

A List of Fishes Inhabiting Mangroves from the South-West Lagoon of New Caledonia

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Abstract—Mangrove fishes from the South-West Lagoon of New Caledonia were sampled using gill nets, fyke nets and rotenone poisonings from 1987 to 1990. A total of 262 species, distributed among 64 families, were recorded with 3 new records. The most speciose families are Gobiidae (31 spp.), Apogonidae (17 spp.), Serranidae (13 spp.), Carangidae (11 spp.), Muraenidae and Lethrinidae (10 spp.). Estuarine families, such as Elopidae, Kuhliidae, Cichlidae, Chandidae and Microdesmidae, are also present together with reef or soft bottom associated species (including Serranidae, Lutjanidae, Carangidae and Lethrinidae). Sciaenidae and Ariidae were not censused and freshwater species were scarce.

Introduction

Mangroves are tropical tidal forests and swamps. In spite of the benefits they provide such as land protection, sediment trapping, high primary productivity, enhancement of coastal productivity and fishery yields, mangroves are severely threatened on most shorelines (Chapman 1976, Baines 1981, Christensen 1983, Saenger et al. 1983, Lal 1984, Tomlinson 1986, Thollot 1992a, in press). Extensive losses of mangrove forests have sometimes reached dramatic levels of disturbance, up to 60% of total area in Java (Saenger et al. 1983). These are mainly related to land reclamation and conversion, particularly for agriculture (rice or sugar cane farming), aquaculture (prawns and fish ponds) or tourism (artificial beaches, resorts). There is an urgent need to prevent further destruction of mangroves, to allow a sustainable use of this natural resource (Thollot, in press).

The purpose of this work is to list the fish fauna inhabiting mangroves of the South-West Lagoon of New Caledonia. Fortunately, this area has not yet been subjected to heavy anthropogenic stresses, except in the vicinity of the urban center of Nouméa. Results presented here can be used as baseline information for future monitoring of the community. They are also useful for similar research and for zoogeographic studies undertaken in the South-West Pacific, as well as in the Central Pacific, where Indo-Pacific mangroves reach their eastward limit of distribution (Tomlinson 1986).

Material and Methods

STUDY AREA

Located in the South-West Pacific, New Caledonia is a high island surrounded by an extensive barrier reef enclosing several lagoons (Fig. 1). The climate is tropical with 2 rainy (summer and winter) and 2 dry (spring and fall) seasons. The most noticeable meteorological event is the occurrence of cyclones during the warm and rainy season (January to March). Maximum tidal range is 1.8 m. Most mangrove forests are located on the west coast which is protected from SE trade winds. These forests and swamps cover approximately 200 km². In the South-West Lagoon, mangroves are well developed in estuaries and sheltered bays. On the northern part of the study area, the width of the lagoon decreases. As a consequence, hydrodynamic conditions are reduced and the shoreline becomes suitable for settlement, growth and development of extensive mangroves. These mangroves can grow in the vicinity of fringing reefs or reef flats. Further details on floristics and quantitative assessment of mangrove forests, water quality, and characterization of habitat (temperature, salinity, turbidity, dissolved oxygen, sediment) are given in Thollot (1992a).

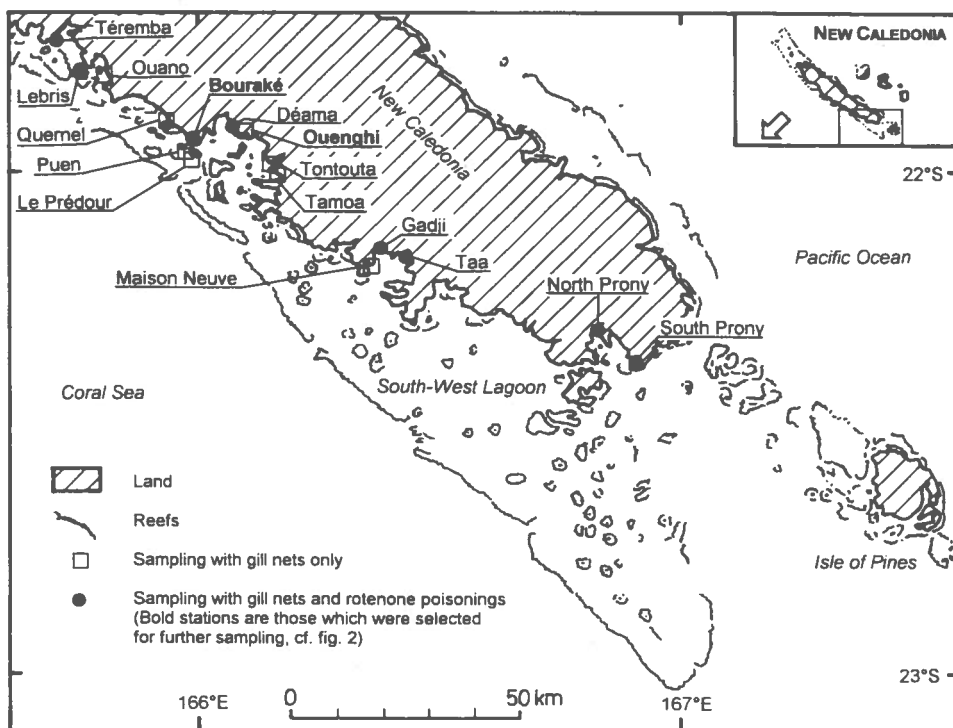


Figure 1. Study area and location of sampling sites from "SW Lagoon Mangroves fish fauna" survey.

