

Thank you for participating in our survey. Your feedback is important.

The goal of this project is to select a short (8-10) list of ecosystem indicators for the Gulf of Alaska that will form the basis of a Gulf of Alaska (GOA) Report Card and Ecosystem Assessment to include in the NOAA's Ecosystem Considerations report. This report is produced annually as part of the Stock Assessment and Fishery Evaluation report for the North Pacific Fishery Management Council. The format of the new GOA Report Card and Ecosystem Assessment will be similar to those that have been produced in recent years for the eastern Bering Sea and Aleutian Islands.

The primary recipients, considered to be the stakeholders, of the Report Card and Ecosystem Assessment are those involved with the fishery quota-setting process for the North Pacific Fisheries Management Council. This includes the Science and Statistical Committee and the regional Plan Teams. Additional recipients include the Advisory Panel, Council, and stock assessment scientists. The Report Card and Ecosystem Assessment are also made available to the public.

For the purposes of this project, ecosystem indicators are defined as time-series of data that measure some component of the ecosystem. Hundreds of indicators are available for the GOA, which is defined as the Canadian-US boundary at Dixon Entrance to the east and False Pass to the west. During a workshop in 2010, a group of largely scientists and some fisheries managers with expertise in the eastern Bering Sea ecosystem selected 10 indicators to best represent trends in productivity in the eastern Bering Sea. In 2011, a more diverse group including a commercial fisherman and conservation NGO representative met in a similar workshop format to select 8 ecosystem indicators for the Aleutian Islands that best characterized trends in variability throughout the ecosystem. For the GOA, we hope to increase the group size and diversity in GOA expertise of the participants in the indicator selection process by soliciting information individually via an email survey. The main objective of the survey is to have participants rank the importance of indicators; the surveys will then be compiled to generate a list of top indicators. This process will be followed by a smaller in-person meeting to refine this list to form to basis of the new GOA Report Card. We hope that by surveying a greater number of individuals than were involved with indicator selection for the eastern Bering Sea and Aleutian Islands, the survey results will reflect broader expertise and an 'equal voice' from all participants.

The GOA is characterized by topographical complexity, including: islands; deep sea mounts; continental shelf interrupted by large gullies; and varied and massive coastline features such as the Cook Inlet, Prince William Sound, Copper River, and Cross Sound, which bring both freshwater and nutrients into the GOA. The topographical complexity leads to ecological complexity, such that species richness and diversity differ from the western to eastern GOA. Thus, local effects of ecosystem drivers may swamp basin-wide signals. With this in mind, we hope to create a short list of ecosystem indicators that best reflect the complexity of the GOA. Although there are many more people living in both large and small communities throughout the GOA relative to the AI or EBS, we consider the GOA to be data-moderate relative to the AI (data-poor) and EBS (data-rich). That being said, we have developed a non-exhaustive list of about 75 ecosystem indicators from which we hope to form the basis of a new GOA report card and ecosystem assessment.

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### Instructions

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The survey is structured as follows. There are 8 categories of indicator types. Within each indicator category, rank the top 3 indicators that in your opinion are the most informative of the current and likely future state of the GOA ecosystem. If there are fewer than 3 potential indicators in a category, rank only the ones (or none) that you believe fit the above criteria. You may skip indicator categories if you don't feel that you can make a choice. Each indicator category will have a blank option for you to fill in with a suggested indicator. Please specify whether this is one that currently exists or not.

After you have finished making your choices within each category you will be asked to select your top 10 indicators among all of the possible choices regardless of category. The last page of the survey has a space for you to add any comments you wish to pass along and to note your particular area(s) of expertise in the GOA ecosystem. [Note that we are interested in your rankings in any category, even for ones in which you may not consider yourself an 'expert']. This will help us better understand the composition of the survey group for our summary report(s).

