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A Synoptic Check-list of the FRESHWATER FISHES of New Zealand

By R. M. McDowall

Fisheries Research Division Occasional Publication No. 16

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Occasional Publication No. 16
1980**

**Published by the New Zealand Ministry of
Agriculture and Fisheries**

Wellington

1980

ISSN 0110-1765

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Introduction

For many years there has been some uncertainty about what species of fish are present in New Zealand's fresh waters and what names should be applied to them. Studies in recent years have reduced this uncertainty to a point where the freshwater fishes can be identified and named with considerable certainty. Major changes in the species recognised and the names used for them seem unlikely. Similarly, after 15 years' intensive collecting by staff of the Fisheries Research Division and others, major changes in knowledge of distribution seem unlikely. For these reasons it is now possible to prepare a stable and definitive check-list of the fauna.

Studies have shown that the native freshwater fish fauna is small, with only 27 species that can be properly regarded as "freshwater fishes". There are additional introduced freshwater species and also a few marine species that regularly make their way into estuaries and need to be considered. This check-list covers all fish species found regularly in New Zealand's fresh waters.

For these species, the following information is provided:

1. Scientific name: The correct scientific name is given and the family to which the species belongs is listed.
2. Synonyms: Other scientific names that have been used for the species in New Zealand are listed.
3. Common name: A common name is given in the hope that standardised common names will come into general use.
4. Status: Species are listed as "Endemic" (found only in New Zealand), "Indigenous" (native to New Zealand, but also found elsewhere), and "Introduced" (introduced into New Zealand from elsewhere).
5. Habit: Species are listed as "Freshwater" (occur only in fresh water), "Diadromous" (spend a regular part of the life cycle in the sea), and "Marine" (marine species that regularly make their way into estuaries and fresh water).
6. Distribution: Distribution both in New Zealand and beyond is outlined.
7. Size attained: Greatest recorded length is given.
8. Literature: References (listed after the check-list) containing further information are given for each species. Generally only recent literature, mostly since about 1960, is given unless there are older publications of major significance.

A comprehensive general account of the New Zealand freshwater fish fauna may be found in McDowall (1978); this includes keys to species in all families. The freshwater fauna has been augmented in recent years by the liberation of

rudd (*Scardinius erythrophthalmus*), and there are possibly populations of koi carp (a domesticated form of *Cyprinus carpio*) in New Zealand lakes. Two further species, the Chinese grass carp (*Ctenopharyngodon idella*) and the silver carp (*Hypophthalmichthys molitrix*), are under study in relation to possible release for the control of aquatic plants. From time to time exotic aquarium fishes have been released and have become established in the wild. Thus, for several reasons, species not included in the check-list may be found in the streams and lakes of New Zealand. If they are, it is important that, if possible, specimens be forwarded to the Fisheries Research Division, Ministry of Agriculture and Fisheries, Christchurch for checking. If specimens are not available, all available information should be referred to the Division.

Key to families of fishes

Although this check-list is not intended as a field guide, it is considered fruitful to include keys to enable identification and line drawings of the fishes listed. A key to families is included before the species listings, and within each family listing there is a key to species.

Keys are intended to facilitate identification. In the family key a simple outline drawing of a representative of each family is given to help confirm that the correct family has been found. Following the key step by step will lead to identification of the right family. As long as the directions given in each pair of statements are followed, the proper identification will be obtained. In using a key it is essential always to start at the beginning. The key consists of pairs of alternative statements only one of which can be correct. Begin at the first pair of statements; read the first alternative and if it does not fit, try the second. Each statement will end with either the name of a family (or species) or with a number. If it ends with a family name, you have the family identification (check it against the outline drawing); turn to the page indicated. If it ends with a number, find that number on the left margin of the page and there will be a further pair of alternative statements, for example:

1. Mouth a circular sucking disc with
no jaws . . . — family **Geotriidae**
(lampreys)

Mouth not circular, but with true jaws . . . — 2

If the fish to be identified is a lamprey (family Geotriidae), the family key leads straight to the family; if it is not a lamprey, the key statement ends with "2". Looking below in the margin for "2", you will find that the key offers:

2. Dorsal, caudal, and anal fins joined
around tail . . . — family **Anguillidae**
(eels)

Dorsal, caudal, and anal fins
separate . . . — 3

Again, choose alternatives according to which one applies best to the fish you are trying to identify and follow the numbers relentlessly until you reach a family name.

1. Mouth a circular sucking disc with no jaws; seven pairs of external gill openings; no paired fins –

family **Geotriidae** page 15
(lampreys)
1 species

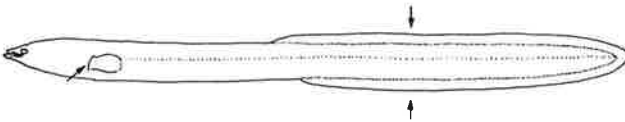


Mouth not circular, but with true jaws; one pair of external gill openings; paired fins present –

2

2. Dorsal, caudal, and anal fins joined around tail and not separable; pelvic fins absent; gill openings narrow slits on sides of head; rays in fins not obvious –

family **Anguillidae** page 16
(eels)
2 species



Dorsal, caudal, and anal fins separate; pelvic fins usually (but not always) present; gill openings broad, extending well below head; rays in fins usually easily seen –

3

3. Adipose dorsal fin present –

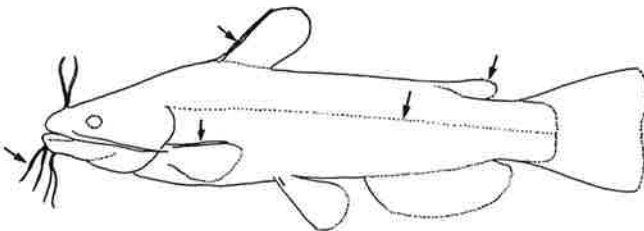
4

Adipose dorsal fin absent –

7

4. Stout spines at front edges of dorsal and pectoral fins; scales lacking; barbels around mouth –

family **Ictaluridae*** page 39
(catfishes)
1 species

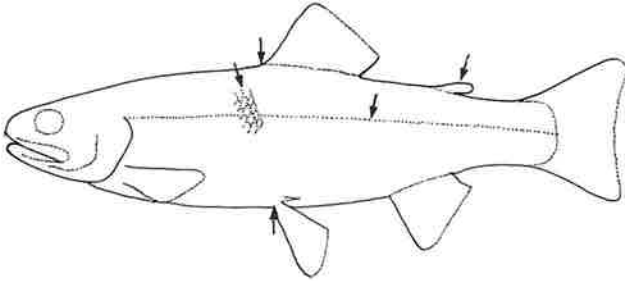


No spines in any fins; scales present;
no barbels —

5

5. Rayed dorsal fin origin in front of pelvic fin bases; axillary processes at bases of pelvic fins; lateral line present —

family **Salmonidae*** page 32
(trouts and
salmons)
7 species

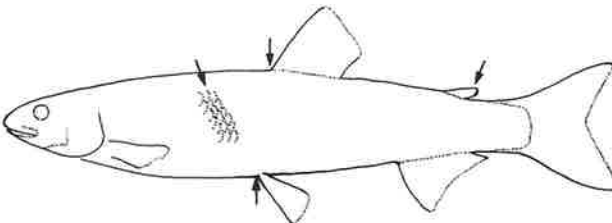


Rayed dorsal fin origin behind pelvic fin bases;
no axillary processes at bases of pelvic fins;
lateral line absent —

6

6. Rayed dorsal fin origin just behind pelvic fin bases, well forward of origin of anal fin, dorsal fin not above anal; teeth in upper jaw rather close together, straight, and blunt; lower jaw shorter than upper —

family **Prototroctidae** page 20
(grayling)
1 species

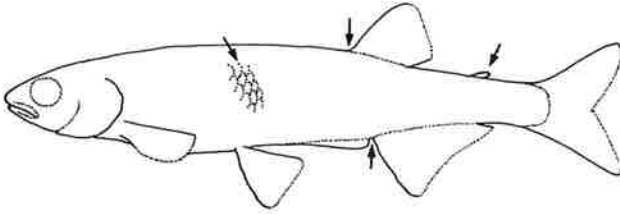


Rayed dorsal fin origin well behind pelvic fin bases, dorsal fin partly above anal fin; teeth in upper jaw spaced, curved, and sharp; jaws equal or lower jaw longer –

family **Retropinnidae** page 18

(smelts)

2 species

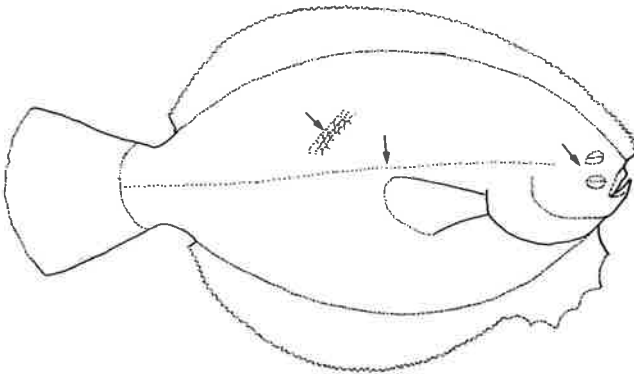


7. Body very flat; both eyes on one side; one pelvic fin, joined to anal fin; fish lies on one side which is usually much paler than eyed side –

family **Pleuronectidae** page 61

(flounders)

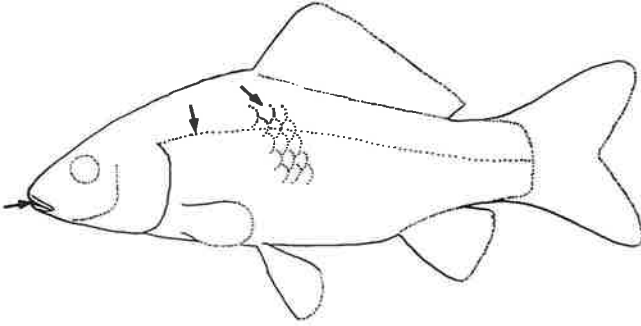
2 species



Body not so flat; an eye on each side of head; two pelvic fins separate from anal fin; fish swims upright with both sides coloured the same –

8. Teeth lacking from jaws –

family **Cyprinidae*** page 40
(goldfish,
carps, etc.)
3 species



Teeth present in jaws –

9

9. One dorsal fin –

10

Two or more dorsal fins –

14

10. Pelvic fins abdominal, well behind pectoral fins –

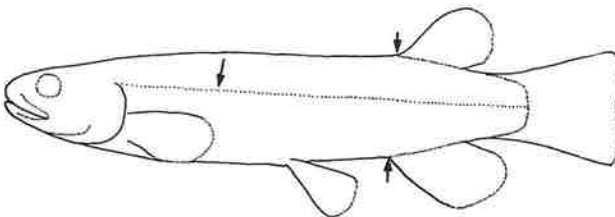
11

Pelvic fins thoracic or jugular, below or in front
of pectoral fins –

12

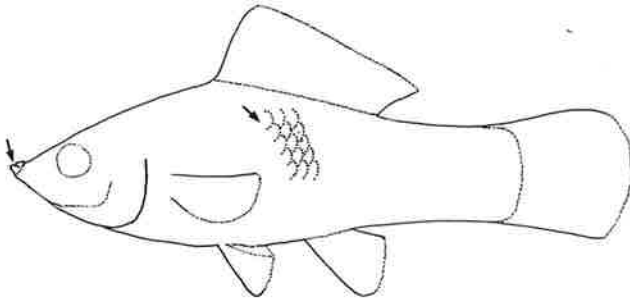
11. Scales absent; lateral line present –

family **Galaxiidae** page 21
(whitebait,
kokopu, mudfishes, etc.)
13 species

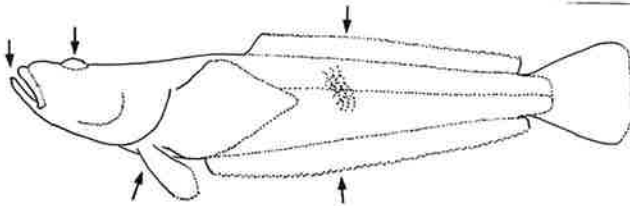


Scales present; lateral line absent –

family **Poeciliidae*** page 43
(mosquitofish,
mollies)
2 species



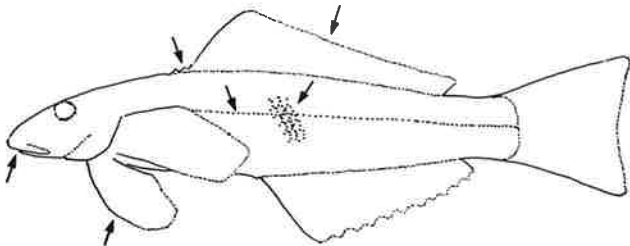
12. Mouth obviously upturned; eyes obviously on top of head; no spines in dorsal fin – family **Leptoscopidae**† page 50
(stargazer)
1 species



Mouth not obviously upturned; eyes dorso-lateral or lateral; spines present in dorsal fin –