SAMPLING

The mangrove fish survey took place in the South-West Lagoon of New Caledonia (Fig. 1), from 1987 to 1990 (see Thollot 1992a for details). Two sampling surveys were undertaken. The first one was an exhaustive census of the species inhabiting most mangroves from the study area ("SW Lagoon Mangroves fish fauna"). Data from this sampling allowed the assessment of the spatial distribution of the fish communities. The second sampling was held in Saint-Vincent bay area ("St. Vincent Bay Mangroves fish fauna"). Two sites were selected, an estuarine mangrove (Ouenghi-Nongoro deltaic system) and a fringing reef mangrove (Bouraké). Each of these sites was sampled monthly, over a one year period.

SW Lagoon Mangroves fish fauna

From Prony to Térémba, mangroves were sampled using gill nets (1.20, 2.20 and 3.00 m high, 50, 75 and 100 m long, 35, 40, 60 and 80 mm stretched meshes) (Fig. 1). Nets were set along the mangrove fringe at the end of the incoming tide and withdrawn at low tide. Most fish moving out the mangrove during the ebbing tide were collected. A total of 68 gill net settings were performed on 16 stations, both by night and day (Table 1, Fig. 1). In addition, fyke nets and an ichthyocide (rotenone) were also used. In Saint-Vincent Bay (Déama station), fyke nets were set perpendicular to the shoreline for 48 hours, the catch being retrieved every 24 hours. Ten rotenone poisonings were performed on 8 stations, from Térémba to Prony (Table 1, Fig. 1). The area to be poisoned was circled with small meshed nets (20 to 35 mm) before spreading rotenone powder (10% active matter) mixed with sea water and liquid soap. All fish drifting at the sea surface and caught in the surrounding nets were recovered with scoopnets. Even though we were snorkeling, most fish sinking to the bottom could not be collected because of the water turbidity.

St Vincent Bay Mangroves fish fauna

Thollot (1992a) has extensively detailed the ecological characteristics of Ouenghi (Ouenghi-Nongoro deltaic system) and Bouraké stations (Fig. 2). In 1989, 12 samplings were performed during each last quarter of the lunar month. On both stations, a fleet of gill nets (3 nets, 3m × 70 m, with 40, 60 and 80 mm stretched meshes) were set four times, twice daily and twice nightly, together with 2 sets of a fyke net (Fig. 3). Thus, on each sampling site, 48 sets of gill nets and 24 sets of fyke nets were performed during 1989. The exception was in Bouraké, where only three sets of gill nets have been completed in July 1989, because of bad weather (strong westerly wind). At the end of the sampling cycle, in March (Bouraké) and June (Ouenghi) 1990, an ichthyocide (rotenone) was used to sample each station (gill nets and fyke net).

SPECIES IDENTIFICATION

All fish collected were identified using identification keys and taxonomic books such as Fischer & Bianchi (1984), Gloerfelt-Tarp & Kailola (1984), Masuda et al. (1984), Sainsbury et al. (1984), Myers (1989) and Randall et al. (1990). Where

Table 1. "SW Lagoon Mangroves fish fauna" sampling.

Station	Location	Gill nets settings	Rotenone poisonings	Date
Déama	21°56'S-166°04'E	18 (+2 Fyke nets)	1	04-04/87
Maison Neuve	22°11'S-166°20'E	2	—	05/88
North Prony	22°17'S-166°51'E	3	1	06/88
South Prony	22°23'S-166°54'E	3	2	06/88
Puen	21°58'S-165°58'E	2	—	07/88
Le Prédour	21°59'S-165°58'E	2	—	07/88
Bouraké*	21°57'S-165°58'E	2	1	07/88
Quenghi*	21°56'S-166°05'E	7	—	11/88
Quermel	21°55'S-165°55'E	7	—	11/88
Téremba	21°45'S-165°42'E	4	2	12/88
Lebris	21°49'S-165°45'E	4	1	12/88
Ouano	21°50'S-165°49'E	4	—	12/88
Tontouta	22°01'S-166°09'E	2	—	04/89
Tamoa	22°03'S-166°10'E	4	—	04/89
Gadji	22°10'S-166°22'E	2	1	06/89
Taa	22°11'S-166°26'E	2	1	06/89

*Stations selected for further sampling ("St Vincent Bay Mangroves fish fauna").

difficulties were encountered, specimens were sent to taxonomic authorities. However, a few species remained either unidentified or undescribed.

Results and Discussion

Data from all samples were qualitatively pooled. In the following list, the letters G, F or R may be found before a species name. This indicates that the species was collected using gill nets (G), fyke nets (F) or poisoned with rotenone (R). The families are ordered phylogenetically following Eschmeyer (1990). The taxa are ordered alphabetically within each family. New records are followed by NR.

