

Comisión Interamericana del Atún Tropical
Inter-American Tropical Tuna Commission



Ecosystem considerations (SAC-12-12)

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Outline

- Review of IATTC ecosystem mandates and the Ecosystem Approach to Fisheries (EAF)
- Reporting of bycatch by taxonomic group
- Need for improved data reporting on bycatch (**SAC-12-09**)
- Reporting of physical environmental indicators
- Ecological Risk Assessments (ERA) (**BYC-10 INF-B**)
- Ecosystem model (**SAC-12-13**)
- Summary



IATTC mandates

- Under the Antigua convention, the IATTC is responsible for ensuring the “*long-term conservation and sustainable use of the stocks of tunas and tuna-like species and other associated species of fish taken by vessels fishing for tunas and tuna-like species in the eastern Pacific Ocean (EPO)*”
- Article IV. “*Where the status of target stocks or non-target or associated or dependent species is of concern, the members of the Commission shall subject such stocks and species to enhanced monitoring in order to review their status and the efficacy of conservation and management measures. They shall revise those measures regularly in the light of new scientific information available.*”
- Article VII. “*adopt, as necessary, conservation and management measures and recommendations for species belonging to the same ecosystem and that are affected by fishing for, or dependent on or associated with, the fish stocks covered by this Convention, with a view to maintaining or restoring populations of such species above levels at which their reproduction may become seriously threatened*”

Ecosystem Approach to Fisheries (EAF)

- Recognizes broader impacts of fisheries on the ecosystem
- IATTC proactive in pursuing EAF and ecological sustainability
 - Dolphin mortality limits (DMLs)
 - Monitoring catches of incidentally-caught species
 - Resolutions pertaining to such species (*e.g.* silky and oceanic whitetip sharks, mobulid rays)
 - Undertaking research on trophic ecology
 - Development of the ETP ecosystem model (Olson and Watters, 2003)
 - Annual reporting of ecological indicators; refining ecosystem models (*e.g.* ETP21; SAC-12-13)
 - Development and application of new ecological risk assessment methods (*e.g.* EASI-Fish; BYC-10 INF-B)

Reporting of bycatch species

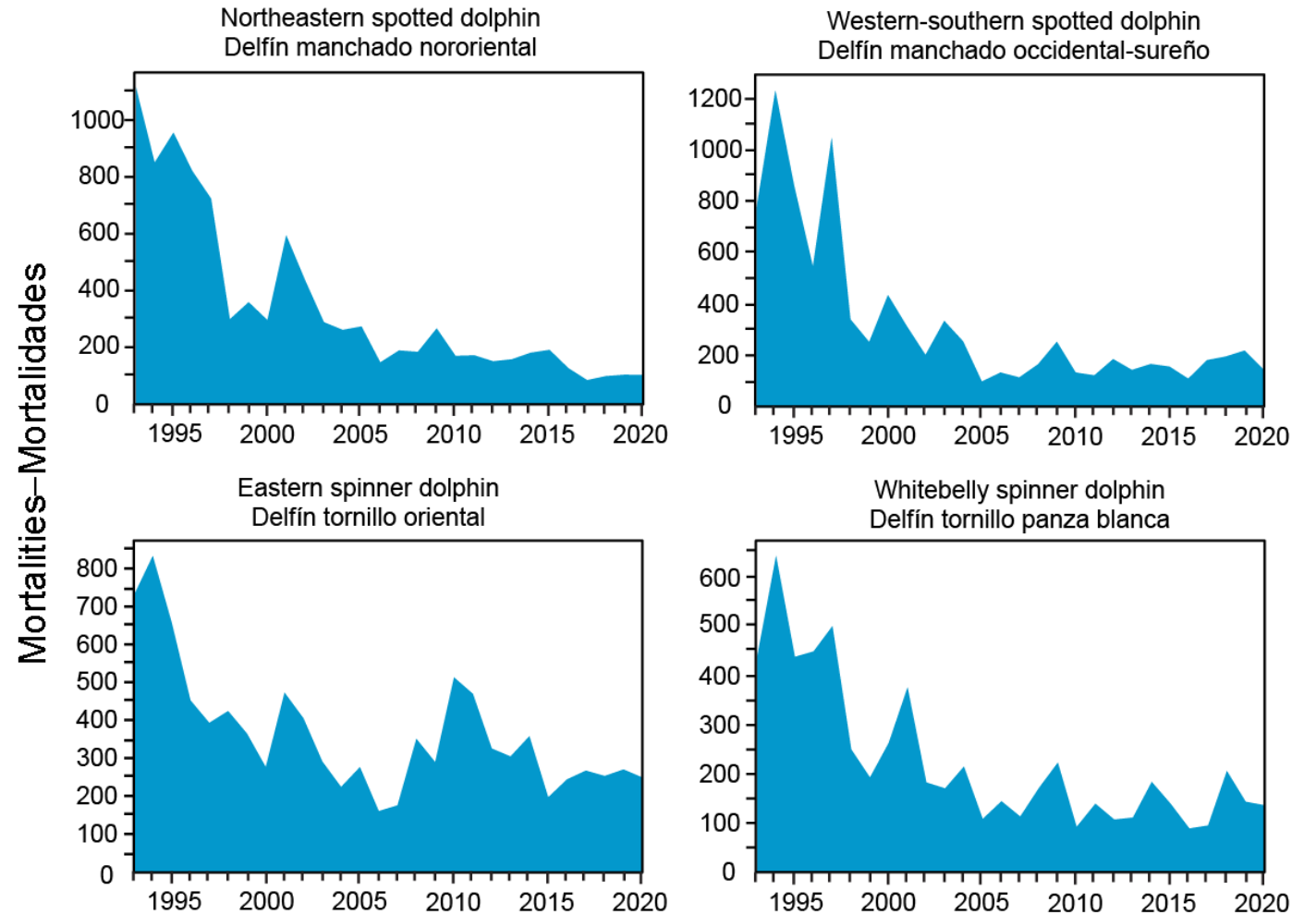
- Improvements made to reporting of bycatch species, large purse seiners
 - *e.g.* species-specific catches of sharks, rays, fishes
- Provide transparency and context to the relative magnitude of change (1993-2020)
- Inclusion of minimum catch estimates by longline vessels
 - Obtained using “Task I” data of gross annual removals
 - Iterative process to improve LL data reporting
(see [SAC-08-07b](#), [SAC-08-07e](#), [SAC-09 INF A](#), [SAC-10 INF-H](#), [SAC-12-04](#))
 - Longline observer estimates currently insufficient for reliably estimating annual bycatches ([BYC-10 INF-D](#))
- Inclusion of minimum catch estimates by small purse-seine vessels
 - Limited observer data (24% of trips carried an observer; 2020)
- For total catch estimates to improve, reporting on bycatch species must continue to be improved ([SAC-12-09](#))

