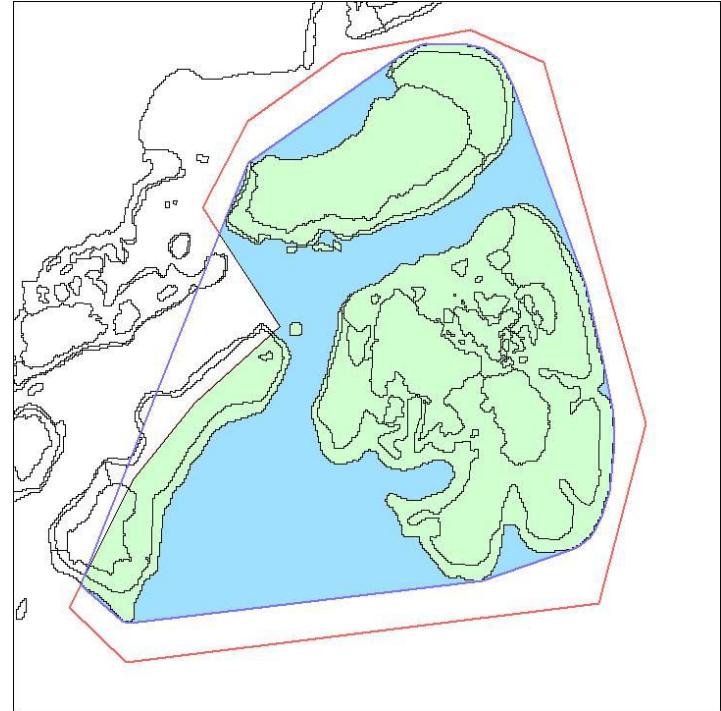
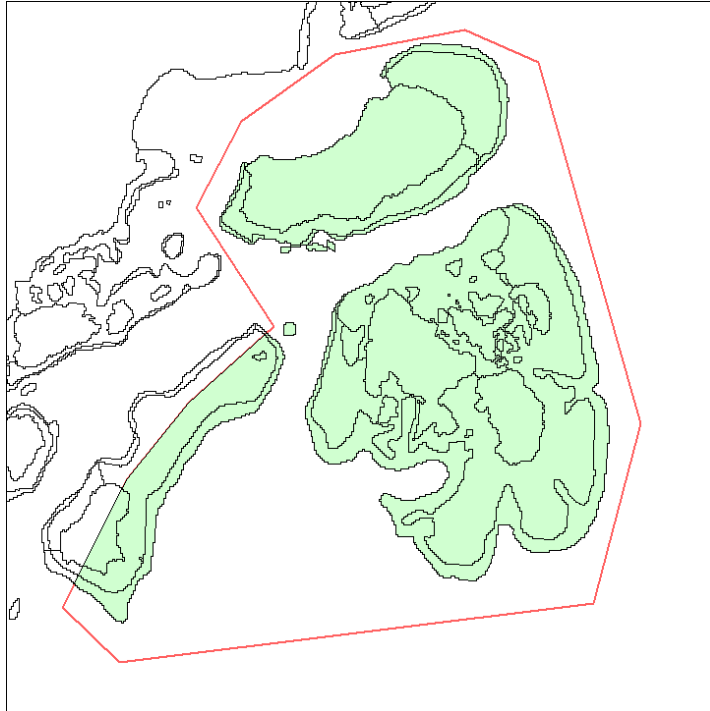


Why ProcFish?