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**1. Physical indicators: Considered forcing functions, physical indicators should reflect changes in the environment that lead to changes in the biological components of the ecosystem, usually through bottom up processes. For details on most indicators see the Ecosystem Considerations report <http://access.afsc.noaa.gov/reem/ecoweb/Index.php>**

**For the 12 indicators for the GOA listed below, select and rank the top 3 in your opinion. You may select only up to three indicators, but can add a description of additional indicators in the box below.**

	1	2	3
<b>NINO3.4</b> - Characterizes the state of the El Nino Southern Oscillation; 1948-present Contact/Source: Nick Bond/UW JISAO	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>PDO</b> - Pacific Decadal Oscillation; the leading mode of North Pacific sea surface temperature variability ;1948-present Contact/Source: Nick Bond/UW JISAO	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>NPI</b> - North Pacific Index, area-weighted sea level pressure; 1948-present Contact/Source: Nick Bond/UW JISAO	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>NPGO</b> - North Pacific Gyre Oscillation, the second leading mode of variability in the North Pacific, related to biological and chemical properties in the GOA and California Current System; 1950-present Contact/Source: Nick Bond/UW JISAO	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Eddy kinetic energy</b> - Monthly eddy kinetic energy derived from altimetry; 1992-present Contact/Source: Carol Ladd/PMEL	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>PAPA trajectory index</b> - This measures ocean surface currents. It is the end point latitude of a simulated drifter track released from Ocean Station PAPA on Dec 1 for 90 days; 1902-present Contact/Source: Buck Stockhausen/NMFS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>GOA transport</b> - The proportion of the North Pacific current diverted into the GOA; 2002-present Contact/Source: Howard Freeland/DFO Canada	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Water temperature anomalies 25 m deep at the GAK 1 mooring</b> - offshore of Seward;1970-current Contact/Source: UAF	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Water temperature anomalies 100 m deep at the GAK 1 mooring</b> - offshore of Seward; 1970-current Contact/Source: UAF	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Bottom temperature anomalies in Barnabus gully</b> - offshore Kodiak; 1990-current Contact/Source: Carrie Worton, ADF&G	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Bottom temperature anomalies in Kiliuda and Ugak bays</b> - inshore Kodiak; 1990-current Contact/Source: Carrie Worton, ADF&G	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Freshwater input to GOA</b> - source to be identified	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Other indicator (please specify whether this is an indicator that currently exists or one that you believe should exist)

**2. Plankton indicators: Phyto and zooplankton serve important roles at the base of the GOA food web. Plankton indicators should inform us about how changes are occurring at the base of the food web. For details on most indicators see the Ecosystem Considerations report <http://access.afsc.noaa.gov/reem/ecoweb/Index.php>**

**For the 6 indicators for the GOA listed below, select and rank the top 3 in your opinion. You may select up to three indicators or none if you have no opinion. You may add a description of additional indicators in the box below.**

	1	2	3
<b>Large diatom abundance anomaly</b> - Measured on the shelf southeast of Lower Cook Inlet; sampled 5-6x per year by continuous plankton recorder deployed on container ships; 2004-present Contact/Source: Sonia Batten; SAHFOS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Total zooplankton density</b> by summer month in Icy Strait - SE Alaska; density anomaly (numbers/m3); May - Aug; 1997-present Contact/Source: Molly Sturdevant/NMFS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Large calanoid copepod % composition</b> in Icy Strait - SE Alaska; percent numerical composition anomaly, May-Aug; 1997-present Contact/Source: Molly Sturdevant/NMFS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Small calanoid copepod % composition</b> in Icy Strait - SE Alaska; percent numerical composition anomaly, May-Aug; 1997-present Contact/Source: Molly Sturdevant/NMFS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Copepod community size anomaly</b> - Measured on the shelf southeast of Lower Cook Inlet; sampled 5-6x per year Apr - Sept by continuous plankton recorder deployed on container ship; 2004-present Contact/Source: Sonia Batten, SAFOS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Mesozooplankton biomass</b> - Measured on the shelf southeast of Lower Cook Inlet; sampled 5-6x per year Apr - Sept by continuous plankton recorder deployed on container ship; 2004-present Contact/Source: Sonia Batten, SAFOS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Other indicator (please specify whether this is an indicator that currently exists or one that you believe should exist)

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**3. Benthic fauna indicators:** These indicators should inform us about variations in the size and composition of the group of sea floor-dwelling animals such as crabs, urchins, and sea stars. For details on most indicators see the Ecosystem Considerations report <http://access.afsc.noaa.gov/reem/ecoweb/Index.php>

For the 3 indicators for the GOA listed below, select up to 3 or none if you have no opinion, and, if you wish, add a description of additional indicators in the box below.

