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Food-Web Structure and Functioning of Coastal Marine Ecosystems: Alvarado Lagoon and Adjacent Continental Shelf, Northern Gulf of Mexico

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SUPPLEMENTARY ANNEX TABLES

Annex S1. Information sources for trophic groups, and representative species included in the adjacent continental shelf and coastal lagoon off Alvarado, Veracruz, Mexico (southwest Gulf of Mexico) generic model. B: biomass; P/B: production:biomass ratio; Q/B: Consumption: Biomass ratio. ^aadjacent continental shelf; ^bAlvarado lagoon; ^cadults stage, ^djuvenile stage; m= compute by model.

Functional Group	B	PB	QB	Diet	Representative Taxa
Sea mammals	30 ^{bc} , 41 ^{ad}	92 ^{abcd}	92 ^{abcd}	33 ^{abcd} , 30 ^{bd} , 92 ^{abcd}	<i>Tursiops</i> spp.
Sea bird	m ^{acd}	42 ^{acd}	42 ^{acd}	11 ^{acd} , 46 ^{acd} , 49 ^{acd}	Pelecanidae, Fregatidae, Laridae
Coastal sharks	2 ^{acd} , 3 ^{acd} , 4 ^{acd}	42 ^{acd}	42 ^{acd}	2 ^{acd} , 3 ^{acd} , 4 ^{acd} , 63 ^{acd}	Charcharinidae
Rays/skates	2 ^{ac} , 3 ^{ac} , 4 ^{ac} , 24 ^{bd}	42 ^{ac} , 71 ^{bd}	42 ^{ac} , 69 ^{bd}	2 ^{acd} , 3 ^{ac} , 4 ^{ac} , 32 ^{bd} , 63 ^{ac} , 70 ^{bd}	Rajidae, Torpedinidae, Gymnuridae, Dasyatidae
Mackerels	2 ^{acd} , 3 ^{acd} , 4 ^{acd}	8 ^{acd} , 96 ^{acd}	8 ^{acd} , 96 ^{acd}	2 ^{acd} , 3 ^{acd} , 4 ^{acd} , 94 ^{acd}	Scombridae
Goatfish	2 ^{acd} , 3 ^{acd} , 4 ^{acd}	40 ^{acd} , 59 ^{acd} , 92 ^{acd}	40 ^{acd} , 59 ^{acd} , 92 ^{acd}	2 ^{acd} , 3 ^{acd} , 4 ^{acd} , 16 ^{acd}	Mullidae
Flatfish	2 ^{ac} , 3 ^{ac} , 4 ^{ac} , 21 ^{bd}	42 ^{ac} , 80 ^{bd} , 81 ^{bd}	42 ^{ac} , 80 ^{bd}	2 ^{ac} , 3 ^{ac} , 4 ^{ac} , 18 ^{bd} , 21 ^{cd} , 23 ^{bd} , 32 ^{bd}	Pleuronectiformes
Croakers/drums	2 ^{ac} , 3 ^{ac} , 4 ^{ac} , 23 ^{bd}	8 ^{ac} , 80 ^{bd} , 96 ^{ac}	8 ^{ac} , 80 ^{bd} , 96 ^{ac}	2 ^{ac} , 3 ^{ac} , 4 ^{ac} , 7 ^{bd} , 18 ^{bd} , 23 ^{bd} , 51 ^{bd}	Sciaenidae
Herring	2 ^{ac} , 3 ^{ac} , 4 ^{ac} , 23 ^{bd}	8 ^{abcd} , 40 ^{bd} , 59 ^{bd} , 96 ^{ac}	8 ^{abcd} , 40 ^{bd} , 59 ^{bd} , 96 ^{ac}	2 ^{ac} , 3 ^{ac} , 4 ^{ac} , 7 ^{bd} , 18 ^{bd} , 20 ^{ac} , 23 ^{bd}	Clupeidae

Suppl. Annex S1 contd....