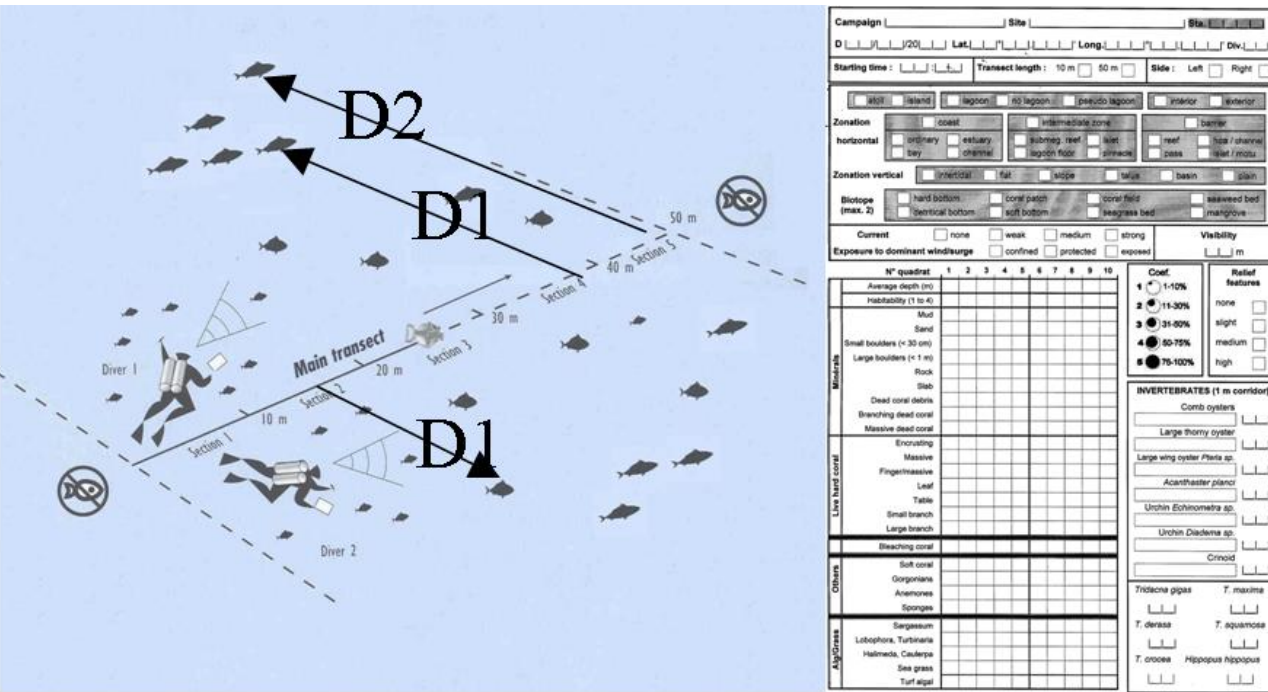
- Stock assessment in small-scale multi-gear multi-species fisheries must get a picture of the whole, not small fragments of the parts.
- Single species assessment and methods not appropriate
- Data for above not available
- Full fledged length-based assessment too data demanding, too laborious, and not necessary when estimates of biomass and catch are available

Procfish Surveys



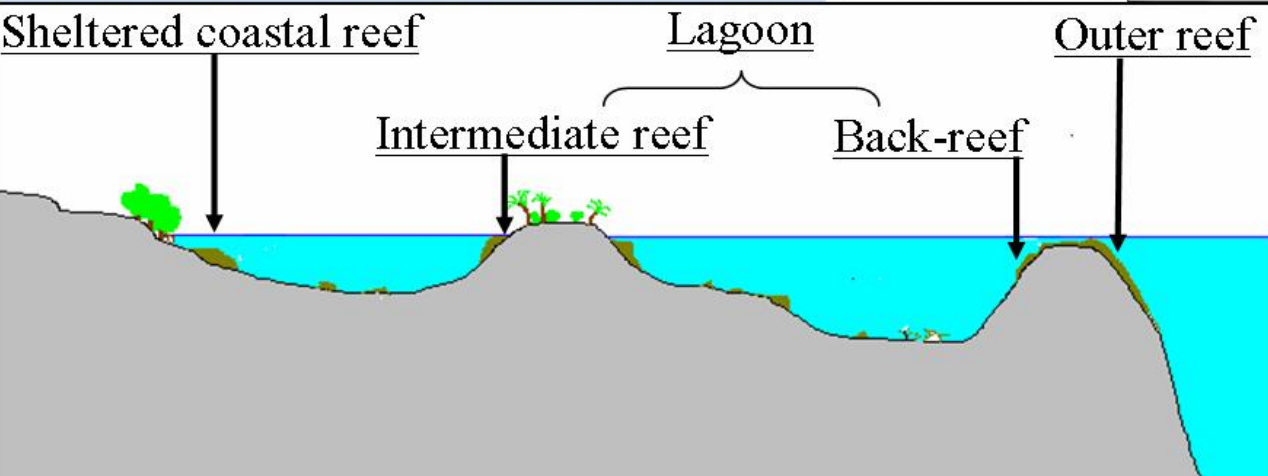
The fishing ground (in red) is delineated using information from fishers. Reef areas within the fishing area (in green; interpreted from satellite data) are then identified. The remaining non-reef areas within the fishing grounds are labelled as lagoon (in blue).