	1	2	3
<b>Aggregate motile epifauna biomass</b> - Total biomass of crabs, echinoderms, sea stars, etc. from NOAA summer bottom trawl surveys; 1984-2003, biennial or triennial. Contact/Source: Kerim Aydin/NMFS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Tanner Crab biomass: Barnabus Gully</b> - Offshore Kodiak; standardized anomalies of ADF&G trawl survey catch; 1988-present Contact/Source: Carrie Worton/ADF&G	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Tanner Crab biomass: Kiliuda and Ugak Bays</b> - Inshore Kodiak; standardized anomalies of ADF&G trawl survey catch; 1988-present Contact/Source: Carrie Worton/ADF&G	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Other indicator (please specify whether this is an indicator that currently exists or one that you believe should exist)

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**4. Forage fish indicators:** Forage fish include small fish such as sand lance as well as young age classes of larger fish such as pollock. Forage fish play a fundamental role in marine ecosystems by converting energy from lower trophic levels into food for larger fish, marine mammals, and seabirds (Lenfest, <http://www.oceanconservationscience.org/foragefish/project/what.html>). For details on most indicators see the Ecosystem Considerations report <http://access.afsc.noaa.gov/reem/ecoweb/Index.php>

For the 12 indicators for GOA listed below, select and rank the top 3 in your opinion. You may select up to three indicators or none if you have no opinion. You may add a description of additional indicators in the box below.

	1	2	3
<b>Eulachon CPUE</b> - From smallmesh trawl surveys; CPUE kg/km; western GOA, nearshore; 1972-present Contact/Source: Dan Urban/NMFS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Juvenile pollock CPUE</b> - From smallmesh trawl surveys; CPUE kg/km; western GOA, nearshore; 1972-present Contact/Source: Dan Urban/NMFS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Herring CPUE</b> - From smallmesh trawl surveys; CPUE kg/km; western GOA, nearshore; 1972-present Contact/Source: Dan Urban/NMFS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Post-fishery mature herring biomass+catch</b> - Sitka Sound; 1980-present Contact/Source: Kyle Hebert, Sherrie Dressel/ADF&G	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Herring spawning biomass</b> - Total biomass in SE Alaska; 1980-present Contact/Source: Kyle Hebert, Sherrie Dressel/ADF&G	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Age-3 herring abundance</b> - Millions of age-3 herring; Sitka Sound; 1980-present Contact/Source: Kyle Hebert, Sherrie Dressel/ADF&G	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Capelin</b> , percent composition in puffin chick diets; collected <b>at the Barren Islands</b> - Percent of fish delivered to tufted puffin chicks; 1995-present, except 2012 Contact/Source: Heather Renner/USFWS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Capelin</b> , percent composition in puffin chick diets collected <b>at Middleton Island</b> - Percent biomass of fish delivered to rhinoceros auklet chicks; 1993-present Contact/Source: Scott Hatch/ISRC	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Sandlance</b> , percent composition in puffin chick diets - Percent of fish delivered to tufted puffin chicks; collected <b>at the Barren Islands</b> ; 1995-present, except 2012 Contact/Source: Heather Renner/USFWS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Sandlance</b> , percent composition in puffin chick diets - Percent biomass of fish delivered to rhinoceros auklet chicks; collected <b>at Middleton Island</b> ; 1993-present Contact/Source: Scott Hatch/ISRC	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Northern lampfish/myctophid ichthyoplankton abundance</b> - Western GOA; late spring larval abundance (log10 of mean abundance (no/m <sup>2</sup> + 1), standardized); bongo tows; 1981-present, missing some years. Contact/Source: Miriam Doyle/NMFS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Sandlance ichthyoplankton abundance</b> - Western GOA; late spring larval abundance (log10 of mean abundance (no/m <sup>2</sup> + 1), standardized); bongo tows; 1981-present, missing some years. Contact/Source: Miriam Doyle/NMFS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Other indicator (please specify whether this is an indicator that currently exists or one that you believe should exist)

**5. Non-forage fish indicators:** These indicators should reflect various aspects of the fish community as it interacts with the ecosystem, but should not duplicate stock trend information that could be found in a stock assessment. For details on most indicators see the Ecosystem Considerations report <http://access.afsc.noaa.gov/reem/ecoweb/Index.php>

For the 16 indicators for the GOA listed below, select and rank the top 3 in your opinion. You may select up to three indicators or none if you have no opinion. You may add a description of additional indicators in the box below.