Reporting of bycatch species: Marine mammals

- Estimates of incidental mortalities (numbers) from the purse-seine fishery

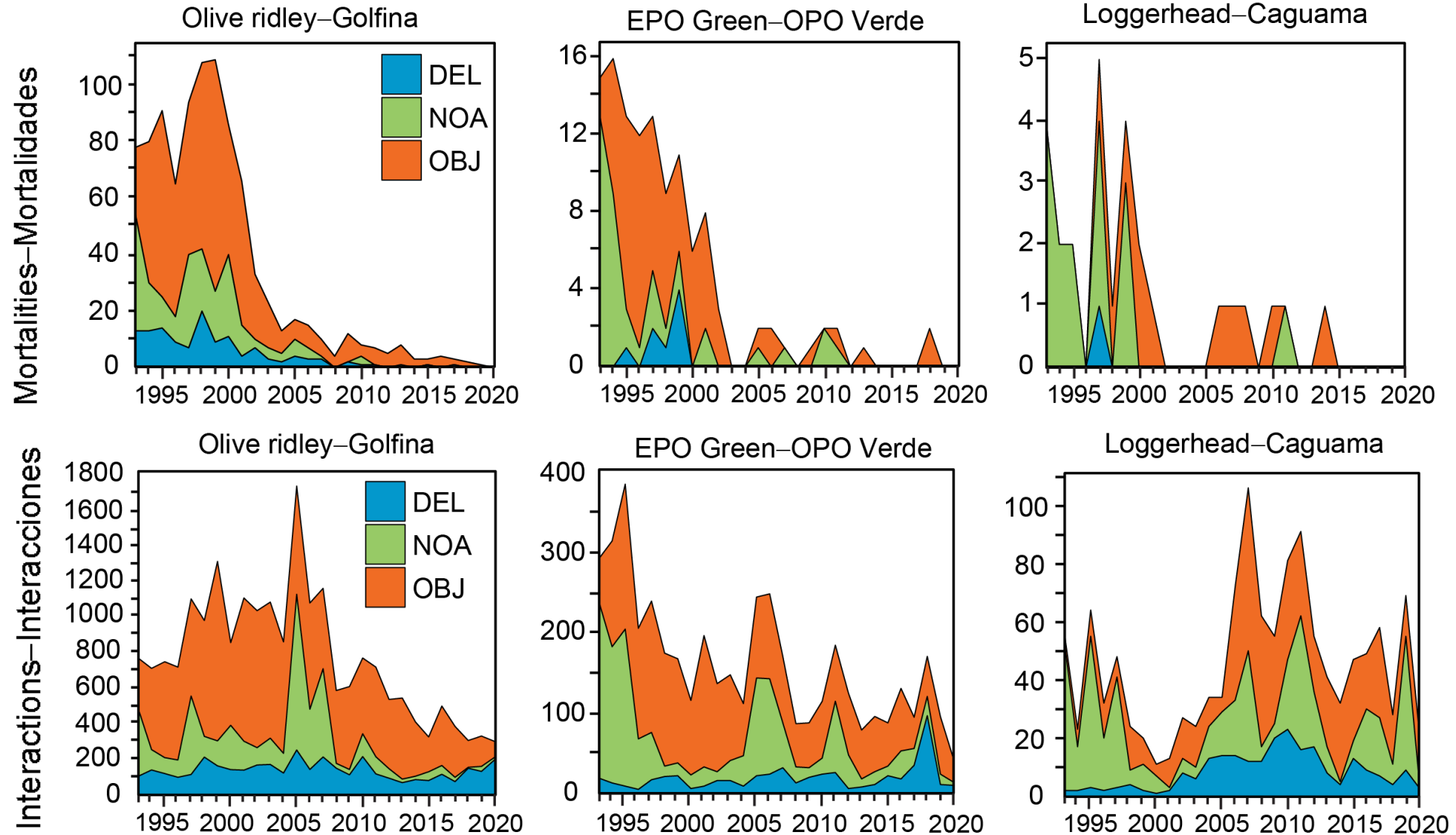
- Time-series: 1993-2020

Year	<i>Stenella attenuata</i>				<i>Stenella longirostris</i>			
	Offshore ¹				Spinner			
	Northeastern	Western-southern			Eastern	Whitebelly		
	Num	Wt	Num	Wt	Num	Wt	Num	Wt
1993	1,112	56.3	773	44.4	725	34.4	437	22.5
1994	847	42.9	1,228	70.6	828	39.3	640	32.9
1995	952	48.2	859	49.4	654	31.0	436	22.4
1996	818	41.4	545	31.3	450	21.3	447	23.0
1997	721	36.5	1,044	60.0	391	18.5	498	25.6
1998	298	15.1	341	19.6	422	20.0	249	12.8
1999	358	18.1	253	14.5	363	17.2	192	9.9
2000	295	14.9	435	25.0	275	13.0	262	13.5
2001	592	30.0	315	18.1	470	22.3	374	19.2
2002	435	22.0	203	11.7	403	19.1	182	9.4
2003	288	14.6	335	19.3	290	13.8	170	8.7
2004	261	13.2	256	14.7	223	10.6	214	11.0
2005	273	13.8	100	5.8	275	13.0	108	5.6
2006	147	7.4	135	7.8	160	7.6	144	7.4
2007	189	9.6	116	6.7	175	8.3	113	5.8
2008	184	9.3	167	9.6	349	16.6	171	8.8
2009	266	13.5	254	14.6	288	13.7	222	11.4
2010	170	8.6	135	7.8	510	24.2	92	4.7
2011	172	8.7	124	7.1	467	22.1	139	7.1
2012	151	7.6	187	10.8	324	15.4	107	5.5
2013	158	8.0	145	8.3	303	14.4	111	5.7
2014	181	9.2	168	9.7	356	16.9	183	9.4
2015	191	9.7	158	9.1	196	9.3	139	7.1
2016	127	6.4	111	6.4	243	11.5	89	4.6
2017	85	4.3	183	10.5	266	12.6	95	4.9
2018	99	5.0	197	11.3	252	12.0	205	10.5
2019	104	5.3	220	12.7	269	12.8	143	7.4
2020	105	5.3	154	8.9	251	11.9	138	7.1
Total	9,579	485.2	9,141	525.6	10,178	482.7	6,300	323.9



