monitoring?	Potential Baseline?	Comments
			NPS. 37p. Comment: Careful list of dominant plants and special delineations should allow documentation of gross changes in these parameters
Natural history observation database	No	No	Comment: Opportunistic observations
Photography			
Repeat photography	No (B2)	PRIME (A2, B)	What? Reoccupation and re-photography of sites from which historical photos have been taken. Where? Retakes of 7 1895 - early 1900's photos from vantages in the Taiya and Skagway valleys When? 2005, 2 days Who? Richard Carstensen & Cathy Pohl Ref: Carstensen's illustrated field notes and report provided to KLGO Comments: would be very valuable to expand this program
Lidar, historical and aerial photos	No (B2)	PRIME (Ba)	What? Most of the park photographed by LIDAR technology in 2003. Several generations of black/white color and infrared photography exists at various scales for various parts of the park and environs A large and systematically curated collection of historical phots is housed at KLGO. Comment: Data have not been extracted from the LIDAR, but this set has immense monitoring potential for many aspects of vegetation and geomorphology. This is true to a lesser degree for the other aerial photography. Historical photos have great potential for monitoring change on various scales (see Repeat photography for one example).
Chilkoot trail campsite monitoring	No (B1)	Yes? (A2?,B)	What? Large amount of undigested but systematic data on campsite condition How? Mapped, described vegetation and visual conditions, using standard form Where? Campgrounds at Dyea and along trail When? 1994-95 Who? NPS (Rangers) Refs: Large binder of data in RM office Comment: hard to judge whether data are sufficiently relocatable after the decade elapsed time.

SITK project Evaluation Table FINAL 10/17/06

Greg Streveler, in consultation with Geof Smith, SITK

(Codes follow outline in a companion document, "Identifying Baseline Candidates and Ongoing Monitoring for the SEAN parks")

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
Atmosphere			
Weather stations, Sitka	Yes (A1,B2)	PRIME (A2,B)	What? 1) Magnetic Observatory Site near SITK has kept weather records intermittently, 1898-1989 , with the longest continuous records being from 1908-1926 and 1949-1982. Site has moved at least once during this period. 2) Japonski Airport, 1930-present 3) Three other stations in area with data beginning from 1996 to 2005. Comment: together, these stations provide the longest weather record in the state.
Birds			
Eagle nest survey	Yes (A1,B1)	Yes (A2,B)	What? The one eagle nest in the park is monitored for activity and fledgling productivity; area checked for other active nests Where? Throughout park How? Visual check from ground When? 2002-2005 Who? NPS (Smith) Ref: Data kept at park Comments: This one nest is an important indicator of park ecosystemic health; maybe deserves a PRIME.
Bird Observation & Inventory	No	No	What? Bird observation records for park Where? Throughout park How? Opportunistic observation When? From 1980 Who? NPS (Smith), Ward, Tedin Comments: Ward & Tedin have additional data that the park needs to get hold of. Purpose of project is construction and updating of qualitative checklist
Breeding bird survey	Yes (A2,B1)	No (A1)	What? A standard breeding bird survey route annually that includes 12 points Where? Only 6 points in the park How? Per national BBS protocol, using 3 minute and longer obs intervals When? 2000-2005 (except 2001)