	1	2	3
<b>Pacific cod ichthyoplankton abundance</b> - Western GOA; late spring larval abundance (log10 of mean abundance (no/m <sup>2</sup> + 1), standardized); bongo tows; 1981-present, missing some years. Contact/Source: Miriam Doyle/NMFS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Pollock ichthyoplankton abundance</b> - Western GOA; late spring larval abundance (log10 of mean abundance (no/m <sup>2</sup> + 1), standardized); bongo tows; 1981-present, missing some years. Contact/Source: Miriam Doyle/NMFS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Arrowtooth ichthyoplankton abundance</b> - Western GOA; late spring larval abundance (log10 of mean abundance (no/m <sup>2</sup> + 1), standardized); bongo tows; 1981-present, missing some years. Contact/Source: Miriam Doyle/NMFS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Halibut ichthyoplankton abundance</b> - Western GOA; late spring larval abundance (log10 of mean abundance (no/m <sup>2</sup> + 1), standardized); bongo tows; 1981-present, missing some years. Contact/Source: Miriam Doyle/NMFS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Mushy halibut</b> - Presence/absence of mushy halibut reports during sport fishing, mainly Kenai Peninsula area; 1980-present Contact/Source: ADF&G	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Juvenile pink salmon CPUE</b> - Juvenile peak pink salmon survey CPUE during June or July, Icy Strait, SE Alaska ; 1998-present Contact/Source: NOAA/SECM	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Marine survival of PWS hatchery pink salmon</b> - survival of hatchery salmon; 1977-present Contact/Source: Botz/ADF&G	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Arrowtooth biomass: Barnabus Gully</b> - Offshore Kodiak; standardized anomalies of ADF&G trawl survey catch; 1988-present Contact/Source: Carrie Worton/ADF&G	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Pollock biomass: Kiliuda and Ugak Bays</b> - Inshore Kodiak; standardized anomalies of ADF&G trawl survey catch; 1988-present Contact/Source: Carrie Worton/ADF&G	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Groundfish trawl community index: Species richness</b> - Calculated from summer NOAA bottom trawl survey data; 1984-present, biennial or triennial. Contact/Source: Franz Mueter/UAF	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Groundfish trawl community index: Species diversity</b> - Calculated from summer NOAA bottom trawl survey data; 1984-present, biennial or triennial. Contact/Source: Franz Mueter/UAF	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Pelagic forager aggregate biomass</b> - Total biomass of pollock, forage fish, etc. from summer bottom trawl surveys; 1984-present, biennial or triennial. Contact/Source: Kerim Aydin/NMFS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Fish top predator aggregate biomass</b> - Total biomass of Pacific cod, arrowtooth, halibut, etc. from summer bottom trawl surveys; 1984-present, biennial or triennial. Contact/Source: Kerim Aydin/NMFS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Benthic forager aggregate biomass</b> - Total biomass of crabs, echinoderms, sea stars, etc. from summer bottom trawl surveys; 1984-present, biennial or triennial. Contact/Source: Kerim Aydin/NMFS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Total annual groundfish surplus production</b> - annual change in biomass (estimated from stock assessments) plus catch; 1978-2009 Contact/Source: Franz Mueter, UAF	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Single species CPUE</b> - Mean survey CPUE of any single groundfish species caught regularly in NOAA summer bottom trawl surveys; 1984-present, biennial or triennial. Please specify the species in the comment box below. Contact/Source: Chris Rooper/NMFS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

If you selected the 'Single species CPUE' indicator, specify that species here. Also, list any additional indicator not included above (please specify whether this is an indicator that currently exists or one that you believe should exist)

**6. Marine mammal indicators:** Marine mammal indicators have been used in the EBS to represent upper trophic consumers (fur seals) and in the AI to represent a keystone species in the nearshore (otters). For details on most indicators see the Ecosystem Considerations report <http://access.afsc.noaa.gov/reem/ecoweb/Index.php>

There are 3 indicators for the GOA listed below. You may select and rank up to three or none if you have no opinion, and can add a description of additional indicators in the box below.