Class Elasmobranchii

ORDER CARCHARINIFORMES

Family Carcharhinidae

G *Carcharhinus leucas* (Muller & Henle, 1837)

G *Carcharhinus limbatus* (Muller & Henle, 1837)

G *Carcharhinus melanopterus* (Quoy & Gaimard, 1824)

G *Negaprion acutidens* (Rüppell, 1837)

Family Sphyrnidae

G *Sphyrna lewini* (Griffith & Smith, 1834)

ORDER MYLIOBATIFORMES

Family Dasysatidae

G *Dasysatis benetti* (Muller & Henle, 1841)

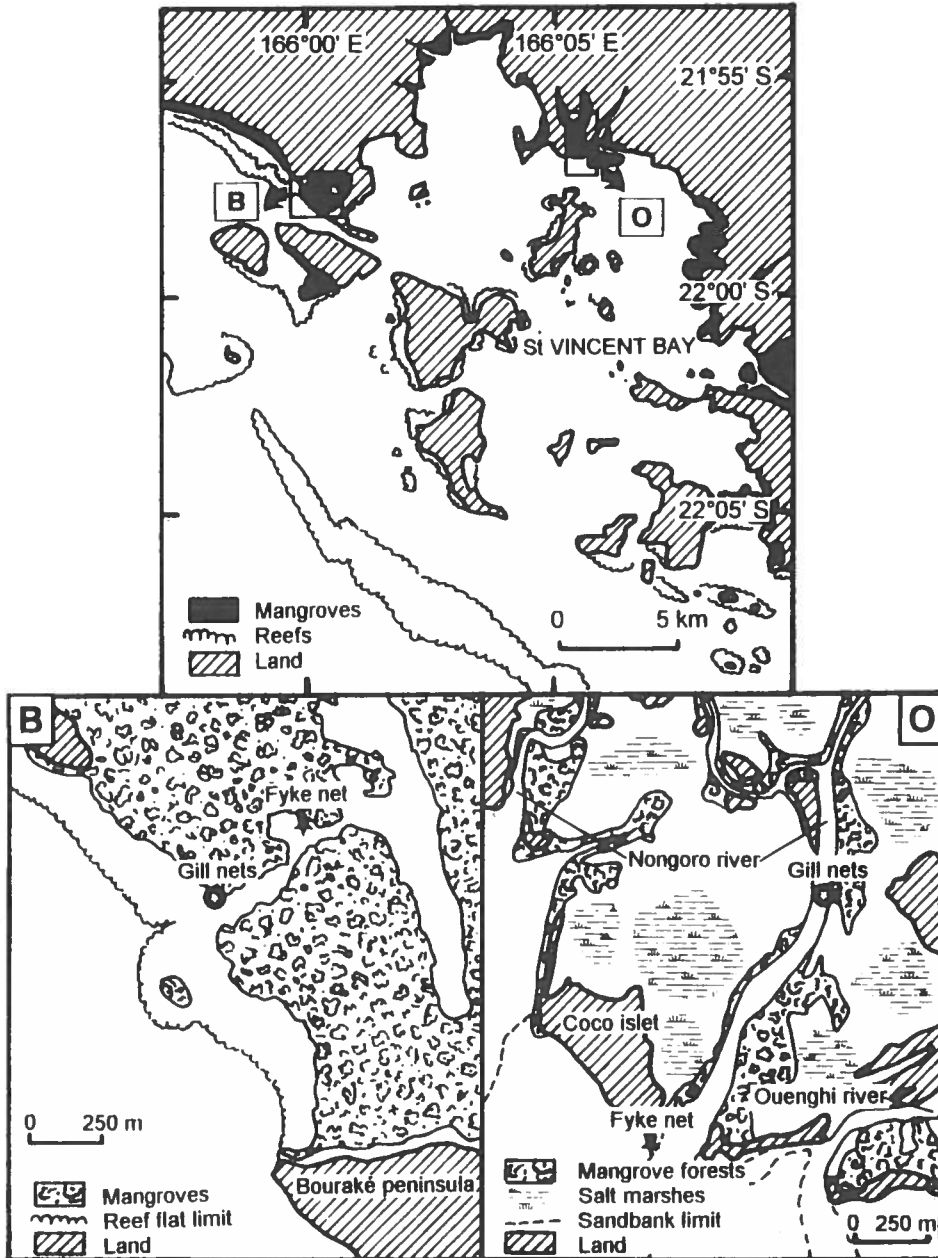


Figure 2. “St. Vincent Bay Mangroves fish fauna” sampling sites: B) Bouraké, O) Ouenghi.

