THE IMPACTS OF CLIMATE CHANGE ON TUNA IN THE WESTERN AND CENTRAL PACIFIC OCEAN

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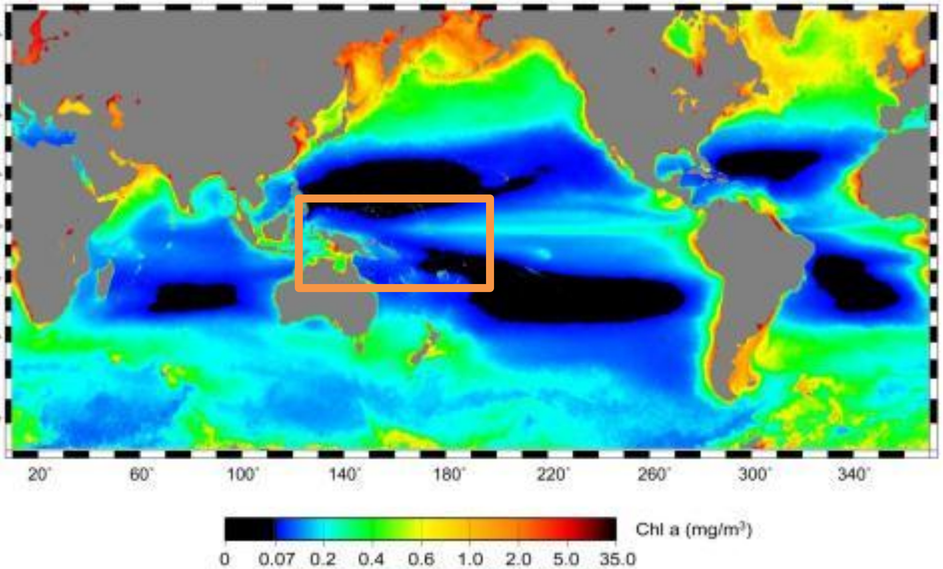
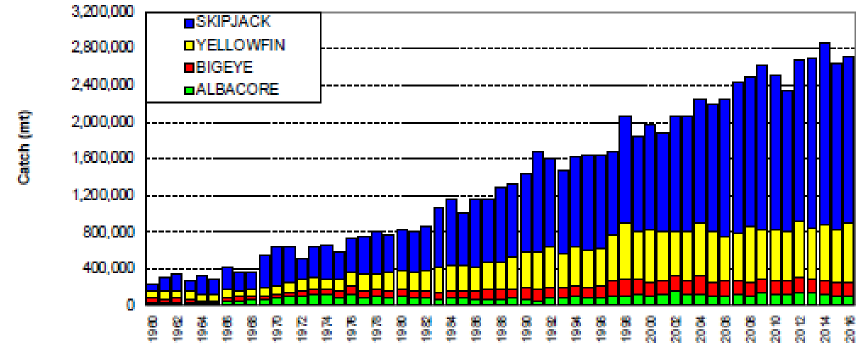
PACIFIC ISLANDS OCEANIC FISHERIES MANAGEMENT

The project objective is:

*To support PacSIDS to **implement and enforce** arrangements for the conservation and management of transboundary oceanic fisheries,*



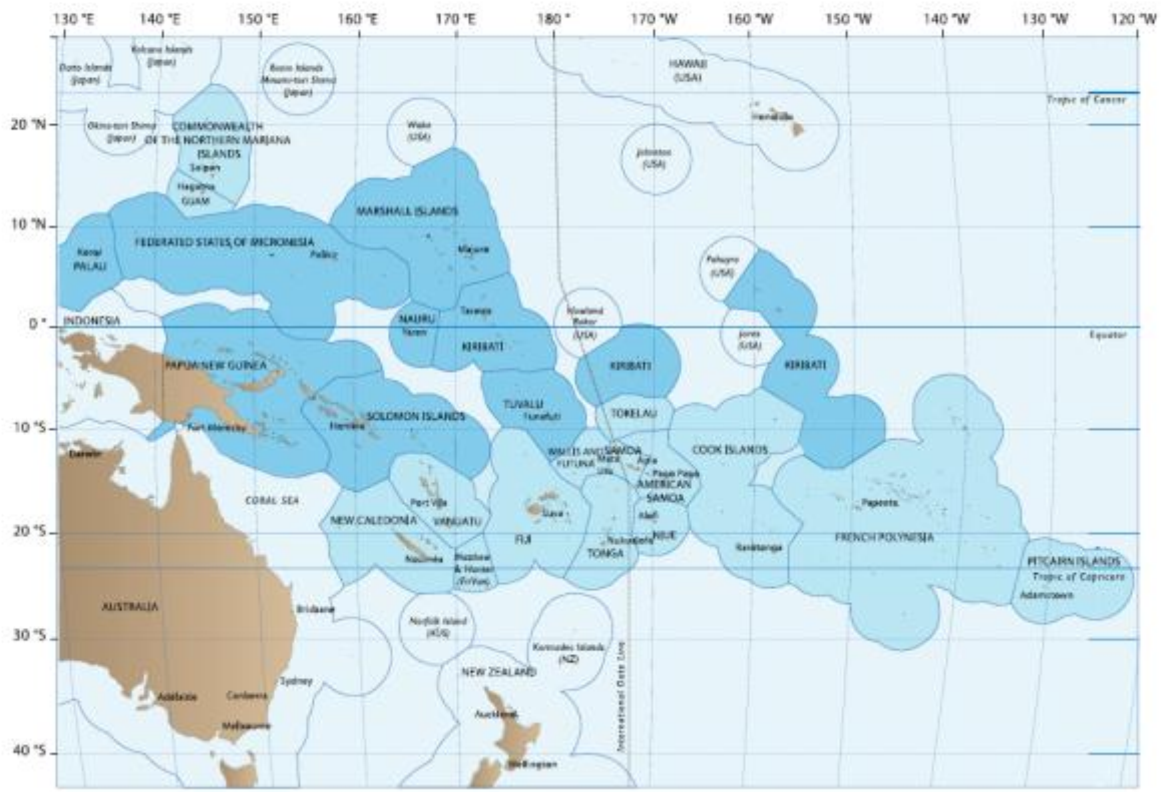
Pacific Community
Communauté du Pacifique