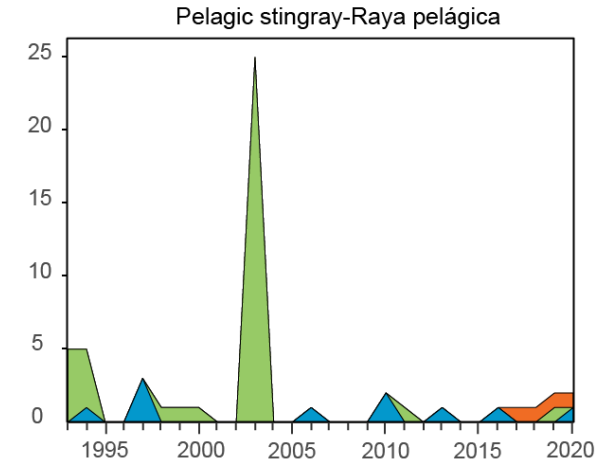
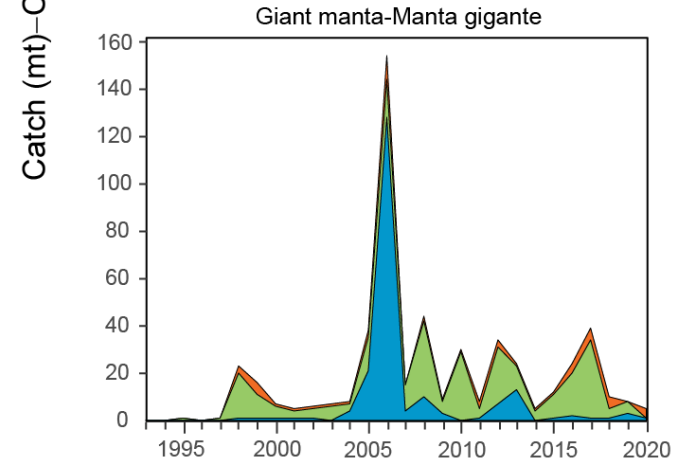
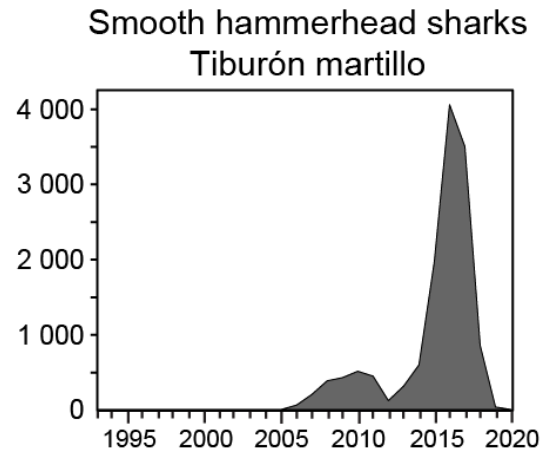
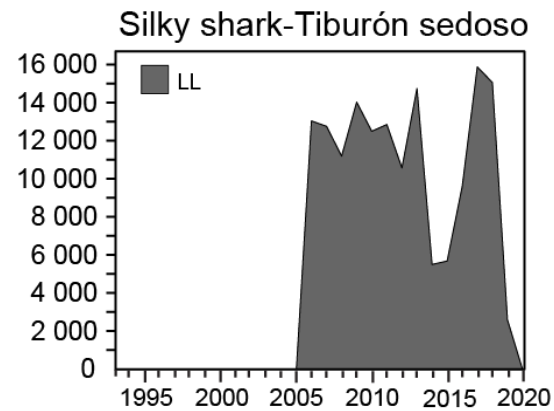
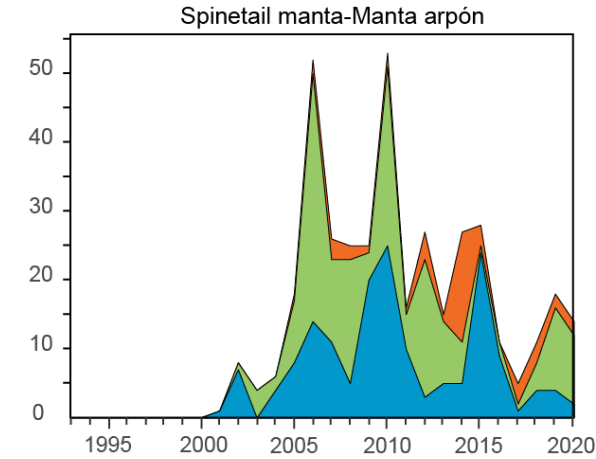
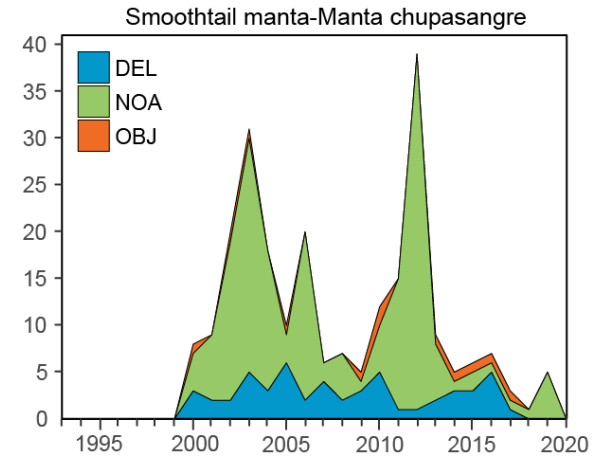
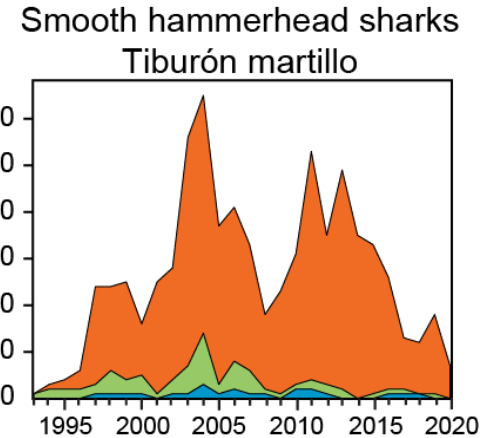
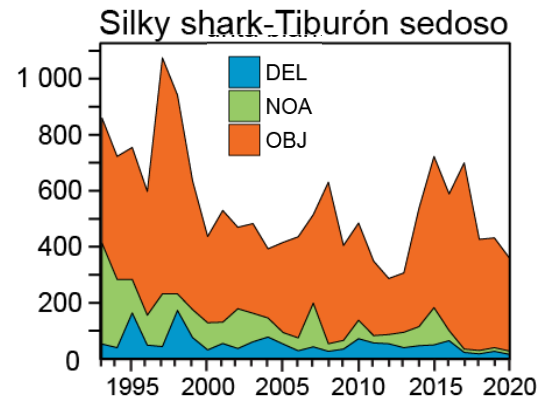
Reporting of bycatch species: Sea turtles

- Mortalities and interactions (numbers) from the purse-seine fishery (1993-2020)



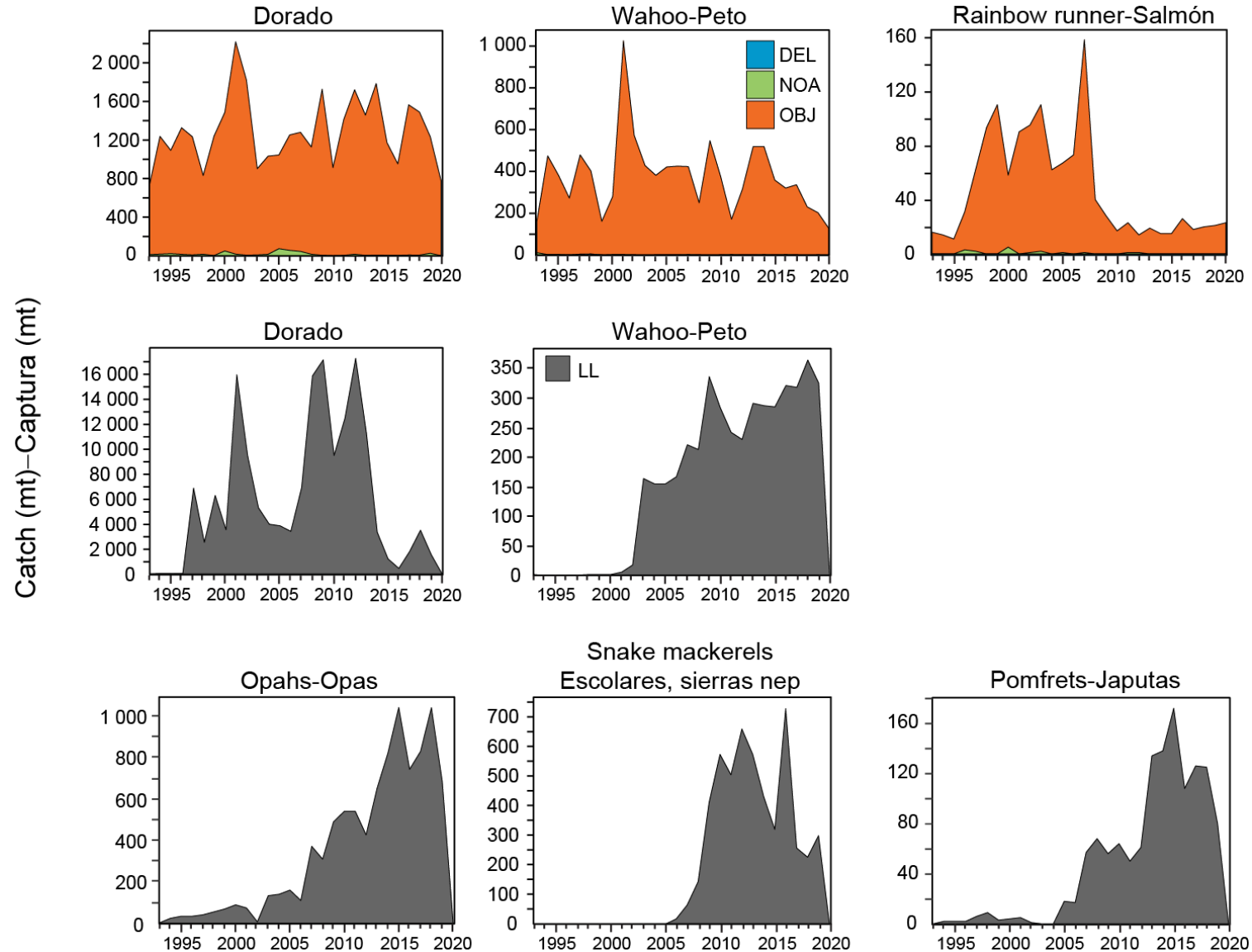
Reporting of bycatch species: Elasmobranchs

