

This issue of Fishbyte includes three data-rich contributions. The paper by Garcia et al. gives length-weight relationship parameters of 46 fish species caught in Colombia. The paper by Pakoa gives a summary of available stock information for 38 species in Vanuatu; while that of King gives weight-fecundity relationships for 25 stocks belonging to 15 species in Nigeria. All these data, indeed, are very welcome additions to the substantial information already compiled in FishBase.

Read on and keep the contributions coming!

G. Silvestre and V. Christensen

Vital Statistics of Marine Fishes of Vanuatu

K. Pakoa

Abstract

Vital statistics are presented for 38 marine species of Vanuatu based on previous studies conducted in the area, with parameters describing growth (6 species, 13 sets of parameters), mortality (estimates of M for 6 species), length-weight relationship (32 species), and reproduction (length at first maturity for 26 species, months of reproduction for 18 species). The species covered belong mainly to the family Lutjanidae.

Introduction

The fisheries resources of Vanuatu are extremely important to the local economy, especially in villages affected by the recent drop in copra production. Nominal catches, excluding tuna, as reported to FAO, were 1 268 t in 1994 (Lui et al. 1994). There are indications that the stocks of slow-growing, deep water bottom fishes may be over-exploited. This may be one of the causes of the failure of Vanuatu's Village Fisheries Development Program.

Available resources are presently insufficient to conduct the extensive field-based research required to test this hypothesis rigorously. Pending such assessment work, the key results of biological

studies conducted so far on the fishes of Vanuatu are summarized here, to indicate work that requires follow up and for use in other countries with similar fish fauna.

Materials and Methods

A search for publications complementing the limited holdings of the Fisheries Department, Port Vila, Vanuatu, was conducted in October 1997 at the library of the South Pacific Commission in Nouméa, New Caledonia. This was followed by a search of the PIMRIS Database (PIMRIS Coordination Unit 1993) and of FishBase (Froese and Pauly 1997). Scientific names used in the cited publications were checked and updated using FishBase.

Results

A total of 431 species of finfish have been so far reported from Vanuatu. Of these, only 11 are freshwater species (Froese and Pauly 1997). FishBase documents many studies on these 431 species. However, only few studies, mostly documented in the 'grey' literature, have been conducted in Vanuatu. Their results, covering 38 marine species, are summarized in Table 1.

The parameters of length-weight relationships of the form $W = a \cdot L^b$ have been estimated for 32 species, while the parameters of the von Bertalanffy growth equation (L_∞ and K) have been estimated for six species.

Other information is available on natural mortality (6 species),

Table 1. Summary of available biological information on fishes of Vanuatu^a. Length measurements are fork length in cm unless stated otherwise.