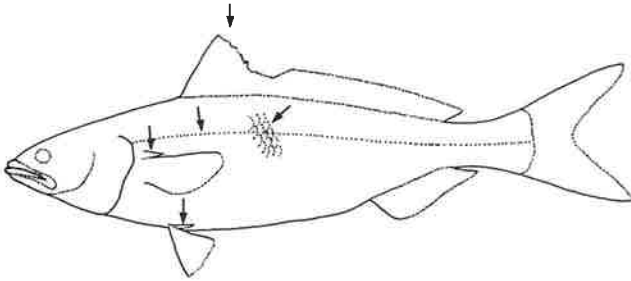
13

13. Three or four very stout, short spines at front of dorsal fin; mouth obviously inferior, shark-like; no axillary processes with paired fins – family **Mugiloididae** page 51
(torrentfish)
1 species



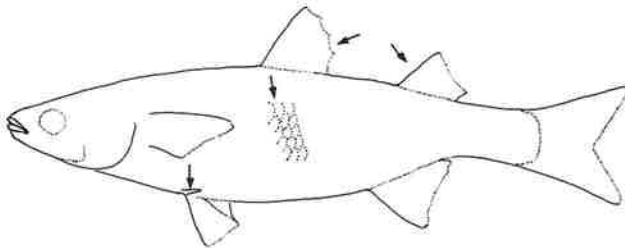
Spines at front of dorsal fin not abruptly shorter than those following; mouth not obviously inferior; axillary processes on both pectoral and pelvic fins –

family **Arripidae**† page 47
(kahawai)
1 species



14. Two dorsal fins, the first with four spines and broadly separated from second; pelvic fins abdominal –

family **Mugilidae**† page 48
(mulletts)
2 species

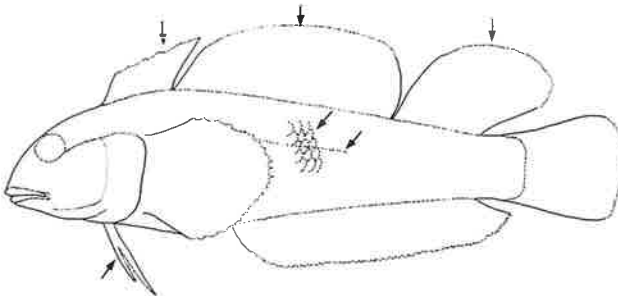


Two or more dorsal fins, close together along back; pelvic fins jugular or thoracic –

15

15. Three dorsal fins, scarcely separated; only two thick, fleshy pelvic fin rays –

family **Tripterygiidae**† page 52
(cockabullies)
1 species

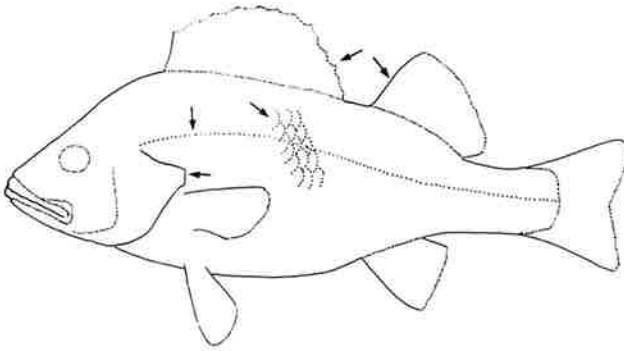


Two dorsal fins, scarcely separated; usually one spine and five rays in pelvic fins –

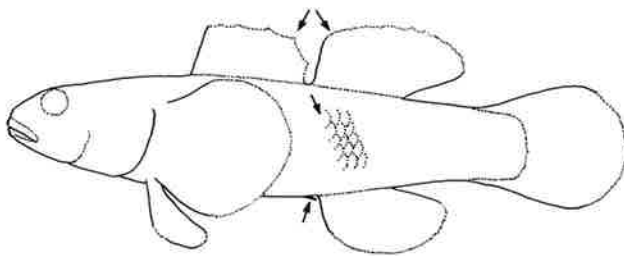
16

16. Thirteen or more spines in first dorsal fin; two or more spines in anal fin; a broad, flat opercular spine present; no genital papilla –

family **Percidae*** page 46
(perch)
1 species



Eight or fewer spines in first dorsal fin; one spine in anal fin; no opercular spine; a small but well-developed genital papilla – family **Eleotridae** page 53
(bullies)
6 species



* Introduced.

† Marine species moving into fresh water.

Family Geotriidae

There is only one species in this family, *Geotria australis*.

Scientific name: *Geotria australis* Gray, 1851.

Synonyms: None.

Common name: Lamprey.

Status: Indigenous.

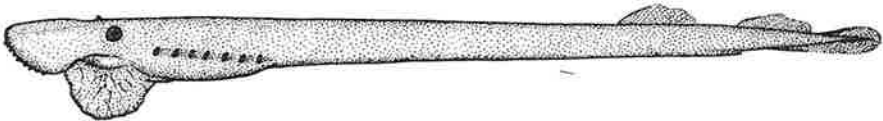
Habit: Diadromous.

Distribution – New Zealand: Widespread in localities accessible to migrants from the sea; inland penetration moderate.

– elsewhere: Western Australia, New South Wales, Victoria, Tasmania, Chile, Argentina.

Size attained: 600 mm.

Literature: Hubbs and Potter 1971; Maskell 1929; Todd 1979b.



Lamprey (*Geotria australis*), pouched male, 465 mm.

Family Anguillidae

This family contains 15 species, 2 of them in New Zealand waters.

Key to species

Dorsal fin extends much further forward along body than anal fin; vomerine teeth in mouth in a narrow band which extends back as far as jaw teeth; mouth large, cleft reaching back well past eye –

Anguilla dieffenbachii
page 16

Dorsal fin extends forward only a little further than anal fin; vomerine teeth in a club-shaped mass that reaches back only about two-thirds as far as jaw teeth; mouth small, cleft just reaching eye –

Anguilla australis
page 17

Scientific name: *Anguilla dieffenbachii* Gray, 1842.

Synonyms: *A. aucklandii*; *A. waitei*.

Common name: Long-finned eel.

Status: Endemic.

Habit: Diadromous.

Distribution – New Zealand: Widespread in localities accessible to migrants from the sea; inland penetration extensive.
– elsewhere: Unknown.

Size attained: 1750 mm.

Literature: Bertin 1956; Burnet 1968, 1969a, 1969b; Cairns 1941, 1942a, 1942b; Jellyman 1977a, 1977b, 1977c, 1979a, 1979b; Jellyman and Coates 1976; Todd 1973, 1977, 1979a.



Long-finned eel (*Anguilla dieffenbachii*), adult female, 1450 mm.

Scientific name: *Anguilla australis* Richardson, 1848.

Synonyms: None.

Common name: Short-finned eel.

Status: Indigenous.

Habit: Diadromous.

Distribution — New Zealand: Widespread in localities accessible to migrants from the sea; inland penetration moderate.

— elsewhere: Victoria, Tasmania, New Caledonia, Norfolk Island, and some other Pacific Islands.

Size attained: 1000 mm.

Literature: See *A. dieffenbachii*.



Short-finned eel (*Anguilla australis*), 750 mm.

Family Retropinnidae

This family contains four species, two of them in New Zealand.

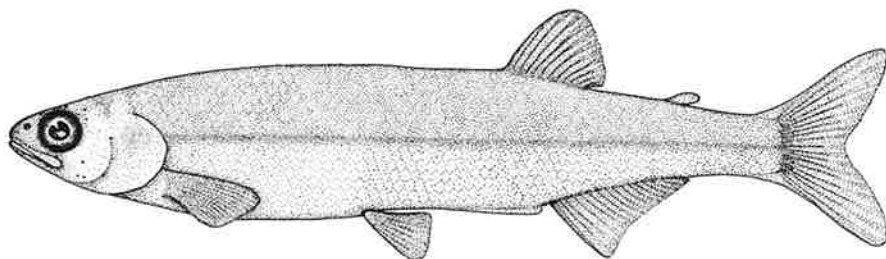
Key to species

Scales large, up to 60 along side; premaxilla short, reaching about half way along maxilla; maxilla sometimes toothed –

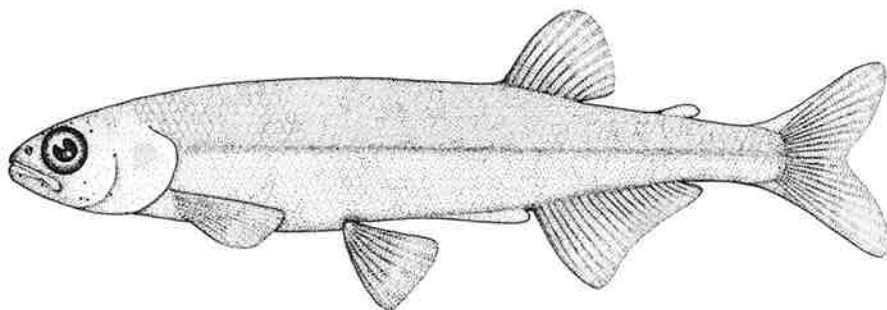
Retropinna retropinna
page 19

Scales small, about 100 along side; premaxilla long, reaching about three-quarters of the distance along maxilla; maxilla toothless –

Stokellia anisodon
page 19



Common smelt (*Retropinna retropinna*), female, 93 mm.



Common smelt (*Retropinna retropinna*), male, 86 mm.

Scientific name: *Retropinna retropinna* (Richardson, 1848).

Synonyms: *R. osmeroides*; *R. lacustris*; *R. obtusirostris*; *R. chathamensis*; *R. abbreviata*; *R. media*; *R. diversa*.

Common name: Common smelt.

Status: Endemic.

Habit: Diadromous and freshwater.

Distribution – New Zealand: Widespread in localities accessible to migrants from the sea; inland penetration slight; also many landlocked populations in lakes.

– elsewhere: Unknown.

Size attained: 148 mm.

Literature: Burstall 1950; Jolly 1967; McDowall 1972b, 1979.

Scientific name: *Stokellia anisodon* (Stokell, 1941).

Synonyms: None.

Common name: Stokell's smelt.

Status: Endemic.

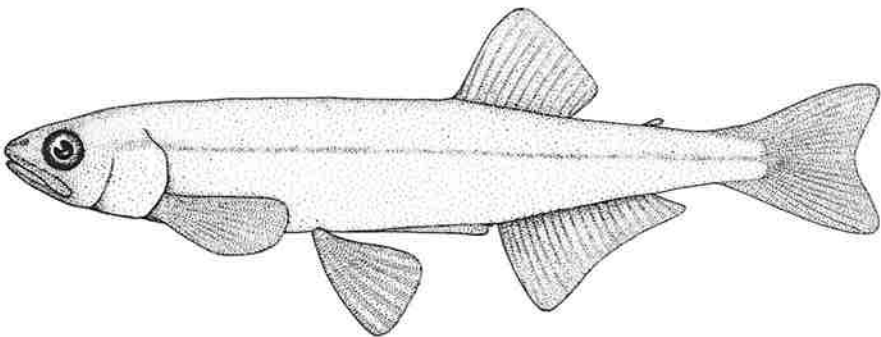
Habit: Diadromous.

Distribution – New Zealand: Coastal rivers of Canterbury, Otago, and Southland; inland penetration very slight.

– elsewhere: Unknown.

Size attained: 91 mm.

Literature: McDowall 1979; McMillan 1961.



Stokell's smelt (*Stokellia anisodon*), male, 76 mm.

Family Prototroctidae

This family contains two species, only one of them present in New Zealand.

Scientific name: *Prototroctes oxyrhynchus* Günther, 1870.

Synonyms: *Retropinna upukororo*.

Common name: Grayling.

Status: Endemic.

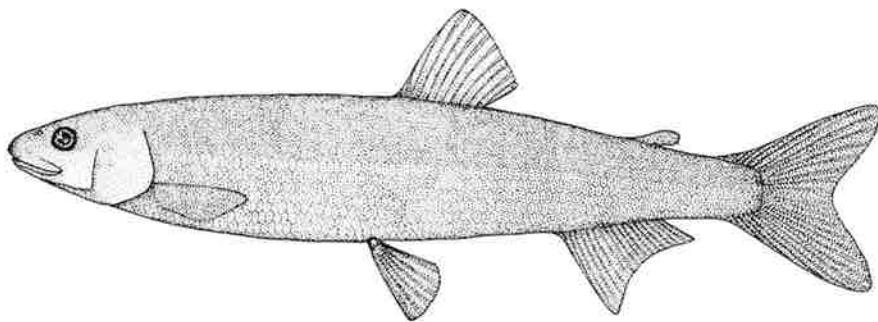
Habit: Diadromous (?).

Distribution – New Zealand: Once widespread in localities (except Chatham Islands) accessible to migrants from the sea; inland penetration slight; believed extinct.

– elsewhere: Unknown.

Size attained: 320 mm.

Literature: Allen 1949; McDowall 1974, 1976.



Grayling (*Prototroctes oxyrhynchus*), 220 mm.

Family Galaxiidae

This family contains about 36 species, 13 of them in New Zealand.

