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OBSERVATIONS ON THE FRESHWATER FISH OF A SMALL TASMANIAN COASTAL STREAM

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(with three tables and one text figure)

ABSTRACT

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Fish were collected on two occasions, May and December 1976, by electro-fishing from Parsons Bay Creek, a small coastal stream in southeastern Tasmania. From the six sites sampled, seven species of native fish and one species of introduced fish (*Salmo trutta*) were collected. In terms of biomass, the short-finned eel *Anguilla australis* dominated the catch, while in terms of numbers *Galaxias maculatus* dominated the catch in May and *Galaxias truttaceus* in December. Trout abundance and biomass were low. The numerical density and the biomass density of fish increased in a downstream direction as did the number of species per site. Standing crop estimates in Parsons Bay Creek indicate that the stream harbours a relatively high standing crop of fish, up to 30.36 g/m^2.

INTRODUCTION

In the published work on Australian freshwater fish there have been only a few reports on the ecology of fish communities in any freshwater body. Few data are available on the relative abundance and biomass of constituent fish species in Australian freshwater fish communities. The aim of this investigation is to examine how the distribution of fish, their population density and their standing crop change in a small Tasmanian stream from source to mouth.

The stream examined has the distinct attraction to fish biologists in that it harbours substantial populations of native fish and only a small population of one exotic fish species (*Salmo trutta*).

Parsons Bay Creek (Figure 1)

This small stream is on the western side of Tasman Peninsula in southeastern Tasmania. From its source (320 m a.s.l.) on the northwestern slopes of Mt Arthur the stream flows in a northwesterly direction to enter the sea at Parsons Bay (147°47'E, 43°08'S) near the village of Nubeena. Most of the catchment of the stream is covered by wet sclerophyll forest with some of the slopes and valley floor cleared for unimproved pasture. Part of the valley floor of the lower half of the stream is occupied by apple and pear orchards. The top part of the catchment (Stations 1 and 2) lies on Triassic sandstones while the major part of the catchment lies on Jurassic dolerites.

The creek has two major tributaries, an unnamed creek which rises on Benjafields Ridge and Thompsons Hill and flows north to enter Parsons Bay Creek near Highcroft and Plummers Creek which rises on the slopes of Mount Clark and Mount Koonya and flows southwesterly to join Parsons Bay Creek near Noyes Hill. The first tributary being of equal size to Parsons Bay Creek changes the stream order from 1 to 2. Following the stream order system of Horton (1945) as modified by Strahler (1957), Parsons Bay Creek at its mouth is thus an Order 2 stream. The catchment of the creek has a dendritic drainage pattern. The mainstream has a length of 12.6 km and a drainage area of 36 km^2.

The pH of the stream is about 7.20 and the conductivity about 270 uS/cm. Thus the stream has a higher conductivity and hence level of total dissolved solids than the

majority of lotic waters examined in Tasmania (Buckney and Tyler 1973).