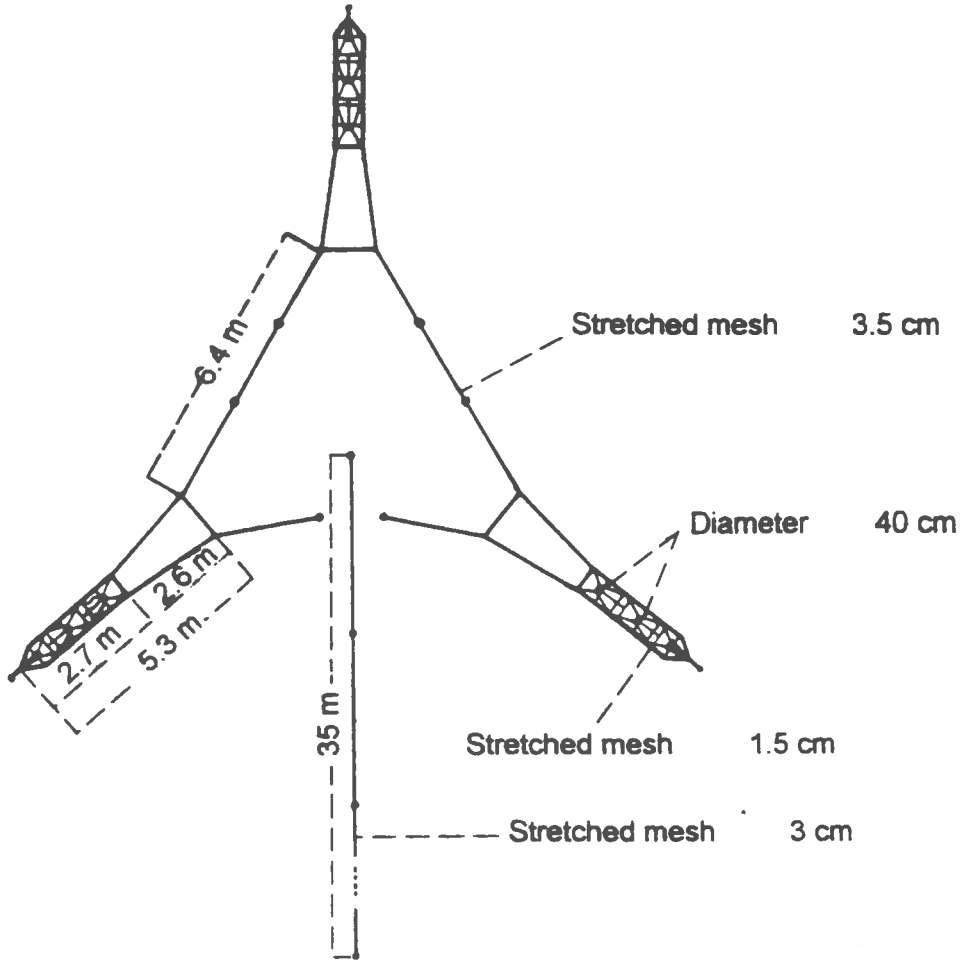


Figure 3. Design and measurements of the fyke net used during New Caledonia mangrove fish surveys.

G F *Dasyatis kuhlii* (Muller & Henle, 1841)

G *Pastinachus sephen* (Forsskal, 1775)

Class Actinopterygii

ORDER ELOPIFORMES

Family Elopidae

G F R *Elops machnata* Forsskal, 1775

Family Megalopidae

G F *Megalops cyprinoides* (Broussonet, 1782)

ORDER ANGUILLIFORMES

Sub-Order Anguilloidei**Family Anguillidae**

F *Anguilla mossambica* (Peters, 1852)

Sub-Order Muraenoidei**Family Muraenidae**

R *Gymnothorax albimarginatus* (Temminck & Schlegel, 1847)

R *Gymnothorax fimbriatus* (Bennett, 1831)

R *Gymnothorax* sp. 1

R *Gymnothorax* sp. 2

F R *Gymnothorax undulatus* (Lacépède, 1803)

F *Siderea picta* (Ahl, 1789)

G R *Siderea thyrsoides* (Richardson, 1844)

G F R *Strophidon sathette* (Hamilton, 1822)

G *Thyrsoidea* sp.

R *Uropterygius* sp.

Sub-Order Congroidei**Family Ophichthidae**

R *Leiuranus semicinctus* (Lay & Bennett, 1839)

R *Muraenichthys* sp.

R *Myrophis uropterus* (Temminck & Schlegel, 1842)

R *Ophichthus cephalozona* (Bleeker, 1864)

Family Congridae

G R *Conger cinereus* (Rüppell, 1828)

Family Muraenesocidae

G *Muraenesox bagio* Bleeker, 1864

ORDER CLUPEIFORMES

Family Clupeidae

G *Amblygaster sirm* (Walbaum, 1792)

G F *Anodontostoma chacunda* (Hamilton-Buchanan, 1822)

F R *Herklotsichthys quadrimaculatus* (Rüppell, 1837)

R *Herklotsichthys* sp.

G *Sardinella* sp.

G F *Sardinella fijiensis* (Fowler & Bean, 1923)

F R *Spratelloides delicatulus* (Bennett, 1831)

F *Spratelloides gracilis* (Temminck & Schlegel, 1846)

R *Spratelloides* spp.

Family Engraulidae

F *Stolephorus devisi* (Whitley, 1940)

F *Stolephorus heterolobus* (Rüppell, 1837)

F R *Stolephorus indicus* (Van Hasselt, 1823)

F *Stolephorus* spp.