2.7 million tonnes of tuna

56% of the global tuna catch

5.3 billion $



Implementation of adaptive management of oceanic fisheries through better understanding of the impacts of climate change

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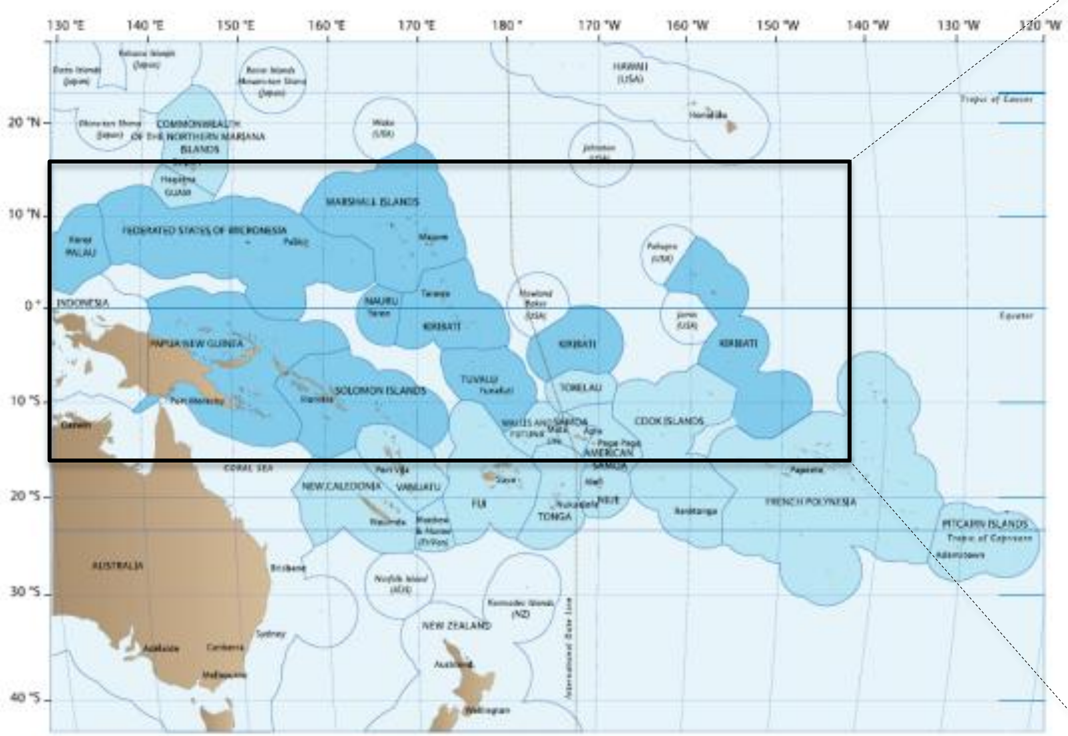
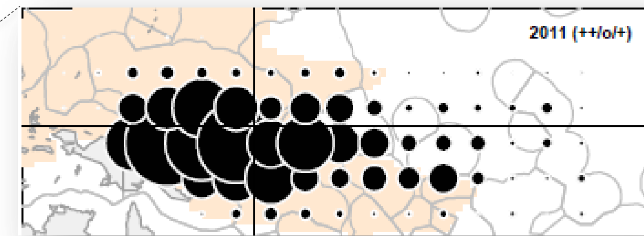
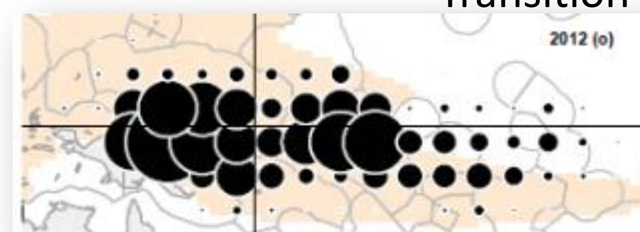


