FISHING INDUSTRY RESEARCH TRUST ACCOUNT

PROJECT 84/27: Identification of deep-water trawl fish stocks

using parasites as markers. University of Queensland and

Department of Sea Fisheries, Tasmania

FINAL REPORT, PART I. ORANGE ROUGHY

Orange roughy are a relatively sedentary species with little

movement between fish management zones. This is the conclusion

of our analysis of the numbers of parasites in the gut wall of

1251 orange roughy Hoplostethus atlanticus from eight areas off

southern Australia and three areas off New Zealand (Fig. 1).

Fish from each area were divided into three length groups

which averaged close to 28, 37 and 42 cm. Statistical analysis

of data on larval nematodes (Anisakis spp., Terranova sp., and a

spirurid) and larval cestodes (Hepatoxylon trichiuri and

Callitetrarhynchus sp.) discriminated five Australian and three

New Zealand stocks. These were: Great Australian Bight (area 1);

South Australia/west Victoria/west and south Tasmania (areas

2,3,4 and 5); Cascade Plateau/Tasman Rise (area 6); north-east

Tasmania (area 7); New South Wales (area 8); north-east New

Zealand (9); south-east New Zealand (1Ø); and west New Zealand

(11) (Figs 2 and 3).

In four pairs of samples, little difference was found

between the parasite fauna of fish taken during the spawning

season and those taken outside the spawning season in the same

area. Along the west coast of Tasmania there was a gradual

increase in the numbers of larval ascaridoid nematodes as one

moved south. This was apparent in both small (immature) and

medium-sized (mature) fish. These results suggest that at least

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medium-sized fish spawn in the same locality that they inhabited as juveniles.

Two manuscripts have been submitted for publication:
1) Lester, R.J.G., K.B. Sewell, A. Barnes and K. Evans. Stock discrimination of orange roughy Hoplostethus atlanticus by parasite analysis. Submitted to 'Marine Biology'.
2) Sewell, K.B. and R.J.G. Lester. The numbers of selected parasites in Australian and New Zealand samples of orange roughy Hoplostethus atlanticus, 1983 to 1986. Submitted to 'Tasmanian Fisheries Research'.

Copies of the manuscripts have been lodged with FIRTA.

FIGURE CAPTIONS

Figure 1. Origins of the eleven samples of orange roughy from Australia and New Zealand, and the 1000m depth contour.

Figure 2. Graphical representation of the similarities of the parasite faunas of large roughy from Australian samples. The first two canonical axes from a multivariate analysis are shown. Each sample is representated by a point surrounded by a circle indicating the 99% confidence limit. Note that the parasite faunas of areas 1 and 6 are distinct from other areas. When the third axis was taken into account, area 7 was separated from all other areas at the 95% level of confidence.

Figure 3. Similarity of parasite faunas from large fish in New Zealand.

Fig. 1.

Fig. 2.

Fig. 3.

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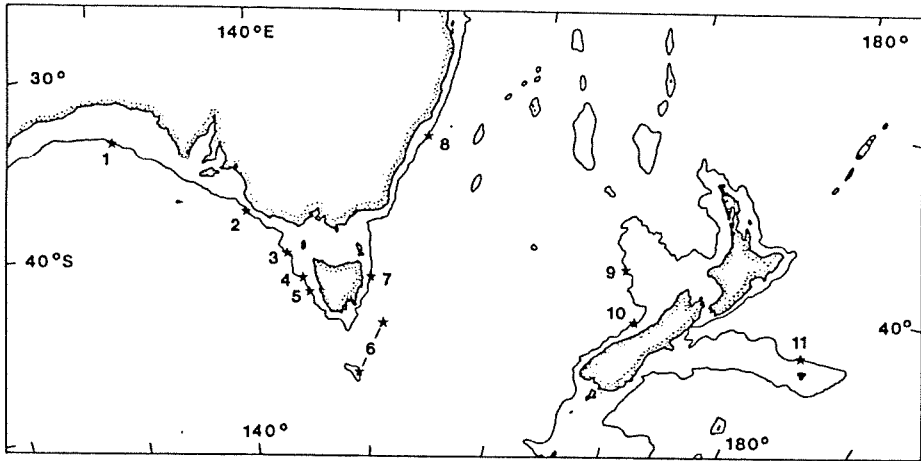The numbers of selected parasites in Australian and New Zealand samples of orange roughy Hoplostethus atlanticus, 1983 to 1986.

K.B Sewell and R.J.G Lester

Department of Parasitology, University of Queensland, St. Lucia, Brisbane, Australia 4067.

From 1983 to 1986, 40 samples of orange roughy from Australia and New Zealand were dissected and the numbers of selected parasite species recorded. Most of the data was used for the analysis in Lester, Sewell, Barnes and Evans (in press).

This paper contains the raw data. Australian fish are listed first (Tables 1 to 3) followed by New Zealand fish (Tables 4 to 6). The length of Australian fish was recorded as length to caudal fork (LCF). The length of New Zealand fish was recorded as standard length (SL) and converted to LCF by the formula, LCF = (SL x 1.10) + 0.195 (New Zealand Ministry of Agriculture and Fisheries, personal communication). For each country, data from small fish (20 to 34 cm LCF) are followed by those for medium sized fish (35 to 39 cm LCF) and for large fish (40 to 48 cm LCF). At the end of each table there is a group of fish separated by a blank line. These are the short and long fish removed from each size group to equalize the mean length prior to the analysis in Lester et. al. Asterisks indicate unknown data.

The 22 columns in Tables 1 to 6 refer to the following:
Column

1	Autopsy number
2	Area (see Figure 1)
3	Area sample number
4	Capture date (day month year)
5	Fish length (LCF cms)
6	Sphaeromyxa sp. (1 = present, 0 = absent)
7	Spirurid sp.
8	Hepatoxylon trichiuri
9	Degenerate H. trichiuri
10	Tentacularia sp.

11	*Sphyriocephalus* sp.
12	*Callitetrarhynchus* sp.
13	*Anisakis* type 1
14	*Anisakis* type 2
15	*Anisakis* type 3
16	Degenerate *Anisakis*
17	*Terranova* sp.
18	*Echinorhynchus* sp.
19	*Ascarophis* sp.
20	*Glomericirrus* *amadai*
21	*Pseudopecoelus* sp.
22	Scolex polymorphus

Tables 1 to 6 are followed by Table 7 which gives the locations for the 40 sampling sites and other details.

Representative specimens for the 14 parasite species have been lodged in the Queensland Museum. Their accession numbers are listed in Table 8.

Reference

Lester, R.J.G., K.B. Sewell, A. Barnes and K. Evans. Stock discrimination of orange roughy *Hoplostethus* *atlanticus* by parasite analysis. Marine Biology (in press).

Table 1. Numbers of parasites in small <u>H.atlanticus</u> (20 to 34

cm LCF) from Australia.

3	1	1	50683	29	0	*	0	0	19	0	0	2	1	0	0	0	0	1	0	0	0
4	1	1	50683	30	0	*	0	0	13	0	0	5	0	0	0	0	0	2	1	0	0
7	1	1	50683	21	0	0	0	0	0	0	0	0	0	0	0	0	12	5	0	0	0
8	1	1	50683	32	0	*	0	0	2	0	0	2	0	0	0	0	3	2	2	0	0
10	1	1	50683	29	0	1	0	0	0	0	0	5	1	0	1	0	0	18	0	0	0
13	1	1	50683	31	0	1	0	0	3	0	0	1	0	0	0	0	0	3	0	0	0
14	1	1	50683	27	0	*	0	0	3	0	0	1	0	0	0	0	4	7	2	0	0
17	1	1	50683	27	0	30	0	0	*	0	0	1	0	0	0	0	2	1	2	0	0
18	1	1	50683	30	0	*	0	0	*	0	0	2	0	0	0	0	10	1	0	0	0
19	1	1	50683	26	1	*	0	0	*	0	0	1	1	0	0	0	4	4	1	0	0
470	1	2	91184	32	1	50	0	0	1	0	0	5	0	0	0	0	0	16	2	0	2
472	1	3	101184	28	0	4	0	0	*	0	0	0	0	0	0	0	0	*	*	*	*
480	1	3	101184	27	1	5	0	0	*	0	0	2	0	0	0	0	2	*	*	*	*
481	1	3	101184	25	0	2	0	0	*	0	0	1	1	0	0	0	7	*	*	*	*
484	1	3	101184	28	1	2	0	0	1	0	0	0	0	0	0	0	5	*	*	*	*
486	1	3	101184	29	1	1	0	0	*	0	0	10	1	0	0	1	1	*	*	*	*
489	1	3	101184	26	0	0	0	0	*	0	0	0	0	0	1	0	0	2	0	0	1
560	1	3	101184	23	0	3	0	0	*	0	0	0	0	0	0	0	12	*	*	*	*
561	1	3	101184	31	0	10	0	0	*	0	0	6	0	1	0	0	4	*	*	*	*
564	1	3	101184	23	1	12	0	0	*	0	0	2	1	0	2	0	11	*	*	*	*
572	1	3	101184	29	0	10	0	0	9	0	0	2	0	0	0	0	5	6	3	0	2
591	1	4	121184	33	0	3	0	0	*	0	0	11	0	0	3	0	0	*	*	*	*
656	1	4	121184	31	0	0	0	0	*	0	0	2	0	0	0	0	1	*	*	*	*
657	1	4	121184	33	0	15	0	0	*	0	0	1	0	0	0	0	0	*	*	*	*
754	1	4	121184	26	1	5	0	0	*	0	0	1	2	0	0	1	0	*	*	*	*
755	1	4	121184	33	0	200	0	0	*	0	0	15	2	0	6	5	0	*	*	*	*
756	1	4	121184	28	0	2	0	0	*	0	0	1	0	0	0	0	6	*	*	*	*
760	1	4	121184	33	0	350	0	0	*	0	0	33	8	0	1	2	0	*	*	*	*
763	1	4	121184	32	0	250	0	0	*	0	0	13	4	0	0	0	3	*	*	*	*
691	1	5	30685	34	0	30	0	0	*	0	0	10	0	0	2	1	1	*	*	*	*
693	1	5	30685	30	0	40	0	0	*	0	0	2	0	0	0	1	4	*	*	*	*
695	1	5	30685	30	0	15	0	0	*	0	0	4	0	0	0	0	12	*	*	*	*
696	1	5	30685	34	0	700	0	0	*	0	0	50	12	0	4	2	3	*	*	*	*
698	1	5	30685	33	0	350	0	0	*	0	0	14	1	0	3	0	0	*	*	*	*
699	1	5	30685	28	0	30	0	0	*	0	0	1	0	0	0	0	3	*	*	*	*
703	1	5	30685	29	0	30	0	0	*	0	0	5	2	0	0	0	0	*	*	*	*
706	1	5	30685	31	0	20	0	0	*	0	0	7	0	0	0	0	1	*	*	*	*
707	1	5	30685	34	0	30	0	0	*	0	0	7	1	0	2	0	0	*	*	*	*
714	1	5	30685	31	0	15	0	0	*	0	0	10	0	0	0	0	2	*	*	*	*
41	2	1	*	23	1	5	0	0	*	0	0	0	0	0	0	0	0	2	0	0	0
43	2	1	*	26	*	2	0	0	*	0	0	0	0	0	0	0	0	*	*	*	*
45	2	1	*	27	1	3	0	0	*	0	0	2	0	0	0	0	0	1	1	0	0
46	2	1	*	25	1	1	0	0	0	0	0	1	0	0	0	0	0	8	0	0	2
48	2	1	*	28	1	100	0	0	*	0	0	1	2	0	1	0	0	0	0	0	0
51	2	1	*	23	1	10	0	0	*	0	0	3	1	0	0	0	0	6	0	2	0
53	2	1	*	31	1	10	0	0	*	0	0	5	0	0	0	0	2	3	0	0	0
54	2	1	*	30	1	200	0	0	*	0	0	1	0	0	0	0	1	4	0	0	0
56	2	1	*	28	1	20	0	0	*	0	0	2	0	0	0	0	0	2	0	2	1
1	2	2	83	29	1	*	0	0	0	0	0	6	0	0	0	0	0	5	2	0	0
2	2	2	83	27	0	*	1	0	0	0	0	1	0	0	0	0	0	0	1	0	0
65	2	2	83	31	0	200	0	0	*	0	0	8	2	1	3	1	5	10	0	1	0
492	2	3	311084	26	1	8	0	0	*	0	0	1	0	0	0	0	0	*	*	*	*
493	2	3	311084	25	0	2	0	0	*	0	0	1	0	0	0	0	0	*	*	*	*