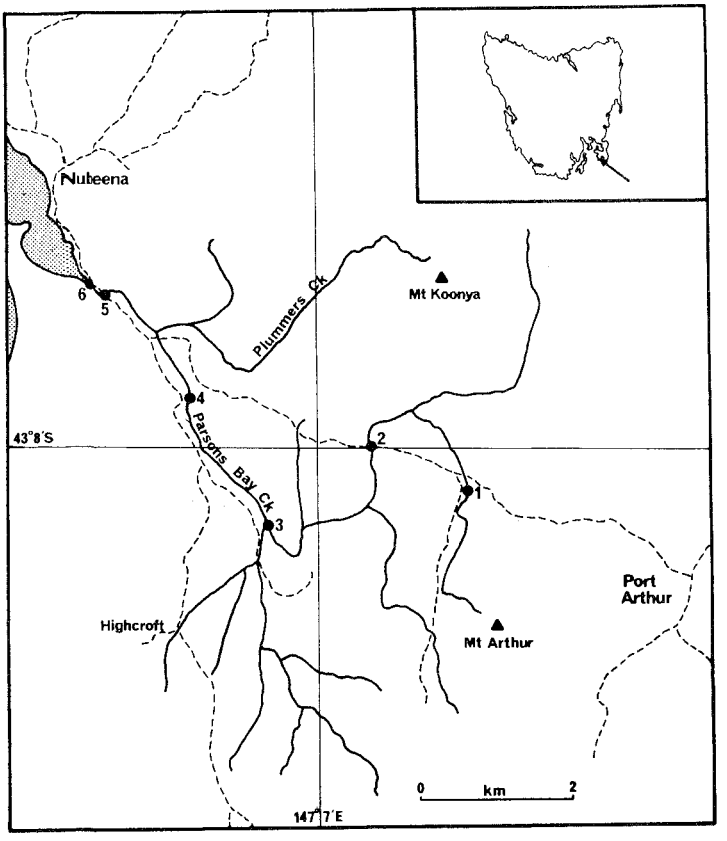

FIG.1.- Locality Map.

Sampling Sites

Site 1. This site is 2.4 km from the source of the creek on the slopes of Mt Arthur. The stream at this site emerges from an area of swamp. The stream is in a narrow channel flowing over a yellow clay substratum and it is lined with reeds. The length of the site that was fished was 80 m with a mean width of 0.5 m (area = 40 m^2) and a uniform depth of about 0.30 m. The site is on cleared land at an altitude of 260 m (a.s.l.).

Site 2.- This is 5.2 km from the source at an elevation of about 130 m (a.s.l.). just upstream of the second crossing (from Port Arthur end) of the stream by the Port Arthur-Nubeena Road. The length of the stream fished was 70 m with a mean width of 2.3 m (area = 161 m^2). The depth varied from 15 to 50 cm. The substratum of this site was mostly large stones and pebbles and the stream is relatively fast flowing. The top 40 metres of the site are completely shaded by eucalypts and tea tree while the lower section is open.

Site 3.- This site at an altitude of about 80 m a.s.l. is 7.6 km from the creek's source. It is situated just upstream of the junction between Parsons Bay Creek and the unnamed major tributary. The length of the section fished was 65 m with a mean width of 3.1 m (area = 201.5 m^2). The depth varies from about 0.20 m to 0.75 m. The upper part of this site, in a downstream direction, consists of a shallow pool, a riffle and a flat while below this part there is a cascade section over protruding dolerite bed rock.

Site 4.- This site is in a small densely vegetated gorge at an altitude of about 40 m (a.s.l.) and 9.5 km from the source. The section of stream fished was 70 metres long with a mean width of 3 m (surface area = 210 m). The stream is fast flowing over and around large boulders and stones. This site is almost totally shaded by a dense bank-side growth of tea tree, willows, eucalypts and blackwood. The depth of the site varies from about 0.20 to 0.80.

Site 5,- This site was straddled by the bridge of the fourth crossing of the stream by the Nubeena-Port Arthur Road. It is 0.3 km upstream from site 6 and is 12.3 km from the creek's source, and is at an altitude of 3 m a.s.l. The section of stream fished was 52 m with a mean width of 3.75 m (surface area = 195 m^2). The upstream part consists of flats and a pool while below there is an extensive stickle section. This section is

shaded only beneath the bridge. The depth varied from about 0.15 m to 0.80 m.

Site 6.- This site is just above sea level and just above the entry of the creek into the sea. The section of stream fished was 50 m with a mean width of 4.1 m (area fished = 205 m^2). Approximately 20 m of the section, although fresh water, is under tidal influence. On both sampling occasions the section was electro-fished at low tide. The depth varied from 0.10 to 0.60 m. The site was partly shaded by scattered eucalypts and casuarinas.