Key to species

1. Pelvic fins present — 2
Pelvic fins lacking — 12
2. Pelvic fins small, usually less than one-third pelvic-anal distance, 4–5 rays —
Neochanna burrowsius
page 30
Pelvic fins larger, usually more than one-third pelvic-anal distance, 6 or, more often, 7 rays — 3
3. Lower jaw obviously protruding — *Galaxias prognathus*
page 29 4
Lower jaw not protruding — 4
4. Lower jaw receding, tucks in behind upper when mouth is closed — 5
Jaws about equal in length — 6
5. Caudal peduncle much longer than deep; canine teeth in jaws large; distinct, irregular blotching on sides — *Galaxias brevipinnis*
page 25
Caudal peduncle little longer than deep; canine teeth not present in jaws; little distinct colour pattern apart from a large dark blotch above pectoral base — *Galaxias postvectis*
page 24

6. Pyloric caeca long, length much greater than thickness at base – 7
- Pyloric caeca short or absent – 8
7. Depth of caudal peduncle much less than length; 49–57 vertebrae; 9–13 gill rakers; irregular blotching or banding on sides – *Galaxias vulgaris* page 26
- Depth of caudal peduncle sub-equal to length; 58–61 vertebrae; 14–17 gill rakers; small, clearly defined gold spots, lines, rings, and crescents on sides – *Galaxias argenteus* page 23
8. Canine teeth in jaws large; distinct, vertical pale bands across sides – *Galaxias fasciatus* page 24
- Canine teeth lacking; no distinct vertical pale bands across sides – 9
9. Gill rakers very short, 11 or fewer – 10
- Gill rakers long, 11 or more – 11
10. Usually 6 pelvic fin rays, 15 caudal fin rays – *Galaxias divergens* page 28
- Usually 7 pelvic fin rays, 16 caudal fin rays – *Galaxias paucispondylus* page 28
11. Gill rakers 17 or fewer; vertebrae 54 or more, usually 59 or more – *Galaxias maculatus* page 26
- Gill rakers 18 or more; vertebrae up to 53 – *Galaxias gracilis* page 27

12. Dorsal and anal fins long, 14–19 rays; depth of caudal peduncle 1.2–2.0 times length; jaw teeth flattened, incisor-like; brownish; south of about latitude 39° S –

Neochanna apoda
page 30

Dorsal and anal fins shorter, 11–16 rays; depth of caudal peduncle 0.9–1.4 times length; teeth not flattened; blackish; north of about latitude 38° S –

Neochanna diversus
page 31

Scientific name: *Galaxias argenteus* (Gmelin, 1789).

Synonyms: *G. alepidotus*; *G. forsteri*; *G. grandis*; *G. kokopu*.

Common name: Giant kokopu.

Status: Endemic.

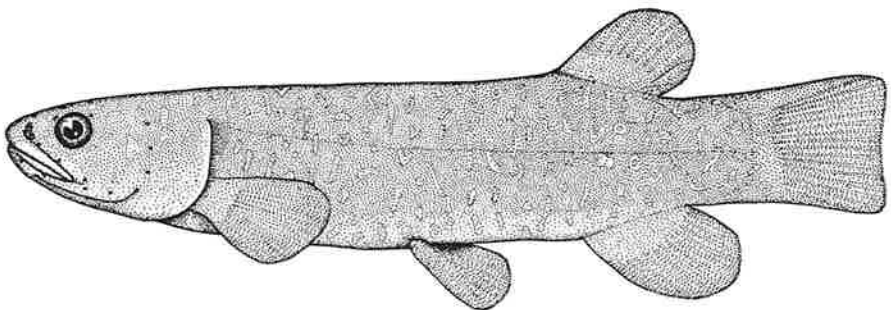
Habit: Diadromous.

Distribution – New Zealand: Widespread in localities accessible to migrants from the sea; inland penetration slight.

– elsewhere: Unknown.

Size attained: 580 mm.

Literature: Eldon 1979d; Jellyman 1979c; McDowall 1970.



Giant kokopu (*Galaxias argenteus*), 280 mm.

Scientific name: *Galaxias fasciatus* Gray, 1842.

Synonyms: None.

Common name: Banded kokopu.

Status: Endemic.

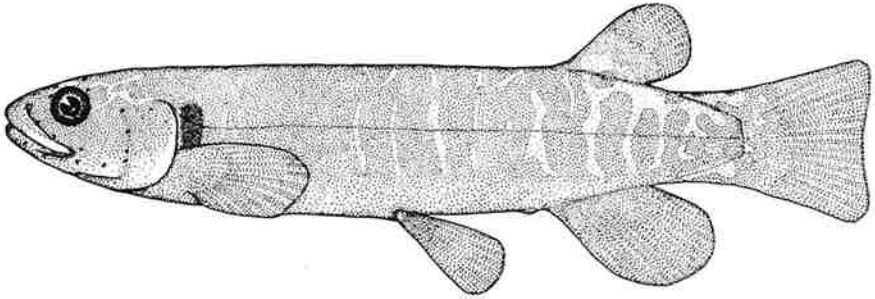
Habit: Diadromous and freshwater.

Distribution – New Zealand: Widespread in localities accessible to migrants from the sea; inland penetration extensive; a few landlocked populations are known.

– elsewhere: Unknown.

Size attained: 260 mm.

Literature: Hopkins 1979a, 1979b; McDowall 1970; McDowall and Eldon 1980; Ots and Eldon 1975.



Banded kokopu (*Galaxias fasciatus*), 155 mm.

Scientific name: *Galaxias postvectis* Clarke, 1899.

Synonyms: *G. charlotta*.

Common name: Short-jawed kokopu.

Status: Endemic.

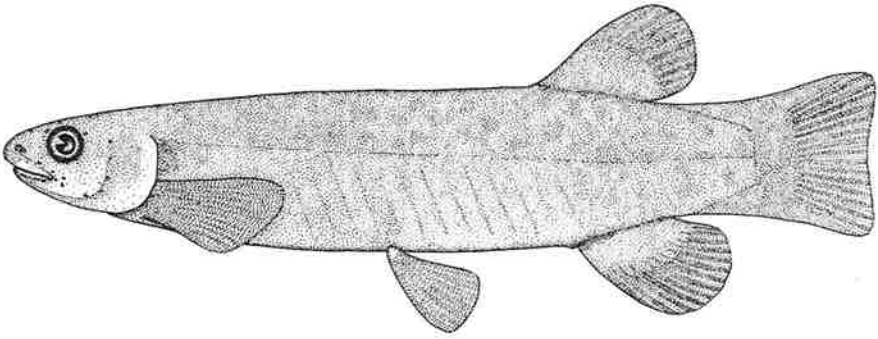
Habit: Diadromous.

Distribution – New Zealand: Widespread in localities (except Chatham Islands) accessible to migrants from the sea; inland penetration moderate.

– elsewhere: Unknown.

Size attained: 260 mm.

Literature: McDowall 1970.



Short-jawed kokopu (*Galaxias postvectis*), 178 mm.

Scientific name: *Galaxias brevipinnis* Günther, 1866.

Synonyms: *G. robinsonii*; *G. huttoni*; *G. bollansi*; *G. kaikorai*; *G. lynx*; *G. koaro*; *G. castlae*.

Common name: Koaro.

Status: Indigenous.

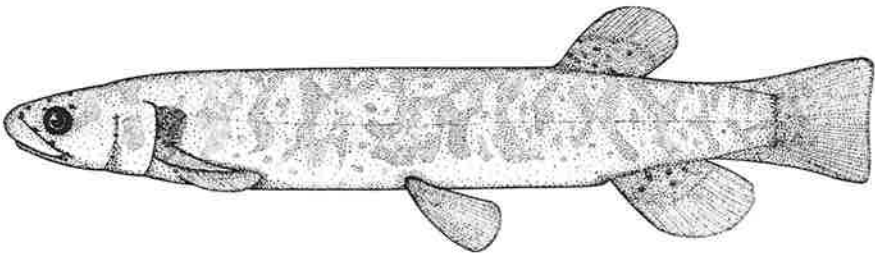
Habit: Diadromous and freshwater.

Distribution – New Zealand: Widespread in localities accessible to migrants from the sea, including Campbell and Auckland Islands; inland penetration very extensive; landlocked populations in many inland and subalpine lakes.

– elsewhere: New South Wales, Victoria, South Australia, Tasmania.

Size attained: 280 mm.

Literature: McDowall 1970; McDowall and Eldon 1980.



Koaro (*Galaxias brevipinnis*), 185 mm.

Scientific name: *Galaxias vulgaris* Stokell, 1949.

Synonyms: *G. anomalus*.

Common name: Common river galaxias.

Status: Endemic.

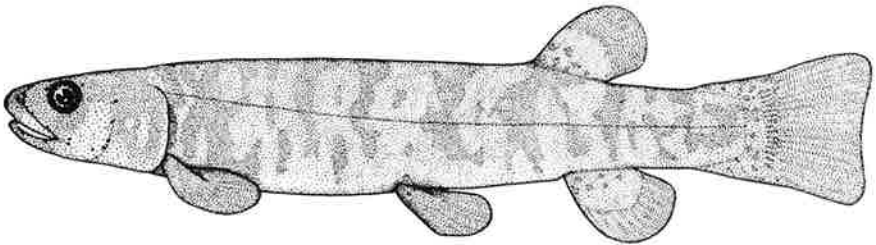
Habit: Freshwater.

Distribution – New Zealand: Inland and subalpine rivers east of main divide in South Island; also upper Maruia River west of divide.

– elsewhere: Unknown.

Size attained: 150 mm.

Literature: Benzie 1968c; Cadwallader 1975a, 1975b, 1976, 1978; McDowall 1970.



Common river galaxias (*Galaxias vulgaris*), 100 mm.

Scientific name: *Galaxias maculatus* (Jenyns, 1842).

Synonyms: *G. attenuatus*; *G. usitatus*.

Common name: Inanga.

Status: Indigenous.

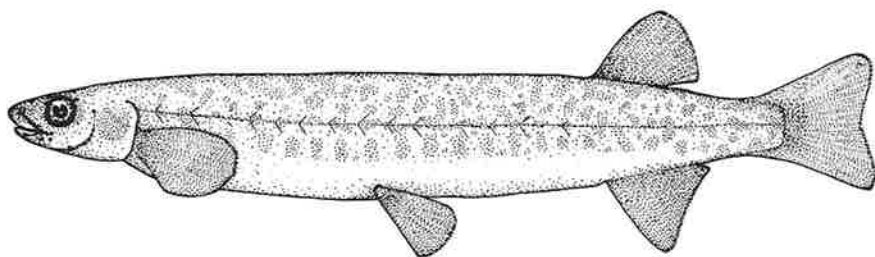
Habit: Diadromous and freshwater.

Distribution – New Zealand: Widespread in localities accessible to migrants from the sea; inland penetration slight; a few landlocked populations in northern New Zealand.

– elsewhere: Western Australia, southern Queensland, New South Wales, Victoria, South Australia, Tasmania; Lord Howe Island, Chile, Patagonian Argentina, Tierra del Fuego, Falkland Islands.

Size attained: 169 mm.

Literature: Benzie 1968a, 1968b, 1968c, 1968d; Burnet 1965; McDowall 1968, 1970, 1972a; McDowall and Eldon 1980.



Inanga (*Galaxias maculatus*), 94 mm.

Scientific name: *Galaxias gracilis* McDowall, 1967.

Synonyms: None.

Common name: Dwarf inanga.

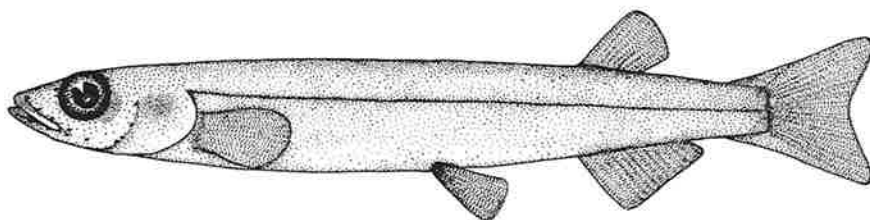
Status: Endemic.

Habit: Freshwater.

Distribution – New Zealand: Few lakes on west coast of Northland.
– elsewhere: Unknown.

Size attained: 62 mm.

Literature: McDowall 1970, 1972a.



Dwarf inanga (*Galaxias gracilis*), 59 mm.

Scientific name: *Galaxias divergens* Stokell, 1959.

Synonyms: None.

Common name: Dwarf galaxias.

Status: Endemic.

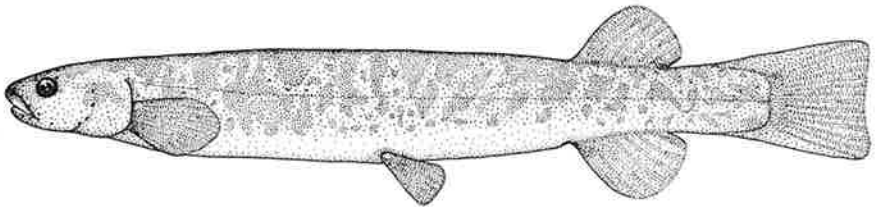
Habit: Freshwater.