C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17	C18	C19	C20	C21	C22
494	2	3	311084	32	0	20	0	0	*	0	0	5	0	0	0	0	0	*	*	*	*
495	2	3	311084	34	0	5	0	0	*	0	0	4	0	0	0	0	0	*	*	*	*
499	2	3	311084	28	0	24	0	0	*	0	0	2	0	0	1	0	0	*	*	*	*
501	2	3	311084	30	0	14	0	0	*	0	0	0	0	0	0	0	0	*	*	*	*
502	2	3	311084	23	1	3	0	0	*	0	0	0	0	0	0	0	0	*	*	*	*
503	2	3	311084	28	1	8	0	0	*	0	0	0	0	0	0	0	0	*	*	*	*
505	2	3	311084	24	1	8	0	0	*	0	0	0	0	0	0	0	1	*	*	*	*
506	2	3	311084	28	0	1	0	0	*	0	0	7	0	0	1	0	0	*	*	*	*
507	2	3	311084	29	1	9	0	0	*	0	0	2	0	0	0	0	0	*	*	*	*
508	2	3	311084	33	1	10	0	0	*	0	0	3	0	0	1	0	0	*	*	*	*
509	2	3	311084	27	0	4	0	0	*	0	0	1	0	0	0	0	0	*	*	*	*
510	2	3	311084	27	1	2	0	0	*	0	0	4	0	3	1	5	0	*	*	*	*
512	2	3	311084	25	0	5	0	0	*	0	0	1	2	0	1	0	0	*	*	*	*
513	2	3	311084	30	1	10	0	0	*	0	0	3	0	0	0	2	0	*	*	*	*
515	2	3	311084	25	1	3	0	0	*	0	0	0	0	0	0	0	0	*	*	*	*
516	2	3	311084	30	1	26	0	0	*	0	0	0	0	0	1	0	1	*	*	*	*
517	2	3	311084	27	1	12	0	0	*	0	0	3	1	0	0	0	0	*	*	*	*
518	2	3	311084	26	1	23	0	0	*	0	0	3	0	0	0	0	0	*	*	*	*
520	2	3	311084	31	1	3	0	0	*	0	0	3	0	0	0	0	0	*	*	*	*
522	2	3	311084	32	0	25	0	0	*	0	0	14	0	1	0	0	0	*	*	*	*
524	2	3	311084	34	1	57	0	1	*	0	0	13	1	0	0	0	0	*	*	*	*
526	2	3	311084	28	0	3	0	0	*	0	0	3	0	0	0	1	0	*	*	*	*
528	2	3	311084	32	0	3	0	0	*	0	0	4	0	0	0	0	0	*	*	*	*
529	2	3	311084	26	1	15	0	0	*	0	0	1	0	1	0	0	0	*	*	*	*
530	2	3	311084	27	1	0	0	0	*	0	0	0	0	0	0	0	0	*	*	*	*
531	2	3	311084	25	1	1	0	0	*	0	0	0	0	0	0	0	0	*	*	*	*
532	2	3	311084	27	1	2	0	0	*	0	0	0	0	0	0	0	0	*	*	*	*
533	2	3	311084	33	1	40	0	0	*	0	0	11	0	1	0	0	0	*	*	*	*
534	2	3	311084	32	1	15	0	0	*	0	0	7	0	0	1	0	0	*	*	*	*
538	2	3	311084	32	0	0	0	0	*	0	0	3	0	1	0	0	0	*	*	*	*
540	2	3	311084	25	0	12	0	0	1	0	0	0	0	0	0	1	0	*	*	*	*
541	2	3	311084	24	1	8	0	0	*	0	0	1	0	0	0	0	0	*	*	*	*
542	2	3	311084	30	1	20	0	0	*	0	0	6	1	0	0	0	0	*	*	*	*
543	2	3	311084	25	1	17	0	0	*	0	0	0	0	0	0	0	0	*	*	*	*
544	2	3	311084	25	1	2	0	0	*	0	0	0	0	0	1	0	0	*	*	*	*
545	2	3	311084	30	1	10	0	0	*	0	0	4	0	0	0	0	0	*	*	*	*
546	2	3	311084	32	0	3	0	0	*	0	0	8	0	0	0	0	0	*	*	*	*
547	2	3	311084	28	1	12	0	0	*	0	0	3	0	0	0	0	0	*	*	*	*
548	2	3	311084	30	1	0	0	0	*	0	0	0	0	0	0	0	0	*	*	*	*
549	2	3	311084	24	1	7	0	0	*	0	0	0	1	0	0	0	0	*	*	*	*
550	2	3	311084	27	0	25	0	0	*	0	0	3	1	0	0	0	0	*	*	*	*
551	2	3	311084	26	1	15	0	0	*	0	0	0	0	0	0	0	0	*	*	*	*
552	2	3	311084	29	0	3	0	0	*	0	0	0	0	0	0	0	0	*	*	*	*
553	2	3	311084	26	1	0	0	0	*	0	0	1	0	0	5	0	0	*	*	*	*
554	2	3	311084	24	1	0	0	0	*	0	0	4	1	0	0	1	0	*	*	*	*
555	2	3	311084	25	0	7	0	0	11	0	0	2	0	0	0	0	0	3	0	3	2
557	2	3	311084	28	1	*	0	0	*	0	0	*	*	*	*	*	0	*	*	*	0
558	2	3	311084	25	1	1	0	0	2	0	0	2	0	0	0	0	0	1	0	0	0
282	2	4	151284	31	1	10	0	0	0	0	0	8	0	0	0	0	0	*	*	*	*
283	2	4	151284	32	1	5	0	0	0	0	0	8	0	0	0	1	0	*	*	*	*
286	2	4	151284	28	1	10	0	0	0	0	0	1	0	0	0	0	0	3	0	0	0
287	2	4	151284	24	1	0	0	0	0	0	0	2	0	0	0	0	0	*	*	*	*
288	2	4	151284	31	0	5	0	0	1	0	0	5	0	0	4	0	1	*	*	*	*
289	2	4	151284	31	1	20	0	0	0	0	0	3	0	0	1	0	1	*	*	*	*
290	2	4	151284	31	0	2	0	0	0	0	0	6	0	0	1	0	0	*	*	*	*
291	2	4	151284	31	0	0	0	0	0	0	0	1	0	0	0	0	0	8	0	1	2
297	2	4	151284	28	0	*	0	0	2	0	0	2	1	1	1	3	0	*	*	*	*
300	2	4	151284	23	1	0	0	0	0	0	0	1	0	0	0	0	1	*	*	*	*
301	2	4	151284	26	1	40	0	0	0	0	0	1	2	0	1	0	0	*	*	*	*

302	2	4	151284	27	1	15	0	0	5	0	0	0	0	0	0	0	0	*	*	*	*
303	2	4	151284	32	1	10	0	0	0	0	0	2	0	2	0	1	0	8	0	0	9
304	2	4	151284	32	1	0	0	0	0	0	0	2	0	0	0	0	0	*	*	*	*
305	2	4	151284	27	0	10	0	0	1	0	0	1	0	0	0	0	1	*	*	*	*
306	2	4	151284	30	1	2	0	0	0	0	0	5	0	0	0	0	0	*	*	*	*
310	2	4	151284	32	0	2	0	0	0	0	0	3	0	1	0	0	0	*	*	*	*
311	2	4	151284	29	0	2	0	0	0	0	0	5	0	0	0	0	0	*	*	*	*
314	2	4	151284	31	1	3	0	0	0	0	0	3	0	0	0	0	0	2	0	0	0
315	2	4	151284	23	1	0	0	0	1	0	0	3	0	0	0	0	0	*	*	*	*
321	2	4	151284	32	0	0	0	0	0	0	0	8	0	2	0	0	0	*	*	*	*
322	2	4	151284	32	0	20	0	1	0	0	0	7	0	0	0	0	0	*	*	*	*
323	2	4	151284	27	0	20	0	0	2	0	0	0	0	0	0	0	0	*	*	*	*
324	2	4	151284	27	0	15	0	0	2	0	0	1	0	0	0	0	0	6	0	0	0
326	2	4	151284	32	1	0	0	0	0	0	0	5	0	0	0	0	0	*	*	*	*
330	2	4	151284	30	0	20	0	0	0	0	0	3	0	0	3	0	0	*	*	*	*
92	3	1	121083	23	1	0	0	0	*	0	0	0	0	0	0	0	0	6	0	1	0
143	3	1	121083	24	1	5	0	0	*	0	0	1	2	0	0	0	0	0	0	0	0
144	3	1	121083	30	1	10	0	0	*	0	0	8	0	0	0	0	*	*	*	*	*
146	3	1	121083	24	1	5	0	0	*	0	0	1	0	0	0	1	*	*	*	*	*
149	3	1	121083	27	1	5	0	0	*	0	0	0	0	0	0	0	*	*	*	*	*
150	3	1	121083	31	0	50	1	0	*	0	0	8	0	0	0	0	*	*	*	*	*
93	3	2	131083	21	1	0	0	0	*	0	0	1	1	0	1	0	0	5	0	0	1
94	3	2	131083	25	1	20	0	0	*	0	0	2	0	0	0	0	0	16	1	0	2
98	3	2	131083	22	1	2	0	0	*	0	*	1	0	0	0	0	0	10	0	0	1
100	3	2	131083	25	1	1	0	0	*	0	0	0	0	0	0	0	0	5	0	1	0
110	3	2	131083	32	0	500	0	0	*	0	0	16	0	2	2	1	*	*	*	*	*
114	3	2	131083	34	0	15	0	0	*	0	0	4	0	0	0	0	*	*	*	*	*
119	3	2	131083	22	0	5	0	0	*	0	0	14	1	0	1	0	*	*	*	*	*
338	4	1	200684	32	0	0	0	0	0	0	0	5	0	0	0	1	2	*	*	*	*
343	4	1	200684	24	0	2	0	0	11	0	0	1	0	0	0	0	0	16	0	0	0
347	4	1	200684	32	1	0	0	0	0	0	0	2	2	1	0	0	0	*	*	*	*
353	4	1	200684	34	1	*	0	0	11	0	0	11	1	1	0	0	0	12	0	1	0
364	4	1	200684	33	0	3	0	0	1	0	0	11	0	1	0	5	0	*	*	*	*
366	4	1	200684	33	0	2	0	0	3	0	0	10	4	0	0	0	0	11	1	1	0
368	4	1	200684	30	0	3	0	0	0	0	0	5	1	0	1	0	0	*	*	*	*
372	4	1	200684	33	0	0	0	0	0	0	0	3	2	0	0	0	0	*	*	*	*
373	4	1	200684	32	1	10	0	0	0	0	0	7	0	0	0	1	0	*	*	*	*
374	4	1	200684	32	0	30	0	0	2	0	0	4	0	1	2	0	0	*	*	*	*
375	4	1	200684	34	0	40	0	0	*	0	0	6	1	5	0	1	0	*	*	*	*
378	4	1	200684	34	0	3	0	0	*	0	0	11	0	0	0	0	0	*	*	*	*
384	4	1	200684	30	0	1	0	0	*	0	0	3	0	0	0	1	0	*	*	*	*
388	4	1	200684	33	0	3	0	0	0	0	0	7	1	0	0	5	0	*	*	*	*
183	4	3	181084	24	1	0	0	0	4	0	0	3	0	0	0	1	1	*	*	*	*
184	4	3	181084	23	1	15	0	0	0	0	0	3	0	0	0	0	0	1	0	0	0
185	4	3	181084	23	1	2	0	0	2	0	0	1	0	0	0	0	*	*	*	*	*
186	4	3	181084	21	1	0	0	0	*	0	0	1	0	0	0	0	*	*	*	*	*
187	4	3	181084	20	1	1	0	0	1	0	0	0	0	0	0	0	1	*	*	*	*
188	4	3	181084	29	0	50	0	0	0	0	0	2	0	1	0	1	*	*	*	*	*
190	4	3	181084	21	0	0	0	0	1	0	0	1	0	0	0	0	*	*	*	*	*
200	4	3	181084	26	0	20	0	0	0	0	0	2	0	1	0	1	0	4	0	3	6
206	4	3	181084	24	1	10	0	0	0	0	0	2	0	0	0	2	0	7	0	1	5
209	4	3	181084	33	1	80	0	0	0	0	0	40	1	1	3	2	0	9	0	0	9
213	4	3	181084	23	1	10	0	0	0	0	0	2	0	0	0	0	0	23	0	2	1
214	4	3	181084	27	1	30	0	0	0	0	0	3	0	0	0	0	7	11	0	2	0
137	5	1	211083	32	1	0	0	0	*	0	0	1	1	0	1	1	1	*	*	*	*
140	5	1	211083	29	1	0	0	0	*	0	0	8	0	0	0	0	*	*	*	*	*
78	5	3	231083	31	1	50	0	0	*	0	0	3	0	0	0	0	0	24	0	1	6
79	5	3	231083	24	1	1700	0	0	*	0	0	44	1	1	5	2	0	2	2	0	9
84	5	3	231083	21	0	500	0	0	*	0	0	72	4	2	4	3	0	6	0	0	2

85	5	3	231083	33	0	10	0	0	*	0	0	0	0	0	0	0	0	3	0	0	0
87	5	3	231083	28	1	5	0	0	*	0	0	3	0	0	0	0	0	12	0	0	2
90	5	3	231083	30	0	0	0	0	*	0	0	3	0	0	0	0	0	8	1	1	0
172	5	3	231083	34	0	1	0	0	0	0	0	8	0	0	0	0	*	*	*	*	*
173	5	3	231083	28	0	5	0	0	*	0	0	5	0	0	0	0	*	*	*	*	*
179	5	3	231083	25	0	0	0	0	1	0	0	3	0	0	0	0	0	10	0	1	0
180	5	3	231083	31	0	5	0	0	0	0	0	7	1	0	0	0	*	*	*	*	*
719	6	2	240985	32	0	*	0	0	*	0	0	2	0	0	0	0	0	*	*	*	*
721	6	2	240985	26	0	1	0	0	*	0	0	1	0	0	0	0	0	*	*	*	*
722	6	2	240985	27	0	0	0	0	*	0	0	0	0	0	0	0	0	*	*	*	*
723	6	2	240985	25	0	0	0	0	*	0	0	0	0	0	0	0	0	*	*	*	*
724	6	2	240985	24	0	2	0	0	*	0	0	0	0	0	0	0	0	*	*	*	*
725	6	2	240985	27	0	0	0	0	*	0	0	1	0	0	0	0	0	*	*	*	*
726	6	2	240985	29	0	2	0	0	*	0	0	0	0	0	2	0	0	*	*	*	*
20	7	1	30983	29	0	*	0	0	4	0	0	7	2	0	2	2	0	10	0	2	0
21	7	1	30983	27	1	*	0	0	*	0	0	0	0	0	0	0	0	6	0	0	0
23	7	1	30983	23	1	40	0	0	*	0	0	1	1	0	0	0	0	16	0	12	0
24	7	1	30983	31	1	*	0	0	*	0	0	4	0	0	0	0	0	9	0	0	0
25	7	1	30983	23	0	*	0	0	*	0	0	0	0	0	0	0	0	10	0	2	0
28	7	1	30983	22	0	*	0	0	*	0	0	0	0	0	0	0	0	16	2	4	0
30	7	1	30983	24	0	0	0	0	*	0	0	3	2	0	1	7	0	17	1	1	0
33	7	1	30983	31	1	0	0	0	*	0	0	4	0	0	0	1	0	5	0	1	2
34	7	1	30983	31	0	100	0	0	*	0	0	4	4	0	0	0	0	9	0	5	0
35	7	1	30983	28	0	20	0	0	*	0	0	3	1	0	2	1	0	10	1	0	0
36	7	1	30983	29	0	10	0	0	*	0	0	5	1	0	1	0	0	27	0	7	0
37	7	1	30983	31	1	150	0	0	*	0	0	8	2	1	0	1	0	6	0	1	0
38	7	1	30983	30	1	10	0	0	*	0	0	6	2	2	2	3	1	4	0	0	0
39	7	1	30983	33	0	200	0	0	*	0	0	8	4	0	0	1	0	5	0	0	0
152	7	2	281083	33	0	50	0	0	*	0	0	3	6	0	0	0	*	*	*	*	*
161	7	2	281083	33	0	10	0	0	*	0	0	7	6	3	2	0	*	*	*	*	*
168	7	2	281083	33	0	30	0	0	*	0	0	1	7	0	0	3	*	*	*	*	*
171	7	2	281083	32	0	50	0	0	*	0	0	6	2	0	0	0	*	*	*	*	*
392	7	4	170185	31	0	20	0	0	*	0	0	5	0	3	0	1	0	*	*	*	*
404	7	4	170185	29	0	10	0	0	2	0	0	4	0	1	0	0	0	*	*	*	*
405	7	4	170185	23	0	1	0	0	*	0	0	0	1	0	0	0	0	*	*	*	*
407	7	4	170185	23	1	1	0	0	3	0	0	0	0	0	0	1	0	*	*	*	*
410	7	4	170185	20	0	1	0	0	*	0	0	0	0	0	0	0	0	*	*	*	*
411	7	4	170185	21	0	50	0	0	3	0	0	34	10	1	9	7	0	*	*	*	*
412	7	4	170185	34	0	70	0	0	*	0	0	17	5	9	2	12	0	*	*	*	*
413	7	4	170185	32	1	5	0	0	*	0	0	7	0	0	0	0	0	*	*	*	*
421	7	4	170185	20	0	2	0	0	*	0	0	1	0	0	0	0	0	*	*	*	*
422	7	4	170185	23	0	0	0	0	3	0	0	0	0	0	0	0	0	*	*	*	*
428	7	4	170185	34	1	40	0	0	*	0	0	10	2	0	1	2	0	*	*	*	*
431	7	4	170185	28	0	5	0	0	*	0	0	1	0	0	1	1	0	*	*	*	*
432	7	4	170185	31	0	30	0	0	*	0	0	6	1	9	0	17	0	*	*	*	*
768	7	5	110985	24	0	10	0	0	*	0	0	0	0	0	0	0	0	*	*	*	*
769	7	5	110985	24	0	0	0	0	*	0	0	2	0	0	0	0	0	*	*	*	*
770	7	5	110985	25	0	10	0	0	*	0	0	2	0	0	0	0	0	*	*	*	*
771	7	5	110985	24	1	5	0	0	*	0	0	6	0	0	0	0	0	*	*	*	*
772	7	5	110985	30	1	10	0	0	*	0	0	2	2	0	0	1	0	*	*	*	*
773	7	5	110985	24	0	15	0	0	*	0	0	0	0	0	0	0	0	*	*	*	*
774	7	5	110985	30	0	1	0	0	*	0	0	0	2	0	0	1	0	*	*	*	*
775	7	5	110985	22	0	0	0	0	*	0	0	0	0	0	0	0	0	*	*	*	*
776	7	5	110985	27	0	15	0	0	*	0	0	5	1	0	0	1	0	*	*	*	*
777	7	5	110985	29	1	15	0	0	*	0	0	0	0	2	0	0	0	*	*	*	*
778	7	5	110985	30	0	0	0	1	*	0	0	3	3	0	0	1	0	*	*	*	*
779	7	5	110985	31	0	60	0	0	*	0	0	9	2	0	1	5	0	*	*	*	*
780	7	5	110985	31	0	15	0	0	*	0	0	10	1	0	0	0	0	*	*	*	*
791	7	5	110985	28	1	60	0	0	*	0	0	3	0	1	0	5	1	*	*	*	*

