

Indicator	FEP Indicator Ecosystem type Objective	Indicator topic	Indicator category (AK)	Reporting (already tracked, possible, would be nice but not possible, not relevant)	EwE ready for Andy?	Managem ent interest (1. Priority, 2. Desired, 3. Of interest)	Ref	What is it?
Foodweb complexity: number of trophic levels, connectivity, path length, niche width	5 ecosystem function	network analysis	Foodweb	possible	yes	1. Priority	Degnbol, P. and A. Jarre (2004). "Review of indicators in fisheries management - A development perspective."	
Oceanography (production index - plankton) <i>as in PPR otherwise physical</i>	5 ecosystem function	trophic	Oceanogra phy	Already tracked	possible	1. Priority	*Fulton et al. 2004. "Ecological Indicators for the Impacts of Fishing on Non-Target Species, Communities and Ecosystems: Review of Potential Indicators"	
Condition index (of proxy species) <b>Fulton's?</b>	5, 15 population structure	size/ age/ maturity	Survey biomass	Already tracked	no	1. Priority	?	
CPUE (species, community, species at risk etc)	1,3 population/ community condition	catch/effort	Catch	Already tracked	no	1. Priority	*Shin et al. 2010. "Using indicators for evaluating, comparing, and communicating the ecological status of exploited marine ecosystems. 2. Setting the scene"	
Diversity size-spectra slope and intercept	5 community structure	size/ age/ maturity	Survey biomass	Already tracked	no	1. Priority	Shin, Y. J., et al. (2005). "Using size-based indicators to evaluate the ecosystem effects of fishing." <i>Ices Journal of Marine Science</i> 62(3): 384-396.	
Physical oceanography (e.g. temperature, DIN, oxygen, chlorophyll a, ENSO)	5 physical		Physical	Already tracked	no	1. Priority	?	
Species composition - plankton assemblage	5 community structure	abundance	Survey biomass	Already tracked	no	1. Priority	Fulton et al. 2004. "Ecological Indicators for the Impacts of Fishing on Non-Target Species, Communities and Ecosystems: Review of Potential Indicators"	
Fat content of selected species - as proxy for food availability and quality of food	5, 15 ecosystem structure	trophic	Survey biomass	Already tracked	no	1. Priority (using length/ma ss ratio)	Degnbol, P. and A. Jarre (2004). "Review of indicators in fisheries management - A development perspective." <i>African Journal of Marine Science</i> 26: 303-326.	
Ecological network analysis indices (production, consumption, respiration, flow to detritus, system exports)	5 ecosystem structure	trophic	Network	possible	yes	2. Desired	?	
Increasing return time from perturbations	5 ecosystem function	threshold	Fishing effects	possible	yes	2. Desired	*Fulton et al. 2004. "Ecological Indicators for the Impacts of Fishing on Non-Target Species, Communities and Ecosystems: Review of Potential Indicators"	
Species composition - fish assemblage	5 community structure	diversity	Survey biomass	possible	yes	2. Desired	Fulton et al. 2004. "Ecological Indicators for the Impacts of Fishing on Non-Target Species, Communities and Ecosystems: Review of Potential Indicators"	
Network indices	15? 5 ecosystem function	network analysis	Network	possible	possible	2. Desired	Fulton, E. A., et al. (2005). "Which ecological indicators can robustly detect effects of fishing" <i>ICES Journal of Marine Science</i> , 62: 540e551. doi:10.1016/j.icesjms.2004.12.012	
Gao resilience index	5 community condition	vulnerability/ resilience	Fishing effects	possible	?	2. Desired	?	