Distribution — New Zealand: Inland rivers of Bay of Plenty, Hawkes Bay, Wairarapa, southern Wellington, Marlborough, Nelson, Westland south to Taramakau River.

— elsewhere: Unknown.

Size attained: 87 mm.

Literature: Hopkins 1971; McDowall 1970.



Dwarf galaxias (*Galaxias divergens*), 68 mm.

Scientific name: *Galaxias paucispondylus* Stokell, 1938.

Synonyms: None.

Common name: Alpine galaxias.

Status: Endemic.

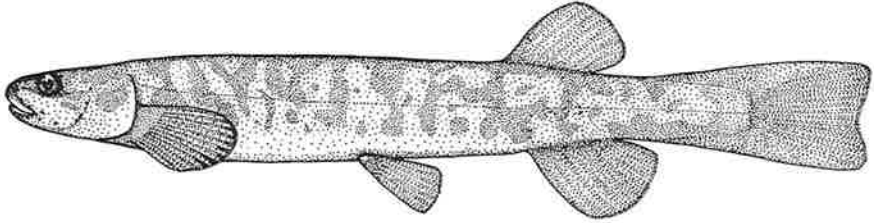
Habit: Freshwater.

Distribution — New Zealand: Few localities in inland-subalpine rivers of Canterbury, Otago, and Southland; also Maruia River west of main divide in South Island.

— elsewhere: Unknown.

Size attained: 112 mm.

Literature: McDowall 1970.



Alpine galaxias (*Galaxias paucispondylus*), 70 mm.

Scientific name: *Galaxias prognathus* Stokell, 1938.

Synonyms: None.

Common name: Long-jawed galaxias.

Status: Endemic.

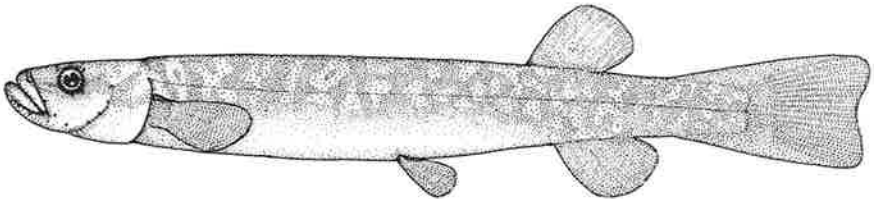
Habit: Freshwater.

Distribution – New Zealand: Few localities in subalpine Canterbury, and north Otago from Hurunui River south to Kakanui east of South Island main divide; Maruia River west of divide.

– elsewhere: Unknown.

Size attained: 79 mm.

Literature: McDowall 1970.



Long-jawed galaxias (*Galaxias prognathus*), 64 mm.

Scientific name: *Neochanna burrowsius* (Phillipps, 1926).

Synonyms: *Galaxias burrowsius*.

Common name: Canterbury mudfish.

Status: Endemic.

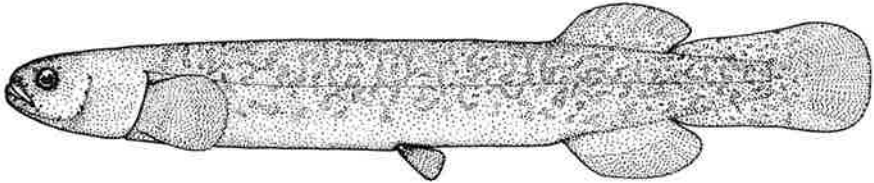
Habit: Freshwater.

Distribution – New Zealand: Restricted to lowland and inland waters of Canterbury south to Waitaki River.

– elsewhere: Unknown.

Size attained: 150 mm.

Literature: Cadwallader 1975b; Eldon 1979a, 1979b, 1979c; Lane 1964; McDowall 1970; Skrzynski 1968.



Canterbury mudfish (*Neochanna burrowsius*), 108 mm.

Scientific name: *Neochanna apoda* Günther, 1867.

Synonyms: None.

Common name: Brown mudfish.

Status: Endemic.

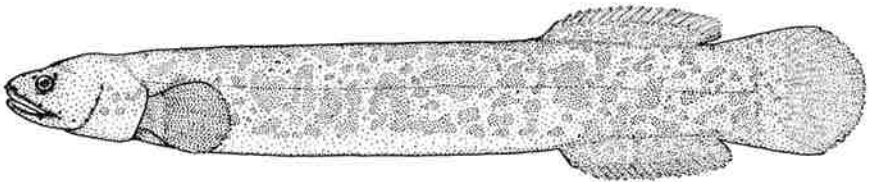
Habit: Freshwater.

Distribution – New Zealand: Southern half of North Island from Opunake south, and west coast of South Island as far south as Whataroa.

– elsewhere: Unknown.

Size attained: 200 mm.

Literature: Eldon 1968, 1971, 1978a, 1978b; McDowall 1970.



Brown mudfish (*Neochanna apoda*), 110 mm.

Scientific name: *Neochanna diversus* Stokell, 1949.

Synonyms: None.

Common name: Black mudfish.

Status: Endemic.

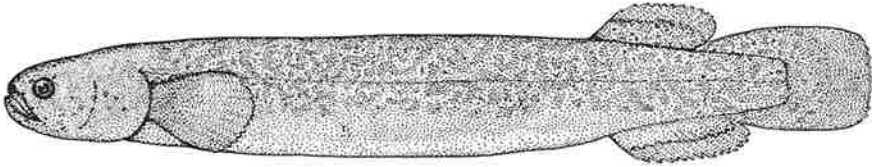
Habit: Freshwater.

Distribution – New Zealand: Northern New Zealand south to Mokau River.

– elsewhere: Unknown.

Size attained: 122 mm.

Literature: McDowall 1970.



Black mudfish (*Neochanna diversus*), 110 mm.

Family Salmonidae

The family contains about 70 species, 7 introduced and established in New Zealand.

Key to species

1. Anal fin short-based, usually 8–12 rays, fin base shorter than longest ray — 2
Anal fin longer-based, usually 13–19 rays, fin base longer than longest ray — 6
2. Coloured with dark spots on paler background; leading edge of pelvic and anal fins not usually white, though fin tips may be; teeth present on shaft, and usually on head, of vomer — 3
Coloured with paler spots on darker background; leading edge of pelvic and anal fins white; teeth present only on head of vomer — 5
3. Spots lacking from tail, or few and inconspicuous — 4
Numerous bold spots on tail —
Salmo gairdnerii
page 34
4. Dark spots on body, usually surrounded by paler haloes; often pale and orange-red spots on flanks; teeth on head and shaft of vomer, those on shaft strong and not deciduous; caudal peduncle short and deep —
Salmo trutta
page 34

Dark spots on body not surrounded by paler haloes; no pale or orange-red spots on flanks; teeth only on shaft of vomer, weak and deciduous; caudal peduncle long and slender (only Lake Te Anau-Manapouri system) –

Salmo salar
page 35

5. Caudal fin little forked; pale leading edge of pelvic and anal fins followed by contrasting black stripe; fewer than 60 pyloric caeca –

Salvelinus fontinalis
page 36

Caudal fin deeply forked; no contrasting black stripe in pelvic and anal fins; more than 90 pyloric caeca (only Lake Pearson) –

Salvelinus namaycush
page 36

6. Flesh along bases of teeth in lower jaw dusky grey-black; gill rakers short, 16–26 –

Oncorhynchus tshawytscha
page 37

Flesh along bases of teeth in lower jaw not black; gill rakers very long, 31–43 (only in Waitaki River system) –

Oncorhynchus nerka
page 38

Scientific name: *Salmo trutta* Linnaeus, 1758.

Synonyms: *Salmo fario*.

Common name: Brown trout.

Status: Introduced.

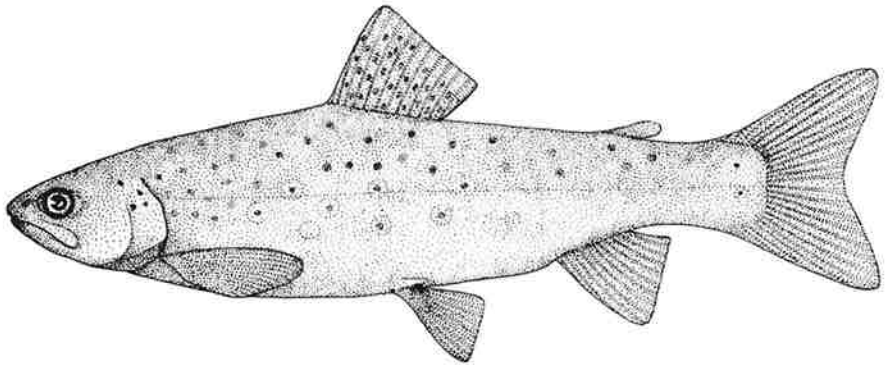
Habit: Diadromous and freshwater.

Distribution — New Zealand: Widespread in rivers and lakes south of about Auckland.

— elsewhere: Native to Europe; now widespread in cool waters in many parts of the world.

Size attained: 1400 mm (Europe).

Literature: Allen 1951; Burnet 1968; MacCrimmon and Marshall 1968; Staley 1966.



Brown trout (*Salmo trutta*), female, 225 mm.

Scientific name: *Salmo gairdnerii* Richardson, 1836.

Synonyms: *Salmo irideus*.

Common name: Rainbow trout.

Status: Introduced.

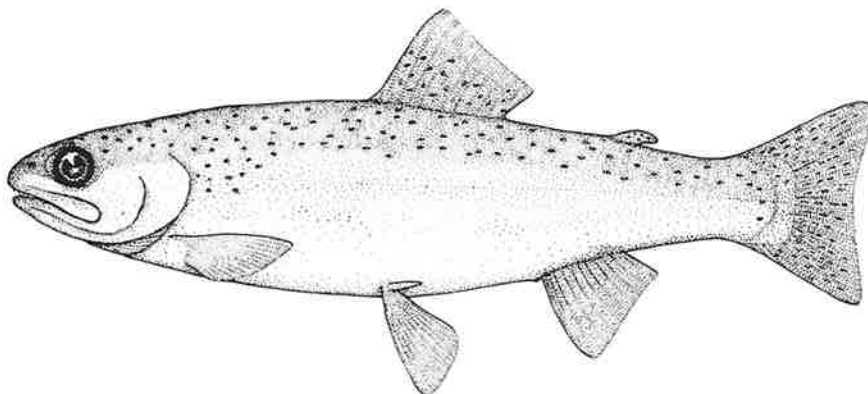
Habit: Diadromous (not N.Z.) and freshwater.

Distribution — New Zealand: Few lakes in Northland, lakes and some rivers of central North Island, rivers of east coast of North Island, many South Island lakes and some rivers.

— elsewhere: Native to west coast of North America; now widespread in cool waters in many parts of the world.

Size attained: 1220 mm (North America).

Literature: MacCrimmon 1971; Scott and Crossman 1973; Smith 1959.



Rainbow trout (*Salmo gairdnerii*), female, 560 mm.

Scientific name: *Salmo salar* Linnaeus, 1758.

Synonyms: *Salmo sebago*.

Common name: Atlantic salmon.

Status: Introduced.

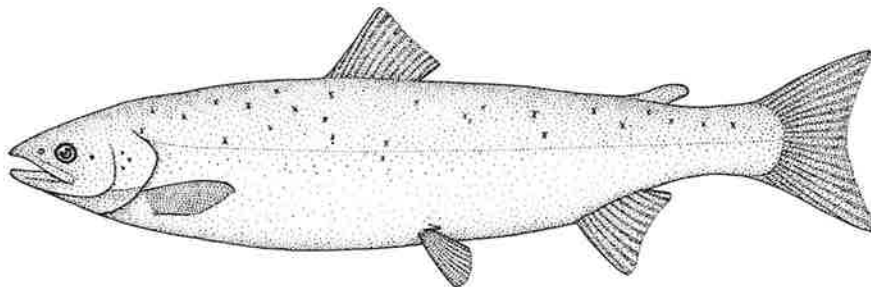
Habit: Diadromous (not N.Z.) and freshwater.

Distribution – New Zealand: Lake-limited in Lakes Te Anau and Manapouri and some small lakes nearby.

– elsewhere: Native to waters draining into North Atlantic Ocean; populations present in Australia.

Size attained: 1500 mm (Europe).

Literature: Calderwood 1927; Hefford 1927; Stokell 1959.



Atlantic salmon (*Salmo salar*), 495 mm.

Scientific name: *Salvelinus fontinalis* (Mitchill, 1814).

Synonyms: None.

Common name: Brook char.

Status: Introduced.