Distance-sampling Underwater Visual Census (D-UVC)

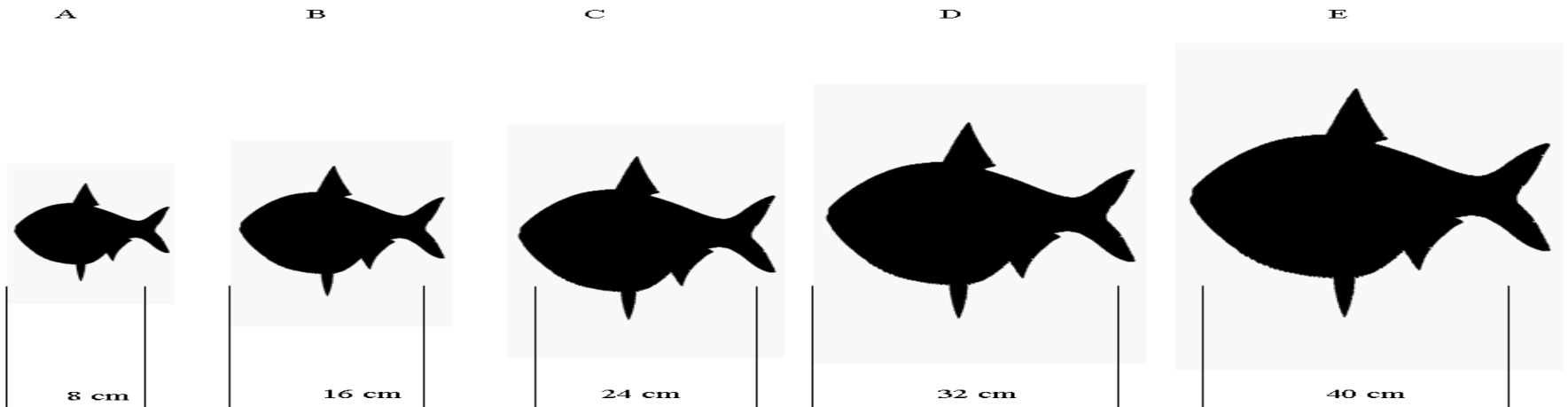


Campaign		Site		Sta.	
D		/20		Lat.	Long.
Starting time		Transect length: 10 m 50 m		Side: Left Right	
Zonation horizontal		Zonation vertical		Biotope (max. 2)	
<input type="checkbox"/> atoll <input type="checkbox"/> island <input type="checkbox"/> lagoon <input type="checkbox"/> no lagoon <input type="checkbox"/> pseudo lagoon <input type="checkbox"/> interior <input type="checkbox"/> exterior		<input type="checkbox"/> coast <input type="checkbox"/> intermediate zone <input type="checkbox"/> barrier		<input type="checkbox"/> hard bottom <input type="checkbox"/> coral patch <input type="checkbox"/> coral field <input type="checkbox"/> seaweed bed	
<input type="checkbox"/> estuary <input type="checkbox"/> bay <input type="checkbox"/> mangrove <input type="checkbox"/> lagoon floor <input type="checkbox"/> shallow reef <input type="checkbox"/> reef <input type="checkbox"/> sand <input type="checkbox"/> flat / rocky		<input type="checkbox"/> interior <input type="checkbox"/> flat <input type="checkbox"/> slope <input type="checkbox"/> mesa <input type="checkbox"/> basin <input type="checkbox"/> grass		<input type="checkbox"/> bare / soft bottom <input type="checkbox"/> seagrass bed <input type="checkbox"/> mangrove	
Current		Exposure to dominant wind/surge		Visibility	
<input type="checkbox"/> none <input type="checkbox"/> weak <input type="checkbox"/> medium <input type="checkbox"/> strong		<input type="checkbox"/> confined <input type="checkbox"/> protected <input type="checkbox"/> exposed		<input type="checkbox"/> 1-10m <input type="checkbox"/> 11-30m <input type="checkbox"/> 31-50m <input type="checkbox"/> 51-75m <input type="checkbox"/> 76-100m	
N° quadrat		Coef.		Relief features	
Average depth (m)		1 2 3 4 5 6 7 8 9 10		<input type="checkbox"/> none <input type="checkbox"/> slight <input type="checkbox"/> medium <input type="checkbox"/> high	
Habitability (1 to 4)					
Mud					
Sand					
Small boulders (< 30 cm)					
Large boulders (> 30 cm)					
Rock					
Slab					
Dead coral skeleton					
Branching dead coral					
Massive dead coral					
Encrusting					
Massive					
Fingermassive					
Leaf					
Table					
Small branch					
Large branch					
Bleaching coral					
Soft coral					
Gorgonians					
Acanthocephala					
Sponges					
Sargassum					
Lobophora					
Turritella					
Halimeda					
Caularia					
Sea grass					
Turf algal					

Each diver records the **number** of fish, **fish size**, **distance** of fish to the transect line, and **habitat quality**, using pre-printed underwater paper.