F *Stolephorus waitei* Jordan & Seale, 1926

G F R *Thryssina baelama* (Forsskal, 1775)

Family ChirocentridaeG F *Chirocentrus dorab* (Forsskal, 1775)

ORDER GONORYNCHIFORMES

Family ChanidaeG F *Chanos chanos* (Forsskal, 1775)

ORDER SILURIFORMES

Family PlotosidaeG *Plotosus lineatus* (Thunberg, 1787)

ORDER AULOPIFORMES

Sub-Order Alepisauroidi**Family Synodontidae**G R *Saurida gracilis* (Quoy & Gaimard, 1824)G F *Saurida nebulosa* Valenciennes, 1849

ORDER LOPHIFORMES

Sub-Order Antennarioidei**Family Antennaridae**F *Antennarius commersoni* (Latreille, 1804)F *Antennarius maculatus* (Desjardins, 1840) NR

ORDER ATHERINIFORMES

Family Atherinidae

R Unidentified Atherinidae

G F *Atherinomorus endrachtensis* (Quoy & Gaimard, 1824)G F R *Atherinomorus lacunosus* (Schneider, 1801)G *Stenatherina panatela* (Jordan & Richardson, 1908)

ORDER BELONIFORMES

Sub-Order Exocoetoidei**Family Belonidae**G R *Strongylura incisa* (Valenciennes, 1846)G F *Strongylura leiura* (Bleeker, 1850)G F *Strongylura urvilli* (Valenciennes, 1846)G F *Tylosurus crocodilus crocodilus* (Peron & Le Sueur, 1821)**Family Hemiramphidae**

R Unidentified Hemiramphidae

G R *Hemirhamphus far* (Forsskal, 1775)G F R *Hyporhamphus dussumieri* (Valenciennes, 1846)G R *Zenarchopterus dispar* (Valenciennes, 1846)

ORDER BERICIFORMES

Sub-Order Bercoidei**Family Holocentridae**

- G *Neoniphon argenteus* (Valenciennes, 1831)
 G F *Neoniphon sammara* (Forsskal, 1775)
 G F *Sargocentron rubrum* (Forsskal, 1775)

ORDER SYNGNATHIFORMES

Sub-Order Syngnathoidei**Family Syngnathidae**

- R *Corythoichthys amplexus* Dawson & Randall, 1975
 F *Doryrhamphus excisus excisus* Kaup, 1856
 G *Hippocampus hystrix* Kaup, 1856
 F *Hippocampus* sp. 1
 R *Hippocampus* sp. 2
 R *Micrognathus andersonii* (Bleeker, 1858) NR
 R *Syngnathoides biaculeatus* (Bloch, 1875)

ORDER SCORPAENIFORMES

Sub-Order Scorpaenoidei**Family Scorpaenidae**

- R *Inimicus didactylus* (Pallas, 1769)

Sub-Order Platycephaloidei**Family Platycephalidae**

- G F *Suggrundus staigeri* (Castelnau, 1872)

ORDER PERCIFORMES

Sub-Order Percoidei**Family Ambassidae**

- G F R *Ambassis interruptus* Bleeker, 1852
 F R *Ambassis myops* Günther, 1871

Family Serranidae

- R *Anyperodon leucogrammicus* (Valenciennes, 1828)
 G F R *Epinephelus caeruleopunctatus* (Bloch, 1790)
 G F R *Epinephelus coioides* (Valenciennes, 1828)
 G *Epinephelus cyanopodus* (Richardson, 1846)
 F R *Epinephelus lanceolatus* (Bloch, 1790)
 R *Epinephelus maculatus* (Bloch, 1790)
 G F R *Epinephelus malabaricus* (Bloch & Schneider, 1801)
 G *Epinephelus merra* Bloch, 1793
 G F R *Epinephelus polyphekadion* (Bleeker, 1849)
 R *Epinephelus rivulatus* (Valenciennes, 1830)
 G *Epinephelus* sp.
 G *Epinephelus* sp. aff. *tauvina*
 G R *Epinephelus tauvina* (Forsskal, 1775)

Family Terapontidae

- G R *Therapon jarbua* (Forsskal, 1775)

Family Kuhliidae

G R *Kuhlia marginata* (Cuvier, 1829)

G *Kuhlia rupestris* (Lacépède, 1802)

Family Apogonidae

F *Apogon fragilis* Smith, 1961

F *Apogon gilberti* (Jordan & Seale, 1905)

G F *Apogon guamensis* Valenciennes, 1832

G F R *Apogon hyalosoma* Bleeker, 1852

G F R *Apogon lateralis* Valenciennes, 1832

F *Apogon leptacanthus* Bleeker, 1856

R *Apogon melas* Bleeker, 1848

G *Apogon* sp. 1

G *Apogon* sp. 2

G F *Apogon* sp. 3

R *Apogonichthys perdix* Bleeker, 1854

G *Cheilodipterus quinquelineatus* Cuvier, 1828

R *Foa brachygramma* (Jenkins, 1902)

F *Foa* sp.