599	7	6	260485	28	1	2	0	0	*	0	0	2	2	0	0	0	0	*	*	*	*
611	7	6	260485	29	0	200	0	0	*	0	0	51	5	10	19	28	0	*	*	*	*
617	7	6	260485	29	1	15	0	0	*	0	0	0	0	1	0	2	0	*	*	*	*
619	7	6	260485	32	0	0	0	0	*	0	0	5	1	0	0	0	0	*	*	*	*
621	7	6	260485	26	0	0	0	0	*	0	0	4	0	0	2	0	0	*	*	*	*
623	7	6	260485	25	0	1	0	0	*	0	0	2	0	0	0	0	0	*	*	*	*
624	7	6	260485	27	0	20	0	0	*	0	0	1	0	0	0	1	0	*	*	*	*
626	7	6	260485	25	1	1	0	0	*	0	0	4	0	0	0	0	0	*	*	*	*
627	7	6	260485	32	0	20	0	0	*	0	0	4	0	1	0	1	0	*	*	*	*
668	7	6	260485	31	1	15	0	0	*	0	0	0	0	0	0	3	0	*	*	*	*
671	7	6	260485	26	0	3	0	0	*	0	0	1	1	0	0	0	0	*	*	*	*
673	7	6	260485	26	1	120	0	0	*	0	1	1	0	2	0	7	0	*	*	*	*
675	7	6	260485	29	0	8	0	0	*	0	0	2	0	0	0	0	0	*	*	*	*
636	7	7	270685	26	0	3	0	0	*	0	0	6	0	0	0	0	0	*	*	*	*
637	7	7	270685	34	0	50	0	0	*	0	0	12	4	1	0	0	1	*	*	*	*
655	7	7	270685	28	0	3	0	0	*	0	0	4	3	0	0	1	0	*	*	*	*
858	8	1	120286	31	1	125	0	0	*	0	0	5	2	2	1	16	3	*	*	*	*
861	8	1	120286	31	0	250	0	0	*	0	0	5	6	10	2	10	3	*	*	*	*
863	8	1	120286	20	1	20	0	0	*	0	0	3	0	1	0	4	0	*	*	*	*
866	8	1	120286	31	1	260	0	0	*	0	0	4	0	0	0	6	1	*	*	*	*
867	8	1	120286	31	1	50	0	0	*	0	0	3	2	3	1	2	5	*	*	*	*
870	8	1	120286	30	0	20	0	0	*	0	0	1	0	0	1	3	1	*	*	*	*
871	8	1	120286	27	1	10	0	0	*	0	0	2	0	0	0	0	0	*	*	*	*
872	8	1	120286	29	0	10	0	0	*	0	0	1	0	1	1	5	1	*	*	*	*
874	8	1	120286	29	1	40	0	0	*	0	0	0	0	1	0	1	1	*	*	*	*
875	8	1	120286	26	0	*	0	0	*	0	0	0	0	0	0	0	0	*	*	*	*
802	8	2	120286	29	1	*	0	0	*	0	0	1	0	0	0	1	1	*	*	*	*
805	8	2	120286	29	1	2	0	0	*	0	0	4	0	2	0	4	2	*	*	*	*
810	8	2	120286	30	1	100	0	0	*	0	0	1	0	4	1	12	0	*	*	*	*
813	8	2	120286	29	1	15	0	0	*	0	0	0	1	3	0	4	1	*	*	*	*
815	8	2	120286	24	1	100	0	0	*	0	0	0	2	0	0	1	2	*	*	*	*
816	8	2	120286	30	1	90	0	0	*	0	0	3	0	6	3	14	1	*	*	*	*
817	8	2	120286	29	0	2	0	0	*	0	0	0	0	3	0	16	2	*	*	*	*
821	8	2	120286	29	1	50	0	0	*	0	0	2	0	5	0	6	0	*	*	*	*
825	8	2	120286	31	1	360	0	0	*	0	0	3	4	5	0	16	0	*	*	*	*
826	8	2	120286	30	0	60	0	0	*	0	0	2	0	2	0	0	1	*	*	*	*
828	8	2	120286	29	1	80	0	0	*	0	0	0	0	1	0	1	0	*	*	*	*
830	8	2	120286	25	1	30	0	0	*	0	0	0	0	1	0	5	0	*	*	*	*
831	8	2	120286	28	1	170	0	0	*	0	0	2	1	2	0	11	2	*	*	*	*
832	8	2	120286	27	0	150	0	0	*	0	0	1	0	4	0	9	0	*	*	*	*
835	8	2	120286	31	1	250	0	0	*	0	0	3	0	8	0	24	0	*	*	*	*
839	8	2	120286	25	1	100	0	0	*	0	0	1	0	2	0	5	0	*	*	*	*
843	8	2	120286	28	0	30	0	0	*	0	0	1	0	0	0	0	1	*	*	*	*
844	8	2	120286	30	0	25	0	0	*	0	0	0	0	4	0	6	0	*	*	*	*
845	8	2	120286	31	0	35	0	0	*	0	0	1	4	0	0	8	1	*	*	*	*
853	8	2	120286	24	1	7	0	0	*	0	0	0	0	1	0	0	0	*	*	*	*
855	8	2	120286	28	1	15	0	0	*	0	0	1	1	0	0	0	0	*	*	*	*
856	8	2	120286	27	1	10	0	0	*	0	0	3	0	3	0	3	1	*	*	*	*
857	8	2	120286	30	1	180	0	0	*	0	0	2	1	1	0	0	0	*	*	*	*
5	1	1	50683	34	0	*	0	0	*	0	0	9	1	1	0	0	0	4	0	0	0
6	1	1	50683	34	0	*	0	0	*	0	0	12	0	0	0	0	0	17	0	0	0
9	1	1	50683	34	0	*	0	0	*	0	0	1	1	0	0	0	2	5	0	0	0
12	1	1	50683	17	0	0	0	0	*	0	0	0	0	0	0	0	0	7	0	0	0
15	1	1	50683	33	0	1000	0	0	*	0	0	57	5	0	5	0	0	0	1	1	0
473	1	3	101184	34	0	500	0	0	*	0	0	35	2	0	2	0	0	*	*	*	*
475	1	3	101184	33	0	250	0	1	2	0	0	45	4	0	7	1	0	*	*	*	*
566	1	3	101184	34	0	10	0	0	*	0	0	1	4	0	0	5	1	*	*	*	*
573	1	3	101184	34	0	80	0	0	5	0	0	5	0	0	0	0	22	0	0	0	0

```
 581  1  4  121184  33  0   100  0  0   *  0  0   22   2   1   1    0   3   *   *   *   *
 584  1  4  121184  33  0    80  0  0   *  0  0    8   0   0   0    0   0   *   *   *   *
 587  1  4  121184  34  0    15  0  0   *  0  0   10   0   0   0    0   7   *   *   *   *
 661  1  4  121184  34  0    10  0  0   *  0  0   13   0   2   1    0   1   *   *   *   *
 665  1  4  121184  34  0    20  0  0   *  0  0   11   0   0   0    0   1   *   *   *   *
  42  2  1       *  33  0     2  0  0   *  0  0    1   2   2   0    0   0   6   0   0   0
  44  2  1       *  32  1    15  0  0   *  0  0    1   0   0   2    1   0   0   0   1   0
  47  2  1       *  33  1     5  0  0   *  0  0    9   0   0   0    1   0   7   0   1   0
  49  2  1       *  32  1     2  0  0   *  0  0    2   0   0   0    1   0   1   0   0   0
  50  2  1       *  32  1   100  0  0   *  0  0    5   0   0   0    0   0   1   1   0   0
  61  2  2      83  32  0    40  0  0   *  0  1    6   0   0   3    0   0   6   0   1   0
 556  2  3  311084  18  1    15  0  0   0  0  0    1   0   0   0    0   0   6   0   1   0
 294  2  4  151284  33  1     5  0  0   *  0  0    5   0   0   0    0   0   *   *   *   *
 295  2  4  151284  34  1     0  0  0   *  0  0    1   0   0   0    0   0   *   *   *   *
 307  2  4  151284  34  0     0  0  0   0  0  0    3   1   0   0    0   0   *   *   *   *
 308  2  4  151284  33  1     5  0  0   0  0  0    2   0   1   0    1   0   *   *   *   *
 312  2  4  151284  24  0    40  0  0   1  0  0    3   1   2   3    1   0   *   *   *   *
 317  2  4  151284  33  1    10  0  1   0  0  0    3   0   0   0    0   0   *   *   *   *
 327  2  4  151284  33  1    10  0  0   1  0  0   11   1   0   0    0   0   *   *   *   *
 331  2  4  151284  34  0    10  0  0   0  0  0   10   0   1   0    7   0   *   *   *   *
 189  4  3  181084  17  1     0  0  0   *  0  0    0   0   0   0    0   0  23   1   2   0
 191  4  3  181084  17  0     0  0  0   *  0  0    0   0   0   0    0   *   *   *   *   *
 207  4  3  181084  14  1     0  0  0   0  0  0    0   0   0   0    0   4  20   4   0   0
1227  6  5  310386  33  0     0  0  0   *  0  0   24   0   0   0    0   0   *   *   *   *
 618  7  6  260485  18  0    70  0  0   *  0  0    4   2   7   0    4   0   *   *   *   *
 860  8  1  120286  32  1     *  0  0   *  0  0    1   1   4   0    0   0   *   *   *   *
 862  8  1  120286  33  1   130  0  0   *  0  0    6   1   5   0   22   0   *   *   *   *
 868  8  1  120286  32  0    15  0  0   *  0  0    3   0   2   0    3   1   *   *   *   *
 804  8  2  120286  31  1   150  0  0   *  0  0    4   1   3   3   21   1   *   *   *   *
 807  8  2  120286  32  *    60  0  0   *  0  0    7   0   0   0   14   1   *   *   *   *
 809  8  2  120286  33  0   150  0  0   *  0  0    3   2  15   1   43   1   *   *   *   *
 818  8  2  120286  31  0    10  0  0   *  0  0    1   0   0   0    4   0   *   *   *   *
 819  8  2  120286  33  0   125  0  0   *  0  0    8   2   3   0   20   1   *   *   *   *
 820  8  2  120286  33  0   130  0  0   *  0  0    4   1   3   0    6   1   *   *   *   *
 822  8  2  120286  34  0    30  0  0   *  0  0    3   0   2   0    4   0   *   *   *   *
 823  8  2  120286  34  0     *  0  0   *  0  0    1   0   0   0    4   1   *   *   *   *
 824  8  2  120286  34  0    50  0  0   *  0  0   10   0  10   0   20   2   *   *   *   *
 829  8  2  120286  33  0   130  0  0   *  0  0    1   0   5   0   17   1   *   *   *   *
 833  8  2  120286  33  0    10  0  0   *  0  0    2   0   4   1   12   0   *   *   *   *
 836  8  2  120286  33  1    15  0  0   *  0  0    5   1   6   1    4   1   *   *   *   *
 837  8  2  120286  33  1   250  0  1   *  0  0    3   0   6   0    7   0   *   *   *   *
 841  8  2  120286  34  0   130  0  0   *  0  0    1   1   3   0   11   2   *   *   *   *
 847  8  2  120286  32  0    80  0  0   *  0  0    2   3   0   0    3   0   *   *   *   *
 851  8  2  120286  34  0   250  0  0   *  0  0    7   1   4   0   35   0   *   *   *   *
 852  8  2  120286  32  1    50  0  0   *  0  0    1   2   2   0   17   4   *   *   *   *
 854  8  2  120286  33  1   250  0  0   *  0  0    0   0   5   1    5   0   *   *   *   *
```

Table 2. Numbers of parasites in medium sized H. atlanticus (35 to 39 cm LCF) from Australia.