- Mortalities (mt) from the purse-seine fishery (sharks and rays) and minimum estimates by longline (sharks)



Reporting of bycatch species: Fishes

- Mortalities (mt) from the purse-seine fishery and minimum estimates by longline



Minimum estimates of bycatch species: Small purse-seine fishery (2020)

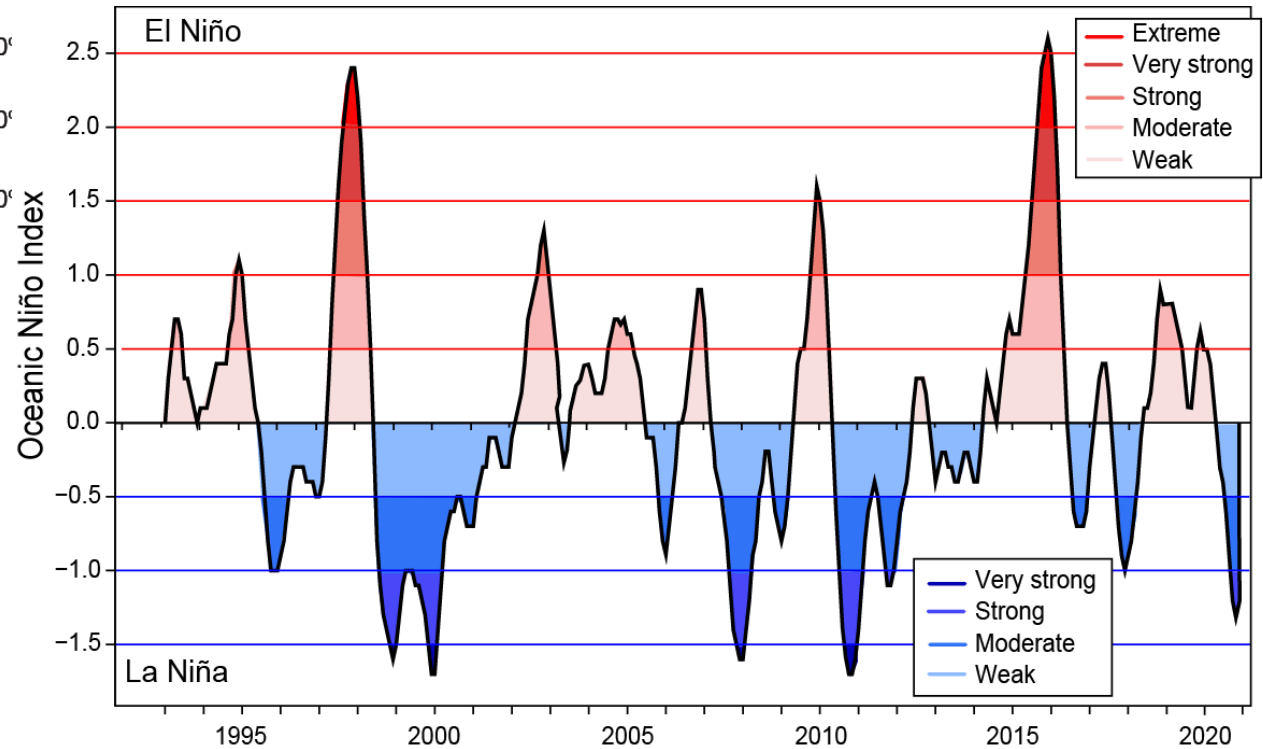
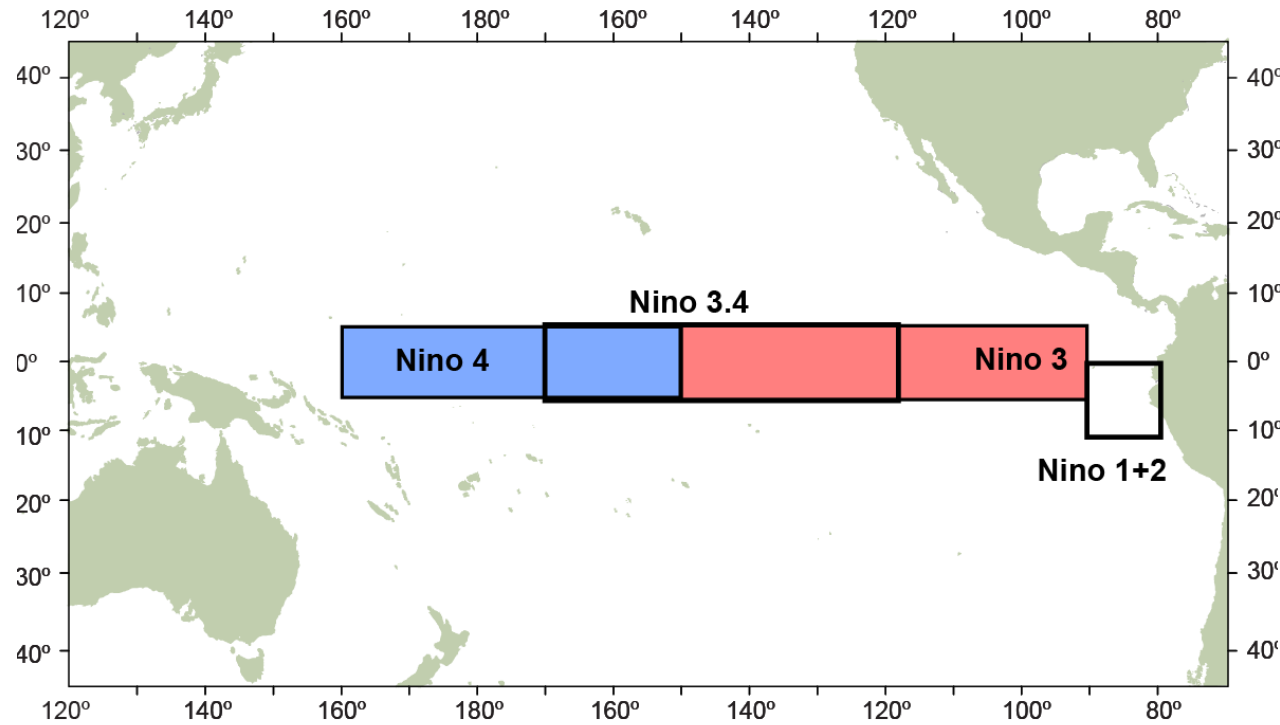
- Mortalities (mt) from limited observer data (24% of all trips carried an observer)
- Data reporting for these vessels is aimed to be improved in the near future