R *Fowleria abocellata* Goren & Karpuls, 1980

R *Fowleria variegata* (Valenciennes, 1832)

G *Sphaeramia orbicularis* (Kuhl & Van Hasselt, 1828)

Family Sillaginidae

G F *Sillago ciliata* Cuvier, 1829

G F R *Sillago sihama* (Forsskal, 1775)

G R *Sillago* spp.

Family Carangidae

F Unidentified Carangidae

G *Alepes vari* (Cuvier, 1833)

F *Carangoides* spp.

G F R *Caranx ignobilis* (Forsskal, 1775)

G *Caranx lugubris* Poey, 1861

G F R *Caranx melampygus* Cuvier, 1833

G F R *Caranx papuensis* Alleyne & Mc Leay, 1877

R *Caranx sexfasciatus* Quoy & Gaimard, 1924

G F *Gnathanodon speciosus* (Forsskal, 1775)

G *Scomberoides lysan* (Forsskal, 1775)

G F R *Scomberoides tol* (Cuvier, 1832)

Family Leiognathidae

G F R *Gazza minuta* (Bloch, 1797)

G F R *Leiognathus equulus* (Forsskal, 1775)

G F R *Leiognathus fasciatus* (Lacépède, 1803)

G F *Leiognathus leuciscus* (Günther, 1860)

G *Leiognathus rivulatus* (Temminck & Schlegel, 1845)

G F R *Leiognathus splendens* (Cuvier, 1829)

G F *Secutor ruconius* (Hamilton, 1822)

Family Lutjanidae

- G F R *Lutjanus argentimaculatus* (Forsskal, 1775)
 R *Lutjanus bohar* (Forsskal, 1775)
 G F R *Lutjanus fulviflammus* (Forsskal, 1775)
 G F R *Lutjanus fulvus* (Bloch & Schneider, 1801)
 G F R *Lutjanus russelli* (Bleeker, 1849)

Family Gerreidae

- F *Gerres acinaces* Bleeker, 1854
 G F R *Gerres filamentosus* Cuvier, 1829
 F *Gerres macrosoma* Bleeker, 1854
 G F R *Gerres ovatus* Günther, 1859
 G *Gerres oyena* (Forsskal, 1775)

Family Haemulidae

- G *Diagramma pictum* (Thunberg, 1792)
 G F *Plectorhinchus albovittatus* (Ruppell, 1838)
 G *Plectorhinchus gibbosus* (Lacépède, 1802)
 G F *Plectorhinchus lineatus* (Linnaeus, 1758)
 G F R *Pomadasys argenteus* (Forsskal, 1775)
 F *Pomadasys* sp.

Family Sparidae

- G F R *Acanthopagrus berda* (Forsskal, 1775)

Family Lethrinidae

- G *Gymnocranius lethrinoides* (Bleeker, 1849)
 G *Lethrinus atkinsoni* (Seale, 1909)
 G *Lethrinus genivittatus* Valenciennes, 1830
 G F R *Lethrinus harak* (Forsskal, 1775)
 G F R *Lethrinus lentjan* (Lacépède, 1802)
 G F R *Lethrinus nebulosus* (Forsskal, 1775)
 G *Lethrinus obsoletus* (Forsskal, 1775)
 G *Lethrinus olivaceus* Valenciennes, 1830
 F *Lethrinus rubrioperculatus* Sato, 1978
 F *Lethrinus* sp.

Family Nemipteridae

- G *Scolopsis bilineatus* (Bloch, 1793)
 R *Scolopsis* spp.
 G *Scolopsis trilineatus* Kner, 1868

Family Mullidae

- G R *Mulloidichthys flavolineatus* (Lacépède, 1801)
 R *Parupeneus barberinus* (Lacépède, 1801)
 G F R *Parupeneus ciliatus* (Lacépède, 1802)
 G R *Parupeneus indicus* (Shaw, 1803)
 G *Parupeneus spilurus* (Bleeker, 1854)
 G F R *Upeneus tragula* Richardson, 1845
 G F R *Upeneus vittatus* Lacépède, 1801

Family Drepanidae

- G F *Drepane punctata* (Linnaeus, 1758)

Family Ephippidae

F *Platax orbicularis* (Forsskal, 1775)

Family Monodactylidae

G F R *Monodactylus argenteus* (Linnaeus, 1758)

Family Scatophagidae

G F R *Scatophagus argus* (Linnaeus, 1766)

Family Chaetodontidae

G *Chaetodon auriga* Forsskal, 1775

G F R *Heniochus acuminatus* (Linnaeus, 1758)

Family Cichlidae

G R *Oreochromis mossambicus* (Peters, 1852)

Family Pomacentridae

G *Abudefduf septemfasciatus* (Cuvier, 1830)

R *Abudefduf* sp.

R *Chrysiptera biocellata* (Quoy & Gaimard, 1825)

F R *Neopomacentrus taeniurus* (Bleeker, 1856)

Sub-Order Mugiloidei**Family Mugilidae**

G F R *Liza macrolepis* (Smith, 1849)

G F R *Liza melinoptera* (Valenciennes, 1836)

G F R *Liza* spp.