11	1	1	50683	39	0	*	0	0	0	0	0	6	0	0	0	0	0	2	0	0	0
16	1	1	50683	38	0	750	0	0	*	1	1	19	4	1	0	0	0	3	1	0	0
442	1	2	91184	37	0	600	0	0	*	0	1	18	8	0	4	3	0	*	*	*	*
444	1	2	91184	38	0	50	0	0	*	0	0	52	3	0	4	2	3	*	*	*	*
449	1	2	91184	35	0	50	0	0	*	0	0	21	3	1	0	1	0	*	*	*	*
451	1	2	91184	38	0	500	0	0	*	0	0	73	10	1	11	2	2	*	*	*	*
452	1	2	91184	39	0	350	0	0	*	0	0	23	1	0	2	1	2	*	*	*	*
455	1	2	91184	37	0	15	0	0	*	0	0	15	0	0	0	0	0	3	4	0	0
458	1	2	91184	39	1	1	0	0	*	0	0	19	0	1	0	2	0	2	0	0	0
460	1	2	91184	35	0	40	0	0	*	0	0	10	1	0	0	0	1	*	*	*	*
462	1	2	91184	35	0	100	0	1	1	0	0	31	5	0	8	1	1	*	*	*	*
463	1	2	91184	39	0	200	0	0	*	0	0	56	7	0	10	1	0	*	*	*	*
465	1	2	91184	38	0	400	0	0	*	0	0	69	7	0	5	0	1	*	*	*	*
466	1	2	91184	39	0	250	0	0	*	0	0	49	4	1	1	2	0	*	*	*	*
467	1	2	91184	37	0	300	0	0	*	0	0	30	3	1	1	1	0	*	*	*	*
468	1	2	91184	35	0	200	0	0	*	0	1	37	6	1	4	1	0	*	*	*	*
471	1	2	91184	35	0	20	0	0	*	0	0	32	0	0	1	0	0	1	0	0	1
476	1	3	101184	38	0	150	0	0	1	0	0	90	10	1	6	2	0	*	*	*	*
477	1	3	101184	38	0	10	0	0	*	0	0	22	2	1	0	0	0	*	*	*	*
478	1	3	101184	39	0	200	1	0	*	0	0	97	10	0	7	3	3	*	*	*	*
482	1	3	101184	35	0	3	0	0	*	0	0	18	0	0	1	2	0	*	*	*	*
483	1	3	101184	38	0	57	0	0	*	0	0	51	4	2	6	4	2	*	*	*	*
487	1	3	101184	37	0	5	0	0	*	0	0	44	0	0	0	1	0	*	*	*	*
488	1	3	101184	39	0	999	0	0	*	0	0	167	18	0	17	7	0	0	0	1	1
491	1	3	101184	38	0	8	0	0	*	0	0	21	2	1	3	0	0	15	1	0	3
567	1	3	101184	36	0	90	0	0	*	0	0	9	2	0	0	0	0	*	*	*	*
568	1	3	101184	35	0	50	0	1	*	0	0	10	0	0	0	0	0	*	*	*	*
569	1	3	101184	36	0	150	0	0	*	0	0	72	6	1	1	0	1	*	*	*	*
570	1	3	101184	35	1	64	0	0	15	0	0	7	1	2	2	1	1	7	1	0	2
571	1	3	101184	38	1	100	0	0	2	0	0	51	5	0	9	1	0	0	1	0	0
574	1	4	121184	38	0	100	0	1	0	0	0	23	2	0	1	0	0	*	*	*	*
575	1	4	121184	35	0	88	0	0	*	0	0	11	1	0	1	1	0	*	*	*	*
576	1	4	121184	35	0	250	0	0	*	0	0	7	3	0	0	0	0	*	*	*	*
577	1	4	121184	39	0	1200	0	0	*	0	0	47	0	0	32	3	0	*	*	*	*
578	1	4	121184	36	0	250	0	0	*	0	0	30	4	5	5	4	0	*	*	*	*
580	1	4	121184	35	0	260	0	0	*	0	0	36	7	1	5	12	0	*	*	*	*
583	1	4	121184	37	0	80	0	0	*	0	0	18	1	1	3	2	2	*	*	*	*
585	1	4	121184	35	0	70	0	0	*	0	0	17	3	0	0	0	1	*	*	*	*
586	1	4	121184	39	0	80	0	0	*	0	0	28	8	2	3	5	0	*	*	*	*
588	1	4	121184	37	0	170	0	0	*	0	0	32	3	0	4	0	0	*	*	*	*
589	1	4	121184	37	0	25	0	0	*	0	0	19	0	0	0	0	3	*	*	*	*
590	1	4	121184	35	0	30	0	0	*	0	0	8	1	0	0	0	1	*	*	*	*
592	1	4	121184	37	0	150	0	0	*	0	0	28	3	0	2	2	0	*	*	*	*
593	1	4	121184	39	0	90	0	0	*	0	0	10	2	0	3	2	0	*	*	*	*
594	1	4	121184	35	0	5	0	0	*	0	0	12	0	0	0	0	4	*	*	*	*
658	1	4	121184	35	0	20	0	0	*	0	0	20	1	0	1	0	0	*	*	*	*
659	1	4	121184	38	0	*	0	0	*	0	0	53	8	0	1	4	0	*	*	*	*
660	1	4	121184	37	0	200	0	0	*	0	0	18	1	0	5	1	2	*	*	*	*
662	1	4	121184	38	0	30	0	0	*	0	0	26	2	0	2	0	0	*	*	*	*
663	1	4	121184	39	0	400	0	0	*	0	0	52	4	1	2	1	0	*	*	*	*
664	1	4	121184	35	0	150	0	0	*	0	0	16	0	2	2	1	0	*	*	*	*
666	1	4	121184	36	0	20	0	0	*	0	0	9	1	0	1	1	0	*	*	*	*
667	1	4	121184	38	0	60	0	0	*	0	0	11	2	0	2	2	0	*	*	*	*

758	1	4	121184	39	0	200	0	0	*	0	0	91	10	1	23	18	3	*	*	*	*
759	1	4	121184	39	0	180	0	1	*	0	0	25	1	0	3	3	0	*	*	*	*
761	1	4	121184	36	0	50	0	0	*	0	0	4	0	0	0	0	0	*	*	*	*
762	1	4	121184	35	0	150	0	0	*	0	0	14	10	0	0	1	0	*	*	*	*
764	1	4	121184	38	0	300	0	0	*	0	0	27	3	3	8	4	0	*	*	*	*
765	1	4	121184	38	0	40	0	0	*	0	0	72	12	1	7	2	0	*	*	*	*
766	1	4	121184	38	0	60	0	0	*	0	0	49	6	6	8	6	0	*	*	*	*
767	1	4	121184	36	0	70	0	0	*	0	0	18	6	0	4	4	0	*	*	*	*
684	1	5	30685	38	0	800	1	0	*	0	0	81	10	0	0	1	0	*	*	*	*
685	1	5	30685	39	0	140	0	0	*	0	0	32	0	2	2	2	1	*	*	*	*
686	1	5	30685	36	0	*	0	0	*	0	0	97	5	0	2	1	0	*	*	*	*
688	1	5	30685	35	0	40	0	0	*	0	0	5	0	0	0	3	3	*	*	*	*
692	1	5	30685	38	0	300	0	1	*	0	0	7	0	0	0	0	1	*	*	*	*
694	1	5	30685	37	0	100	0	0	*	0	0	46	2	1	6	9	0	*	*	*	*
700	1	5	30685	39	0	1000	0	0	*	0	0	105	16	3	14	11	0	*	*	*	*
701	1	5	30685	39	1	400	0	0	*	0	0	28	1	1	2	3	0	*	*	*	*
702	1	5	30685	38	0	500	0	0	*	0	0	56	15	4	7	11	0	*	*	*	*
705	1	5	30685	35	0	1700	0	0	*	0	0	49	4	0	12	1	3	*	*	*	*
708	1	5	30685	35	0	25	0	0	*	0	0	19	5	0	1	1	1	*	*	*	*
711	1	5	30685	39	0	120	0	0	*	0	0	42	2	0	5	3	2	*	*	*	*
40	2	1	*	37	1	10	0	0	*	0	1	16	0	3	0	0	0	5	0	1	0
52	2	1	*	35	1	40	0	0	*	0	0	5	0	1	0	1	0	6	0	0	0
55	2	1	*	36	0	15	0	0	*	0	0	2	0	0	0	0	0	1	2	0	0
57	2	1	*	35	0	10	0	0	*	0	0	8	0	0	0	0	0	7	0	1	1
58	2	1	*	35	1	250	0	0	*	0	0	9	0	0	0	0	0	2	0	0	0
59	2	1	*	37	1	999	0	0	*	0	0	4	0	0	0	1	0	1	0	0	0
60	2	2	83	36	0	100	0	0	*	0	0	7	0	2	1	1	0	2	0	0	0
62	2	2	83	36	0	50	0	0	*	0	0	4	2	1	1	1	0	9	0	1	0
63	2	2	83	36	0	0	0	0	*	0	0	6	0	0	1	0	0	9	0	0	0
64	2	2	83	35	1	50	0	0	*	0	0	12	1	0	0	0	0	3	0	0	0
66	2	2	83	35	1	1000	0	0	*	0	0	40	3	8	9	7	1	2	0	0	0
67	2	2	83	37	0	1000	0	0	*	0	0	18	1	1	6	0	0	0	1	0	0
497	2	3	311084	38	1	60	0	0	*	0	0	17	2	0	0	5	0	*	*	*	*
498	2	3	311084	39	1	40	0	0	*	0	0	18	1	0	6	1	0	*	*	*	*
500	2	3	311084	37	1	40	0	0	*	0	0	11	0	0	0	5	0	*	*	*	*
504	2	3	311084	35	0	2	0	0	*	0	0	0	0	0	0	0	2	*	*	*	*
511	2	3	311084	35	1	34	0	0	1	0	0	15	0	1	3	14	0	*	*	*	*
514	2	3	311084	35	0	*	0	0	*	0	0	7	0	1	0	0	0	*	*	*	*
521	2	3	311084	37	1	53	0	0	*	0	0	10	3	0	2	0	0	*	*	*	*
525	2	3	311084	37	0	5	0	0	*	0	0	14	0	2	0	0	0	*	*	*	*
527	2	3	311084	38	0	320	0	0	*	0	0	33	0	1	1	0	0	*	*	*	*
535	2	3	311084	36	1	25	0	0	*	0	0	12	1	0	0	0	0	*	*	*	*
536	2	3	311084	35	1	15	0	0	*	0	0	6	2	0	0	0	0	*	*	*	*
284	2	4	151284	38	0	40	0	0	1	0	0	20	0	1	0	4	0	*	*	*	*
293	2	4	151284	35	1	10	0	0	1	0	0	7	0	0	0	3	0	*	*	*	*
296	2	4	151284	35	0	10	0	0	0	0	0	6	1	0	0	0	0	1	0	0	1
313	2	4	151284	35	0	30	0	0	0	0	0	7	0	0	0	0	0	*	*	*	*
316	2	4	151284	35	1	0	0	0	0	0	0	6	0	0	0	0	0	*	*	*	*
318	2	4	151284	35	1	5	0	0	0	0	0	7	1	1	1	1	0	*	*	*	*
319	2	4	151284	36	0	30	0	0	0	0	0	9	2	1	0	3	0	1	2	1	2
320	2	4	151284	38	1	350	0	0	0	0	0	10	2	1	0	1	0	*	*	*	*
325	2	4	151284	38	1	20	0	0	0	0	0	7	0	0	0	0	0	*	*	*	*
328	2	4	151284	39	0	70	0	0	0	1	0	19	3	0	0	0	0	*	*	*	*
329	2	4	151284	35	0	5	0	0	0	0	0	4	0	0	0	0	0	4	3	0	2
68	3	2	131083	36	1	1500	0	0	*	0	0	21	0	1	0	2	0	6	0	1	5
69	3	2	131083	38	0	300	0	0	*	0	0	23	1	0	0	1	0	12	0	0	2
71	3	2	131083	35	0	75	0	0	*	0	0	5	2	0	0	0	0	3	0	0	1
73	3	2	131083	39	0	150	0	0	*	0	0	40	1	1	5	2	0	2	1	0	3
74	3	2	131083	38	0	2000	0	0	*	0	0	54	0	1	24	3	0	0	2	0	0

