

A CHECKLIST OF THE BRACKISH AND FRESHWATER FISH OF FIJI

by

P. A. Ryan
 School of Natural Resources
 University of the South Pacific

ABSTRACT

A list of the brackish and freshwater fish species known to occur in Fiji is given together with information on species which are likely to be present but thus far not reported. Where a species has been collected by the author this information is given also with an indication of its abundance.

INTRODUCTION

Fiji is blessed with magnificent coral reefs which contain many hundreds of fish species. Because of this abundance most research has centred on the marine fish, overlooking the equally interesting fresh and brackish water species.

Early fish collections in the Fiji group were made by Wilkes during the United States Exploring Expedition of 1838 - 1842 (in Fowler, 1940), by the "Challenger" Expedition (Gunther, 1880) which called into Kadavu and Levuka in 1874, and by Gardiner (listed in Boulenger, 1897). More recently there have been publications on fish collections from the group by Nutting (1924), Whitley (1927), Fowler (1928, 1929, 1959) and Herre (1936). Most of these publications concentrated on marine fish but estuarine species are included in most. There has been no concerted research on fresh and brackish water fish and no checklist exists, thereby forcing a researcher to sift through the published literature to find references. This paper provides a comprehensive checklist derived from the literature together with information on recently introduced species, new records and species not yet recorded but likely to be present. It does not describe each fish. The classification follows Nelson (1976). A reference to the species concerned follows the authority.

At the risk of becoming embroiled in semantics I am defining a "brackish water fish" as a fish species normally found in the lower reaches of rivers within the tidal influence or in lakes where the salinity is lower than that of seawater. This definition thereby excludes predominantly marine fish which happen to stray into rivers but includes the young of marine fish which may mature in estuarine/river/coastal lake situations.

SPECIES KNOWN TO BE PRESENT

Class C H O N D R I C H T H Y E S

Order LAMNIFORMES

Family CARCHARINIDAE

- 1) Carcharinus gangetica Muller and Henle (Fowler 1959, p. 16)
 Reported from a long way up a number of Fiji rivers (40 miles up the Rewa according to Fowler, p. 569). Cluney (pers comm), reports this or a similar species from the Sigatoka river as far as Keiyasi. There is some doubt as to the species involved and it is likely that this shark is C. leucas which is found in both the Atlantic and Pacific oceans (Nelson, 1976) and penetrates many hundreds of miles up rivers (Lowe-McConnell, 1975). Length to 2100 mm.

Class O S T E I C H T H Y E S

Order ELOPIFORMES

Family ALBULIDAE

- 2) Aibula vuipes Linnaeus (Fowler 1959, p. 570)
 Reported from the Rewa by Pickering (in Fowler, 1959). Grows to 1000 mm.

Order ANGUILLIFORMES

Family ANGUILLIDAE

- 3) Anguilla megastoma Kaup (Fowler 1959, p. 45)
 Large freshwater eel. Like other members of the genus it returns to saltwater to breed. Reaches 2000 mm. Common
- 4) Anguilla obscura Gunther (Fowler 1959, p. 48)
 Medium freshwater eel. Common. Up to 1500 mm.
5. Anguilla australis schmidti Phillips (Fowler 1959, p. 48)
 According to Castle (pers comm) only a few specimens of A. australis have been identified from Fiji and all have been referred to the New Zealand subspecies. A. australis is very similar to A. obscura and differs from it only in vertebral number and in minor external ways. Up to 1000 mm.
- 6) Anguilla marmorata Quoy and Gaimard (Munro 1967, p. 90)
 Not reported by Fowler. Presence confirmed by Castle (pers comm). Up to 2000 mm.
- 7) Moringua abbreviata (Bleeker) (Fowler 1959, p. 68)
 Degenerate threadlike eel. Recorded from Namusi. The inclusion of this and many other species in this checklist depends upon the interpretation of the locality listed; Namusi. There does not appear to be a Namusi on Viti Levu but there is

a Namosi on the Waidina river. Fowler clouds the issue by quoting Parham who says that the locality given as "Nemusi" on page 62 should read Namosi. Fowler does not give a Nemusi on page 62, only Namusi! Fowler also lists fish caught at Mamusi and an Admiralty chart (1978) describes the Namosi district as Nimosi. Examination of the species types recorded from Namusi show that they are estuarine or freshwater species which lends support to the suggestion that Namusi/Nemusi/Mamusi/Nimosi = Namosi.