Family	Species	Depth (m)	Spawning months ^b												L _m ^c	L _{max}	M (yr ⁻¹) ^d	Growth		Length-weight relationships				
			J	F	M	A	M	J	J	A	S	O	N	D				L _e	K (yr ⁻¹)	a	b	range		
Lutjanidae	<i>Aphareus rutilans</i>	120-240	x											x			48	88				0.0034	3.31	
Lutjanidae	<i>Aprion virescens</i>	<120	x											x			44	82				0.0034	3.33	44-82
Lutjanidae	<i>Etelis carbunculus</i>	>240															54	112	0.07	82 ^{e)}	0.19 ^{h)}	0.0216	2.95	20-100
Lutjanidae	<i>Etelis carbunculus</i>	>240																		75 ^{h)}	0.23 ^{h)}	—	—	
Lutjanidae	<i>Etelis carbunculus</i>	>240																		127 ^{g)}	0.13 ^{g)}	—	—	
Lutjanidae	<i>Etelis carbunculus</i>	>240																		132 ^{g)}	0.22 ^{g)}	—	—	
Lutjanidae	<i>Etelis carbunculus</i>	>240																		94	0.07	—	—	
Lutjanidae	<i>Etelis coruscans</i>	>240															47	91	0.107	82	0.128	0.0410	2.76	20-90
Lutjanidae	<i>Etelis oculatus</i>	>240															40					—	—	
Lutjanidae	<i>Etelis radiosus</i>	>240	x	x		x								x	x		40	89				0.0563 ^{f)}	2.69 ^{f)}	
Lutjanidae	<i>Lipocheilus camolabrum</i>	>240		x													35					0.1490	2.49	30-68
Lutjanidae	<i>Lutjanus argentimaculatus</i>	120-240												x	x		44	82				0.0054	3.21	48-82
Lutjanidae	<i>Lutjanus bohar</i>	<120															36	64				—	—	
Lutjanidae	<i>Lutjanus gibbus</i>	<120															21	52				—	—	
Lutjanidae	<i>Lutjanus malabaricus</i>	120-240															35	76	0.447	60	0.31	0.0085	3.14	27-62
Lutjanidae	<i>Lutjanus rufolineatus</i>	120-240															16					—	—	
Lutjanidae	<i>Paracaesio kusakarii</i>	120-240	x			x								x		x	33	62				0.0106	3.14	20-62
Lutjanidae	<i>Paracaesio stonei</i>	120-240																				0.2000	2.40	
Lutjanidae	<i>Pristipomoides argyrogrammicus</i>	>240		x		x	x							x	x	x	14	29				0.0098	3.22	18-28
Lutjanidae	<i>Pristipomoides filamentosus</i>	<120	x			x											35	76	0.467	60	0.29	—	—	
Lutjanidae	<i>Pristipomoides flavipinnis</i>	120-240				x											33	65	0.648	58	0.36	0.0299	2.82	20-61
Lutjanidae	<i>Pristipomoides multidentis</i>	120-240															37	76	0.375	61 ^{h)}	0.35 ^{h)}	0.0200	2.94	26-70
Lutjanidae	<i>Pristipomoides multidentis</i>	120-240																		65	0.28	—	—	
Lutjanidae	<i>Pristipomoides typus</i>	120-240																				0.0391	2.73	
Serranidae	<i>Epinephelus areolatus</i>	120-240					x	x						x		x	22	44				0.1360	2.33	24-44
Serranidae	<i>Epinephelus magniscuttis</i>	120-240	x												x		40	95				0.0392	2.75	24-80
Serranidae	<i>Epinephelus morhua</i>	120-240																		44	79	0.0606	2.62	26-80
Serranidae	<i>Epinephelus septemfasciatus</i>	>240				x											83					0.0033	3.35	32-170
Lethrinidae	<i>Gymnocranius euanus</i>	120-240																				0.0209	2.93	
Lethrinidae	<i>Lethrinus olivaceus</i> **	120-240																				0.0329	2.73	28-78
Lethrinidae	<i>Lethrinus variegatus</i>	<120																				0.1820	2.28	
Lethrinidae	<i>Waltzia mossambicus</i>	120-240																				0.0401	2.82	24-48
Carangidae	<i>Caranx lugubris</i>	<120																				0.0105	3.09	
Carangidae	<i>Seriola rivoliana</i>	120-240	x				x	x									49	92				0.0064	3.17	24-88
Carcharhinidae	<i>Carcharhinus albimarginatus</i>	120-240																				0.0030*	3.24	
Carcharhinidae	<i>Carcharhinus falciformis</i>	120-240																				0.0464*	2.75	
Squalidae	<i>Squalus megalops</i>	>240															47*	84				0.0126*	2.88	42-84
Triakidae	<i>Mustelus manazo</i>	>240																				0.0023*	3.20	
Scombridae	<i>Gymnosarda unicolor</i>	120-240																				0.0409	2.80	
Scombridae	<i>Katsuwonus pelamis</i>	—																				62 ^{g)}	1.10 ^{g)}	—
Gempylidae	<i>Thyrsooides marleyi</i>	>240																				0.0002	3.61	
Hexanchidae	<i>Hexanchus nakamurai</i>	>240																				0.0012*	3.47	
Sphyrnidae	<i>Sphyrna barracuda</i>	—																				0.0080	3.49	

a) Source is Brouard and Grandperrin 1985, except where noted otherwise; length range for LW relationships read off from Figs. 15a-15c; b) x means high gonadosomatic index and/or occasional spawning have been noted for that month. c) L_m refers to smallest recorded size at maturity. d) M = Z for unexploited stocks. e) Brouard et al. 1983; f) Smith and Kostlan 1991; g) Carlot 1990; h) Brouard et al. 1984; i) Schaan et al. 1987; * Refers to standard length. ** as *Lethrinus miniatus* in Brouard and Grandperrin 1985.

length at first maturity (26 species), as well as scattered records of months of reproductive activity (18 species) and depth of occurrence of adults for almost all species.