75	3	2	131083	38	0	300	0	0	*	0	0	11	0	2	4	5	0	4	3	0	2
77	3	2	131083	37	0	200	0	0	*	0	0	28	0	0	1	1	0	1	1	0	0
102	3	2	131083	35	0	50	0	0	*	0	0	4	0	2	0	12	0	16	0	0	4
104	3	2	131083	36	0	150	0	0	*	0	0	21	0	0	2	4	0	14	0	1	3
109	3	2	131083	35	0	20	0	0	*	0	0	2	0	0	0	0	*	*	*	*	*
115	3	2	131083	37	0	800	0	0	*	0	0	27	0	3	1	0	*	*	*	*	*
117	3	2	131083	38	0	50	0	0	*	0	0	3	0	0	0	0	*	*	*	*	*
121	3	2	131083	39	0	60	0	0	*	0	0	22	1	1	0	1	*	*	*	*	*
147	3	2	131083	35	1	120	0	0	*	0	0	7	2	0	2	4	1	*	*	*	*
148	3	2	131083	36	0	20	0	0	*	0	0	2	1	0	2	0	0	15	0	0	7
339	4	1	200684	37	0	150	0	0	2	0	0	24	2	3	1	0	0	3	0	0	0
344	4	1	200684	38	0	70	0	0	0	0	0	19	0	0	2	0	0	*	*	*	*
345	4	1	200684	38	1	100	0	0	1	0	0	8	0	0	0	2	0	*	*	*	*
348	4	1	200684	37	0	150	0	0	1	0	0	48	1	0	1	0	0	7	0	1	0
349	4	1	200684	39	0	5	0	0	0	0	0	4	0	0	0	1	0	*	*	*	*
351	4	1	200684	37	0	150	0	0	1	0	0	27	1	5	4	4	0	*	*	*	*
352	4	1	200684	38	0	30	0	0	0	0	0	5	1	0	0	1	0	*	*	*	*
356	4	1	200684	36	0	5	0	0	3	0	0	25	0	1	0	0	1	9	0	0	0
358	4	1	200684	35	1	30	0	0	3	0	0	16	1	2	0	0	0	*	*	*	*
359	4	1	200684	35	0	20	0	0	2	0	0	3	2	0	0	1	0	*	*	*	*
361	4	1	200684	37	0	50	0	0	2	0	0	11	0	2	0	0	0	4	0	0	0
362	4	1	200684	35	0	8	0	0	0	0	0	12	0	0	1	0	0	*	*	*	*
365	4	1	200684	35	0	0	0	0	0	0	0	21	1	1	0	1	0	*	*	*	*
367	4	1	200684	35	0	6	0	0	2	0	0	17	1	0	0	8	0	*	*	*	*
369	4	1	200684	38	0	5	0	0	3	0	0	13	1	0	2	2	1	*	*	*	*
370	4	1	200684	35	0	30	0	0	1	0	0	8	9	0	0	0	0	*	*	*	*
371	4	1	200684	36	0	10	0	0	0	0	0	23	1	0	4	1	0	7	1	0	0
376	4	1	200684	36	0	20	0	0	0	0	0	8	2	0	0	0	0	1	0	0	0
377	4	1	200684	38	0	50	0	0	*	0	0	9	0	0	3	3	0	*	*	*	*
380	4	1	200684	39	0	30	0	0	*	0	0	25	2	0	2	6	0	*	*	*	*
382	4	1	200684	38	1	*	0	0	*	0	0	5	0	3	2	14	0	*	*	*	*
385	4	1	200684	38	0	4	0	0	*	0	0	45	0	3	2	3	0	*	*	*	*
387	4	1	200684	38	0	67	0	0	*	0	0	11	2	1	4	2	1	*	*	*	*
192	4	3	181084	39	0	1500	0	0	0	0	0	40	3	4	0	3	*	*	*	*	*
196	4	3	181084	39	0	400	0	0	0	0	0	33	1	0	0	0	*	*	*	*	*
201	4	3	181084	38	0	150	0	0	1	0	0	28	0	0	2	1	0	*	*	*	*
202	4	3	181084	38	0	100	0	1	0	0	0	61	5	12	24	2	0	*	*	*	*
205	4	3	181084	38	1	40	0	0	0	0	0	17	0	0	5	0	0	2	1	2	3
212	4	3	181084	36	0	80	0	0	0	0	0	21	2	3	0	3	0	3	0	0	3
218	4	3	181084	37	0	5	0	0	1	0	0	35	0	0	2	1	0	2	2	0	0
219	4	3	181084	36	*	20	0	0	2	0	0	12	1	0	0	1	0	6	1	0	2
220	4	3	181084	39	0	5	0	1	0	0	0	32	0	0	5	0	0	0	0	0	1
123	5	1	211083	38	1	30	0	0	*	0	0	24	1	0	6	2	0	6	0	0	1
125	5	1	211083	39	1	0	0	0	*	0	0	15	2	2	1	0	*	*	*	*	*
126	5	1	211083	35	0	20	0	0	*	0	0	8	0	0	0	1	*	*	*	*	*
127	5	1	211083	38	0	150	0	0	*	0	0	33	2	5	1	8	*	*	*	*	*
128	5	1	211083	39	0	70	0	0	*	0	0	49	4	2	11	1	0	3	0	0	7
130	5	1	211083	35	0	40	0	0	*	0	0	14	0	0	0	0	*	*	*	*	*
132	5	1	211083	39	0	1000	0	0	*	0	0	59	0	2	1	9	*	*	*	*	*
133	5	1	211083	38	0	100	0	1	*	0	0	37	1	0	2	0	0	2	0	1	3
139	5	1	211083	35	0	20	0	0	*	0	0	10	1	1	0	9	*	*	*	*	*
141	5	1	211083	37	0	10	0	0	*	0	0	10	0	0	1	1	*	*	*	*	*
96	5	2	221083	37	0	0	0	0	*	0	0	23	0	0	3	1	0	4	0	1	2
97	5	2	221083	39	0	250	1	0	*	0	0	52	3	4	8	3	*	7	0	0	1
81	5	3	231083	36	1	50	0	0	*	0	0	1	0	2	0	0	1	41	0	1	3
83	5	3	231083	38	1	150	0	0	*	0	0	0	0	0	0	2	0	10	0	0	0
88	5	3	231083	38	0	0	0	0	*	0	0	1	0	0	0	0	0	15	0	0	0
174	5	3	231083	35	0	20	0	0	*	0	0	8	1	0	0	0	*	17	0	1	0
175	5	3	231083	38	0	200	0	0	*	0	0	23	0	3	2	2	*	*	*	*	*

176	5	3	231083	35	0	*	0	0	*	0	0	22	0	0	3	0	*	*	*	*	*
178	5	3	231083	37	0	30	0	0	0	0	0	18	2	1	8	0	*	*	*	*	*
181	5	3	231083	39	0	*	0	0	3	0	0	12	1	4	2	3	*	*	*	*	*
1432	6	1	*	38	0	10	0	0	*	0	0	57	2	1	2	0	0	*	*	*	*
1433	6	1	*	37	0	70	0	0	*	0	0	26	0	0	1	0	0	*	*	*	*
720	6	2	240985	39	0	450	0	0	*	0	0	24	1	1	1	1	0	*	*	*	*
730	6	2	240985	39	0	40	0	0	*	0	0	32	0	0	1	2	0	*	*	*	*
732	6	2	240985	35	0	20	0	0	*	0	0	5	0	0	0	0	0	*	*	*	*
746	6	2	240985	38	0	5	0	0	*	0	0	34	1	2	1	0	0	*	*	*	*
1220	6	4	170386	38	0	0	0	0	*	0	0	10	0	1	0	0	0	*	*	*	*
1449	6	4	17386	38	0	3	0	0	*	0	0	49	1	0	2	0	0	*	*	*	*
1450	6	4	17386	37	0	0	0	0	*	0	0	29	2	1	0	0	0	*	*	*	*
1455	6	4	17386	38	0	40	0	0	*	0	0	29	1	1	3	3	0	*	*	*	*
1213	6	5	310386	36	0	130	0	0	*	0	0	61	1	2	2	0	0	*	*	*	*
1216	6	5	310386	37	*	10	0	0	*	0	0	74	1	1	2	1	0	*	*	*	*
1218	6	5	310386	38	0	10	0	0	*	0	0	67	1	3	6	1	0	*	*	*	*
1225	6	5	310386	38	0	0	0	0	*	0	0	24	0	1	0	0	0	*	*	*	*
1226	6	5	310386	38	0	0	0	0	*	0	0	20	0	1	1	0	0	*	*	*	*
1230	6	5	310386	38	*	3	0	0	*	0	0	32	0	0	1	1	0	*	*	*	*
1234	6	5	310386	36	0	1	0	0	*	0	0	38	0	0	1	0	0	*	*	*	*
1235	6	5	310386	37	0	0	0	0	*	0	0	30	5	0	0	0	0	*	*	*	*
22	7	1	30983	37	0	80	0	0	*	1	0	22	4	4	6	3	0	10	6	1	0
26	7	1	30983	37	1	300	0	0	*	1	0	27	4	4	4	0	0	17	3	0	0
27	7	1	30983	38	0	300	0	0	*	0	0	56	3	8	3	2	0	1	0	0	0
31	7	1	30983	37	0	100	0	0	*	0	0	16	0	2	2	0	0	6	0	1	0
159	7	2	281083	35	0	80	0	0	2	1	0	9	7	4	0	0	*	*	*	*	*
160	7	2	281083	36	0	5	0	0	7	0	0	5	2	0	0	0	*	*	*	*	*
162	7	2	281083	37	1	100	0	0	*	0	0	12	8	0	1	0	1	*	*	*	*
165	7	2	281083	37	0	30	0	0	*	0	0	8	1	1	1	0	*	*	*	*	*
270	7	3	100684	35	0	50	0	0	0	0	0	10	2	2	2	3	0	11	0	0	0
271	7	3	100684	38	0	0	0	0	0	0	0	18	1	5	0	3	0	*	*	*	*
276	7	3	100684	38	*	80	0	0	0	0	0	20	0	0	0	3	1	*	*	*	*
277	7	3	100684	38	0	50	0	1	0	0	0	42	2	4	1	3	0	*	*	*	*
391	7	4	170185	36	0	20	1	0	5	0	0	13	1	0	2	4	0	*	*	*	*
394	7	4	170185	38	0	64	0	0	*	0	0	35	2	26	0	7	0	*	*	*	*
395	7	4	170185	35	0	*	0	0	*	0	0	11	1	2	3	6	0	*	*	*	*
396	7	4	170185	38	1	95	0	0	*	0	0	7	3	6	5	6	0	*	*	*	*
399	7	4	170185	38	0	3	0	0	*	0	0	9	1	4	1	2	0	*	*	*	*
415	7	4	170185	37	0	110	0	0	*	0	0	10	2	4	4	4	0	*	*	*	*
426	7	4	170185	39	0	50	0	0	*	0	0	15	0	3	2	0	0	*	*	*	*
427	7	4	170185	38	0	50	0	0	*	0	0	15	2	2	9	1	0	*	*	*	*
439	7	4	170185	39	0	200	0	0	*	0	0	21	0	0	0	1	0	*	*	*	*
781	7	5	110985	36	0	20	0	0	*	0	0	15	8	3	0	3	0	*	*	*	*
782	7	5	110985	39	0	300	0	0	*	0	0	29	4	20	8	21	0	*	*	*	*
783	7	5	110985	36	0	350	0	0	*	0	0	21	2	3	0	2	0	*	*	*	*
784	7	5	110985	36	0	300	0	0	*	0	0	5	3	1	0	3	0	*	*	*	*
785	7	5	110985	39	0	350	0	0	*	0	0	49	5	5	4	14	0	*	*	*	*
600	7	6	260485	37	0	40	0	0	*	0	0	8	1	4	0	25	0	*	*	*	*
603	7	6	260485	37	0	25	0	0	*	0	0	10	1	0	1	0	0	*	*	*	*
604	7	6	260485	38	0	35	0	0	*	0	0	13	6	4	3	8	0	*	*	*	*
605	7	6	260485	36	0	80	0	0	*	0	2	13	4	9	2	15	0	*	*	*	*
608	7	6	260485	37	0	15	0	0	*	0	0	27	6	0	4	0	0	*	*	*	*
610	7	6	260485	38	0	400	0	0	*	0	0	50	7	11	42	12	1	*	*	*	*
613	7	6	260485	39	1	150	0	0	*	0	0	24	2	6	1	19	0	*	*	*	*
615	7	6	260485	35	0	180	0	0	*	0	0	14	2	8	1	7	0	*	*	*	*
616	7	6	260485	36	0	150	0	0	*	0	0	6	2	8	2	17	1	*	*	*	*
628	7	6	260485	35	1	20	0	0	*	0	0	14	4	7	0	6	0	*	*	*	*
629	7	6	260485	37	0	15	0	0	*	0	0	6	0	0	5	1	1	*	*	*	*
633	7	6	260485	36	0	300	0	0	*	0	0	24	4	5	5	1	0	*	*	*	*

634	7	6	260485	37	0	150	0	1	*	0	0	12	11	0	7	9	0	*	*	*	*
635	7	6	260485	35	0	90	0	0	*	0	0	14	6	3	3	5	0	*	*	*	*
669	7	6	260485	39	0	150	0	0	*	0	0	21	1	0	3	9	1	*	*	*	*
676	7	6	260485	36	0	500	0	0	*	0	0	38	2	9	7	3	0	*	*	*	*
677	7	6	260485	38	1	30	0	0	*	0	0	5	3	0	0	0	0	*	*	*	*
640	7	7	270685	35	0	60	0	0	*	0	0	22	2	4	3	5	1	*	*	*	*
641	7	7	270685	39	0	50	0	0	*	0	0	50	1	7	4	7	0	*	*	*	*
643	7	7	270685	38	0	120	0	0	*	0	0	25	2	10	7	9	0	*	*	*	*
645	7	7	270685	37	0	150	0	0	*	0	0	48	7	6	5	4	0	*	*	*	*
646	7	7	270685	39	0	20	0	0	*	0	0	13	0	1	10	2	0	*	*	*	*
648	7	7	270685	39	0	200	0	0	*	0	0	46	0	1	12	1	0	*	*	*	*
650	7	7	270685	35	0	20	0	0	*	0	0	9	3	0	0	0	0	*	*	*	*
651	7	7	270685	38	0	125	0	0	*	0	0	33	4	0	2	1	0	*	*	*	*
652	7	7	270685	35	0	50	0	0	*	0	0	11	2	3	0	10	0	*	*	*	*
859	8	1	120286	36	0	10	0	0	*	0	0	9	6	4	0	11	1	*	*	*	*
864	8	1	120286	38	0	500	0	0	*	0	0	46	2	37	4	111	3	*	*	*	*
865	8	1	120286	35	1	150	0	0	*	0	0	2	0	3	1	18	0	*	*	*	*
869	8	1	120286	36	0	500	0	0	*	0	0	14	2	23	7	18	1	*	*	*	*
873	8	1	120286	37	0	100	0	0	*	0	0	8	6	36	1	56	2	*	*	*	*
803	8	2	120286	37	0	700	0	0	*	0	0	21	8	26	3	78	1	*	*	*	*
806	8	2	120286	35	0	30	0	0	*	0	0	5	1	2	1	9	0	*	*	*	*
808	8	2	120286	36	1	220	0	0	*	0	0	12	5	3	2	20	0	*	*	*	*
811	8	2	120286	35	1	20	0	0	*	0	0	5	1	13	2	32	0	*	*	*	*
812	8	2	120286	39	0	700	0	0	*	0	0	32	2	19	5	36	3	*	*	*	*
814	8	2	120286	39	0	*	0	0	*	0	0	26	0	63	10	130	3	*	*	*	*
827	8	2	120286	36	1	20	0	0	*	0	0	5	3	8	0	18	1	*	*	*	*
834	8	2	120286	36	0	100	0	0	*	0	0	7	1	10	0	25	1	*	*	*	*
838	8	2	120286	39	1	999	0	0	*	0	0	36	7	27	11	89	0	*	*	*	*
840	8	2	120286	35	0	170	0	0	*	0	0	12	1	7	0	11	0	*	*	*	*
846	8	2	120286	35	0	100	0	0	*	0	0	3	1	7	1	8	1	*	*	*	*
848	8	2	120286	35	0	300	0	0	*	0	0	2	1	2	2	8	2	*	*	*	*
849	8	2	120286	36	1	400	0	0	*	0	0	5	1	14	2	37	0	*	*	*	*
850	8	2	120286	38	1	600	0	0	*	0	0	19	9	18	5	52	6	*	*	*	*
262	4	2	270784	37	0	15	0	0	*	0	0	15	1	1	0	5	0	*	*	*	*
264	4	2	270784	39	0	15	0	0	*	0	0	27	0	0	0	1	0	*	*	*	*
266	4	2	270784	38	0	30	0	0	*	0	0	17	0	1	0	0	1	4	0	0	1
268	4	2	270784	39	0	200	0	0	*	0	0	23	0	3	3	0	0	*	*	*	*
898	6	3	291185	39	0	2500	0	0	*	0	0	60	8	7	59	62	0	*	*	*	*
1220	6	4	170386	38	0	0	0	0	*	0	0	10	0	1	0	0	0	*	*	*	*
1223	6	4	170386	39	0	0	0	0	*	0	0	46	1	0	1	0	0	*	*	*	*
1435	6	4	170386	39	0	0	0	0	*	0	0	32	1	1	0	1	0	*	*	*	*
1436	6	4	170386	39	0	0	0	0	*	0	0	63	1	6	1	1	0	*	*	*	*
1439	6	4	170386	39	*	0	0	1	*	0	0	72	0	1	2	0	0	*	*	*	*
1445	6	4	170386	39	0	0	0	0	*	0	0	43	0	1	8	0	0	*	*	*	*
1447	6	4	170386	39	0	15	0	0	*	0	1	14	0	1	0	0	0	*	*	*	*
1453	6	4	170386	39	0	0	0	0	*	0	0	33	0	0	5	0	0	*	*	*	*
1214	6	5	310386	38	0	0	0	0	*	0	0	42	0	1	1	0	1	*	*	*	*
1215	6	5	310386	39	0	30	0	0	*	0	0	47	0	0	1	0	0	*	*	*	*
1228	6	5	310386	39	0	0	0	0	*	0	0	24	0	0	0	0	0	*	*	*	*
1409	6	5	310386	39	0	0	0	0	*	0	0	48	0	0	0	0	0	*	*	*	*
1431	6	5	310386	39	0	0	0	0	*	0	0	29	0	0	2	1	0	*	*	*	*
1432	6	5	310386	38	0	10	0	0	*	0	0	57	2	1	1	0	0	*	*	*	*
1433	6	5	310386	37	0	70	0	0	*	0	0	26	0	0	1	0	0	*	*	*	*
154	7	2	281083	39	0	600	0	0	*	0	0	34	0	3	15	13	*	*	*	*	*
156	7	2	281083	39	1	50	0	0	*	0	0	12	1	6	1	2	*	*	*	*	*
158	7	2	281083	39	0	100	0	0	1	0	0	20	0	0	1	0	0	*	*	*	*
163	7	2	281083	39	0	250	0	0	*	0	0	9	3	0	7	3	0	*	*	*	*
164	7	2	281083	39	0	10	0	0	*	0	0	3	4	0	0	0	*	*	*	*	*

