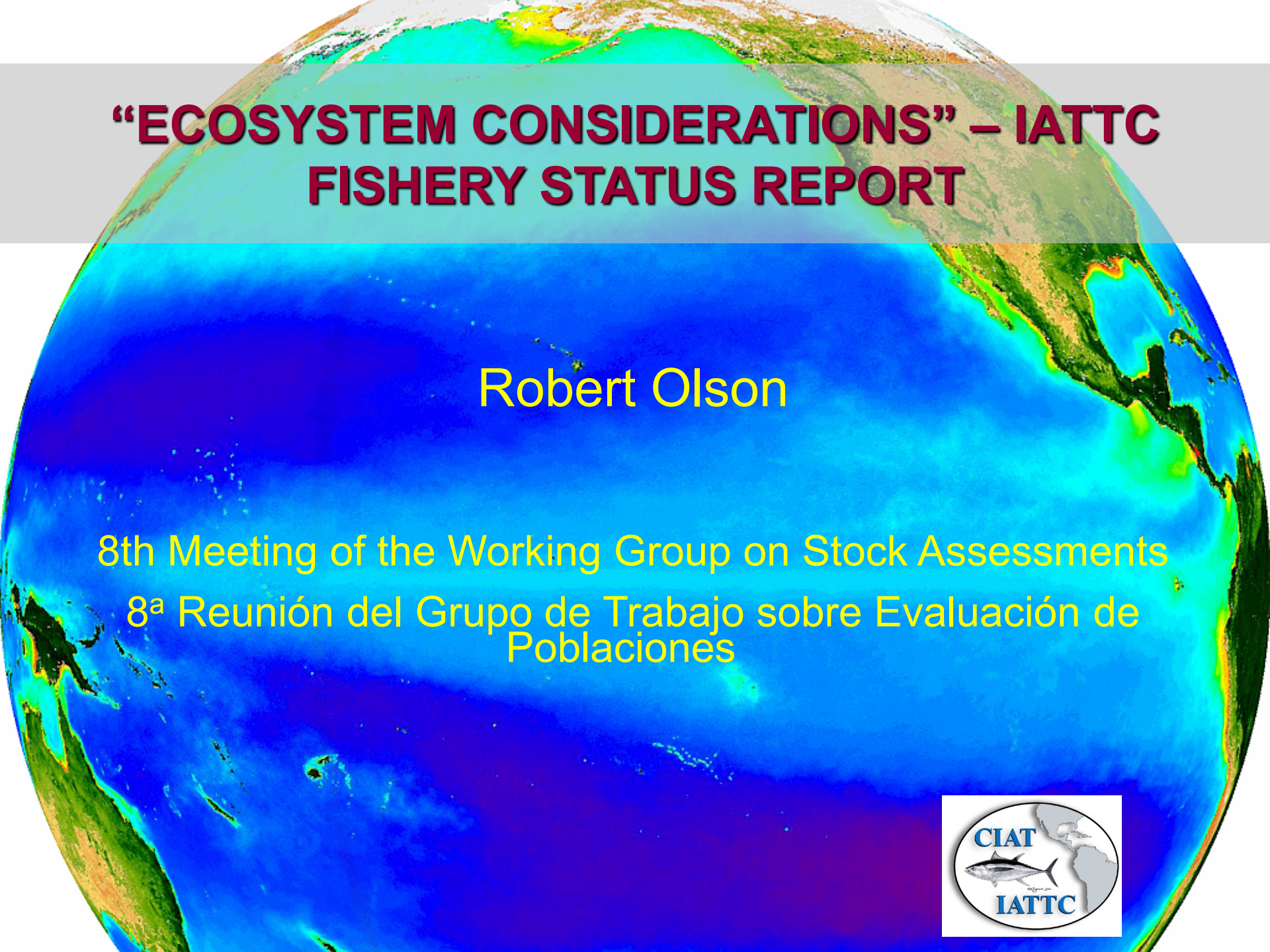


"ECOSYSTEM CONSIDERATIONS" – IATTC FISHERY STATUS REPORT

Robert Olson

8th Meeting of the Working Group on Stock Assessments

8ª Reunión del Grupo de Trabajo sobre Evaluación de Poblaciones

CIAT IATTC

IATTC Fishery Status Report – "Ecosystem Considerations"

- Call attention to the Ecosystem Considerations section
- Overview of the section's contents
- Briefly highlight some ecological studies in the EPO (IATTC and NMFS-SWFSC)