1/(landings / biomass)	5 community condition	catch/effort	Survey biomass/c atch	possible	yes	3. Of interest	Shin et al. 2010. "Using indicators for evaluating, comparing, and communicating the ecological status of exploited marine ecosystems. 2. Setting the scene"	indicates global fishing pressure at the community level

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Biomass ratio of demersal:pelagic finfish	5 ecosystem structure	abundance	Survey biomass	possible	yes	3. Of interest	Fulton et al. 2004. "Ecological Indicators for the Impacts of Fishing on Non-Target Species, Communities and Ecosystems: Review of Potential Indicators"	indicates trophic structure and may indicate stress or depletion of system
biomass ratio of Infauna:epifauna (InF:EpF)	5 ecosystem structure	abundance	Survey biomass	possible	yes	3. Of interest	Fulton, E. A., et al. (2005). "Which ecological indicators can robustly detect effects of fishing" ICES Journal of Marine Science, 62: 540e551. doi:10.1016/j.icesjms.2004.12.012	
biomass ratio of piscivorous:zooplanktivorous fish (PvB:ZvB)	5 ecosystem structure	trophic	Survey biomass	possible	yes	3. Of interest	*Shin et al. 2010. "Using indicators for evaluating, comparing, and communicating the ecological status of exploited marine ecosystems. 2. Setting the scene"	
Species composition (e.g ratio of species, MDS and other ordination/clustering analysis)	5 community structure	diversity	Survey biomass	possible	yes	3. Of interest	Fulton et al. 2004. "Ecological Indicators for the Impacts of Fishing on Non-Target Species, Communities and Ecosystems: Review of Potential Indicators"	
biomass relative to unexploited level - by community and group	5 community condition	abundance	Survey biomass	possible	possible	3. Of interest	Fulton, E. A., et al. (2005). "Which ecological indicators can robustly detect effects of fishing" ICES Journal of Marine Science, 62: 540e551. doi:10.1016/j.icesjms.2004.12.012	
Community relatedness-similarity indices	5 community structure	diversity	Survey biomass	possible	?	3. Of interest	Fulton et al. 2004. "Ecological Indicators for the Impacts of Fishing on Non-Target Species, Communities and Ecosystems: Review of Potential Indicators"	
1 / Coefficient of variation (e.g. of catch or of survey index)	5 community structure	abundance	Catch	possible	yes	4. Low priority	Shin et al. 2010. "Using indicators for evaluating, comparing, and communicating the ecological status of exploited marine ecosystems. 2. Setting the scene"	provides a measure of the stability of the ecosystem and its resilience to perturbations
biomass ratio of endangered:non-endangered	5 community condition	vulnerability/ resilience	Foodweb	possible	yes	4. Low priority	Degnbol, P. and A. Jarre (2004). "Review of indicators in fisheries management - A development perspective." African Journal of Marine Science 26: 303-326.	fraction of endangered species. Almost no information on this indicator.
Capacity, overhead, and relative ascendancy	5 ecosystem function	network analysis	Catch	possible	yes	4. Low priority	Fulton, E. A., et al. (2005). "Which ecological indicators can robustly detect effects of fishing" ICES Journal of Marine Science, 62: 540e551. doi:10.1016/j.icesjms.2004.12.012	
Cumulative biomass vs. trophic level curve inflection point	5 community structure	trophic	Survey biomass	possible	yes	4. Low priority	Link et al., 2015. Emergent Properties Delineate Marine Ecosystem Perturbation and Recovery. Trends in Ecology & Evolution, 30(11), pp.649–661.	

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Cumulative production vs. cumulative biomass curve junction point	5 ecosystem function	abundance	Survey biomass	possible	yes	4. Low priority	Link et al., 2015. Emergent Properties Delineate Marine Ecosystem Perturbation and Recovery. Trends in Ecology & Evolution, 30(11), pp.649–661.	
Ecological Network Analysis diversity	5 ecosystem function	network analysis	Network	possible	yes	4. Low priority	OSPAR indicators ( <a href="https://www.ospar.org/work-areas/bdc">https://www.ospar.org/work-areas/bdc</a> ) - FROM ICES REPORT ABOVE	
Ecotrophic efficiency (EE) - across a set of groups and by group	5 ecosystem structure	trophic	Foodweb	not relevant	yes	4. Low priority	Fulton, E. A., et al. (2005). "Which ecological indicators can robustly detect effects of fishing" ICES Journal of Marine Science, 62: 540e551. doi:10.1016/j.icesjms.2004.12.012	
Evenness	5 community structure	diversity	Survey biomass	possible	yes	4. Low priority	Link, J.S. et al., 2002. Marine ecosystem assessment in a fisheries management context. Canadian Journal of Fisheries and Aquatic Sciences, 59(9), pp.1429–1440.	