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			Who? NPS (Smith) Ref: Data archived by NPS Comments: not enough data to be considered a baseline, but it is part of a larger data set that is probably useful for the general area.
Migratory bird reconnaissance	No	No	Comment: These periodic patrols of the park and intertidal zone during peak migration periods are not sufficiently rigorous for monitoring purposes.
Christmas bird count	Yes (A2, B1)	No (A1)	Comments: Counts not systematic or strictly comparable from year to year; nonetheless is considered monitoring on a national scale
Mammals			
Small mammal inventory	No	No	Ref: Muldoon, C. 1987. Small Mammal Inventory, SITK, May-Aug, 1987. Comment: 749 trap nights, but no exact location data. Intended to document species presence.
Land Plants			
Vascular plant inventory (ANHP)	No	No	What? Inventory of vascular species presence in park, with notes on species of particular floristic interest (including exotics) How? Standard Ak Natural Heritage Program inventory When? 2002 Who? ANHP (Lipkin, Carlson) Ref: Lipkin, R & M. Carlson. 2004. SITK Vascular Plant Inventory. Ann. Technical Rept. AHNP, Anchorage. 10p. Comments: Park has not received the final species list not herbarium specimens. This work is intended to extend the SITK species list, and is not quantitative.
Vegetation inventory and forest health	No (B2)	Yes? (A1?,B)	What? 11 permanent plots on which detailed tree mensuration and semi-quantitative shrub & forb descriptions are given. Forest pathogens present are described and in some cases roughly mapped. When? 1994. Who? USFS (Russell, Dougan) Ref: Russell, J. & B.Dougan. 1994. Vegetative Inventory and Forest Health Assessment, SITK. USFS, Chatham Area. 15p. Comments: There will be an effort this year to relocate the plots, and if successful should provide repeatable data.
Nonvascular plant survey	No	No	Ref: LaBounty, K. 2005. Non-vascular plants to SITK: bryophyte inventory, 2004-05. NPS. 11p. Comment: designed for construction of a species list
Exotic plant surveys	Yes (A1,B1)	PRIME (A2,B)	What? Densmore, et al.: General work that includes cursory surveys in a number of parks, including SITK Spencer: did some work but never provided a report McKee: Records and precisely delimits extent of 9 species in an “extensive” survey

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			Rapp: Records and precisely delimits extent of 27 spp; probably the most thorough inventory to date. How? McKee: Says thoroughly covered the park; accurately delimits extent of infestation by species identified via GPS with "sufficient accuracy to monitor yearly change". Rapp: Redescribed areas found in 2004; identified and precisely located additional areas via GPS; follows NPS (Heys) EPMT protocol. When? 2004 was the fourth year of exotic plant surveys, but this is the first one that is precisely relocatable Who? NPS (Rapp, McKee, Roland, Densmore) Refs: Densmore, R., P. McKee & C. Roland. 2001. Exotic Plants in AK National Park Units. USGS/NPS 127p. McKee, C. 2004. Exotic Plant Surveys at SITK, Alaska: Summer 2004 Field Season Report. USGS/BRD. 10p. Rapp, W. 2005. Invasive Plant Management in SITK, Sitka, Alaska: summer 2005 Field Season Report. NPS/GLBA. 40p. Rapp data archived electronically at GLBA and SITK Comments: The last two years of this survey effort has provided important and replicable data
Marine/Intertidal			
SEAN Marine/estuarine fish inventory	No	No? (A2?, B)	What? Inventory of nearshore fishes along SITK forefront How? By beach seine. Two precisely located sample sites; 4 sets at each in June, 1 set at each in September. When? 2001 Who? Brewer, Arimitsu, Litzow Ref: Litzow, M., J. Piatt, and M. Arimitsu. 2002. Inventory of Marine and Estuarine Fishes in Southeast Alaskan National Parks during summer, 2001. NPS, ANC. Intended to extend species list; replicable albeit very small sample size
Intertidal monitoring	Yes? (A2,B2?)	PRIME (Bd)	What? Monitor distribution and abundance of intertidal zone macrobiota Where? On park shore, exclusive of estuary How? Using protocol developed by Gail Irvine. Includes 15 transects along which point intercept and quadrat data are obtained; visual count of mobile predators make in band along transects as well When? 1999, 2002, 2003 Who? USGS (Irvine), NPS (Smith) Ref: Terastat Consulting. 2006. Draft Statistical Review of Sampling and Analysis Methods for Intertidal Monitoring at SITK. Comment: report gives general ok; recommends setting permanent transects and # quadrats proportional to