Ecosystem Considerations

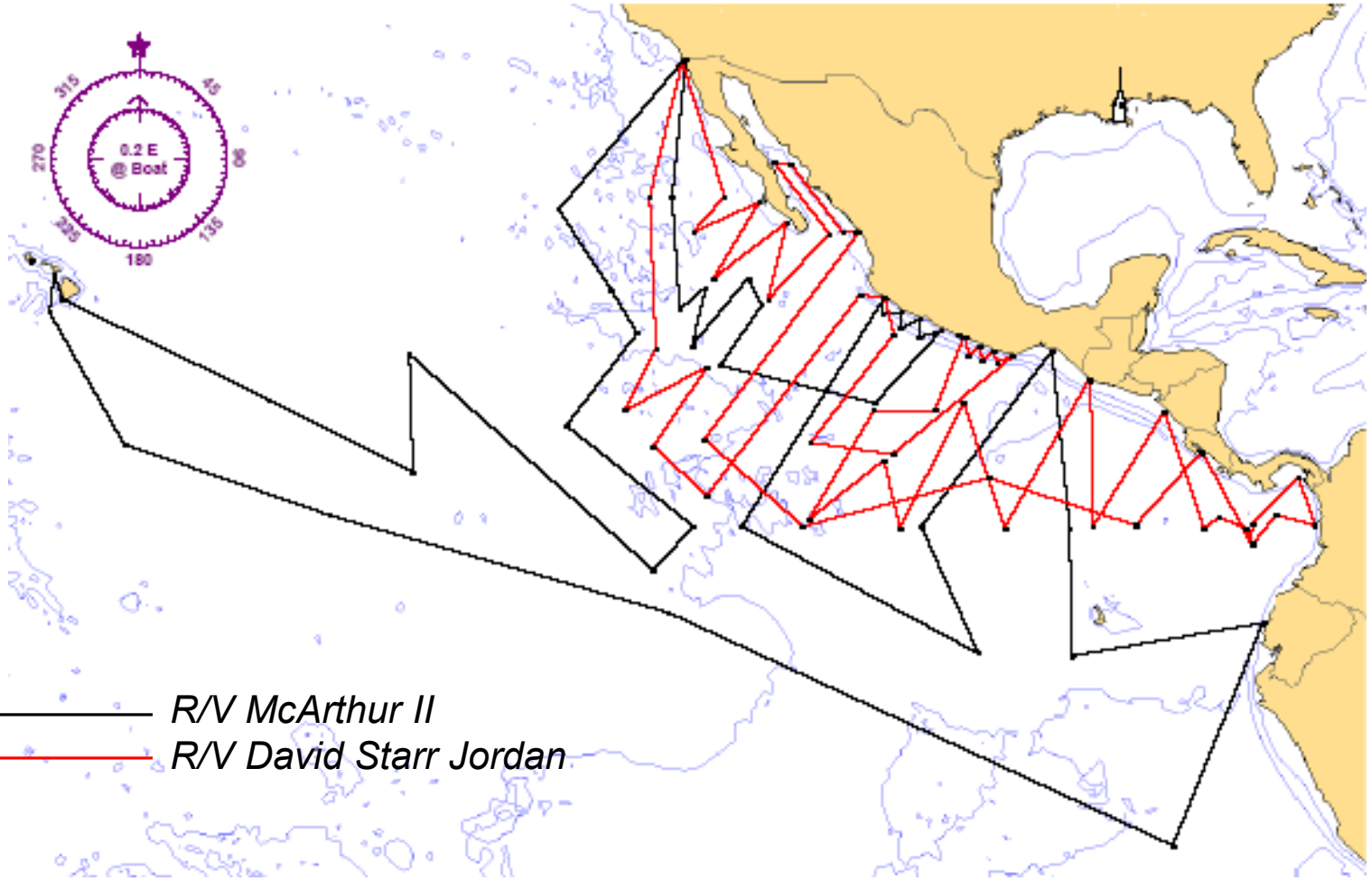
- International calls for ecosystem considerations in fisheries management
  - FAO Code of Conduct for Responsible Fisheries
  - Reykjavik Declaration on Responsible Fisheries in the Ecosystem
- Focus on the ecosystem as a whole
  - Direct impact of fisheries on species and groups in ecosystem
  - Indirect effects of fisheries
  - Physical environment
- Bring together information and updates on the status and trends of ecosystem components.
- Spur improved understanding of the connections between ecosystem components by bringing together diverse research efforts into one document.

Fishery Status Report - Ecosystem Considerations

- Introduction
- Components impacted by catches
  - Single species assessments
    - Tunas
    - Billfishes
    - Summary catch statistics by gear
  - Species groups
    - Marine mammals-2006 dolphin mortality est.
    - Sea turtles – 2006 mortality est. (PS)
    - Sharks and other large fishes
- Other ecosystem components
  - Seabirds
  - Forage taxa
  - Larval fishes and plankton

ECOSYSTEM STUDIES
ECOLOGY PROGRAM

Stenella Abundance Research (STAR) 2006



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STAR Ecosystem Research

- Marine mammal abundance
- Sea turtles
- Seabird ecology and abundance
- Forage organisms
- Planktonic organisms
- Physical environment

STAR - Prey Fishes and Squids

- Acoustic backscatter
- Net sampling
  - Manta tows
  - Bongo tows
- Dipnetting surveys
- Collection of squid
- Collection of jellyfish (sea turtle diet SIA)
- Several components provided to IATTC for studies of tropho-dynamics based on stable isotope analysis

Pelagic ommastrephid squids (*e.g. Dosidicus gigas*): ecosystem indicators?