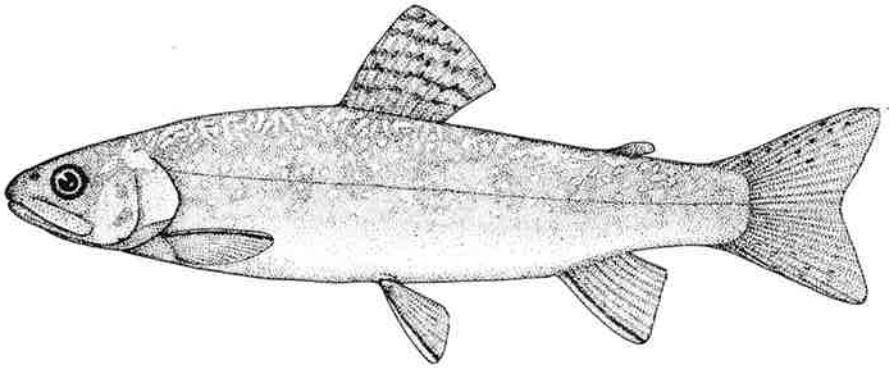
Habit: Diadromous (not N.Z.) and freshwater.

Distribution – **New Zealand:** Isolated populations in central North Island and inland waters of Canterbury and Otago.

– **elsewhere:** Native to eastern waters of North America; now widespread in cool waters in many parts of the world.

Size attained: 1400 mm (North America).

Literature: Lane 1964; MacCrimmon and Campbell 1969; Scott and Crossman 1973.



Brook char (*Salvelinus fontinalis*), 145 mm.

Scientific name: *Salvelinus namaycush* (Walbaum, 1792).

Synonyms: *Cristivomer namaycush*.

Common name: Mackinaw.

Status: Introduced.

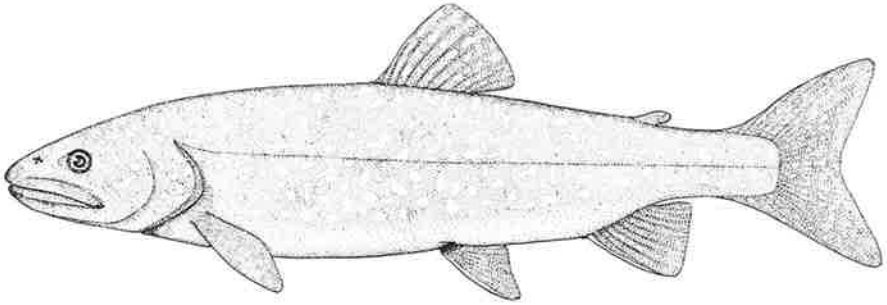
Habit: Freshwater.

Distribution – **New Zealand:** Only Lake Pearson.

– **elsewhere:** Native to Alaska, Canada, and north-eastern United States; introduced into a few other countries.

Size attained: 1260 mm (North America).

Literature: Flain 1971; McAfee 1966; Scott and Crossman 1973; Stokell 1951.



Mackinaw (*Salvelinus namaycush*).

Scientific name: *Oncorhynchus tshawytscha* (Walbaum, 1792).

Synonyms: None.

Common name: Quinnat salmon.

Status: Introduced.

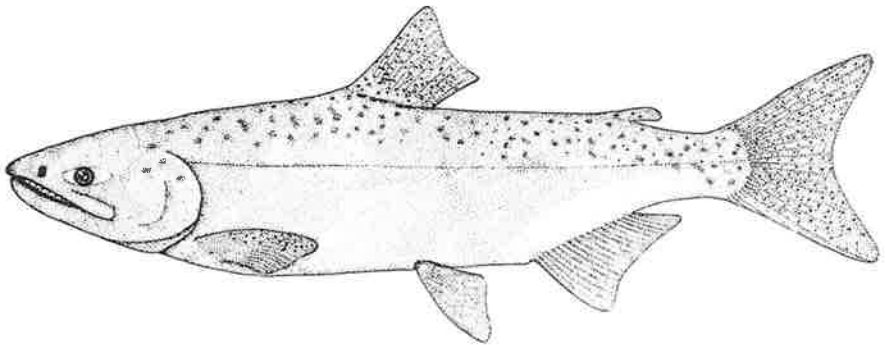
Habit: Diadromous and freshwater.

Distribution – New Zealand: Rivers of Canterbury, Otago, Southland, and southern Westland; also landlocked populations in some inland lakes of South Island.

– elsewhere: Native to waters draining into North Pacific Ocean (Japan to northern U.S.A.); introduced into many countries.

Size attained: 1490 mm (North America).

Literature: Finlay 1972; Flain 1970, 1972a; Galloway 1976; Parrott 1971; Scott and Crossman 1973.



Quinnat salmon (*Oncorhynchus tshawytscha*), male, 1325 mm.

Scientific name: *Oncorhynchus nerka* (Walbaum, 1792).

Synonyms: None.

Common name: Sockeye salmon.

Status: Introduced.

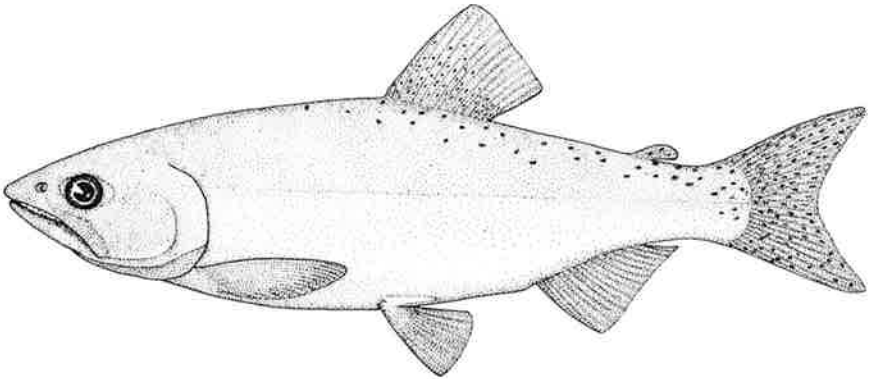
Habit: Diadromous (not N.Z.) and freshwater.

Distribution – New Zealand: Lakes of Waitaki River system (landlocked populations only).

– elsewhere: Native to rivers draining into North Pacific Ocean (Japan to northern U.S.A.).

Size attained: 840 mm (North America).

Literature: Flain 1972b; Foerster 1968; Graynoth 1978; Scott and Crossman 1973.



Sockeye salmon (*Oncorhynchus nerka*), male, 335 mm.

Family Ictaluridae

This family contains about 37 species, 1 of them introduced and established in New Zealand.

Scientific name: *Ictalurus nebulosus* (Le Sueur, 1819).

Synonyms: None.

Common name: Catfish.

Status: Introduced.

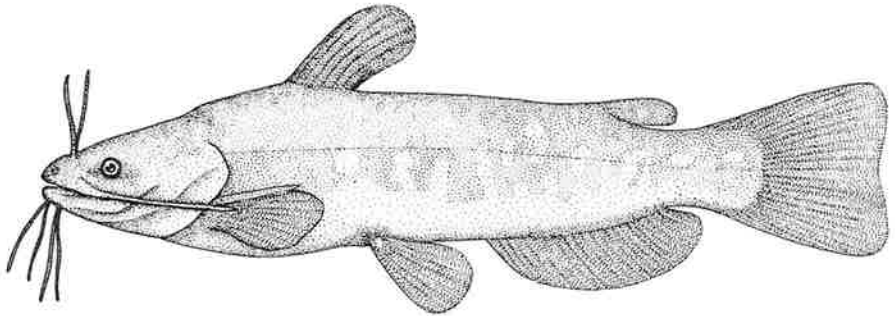
Habit: Freshwater.

Distribution – New Zealand: Waikato River, Lake Mahinapua; possibly some localities in southern North Island.

– elsewhere: Native to eastern-central North America from about Great Lakes southwards; introduced into Europe.

Size attained: 530 mm (North America).

Literature: Emig 1966; Scott and Crossman 1973.



Catfish (*Ictalurus nebulosus*), 165 mm.

Family Cyprinidae

This family contains about 1600 species, 3 species introduced and established in the wild in New Zealand; many more are kept in captivity.

Key to species

1. Scales small, about 100 along lateral line; a pair of small barbels at corners of mouth –

Tinca tinca
page 41

Scales larger, up to 40 along lateral line;
no barbels –

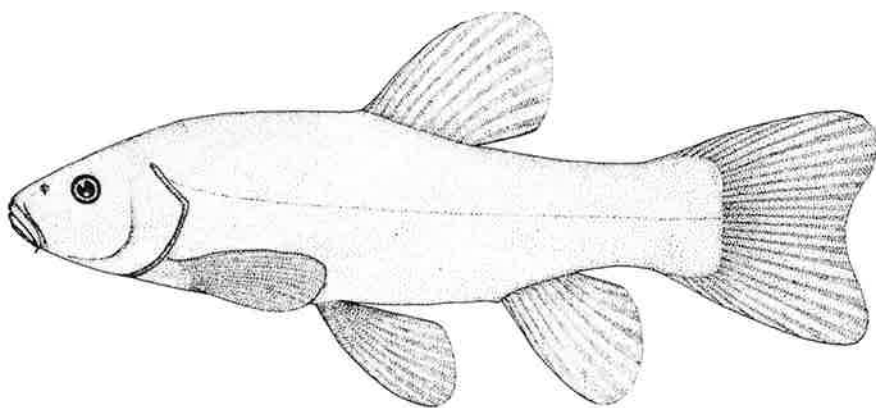
2

2. Axillary processes at bases of pectoral and pelvic fins;
10-11 short, stout gill rakers –

Scardinius erythrophthalmus
page 41

No axillary processes at bases of pectoral and
pelvic fins; 40-46 long gill rakers –

Carassius auratus
page 42



Tench (*Tinca tinca*), 205 mm.

Scientific name: *Tinca tinca* (Linnaeus, 1758).

Synonyms: None.

Common name: Tench.

Status: Introduced.

Habit: Freshwater.

Distribution – New Zealand: Quite widespread in northern New Zealand (Waikato and north); a few populations further south.
– elsewhere: Native to Europe; now widespread.

Size attained: 700 mm (Europe).

Literature: Weatherley 1959.

Scientific name: *Scardinius erythrophthalmus* (Linnaeus, 1758).

Synonyms: None.

Common name: Rudd.

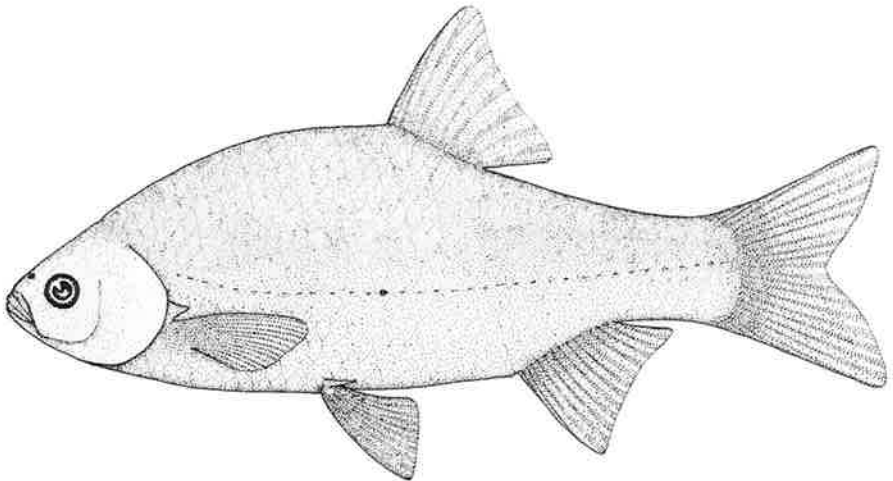
Status: Introduced.

Habit: Freshwater.

Distribution – New Zealand: Widespread from Waikato River northwards.
– elsewhere: Native to Europe; introduced into some other areas.

Size attained: 410 mm.

Literature: Wheeler 1969.



Rudd (*Scardinius erythrophthalmus*), 144 mm.

Scientific name: *Carassius auratus* Linnaeus, 1758.

Synonyms: None.

Common name: Goldfish.

Status: Introduced.

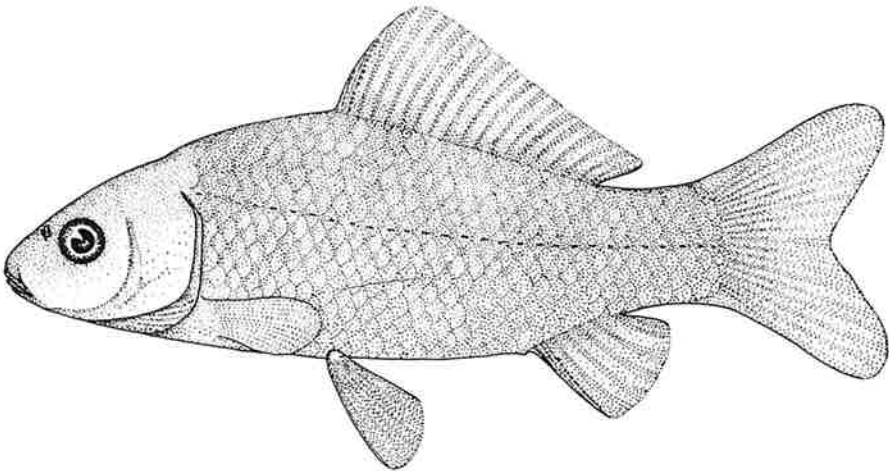
Habit: Freshwater.

Distribution – New Zealand: Widespread but intermittent throughout New Zealand.

– elsewhere: Native to eastern Asia; now virtually world-wide.