Estimating fish size

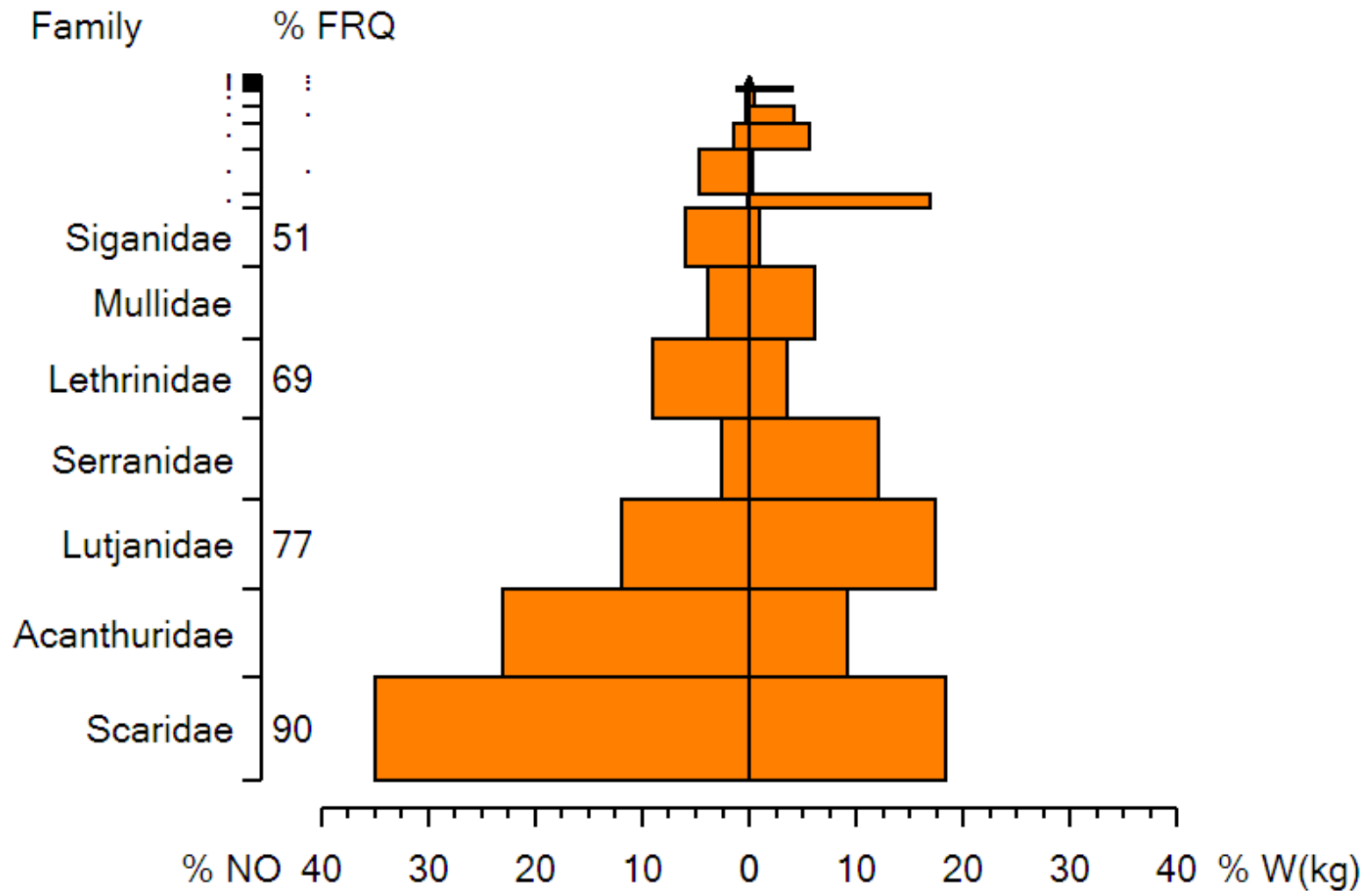


Finfish size field survey chart for estimating average length of reef and