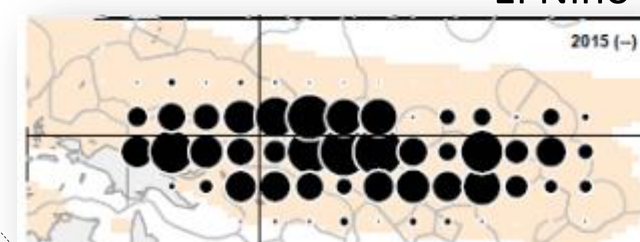
La Niña



Transition

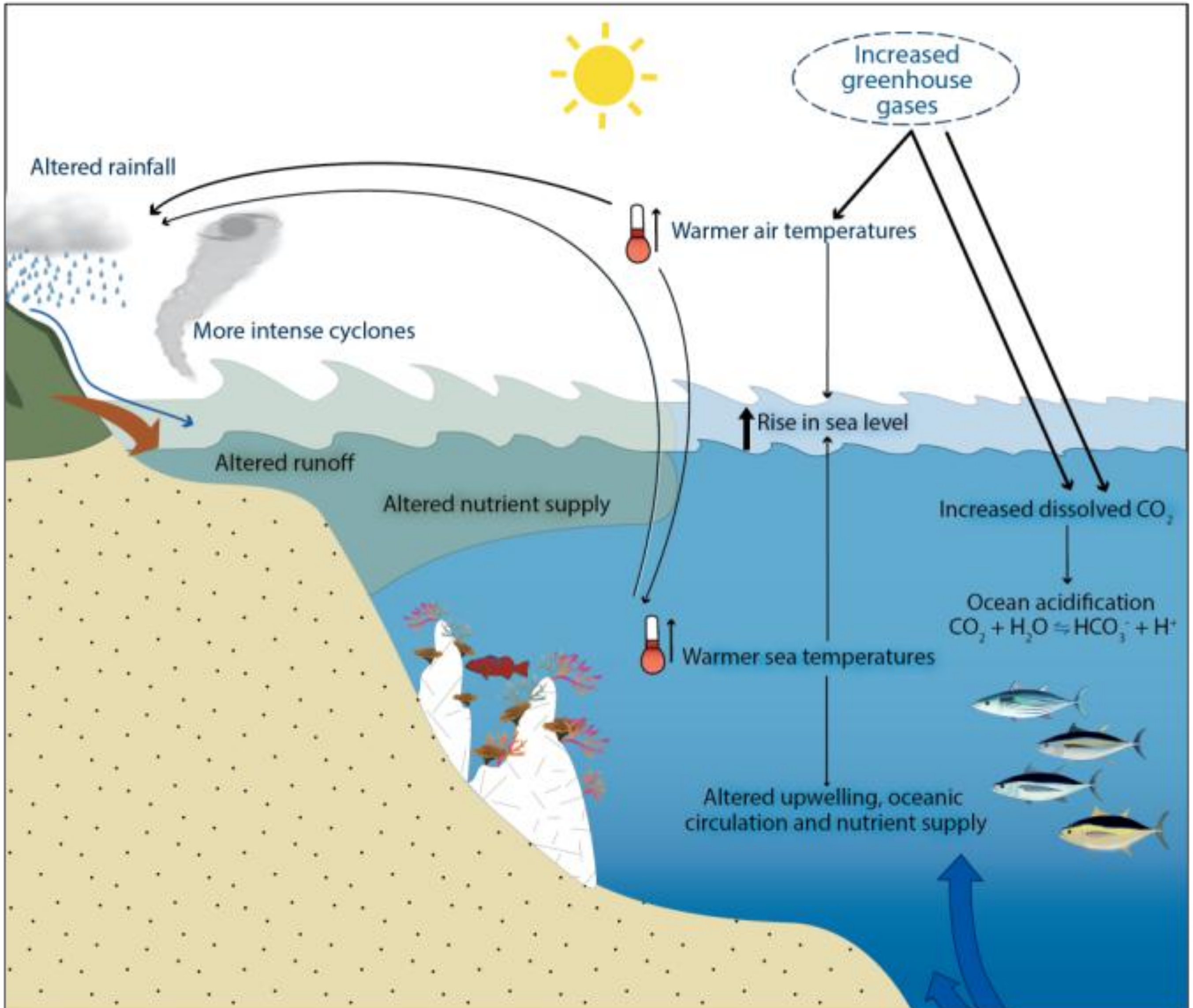