Size attained: 300 mm

Literature: Okada 1960.



Goldfish (*Carassius auratus*), 106 mm.

Family Poeciliidae

This family contains about 140 species, 2 species introduced and established in the wild in New Zealand; many more are kept in captivity.

Key to species

Dorsal fin 7-9 rays, its origin well behind anal fin origin –

Gambusia affinis
page 43

Dorsal fin 13 or more rays, its origin well in front of anal fin –

Poecilia latipinna
page 44

Scientific name: *Gambusia affinis* (Baird and Girard, 1854).

Synonyms: *G. holbrooki*.

Common name: Mosquitofish.

Status: Introduced.

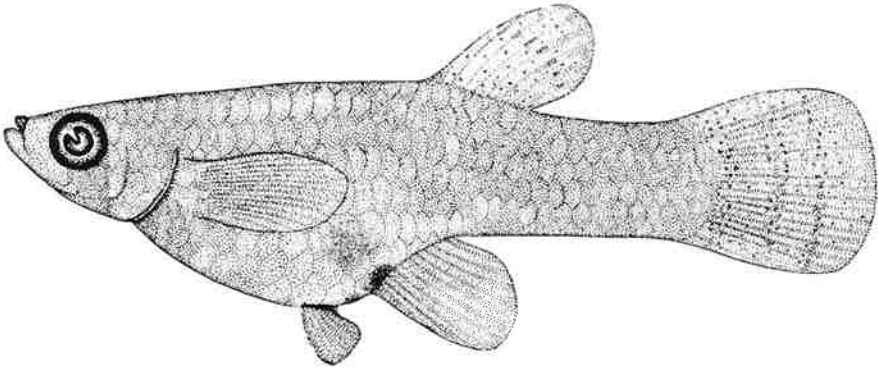
Habit: Freshwater.

Distribution – **New Zealand:** Now widespread in northern half of North Island.

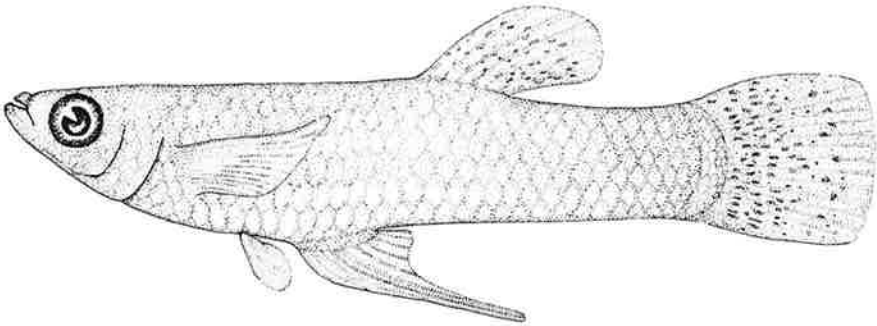
– **elsewhere:** Native to rivers of U.S.A. which drain into Gulf of Mexico; now present in many countries in cool to warm waters.

Size attained: 60 mm.

Literature: Krumholz 1948; Myers 1965.



Mosquitofish (*Gambusia affinis*), female, 28 mm.



Mosquitofish (*Gambusia affinis*), male, 16 mm.

Scientific name: *Poecilia latipinna* (Le Sueur, 1821).

Synonyms: None.

Common name: Sailfin molly.

Status: Introduced.

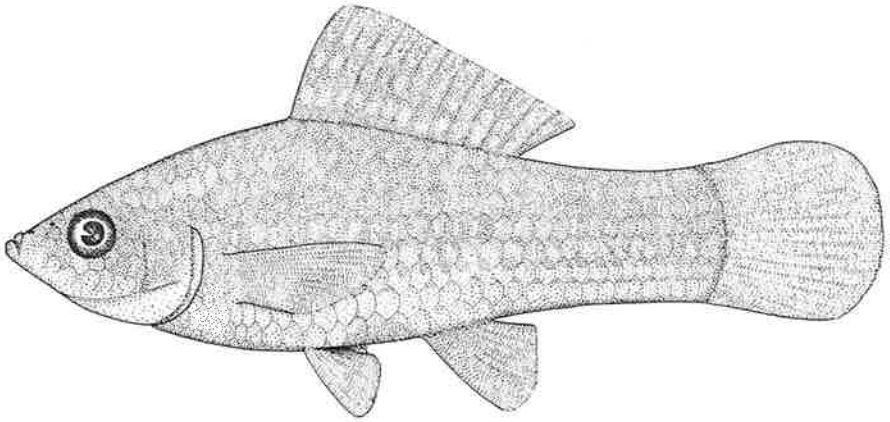
Habit: Freshwater.

Distribution – New Zealand: Swamps near Tokaanu.

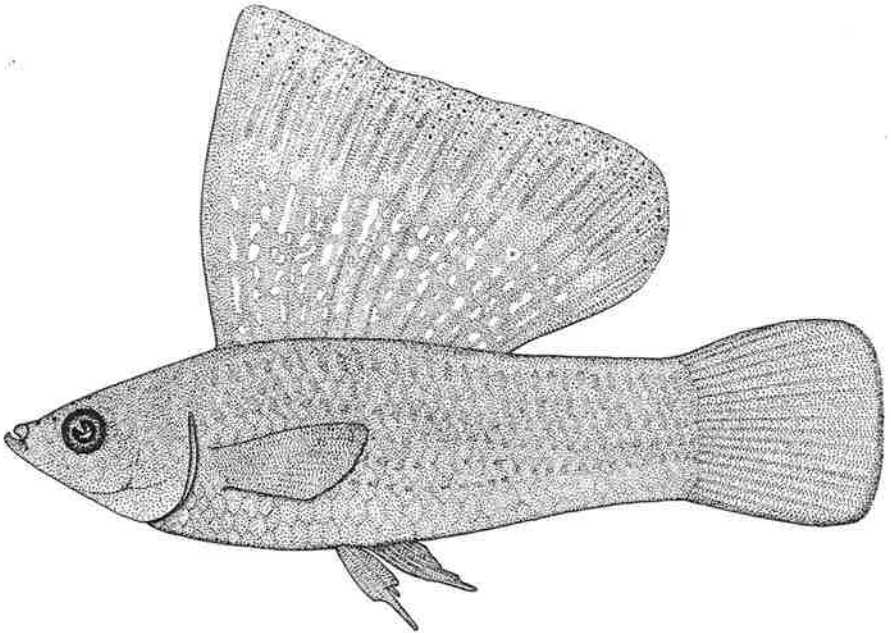
– elsewhere: Native to rivers draining into Gulf of Mexico in Mexico and U.S.A., and eastern states of U.S.A. as far north as North Carolina; now widespread as an aquarium fish.

Size attained: 120 mm.

Literature: Winterbourn and Brown 1967.



Sailfin molly (*Poecilia latipinna*), female, 65 mm.



Sailfin molly (*Poecilia latipinna*), male, 72 mm.

Family Percidae

This family contains 126 species, of which 1 has been introduced and is established in New Zealand.

Scientific name: *Perca fluviatilis* Linnaeus, 1758.

Synonyms: None.

Common name: Perch.

Status: Introduced.

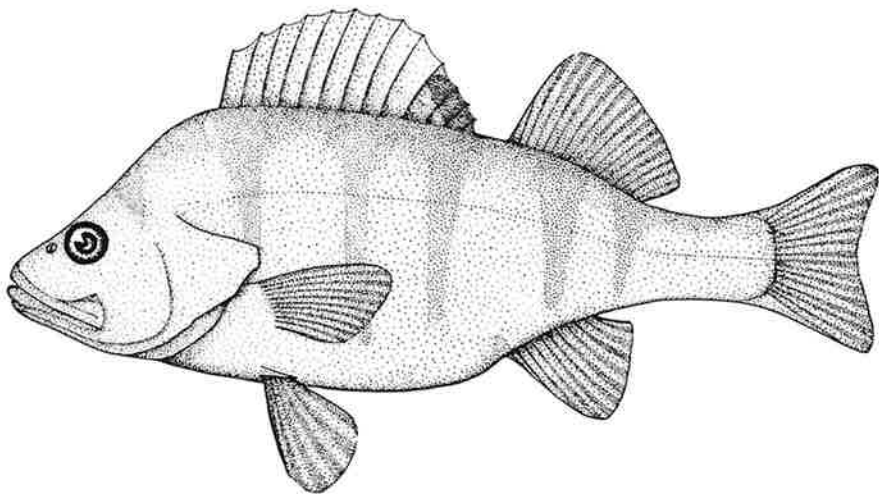
Habit: Freshwater.

Distribution – New Zealand: Widespread, mostly at lower elevations.

– elsewhere: Native to cooler waters of Europe; now in many countries.

Size attained: 500 mm.

Literature: Duncan 1967; Griffiths 1976; Wheeler 1969.



Perch (*Perca fluviatilis*), 368 mm.

Family Arripidae

This family contains two primarily marine species, one of which occurs in New Zealand seas and commonly enters fresh water.

Scientific name: *Arripis trutta* (Forster, in Bloch and Schneider, 1801).

Synonyms: None.

Common name: Kahawai.

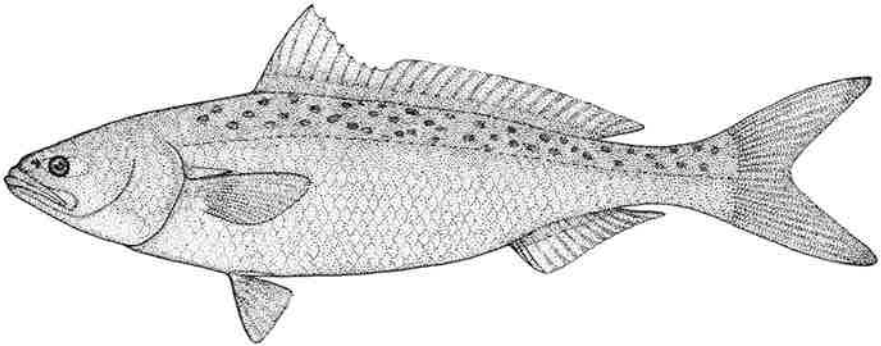
Status: Indigenous.

Habit: Marine.

Distribution – New Zealand: Widespread, moving into estuaries.
– elsewhere: southern Australia.

Size attained: 750 mm.

Literature: Eggleston 1975; Graham 1956; Malcolm 1966.



Kahawai (*Arripis trutta*), 438 mm.

Family Mugilidae

This family contains about 70 primarily marine species, 2 of which occur in New Zealand seas and regularly enter fresh water.

Key to species

Eyes with adipose eyelids; scales large, 38-43 along side; tongue without teeth –

Mugil cephalus
page 48

Eyes without adipose eyelids; scales smaller, 60 or more along side; tongue toothed –

Aldrichetta forsteri
page 49

Scientific name: *Mugil cephalus* Linnaeus, 1758.

Synonyms: None.

Common name: Grey mullet.

Status: Indigenous.

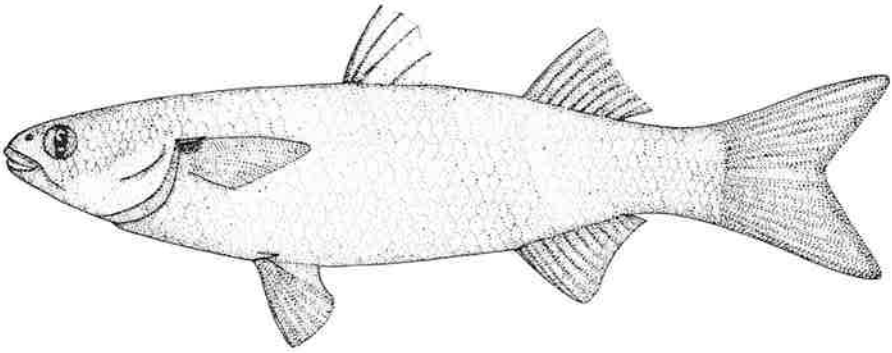
Habit: Marine.

Distribution – New Zealand: Mostly in northern waters, reaching about to Cook Strait; moving into estuaries.

– elsewhere: World-wide in warm and temperate seas.

Size attained: 750 mm.

Literature: Graham 1956; Scott, Glover, and Southcott 1974.



Grey mullet (*Mugil cephalus*), 135 mm.

Scientific name: *Aldrichetta forsteri* (Valenciennes, in Cuvier and Valenciennes, 1836).

Synonyms: None.

Common name: Yellow-eyed mullet.

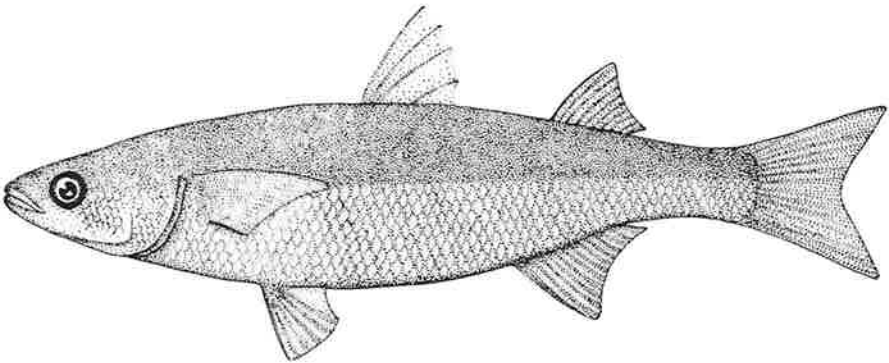
Status: Indigenous.