Sampling Methods

The six sites on the stream were sampled on two separate occasions; in late autumn (1-2 May 1976) and late spring (4-5 December 1976). On both occasions the creek was at the same level. The electro-fishing apparatus used was constructed from a design of Dr R.H.K. Man (pers. comm.) of the Freshwater Biological Association, U.K., with the design of the control switch circuitry being modified. Electric power was provided by a Honda E 800 U generator and the A.C. current was rectified to a 50 p.p.s. D.C. current. Each stream section was delineated by upstream and downstream 1 cm mesh nets. The section was then electro-fished twice in an upstream direction with a time interval of 30 minutes between each run. All fish captured were identified, counted and their wet weights and lengths recorded in the field.

In order to assess the efficiency of the electro-fishing procedures in Parsons Bay Creek, a series of five electro-fishing runs were carried out at Site 5 in December 1976. A time interval of 30 minutes elapsed between each successive electro-fishing run.

RESULTS

In the five electro-fishing runs at Site 2 in December 1976, six species of native fish and one species of exotic fish (*Salmo trutta*) were caught. The numbers of fish for all species caught per electro-fishing run were plotted against previous total catch and the line fitted by eye (Southwood 1966). In two electro-fishing runs in Parsons Bay Creek with the apparatus used, 60.2 per cent of the estimated total catch was caught. A non-parametric contingency test (Elliott 1971) revealed that for the seven species of fish caught at Site 2 the proportion of fish of each species caught per successive run did not vary significantly ($P < 0.05$).

When wet weight of all species caught per successive electro-fishing run was plotted against previous total biomass the estimated total biomass was 4 510 g and 77.2 per cent of the total estimated biomass was caught in the first two electro-fishing runs. The non-parametric contingency test revealed that for the seven species of fish the proportion of biomass of each species caught per successive electro-fishing runs did vary markedly.

Estimates of the total population of fish in the sections of Parsons Bay Creek that were electrofished were approximated by multiplying the observed catch in two successive electro-fishing runs by 1.661. Less reliable estimates of the total biomass of fish were made by multiplying the biomass of the observed catch in two successive electro-fishing runs by 1.295.

Seven species of native fish *Anguilla australis* (Richardson), *Galaxias maculatus* (Jenyns), *Galaxias truttaceus* (Valenciennes), *Pseudaphritis urvillii* (Cuvier and Valenciennes), *Favonigobius tamarensis* (Johnston), *Retropinna tasmanica* McCulloch and *Geotria australis* (Gray) and one species of exotic fish (*Salmo trutta* Linnaeus) were collected from Parsons Bay Creek in May 1976.

The short-finned eel *Anguilla australis* was the dominant fish by weight (53.5 per cent of the total biomass collected) and *Galaxias maculatus* was the numerically dominant fish in the system (51.62 per cent of the total number of fish collected) (table 1). Of the eight species caught in the creek three species (*Pseudaphritis urvillii*, *Favonigobius tamarensis*, *Retropinna tasmanica*) were caught only at site 6, close to the sea. On the

TABLE 1

The estimated numerical densities (No./m^2) (A) and biomass densities (g wet weight/m^2) (B) of fish at each sampling site in Parsons Bay Creek on 1-2 May 1976

	Site 1		Site 2		Site 3		Site 4		Site 5		Site 6	
	A	B	A	B	A	B	A	B	A	B	A	B
Anguilla australis	0.15	2.07	0.02	2.83	0.10	6.83	0.07	3.13	0.20	7.98	0.05	1.62
Galaxias maculatus	-	-	-	-	0.11	0.31	0.03	0.08	0.68	2.00	0.50	.72
Galaxias truttaceus	-	-	0.03	0.05	0.05	0.31	0.15	2.73	0.14	2.36	0.03	0.31
Pseudaphritis urvillii	-	-	-	-	-	-	-	-	-	-	0.02	1.88
Favonigobius tamarensis	-	-	-	-	-	-	-	-	-	-	0.19	0.20
Retropinna tasmanica	-	-	-	-	-	-	-	-	-	-	0.03	0.01
Geotria australis	-	-	-	-	-	-	0.02	0.01	0.03	0.02	-	-
Salmo trutta	-	-	0.03	0.42	0.02	3.19	0.01	0.12	0.01	4.32	-	-
Total numerical density	0.15	-	0.08	-	0.28	-	0.28	-	1.06	-	0.82	-
Total biomass density	-	2.07	-	3.75	-	10.64	-	6.07	-	16.68	-	4.74