El Niño



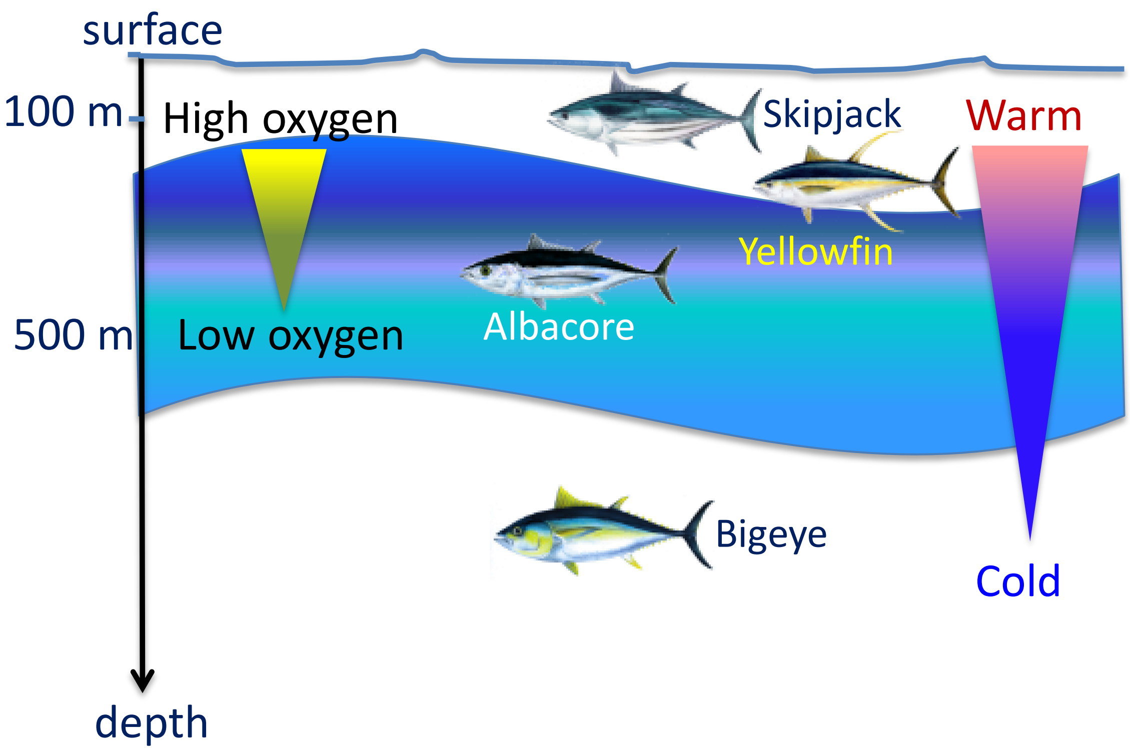
● Purse seine effort   Water >28.5°C

Changing climate