Taxa	Common name	Scientific name	Set type	
			OBJ	NOA
Sharks	Silky shark	<i>Carcharhinus falciformis</i>	17	<1
	Blue shark	<i>Prionace glauca</i>	-	<1
	Other Carcharhinidae	Carcharhinidae spp.	<1	-
	Smooth hammerhead	<i>Sphyrna zygaena</i>	<1	<1
	Scalloped hammerhead	<i>Sphyrna lewini</i>	3	-
	Hammerhead, nei	<i>Sphyrna</i> spp.	<1	-
	Pelagic thresher shark	<i>Alopias pelagicus</i>	<1	-
	Other shark		<1	-
Rays	Smoothtail manta	<i>Mobula thurstoni</i>	<1	<1
	Spinetail manta	<i>Mobula mobular</i>	<1	1
	Munk's devil ray	<i>Mobula munkiana</i>	-	<1
	Chilean devil ray	<i>Mobula tarapacana</i>	<1	<1
	Giant manta	<i>Mobula birostris</i>	-	<1
	Mobulidae ray, nei	Mobulidae spp.	<1	<1
	Pelagic stingray	<i>Pteroplatytrygon violacea</i>	<1	<1
	Stingray, nei	Dasyatidae spp.	<1	<1
Large fishes	Dorado	<i>Coryphaenidae</i> spp.	88	<1
	Wahoo	<i>Acanthocybium solandri</i>	16	<1
	Rainbow runner	<i>Elagatis bipinnulata</i>	1	-
	Amberjack, nei	<i>Seriola</i> spp.	1	-
	Jacks, crevalles, nei	<i>Caranx</i> spp.	<1	-
	Amberjack, jack, crevalles, nei	<i>Seriola, Caranx</i> spp.	<1	-
	Mola, nei	Molidae spp.	<1	-
	Tripletail	<i>Lobotes surinamensis</i>	<1	<1
	Other large fish		<1	-
Small fishes	Bullet and frigate tunas	<i>Auxis</i> spp.	60	6
	Triggerfishes, filefishes	Balistidae, Monacanthidae spp.	12	<1
	Sea chubs	Kyphosidae spp.	<1	-
	Small carangid, nei	Carangidae spp.	<1	<1
	Epipelagic forage fishes		<1	-

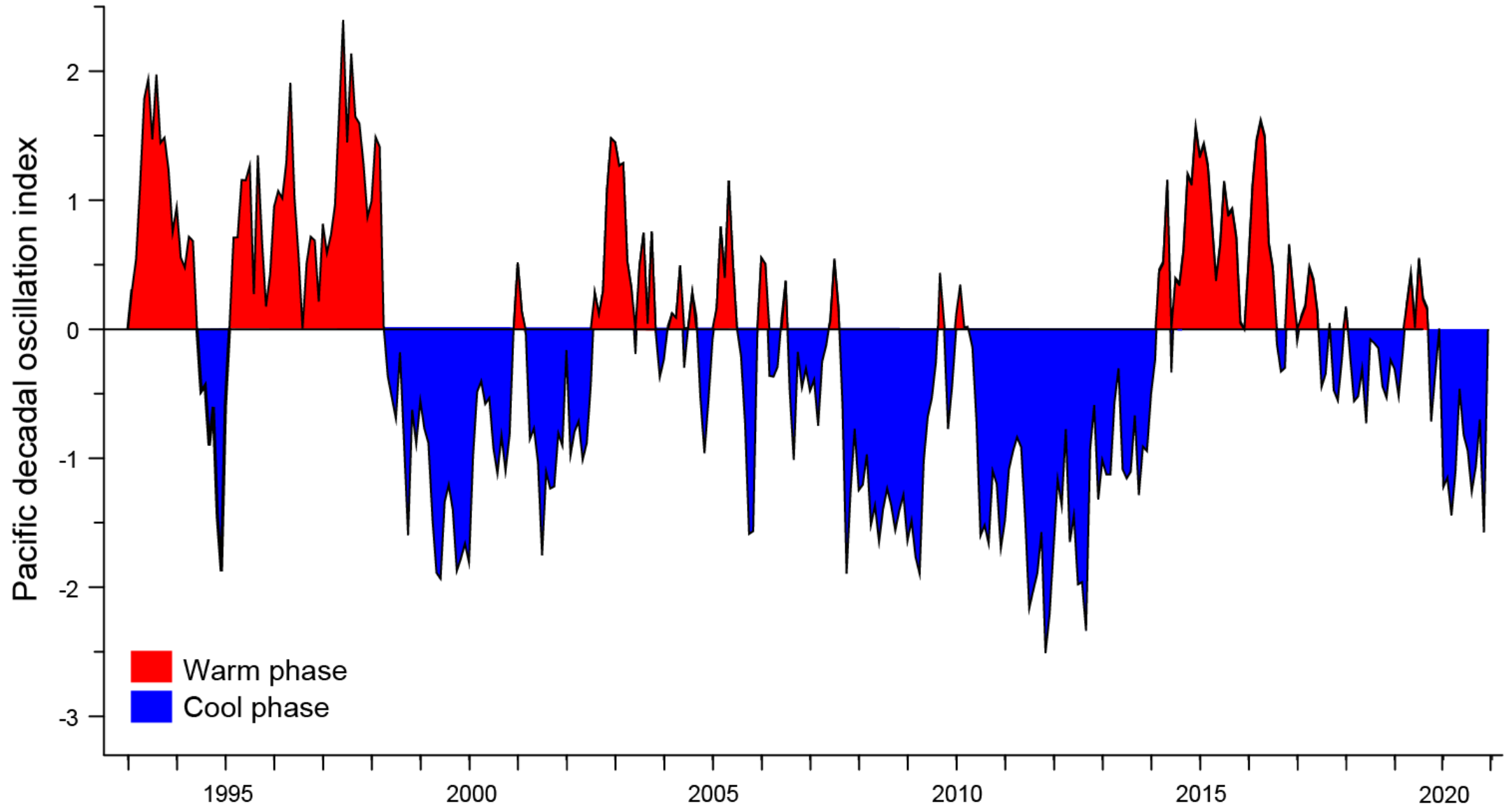
Physical Environment

- Oceanographic indices to describe SST anomalies
 - Shorter-term, interannual events (e.g. ENSO events)
 - Longer-term, interdecadal events (e.g. Pacific Decadal Oscillation (PDO))
- Primary indicator of warm El Niño and cool La Niña conditions
 - Oceanic Niño Index (ONI), Niño 3.4 region
- PDO tracks large-scale interdecadal patterns of environmental and biotic changes
 - Primarily in NPO, secondary signatures in tropical Pacific