lagoon fish (including 5 size classes from A=8 cm to E=40 cm, in 8 cm intervals).

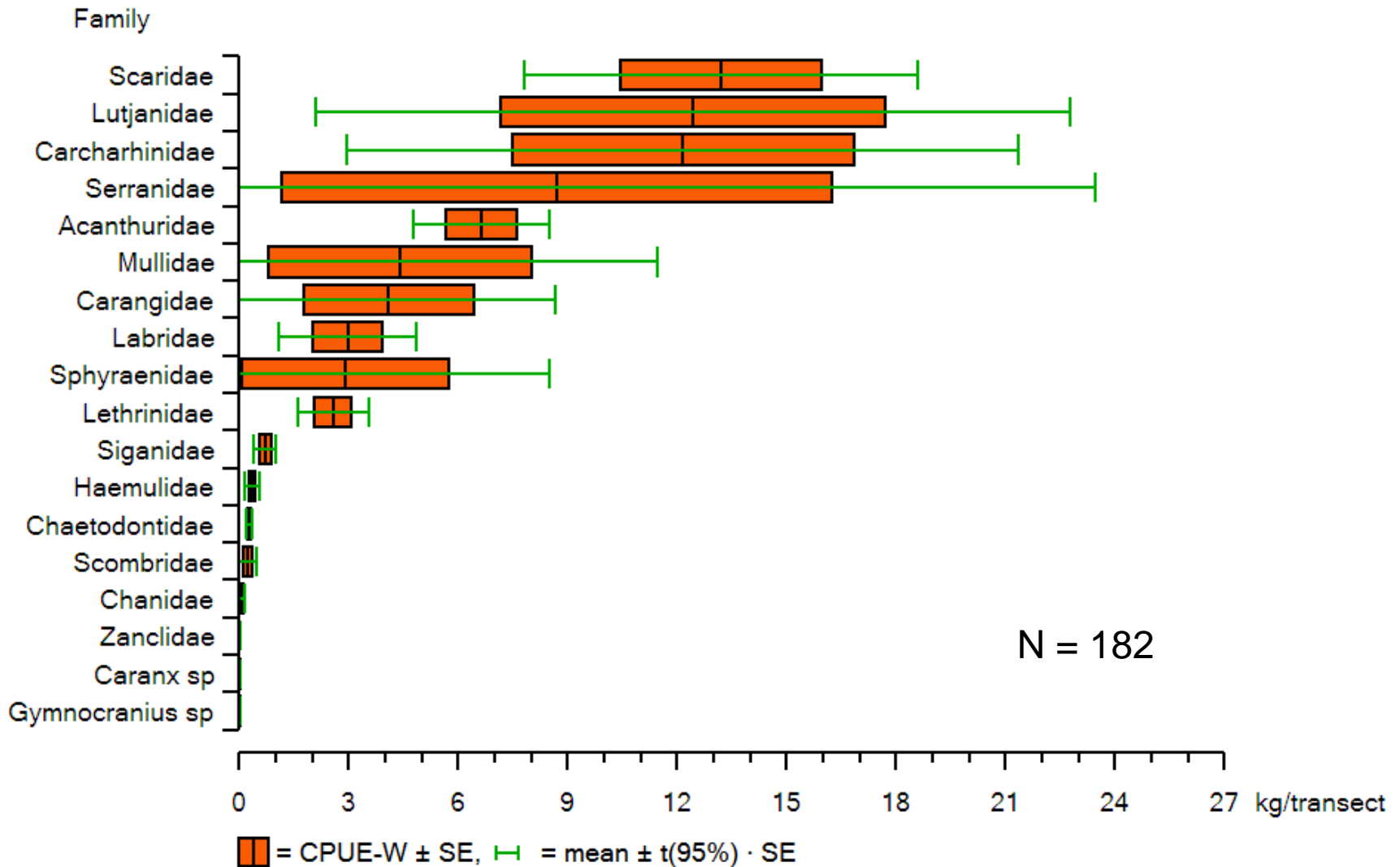
Output (example)