167	7	2	281083	39	0	20	0	0	*	0	0	16	3	1	4	2	*	*	*	*	
272	7	3	100684	39	0	250	0	0	*	0	1	19	1	8	10	2	0	*	*	*	
398	7	4	170185	39	0	100	0	0	*	0	0	22	1	0	4	2	0	*	*	*	
400	7	4	170185	39	1	8	0	0	*	0	0	20	5	16	6	6	0	*	*	*	
406	7	4	170185	39	0	50	0	0	1	0	0	23	1	6	6	9	0	*	*	*	
409	7	4	170185	39	0	600	0	0	7	0	0	9	8	15	5	3	0	*	*	*	
414	7	4	170185	39	0	20	0	0	*	0	0	17	3	0	0	5	0	*	*	*	

Table 3.   Numbers of parasites in large H. atlanticus (40 to 48 cm LCF) from Australia.

441	1	2	91184	42	0	20	0	0	*	0	0	16	1	0	0	1	1	*	*	*	*
443	1	2	91184	48	0	1800	0	0	*	0	0	73	5	9	15	7	0	*	*	*	*
445	1	2	91184	43	0	400	0	0	*	0	0	43	5	0	5	3	0	*	*	*	*
446	1	2	91184	43	0	*	0	3	1	0	0	65	5	2	7	7	0	*	*	*	*
447	1	2	91184	43	0	20	0	0	*	0	0	47	1	17	3	5	0	*	*	*	*
448	1	2	91184	40	0	*	0	0	*	0	0	17	2	0	0	1	3	*	*	*	*
450	1	2	91184	46	0	3	0	0	*	0	0	9	0	0	0	0	2	*	*	*	*
453	1	2	91184	40	0	0	0	0	*	0	0	6	0	0	0	1	5	*	*	*	*
454	1	2	91184	42	0	300	0	0	4	0	0	18	3	2	0	1	0	*	*	*	*
456	1	2	91184	43	0	500	0	0	*	0	0	42	1	1	11	10	1	1	1	0	0
457	1	2	91184	40	0	200	1	0	*	0	0	40	2	1	12	2	1	0	0	0	3
459	1	2	91184	46	0	300	0	0	1	0	0	123	11	1	41	6	0	*	*	*	*
461	1	2	91184	41	0	60	0	0	*	0	0	46	2	0	2	2	0	*	*	*	*
464	1	2	91184	40	0	70	0	1	*	0	0	22	0	0	1	1	0	*	*	*	*
469	1	2	91184	40	0	25	0	0	5	0	0	30	3	0	1	2	0	7	0	0	5
474	1	3	101184	41	0	20	0	0	*	0	0	21	2	1	3	3	0	*	*	*	*
479	1	3	101184	40	0	300	0	0	*	0	1	136	15	10	6	2	2	*	*	*	*
485	1	3	101184	44	0	180	1	0	*	0	1	193	8	5	78	8	3	*	*	*	*
490	1	3	101184	43	0	600	0	1	*	0	0	59	10	0	7	5	0	5	0	0	1
559	1	3	101184	40	1	50	0	0	*	0	0	28	2	1	0	5	1	*	*	*	*
562	1	3	101184	44	0	2000	0	0	*	0	0	115	8	5	3	6	1	*	*	*	*
563	1	3	101184	43	0	2000	0	0	*	0	0	330	18	6	55	35	0	*	*	*	*
565	1	3	101184	40	0	100	0	0	*	0	0	82	8	1	1	2	0	*	*	*	*
579	1	4	121184	40	0	15	0	0	*	0	0	26	6	0	12	0	0	*	*	*	*
582	1	4	121184	41	0	550	0	0	*	0	12	62	3	5	8	2	1	*	*	*	*
595	1	4	121184	40	0	180	0	0	*	0	0	29	5	1	1	0	0	*	*	*	*
596	1	4	121184	41	0	999	0	1	*	0	0	62	5	0	3	0	0	*	*	*	*
597	1	4	121184	40	0	900	0	0	*	0	0	71	14	0	33	4	0	*	*	*	*
598	1	4	121184	41	0	70	0	0	*	0	0	62	4	0	10	1	4	*	*	*	*
757	1	4	121184	42	0	200	0	0	*	0	0	74	11	0	12	1	1	*	*	*	*
690	1	5	30685	41	0	400	0	0	*	0	0	40	10	0	4	7	1	*	*	*	*
704	1	5	30685	41	0	1300	0	0	*	0	0	133	35	0	41	7	0	*	*	*	*

709	1	5	30685	40	0	210	0	0	*	0	0	72	1	0	4	1	1	*	*	*	
710	1	5	30685	43	0	1000	0	0	*	0	0	134	29	2	22	30	1	*	*	*	
712	1	5	30685	43	0	1200	0	0	*	0	0	170	13	2	52	10	0	*	*	*	
713	1	5	30685	43	0	800	0	0	*	0	1	97	6	4	22	7	0	*	*	*	
715	1	5	30685	43	0	900	0	0	*	0	0	153	13	1	18	8	4	*	*	*	
496	2	3	311084	45	1	370	0	0	*	0	0	37	5	2	27	7	0	*	*	*	
519	2	3	311084	42	0	180	0	1	*	0	0	43	2	0	3	1	1	*	*	*	
523	2	3	311084	41	0	330	0	0	*	0	0	38	1	9	3	6	0	*	*	*	
537	2	3	311084	46	0	350	0	0	*	0	0	39	1	3	16	8	0	*	*	*	
539	2	3	311084	43	0	250	0	0	*	0	0	27	1	1	5	1	0	*	*	*	
285	2	4	151284	40	0	300	0	0	1	0	0	51	4	4	11	4	0	*	*	*	
292	2	4	151284	43	1	40	0	1	1	0	0	55	2	3	4	0	0	*	*	*	
298	2	4	151284	41	0	100	0	0	1	0	0	43	0	5	6	6	0	0	1	0	
299	2	4	151284	42	0	200	0	0	1	0	0	35	2	2	9	3	0	*	*	*	
309	2	4	151284	41	1	150	0	3	0	0	0	18	2	0	0	2	0	1	1	0	2
111	3	1	121083	41	0	20	0	0	*	0	0	5	0	1	0	0	*	*	*	*	
112	3	1	121083	44	0	*	0	0	*	0	0	20	4	0	8	2	*	*	*	*	
145	3	1	121083	40	0	200	0	0	*	0	0	25	1	0	2	0	*	*	*	*	
151	3	1	121083	41	1	150	0	0	*	0	0	14	1	0	2	1	*	*	*	*	
70	3	2	131083	42	0	800	0	0	*	0	0	30	0	2	3	1	0	1	1	0	0
72	3	2	131083	42	0	1500	0	0	*	0	0	67	0	8	3	4	0	11	0	0	3
76	3	2	131083	44	0	2000	1	0	*	0	0	47	1	5	19	8	0	6	0	0	0
95	3	2	131083	40	1	150	0	0	*	0	0	19	0	1	1	0	1	5	5	3	3
99	3	2	131083	41	0	50	0	0	*	0	0	10	0	2	21	2	0	0	1	0	0
101	3	2	131083	42	0	150	0	0	*	0	0	34	1	0	4	0	0	7	11	0	23
103	3	2	131083	44	1	2500	0	0	*	0	0	44	2	4	9	2	1	0	2	0	0
106	3	2	131083	40	0	100	0	0	*	0	0	23	1	2	6	2	0	4	0	0	2
107	3	2	131083	44	0	2000	0	0	*	0	0	82	0	1	44	4	0	1	0	0	11
108	3	2	131083	42	0	150	0	0	*	0	0	19	1	2	5	5	*	*	*	*	
113	3	2	131083	40	0	1300	0	0	*	0	0	17	3	4	6	5	0	12	0	0	0
116	3	2	131083	40	0	900	0	0	*	0	0	48	0	2	2	2	*	*	*	*	
118	3	2	131083	41	0	50	0	0	*	0	0	38	0	3	7	1	1	2	0	0	3
120	3	2	131083	44	0	100	0	0	*	0	0	26	2	0	0	3	*	*	*	*	
340	4	1	200684	40	1	60	0	0	5	0	0	23	0	2	9	0	0	*	*	*	*
341	4	1	200684	40	0	150	0	0	1	0	0	55	0	6	13	3	0	*	*	*	*
342	4	1	200684	42	0	150	0	1	0	0	0	43	0	1	3	7	0	*	*	*	*
346	4	1	200684	40	0	250	0	0	3	0	0	37	0	6	17	4	0	*	*	*	*
350	4	1	200684	41	0	120	0	0	1	0	0	23	0	1	5	3	0	*	*	*	*
354	4	1	200684	40	0	100	0	0	0	0	0	28	0	0	16	16	0	*	*	*	*
355	4	1	200684	42	0	100	0	0	0	0	0	23	0	2	1	7	0	*	*	*	*
357	4	1	200684	42	0	60	0	0	6	0	0	32	0	5	10	13	0	*	*	*	*
360	4	1	200684	43	0	24	0	0	1	0	0	24	2	3	8	0	0	*	*	*	*
363	4	1	200684	43	0	200	0	0	0	0	0	29	2	1	4	4	0	*	*	*	*
379	4	1	200684	41	0	20	0	0	*	0	0	61	3	2	8	2	0	*	*	*	*
381	4	1	200684	41	0	90	0	0	6	0	0	85	3	5	3	8	0	5	0	0	0
383	4	1	200684	45	0	*	0	0	*	0	2	39	1	0	2	1	0	*	*	*	*
386	4	1	200684	43	0	50	0	0	0	0	0	27	1	1	2	0	0	10	0	0	1
389	4	1	200684	40	0	150	1	0	*	0	0	33	5	1	1	20	0	*	*	*	*
390	4	1	200684	40	0	*	0	0	*	0	0	42	1	3	6	6	0	*	*	*	*
261	4	2	270784	41	0	0	0	0	0	0	0	40	5	2	5	2	0	2	0	0	0
263	4	2	270784	41	0	100	0	0	1	0	0	36	5	1	3	4	1	*	*	*	*
265	4	2	270784	43	0	10	0	2	0	0	0	43	1	1	18	0	0	*	*	*	*
267	4	2	270784	43	0	120	0	0	2	0	0	44	1	1	11	0	0	*	*	*	*
269	4	2	270784	40	0	50	0	0	0	0	0	25	0	6	2	17	1	0	0	0	0
193	4	3	181084	42	0	2000	0	0	*	0	3	15	1	1	18	5	*	*	*	*	
194	4	3	181084	40	0	200	0	0	0	0	0	32	2	4	2	4	0	4	0	0	0
195	4	3	181084	41	0	1500	0	0	0	0	0	42	2	4	17	1	*	*	*	*	
197	4	3	181084	40	0	200	0	0	1	0	0	10	1	1	5	3	*	*	*	*	
198	4	3	181084	41	0	150	0	0	0	0	0	63	0	13	15	1	*	*	*	*	