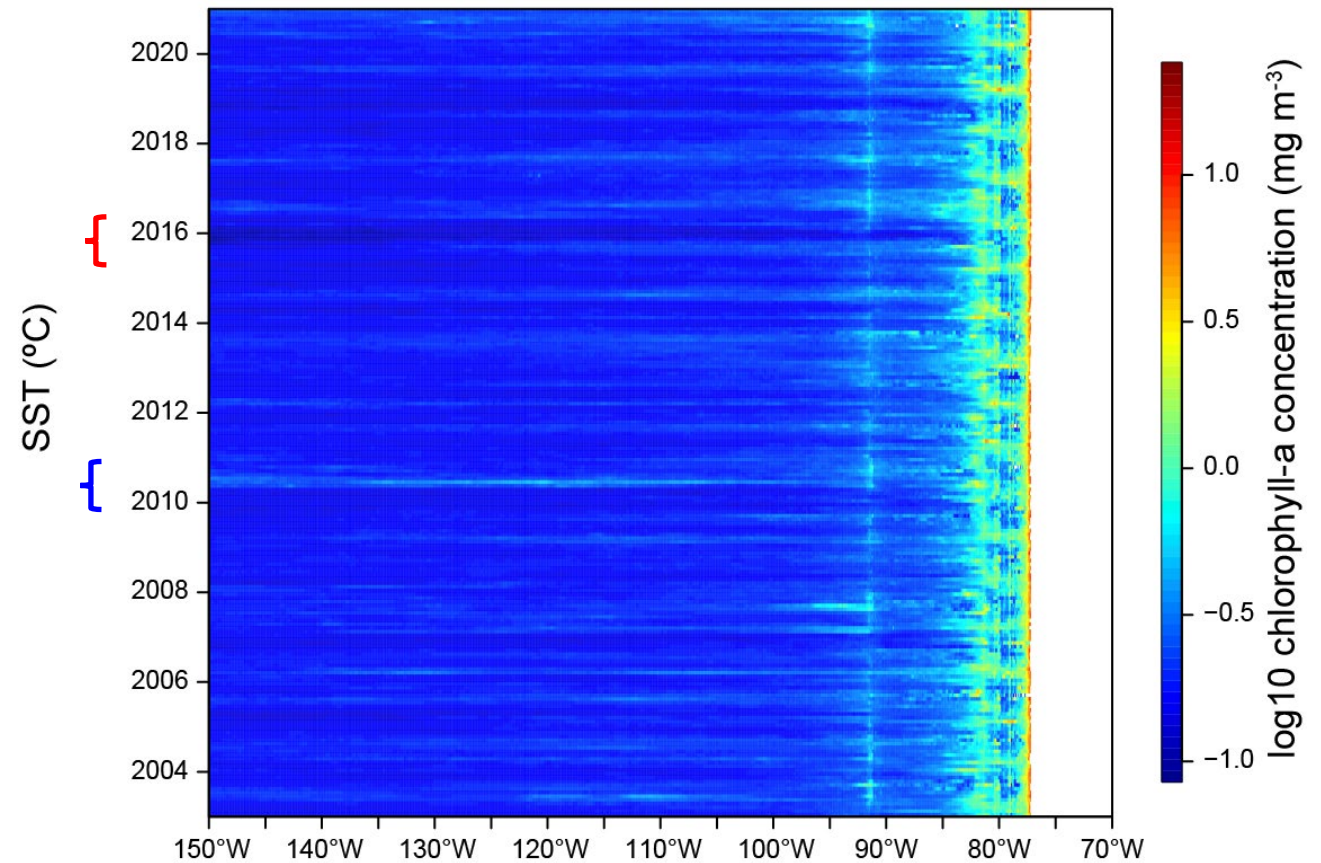
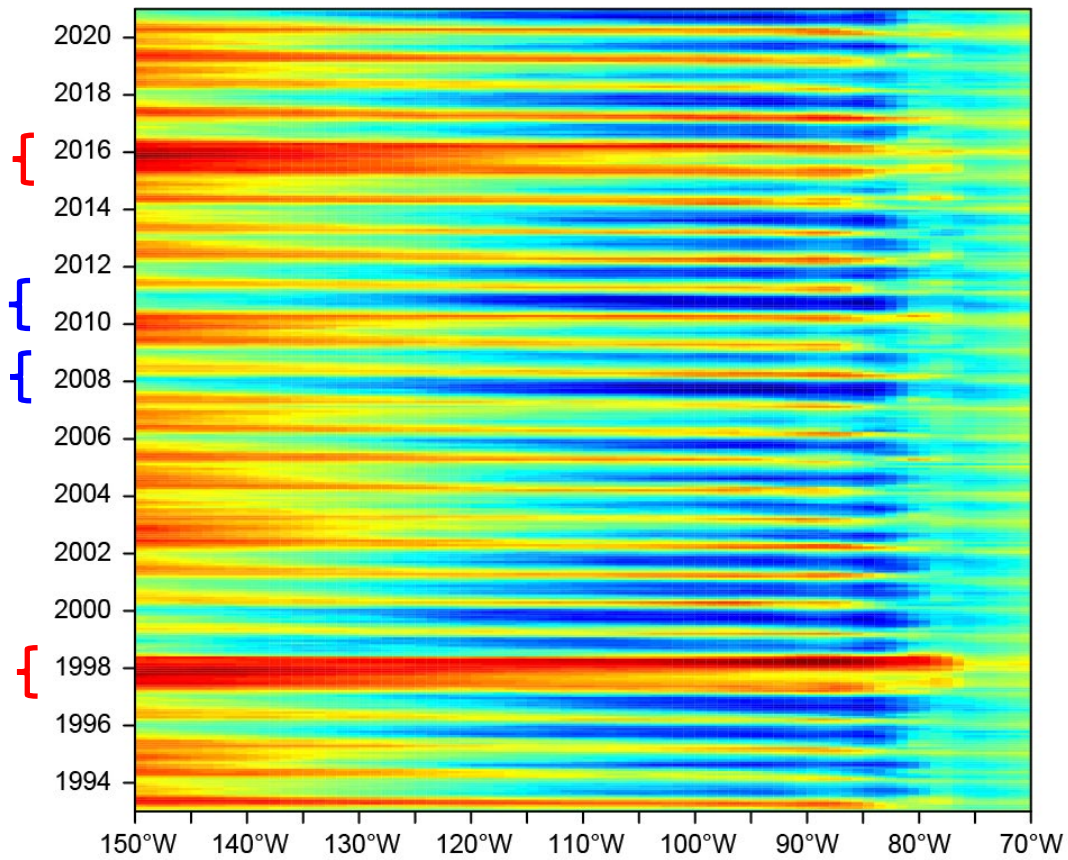
Physical Environment : Oceanic Niño Index (ONI)



