

## PROGRESS REPORT June-August 2023

### INDIA NORTHWEST COAST (NWC) ECOSYSTEM MODEL USING ECOPATH

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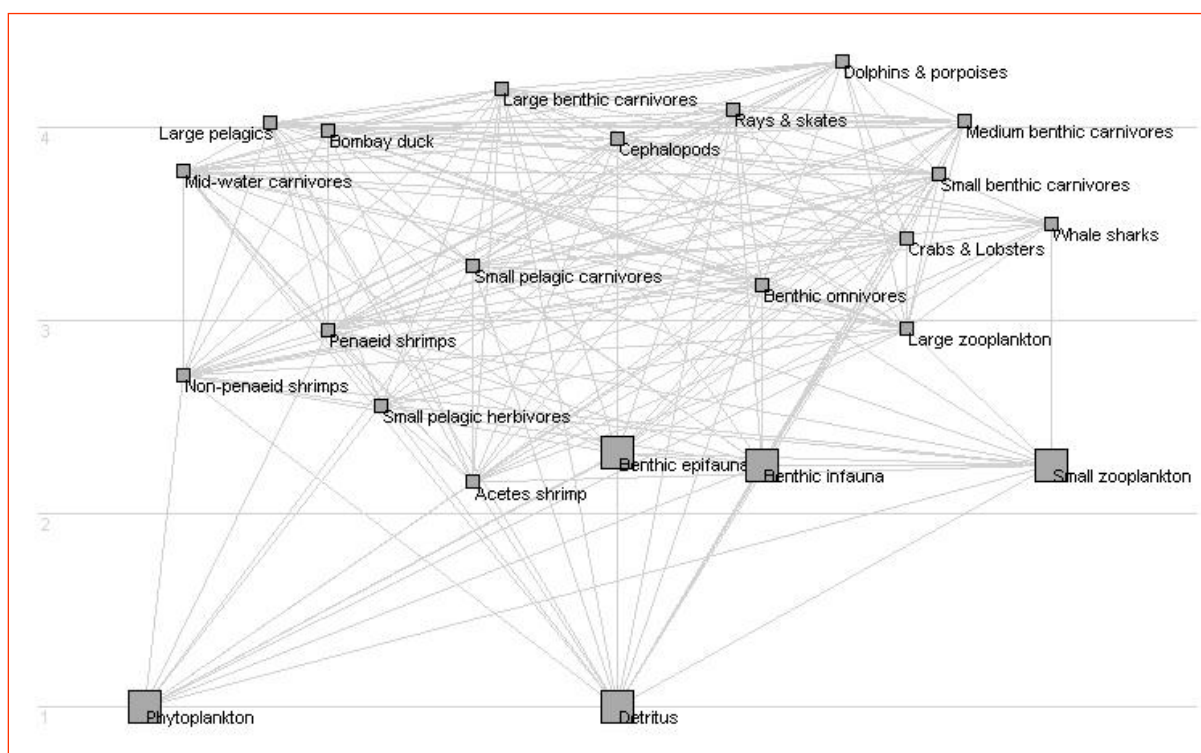
**Objective:** To update the unpublished NWC ecosystem model built using ECOPATH and created in 2008 by CMFRI scientists.

To assist the FIP on Indian Oil Sardine and Indian Mackerel along the coast of Maharashtra and Goa Omega Fishmeal and Oil Pvt Ltd Ratnagiri.

#### Brief Background:

The Northwest coast (between 15°30'-23°30'N and 68°20'-73°30'E) of India adjoining the coasts of Gujarat and Maharashtra states has the largest continental shelf in India covering an area of 0.4 million km<sup>2</sup>. Along this coast, the stretch between Kutch in Gujarat (excluding the Gulf of Kutch) in the north to Harnai in Ratnagiri district in Maharashtra has many oceanographic and fishery peculiarities signifying a distinct ecosystem. The ecosystem in Goa is similar to the NWC ecosystem.

In the 2008 model, the total area up to 100 m depth for the model was 157,320 km<sup>2</sup>. 23 ecological groups including 15 fishery groups were considered. The NWC ecosystem supported a large number of carnivores – MTrL – 3.49 vs 3.2 for Karnataka. The system had low ascendancy and high overhead indicating a resilient ecosystem. The trophic links and trophic levels of the 2008 model are shown below.



### Current Work:

The NWC model has to be updated with the latest catch information and then the model has to be re-balanced. Since Goa is a small state having a similar ecosystem, it is presumed that the new model will represent the Goa fishing area too. This job is currently being undertaken and is expected to be completed by December 2023. Since the ecosystem has undergone considerable changes over time, there is scope to do a *then-and-now* comparison. The basic estimates (trophic level, biomass, production over biomass ratio, consumption over biomass ratio, ecotrophic efficiency and production over respiration ratio) of the 2008 balanced model are shown in the Table below.

Table. Basic estimates of the 2008 balanced NWC model.

Group name	TrL	Biomass	P/B	Q/B	EE	P/Q
1 Dolphins & porpoises	4.342	0.010	0.200	14.600	0.000	0.014
2 Large pelagics	4.022	0.080	3.420	17.980	0.774	0.190
3 Large benthic carnivores	4.197	0.080	2.210	6.110	0.896	0.362
4 Rays & skates	4.088	0.063	0.750	5.980	0.711	0.125
5 Medium benthic carnivores	4.033	0.250	3.220	9.590	0.911	0.336
6 Small benthic carnivores	3.756	0.390	4.120	11.690	0.959	0.352
7 Mid-water carnivores	3.771	0.495	4.000	11.410	0.879	0.351
8 Bombay duck	3.986	0.310	3.035	11.770	0.947	0.258
9 Small pelagic herbivores	2.562	0.360	4.200	15.000	0.890	0.280
10 Small pelagic carnivores	3.286	0.550	5.210	12.640	0.991	0.412
11 Cephalopods	3.943	0.420	5.500	18.000	0.870	0.306
12 Benthic omnivores	3.183	0.413	4.560	16.600	0.934	0.275
13 Non-penaeid shrimps	2.715	0.625	7.500	19.200	0.944	0.391
14 Penaeid shrimps	2.950	0.900	7.900	19.200	0.987	0.411
15 Crabs & Lobsters	3.429	0.566	5.000	12.200	0.945	0.410
16 Acetes shrimp	2.163	1.320	10.270	25.000	0.970	0.411
17 Whale sharks	3.503	0.013	2.429	11.000	0.000	0.221
18 Benthic epifauna	2.313	14.500	3.900	15.000	0.210	0.260
19 Benthic infauna	2.250	10.900	5.755	12.500	0.912	0.460
20 Large zooplankton	2.957	0.192	60.000	225.000	0.647	0.267
21 Small zooplankton	2.250	11.760	35.000	125.000	0.884	0.280
22 Phytoplankton	1.000	25.900	118.300	0.000	0.365	
23 Detritus	1.000	16.989			0.000	