199	4	3	181084	40	0	50	0	0	0	0	0	31	0	2	1	0	*	*	*	*
203	4	3	181084	40	0	5	0	1	0	0	0	20	1	0	2	2	0	*	*	*
204	4	3	181084	44	0	*	0	0	0	0	0	42	0	2	10	0	0	*	*	*
208	4	3	181084	41	0	0	0	0	0	0	0	21	2	0	0	1	0	0	0	0
210	4	3	181084	40	0	40	0	0	0	0	0	38	2	0	8	1	0	2	0	0
211	4	3	181084	41	0	100	0	0	0	0	0	41	3	4	10	3	0	1	1	0
215	4	3	181084	43	0	400	0	0	0	0	0	61	1	1	46	0	0	3	0	0
216	4	3	181084	41	0	70	0	0	2	0	0	74	0	3	15	8	0	3	2	0
217	4	3	181084	40	0	80	0	0	1	0	0	46	0	2	6	3	0	3	0	0
124	5	1	211083	41	0	50	0	0	*	0	0	42	2	3	2	26	*	*	*	*
129	5	1	211083	42	0	300	0	0	*	0	0	35	1	6	68	6	*	*	*	*
131	5	1	211083	40	0	300	0	0	*	0	0	14	2	4	6	2	*	*	*	*
134	5	1	211083	41	0	*	0	1	*	0	0	34	0	0	1	2	*	*	*	*
135	5	1	211083	40	0	*	0	0	*	0	0	22	2	1	2	0	*	*	*	*
136	5	1	211083	40	1	100	0	1	*	0	0	24	0	14	3	9	*	*	*	*
138	5	1	211083	42	0	60	0	0	*	0	0	45	4	5	3	5	0	5	3	2
142	5	1	211083	41	0	300	0	0	*	0	0	80	0	1	37	2	*	*	*	*
80	5	3	231083	42	0	600	0	0	*	0	0	63	0	3	9	3	0	4	0	0
82	5	3	231083	44	0	50	0	0	*	0	0	37	2	1	9	5	0	7	2	0
86	5	3	231083	45	0	3000	0	0	*	0	0	68	3	8	18	4	0	6	0	1
89	5	3	231083	40	0	5	0	0	*	0	0	10	0	0	0	1	0	18	0	1
91	5	3	231083	42	0	200	0	0	*	1	0	27	0	0	13	4	0	2	0	2
177	5	3	231083	42	0	300	0	0	*	0	0	70	2	6	1	5	*	*	*	*
182	5	3	231083	40	0	2	0	0	*	0	0	12	2	3	0	0	*	*	*	*
1417	6	1	*	42	0	30	0	0	*	0	0	99	8	3	5	2	0	*	*	*
1419	6	1	*	44	0	3	0	0	*	0	0	42	0	1	15	0	0	*	*	*
1420	6	1	*	41	*	999	0	0	*	0	0	70	0	0	12	0	1	*	*	*
1421	6	1	*	46	0	0	0	0	*	0	1	109	3	0	10	2	0	*	*	*
1422	6	1	*	41	0	0	0	0	*	0	0	54	6	0	0	0	0	*	*	*
1423	6	1	*	43	0	0	0	0	*	0	0	61	0	0	0	0	0	*	*	*
1424	6	1	*	42	*	0	0	0	*	0	0	69	1	0	1	0	0	*	*	*
1425	6	1	*	42	0	0	0	0	*	0	1	114	0	2	0	0	0	*	*	*
1426	6	1	*	42	0	0	0	0	*	0	0	77	0	0	4	0	0	*	*	*
1427	6	1	*	44	*	0	0	0	*	0	0	60	0	1	2	0	0	*	*	*
1428	6	1	*	42	*	0	0	0	*	0	0	57	3	0	9	0	0	*	*	*
1429	6	1	*	41	0	0	0	0	*	0	0	78	2	2	1	4	0	*	*	*
1430	6	1	*	41	0	0	0	0	*	0	0	83	0	0	2	0	0	*	*	*
1434	6	1	*	40	0	4	0	0	*	0	0	68	0	0	37	1	0	*	*	*
716	6	2	240985	44	0	2500	0	1	*	0	0	101	9	8	83	41	1	*	*	*
734	6	2	240985	44	0	*	0	0	*	0	0	136	9	7	37	13	3	*	*	*
735	6	2	240985	42	0	600	0	0	*	0	1	26	0	1	15	5	1	*	*	*
737	6	2	240985	40	0	*	0	0	*	0	0	26	1	2	0	0	0	*	*	*
738	6	2	240985	41	0	120	0	0	*	0	0	57	2	10	0	50	0	*	*	*
740	6	2	240985	43	0	150	0	0	*	0	0	25	3	1	0	6	1	*	*	*
741	6	2	240985	41	0	350	0	0	*	0	0	62	0	4	2	40	1	*	*	*
742	6	2	240985	43	0	20	0	0	*	0	0	10	1	0	1	1	0	*	*	*
743	6	2	240985	45	0	*	0	0	*	0	0	86	5	6	14	20	0	*	*	*
744	6	2	240985	44	0	*	0	0	*	0	0	38	1	3	2	11	0	*	*	*
881	6	3	291185	40	0	*	0	0	*	0	0	273	6	12	151	24	0	*	*	*
885	6	3	291185	45	0	1500	0	0	*	0	0	217	7	5	211	47	0	*	*	*
899	6	3	291185	40	0	2200	0	0	*	0	0	60	8	7	59	62	0	*	*	*
1221	6	4	170386	41	0	0	0	0	*	0	0	6	2	0	0	0	0	*	*	*
1222	6	4	170386	42	*	0	0	0	*	0	0	8	1	0	0	4	0	*	*	*
1437	6	4	17386	42	0	*	0	0	*	0	0	62	0	0	14	2	0	*	*	*
1438	6	4	17386	42	0	*	0	0	*	0	0	51	1	0	2	0	0	*	*	*
1440	6	4	17386	41	0	10	0	1	*	0	1	58	0	0	0	1	0	*	*	*
1441	6	4	17386	40	*	10	0	0	*	0	0	43	1	0	1	0	0	*	*	*
1442	6	4	17386	43	0	0	0	0	*	0	0	116	1	1	7	0	0	*	*	*
1443	6	4	17386	41	*	100	0	0	*	0	0	65	0	0	0	0	0	*	*	*

1444	6	4	17386	44	0	*	0	0	*	0	0	58	0	0	20	1	0	*	*	*	4
1446	6	4	17386	44	0	0	0	0	*	0	0	70	0	0	1	2	0	*	*	*	3
1448	6	4	17386	42	0	0	0	0	*	0	0	77	0	0	10	0	0	*	*	*	3
1451	6	4	17386	44	0	*	0	0	*	0	0	59	0	2	1	0	0	*	*	*	3
1454	6	4	17386	43	*	0	0	0	*	0	0	94	0	0	1	0	0	*	*	*	3
1217	6	5	310386	40	*	10	0	0	*	0	0	64	6	8	5	1	0	*	*	*	4
1219	6	5	310386	40	0	40	0	0	*	0	0	58	0	4	1	1	0	*	*	*	4
1224	6	5	310386	40	0	0	0	0	*	0	1	64	1	0	3	0	0	*	*	*	4
1229	6	5	310386	40	0	0	0	0	*	0	0	76	0	0	11	3	0	*	*	*	4
1231	6	5	310386	40	*	0	0	0	*	0	0	57	0	0	2	1	0	*	*	*	4
1232	6	5	310386	41	0	0	0	0	*	0	0	45	0	0	0	0	0	*	*	*	4
1233	6	5	310386	43	0	0	0	0	*	0	0	65	2	0	1	0	0	*	*	*	4
1236	6	5	310386	40	*	0	0	0	*	0	0	70	5	1	21	0	0	*	*	*	4
1400	6	5	31386	46	0	0	0	0	*	0	0	85	1	0	27	2	0	*	*	*	*
1401	6	5	31386	41	0	0	0	0	*	0	0	70	0	0	2	0	0	*	*	*	*
1402	6	5	31386	42	0	0	0	0	*	0	0	53	1	3	3	1	0	*	*	*	*
1403	6	5	31386	42	0	0	0	0	*	0	0	110	0	0	1	0	0	*	*	*	*
1404	6	5	31386	43	0	0	0	0	*	0	0	87	0	1	0	0	0	*	*	*	*
1406	6	5	31386	41	*	0	0	0	*	0	0	107	0	2	7	0	0	*	*	*	*
1407	6	5	31386	45	0	2	0	0	*	0	0	100	2	2	6	0	0	*	*	*	*
1408	6	5	31386	41	0	0	0	0	*	0	0	61	2	1	1	0	0	*	*	*	*
1410	6	5	31386	44	0	0	0	0	*	0	0	49	1	1	2	1	0	*	*	*	*
1411	6	5	31386	44	0	0	0	0	*	0	0	36	0	0	7	0	0	*	*	*	*
1412	6	5	31386	43	*	999	0	2	*	0	0	86	2	0	1	1	0	*	*	*	*
1413	6	5	31386	43	0	*	0	0	*	0	0	85	0	3	15	0	0	*	*	*	*
1414	6	5	31386	41	0	0	0	0	*	0	0	63	2	1	1	0	0	*	*	*	*
1415	6	5	31386	42	0	1	0	0	*	0	0	70	0	0	4	0	0	*	*	*	*
1416	6	5	31386	41	0	*	0	0	*	0	0	81	2	0	10	0	0	*	*	*	*
29	7	1	30983	41	0	500	0	0	*	0	0	32	6	6	9	2	0	2	0	0	0
153	7	2	281083	40	1	300	0	0	*	0	0	14	3	1	1	3	0	3	1	1	500
155	7	2	281083	40	0	1000	0	0	*	0	0	12	2	3	2	1	*	*	*	*	*
157	7	2	281083	42	0	200	0	0	2	1	0	32	1	1	1	6	*	*	*	*	*
166	7	2	281083	41	0	800	0	0	*	0	0	9	13	1	10	2	*	*	*	*	*
169	7	2	281083	41	0	300	0	0	*	0	0	23	5	4	3	3	1	1	0	0	0
170	7	2	281083	43	0	100	0	0	*	0	0	57	7	8	10	9	*	*	*	*	*
273	7	3	100684	41	0	200	0	0	1	0	0	24	0	1	13	1	0	*	*	*	*
274	7	3	100684	40	0	100	0	0	0	0	0	15	1	0	6	2	0	*	*	*	*
275	7	3	100684	41	0	80	0	1	7	0	0	27	0	3	9	2	0	0	3	0	4
278	7	3	100684	41	0	10	0	0	1	0	0	84	1	5	11	3	0	*	*	*	*
279	7	3	100684	41	0	20	0	0	0	0	0	32	4	1	3	2	0	*	*	*	*
280	7	3	100684	40	0	30	0	0	1	0	0	23	2	6	5	1	1	*	*	*	*
281	7	3	100684	40	0	0	0	0	9	0	1	10	0	2	3	4	0	2	0	0	4
393	7	4	170185	42	0	250	0	0	*	0	0	44	15	7	31	7	0	*	*	*	*
397	7	4	170185	40	1	*	0	0	*	0	0	25	5	3	3	5	0	*	*	*	*
401	7	4	170185	42	0	100	0	0	22	0	0	18	6	5	4	4	0	*	*	*	*
402	7	4	170185	46	0	60	0	0	*	0	1	42	4	9	15	11	0	*	*	*	*
403	7	4	170185	42	0	150	0	0	10	0	0	28	3	9	2	22	0	*	*	*	*
408	7	4	170185	45	0	1800	0	2	10	0	0	31	0	3	11	2	0	*	*	*	*
416	7	4	170185	43	0	2000	0	0	*	0	0	37	7	6	47	10	0	*	*	*	*
417	7	4	170185	42	0	999	0	0	2	0	0	36	7	9	20	17	0	*	*	*	*
418	7	4	170185	41	0	500	0	0	2	0	0	42	2	1	9	5	1	*	*	*	*
419	7	4	170185	41	1	300	0	0	*	0	0	62	7	14	27	8	0	*	*	*	*
420	7	4	170185	41	0	300	0	0	3	0	0	45	4	1	18	5	0	*	*	*	*
423	7	4	170185	46	0	80	0	0	5	0	0	44	6	1	3	1	0	*	*	*	*
424	7	4	170185	44	0	80	0	0	*	0	0	26	1	0	24	0	0	*	*	*	*
425	7	4	170185	40	0	60	0	0	*	0	0	29	5	4	6	5	0	*	*	*	*
429	7	4	170185	40	0	35	0	0	*	0	0	26	1	2	5	5	1	*	*	*	*
430	7	4	170185	41	0	*	0	0	3	0	0	39	8	8	14	24	0	*	*	*	*
433	7	4	170185	42	0	200	0	0	*	0	0	44	5	6	10	10	0	*	*	*	*

```
434  7  4  170185  43  0   600  0  0  *  0  0   31   6   5   14    6  0  *  *  *  *
435  7  4  170185  42  0   150  0  0  *  0  0   25   3   5    1   20  0  *  *  *  *
436  7  4  170185  44  0   300  0  0  *  0  0   22   3  14    6    5  0  *  *  *  *
437  7  4  170185  43  0   600  0  0  *  0  0   35   3  13   30   13  0  *  *  *  *
438  7  4  170185  43  0  1800  0  0  *  0  0   60   2   4   35    5  3  *  *  *  *
440  7  4  170185  45  0   800  0  1  *  0  0   61   7   9   47   15  2  *  *  *  *
786  7  5  110985  42  0   120  0  0  *  0  0   57   0   8    4    9  0  *  *  *  *
787  7  5  110985  40  0    40  0  0  *  0  0   27   5   8    9   12  0  *  *  *  *
788  7  5  110985  41  0   200  0  0  *  0  0   62   1  10   48    3  0  *  *  *  *
789  7  5  110985  41  0   150  0  0  *  0  0   51   5   4    8    9  1  *  *  *  *
790  7  5  110985  41  0   180  0  0  *  0  0   42   7   6   13    7  0  *  *  *  *
792  7  5  110985  41  0     5  0  0  *  0  0   28   0   4    4    1  0  *  *  *  *
793  7  5  110985  42  0   200  0  0  *  0  0   42   6   6   40   10  0  *  *  *  *
794  7  5  110985  40  0   150  0  0  *  0  0   15   2   5    4   22  1  *  *  *  *
795  7  5  110985  45  0   999  1  0  *  0  0   67  10   3   17    5  0  *  *  *  *
796  7  5  110985  42  0    30  0  0  *  0  0   32   2   7   25    3  0  *  *  *  *
797  7  5  110985  42  0   250  0  1  *  0  1   61   2   7   22    9  0  *  *  *  *
798  7  5  110985  41  0    90  0  0  *  0  0   14   0   0    4    9  0  *  *  *  *
799  7  5  110985  42  0   130  0  0  *  0  0   27   3   4    9    6  1  *  *  *  *
800  7  5  110985  43  0     0  0  1  *  0  0   44   0   0   13    0  1  *  *  *  *
801  7  5  110985  41  0   450  0  0  *  0  0   37   2   0    6    2  0  *  *  *  *
601  7  6  260485  42  0    40  0  0  *  0  0   33   1   2   17    1  0  *  *  *  *
602  7  6  260485  41  0   800  0  0  *  0  2   31  13   3   20   12  0  *  *  *  *
606  7  6  260485  45  0   350  0  0  *  0  0   42   7   0   18    8  0  *  *  *  *
607  7  6  260485  40  *    15  0  0  *  0  0   11   0   1    2    1  0  *  *  *  *
609  7  6  260485  42  0   150  0  0  *  0  0   20  13   2   16   11  0  *  *  *  *
612  7  6  260485  43  0   100  0  0  *  0  0   32   2   1    6    1  0  *  *  *  *
614  7  6  260485  43  0   800  0  0  *  0  0   32   4  13   10   13  1  *  *  *  *
620  7  6  260485  40  1   400  0  1  *  0  0   22   2   2    0    3  1  *  *  *  *
622  7  6  260485  43  0   999  0  0  *  0  0  112   3   6   17   13  1  *  *  *  *
625  7  6  260485  43  0   999  0  0  *  0  0   35   5  12   29   20  1  *  *  *  *
630  7  6  260485  44  0   350  0  1  *  0  1   40   5   2   30    0  3  *  *  *  *
631  7  6  260485  40  0   999  0  0  *  0  0   39   2   8   13    4  0  *  *  *  *
632  7  6  260485  44  0   250  0  0  *  0  0   43   2  14   62   20  2  *  *  *  *
670  7  6  260485  41  0    60  0  0  *  0  0   54   7   1    2    8  0  *  *  *  *
672  7  6  260485  40  0   450  0  0  *  0  0   48   6   3    5    4  0  *  *  *  *
674  7  6  260485  44  1  1000  0  0  *  0  0   46  11   1   12    5  0  *  *  *  *
678  7  6  260485  42  0   140  0  0  *  0  0   29   5   2   24    6  1  *  *  *  *
679  7  6  260485  40  0    30  0  0  *  0  0   19   2   2    3    5  1  *  *  *  *
680  7  6  260485  43  0     *  0  0  *  0  0   16   1   1   25    1  1  *  *  *  *
681  7  6  260485  40  0    40  0  0  *  0  0   52   2   2    5    2  0  *  *  *  *
682  7  6  260485  40  0   600  0  0  *  0  0   51   6  13   13   47  4  *  *  *  *
683  7  6  260485  42  0   450  0  0  *  0  0   33   4   7   24   27  0  *  *  *  *
638  7  7  270685  41  0   300  0  0  *  0  0   39   4  14    8    8  0  *  *  *  *
639  7  7  270685  42  0   300  0  0  *  0  1   22   2   5    5    1  0  *  *  *  *
642  7  7  270685  44  0   700  0  0  *  0  0   55   4   5   52   10  2  *  *  *  *
644  7  7  270685  42  0   200  0  0  *  0  2   28   1  10   17   16  0  *  *  *  *
647  7  7  270685  42  0   120  0  0  *  0  0   35   1   3    6    4  0  *  *  *  *
649  7  7  270685  41  0   200  1  0  *  0  0   58  15   5   44    8  3  *  *  *  *
653  7  7  270685  40  0   250  0  0  *  0  0   61   4   2   11   22  0  *  *  *  *
654  7  7  270685  44  0    10  0  0  *  0  0   20   0   1    4    0  0  *  *  *  *

689  1  5   30685  47  0     *  0  0  *  0  0  201   5  10  163   35  1  *  *  *  *
697  1  5   30685  45  0  2000  0  0  *  0  0  147   3  15   31   15  0  *  *  *  *
105  3  2  131083  47  0  3000  0  0  *  0  0   42   4   6   33    3  0  0  1  0  8
122  3  2  131083  45  0  2000  0  0  *  0  0   89   3   3   22    2  *  *  *  *  *
718  6  2  240985  45  0   500  0  0  *  0  0   97   3   3   11    5  0  *  *  *  *
727  6  2  240985  49  0  2000  0  0  *  0  0  104   1  18   94   30  0  *  *  *  *
728  6  2  240985  45  0  1000  0  0  *  0  1  114   2  12   19   12  0  *  *  *  *
```