Finn's recycling index	5 ecosystem function	trophic	?	possible	yes	4. Low priority	Fulton et al. 2004. "Ecological Indicators for the Impacts of Fishing on Non-Target Species, Communities and Ecosystems: Review of Potential Indicators"	
Mean trophic level of marine predators	5 community structure	trophic	Survey biomass	possible	yes	4. Low priority	ICES 2017.ICES WGECO REPORT 2017 Report of the Working Group on Ecosystem Effects of Fishing Activities ( WGECO )	
Shannon and Hill's index of diversity	5 community structure	diversity	Survey biomass	Already tracked	yes	4. Low priority	Shin et al. 2010. "Using indicators for evaluating, comparing, and communicating the ecological status of exploited marine ecosystems. 2. Setting the scene"	Shannon-Weiner Index
System omnivory index (SOI)	5 ecosystem function	trophic	Foodweb	possible	yes	4. Low priority	*Fulton et al. 2004. "Ecological Indicators for the Impacts of Fishing on Non-Target Species, Communities and Ecosystems: Review of Potential Indicators"	
Trophic index	5 ecosystem structure	trophic	Survey biomass	possible	yes	4. Low priority	*Fulton et al. 2004. "Ecological Indicators for the Impacts of Fishing on Non-Target Species, Communities and Ecosystems: Review of Potential Indicators"	
K-dominance or ABC (abundance biomass comparison) curves	5 community structure	diversity	Survey biomass	possible	possible	4. Low priority	*Fulton et al. 2004. "Ecological Indicators for the Impacts of Fishing on Non-Target Species, Communities and Ecosystems: Review of Potential Indicators"	
Proportion of large fish (LFI)	5 community structure	size/age/maturity	Survey biomass	possible	possible	4. Low priority	*Shin et al. 2010. "Using indicators for evaluating, comparing, and communicating the ecological status of exploited marine ecosystems. 2. Setting the scene"	
Maximum length in a population	5 population structure	size/age/maturity	Survey biomass	possible	no	4. Low priority	*Shin, Y. J., et al. (2005). "Using size-based indicators to evaluate the ecosystem effects of fishing." Ices Journal of Marine Science 62(3): 384-396.	
Provisioning rates: number of meals per day; energy value of each meal	5 ecosystem structure	trophic	Birds/Mammals	possible	no	4. Low priority	Fulton et al. 2004. "Ecological Indicators for the Impacts of Fishing on Non-Target Species, Communities and Ecosystems: Review of Potential Indicators"	
Taxonomic diversity indices (richness, diversity, distinctness, similarity), evenness, dominance, Reyni index, Simpson index, PIE)	5 community structure	diversity	Survey biomass	possible	no	4. Low priority	Fulton et al. 2004. "Ecological Indicators for the Impacts of Fishing on Non-Target Species, Communities and Ecosystems: Review of Potential Indicators"	

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System mean transfer efficiency	5 ecosystem function	trophic	Foodweb	possible	maybe	4. Low priority	Rochet, M.J. and Rice, J.C., 2005. Do explicit criteria help in selecting indicators for ecosystem-based fisheries management?. ICES Journal of Marine Science, 62(3), pp.528-539.	
Invasibility of foodwebs	5 ecosystem function	trophic	Foodweb	would be nice	doubtful	4. Low priority	Degnbol, P. and A. Jarre (2004). "Review of indicators in fisheries management - A development perspective." African Journal of Marine Science 26: 303-326.	