TABLE 2

The estimated numerical densities (No./m^2) (A) and biomass densities (g wet weight/m^2) (B) of fish at each sampling site in Parsons Bay Creek on 4-5 December, 1976

	Site 1		Site 2		Site 3		Site 4		Site 5		Site 6	
	A	B	A	B	A	B	A	B	A	B	A	B
Anguilla australis	0.04	1.07	0.22	11.36	0.42	18.00	0.12	14.50	0.50	15.19	0.98	23.01
Galaxias maculatus	-	-	-	-	0.21	1.18	0.04	0.23	0.62	2.36	0.61	2.53
Galaxias truttaceus	-	-	0.05	1.02	0.12	1.66	0.06	1.27	1.70	2.66	0.85	2.66
Pseudaphritis urvillii	-	-	-	-	-	-	-	-	0.02	0.13	0.26	1.37
Favonigobius tamarensis	-	-	-	-	-	-	-	-	-	-	0.65	0.71
Rhombosolea tapirina	-	-	-	-	-	-	-	-	-	-	0.05	0.08
Geotria australis	-	-	-	-	-	-	-	-	0.26	0.09	-	-
Salmo trutta	-	-	-	-	0.02	2.98	0.01	1.58	0.02	2.60	-	-
Galaxias brevipinnis	-	-	-	-	-	-	0.02	0.01	-	-	-	-
Total numerical density	0.04		0.27		0.77		0.25		3.12		3.4	
Total biomass density		1.07		12.38		23.82		17.59		23.03		30.36

other hand, *Anguilla australis* occurred at all sites, being the only species present at site 1 and being the dominant fish by weight at all sites except site 6. The only exotic fish collected, *Salmo trutta*, was poorly represented.

In terms of estimated numerical density of fish and estimated biomass density of fish, site 5 yielded the highest numerical density and highest biomass density, while site 2 had the lowest estimated numerical density and site 1 the lowest estimated biomass density (table 1).

In December 1976, eight species of native fish and one species of exotic fish were collected with the two native fish species (*Galaxias brevipinnis* Günther and *Rhombosolea tapirina* Günther), being additions to the species caught in May. As in May the short-finned eel dominated the catch in terms of biomass while *Galaxias truttaceus* dominated the catch numerically (table 2).

The Tamar River goby *Favonigobius tamarensis* and juvenile greenback flounder *Rhombosolea tapirina* were only found at site 6 and surprisingly in view of their distribution in May, ammocoete larvae of *Geotria australis* were only found at site 5. *Galaxias brevipinnis*, allowing for only two electro-fishing runs per site, was only found at site 4 but at site 5 this species was collected in the fifth electro-fishing run.

In May 1976 eight species of fish were caught in the creek while in December 1976 nine species of fish were caught. On both sampling occasions the number of species increased steadily from source to mouth with *Anguilla australis* at both times being the only species at site 1 (tables 1 and 2).

In both May and December sites 5 and 6 harboured species found nowhere else. Thus in May *Pseudaphritis urvillii*, *Favonigobius tamarensis* and *Retropinna tasmanica* were only found at site 6 and in December *Favonigobius tamarensis* and *Rhombosolea tapirina* were only found at site 6. Ammocoete larvae of *Goetria australis* were collected at sites 4 and 5 in May but only at site 5 in December. The smelt *Retropinna tasmanica* was only collected in May while *Rhombosolea tapirina* and *Galaxias brevipinnis* were only collected in December 1976.

For both sampling occasions the estimated numerical density and the estimated biomass density increased from source to mouth (tables 1 and 2). In December the estimated numerical density and the estimated biomass density of fish at each site were greater than in May. The increase in numerical density was most marked at sites 5 and 6 and was largely due to a great increase in the number of *Anguilla australis*, *Galaxias truttaceus*, *Favonigobius tamarensis* and *Pseudaphritis urvillii* at these two sites. Increased numbers of *Anguilla australis* were also caught in December at sites 2 and 3. The increased biomass density of the December samples compared with those of the May samples was largely due to the considerable increase in the biomass of eels captures at all sites except site 1 in December.