impacts the ocean



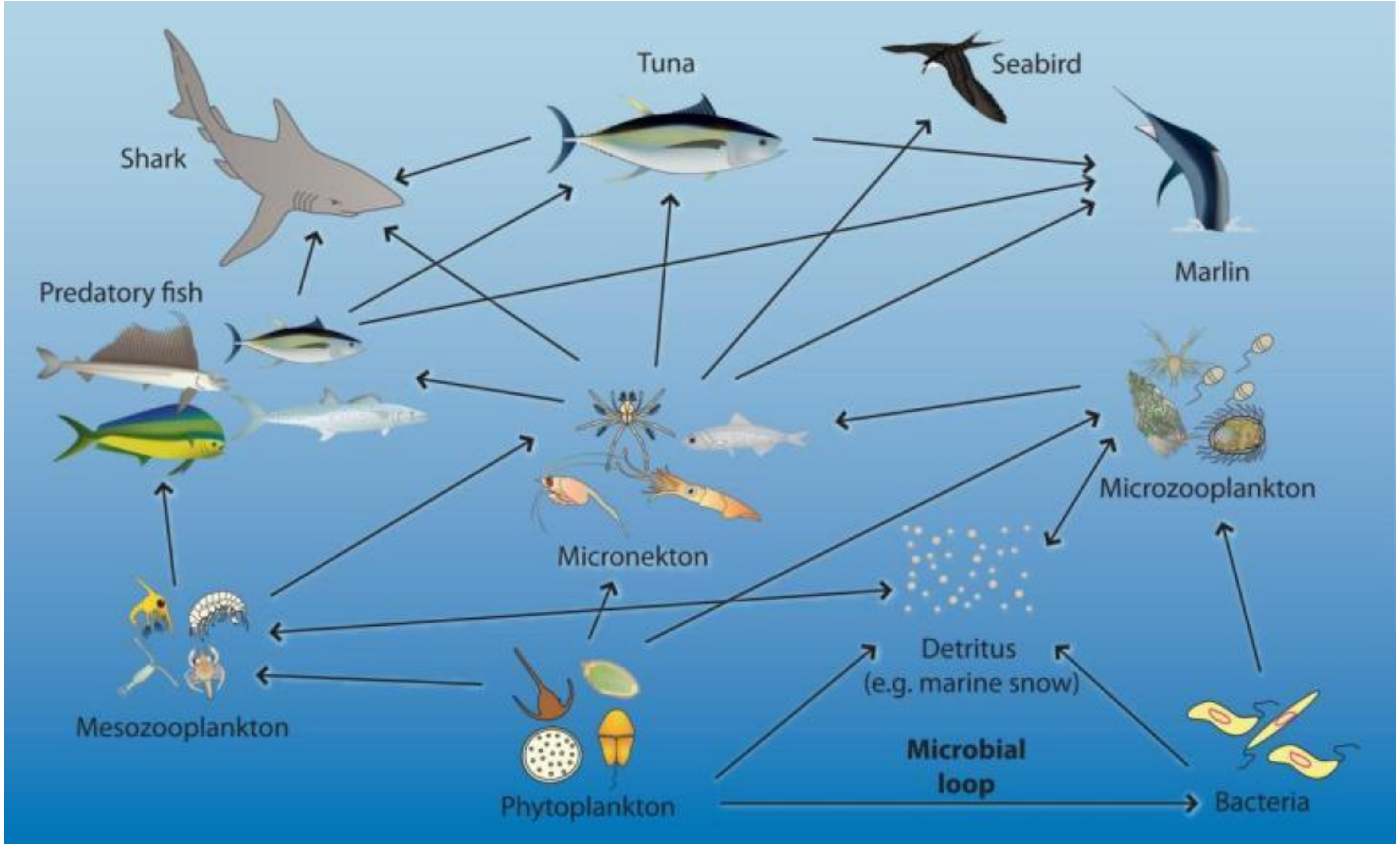
Changing climate impacts the ocean and the fish