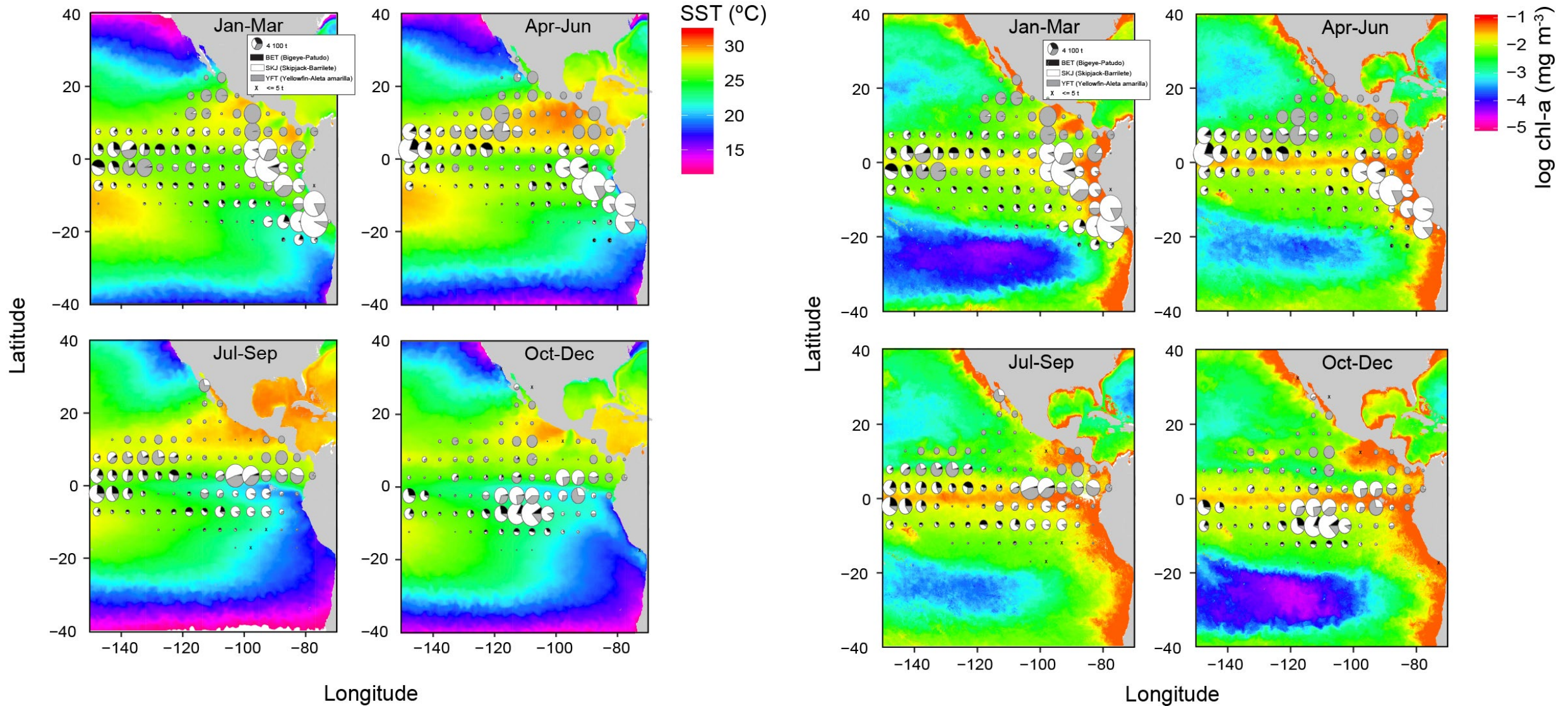
Physical Environment: Pacific Decadal Oscillation Index (PDO)



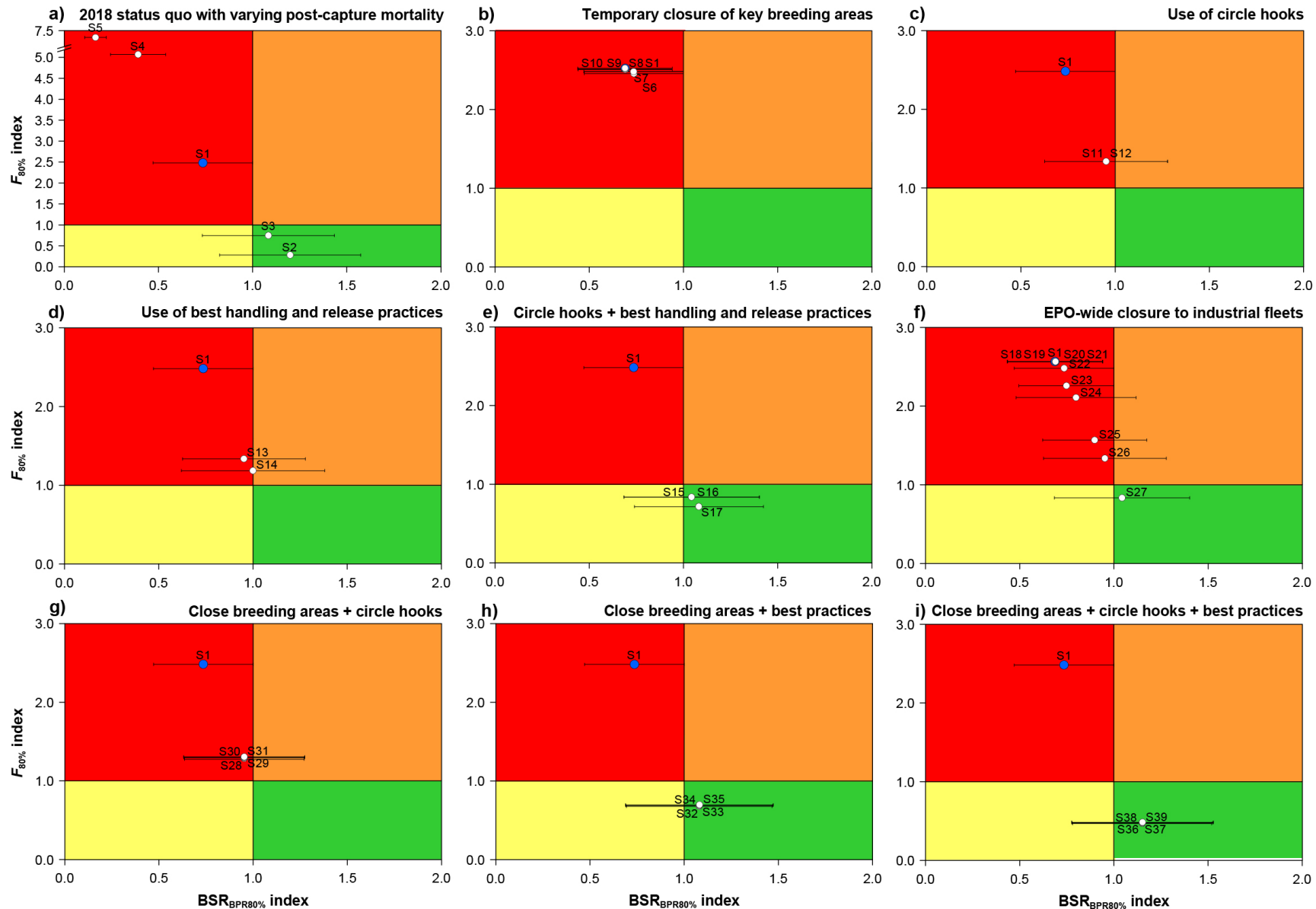
Physical Environment: SST and chlorophyll time series