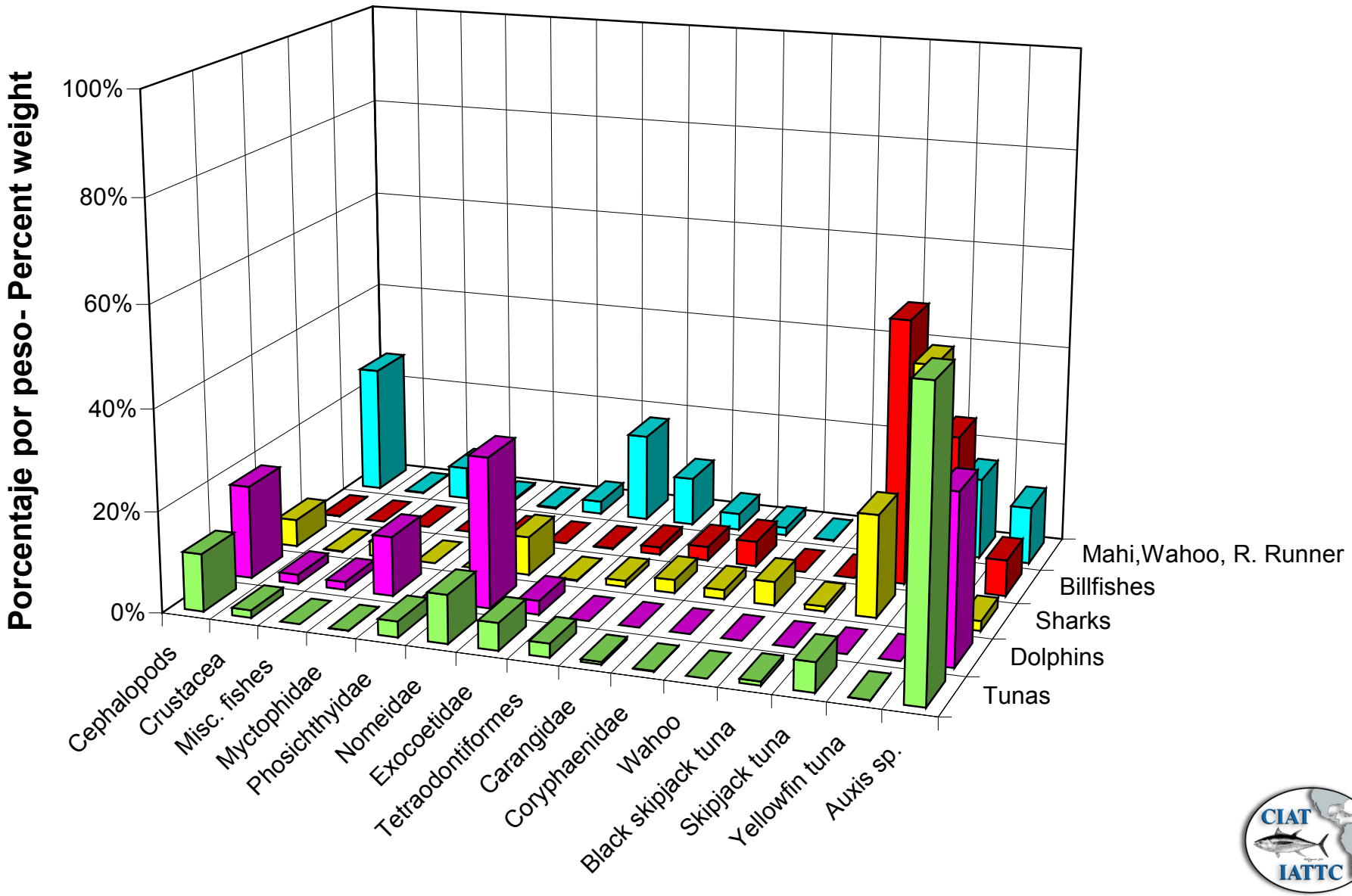
		Catch (mt)			Discarded damaged (mt)		Tuna length (cm)	Mean Wt (kg)	
Date	Time	Yellowfin	Skipjack	Squid	Yellowfin	Skipjack	mean (sd)	Tuna	Squid
5-May-2002	18:17		50	100		48	51 (4.2)	2.7	33
14-May-2002	13:54		48	10		8	51 (4.2)	2.7	63
30-Nov-2002	12:42	11.2	1.2	50	0.2	0.2	39/50	1.5/2.6	22

Olson, R.J., M.H. Román-Verdesoto, and G.L. Macías-Pita. 2006. Bycatch of jumbo squid *Dosidicus gigas* in the tuna purse-seine fishery of the eastern Pacific Ocean and predatory behaviour during capture. Fish. Res. 79(1-2): 48-55.

Fishery Status Report - Ecosystem Considerations (continued)

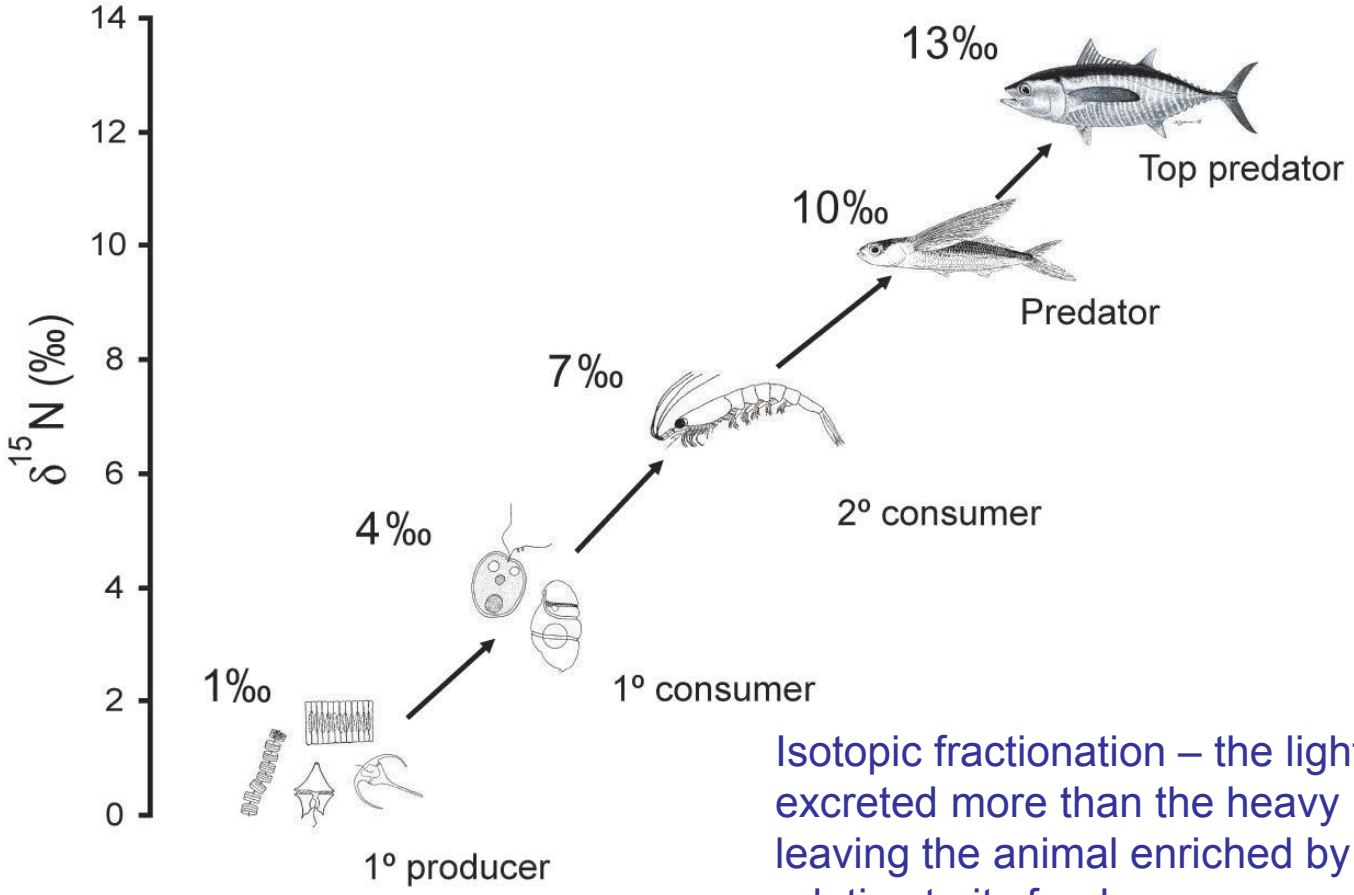
- Trophic interactions
- Physical environment
- Aggregate indicators
- Ecosystem modeling
- Actions by the IATTC and the AIDCP addressing ecosystem considerations
  - Dolphins
  - Sea turtles
  - Other species
  - All species
- Future developments