Family MURAENIDAE

- 8) Gymnothorax polyuranodon (Bleeker) (Fowler 1959, p. 73)
Not listed by Fowler as living in freshwater but reported by Gunther (1910) from freshwater on Ovalau. Described as living in freshwater streams by Munro (1967) and given the common name, "freshwater moray". Gray (1974) reports this species from freshwater on Guadalcanal. Up to 1000 mm.
- 9) Caecula bicolor (Kaup) (Fowler 1959, p. 62)
Reported from Namosi. Up to 425 mm.
- 10) Caecula lumbricoides (Bleeker) (Fowler 1959, p. 63)
Thinner than the previous species and does not grow as long. Collected at Namosi. Up to 230 mm.
- 11) Muraenichthys macropterus Bleeker (Fowler 1959, p. 53)
Reported by Gray (1974) from estuaries and riverbanks on Guadalcanal. Likely to be found in similar situations in Fiji. Length 230 mm.

Order GONORYNCHIFORMES

Family CHANIDAE

- 12) Chanos chanos (Forsk.) (Fowler 1950, p. 27)
A widely distributed species, extremely tolerant of varying salinity. Frequently enters freshwater. To 1500 mm.

Order SILURIFORMES

Family PLOTOSIDAE

- 13) Plotosus anguillaris (Bloch) (Fowler 1959, p. 43)
According to Fowler this and the next species enter rivers but seldom wander above the tidal influence. Munro (1967) reports both species as ascending rivers. Grows to 900 mm.
- 14) Plotosus canius Buchanan-Hamilton (Fowler 1959, p. 43)
As above. Grows to 900 mm.

Order ATHERINIFORMES

Family EXOCEETINAE

- 15) Zenarchopterus buffonis (Valenciennes) (Fowler 1959, p. 106)
Widely distributed in rivers and estuaries from India through to Polynesia. Up to 230 mm.
- 16) Zenarchopterus dispar (Cuvier and Valenciennes) (Fowler 1959, p. 106).
Similar to above species. Viviparous. Up to 200 mm.
- 17) Zenarchopterus gilli Smith (Collette 1974)
Previously known as Z. brevirostris (Günther). Up to 165 mm.
- 18) Hyporhamphus dussumieri (Valenciennes) (Herre 1936)
Reported from Bureta river, Ovalau by Herre.
Probably does not penetrate far into freshwater.

Order SYNGNATHIFORMES

Family SYNGNATHIDAE

- 19) Coelonotus argulus Peters (Ryan 1980)
A new record for the Fiji group. One specimen found in Wainibau Creek, Lavena, Taveuni. Grows to 120 mm.
- 20) Coelonotus leiaspis (Bleeker) (Fowler 1959, p. 134)
Reported from Suva. I have collected 3 specimens from the Waimanu river at Sawani. Grows to 160 mm.
- 21) Oostethus brachyurus (Bleeker) (Fowler 1959, p. 136)
Easily distinguishable from all other Fiji freshwater Syngnathidae by its inability to bend the body in a vertical plane and in the male by a bright red line running along the lower half of the body. I have collected 3 specimens in Naikorokoro Creek, South West of Suva. Grows up to 230 mm.
- 22) Doryichthys retzi (Bleeker) (Ryan 1980)
A new record for the Fiji group. Nine specimens collected in Wainibau Creek, Lavena, Taveuni. Grows up to 115 mm.
- 23) Bombonia spicifer (Ruppell) (Fowler 1959, p. 137)
Very slender pipefish, widely distributed through the tropical Pacific. Up to 155 mm.