DISCUSSION

For reliable estimates of numbers and of biomass of fish in the stream it is important to have an estimate of the efficiency of the electro-fishing apparatus that is used. It was found in Parsons Bay Creek, using our electro-fishing apparatus that in two successive electro-fishing runs 60.2 per cent of estimated total number of fish and 77.2 per cent of the estimated total biomass of fish in any one section were caught. Such results compare favourably with efficiencies reported by other workers electro-fishing in systems similar to that of the study (e.g. Burnet 1952, Nicholls 1958b, Hopkins 1970, Fletcher 1979).

The numberical proportion of fish caught in each successive electro-fishing run for each species was shown not to vary significantly, but the biomass proportion of fish caught for electro-fishing run for each species did vary significantly. The principal cause for this variation appeared to be due to the heavier catches of eels and trout in

the initial runs due to the fact that large fish are more susceptible to capture by electro-fishing than smaller fish (Vibert 1967, Lagler 1971). Hence in the first and second runs through a stream section, the large fish are more likely to be captured.

In Tasmania, at present, there are 25 recorded species of native freshwater fish (Frankenberg 1974, Andrews 1976, Fulton 1979, McDowall 1980) and six species of introduced freshwater fish (Lake 1978, McDowall 1980). From Parsons Bay Creek seven species out of the 25 freshwater fish native to Tasmania were collected and one out of the six species of introduced freshwater fish. The Tamar River goby *Favonigobius tamarensis* and the greenback flounder *Rhombosolea tapirina* in Parsons Bay Creek may be regarded as being marine fish capable of living in fresh water though neither species is listed by Frankenberg (1974) in his list B "Species of predominantly marine families occasionally recorded in fresh water".

The short-finned *Anguilla australis* was found at all sites in both May and December and in terms of fiomass, eels were dominant at all sites except site 6 in May. Very little scientific data are available on the biology of eels in Tasmania. Short-finned eels are widespread in Tasmania occurring in almost all of the coastal rivers of the State, in both fast and slow flowing sections (Fulton 1979). In Tasmania, as in New Zealand (*vide* Cairns 1950), short-finned eels have three distinct migrations in their life history (Frankenberg 1974). The first migration, the movement into the estuaries of glass eels appear to occur in winter and early spring (Fulton 1979). The upstream migration of the elvers in the streams appear to take place in mid-summer (Sloane 1978b, Fulton 1979). A downstream spawning migration of the adult eels must occur but details of the time are not available. Frankenberg (1974) suggested that this migration occurs in autumn. In Parsons Bay Creek very few small eels or elvers were collected at any of the sites in May but in December elvers were abundant at sites 5 and 6 suggesting that in December that the upstream migration of elvers was under way.

Galaxias truttaceus was numerically dominant in the creek in December with a large number of juvenile fish at site 5. The fish was distributed throughout Parsons Bay Creek except at the top, e.g. site 1. The adult fish appear to favour sections of stream with large rocks, turbulent flow and a complete plant canopy. This species of galaxiid is widely distributed in Tasmania (Frankenberg 1974, Andrews 1976). *G. truttaceus* is a constituent of Tasmanian whitebait runs with a migration of juvenile fish occurring from September to December (Scott 1941, Lynch 1965, Fulton 1979, McDowall 1980). The timing of this migration fits with the observation at sites 5 and 6 of a large number of juvenile fish in December.