Dieta de los depredadores del OPO
Diet data for EPO predators



$\delta^{15}N$: posición trófica - $\delta^{15}N$: trophic position

$$\delta^{15}N_{predator} = 3.0 + \delta^{15}N_{prey}\ (‰)$$

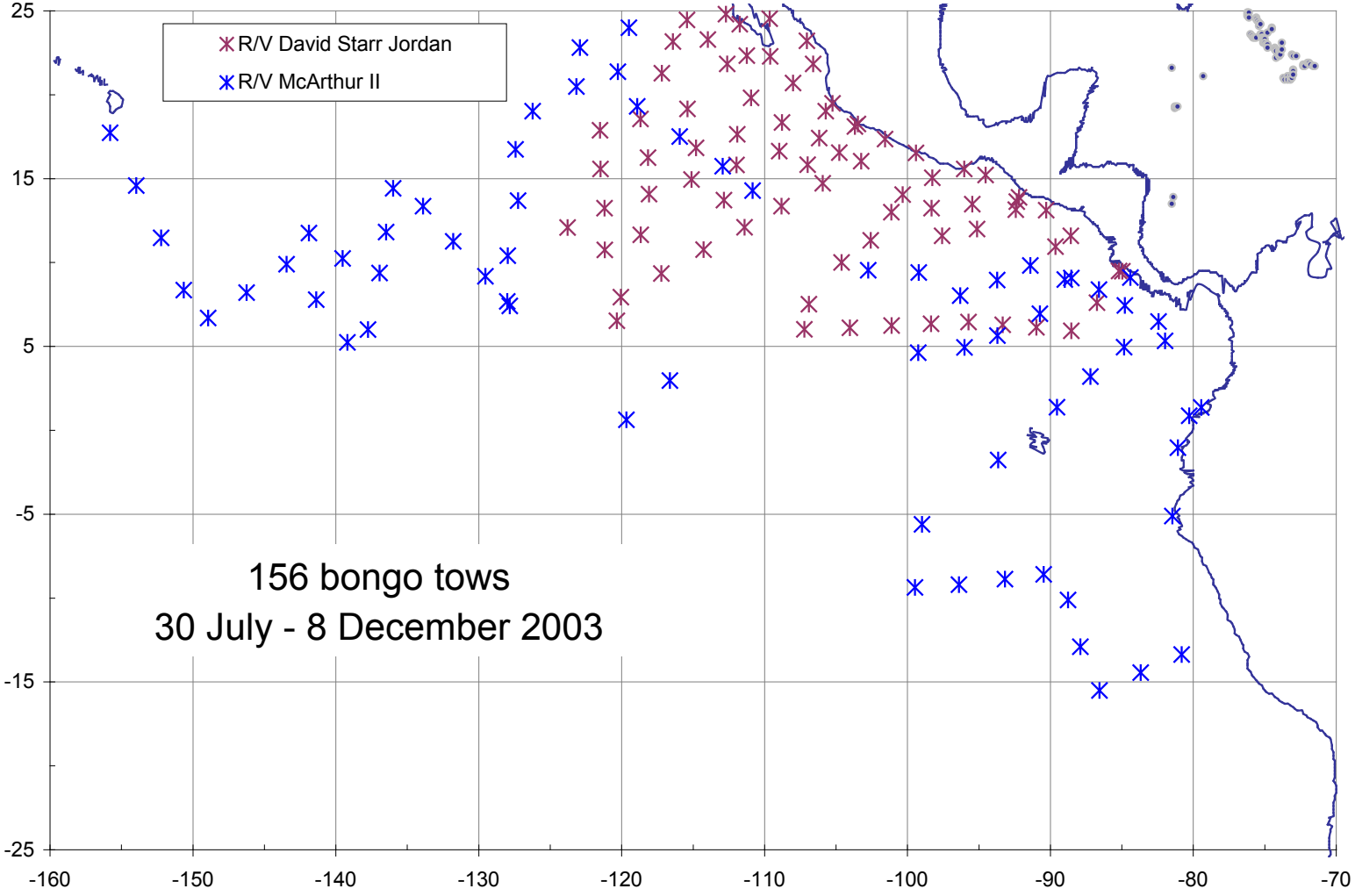


Isotopic fractionation – the light ^{14}N isotope is excreted more than the heavy ^{15}N isotope, leaving the animal enriched by 3‰ in $\delta^{15}N$ relative to its food source.