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			transect length. This is one of the park's best baselines, and I give it a PRIME on that basis, even though some question remains on methodology.
Coastwalker project	No (B2)	Yes (A2,B)	What? Systematic characterization of biota, Substrate, morphology and exposure of shore How? Using standard coastwalker protocol developed at GLBA Where? Entire park intertidal zone When? ~2000 Who? NPS (Sharman & Eichenlaub) Ref: Data archived at GLBA/RM Comment: The coastwalker data are not intended for baseline use, but the relocatable photos accompanying each shore segment can be used to document gross changes in plant and encrusting invertebrate cover, as well as in shore morphology.
Eelgrass community ecology	No (B2)	Yes? (A1?, B)	What? Characterizing structure of eelgrass community, with special reference to shrimp (*Hippolyte)*as an indicator of community intactness, and to presence of pollutants in tissues of selected species How? Systematic sampling of invertebrates and algae, and bioassay at selected sites Where? Sitka Sound (one station in park) When? 2004-2005 (on pilot basis) Who? Baldwin Ref: Shirley, T & A. Baldwin. 2003. Eelgrass habitat and associated fauna at SITK. 6p. Proposal from UAF to SITK as part of Ph.D dissertation study Comment: this work should be a reasonable basis for monitoring on the scale of Sitka Sound, but it is unclear whether it will be for SITK specifically.
Chemistry/physics of a tidepool	No (B2)	Yes? (A1?, B)	What? Describes chemical/physical conditions in a small tidepool How? Sampled water temp, salinity, d.o. in water column, two places within tidepool, 1-2x/mo. Where? Indian River estuary When? Fall/winter, 1997-1998 Who? Logue (Sheldon Jackson student) Ref: Logue, J. 1998. Chemical and Physical Characteristics of a small Tidal Pond in the Indian River Estuary System. Sheldon Jackson College. 8p. Comments: This is a long-lived pool and could be reoccupied rather precisely given the map of the sample sites. But the data set is quite small, and there are no plans for reoccupation.
Indian River			
Stream ecology Water Quality and Streamflow of the	No (B1)	Yes (A1,B) but	What? Contains systematic information on macroinvertebrates and algae as well as water quality data How? Random Surber plots and algal measurement stations, allowing estimates of species abundance Where? On reaches OUTSIDE OFTHE PARK

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
Indian River, Sitka, Alaska, 2001-2002.		outside park	When? 2001-2002 Ref: Neal, E, T. Brabets & S. Frezel. 2004. Water Quality and Streamflow of the Indian River, Sitka, Alaska,. USGS Comment: (*I AM ONLY FLAGGING WATER QUALITY STUFF*)
Freshwater macroinvertebrates	No	No	Comment: This work by NPS (Smith) for over 4 years provides a database representing 53 species, and an extensive bibliography of relevant literature. It is intended to refine the park's species list and provide a first-order idea of species abundance. Doesn't fit the criteria used here, but is a valuable precursor.
Salmon escapement database	No	No	ADF&G does opportunistic and semi-quantitative escapement surveys every year, approximately timed to the peaks of species runs. They give only a first order estimate of abundance
Chinook salmon study	No	No	What & How?: Summary of history of adult escapement data and minnow trapping results, with historical accounts of observations When? 1985-2001 minnow trapping; historical accounts going back to time of Russians Where? Indian River Who? NPS (Brewer) Ref: Brewer, B. 2001. Origin and History of Chinook Salmon in the Indian River, Sitka, Alaska. NPS/SITK. 22p. Comment: doesn't rise to level of monitoring, but valuable background in evaluation of native/exotic status, and any attempts at eradication.
Aquatic Resource Survey: Indian River, SITK	No (B1)	Yes? (A2?, B?) stream profile data only	What? Lots of hydrology information (deferred to Eckert), but also contains macroinvertebrate sampling data and 5 channel profiles. Includes analysis of the macroinvertebrate data by Major and Milner, as an index to water quality. How? Surber sampling, 3-5 samples per station Where? Several sample stations, in park and upstream. Sample profiles in park. When? Spring/fall,1994 Refs: Paustian, S. and T.Hardy. 1995. Aquatic Resource Survey, Indian River, SITK, Alaska. USFS, Chatham area. 60p. Major,E. and A. Milner III. 1994. Macroinvertebrate Analysis Summary of data from the Indian River, SITK. Environmental and Natural Resource Institute, For the USFS. 10p. Comments: Invert sample sites not relocatable, but stream profile sites appear to be mapped with sufficient precision to allow reoccupation. The Major/Milner analysis gives a pronouncement on water quality based on invert presence/absence.
General Ecology			
Ecological inventory	No	No?	What? Thorough characterization of upland communities in park How? Using standard USFS survey and mensuration techniques for plant communities, soils and physical site