Order PERCIFORMES

Family CENTROPOMIDAE

24) Ambassis vaivensis Jordan and Serle (Fowler 1959, p. 586)

A semi-transparent glass perch. Recorded from Suva, the Rewa River and the Bureta River, Ovalau by Herre (1936). I have collected numerous specimens in the lower reaches of Naikorokoro Creek. Up to 60 mm.

Family THERAPONIDAE

25) Therapon jarbua (Forsk.) (Fowler 1959, p. 253)

Listed by Munro (1967) as penetrating up rivers and by Gray (1974) up rivers in Guadalcanal. Up to 250 mm.

26) Kuhlia marginata Cuvier (Fowler 1959, p. 203)

Recorded from Rewa River. I have collected several specimens from Waibasaqa village on the Wainisavulevu Creek. Up to 220 mm.

27) Kuhlia rupestris (Lacepede) (Fowler 1959, p. 205)

Found throughout the tropical Pacific. Said to reach 400 mm. I have collected many specimens from most lowland rivers on Viti Levu and small streams on Taveuni.

28) Kuhlia bilunulata Herre (Fowler 1959, p. 206)

The status of this species is doubtful. Fowler synonymises it with K. munda (De Vis) but Munro (1967) records that K. munda never enters freshwater although Herre caught 18 specimens of K. bilunulata from a river flowing into Suva harbour. Schultz (1943) synonymises K. bilunulata with K. sandvicensis (Steindachner). I have collected several Kuhlia from streams around Suva which possess brilliant yellow caudal fins. Specimens preserved in alcohol lose their colour completely. These match the morphological description Herre gives for K. bilunulata but he does not record such a colour pattern. It is obvious that the taxonomy of this family has yet to be clarified.

Family APOGONIDAE

29) Pristapogon fraenatus (Valenciennes) (Fowler 1959, p. 194)

Described as Amia frenata by Fowler. Herre (1936) collected a specimen from the Marquesas in freshwater. Munro (1967) lists as sometimes entering freshwater. Up to 90 mm.

Family CARANGIDAE

30) Caranx sexfasciatus Quoy and Gaimard (Fowler 1959, p. 172)

Reported by Herre (1936) in the Rewa River 25 miles from the sea. A typical Trevally. Up to 1000 mm.

Family LEIOGNATHIDAE

- 31) Leiognathus splendens (Cuvier) (Fowler 1959, p. 179)
Laterally compressed species. Enters river mouths (Munro 1967). Up to 140 mm.
- 32) Leiognathus dussumieri (Cuvier and Valenciennes) (Fowler 1959, p. 179)
As above. Recorded from Bureta River, Ovalau, by Herre (1936). Up to 180 mm.

Family LUTJANIDAE

- 33) Lutjanus argentimaculatus (Forsk.) (Fowler 1959, p. 229)
Recorded by Herre (1936) as remaining in freshwater until sexually mature. I have collected 2 small specimens of what appear to be this species in Naikorokoro Creek. At least one other species of brackish water Lutjanus is found in Fiji as I have collected one specimen of an unidentified Lutjanus sp in Naikorokoro Creek. This does not correspond to any of the Lutjanidae known to me and may be a new species. Grows to 1000 mm.

Family MONODACTYLIDAE

- 34) Monodactylus argenteus (Linnaeus) (Fowler 1959, p. 290)
Often penetrate freshwater above tidal influence (Munro 1967). Rather beautiful silvery fish commonly kept in aquaria. Up to 230 mm.

Family TOXOTIDAE

- 35) Toxotes jaculator (Pallas) (Fowler 1959, p. 294)
Included by Fowler as this species is listed by Whitley (1927). I have not seen this fish or been able to verify any sightings. If it is present it is at the extreme South East end of its Indo-Pacific range. Up to 260 mm.

Family SCATOPHAGIDAE

- 36) Scatophagus argus (Linnaeus) (Ryan 1980)
A new record for Fiji. Several specimens of this well known fish were collected in Naikorokoro Creek. Length up to 300 mm.

Family MUGILIDAE

- 37) Cestraeus plicatilis Valenciennes (Fowler 1959, p. 160)
Reported from the Waimaru River. Grows to 500 mm.