Samples for stable isotope analysis from STAR 2003 Research Cruises

Type	Taxon	Number of samples
Forage	flyingfishes	--
Forage	cephalopods	--
Forage	mesopelagic fishes	400
Primary consumers	zooplankton	156
Primary producers	phytoplankton	199

Zooplankton Sample Locations



Fishery Status Report - Ecosystem Considerations (continued)

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Fishery Status Report - Physical Environment

- Fiedler, P.C. 2002. Environmental change in the eastern tropical Pacific Ocean: review of ENSO and decadal variability. Marine Ecology Progress Series 244: 265-283.

- Fiedler, P.C., and M.F. Lavin (Editors) 2006. A review of eastern tropical Pacific oceanography. Progress in Oceanography 69: 94-100.

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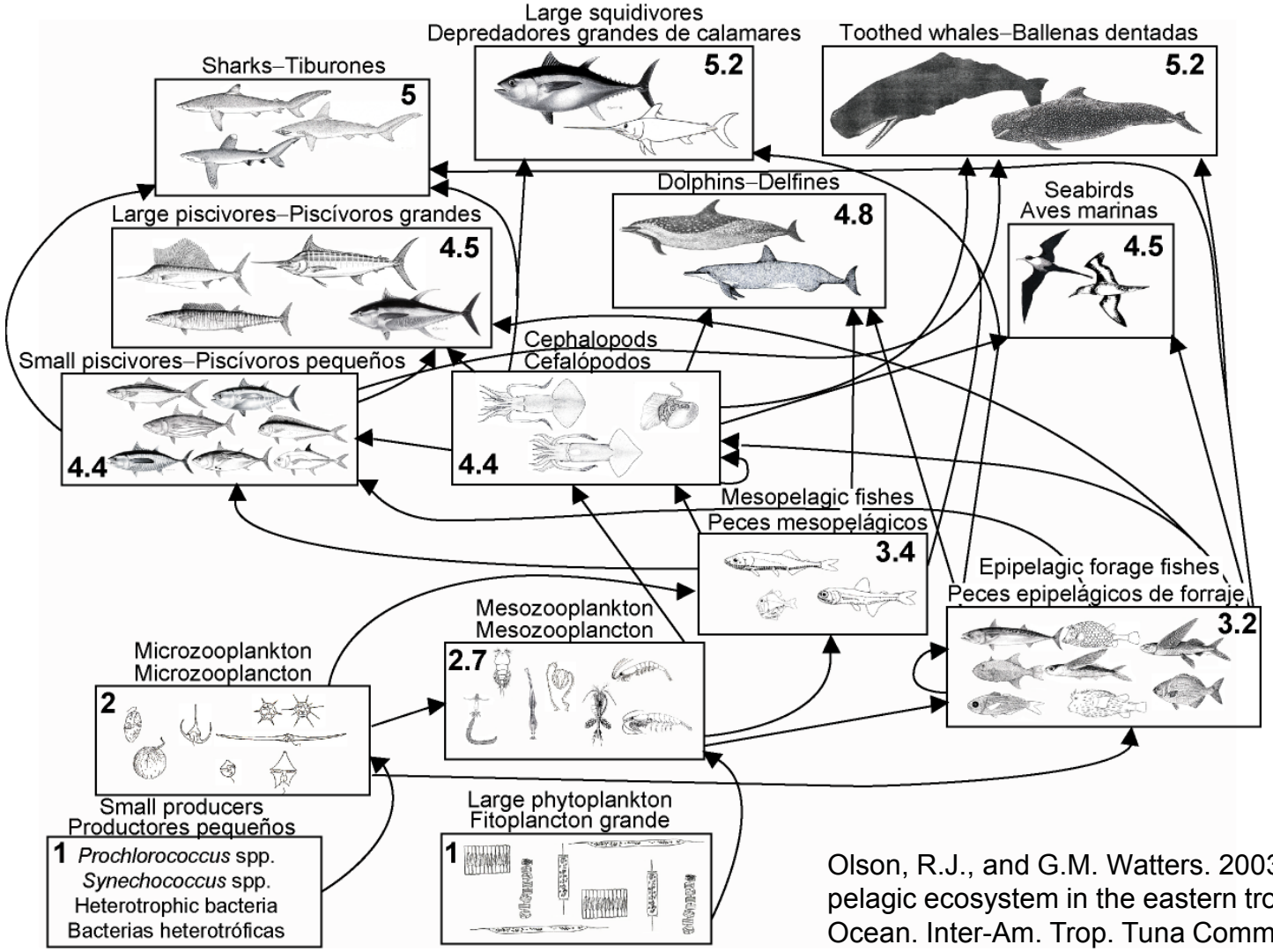
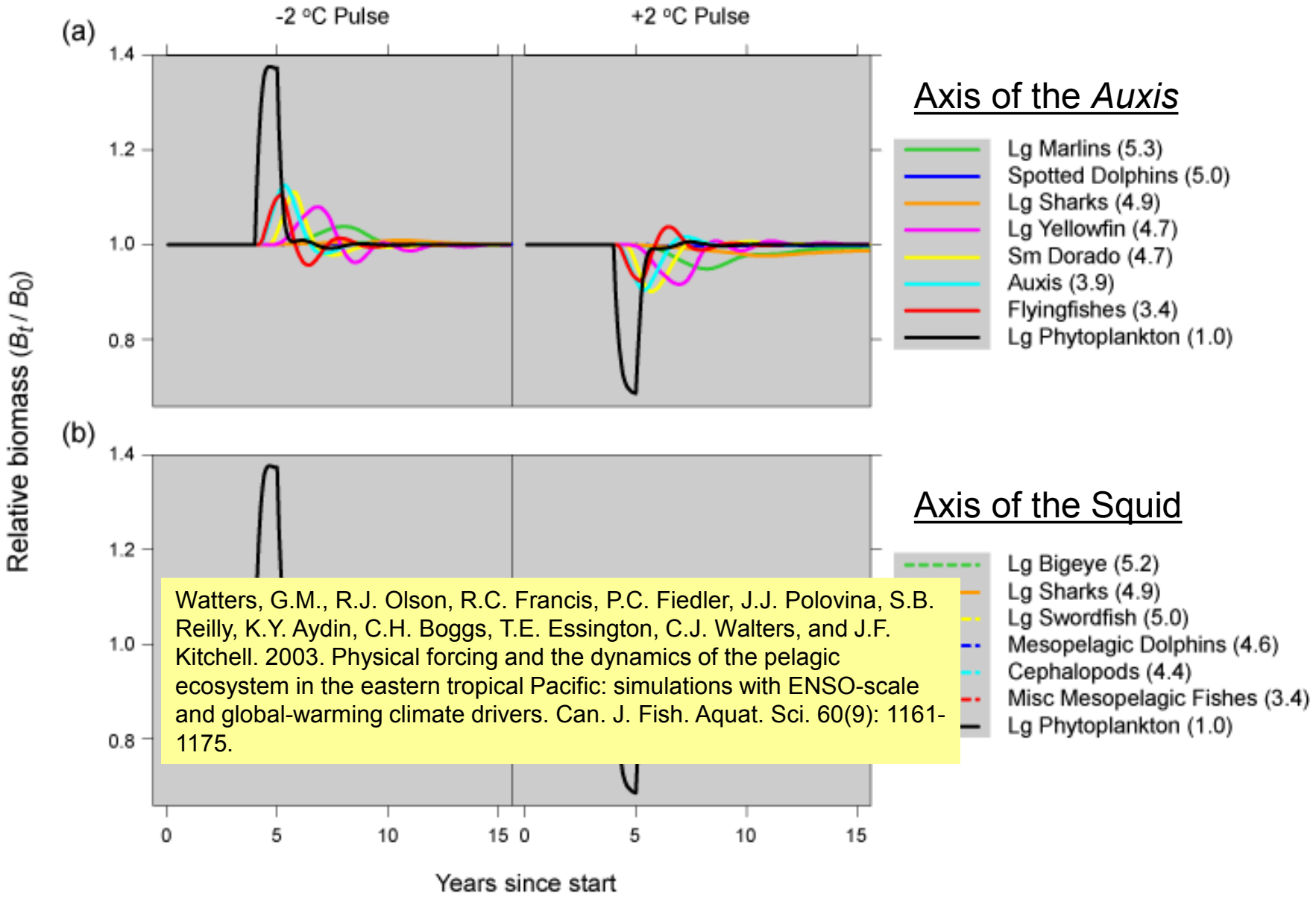
Red trófica del ecosistema pelágico en el OPO
Food web of the pelagic ecosystem in the EPO