Biomass trophic spectrum	5 ecosystem structure	trophic	Survey biomass	rejected	?	4. Low priority	OSPAR indicators ( <a href="https://www.ospar.org/work-areas/bdc">https://www.ospar.org/work-areas/bdc</a> ) - FROM ICES REPORT ABOVE	
Schrodinger ratio	5 ecosystem function	abundance	Foodweb	Uncertain	?	?	Fulton et al. 2004. "Ecological Indicators for the Impacts of Fishing on Non-Target Species, Communities and Ecosystems: Review of Potential Indicators"	
spectral rendering	5 ecosystem function	threshold	?	possible	?	?	Lenton, T.M., 2011. Early warning of climate tipping points. Nature Climate Change, 1(4), pp.201-209.	
Connectance	5 ecosystem function	network analysis	?	?	yes	?	Fulton et al. 2004. "Ecological Indicators for the Impacts of Fishing on Non-Target Species, Communities and Ecosystems: Review of Potential Indicators"	
CCAMLR predator/prey/environment index	4,5 ecosystem function	trophic	?	?	possible	?	Fulton et al. 2004. "Ecological Indicators for the Impacts of Fishing on Non-Target Species, Communities and Ecosystems: Review of Potential Indicators"	
Dominance of detritus	5 ecosystem function	diversity	?	?	possible	?	*Fulton et al. 2004. "Ecological Indicators for the Impacts of Fishing on Non-Target Species, Communities and Ecosystems: Review of Potential Indicators"	
Effective number of species within trophic levels, proportion of species at range of trophic levels	5 ecosystem structure	trophic	?	?	possible	?	Degnbol, P. and A. Jarre (2004). "Review of indicators in fisheries management - A development perspective." African Journal of Marine Science 26: 303-326.	

Indicator	data	Indicator Ref	Indicator definition	Notes
Apex predator biomass	survey index (w/Q)		Trophic guild, reflects ecosystem structure/function and pred/prey relationships	
Benthic forager biomass	survey index (w/Q)		Trophic guild, reflects ecosystem structure/function and pred/prey relationships	
Pelagic forager biomass	survey index (w/Q)		Trophic guild, reflects ecosystem structure/function and pred/prey relationships	
Motile epifauna biomass	survey index (w/Q)		Trophic guild, reflects ecosystem structure/function and pred/prey relationships	
Total biomass	survey index (w/Q)	Shin et al. 2010	Aggregate biomass, stable measure of potential ecosystem contribution as a resource	sum of the four trophic guilds
Pollock biomass	survey index (w/Q)		Dominate groundfish species biomass	
Pelagic:Demersal biomass ratio	survey index (w/Q)	Fulton et al. 2005	Ratio of pelagic foraging fish to demersally oriented fish	Pelagic forager guild divided by the sum of apex guild, benthic forager guild, and eelpouts
Total groundfish catch	SAFE intro		Aggregate groundfish catch	From the "big" table in the SAFE intro, specific to Bering Sea
Pollock catch	SAFE intro		Dominate species catch	From the "big" table in the SAFE intro, specific to Bering Sea
1/(CVbiomass)	survey index (w/Q)	Shin et al. 2010	Groundfish community stability and resistance to perturbations	
Mean length	survey index (w/Q), survey lengths	Shin et al. 2010	Tracks groundfish size, may be sensitive to fisheries targeting larger fish	
Mean lifespan	survey index (w/Q), Age & Growth database	Shin et al. 2010	Proxy for turnover rate and resistance to perturbations	
1/(Landings/Biomass)	SAFE intro, survey index (w/Q)	Shin et al. 2010	Measure of resource potential, reflects production dedicated to fishing	
Shannon index	survey index (w/Q)	Suprenand and Ainsworth 2017	Evenness—distribution of biomass across fixed number of species/functional groups	When used with a fixed number of species (i.e., food web model), this reduces to an evenness index.
Mean TL catch	SAFE intro, GroupQ file (EwE)	Shin et al. 2010	Weighted mean TL of exploited species	Should decrease in the presence of fisheries targeting higher TLs.
TL of surveyed community	survey index (w/Q)	Indiseas		