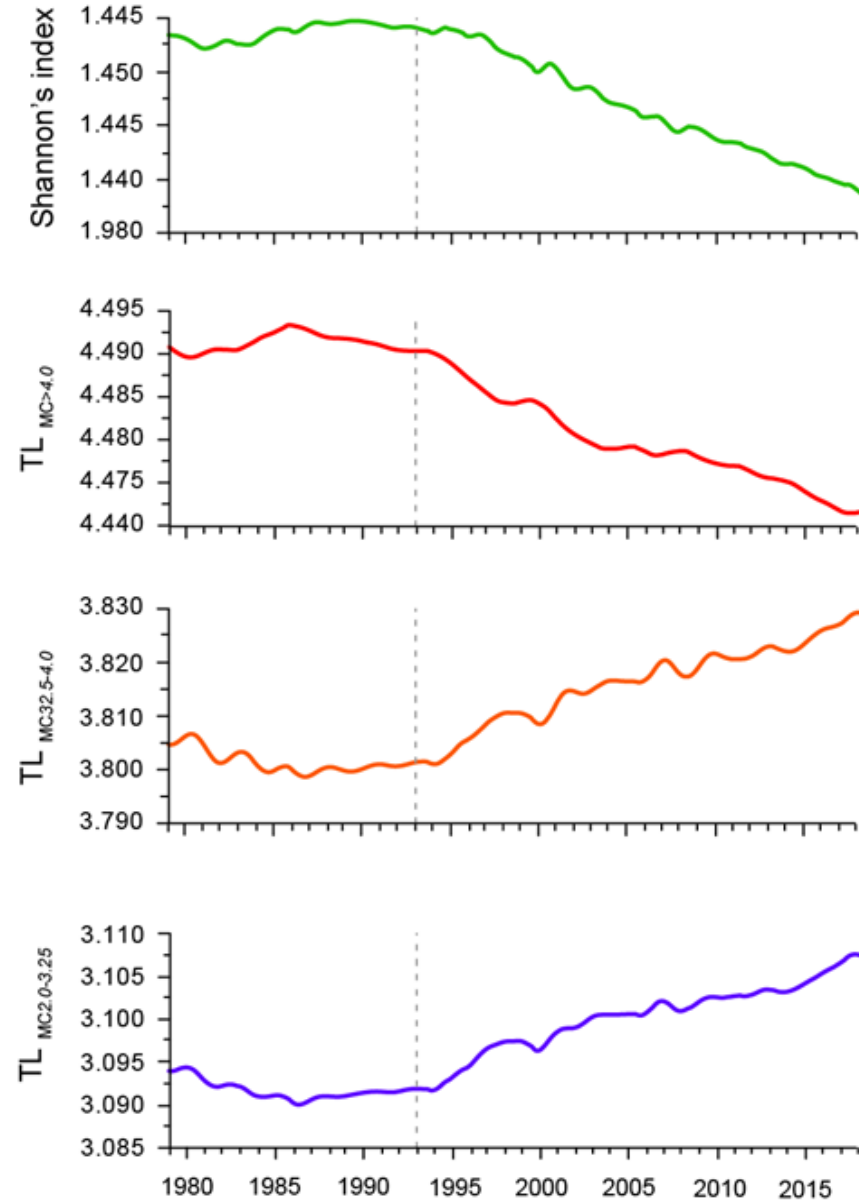
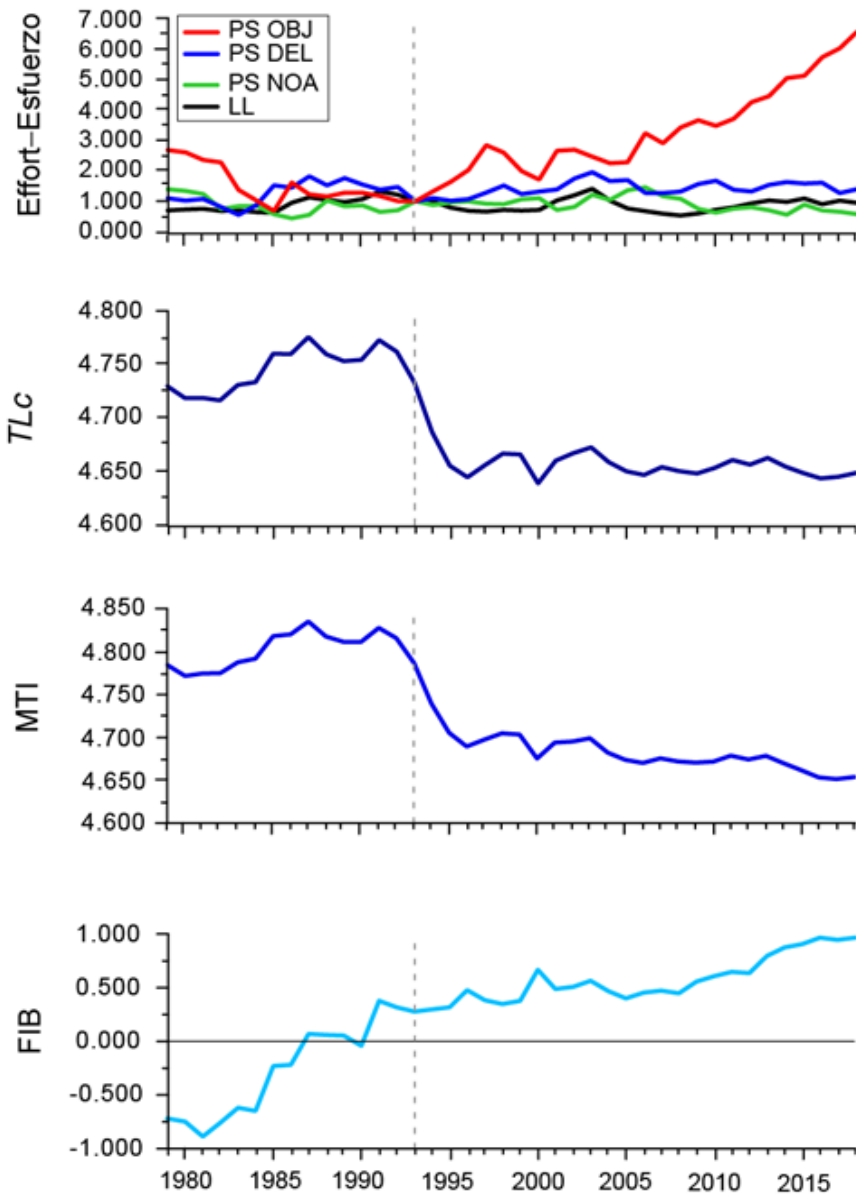
Physical Environment: Quarterly SST and chlorophyll concentration



Ecological Risk Assessment (see BYC-10 INF-B)



Ecosystem modeling: Ecological indicators (see SAC-12-13)



Summary of reporting improvements

- Reporting of non-target species
 - Time series provides greater transparency of catches; warning system for potentially vulnerable species
- Reporting of environmental indicators
 - Assists in explanation of changes in catch
- Improving ERAs for prioritizing vulnerable species for mitigation and research
 - Vulnerability status and conservation measures scenarios (leatherback turtle, **BYC-10 INF-B**)
- Inclusion of ecological indicators for monitoring ecosystem changes
 - Updating fishing- and community-based indicators (**SAC-12-13**)
- To further improve bycatch estimates, ERAs and ecosystem models, data collection must continue to be improved (**SAC-12-09**)
- These provide transparency in our goal to consider ecological impacts of EPO fisheries



Questions