Functional Group	B	PB	QB	Diet	Representative Taxa
Lizardfish	2 ^{ac} , 3 ^{ac} , 4 ^{ac}	40 ^{ac} , 59 ^{ac} , 66 ^{ac} , 67 ^{ac}	40 ^{ac} , 59 ^{ac} , 66 ^{ac} , 67 ^{ac}	29 ^{ac} , 73 ^{ac}	Synodontidae
Sea bass	2 ^{ac} , 3 ^{ac} , 4 ^{ac}	40 ^{ac} , 59 ^{ac} , 66 ^{ac}	40 ^{ac} , 59 ^{ac} , 66 ^{ac}	2 ^{ac} , 3 ^{ac} , 4 ^{ac} , 41 ^{ac}	Serranidae
Jacks/pompanos	2 ^{ac} , 3 ^{ac} , 4 ^{ac} , 23 ^{bd}	8 ^{ac} , 80 ^{bd} , 64 ^{ac}	8 ^{ac} , 80 ^{bd} , 95 ^{ac}	2 ^{ac} , 3 ^{ac} , 4 ^{ac} , 7 ^{bd} , 18 ^{bd} , 23 ^{bd}	Carangidae
Filefish	2 ^{ac} , 3 ^{ac} , 4 ^{ac}	42 ^{ac}	32 ^{ac}	2 ^{ac} , 3 ^{ac} , 4 ^{ac} , 41 ^{ac}	Ballistidae
Cutlassfishes	2 ^{ac} , 3 ^{ac} , 4 ^{ac}	42 ^{ac}	32 ^{ac}	2 ^{ac} , 3 ^{ac} , 4 ^{ac} , 51 ^{ac}	Trichiuridae
Barracudas	2 ^{ac} , 3 ^{ac} , 4 ^{ac}	42 ^{ac}	32 ^{ac}	2 ^{ac} , 3 ^{ac} , 4 ^{ac} , 51 ^{ac}	Sphyraenidae
Needlefish	23 ^{bd}	38 ^{bd}	38 ^{bd}	18 ^{bd} , 23 ^{bd}	Belonidae
Searobin	2 ^{ac} , 3 ^{ac} , 4 ^{ac}	40 ^{ac} , 59 ^{ac} , 66 ^{ac} , 46 ^{ac}	40 ^{ac} , 59 ^{ac} , 66 ^{ac} , 46 ^{ac}	2 ^{ac} , 3 ^{ac} , 4 ^{ac} , 42 ^{ac}	Triglidae
Snappers	2 ^{ac} , 3 ^{ac} , 4 ^{ac} , 23 ^{bd}	80 ^{bd} , 96 ^{ac}	80 ^{bd} , 64 ^{ac}	18 ^{bd} , 23 ^{bd} , 26 ^{ac} , 55 ^{ac} , 78 ^{ac}	Lutjanidae
Mojarras	2 ^{ac} , 3 ^{ac} , 4 ^{ac} , 23 ^{bd}	1 ^{bd} , 80 ^{bd} , 96 ^{ac}	1 ^{bd} , 80 ^{bd} , 96 ^{ac}	2 ^{ac} , 3 ^{ac} , 4 ^{ac} , 23 ^{bd} , 37 ^{ac}	Gerreidae
Pinfish-Porgies	2 ^{ac} , 3 ^{ac} , 4 ^{ac} , 23 ^{bd}	80 ^{bd} , 96 ^{ac}	80 ^{bd} , 64 ^{ac}	2 ^{ac} , 3 ^{ac} , 4 ^{ac} , 18 ^{bd} , 23 ^{bd}	Sparidae
Sea catfishes	2 ^{ac} , 3 ^{ac} , 4 ^{ac} , 17 ^{ac} , 23 ^{bd}	80 ^{bd} , 96 ^{ac}	80 ^{bd} , 64 ^{ac}	2 ^{ac} , 3 ^{ac} , 4 ^{ac} , 18 ^{bd} , 23 ^{bd}	Ariidae
Snook	2 ^{ac} , 3 ^{ac} , 4 ^{ac} , 23 ^{bd}	40 ^{ac} , 59 ^{ac} , 66 ^{ac} , 67 ^{ac} , 80 ^{bd}	40 ^{ac} , 59 ^{ac} , 66 ^{ac} , 67 ^{ac} , 80 ^{bd}	2 ^{ac} , 3 ^{ac} , 4 ^{ac} , 18 ^{bd} , 23 ^{bd}	Centropomidae
Mulletts	2 ^{ac} , 3 ^{ac} , 4 ^{ac} , 23 ^{bd}	1 ^{bd} , 42 ^{ac}	1 ^{bd} , 42 ^{ac}	2 ^{ac} , 3 ^{ac} , 4 ^{ac} , 23 ^{bd}	Mugilidae