Galaxias maculatus was limited to the lower and middle sections of Parsons Bay Creek and was the numerically dominant fish in May. It was well represented in both May and December at both sites 5 and 6, with a high proportion of juvenile fish at these sites, in both months. This fish is common in coastal streams of Tasmania and is generally confined to the lower reaches of these streams (Frankenberg 1974, Andrews 1976, McDowall 1980). In this study the species penetrated about 5.5 km up the stream from the sea (total length of the stream was about 12.6 km). There are two major migrations in the life cycle of *G. maculatus* (McDowall 1978). In Tasmania the peak of *G. maculatus* occurrence in the whitebait run is reached in September and October (Scott 1938, Fulton 1979). At both sites 5 and 6, at both sampling times, juvenile fish were abundant. The juveniles in December may have resulted from the whitebait run in September-October.

The sandy or freshwater flathead, *Pseudaphritis urvillii* was found in the lower reaches of Parsons Bay Creek at Sites 5 and 6. In May adult fish were collected at site 6 while in December at sites 5 and 6 a lot of small fish were present. Hortle (1978) investigated the ecology of this fish in Nicholls Rivulet, a small stream in southern Tasmania. He found that this fish penetrated upstream for a considerable distance to near the source of the stream; a distribution quite different from that found in Parsons Bay Creek. The densities of *Pseudaphritis urvillii* in Nicholls Rivulet were much higher (e.g. up to 17 fish/m^2) than those found for this fish in Parsons Bay Creek (max. density = 0.16 fish/m^2 at site 6 in December). The latter low density of *P. urvillii* is

comparable with densities for this fish reported in southern Tasmanian streams by Sloane (1978a).

In this study *P. urvillii* was found in areas with a coarse gravel and stone bottom especially around logs and aquatic macrophytes. This observation fits with the habitat description given for this fish by Hortle (1978). Hortle (1978) found that density of *P. urvillii* decreased in an upstream direction and that this decline in density was paralleled by an increase in the age of the fish. Young fish (0+) were to be found in the lower reaches of the stream under estuarine influence. Hortle (1978) suggested that *P. urvillii* bred in the estuaries and that the young 0+ fish migrated into the lower reaches of the stream under estuarine influence in December-January. This observation accords with the presence of small *P. urvillii* at site 6 in December.

The Tamar River goby *Favonigobius tamarensis* was only found at site 6 in both May and December. The fish was listed by Whitley (1964), Lake (1971) and McDowall (1980) as a native freshwater fish but not as such by Frankenberg (1974) or Lake (1978). At site 6 this species was most abundant in the rocky stickle section just above tidal influence.

The young greenback flounders *Rhombosolea tapirina* are invaders from the sea being found in fresh water at site 6 just above tidal invluence. Flounders of the genus *Rhombosolea* appear to have a propensity to enter fresh water for in New Zealand two species, *Rhombosolea retiaria* and *R. leporina*, are found in fresh water - in coastal rivers and lakes (McDowall 1978). McDowall (1980) does not however list any species of the family Pleuronectidae as occurring in fresh water in southeastern Australia.

Aspects of the biology of the greenback flounder in Pittwater, a shallow estuarine area near Hobart, were investigated by Kurth (1952). He found that the flounder especially the young fish could tolerate a substantial range of both salinity and temperature but he did not record flounder in fresh water.

Although two species of lamprey (*Mordacia mordax* and *Geotria australis*) are to be found in Tasmanian coastal streams (Frankenberg 1974, Fulton 1979) the ammocoetes of only one species (*Geotria australis* were collected from Parsons Bay Creek. The occurrence of *Geotria australis* in Parsons Bay Creek is at some variance with the suggestion of Hubbs and Potter (1971) that *Geotria australis* does not occur in the rivers of eastern Tasmania. The ammocoete larvae were collected in gravel and sand at the lower sites (sites 5 and 6); not an ideal habitat for ammocoetes according to Hardisty and Potter (1971).

The brown trout (*Salmo trutta*) is an uncommon fish in Parsons Bay Creek occurring in low densities at all sites except Sites 1 and 6. The fishing pressure on this creek appears to be very low and there are no records of liberations of trout into it. The stock of fish in the creek may have been established and be maintained by migratory trout which occur in southern Tasmanian estuaries (Nicholls 1961). Parsons Bay Creek and its tributaries do not possess any substantial sections of stream with clean gravel suitable for trout spawning and thus the resident trout population may have a low recruitment rate. Some recruitment does however occur as indicated by the low numbers of small trout collected.