38) Liza dussumieri (Valenciennes) (Fowler 1959, p. 159)
Reported by Herre (1936) from a small river flowing into Suva harbour. Length to 300 mm.

39) Valamugil seheli (Forsk.) (Fowler 1959, p. 158)
Reported by Herre (1936) from a small creek flowing into Suva harbour. Up to 470 mm.

Family ELEOTRIDAE

40) Bostrichthys sinensis (Lacepede) (Fowler 1959, p. 606)
Reported by Koumans (1953) as occurring in sea, estuaries and rivers in Fiji. Length 111 mm.

41) Eleotris fuscus (Bloch and Schneider) (Fowler 1959, p. 446)
I have collected this species in the Naikorokoro Creek and the Wainibau Creek as well as Rarotonga, Cook Islands. Up to 145 mm.

42) Eleotris melanosoma Bleeker (Fowler 1959, p. 446)
Recorded by Herre (1936) from a small river flowing into Suva harbour. Up to 230 mm.

43) Butis butis Hamilton-Buchanan (Ryan 1980)
A new record for Fiji, very common in the lower reaches of Naikorokoro Creek. Up to 150 mm.

44) Hypseleotris guentheri Bleeker (Fowler 1959, p. 458)
Very common throughout lowland Fiji waters. I have collected it in Viti Levu and Taveuni. Length 92 mm.

45) Ophioeleotris aporos (Bleeker) (Fowler 1959, p. 449)
Three colour varieties of this fish exist and I have found two in Naikorokoro Creek. These are O. aporos var. guentheri and O. aporos var. aporos. A very beautiful species growing to 300 mm.

46) Ophiocara porocephala (Cuvier and Valenciennes) (Fowler 1959, p. 450)
There are two colour varieties of this fish. O. porocephala var. porocephalus and O. porocephala var. darwinense. It is not known which variety is found here. Grows to 300 mm.

47) Oxyeleotris marmorata (Bleeker) (Fowler 1959, p. 452)
Reported from the Rewa River, Viti Levu. Grows to 417 mm.

48) Lairdina hopletopus Fowler (Fowler 1959, p. 607)
Only 2 specimens known but according to Laird (1956) not uncommon in swamps at Sigatoka. Laird believed that this species is likely to be useful in mosquito control throughout the South Pacific because it eats the larvae and can live in small pools of water. When the food supply gets low or the water dries out this fish will jump to a new pool.

Family GOBIIDAE

- 49) Gobius baliuroides Bleeker (Fowler 1959, p. 465)
Reported from Namosi. Up to 56 mm.
- 50) Gobius ocellatus Kner (Fowler 1959, p. 467)
One of the very few endemic freshwater species. Type locality given as freshwaters of Mamusi (presumably Namosi!). Up to 51 mm.
- 51) Gobius leveri Fowler (Fowler 1959, p. 610)
Another endemic species, reported only from Waivivesi. Length 26 mm.
- 52) Gobius nebulosus Forskal (Fowler 1959, p. 467)
Known from the Red Sea through to Polynesia. Length 150 mm.
- 53) Gobius aurocingulus (Herre) (Fowler 1959, p. 612)
Reported by Herre (1936) from Ovalau. Fowler has examined a specimen from Nabukousi Creek, South East Viti Levu. Length 45 mm.
- 54) Awaous ocellaris (Broussonet) (Fowler 1959, p. 474)
Common in all streams I have examined, from the coast right to the central plateau (Wainisavulevu Creek at Waibasaqa). Up to 260 mm.
- 55) Vaimosa osgoodi (Herre) (Herre 1936)
Reported by Herre from a small river flowing into Suva harbour. Length 22 mm.
- 56) Stenogobius genivittatus (Cuvier and Valenciennes) (Fowler 1959, p. 476)
Common in Naikorokoro Creek. Grows to 180 mm.
- 57) Bathygobius scapulopunctatus Beaufort (Fowler 1959, p. 611)
Listed by Koumans (1953) from Fiji. Length 63 mm.
- 58) Bathygobius fuscus (Ruppell) (Fowler 1959, p. 472)
Length up to 104 mm.
- 59) Glossogobius celebius (Cuvier and Valenciennes) (Fowler 1959, p. 483)
Reported by Herre (1936). Four specimens taken from the Rewa and one from a river flowing into Suva harbour. The biggest taken by Herre was 58 mm.
- 60) Glossogobius biocellatus (Cuvier and Valenciennes) (Fowler 1959, p. 483)
Reported by Herre (1936) from a small river flowing into Suva harbour. Up to 105 mm.