Optimal habitat linked to temperature and oxygen

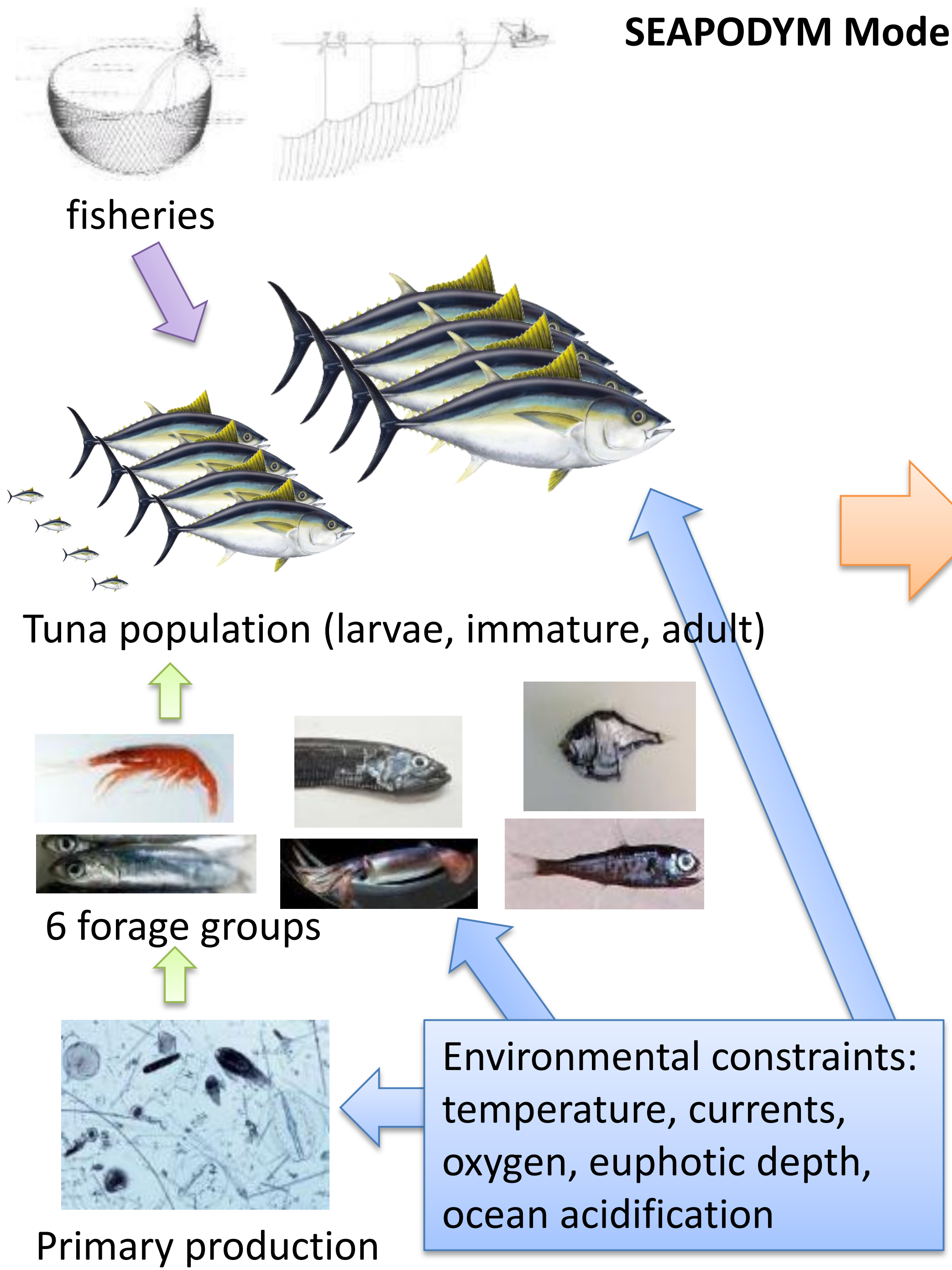


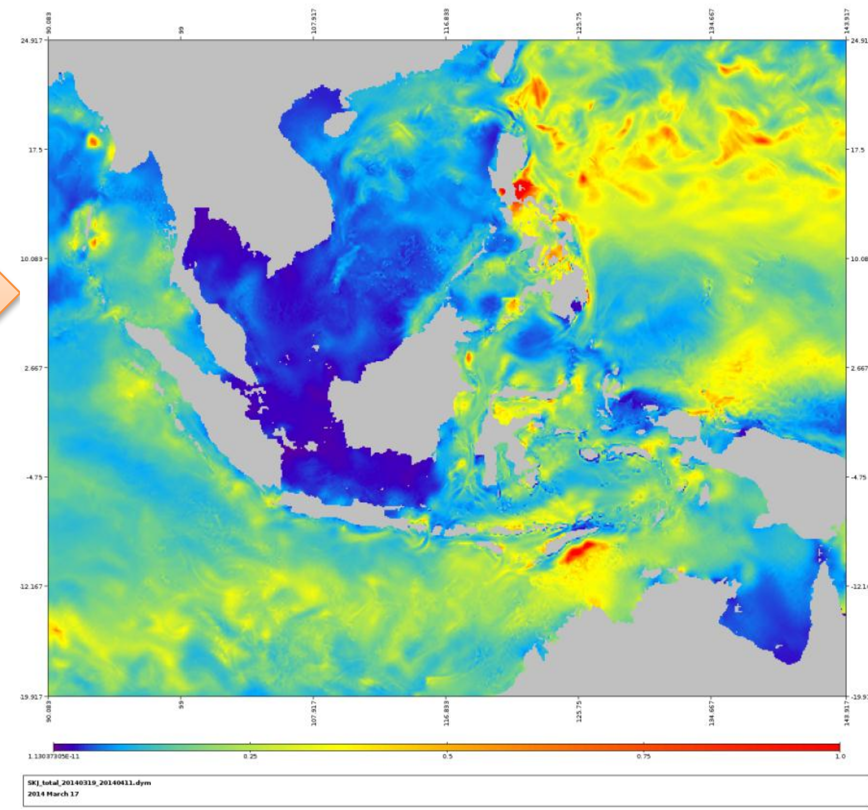
Changing climate impacts the ocean and the fish