Olson, R.J., and G.M. Watters. 2003. A model of the pelagic ecosystem in the eastern tropical Pacific Ocean. Inter-Am. Trop. Tuna Comm., Bull. 22(3): 133-218.

Physical forcing simulations with ENSO-scale and global-warming climate drivers



Watters, G.M., R.J. Olson, R.C. Francis, P.C. Fiedler, J.J. Polovina, S.B. Reilly, K.Y. Aydin, C.H. Boggs, T.E. Essington, C.J. Walters, and J.F. Kitchell. 2003. Physical forcing and the dynamics of the pelagic ecosystem in the eastern tropical Pacific: simulations with ENSO-scale and global-warming climate drivers. Can. J. Fish. Aquat. Sci. 60(9): 1161-1175.

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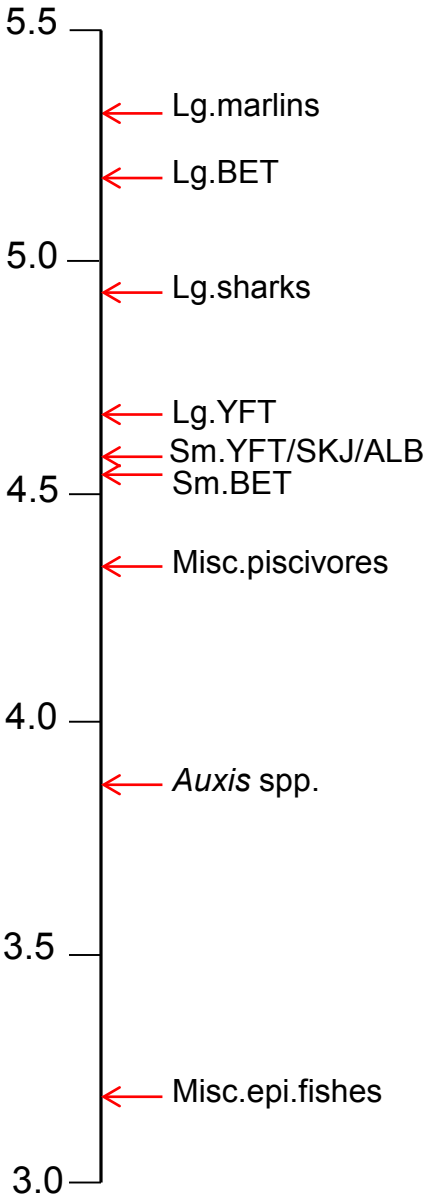
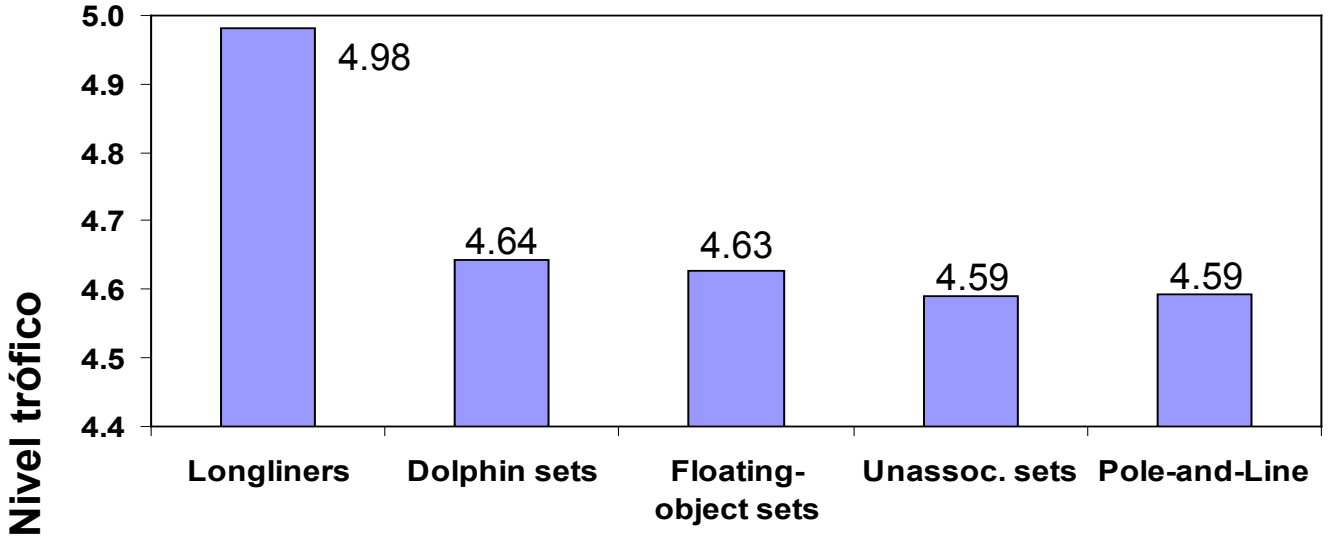
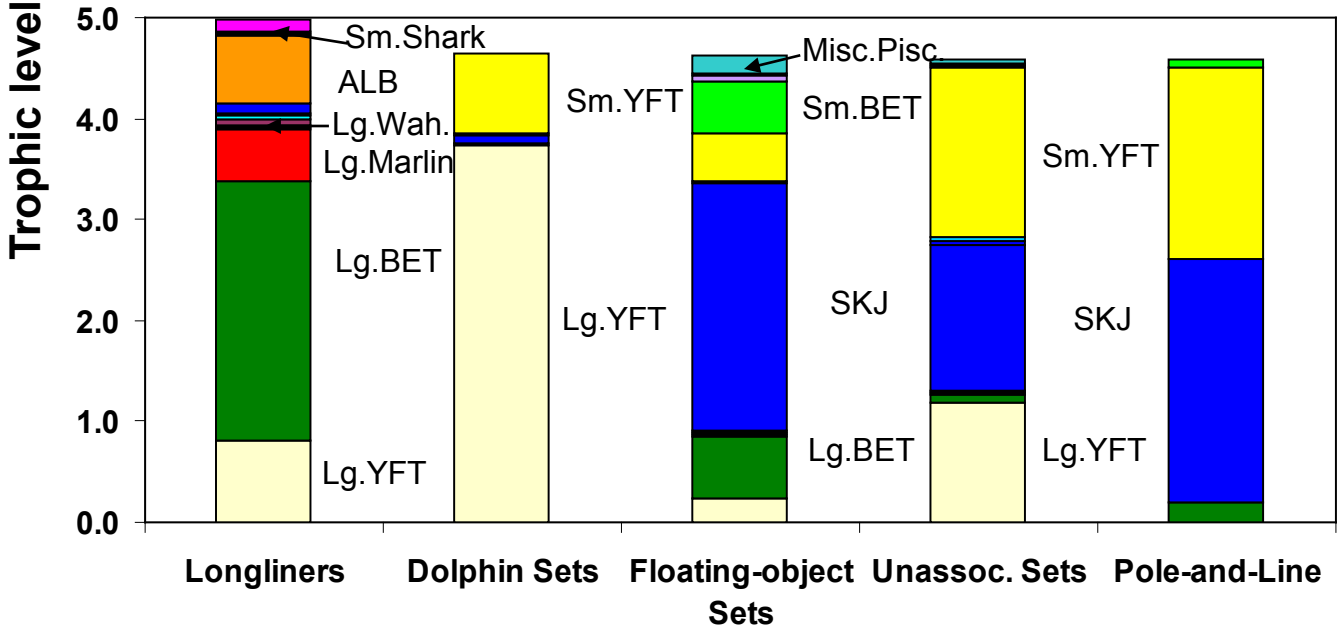
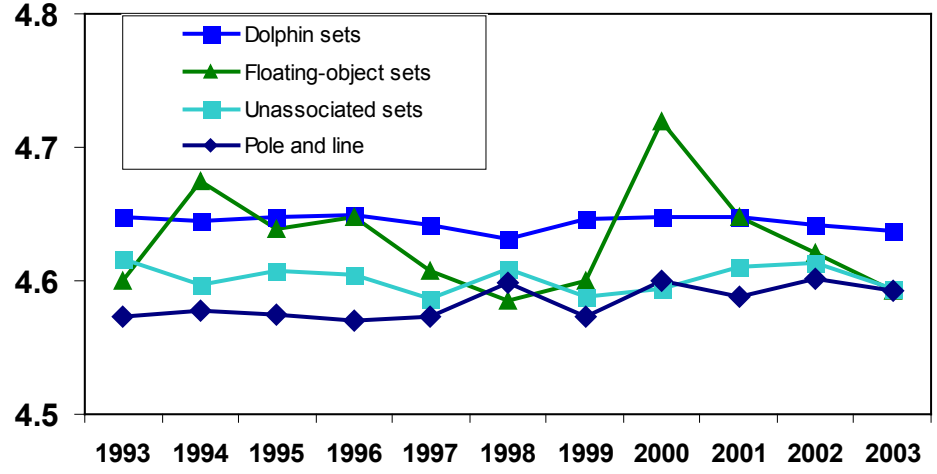
Trophic Levels of Catches (1993-97)