Habit: Marine.

Distribution – New Zealand: Widespread, moving into estuaries.
– elsewhere: South-eastern Australia.

Size attained: 500 mm.

Literature: Graham 1956; Manikiam 1963.



Yellow-eyed mullet (*Aldrichetta forsteri*), 175 mm.

Family Leptoscopidae

This family contains three or four species, which are primarily marine, and several are in the New Zealand area; one enters fresh water.

Scientific name: *Leptoscopus macropygus* (Richardson, 1848).

Synonyms: None.

Common name: Stargazer.

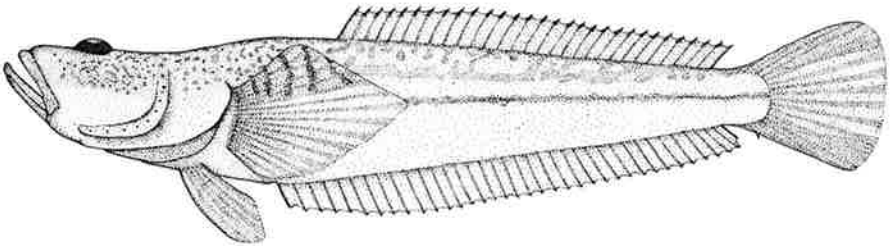
Status: Endemic.

Habit: Marine.

Distribution – New Zealand: Widespread; sometimes resident in estuaries.
– elsewhere: Unknown.

Size attained: 600 mm.

Literature: Graham 1956.



Stargazer (*Leptoscopus macropygus*), 170 mm.

Family Mugiloididae

This family contains about 25 primarily marine species, with several in New Zealand seas and 1 living in fresh water.

Scientific name: *Cheimarrichthys fosteri* Haast, 1874.

Synonyms: None.

Common name: Torrentfish.

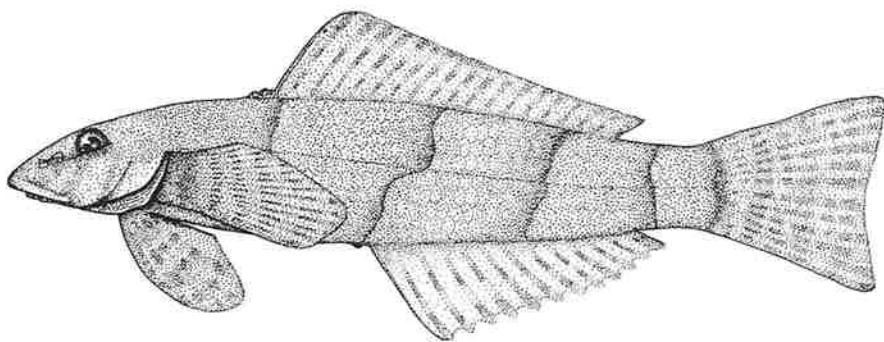
Status: Endemic.

Habit: Diadromous.

Distribution – New Zealand: Widespread in localities (except Chatham Islands) accessible to migrants from the sea; inland penetration moderate.
– elsewhere: Unknown.

Size attained: 161 mm.

Literature: McDowall 1973.



Torrentfish (*Cheimarrichthys fosteri*), 105 mm.

Family Tripterygiidae

This family contains about 95 primarily marine species, with 10–20 in New Zealand seas and 1 species marginally in fresh water.

Scientific name: *Tripterygion nigripenne* (Valenciennes, in Cuvier and Valenciennes, 1836).

Synonyms: None.

Common name: Cockabully.

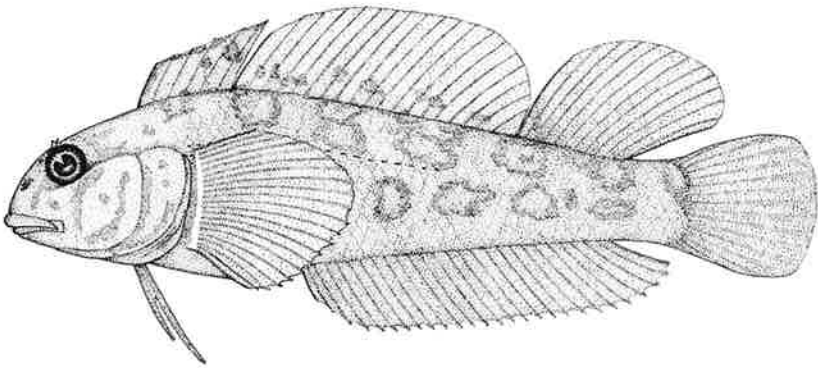
Status: Endemic.

Habit: Marine.

Distribution – New Zealand: Widespread; often resident in estuaries.
– elsewhere: Unknown.

Size attained: 150 mm.

Literature: Darby 1966; Graham 1956; Ruck 1973; Webb 1972, 1973..



Cockabully (*Tripterygion nigripenne*), 90 mm.

Family Eleotridae

This family contains about 300 marine and freshwater species, with 6 species in New Zealand fresh waters.

Key to species

(note: *G. cotidianus* appears twice in key)

- | | | |
|----|--|---|
| 1. | Open pores present on head – | 2 |
| | Open pores absent from head – | 5 |
| 2. | Median occipital pore present – | 3 |
| | Median occipital pore absent – | 4 |
| 3. | Scales present on head, on opercula, and on nape forward to between hind of eyes; diagonal stripes on cheeks – | <i>Gobiomorphus huttoni</i>
page 55 |
| | Scales absent from head; spots on cheeks – | <i>Gobiomorphus hubbsi</i>
page 57 |
| 4. | Cheeks heavily scaled; usually six spines in first dorsal fin – | <i>Gobiomorphus gobioides</i>
page 56 |
| | Cheeks rarely scaled; usually seven spines in first dorsal fin – | <i>Gobiomorphus cotidianus</i>
page 58 |

5. Scales on opercula and on nape forward to between hind of eyes; first scale at up to 53% of head length, usually less than 50% –

Gobiomorphus cotidianus
page 58

Scales absent on opercula and nape; first scale usually at over 55% of head length, most often 60%-80% –

6

6. Pectoral rays up to 16, usually 14-15; gill rakers very short, 6-9 –

Gobiomorphus breviceps
page 59

Pectoral rays 15 or more, usually 17-18; gill rakers moderately long, 8-11 –

Gobiomorphus basalis
page 60

Scientific name: *Gobiomorphus huttoni* (Ogilby, 1894).

Synonyms: *G. radiata*; *G. stokelli*.

Common name: Red-finned bully.

Status: Endemic.

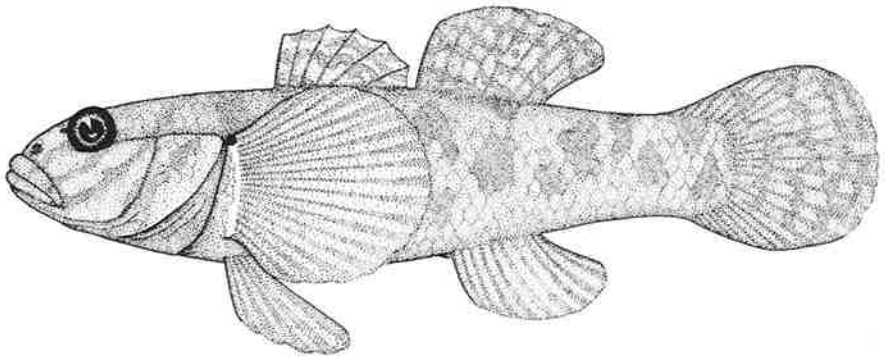
Habit: Diadromous.

Distribution — New Zealand: Widespread in localities accessible to migrants from the sea; inland penetration slight.

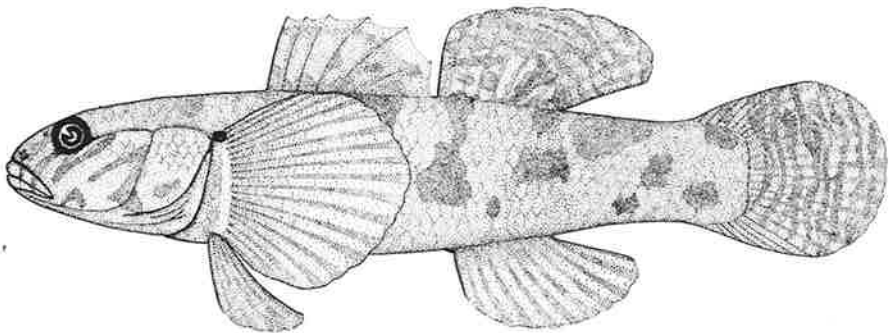
— elsewhere: Unknown.

Size attained: 122 mm.

Literature: McDowall 1964, 1965a, 1965b, 1975.



Red-finned bully (*Gobiomorphus huttoni*), female, 78 mm.



Red-finned bully (*Gobiomorphus huttoni*), male, 105 mm.

Scientific name: *Gobiomorphus gobioides* (Valenciennes, in Cuvier and Valenciennes, 1837).

Synonyms: None.

Common name: Giant bully.

Status: Endemic.

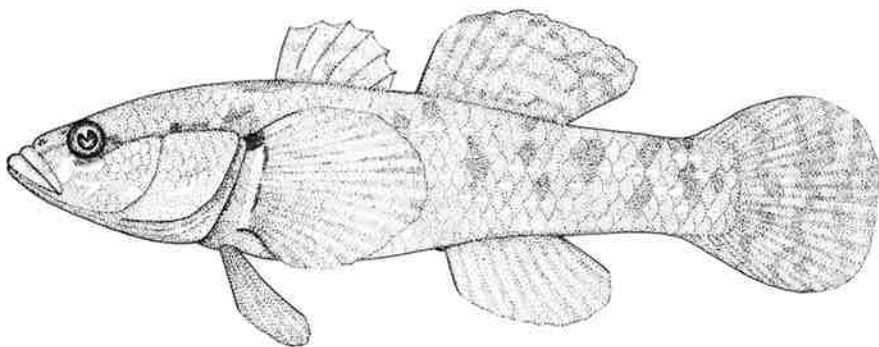
Habit: Diadromous.

Distribution – New Zealand: Widespread in localities very close to the sea.

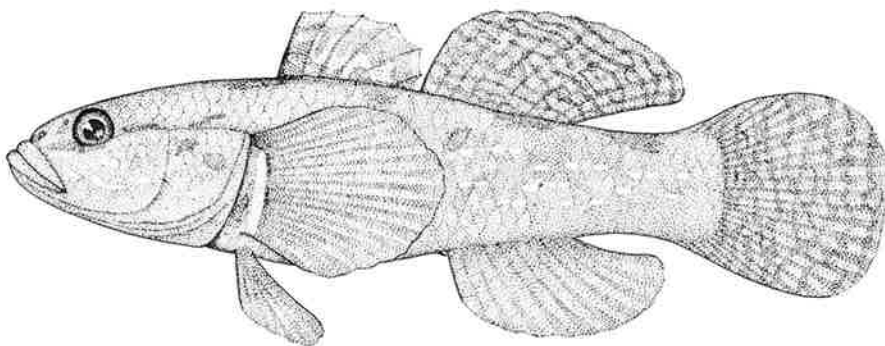
– elsewhere: Unknown.

Size attained: 222 mm.

Literature: McDowall 1975.



Giant bully (*Gobiomorphus gobioides*), female, 146 mm.



Giant bully (*Gobiomorphus gobioides*), male, 174 mm.

Scientific name: *Gobiomorphus hubbsi* (Stokell, 1959).

Synonyms: *Philypnodon hubbsi*.

Common name: Blue-gilled bully.

Status: Endemic.

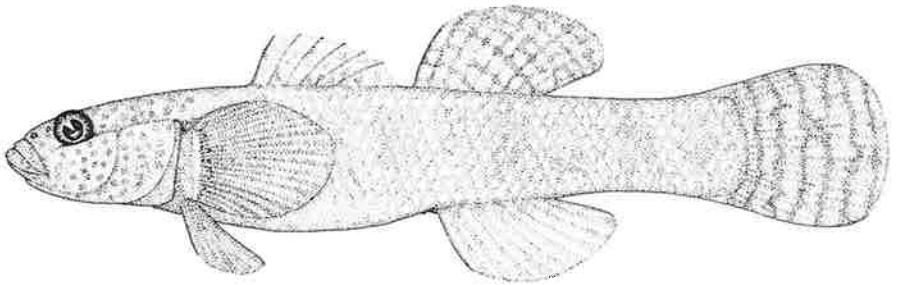
Habit: Diadromous.

Distribution – New Zealand: Widespread in localities accessible to migrants from the sea; inland penetration moderate.