G *Liza vaigiensis* (Quoy & Gaimard, 1824)

G F R *Mugil cephalus* Linnaeus, 1758

G R *Valamugil buchanani* (Bleeker, 1853)

G R *Valamugil cunnesius* (Valenciennes, 1836)

G F R *Valamugil engeli* (Bleeker, 1858)

G *Valamugil seheli* (Forsskal, 1775)

Sub-Order Polynemoidei**Family Polynemidae**

G F *Polydactylus microstoma* (Bleeker, 1851)

Sub-Order Labroidei**Family Labridae**

R *Halichoeres biocellatus* Schultz, 1960

R *Halichoeres* spp.

R *Halichoeres trimaculatus* (Quoy & Gaimard, 1834)

R *Hemigymnus melapterus* (Bloch, 1791)

R *Stethojulis strigiventer* (Bennett, 1832)

Family Scaridae

R *Scarus chameleon* Choat & Randall, 1987

G *Scarus ghobban* (Forsskal, 1775)

R *Scarus* sp.

Sub-Order Trachinoidei**Family Pinguipedidae**

R *Parapercis cylindrica* (Bloch, 1792)

Sub-Order Blennioidei**Family Tripterygiidae**R *Enneapterygius* sp.**Family Blenniidae**R *Istiblennius edentulus* (Bloch & Schneider, 1801)R *Omobranchus* sp.R *Omox biporos* Springer, 1972R *Petroscirtes grammistes* (Valenciennes, 1836)R *Petroscirtes mitratus* Rüppell, 1830R *Praealticus* sp. 1**Sub-Order Callionymoidei****Family Callionymidae**R *Calliurichthys* sp.**Sub-Order Gobioidaei****Family Eleotridae**R *Eleotris fusca* (Bloch & Schneider, 1801)R *Eleotris* sp. aff. *melanosoma*R *Eleotris* sp. aff. *oxycephala*R *Ptereleotris microlepis* (Bleeker, 1856)**Family Gobiidae**

R Unidentified Gobiidae

R *Gobiidae* sp. 1R *Gobiidae* sp. 2R *Gobiidae* sp. 3R *Acentrogobius* sp. aff. *audax*R *Amblygobius albimaculatus* (Rüppell, 1828)R *Amblygobius nocturnus* (Herre, 1945)R *Amblygobius* sp. aff. *nocturnus*R *Asterropteryx semipunctatus* Rüppell, 1830R *Bathygobius albopunctatus* (Valenciennes, 1837)R *Bathygobius* sp. aff. *cocosensis*F R *Butis amboinensis* (Bleeker, 1853)R *Cryptocentrus* sp.F R *Exyrias puntang* (Bleeker, 1851)R *Fusigobius* spp.R *Glossogobius biocellatus* (Valenciennes, 1837)R *Glossogobius* sp.R *Gnatholepis* sp.R *Istigobius decoratus* (Herre, 1927)R *Istigobius ornatus* (Rüppell, 1830)R *Istigobius spence* (Smith, 1947)R *Mahidolia mystacina* (Valenciennes, 1837)F *Oplopomus caninoides* (Bleeker, 1852)R *Oplopomus oplopomus* (Valenciennes, 1837)R *Oplopomus* sp.

- G *Pleurosicya* sp.
 R *Redigobius* sp.
 R *Valenciennesia longipinnis* (Lay & Bennett, 1839)
 R *Vanderhorstia* sp. aff. *lanceolata*
 F R *Yongeichthys nebulosus* (Forsskal, 1775)
 R *Yongeichthys* sp. aff. *pavidus*

Family Microdesmidae

- R *Parioglossus dotui* Tomiyama, 1958
 R *Parioglossus rainfordi* McCulloch, 1921 NR

Sub-Order Acanthuroidei

Family Siganidae

- G F R *Siganus canaliculatus* (Park, 1797)
 G F R *Siganus lineatus* (Valenciennes, 1835)

Family Acanthuridae

- G F *Acanthurus blochii* Valenciennes, 1835
 F R *Acanthurus dussumieri* Valenciennes, 1835
 G *Acanthurus mata* (Cuvier, 1829)
 G F *Acanthurus xanthopterus* Valenciennes, 1835
 G *Naso unicornis* (Forsskal, 1775)

Sub-Order Sphyraenoidei

Family Sphyraenidae

- G F R *Sphyraena barracuda* (Walbaum, 1792)
 G F *Sphyraena flavicauda* Rüppell, 1835
 F R *Sphyraena forsteri* Cuvier, 1829
 G *Sphyraena obtusata* Cuvier, 1829
 G F *Sphyraena putnamiae* Jordan & Seale, 1905

Sub-Order Scombroidei

Family Trichiuridae

- G F *Trichiurus lepturus* Linnaeus, 1758

ORDER PLEURONECTIFORMES

Sub-Order Pleuronectoidei

Family Bothidae

- G R *Bothus pantherinus* (Rüppell, 1830)

Family Soleidae

- G R *Pardachirus pavoninus* (Lacépède, 1802)

ORDER TETRAODONTIFORMES

Sub-Order Tetraodontoidei

Family Tetraodontidae

- R *Arothron hispidus* (Linnaeus, 1758)
 G F R *Arothron manillensis* (de Procé, 1822)
 G *Arothron* sp.
 F *Canthigaster* sp.