	1	2	3
<b>Steller sea lion adult plus juvenile population</b> - non-pup counts; 1990-present, mostly biennial Contact/Source: Lowell Fritz/NMFS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Cook Inlet beluga whale population</b> - Annual; 1994-2011 Contact/Source: NMFS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Sea otter surveys</b> - specific location within the GOA to be determined and dependent on data. Source: USGS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

List any additional indicator not included above (please specify whether this is an indicator that currently exists or one that you believe should exist)

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**7. Seabird indicators: Seabirds are conspicuous top predators that mainly feed on zooplanton (e.g., storm petrels), fish (e.g., murre and kittiwakes), or discards from fishing vessels (e.g., fulmars). For details on most indicators see the Ecosystem Considerations report <http://access.afsc.noaa.gov/reem/ecoweb/Index.php>**

**For the 5 indicators below, select and rank the top 3 in your opinion. You may select up to three indicators or none if you have no opinion. You may add a description of additional indicators in the box below.**

	1	2	3
<b>Seabird bycatch estimates</b> - all gear types; 1993-present Contact/Source: Shannon Fitzgerald/NMFS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Black-legged kittiwake reproductive success at the Semedi Islands</b> - Western GOA; surface-forager, piscivorous; 1979-present, except 82-88, 92-94, 96-97, 99-01, 03, and 08. Contact/Source: Heather Renner/USFWS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Common murre reproductive success at the Semedi Islands</b> - Western GOA; diving-forager, piscivorous; 1979-present, except 82-88, 92, 94, 96-97, 99-01, 03, and 08. Contact/Source: Heather Renner/USFWS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Fork-tailed storm petrel reproductive success at St Lazaria</b> - Eastern GOA; surface forager; mostly planktivorous, partially piscivorous; 1995-present Contact/Source: Heather Renner/USFWS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Common murre reproductive success at St Lazaria</b> - Eastern GOA; diving forager, piscivorous; 1994-present Contact/Source: Heather Renner/USFWS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

List any additional indicator not included above (please specify whether this is an indicator that currently exists or one that you believe should exist)

**8. Human indicators: Humans are considered part of the ecosystem. We are looking for indicators that reflect how humans both impact and are impacted by the ecosystem. For details on most indicators see the Ecosystem Considerations report <http://access.afsc.noaa.gov/reem/ecoweb/Index.php>**

**For the 12 indicators below, select and rank the top 3 in your opinion. You may select up to three indicators or none if you have no opinion. You may add a description of additional indicators in the box below.**

	1	2	3
<b>Human abundance trends</b> - Population of fishing communities within 25 miles of the coast and/or with historical involvement in GOA subsistence or industrial fisheries; 1920-present, decadal; Contact/Source: Amber Himes-Cornell/NMFS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>K-12 school enrollment trends</b> - Numbers of K-12 students in fishing communities within 25 miles of the coast; 1995- present Contact/Source: State of Alaska	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Groundfish fishery discards</b> - Either tonnage or percent discarded in managed groundfish fisheries in the GOA; 1994-present Contact/Source: Jean Lee/Pacific States	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Groundfish fishery non-target catch</b> - Total catch of scyphozoan jellyfish, HAPC-associated species (seapens sponges, anemones, etc.), invertebrates (bivalves, sea stars, etc.) in groundfish fisheries; 2003-present Contact/Source: Jean Lee/Pacific States	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Commercial pink salmon harvest</b> - Total commercial catch; 1994-2013 Contact/Source: ADF&G	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Commercial sockeye salmon harvest</b> - Total commercial catch; 1994-2013 Contact/Source: ADF&G	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Total commercial fisheries removals</b> - Includes groundfish, crab, salmon; to be developed; Contact/Source: To be identified	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Numbers of fishing crew licenses</b> - to be determined; Contact/Source: To be identified	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Numbers of sport licenses</b> - to be determined; Contact/Source: ADF&G	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Percent of trawlable area trawled</b> - not yet calculated; would be similar to that calculated for the AI Report Card; Contact/Source: Steve Barbeaux/NMFS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Overall exploitation rates of groundfish</b> - total catch divided by the estimated combined biomass at the beginning of each year; 1977-2009 (could be updated) Contact/Source: Franz Mueter/UAF	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Groundfish fleet composition</b> - Numbers of longline/jig, trawl, and/pot vessels participating in the groundfish fisheries; 1994-present Contact/Source: Jean Lee/Pacific States	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