Family	NO	% NO	W(kg)	% W	FRQ	% FRQ	% IRI	H'	J'
Scaridae	6260	34.9	2402.426	18.4	163	89.6	36.4	0.367	0.13
Acanthuridae	4143	23.1	1208.425	9.3	141	77.5	19.1	0.339	0.12
Lutjanidae	2144	12	2263.722	17.3	141	77.5	17.3	0.254	0.09
Serranidae	473	2.6	1584.185	12.1	129	70.9	8.0	0.096	0.03
Lethrinidae	1619	9	467.615	3.6	125	68.7	6.6	0.217	0.08
Mullidae	706	3.9	800.721	6.1	117	64.3	4.9	0.127	0.04
Siganidae	1072	6	128.435	1	93	51.1	2.7	0.168	0.06
Carcharhinidae	36	0.2	2214.322	17	22	12.1	1.6	0.012	0.00
Chaetodontidae	829	4.6	46.985	0.4	71	39	1.5	0.142	0.05
Carangidae	257	1.4	744.487	5.7	39	21.4	1.2	0.061	0.02
Labridae	51	0.3	540.98	4.1	29	15.9	0.5	0.017	0.01
Haemulidae	45	0.3	63.608	0.5	25	13.7	0.1	0.015	0.01
Sphyraenidae	196	1.1	529.527	4.1	3	1.6	0.1	0.049	0.02
Scombridae	59	0.3	41.727	0.3	6	3.3	0	0.019	0.01
Zanclidae	24	0.1	2.995	0	6	3.3	0	0.009	0.00
Chanidae	5	0	11.477	0.1	4	2.2	0	0.002	0.00
Gymnocranius sp	5	0	1.397	0	3	1.6	0	0.002	0.00
Caranx sp	3	0	1.855	0	1	0.5	0	0.001	0.00
Total	17927	100	13054.89	100	-	-	100	1.899	0.66