- 61) Glossogobius giuris (Buchanan-Hamilton) (Fowler 1959, p. 483)
Fowler dismisses G. celebius and G. biocellatus collected by Herre as G. giuris. In view of Herre's familiarity with the Gobiidae this seems an unlikely mistake for him to have made. After comparing Herre's (1936) descriptions with that given by Fowler (1959) for G. giuris I believe that the records are valid. Length to 205 mm.
- 62) Acentrogobius caninus (Valenciennes) (Fowler 1959, p. 468)
Known from Namosi, Viti Levu. Up to 130 mm.
- 63) Stigmatogobius hoevertii (Bleeker) (Fowler 1959, p. 468)
Described as Gobius notospilus in Fowler. Reported from Namosi. Up to 64 mm.
- 64) Stigmatogobius romeri (Weber) (Fowler 1959, p. 609)
Known from a river near Suva. Up to 45 mm.
- 65) Stigmatogobius sadanundio (Hamilton-Buchanan) (Fowler 1959, p. 468)
Grows to 77 mm.
- 66) Periophthalmodon schlosseri (Valenciennes) (Fowler 1959, p. 490)
There is some doubt as to the species of Periophthalmodon in Fiji and to the correct species name for them. P. schlosseri was synonymised with P. barbarus by Munro (1967). Up to 255 mm.
- 67) Periophthalmus kolreuteri Lesson (Fowler 1959, p. 487)
P. kolreuteri is given as P. cantonensis by Fowler. I have collected specimens similar to P. kolreuteri from the lower reaches of Naikorokoro Creek. Up to 150 mm.
- 68) Stiphodon elegans (Steindachner) (Fowler 1959, p. 615)
I have caught several specimens that correspond to this species from Wainibau Creek, Lavena, Taveuni. Common. Length to 45 mm.
- 69) Sicyopterus gymnauchen (Bleeker) (Koumans 1953)
Reported from Fiji by Koumans. Length 37 mm.
- 70) Sicyopterus laticeps (Valenciennes) (Fowler 1959, p. 486)
Known only from Kadavu. Not listed by Koumans (1953). Length to 110 mm.
- 71) Sicyopterus micrurus Bleeker (Fowler 1959, p. 485)
Common in all montane streams so far investigated with the exception of some of the small streams around Nadarivatu. It seems likely to me that there may be several closely related species present. Length to 129 mm.

Family SIGANIDAE

- 72) Siganus vermiculatus (Valenciennes) (Fowler 1959, p. 329)
Munro (1967) and Gray (1974) both report this species as entering brackish and freshwater. Often farmed. Grows to 380 mm.

Order TETRAODONTIFORMES

Family TETRAODONTIDAE

- 73) Sphoeroides lunaris (Bloch and Schneider) (Fowler 1959, p. 550)
Reported from Fiji by Fowler and De Beaufort (1962). According to Beaufort this species is found in sea and rivers. Length to 300 mm.
- 74) Arothron reticularis (Bloch and Schneider) (Fowler 1959, p. 552)
Listed by De Beaufort from sea and rivers. Gray (1974) collected several specimens from an oxbow lake in Guadalcanal. Four specimens collected in a brackish creek behind Orchid Island and subsequently kept in 8% seawater. Length to 550 mm.
- 75) Arothron immaculatus (Bloch and Schneider) (Fowler 1959, p. 555)
Collected from mouth of a small stream near the University of the South Pacific. Very similar to A. reticularis but can be distinguished from it by possessing parallel longitudinal dark lines instead of concentric rings. Length to 320 mm.