Family Diodontidae

R *Cyclichthys spilostylus* (Leis & Randall, 1982)
 G *Diodon histrix* Linnaeus, 1758

Discussion

A total of 262 species, distributed among 64 families were recorded. *Antenarius maculatus* (Desjardin, 1984), *Micrognathus andersonii* (Bleeker, 1858) and *Parioglossus rainfordi* McCulloch, 1921 are new records for New Caledonia (Rivaton et al. 1989, Kulbicki et al. 1994). Mangroves appear to be inhabited by numerous fish species, with 14.9% of New Caledonia coastal fish species being recorded there. To our knowledge, the present study is one of the most exhaustive inventories of mangrove fishes undertaken in the Indo-Pacific region. Most mangrove fish fauna censuses list fewer than 200 species. Exceptions are those of Wallace (1975) with 232 species collected in South Africa during a 5 year survey using gill nets, Collette (1983) with 204 species recorded by rotenone poisonings in north Australia, Irian Jaya and Papua New Guinea, and Robertson & Duke (1987), with 203 species collected with beach seines and gill nets over 13 months in Queensland (Australia). Blaber et al. (1990) censused 197 species using gill nets in the Embley estuary (north Queensland, Australia).

Eight families contain 110 species (Table 2), more than 42% of total. Most of the remaining families have a low diversity, 22 families being represented by a single species. Estuarine fishes, *Khulia rupestris*, Chandidae and *Parioglossus* spp., characterize the fish fauna from mangroves of the South-West Lagoon of New Caledonia. These fishes are almost absent from soft bottoms and coral reefs (Thollot 1992b, 1992c). Ubiquitous species such as *Monodactylus argenteus* and *Scatophagus argus* are also present on jetties and *Acanthopagrus berda* and *Drepane punctata* on soft bottoms. Reef and soft bottom species entering mangroves with the tide have been widely observed, for instance in Fiji (Lal et al. 1984), Vanuatu (David 1985) and Australia (Blaber et al. 1985). These species are generally large

Table 2. Number of genera, number of species and percentage of total species richness of major families of the mangrove fish fauna from the South-West Lagoon of New Caledonia.

Family	Genera	Species	Percentage of total species richness
Gobiidae*	18	31	11.8
Apogonidae	6	17	6.5
Serranidae	2	13	5.0
Carangidae*	5	11	4.2
Muraenidae	4	10	3.8
Lethrinidae	2	10	3.8
Clupeidae	5	9	3.4
Mugilidae	3	9	3.4

*As some specimens are still unidentified, the number of genera, the number of species and the relative importance of Gobiidae and Carangidae remain approximate.

predators foraging for food, small to large invertebrates and small resident or juvenile fish (Thollot 1992a). As a consequence, important families (Gobiidae, Apogonidae, Carangidae, Serranidae, Lethrinidae, Clupeidae, Mugilidae, and so on) are similar for most Indo-Pacific mangroves (Chua 1973, Liem & Haines 1977, Blaber 1980, Gomez 1980, Blaber & Cyrus 1981, Krishnamurthy & Jeyaseelan 1981, Hutomo & Djamali 1984, Collette 1983, Bell et al. 1984, Pinto 1987, Little et al. 1988, Blaber & Milton 1990, Blaber et al. 1990). Some families, such as Ariidae and Sciaenidae, are not present in New Caledonia, neither in mangroves nor other coastal habitats. These circumglobal continental shelf families are absent from the Central Pacific (Springer 1982). This is probably due to the absence of shallow-water connections and oceanic currents preventing larval dispersal from the West (Australia, SE Asia and the Indo-Malayan Archipelago), see Springer (1982) or Blaber & Milton (1990) for further discussion.

Very few freshwater species were recorded during this survey (Anguillidae, Kuhliidae, some Blenniidae, Eleotrididae and Gobiidae). The New Caledonia freshwater biota is poorly known and needs further study. Pöllabauer (1992) detailed 33 species of fish distributed among three main components: endemic species, marine species entering rivers (the most speciose component), and introduced species (including tilapias: *Oreochromis* spp. and the black bass: *Micropterus salmoides*). A recent survey, using chemical and electric fishing devices, has censused approximately 50 species, some of them being new records or undescribed (Dingerkus & Séret 1992a, 1992b, 1992c, Séret 1992, Séret & Dingerkus 1992). The paucity of New Caledonia freshwater fish fauna remains unexplained. As New Caledonia broke away from Australia 80 to 60 m.y. ago (Keast 1981), it is possible that freshwater fishes were not able to colonize the island. Furthermore, normally low river flows are subject to sharp increases during cyclonic events with 24 to 48 hours flow greater than the average annual flow. Unusual patterns of dissolved nutrients and noticeably low values for calcium, potassium and phosphorus have been reported and related to the lack of humic substances for the alteration of ultrabasic rocks (Weninger 1968). Thus, the chemical composition of the freshwater and its consequence on the physiology of the organisms may have induced low species richness and high levels of endemism (Pöllabauer 1992).

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