Grunts	2 ^{ac} , 3 ^{ac} , 4 ^{ac}	40 ^{ac} , 59 ^{ac} , 66 ^{ac} , 67 ^a	40 ^{ac} , 59 ^{ac} , 66 ^{ac} , 67 ^a	2 ^{ac} , 3 ^{ac} , 4 ^{ac}	Haemulidae
Morays	2 ^{ac} , 3 ^{ac} , 4 ^{ac}	8 ^{ac}	8 ^{ac}	2 ^{ac} , 3 ^{ac} , 4 ^{ac} , 73 ^{ac}	Muraenidae
Toadfish	2 ^{ac} , 3 ^{ac} , 4 ^{ac} , 17 ^{bd}	72 ^{ac} , 80 ^{bd}	69 ^{ac} , 80 ^{bd}	2 ^{ac} , 3 ^{ac} , 4 ^{ac} , 17 ^{bd}	Batrachoididae
Sleepers	23 ^{bd}	-	-	63 ^{bcd}	Eleotridae
Others fishes	2 ^{ac} , 3 ^{ac} , 4 ^{ac}	42 ^{ac}	42 ^{ac}	2 ^{ac} , 3 ^{ac} , 4 ^{ac}	Others teleosteans
Squids	m ^{acd}	42 ^{ac}	42 ^{ac}	14 ^{ac} , 19 ^{ac} , 52 ^{ac}	Loliginidae
Octopuses	m ^{acd}	42 ^{ac}	42 ^{ac}	14 ^{ac}	Octopodidae
Crabs	m ^{abcd}	44 ^{ac} , 59 ^{ac} , 80 ^{bd}	80 ^{bd} , 92 ^{ac}	25 ^{ac} , 59 ^{ac} , 76 ^{bd} , 92 ^{ac}	Portunidae, Callinectidae
Penaeid shrimps	4 ^{ac} , m ^{bd}	42 ^{ac} , 80 ^{bd} , 94 ^{ac}	42 ^{ac} , 80 ^{bd} , 95 ^{ac}	4 ^{ac} , 27 ^{ac} , 76 ^{bd} , 89 ^{bd}	<i>Farfantepenaeus aztecus</i> , <i>Litopenaeus setiferus</i>
Others crustaceans	m ^{ac}	42 ^{ac}	42 ^{ac}	4 ^{ac}	Squillidae, Sicyoniidae, Solenoceridae, Majidae
Echinoderms	m ^{ac}	65 ^{ac} , 79 ^{ac}	65 ^{ac} , 79 ^{ac}	65 ^{ac} , 79 ^{ac}	Ophiuroidea, Asteroidea, Echinodeia, Crinoidea; Holoturoidea
Gastropods	m ^{abcd}	65 ^{ac} , 79 ^{ac} , 80 ^{bd}	65 ^{ac} , 79 ^{ac} , 80 ^{bd}	65 ^{ac} , 79 ^{ac} , 80 ^{bd}	Fisurelidae, Terebridae, Turridae
Polychaetes	m ^{ab}	65 ^{ab}	65 ^{ab}	65 ^{ab} , 86 ^a	Spionidae, Lumbrineridae, Nereididae, Capitellidae, Cirratulidae, Eunicidae
Bivalves	m ^{ab}	80 ^b , 95 ^a	80 ^b , 95 ^a	4 ^a , 80 ^a , 95 ^b	Tellinidae, Arcidae
Meiobenthos	94 ^b , m ^a	34 ^a , 39 ^a , 79 ^a , 80 ^b	65 ^a , 79 ^a , 80 ^b	65 ^a , 79 ^a , 94 ^b	Amphipoda, Isopoda, Cumacea, Copepoda.
Zooplankton	m ^{ab}	39 ^a , 65 ^a , 55 ^a , 80 ^b , 95 ^b	39 ^a , 65 ^a , 79 ^a , 80 ^b , 63 ^b	39 ^a , 65 ^a , 79 ^a , 80 ^b , 95 ^b	Copepoda, Chaetognatha, fish larvae
Phytoplankton	64 ^b , m ^a	39 ^a , 64 ^b ; 65 ^a , 79 ^a , 95 ^b			Phytoplankton
Benthic producers	94 ^b , m ^a	-	-	-	Seagrass, benthic macroalgae
Shrimp fishery by-catch	2 ^a , 3 ^a , 4 ^a	-	-	-	Death fauna discards
Detritus	71 ^{ab} , 76 ^b	-	-		Detritus