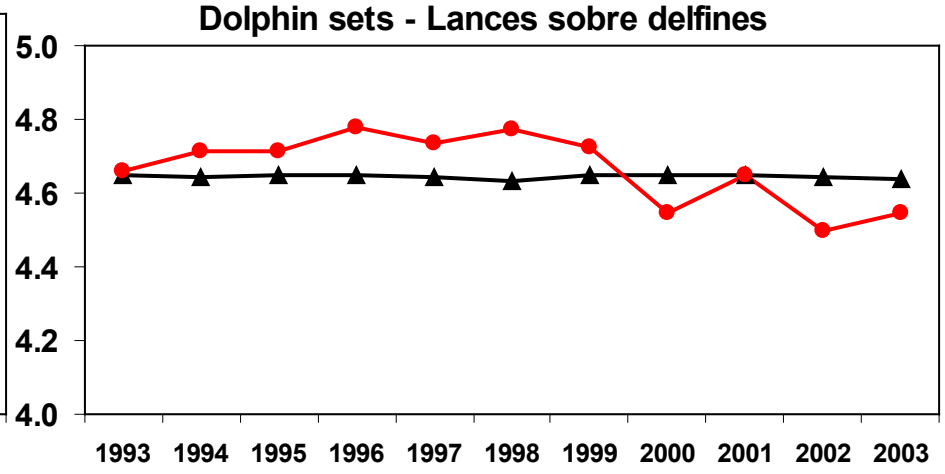


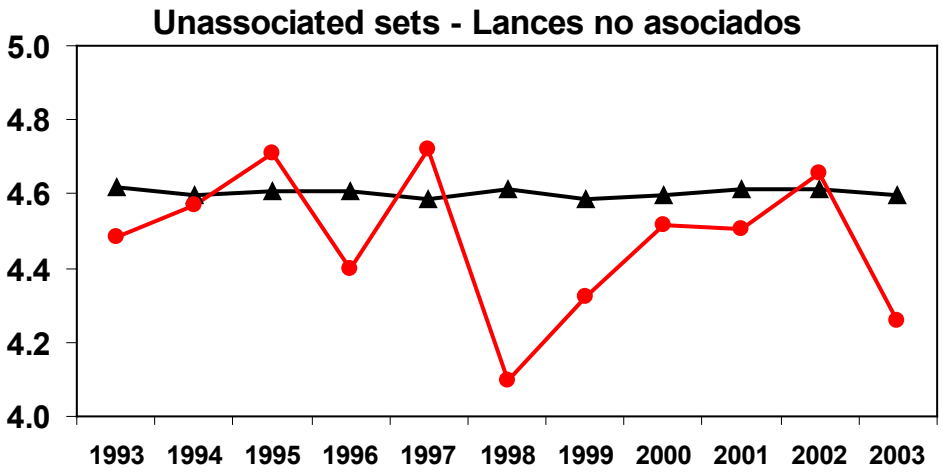


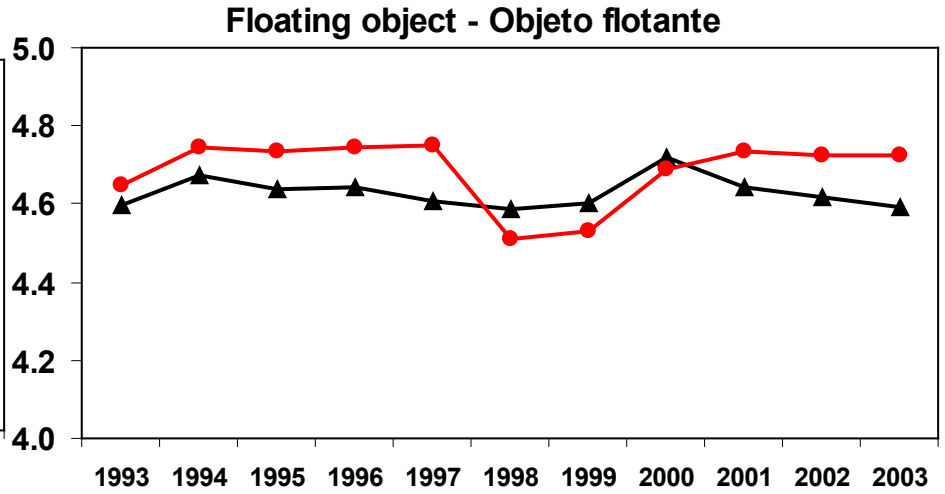


Average Trophic Levels (surface gear)









Retained catches

Discarded catches

Average Trophic Levels (surface gear)