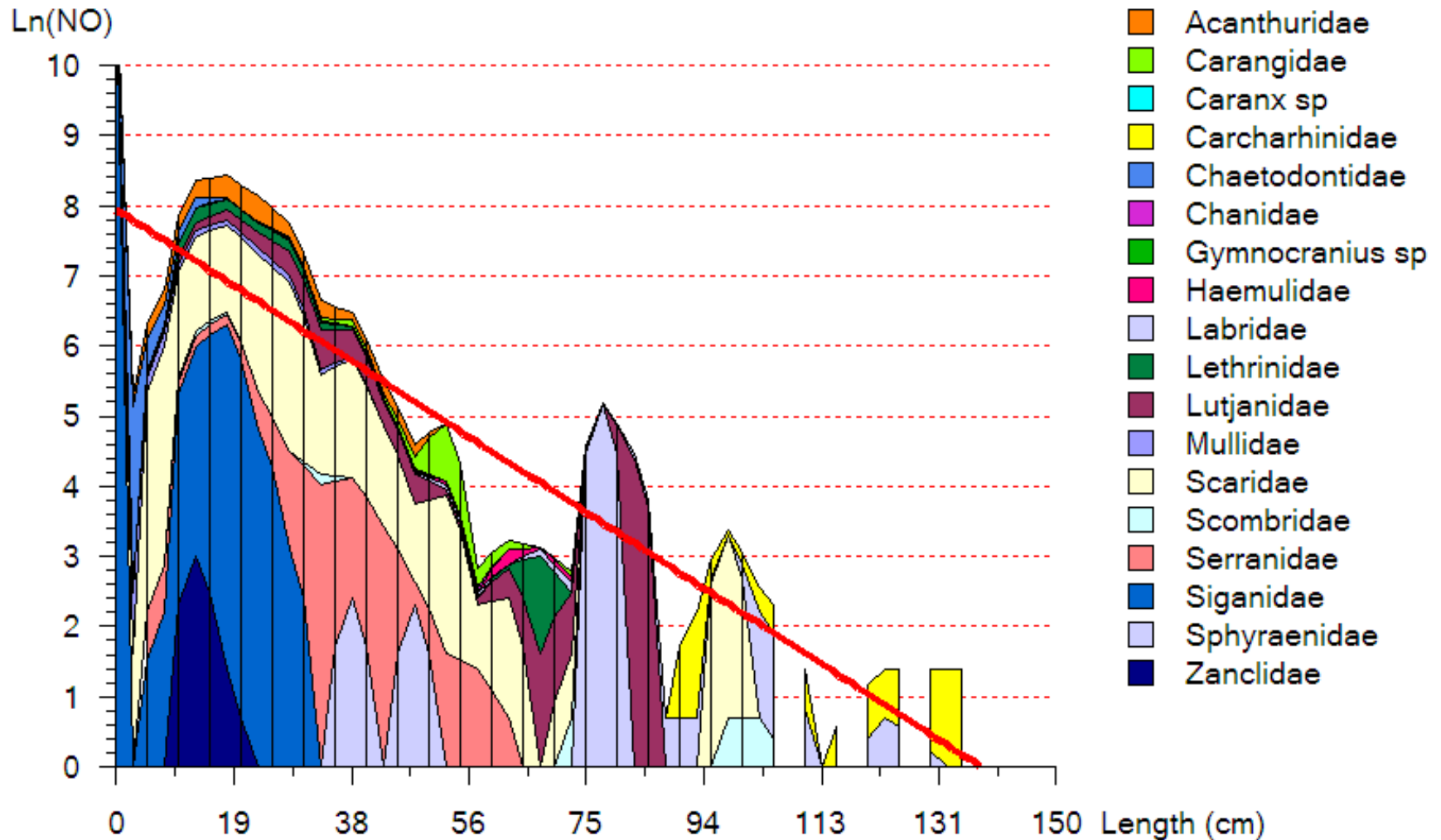
Relative importance by family



Average biomass by family



Ln-transformed distributions “community slope”