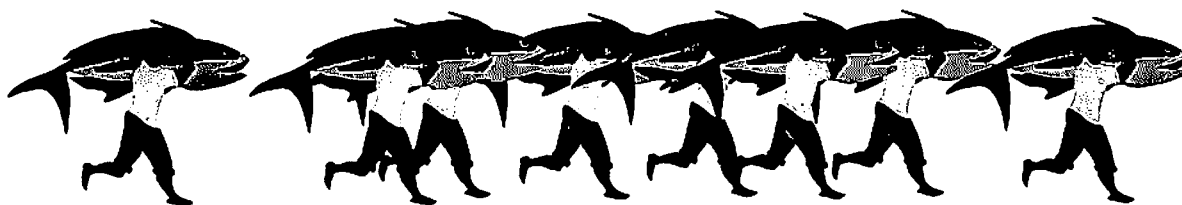
Acknowledgements

I am pleased to acknowledge the assistance of the library staff, South Pacific Commission, and of the staff of the FishBase Project, notably Daniel Pauly, Crispina Binohlan and Rainer Froese. My thanks go also to the EC, for funding the ACP-EU Biodiversity Training Course at which this contribution was initiated, and to the Fisheries Department, Vanuatu, for nominating me for this fruitful training opportunity.

References

- Brouard, F. and R. Grandperrin. 1985. Deep-bottom fishes of the outer reef slope in Vanuatu. South Pacific Commission Seventeenth Regional Technical Meeting on Fisheries, Nouméa, New Caledonia, 5-7 August 1985. 127 p.
- Brouard, F., R. Grandperrin and E. Cillaurren. 1984. Croissance des jeunes thons jaunes (*Thunnus albacares*) et des bonites (*Katsuwonus pelamis*) dans le Pacifique tropical occidental. Notes Doc. Océanogr. Mission ORSTOM Port Vila, Vanuatu. No. 10. 23 p.
- Brouard, F., R. Grandperrin, M. Kulbicki and J. Rivaton. 1983. Note sur les lectures de stries journalières observées sur les otolithes de poissons profonds à Vanuatu. Notes Doc. Océanogr. No. 7. Mission ORSTOM Port Vila, Vanuatu, 22 p. [also available as ICLARM Translations 3, 1984. 8 p.].
- Carlot, A.H. 1990. Growth and mortality of snapper *Etelis carbunculus* in Vanuatu. Fishbyte 8(3):6-7.
- Froese, R. and D. Pauly, Editors. 1997. FishBase 97: Concepts, design and data source. ICLARM, Manila, Philippines. 257 p.
- Lui, A., J. Bell and M.J. Amos. 1994. Republic of Vanuatu Fisheries Resources Profiles. FFA Report 93/49. Honiara, Solomon Islands. No. 36. 37 p.
- PIMRIS Coordination Unit. 1993. PIMRIS Database: MOANA. Suva, Fiji: South Pacific Islands Marine Resources Information System.
- Schaan, O., A.H. Carlot and F. Nguyen. 1987. Exploitation of deep sea fish resources by village fisheries in Vanuatu. Notes Doc. Océanogr. No 16. Mission ORSTOM Port Vila, Vanuatu, 145 p.
- Smith, M.K. and E. Kostlan. 1991. Estimates of age and growth of *Etelis carbunculus* in four regions of the Pacific from density of daily increments in otoliths. Fish. Bull. 89:461-472.

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ERRATUM

We apologize for the incorrect map that was printed as Fig. 1. in "Analysis of RAPD Polymorphisms in *Rastrelliger kanagurta* off India" by P. Jayasankar and K. Dharmalingam in the July-December 1997 issue of the Naga. The correct version is given here.