INTRODUCED FRESHWATER AND BRACKISH WATER FISH

Order CYPRINIFORMES

Family CYPRINIDAE

- 76) Aristichthys nobilis
Introduced along with the grass carp, Ctenopharyngodon idella to control water hyacinth. Length 150 mm.
- 77) Ctenopharyngodon idella Cuvier and Valenciennes
As above. Difficult to induce to breed. Pituitary hormone injections are necessary. Length 1000 mm.
- 78) Puntius gonionotus (Bleeker)
Introduced to provide pituitary hormone for induction of spawning in C. idella. 250 mm.

Order ATHERINIFORMES

Family POECILIIDAE

- 79) Xiphophorus helleri
Introduced to Fiji as an ornamental fish. Can be found in at least one pond in Tamavua, Suva. 100 mm.

80) Poecilia mexicana Heckel
Common in ditches around Suva. Date of introduction not known. 150 mm.

81) Poecilia reticulata (Peters)
Common in ditches and streams around Suva. I have not found P. reticulata and Hypseleotris guentheri together and I suspect from aquarium observation that H. guentheri is an extremely efficient P. reticulata predator. 75 mm.

82) Gambusia affinis (Baird and Girard)
Introduced at an unknown date to control mosquitoes. I have collected it only from a coastal tributary of the Rewa river. 60 mm.

Order PERCIFORMES

Family PERCICHTHYIDAE

83) Macquaria colonorum (Gunther) (Fowler 1959, p. 209)
Recorded by Whitley (1927) as introduced from Australia.
Length 420 mm.

Family THERAPONIDAE

84) Mesopristes argenteus (Cuvier and Valenciennes) (Fowler 1959, p. 254)
Typical perchlike fish. Recorded from a freshwater stream emptying into Suva harbour by Herre (1936). Recorded by Whitley (1927) as introduced from Australia. Length 267 mm.

85) Madigania unicolor (Gunther) (Fowler 1959, p. 255)
According to Whitley (1927) introduced from Australia.
Length 173 mm.

Family CICHLIDAE

86) Sarotheradon mossambica (Peters)
Widely distributed in lowland streams, will tolerate saltwater. Mouth breeder. Date of introduction unknown. Previously known as Tilapia mossambica. Up to 500 mm.

SPECIES NOT RECORDED FROM FIJI BUT LIKELY TO BE PRESENT (BASED ON RECORDS FROM SURROUNDING ISLAND GROUPS)

Order ANGUILLIFORMES

Family ANGUILLIDAE

87) Anguilla reinhardtii Steindachner
Found in New Caledonia and because of breeding habits larvae

are likely to stray to Fiji. Up to 1500 mm.

88) Anguilla bicolor pacifica Schmidt

Known from eastern Indo-Malaya to New Guinea and adjacent areas. Castle (pers. comm.) suggests that both this and the above species are likely to be found here. Up to 1000 mm.

Family OPHICHTHIDAE

89) Achirophichthys kampeni (Weber and de Beaufort) (Herre 1936)

Herre has collected this species in mountain streams in the Philippines and Tahiti. The type specimen came from New Guinea (Weber and de Beaufort, 1916). It is almost certain to occur in Fiji. Up to 450 mm.

Order PERCIFORMES

Family CARANGIDAE

90) Caranx sansun (Forsk.) (Herre 1936)

Collected by Herre in Papenoo River, Tahiti. Reported by Munro (1967) from New Guinea. Likely to be found up large rivers. Length up to 970 mm.

91) Caranx ignobilis (Forsk.) (Gray 1974)

Found in freshwater lagoon on Guadalcanal (Gray, 1974) and reported by Schultz (1943) from Apia, Western Samoa. Likely to be found up large rivers. Up to 1120 mm.

Family MUGILIDAE

92) Mugil engeli Bleeker (Herre 1936)

Collected by Herre in the Papenoo River, Tahiti and reported by Munro (1967) from New Guinea. Up to 146 mm.

Family GOBIIDAE

93) Papenua pugnans Grant (Herre 1936)

Reported by Herre from Tahiti and Savaii (Samoa). Up to 50 mm.