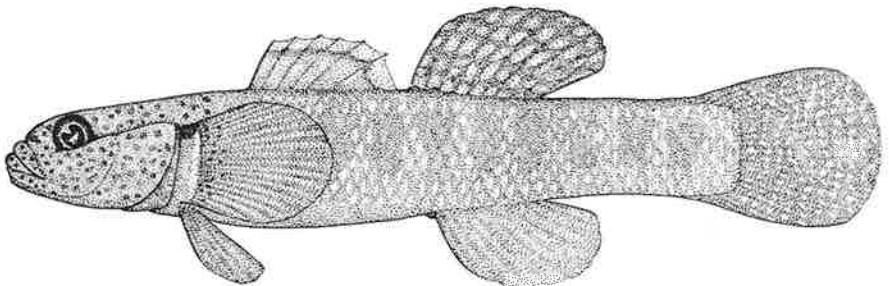
– elsewhere: Unknown.

Size attained: 77 mm.

Literature: McDowall 1975.



Blue-gilled bully (*Gobiomorphus hubbsi*), female, 61 mm.



Blue-gilled bully (*Gobiomorphus hubbsi*), male, 65 mm.

Scientific name: *Gobiomorphus cotidianus* McDowall, 1975.

Synonyms: Until recently incorrectly known as *G. basalis*:

Common name: Common bully.

Status: Endemic.

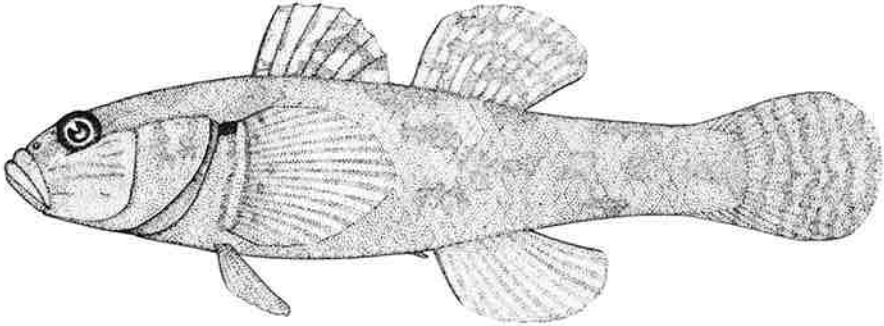
Habit: Diadromous and freshwater.

Distribution — New Zealand: Widespread in localities accessible to migrants from the sea; inland penetration slight; also landlocked populations in most lakes.

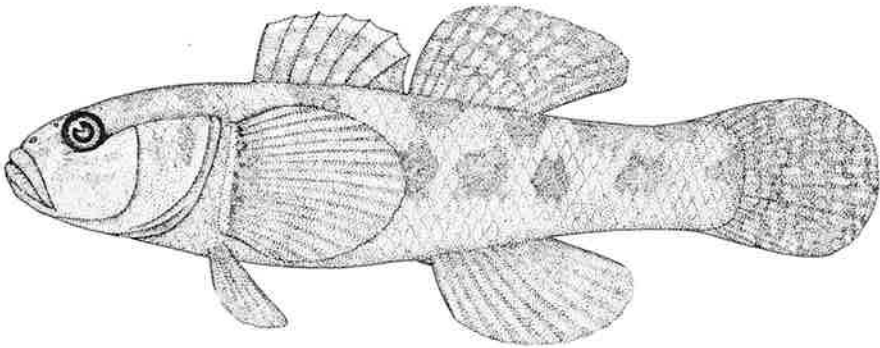
— elsewhere: Unknown.

Size attained: 148 mm.

Literature: McDowall 1975.



Common bully (*Gobiomorphus cotidianus*), female, 100 mm.



Common bully (*Gobiomorphus cotidianus*), male, 112 mm.

Scientific name: *Gobiomorphus breviceps* (Stokell, 1940).

Synonyms: *Philypnodon breviceps*.

Common name: Upland bully.

Status: Endemic.

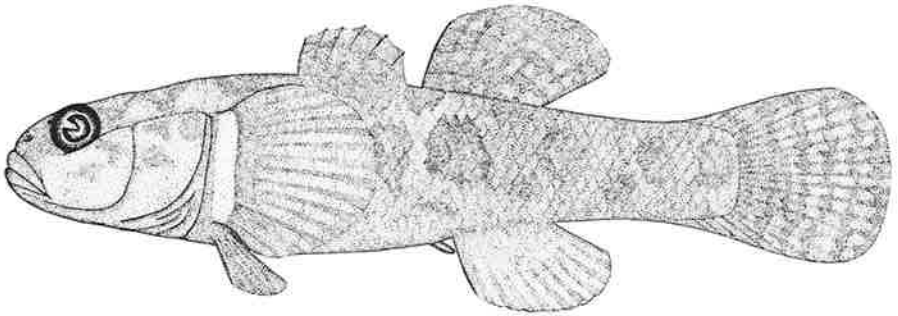
Habit: Freshwater.

Distribution – New Zealand: Some localities in southern North Island and widespread in lowland to subalpine localities in South Island.

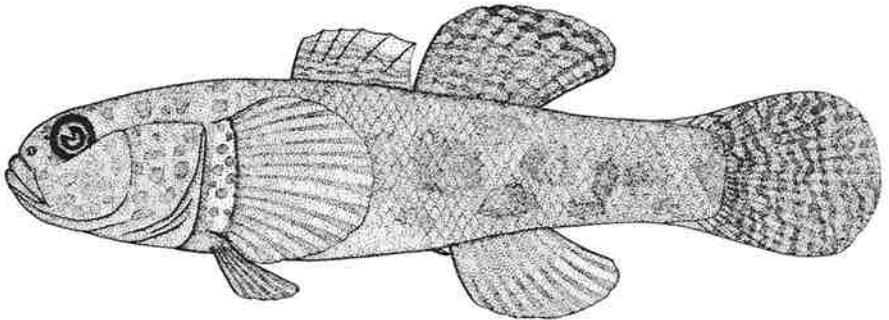
– elsewhere: Unknown.

Size attained: 109 mm.

Literature: Burnet 1963; Hopkins 1965, 1970, 1971; Lane and Skrzynski 1972; McDowall 1975; Staples 1975a, 1975b, 1975c.



Upland bully (*Gobiomorphus breviceps*), female, 79 mm.



Upland bully (*Gobiomorphus breviceps*), male, 83 mm.

Scientific name: *Gobiomorphus basalis* (Gray, 1842).

Synonyms: None.

Common name: Cran's bully.

Status: Endemic.

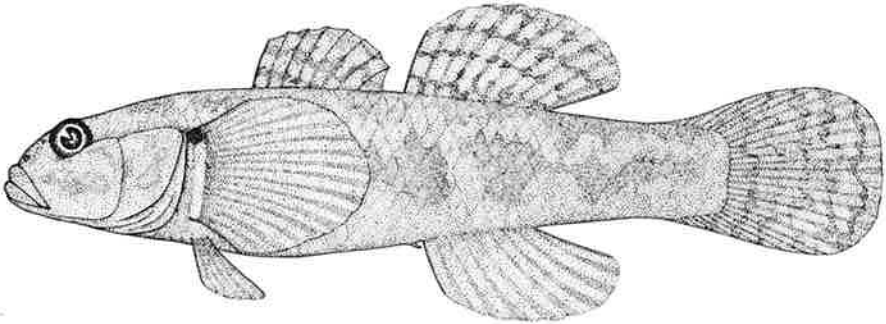
Habit: Freshwater.

Distribution — New Zealand: Widespread in inland localities in North Island and in Marlborough in South Island.

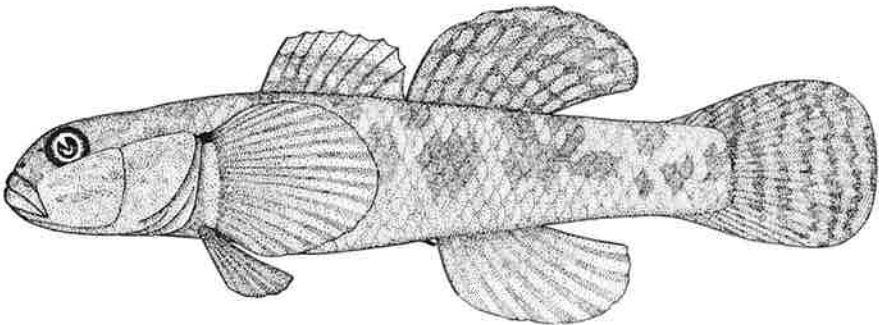
— elsewhere: Unknown.

Size attained: 92 mm.

Literature: McDowall 1975.



Cran's bully (*Gobiomorphus basalis*), female, 77 mm.



Cran's bully (*Gobiomorphus basalis*), male, 83 mm.

Family Pleuronectidae

This family contains about 100 primarily marine species, with several in New Zealand seas; 1 lives regularly in fresh water and another marginally in fresh water.

Key to species

Ocular surface with brick-red spots on olive-green background; 24–29 gill rakers; 63–75 scales along lateral line –

Rhombosolea retiaria
page 62

Ocular surface uniform greenish-grey; 13–17 gill rakers; 75–86 scales along lateral line –

Rhombosolea leporina
page 63

Scientific name: *Rhombosolea retiaria* Hutton, 1874.

Synonyms: None.

Common name: Black flounder.

Status: Endemic.

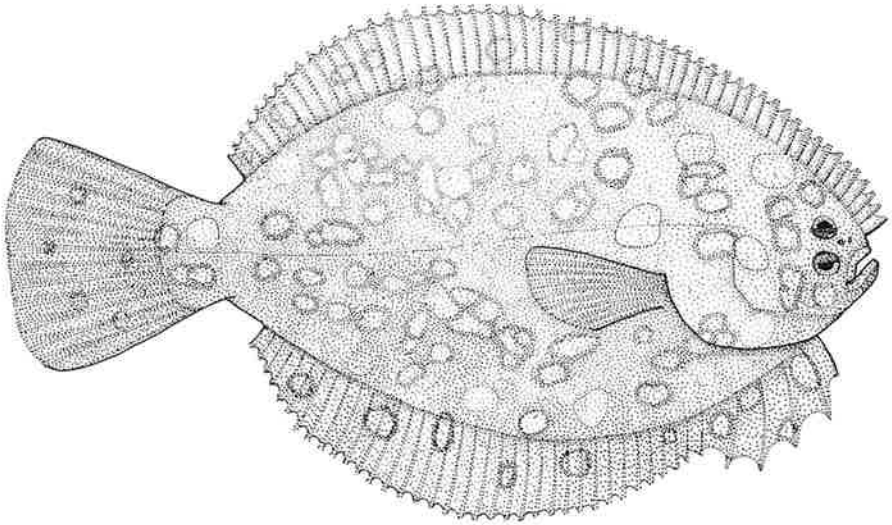
Habit: Diadromous.

Distribution – New Zealand: Widespread in localities accessible to migrants from the sea; inland penetration moderate.

– elsewhere: Unknown.

Size attained: 450 mm.

Literature: Graham 1956; Manikiam 1969.



Black flounder (*Rhombosolea retiaria*), 250 mm.

Scientific name: *Rhombosolea leporina* Günther, 1862.

Synonyms: *R. millari*.

Common name: Yellow-belly flounder.

Status: Endemic.

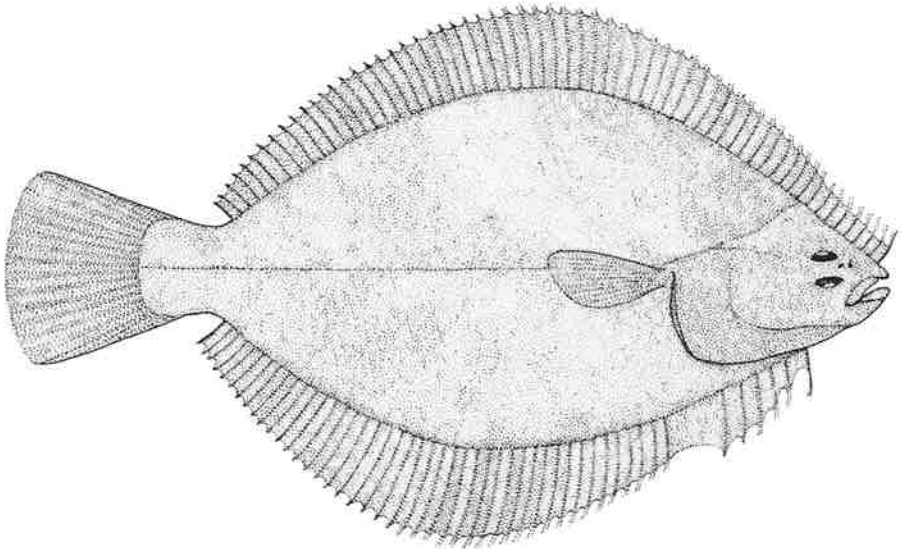
Habit: Marine.

Distribution – New Zealand: Widespread; enters river estuaries.

– elsewhere: Unknown.

Size attained: 400 mm.

Literature: Colman 1973; Manikiam 1969.



Yellow-belly flounder (*Rhombosolea leporina*), 222 mm.

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