List any additional indicator not included above (please specify whether this is an indicator that currently exists or one that you believe should exist)

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## Gulf of Alaska Ecosystem Indicator Survey

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9. Select 10 indicators from all of the indicators listed previously in this survey. Your choice should represent what you believe are the 10 indicators that best represents the current state and may portend the future state of the GOA ecosystem regardless of trophic category. The reason for this is because some people may not think that the best 10 indicators to represent the GOA should include one in each trophic category. For example, some may think that 2 groundfish indicators would be better than 1 benthic and 1 groundfish, etc. If you added indicators by text in any of the previous questions, don't worry; they will be evaluated for inclusion in the final list.

- NINO3.4
- PDO
- NPI
- NPGO
- Eddy kinetic energy
- Ocean surface currents: PAPA trajectory index
- GOA transport
- Water temperature anomalies at 25 m, GAK 1 (Kenai Peninsula)
- Water temperature anomalies at 100 m, GAK 1 (Kenai Peninsula)
- Bottom temperature anomalies in Barnabus gully (Western GOA)
- Bottom temperature anomalies in Kiliuda and Ugak bays (Western GOA)
- Freshwater input to GOA
- Large diatom abundance anomaly (Western GOA)
- Total zooplankton density by summer month in Icy Strait (Eastern GOA)
- Large calanoid copepod % composition in Icy Strait (Eastern GOA)
- Small calanoid copepod % composition in Icy Strait (Eastern GOA)
- Copepod community size anomaly (Western GOA)
- Mesozooplankton biomass (Western GOA)
- Aggregate motile epifauna biomass
- Tanner Crabs: Barnabus Gully
- Tanner Crab: Kiliuda and Ugak Bays
- Eulachon CPUE (Western GOA)
- Juvenile pollock CPUE (Western GOA)
- Herring CPUE (Western GOA)
- Post-fishery mature herring biomass+catch (Eastern GOA)
- Herring spawning biomass (Eastern GOA)
- Age-3 herring abundance (Eastern GOA)
- Capelin in puffin chick diets (Barren Islands)
- Capelin in puffin chick diets (Middleton Island)
- Sandlance in puffin chick diets (Barren Islands)
- Sandlance in puffin chick diets (Middleton Island)
- Northern lampfish/myctophid ichthyoplankton abundance (Western GOA)
- Mushy halibut
- Juvenile pink salmon CPUE (Eastern GOA)
- Marine survival of PWS hatchery pink salmon
- Total catch per km towed: Barnabus Gully
- Total catch per km towed: Kiliuda and Ugak Bays
- Arrowtooth catch: Barnabus Gully
- Arrowtooth catch: Kiliuda and Ugak Bays
- Pollock catch: Barnabus Gully
- Pollock catch: Kiliuda and Ugak Bays
- Groundfish trawl community index: Species richness
- Groundfish trawl community index: Species diversity
- Pelagic forager aggregate biomass
- Fish top predator aggregate biomass
- Benthic forager aggregate biomass
- Total annual groundfish surplus production
- single species CPUE
- Steller sea lion adult plus juvenile population
- Cook Inlet beluga whale population
- Sea otter surveys
- Seabird bycatch estimates: all gear types
- Black-legged kittiwake reproductive success (Semedi Islands)
- Common murre reproductive success( Semedi Islands)
- Fork-tailed storm petrel reproductive success (St Lazaria)
- Common murre reproductive success( St Lazaria)
- Human abundance trends
- K-12 school enrollment trends
- Groundfish fishery discards
- Groundfish fishery non-target catch
- Commercial pink salmon harvest
- Commercial sockeye salmon harvest
- Total commercial fisheries removals
- Numbers of fishing crew licenses
- Numbers of sport licenses
- Percent of trawlable area trawled
- Overall exploitation rates of groundfish
- Groundfish fleet composition

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100%

**10. Thank you for participating! Please note your particular area(s) of expertise in the GOA ecosystem and any additional comments here.**

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