94) Pseudapocryptes lanceolatus (Bloch and Schneider) (Koumans 1953)

Reported by Koumans from Borneo, Java and Tahiti in sea, estuaries and freshwater. Length 200 mm.

95) Sicyopterus ouwensi Weber (Koumans 1953)

Reported by Koumans from New Guinea and Marquesas. Length 131 mm.

Order TETRAODONTIFORMES

Family TETRAODONTIDAE

96) Sphoeroides oblongus (Bleeker) (De Beaufort 1962)

Reported by De Beaufort from New Hebrides and Samoa. In sea and rivers. Length 265 mm.

DISCUSSION

The majority of the fish species given in this checklist are found throughout the Indo-Australian Archipelago (some are found as far west as the Red Sea). Most are euryhaline, which explains their ability to colonise many land masses separated by large expanses of sea. As most have a marine stage in their life cycle speciation does not readily occur as intermixing of populations is likely to be large. Only those fish that breed in freshwater are likely to speciate.

Lowe-McConnell (1975) classifies freshwater fish in five groups. These are:

- 1) primary freshwater fishes groups which have evolved in freshwater since the early teleosts moved into them, are confined to them and cannot tolerate seawater (for example the Ostariophysi, Dipnoi, Osteoglossidae, Mormyridae);
- 2) secondary freshwater fishes of families now confined to freshwater but of marine origin and relatively tolerant of seawater at least for short periods (for example the Cichlidae and the Cyprinodontidae);
- 3) freshwater representatives of marine families (for example clupeids, sciaenids, tetraodont puffers);
- 4) diadromous fishes making regular migrations from salt to freshwater or vice-versa at different stages of the life history (for example, some anadromous clupeids and catadromous anguillid eels);
- 5) occasional sporadic visitors, euryhaline members of marine families (such as some snappers, sharks, grey mullets)."

The Fiji fresh and brackish water fish belong mainly to the last three categories. Primary freshwater fish are not represented in Fiji apart from two interesting exceptions. These are the two species of euryhaline catfish, Plotosus anguillaris and P. canius. The PLOTOSIDAE belong to the suborder SILUROIDEI and have become secondarily marine. The estuarine Plotosus species represent the beginnings of tertiary freshwater fish! The lack of primary freshwater fish is not particularly surprising as east of Wallace's Line there are very few examples. Apart from 3 species found in Australia and New Guinea all of the New Guinea and Australian freshwater fish are of marine origin (Lowe-McConnell 1975).

All of Fiji's secondary freshwater fish have been introduced. The ELOPIFORMES, ANGUILLIFORMES, GONORYNCHIFORMES, SILURIFORMES and ATHERINIFORMES (except for the introduced POECILIDAE) are catadromous. The SYNGNATHIFORMES apparently breed in fresh or brackish water. The PERCIFORMES include those that breed in salt or freshwater. The TETRAODONTIFORMES breed in the sea. It is only amongst the PERCIFORMES that Fiji has any endemic freshwater species. These appear to be Lairdina hopletopus, Gobius ocellatus, Gobius leveri and Gobius aurocingulus. It is likely that several new species of Gobiidae will be discovered as the inland waters are more thoroughly investigated. Most previous collectors have concentrated on Viti Levu and Ovalau; Vanua Levu has rarely been studied.

Unfortunately Fiji already has ten introduced species of fish and the effect these may have on the endemic species is not known. It is possible that endemic species may be eliminated by competition with the imports before they even become known. The extremely common Hypseleotris guentheri appears to compete effectively with the introduced guppy Poecilia reticulata while the molly Poecilia mexicana appears to be restricted to brackish water as I have been unable to keep them successfully in fresh. Xiphophorus helleri is at present restricted to several ornamental ponds in Tamavua but could become widespread with incautious releases. Gambusia affinis does not appear to be very common. Sarotherodon mossambica is widespread in Viti Levu but I did not collect it in Taveuni. The status of the other introduced fish is not known. Further importations should be discouraged at least until the ecology of freshwaters in Fiji is better known.

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