Annex S2. Parameters used to estimate consumption/biomass ratio (*sensu* Pauly, 1983 or *sensu* Binohlan & Pauly, 1997) for some fish groups presents in adjacent continental shelf and coastal lagoon off Alvarado, Veracruz, Mexico (southwest Gulf of Mexico). *K* and *L*_∞ are parameters of the von Bertalanffy growth equation; *A* is the aspect ratio (*sensu* Garcia & Duarte, 2002; Duarte et al., 1999); *a* and *b* are constants for the length–weight relationship.

Group Name	K (year ⁻¹)	L _∞ (cm)	A	a	B
Coastal sharks	0.41 [43]	84.2 [43]	7 [40]	0.000001 [36]	3.05 [36]
Rajidae, Torpedinidae, Gymnuridae, Dasyatidae (rays/skates)	0.11 [43]	67.4 [43]	7.0 [40]	0.000012 [13]	2.73 [36]

Suppl. Annex S3 contd....

	Prey \ Predator	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59
48	Others crustaceans (shelf)	0.12	0.00	0.10	0.00	0.00	0.00	0.00	0.04	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
49	Echinoderms (shelf)	0.05	0.00	0.11	0.00	0.00	0.00	0.00	0.01	0.04	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
50	Gastropods (shelf)	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
51	Gastropods (lagoon)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
52	Polychaetes (shelf)	0.09	0.00	0.00	0.00	0.00	0.16	0.00	0.00	0.26	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
53	Polychaetes (lagoon)	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
54	Bivalves (shelf)	0.10	0.00	0.21	0.00	0.00	0.00	0.00	0.00	0.05	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
55	Bivalves (lagoon)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
56	Meiobenthos (shelf)	0.11	0.00	0.00	0.23	0.00	0.31	0.00	0.16	0.00	0.29	0.00	0.20	0.00	0.00	0.00	0.01	0.00	0.00	0.00
57	Meiobenthos (lagoon)	0.00	0.00	0.00	0.00	0.21	0.00	0.22	0.00	0.00	0.00	0.17	0.00	0.31	0.00	0.00	0.00	0.01	0.00	0.00
58	Zooplankton (shelf)	0.12	0.52	0.03	0.00	0.00	0.11	0.00	0.16	0.00	0.12	0.00	0.00	0.00	0.09	0.00	0.06	0.00	0.06	0.05
59	Zooplankton (lagoon)	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.15	0.00	0.00	0.00	0.26	0.00	0.05	0.00	0.00
60	Phytoplankton (shelf)	0.02	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.00	0.04	0.00	0.77	0.00
61	Phytoplankton (lagoon)	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.08	0.17	0.00	0.00	0.00	0.36	0.00	0.01	0.12	0.77
62	Benthic producers (shelf)	0.00	0.00	0.00	0.00	0.07	0.00	0.11	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
63	Benthic producers (lagoon)	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
64	Shrimp by-catch (shelf)	0.08	0.00	0.22	0.06	0.00	0.00	0.00	0.09	0.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
65	Detritus (shelf)	0.16	0.00	0.00	0.68	0.00	0.38	0.46	0.11	0.28	0.19	0.00	0.80	0.00	0.66	0.00	0.89	0.00	0.06	0.18
66	Detritus (lagoon)	0.08	0.00	0.00	0.00	0.59	0.00	0.00	0.43	0.00	0.00	0.44	0.00	0.69	0.00	0.38	0.00	0.93	0.00	0.00

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