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
			characteristics. When? 1993 Who? FS team led by Trull. Ref: Krieckhaus, B., R. Foster & S. Trull. 1993. Ecological Inventory of SITK. USFS, Chatham Area, 17p. Comment: much data here, including some quantitative measurement of silvic characteristics, and semi-quantitative estimation of shrubs and forbs on standard plots. Original plot cards not at park and maybe lost. The forms are presumably similar to those used at KLGO, and if so will not allow precise relocation. There will be an effort this year by NPS to relocate the the permanent forest inventory plots, and if successful, to consider resampling them.
Natural history observation database	No	No	Comment: Opportunistic observations.
Ecosystem observations	No	No	Streveler. General, cursory
Landscape History			
Physical & cultural landscapes and landscape history	No	No	What & where?: Data-driven description of present physical/biological landscape and, especially, a detailed hypothesis on the evolution of park landscapes. When? Field work in 1994 Who? Vanguard Research Ref: Cheney, G., R.Betts & D. Longenbaugh. 1995. Physical and Cultural Landscapes of SITK. Vanguard Research, Douglas, Ak. 160p. Comment: Major work. Marvelous background work with much information and maps, but not tailored for monitoring
Landscape history	No	Yes (A2, B) (the photos)	What& where? Landscape history from a landscape architect's point of view, How? Synthesis based on the Cheney work, some original observation, and a lot of historical photos for the more modern period. When? Field work in 1997. Who? NPS? (Smith-Middleton, Alanaen) Ref: Smith-Middleton, H. & A. Alanen. 1998. Impressions of Indian River: A Landscape History of SITK. NPS/RO. 326p. Comment: Some of the historical photos could be re-taken; would be a good way to document several sorts of change.
Asphalt Plant			
Asphalt plant site	Yes (in		What? Original assessment of site and adjacent bank of river for hydrocarbon pollution

Project	Ongoing Monitoring?	Potential Baseline?	Characterization
environmental assessment	concert with the next project)	(see next project)	How? Took series of samples from pits dug onsite, and from along riverbank; assayed for asphaltic and aromatic hydrocarbons. When? Fall, 1994 Who? Contractors Ref: Shannon& Wilson, Inc. 1995. Environmental Site Assessment, Indian River Asphalt Site, SITK, Sitka, Ak. Shannon & Wilson, Fairbanks. 95p. Comments: Sample sites relocatable. Cites report by Molnia, 1980, on erosion by the Indian River. Report not found.
Asphalt plant site monitoring	Yes? (A2,B2)	Yes (A1?, B)	What? Water quality monitoring protocol set up; portions of it followed by NPS. How? Deschu set up 3 monitoring sites; NPS has reoccupied 2 of these sites for 5+ years. General water quality parameters monitored, with specific reference to hydrocarbons. When? Monitoring from 1996-1999 and 2001-2005. Probably will not be done this year. Ref: Deschu report not seen. Data entered into a database. I review data for any unusual readings. Comments: no money to continue this monitoring. Nothing alarming has resulted from this sampling. However, debris such as asphalt chunks and metal pieces continue to erode from the site. Given a "yes?" on monitoring, as is planned to be discontinued. Some question whether the small number of monitoring sites gives a sufficient sample of the situation.
Water Quality			
Assessment of Coastal Water Resources and Watershed Conditions of SITK	--	--	(Eckert et al. 2006) Hot off the presses. Comprehensive assessment of the Indian River watershed conditions and threats, including marine, estuarine, and freshwaters. (I HAVE DEFERRED WATER QUALITY MATTERS TO THESE AUTHORS, who are preparing a report similar to mine on water resources (EXCEPT FOR THE ASPHALT PLANT MONITORING) I will just flag these reports: Nadeau, R. & S. Lyons. 1987. Instream Flow Investigations, Indian River, SITK. USFWS, Anchorage. USGS/WRD (Williams) 2000. Progress Report for Indian River Water Resource Data, SITK, Ak. (park has not rec'd final) USGS/WRD. 1998. Baseline Water Quality Data, Inventory and Analysis, SITK. See also Paustian and Hardy, 1995, and Neal, et al.,2004, both discussed above