Optimal habitat linked to prey and predators



SEAPODYM Model





Lehodey et al 2017. WCPFC-SC13-EB-WP01
Senina et al 2016. WCPFC-SC12-EB-WP01

SKIPJACK

Pacific Community
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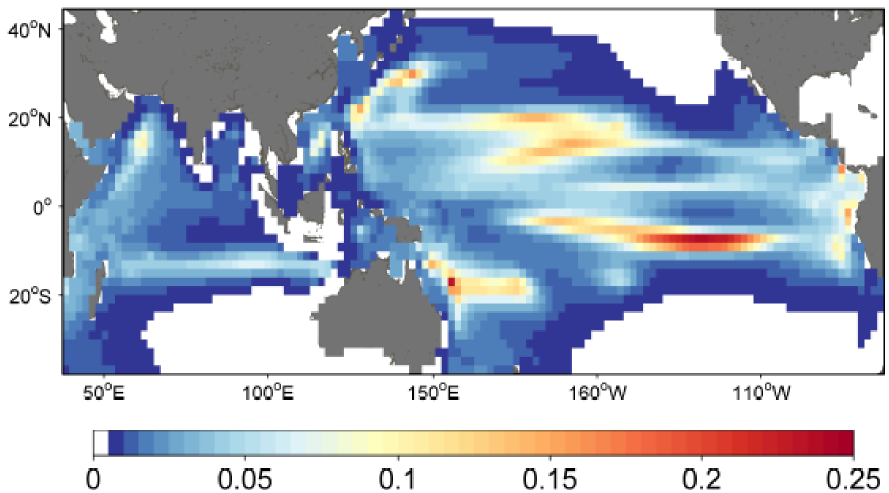
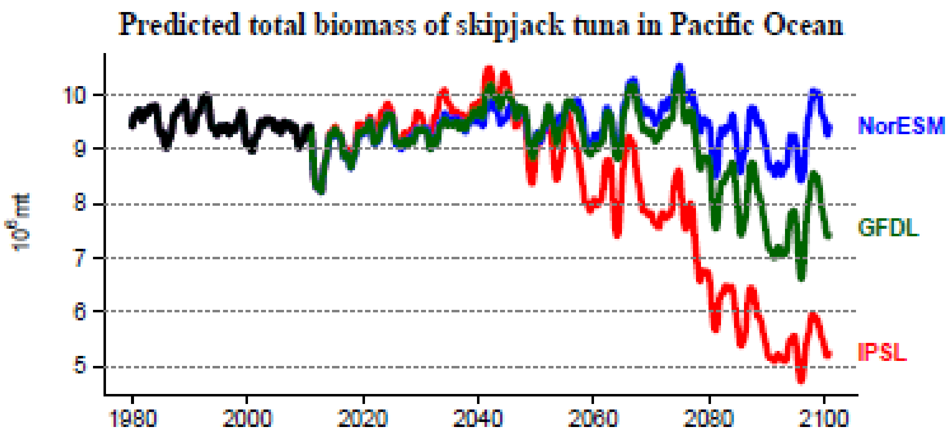
Adult

IPSL: 2091–2100





- A clear eastward shift in the biomass distribution is predicted
- A long term decreasing trend in biomass is predicted after 2050 or 2080

SKIPJACK

Projected % changes in biomass in Pacific Island countries EEZs

EEZ	Skipjack			
	2035		2050	
	F_0	$F_{x1.5}$	F_0	$F_{x1.5}$
Melanesia				
Fiji	20	14	34	27
New Caledonia	15	9	31	24
PNG	-29	-40	-45	-53
Solomon Islands	-26	-37	-38	-47
Vanuatu	16	8	44	33
Micronesia				
FSM	-6	-12	-22	-28
Guam	-	-	-	-
Kiribati	5	-1	-3	-9
Marshall Islands	-1	-3	-21	-25
Nauru	-12	-26	-35	-47
Palau	7	3	-11	-16
Northern Mariana Is	26	26	43	42
Polynesia				
American Samoa	5	3	14	9
Cook Islands	-10	-12	-28	-30
French Polynesia	41	37	55	48
Niue	26	23	28	24
Pitcairn Islands	62	57	111	100
Samoa	11	7	21	15
Tokelau	-30	-32	-44	-46
Tonga	21	17	21	16
Tuvalu	-21	-26	-29	-36
Wallis & Futuna	3	-1	13	6

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F0: effects of climate change alone
Fx1.5: combined *effects of climate change and* fishing effort 1.5 times greater than period 2006-2010
Bell et al (In press, Marine Policy)