In Parsons Bay Creek in May and December 1976, both the numerical density and the biomass density of the fish increased in a downstream direction. Both of these trends differ somewhat from trends found by other workers. The density of fish (number of fish per unit surface area of water) has been reported to decrease in a downstream direction (e.g. Thompson and Hunt 1930, Larimore and Smith 1963). The explanation of these trends is that as one proceeds downstream "the individuals are usually larger and the total weight per unit area remains more or less constant" (Hynes 1970). However, examination of the data of other stream workers reveals that these two trends are by no means universal in their application. For example, in a Scottish stream with salmon and trout no trend for fish density to decrease downstream was apparent (Egglishaw 1970). In both the North Esk River and St. Patricks River, northern Tasmania, Nicholls (1958b) found that both numerical and biomass density increased in a downstream direction.

In Parsons Bay Creek, due principally to the dominating influence of the eels, there is no trend for small fish upstream to be replaced in a downstream direction by larger fish of the same or similar species. In the creek the increase of the numerical and biomass densities in a downstream direction may be partly due to the migration into fresh water, on a short-term or long-term basis of fish from the sea (e.g. *Favonigobius tamarensis*, *Anguilla australis*, *Galaxias maculatus*, *Galaxias truttaceus*, *Pseudaphritis urvillii*). The pool of fish in the sea potentially capable of migrating into fresh water nourished in part or wholly by marine resources, could have an important influence on the numbers and standing crop of fish in the sections of stream close to the estuary (sites 5 and 6).

TABLE 3

Estimates of standing crop (g/m^2) of fish in Parsons Bay Creek Compared with estimates of standing crop from some Australian and New Zealand streams

SITE	STANDING CROP, g/m^2		REFERENCE
Parsons Bay Creek, Tasmania	May 1976	December 1976	
Site 1	2.07	1.07	This study
Site 2	3.75	12.38	
Site 3	10.64	23.82	
Site 4	6.07	17.59	
Site 5	16.68	23.03	
Site 6	4.74	30.36	
Tasmania:			
Ration Tree Creek, nr Mole Creek		7.66	Nicholls 1958a
Sassafras Creek, nr Liena		16.42	Nicholls 1958a
North Esk River 1955		.56-17.45	Nicholls 1958b
" " " 1956		1.79-16.80	Nicholls 1958b
St. Patricks River 1955		.34-20.83	Nicholls 1958b
" " " 1956		.11-11.76	Nicholls 1958b
Victoria			
Watchbox Creek, Strathbogie Ranges			
sections with *Galaxias olidus* only		1.13-2.71	Fletcher 1979
sections with *Salmo trutta* *Galaxias olidus*		.81-5.53	Fletcher 1979
Running Creek, Kinglake			
sections with *Gadopsis marmoratus* and *Galaxias olidus*		4.14-18.50	Fletcher 1979
sections with *Gadopsis marmoratus*, *Galaxias olidus*, *Salmo trutta*, *Anguilla australis*		3.54-7.27	Fletcher 1979
New South Wales			
MacLaughlin River, Snowy River System		19.04	Lake 1957
Abercrombie River, Lachlan River System		19.38	Lake 1957
New Zealand			
Horokiwi stream		26.54	Allen 1951

As table 3 shows, the standing crop in Parsons Bay Creek varies considerably both in time and from site to site. Site 1 has the lowest standing crop - 1.01 and 2.07 g/m^2 while the highest standing crop of 30.36 g/m^2 is found at site 6 in December. In terms of representative Tasmanian streams (Nicholls 1958a, b), Victorian streams (Fletcher 1979) and N.S.W. streams (Lake 1957), Parsons Bay Creek has a relatively high standing crop (table 3), and is quite comparable in magnitude with the upper levels of standing crops in known, highly productive streams (table 3, and see Hynes 1970).

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