Stock assessment

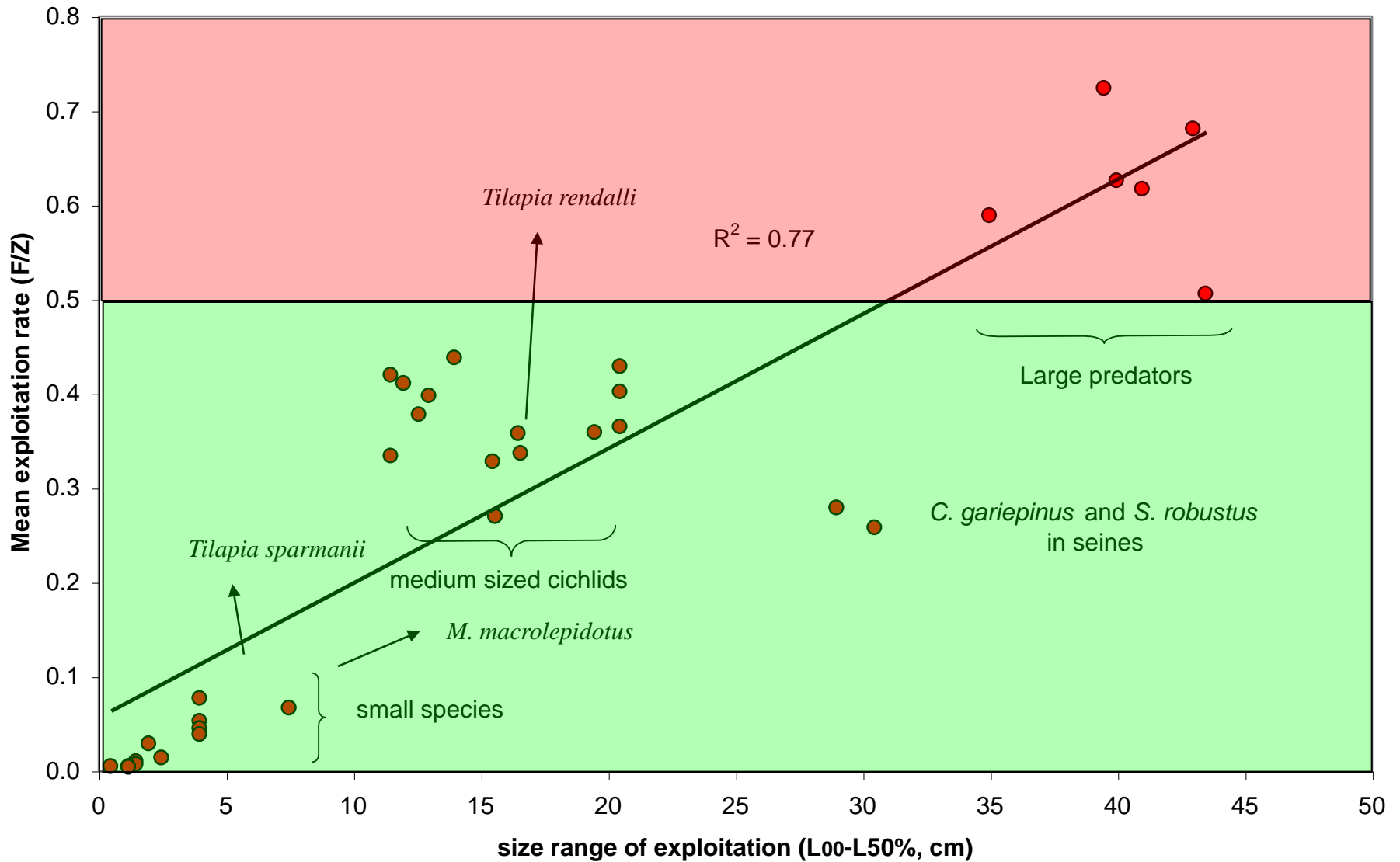
ProcFish

Species	B	Catch	F	M	Z	E
-	Kg	Kg/yr	C/B	?	LFQ VBGF	F/Z

If MPAs then
comparison
Inside/outside:
 $B_{\text{fish}}/B_{\text{MPA}}$

Literature
FishBase
VBGF
Longevity

Exploitation rate and size



Why ProcFish?

- Standardized methodology
 - Facilitates analysis and comparisons
 - Synergetic effect in analysis (e.g. M's)
 - Facilitates supervision
- Data available
 - Time can be spent on analysis/learning instead of sampling
- Stock assessment potential not utilized!
 - (at least not described anywhere)
- Each country participates in analysis
 - Inclusion of local (historical) knowledge
 - Understanding and learning instead of receiving