YELLOWFIN

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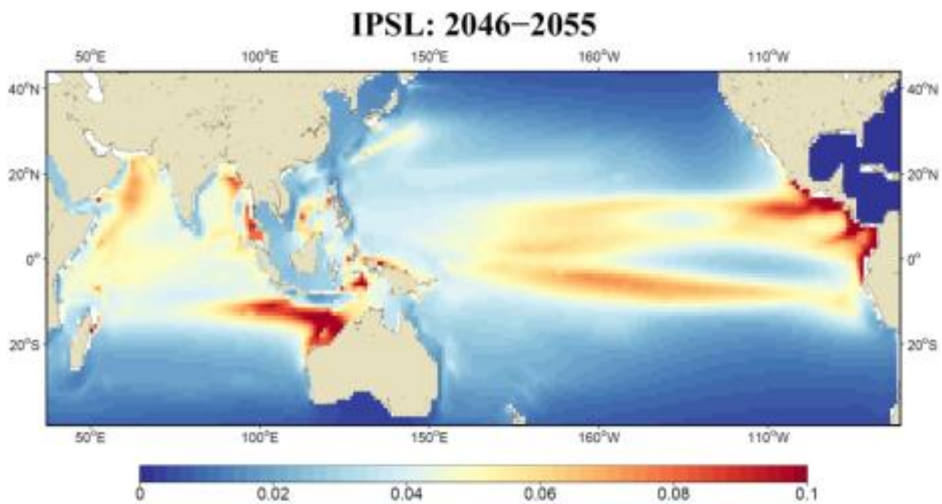
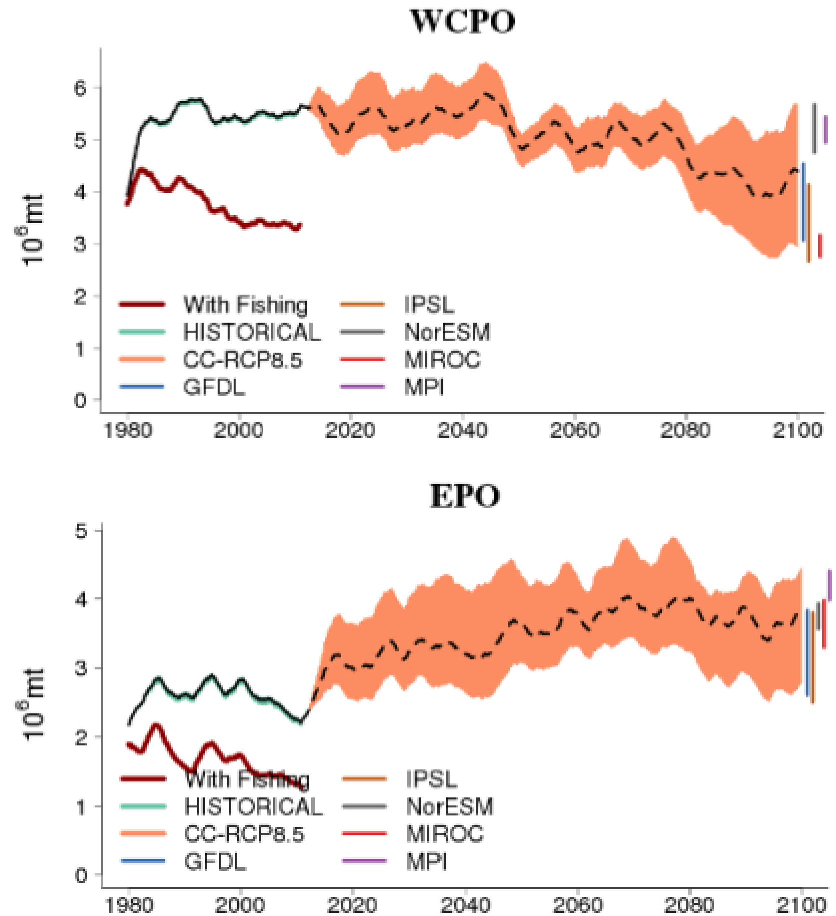
Adult





- A clear eastward shift in the biomass distribution is predicted
- A decrease is observed in the WCPO and an increase in the EPO
- The additional impact of ocean acidification is minor

YELLOWFIN

Projected % changes in biomass in Pacific Island countries EEZs

EEZ	Yellowfin			
	2035		2050	
	F_0	$F_{x1.5}$	F_0	$F_{x1.5}$
Melanesia				
Fiji	-3	-14	-5	-11
New Caledonia	-11	-26	-13	-19
PNG	-23	-45	-30	-48
Solomon Islands	-16	-36	-23	-37
Vanuatu	-8	-24	-10	-19
Micronesia				
FSM	-14	-28	-21	-32
Guam	-	-	-	-
Kiribati	-6	-13	-11	-16
Marshall Islands	-10	-20	-18	-26
Nauru	-18	-35	-28	-43
Palau	-5	-20	-9	-15
Northern Mariana Is	0	-9	1	-1
Polynesia				
American Samoa	1	-6	0	-3
Cook Islands	4	-2	2	-1
French Polynesia	14	8	19	15
Niue	4	-3	5	1
Pitcairn Islands	20	12	36	30
Samoa	0	-8	-1	-6
Tokelau	-6	-12	-10	-15
Tonga	0	-8	0	-4
Tuvalu	-10	-21	-15	-24
Wallis & Futuna	-3	-12	-5	-10

F0: effects of climate change alone

Fx1.5: combined *effects of climate change and* fishing effort 1.5 times greater than period 2006-2010

Bell et al (In press, Marine Policy)

CONCLUSION

- Models predict
  - a decrease in skipjack and yellowfin tuna biomasses in the Pacific
  - a shift of the biomasses towards the east with strong impact at the national level

- The main driver of changes is the warming temperature, ocean acidification is predicted to have a limited impact

- Improving models to improve the accuracy and confidence of the forecast for better management and adaptation
  - Better observation of fisheries
  - Better observation and understanding of the pelagic ecosystem