729	6	2	240985	49	0	700	0	0	*	0	0	108	16	7	29	6	0	*	*	*	
731	6	2	240985	46	0	2000	0	0	*	0	0	134	0	12	47	29	0	*	*	*	
733	6	2	240985	45	0	50	0	0	*	0	0	46	2	1	5	4	0	*	*	*	
736	6	2	240985	45	0	300	0	0	*	0	0	103	10	4	1	10	0	*	*	*	
739	6	2	240985	49	0	200	0	1	*	0	0	163	0	8	79	10	0	*	*	*	
745	6	2	240985	46	0	700	0	0	*	0	1	154	4	9	62	9	1	*	*	*	
747	6	2	240985	48	0	90	0	0	*	0	0	186	3	9	128	13	0	*	*	*	
748	6	2	240985	48	0	800	0	1	*	0	0	138	5	10	90	4	3	*	*	*	
749	6	2	240985	49	0	1200	0	0	*	0	0	135	3	13	153	22	0	*	*	*	
750	6	2	240985	48	0	1500	0	0	*	0	0	149	7	5	38	6	0	*	*	*	
751	6	2	240985	46	0	250	0	1	*	0	0	150	0	14	30	27	0	*	*	*	
752	6	2	240985	46	0	250	0	0	*	0	0	79	3	5	7	16	0	*	*	*	
753	6	2	240985	50	0	200	0	0	*	0	0	105	6	6	31	18	1	*	*	*	
876	6	3	291185	51	0	3500	0	0	*	0	0	198	10	10	235	19	2	*	*	*	
877	6	3	291185	51	*	70	0	0	*	0	0	265	6	5	124	12	0	*	*	*	
878	6	3	291185	48	0	*	0	0	*	0	0	134	5	2	33	12	0	*	*	*	
879	6	3	291185	48	0	*	0	0	*	0	0	132	4	5	75	11	0	*	*	*	
880	6	3	291185	47	0	*	0	0	*	0	0	47	0	3	1	10	1	*	*	*	
882	6	3	291185	48	0	*	0	0	*	0	0	172	2	13	94	12	1	*	*	*	
883	6	3	291185	50	0	*	0	0	*	0	0	185	1	2	80	12	0	*	*	*	
884	6	3	291185	48	0	400	0	0	*	0	0	106	1	1	13	5	1	*	*	*	
886	6	3	291185	45	0	400	0	0	*	0	1	210	9	4	83	11	5	*	*	*	
887	6	3	291185	45	0	80	0	0	*	0	0	67	4	2	1	6	1	*	*	*	
888	6	3	291185	46	0	500	0	0	*	0	0	134	1	3	79	21	0	*	*	*	
889	6	3	291185	47	0	350	0	0	*	0	0	156	0	6	113	21	1	*	*	*	
890	6	3	291185	45	0	140	0	0	*	0	0	177	2	3	121	19	3	*	*	*	
891	6	3	291185	48	0	800	0	0	*	0	0	122	2	2	82	7	0	*	*	*	
892	6	3	291185	55	0	500	0	0	*	0	0	97	0	3	14	23	0	*	*	*	
893	6	3	291185	47	0	400	0	0	*	0	0	280	2	15	82	12	2	*	*	*	
894	6	3	291185	46	0	1500	0	0	*	0	0	172	1	6	287	23	1	*	*	*	
895	6	3	291185	53	0	350	0	0	*	0	0	192	7	5	80	19	3	*	*	*	
896	6	3	291185	45	0	100	0	0	*	0	0	140	2	7	11	17	0	*	*	*	
897	6	3	291185	48	0	600	0	0	*	0	2	141	1	5	57	4	3	*	*	*	
900	6	3	291185	48	0	7	0	0	*	0	0	3	0	0	0	0	0	*	*	*	
1452	6	4	170386	47	0	0	0	0	*	0	0	131	0	1	20	0	0	*	*	*	
1405	6	5	310386	46	0	*	0	0	*	0	0	101	0	1	36	4	0	*	*	*	
1417	6	5	310386	42	0	30	0	0	*	0	0	99	8	3	5	2	0	*	*	*	
1418	6	5	310386	46	0	*	0	0	*	0	0	140	1	2	10	7	0	*	*	*	
1419	6	5	310386	44	0	3	0	0	*	0	0	42	0	1	15	0	0	*	*	*	
1420	6	5	310386	41	*	1000	0	0	*	0	0	70	0	0	12	0	1	*	*	*	
1421	6	5	310386	46	0	0	0	0	*	0	1	109	3	0	10	2	0	*	*	*	
1422	6	5	310386	41	0	0	0	0	*	0	0	54	6	0	0	0	0	*	*	*	
1423	6	5	310386	43	0	0	0	0	*	0	0	61	0	0	0	0	0	*	*	*	
1424	6	5	310386	42	*	0	0	0	*	0	0	69	1	0	1	0	0	*	*	*	
1425	6	5	310386	42	0	0	0	0	*	0	1	114	0	2	0	0	0	*	*	*	
1426	6	5	310386	42	0	0	0	0	*	0	0	77	0	0	4	0	0	*	*	*	
1427	6	5	310386	44	*	0	0	0	*	0	0	60	0	1	2	0	0	*	*	*	
1428	6	5	310386	42	*	0	0	0	*	0	0	57	3	0	9	0	0	*	*	*	
1429	6	5	310386	41	0	0	0	0	*	0	0	78	2	2	1	4	0	*	*	*	
1430	6	5	310386	41	0	0	0	0	*	0	0	83	0	0	2	0	0	*	*	*	
1434	6	5	310386	40	0	4	0	0	*	0	0	68	0	0	37	1	0	*	*	*	
842	8	2	120286	43	0	750	0	0	*	0	0	33	6	21	5	57	4	*	*	*	

Table 4.   Numbers of parasites in small H. atlanticus (20 to 34 cm

LCF) from New Zealand.

903	9	1	13	786	34	0	150	0	0	*	0	0	5	1	4	2	2	2	*	*	*	
908	9	1	‹	786	30	0	80	0	0	*	0	0	2	0	4	0	0	0	*	*	*	
909	9	1	‹	786	32	0	100	0	0	*	0	1	11	3	2	0	9	0	*	*	*	
911	9	1	‹	786	33	0	250	0	0	*	0	0	9	2	5	0	5	1	*	*	*	
914	9	1		786	31	0	60	0	0	*	0	0	0	0	1	1	0	0	*	*	*	
918	9	1		786	31	1	0	0	0	*	0	0	2	0	0	0	0	0	*	*	*	
920	9	1		786	32	0	0	0	0	*	0	0	6	0	0	0	0	0	*	*	*	
924	9	1		786	33	0	30	0	0	*	0	0	2	0	0	0	0	0	*	*	*	
925	9	1		786	28	0	10	0	0	*	0	0	3	0	0	0	1	0	*	*	*	
928	9	1		786	34	0	40	0	0	*	0	0	8	2	0	0	1	0	*	*	*	
932	9	1		786	31	0	60	0	0	*	0	0	5	0	1	0	1	2	*	*	*	
933	9	1		786	30	0	0	0	0	*	0	0	3	0	0	1	0	0	*	*	*	
934	9	1		786	32	0	15	0	0	*	0	0	2	0	0	1	0	0	*	*	*	
936	9	1		786	34	0	20	0	0	*	0	0	12	0	0	2	0	0	*	*	*	
937	9	1		786	31	1	10	0	0	*	0	0	9	0	2	0	1	0	*	*	*	
939	9	1		786	29	0	0	0	0	*	0	0	0	1	0	0	0	0	*	*	*	
940	9	1		786	29	1	0	0	0	*	0	0	1	1	0	0	0	0	*	*	*	
942	9	1		786	31	1	80	0	0	*	0	0	7	4	2	2	1	2	*	*	*	
995	9	1		786	33	0	20	0	0	*	0	0	2	1	0	0	0	0	*	*	*	
998	9	1		786	29	0	10	0	0	*	0	0	2	0	1	0	0	0	*	*	*	
1122	9	1		786	27	1	1	0	0	*	0	0	0	0	0	0	0	0	*	*	*	
1124	9	1		786	30	1	10	0	0	*	0	0	5	0	0	0	0	0	*	*	*	
1127	9	1		786	31	0	0	0	0	*	0	0	1	0	0	0	0	0	*	*	*	
1128	9	1		786	31	0	0	0	0	*	0	0	0	0	0	0	0	0	*	*	*	
1129	9	1		786	33	0	10	0	0	*	0	0	3	0	4	0	4	0	*	*	*	
1133	9	1		786	31	0	80	0	0	*	0	0	7	1	0	0	1	0	*	*	*	
1136	9	1		786	30	0	3	0	0	*	0	0	0	0	0	0	0	0	*	*	*	
1142	9	1		786	29	1	*	0	0	*	0	0	5	0	0	0	1	0	*	*	*	
1143	9	1		786	29	0	0	0	0	*	0	0	3	2	0	0	0	0	*	*	*	
1149	9	1		786	32	0	10	0	0	*	0	0	6	1	0	0	0	0	*	*	*	
1152	9	1		786	32	0	0	0	0	*	0	0	11	0	2	0	2	0	*	*	*	
1154	9	1		786	32	0	0	0	0	*	0	0	7	2	3	1	1	0	*	*	*	
1156	9	1		786	31	0	0	0	0	*	0	0	43	0	0	2	0	0	*	*	*	
1159	9	1		786	30	0	120	0	0	*	0	0	3	1	0	0	0	1	*	*	*	
1160	9	1		786	29	0	10	0	0	*	0	0	1	0	1	0	0	0	*	*	*	
1161	9	1		786	31	1	40	0	0	*	0	0	4	0	0	0	0	0	*	*	*	
1162	9	1		786	31	0	20	0	0	*	0	0	2	5	3	0	1	0	*	*	*	
1163	9	1		786	33	1	20	1	0	*	0	0	3	0	0	1	0	0	*	*	*	
1167	9	1		786	29	1	2	0	1	*	0	0	3	1	0	0	0	0	*	*	*	
1168	9	1		786	30	0	5	0	0	*	0	0	2	0	0	0	0	0	*	*	*	
1172	9	1		786	32	0	25	0	0	*	0	0	1	2	0	0	0	0	*	*	*	
1173	9	1		786	33	0	70	0	0	*	0	0	12	0	5	2	2	0	*	*	*	
1174	9	1		786	32	0	50	0	0	*	0	0	4	0	0	0	0	0	*	*	*	
1175	9	1		786	32	0	5	0	0	*	0	0	4	0	0	0	0	0	*	*	*	
1176	9	1		786	33	0	30	0	0	*	0	0	5	1	0	5	0	0	*	*	*	
1177	9	1		786	28	0	0	0	1	*	0	0	2	0	0	0	0	0	*	*	*	
1178	9	1		786	28	0	30	0	0	*	0	0	0	0	1	0	0	0	*	*	*	
1179	9	1		786	27	0	0	0	0	*	0	0	1	0	0	0	0	0	*	*	*	
1183	9	1		786	30	0	80	0	0	*	0	0	25	0	0	0	0	0	*	*	*	
1187	9	1		786	33	0	0	0	0	*	0	0	7	0	2	2	0	0	*	*	*	
1198	9	1		786	31	0	20	0	0	*	0	0	0	0	0	0	0	0	*	*	*	
901	9	2	7	786	30	0	80	0	0	*	0	0	1	0	1	1	2	1	*	*	*	
915	9	2	‹	786	33	0	40	0	0	*	0	0	3	0	0	0	0	0	*	*	*	

919	9	2	7	786	33	0	0	0	0	*	0	0	6	0	0	0	0	0	*	*	*	*
989	9	2		786	34	*	200	0	0	*	0	0	13	0	0	3	0	1	*	*	*	*
994	9	2		786	33	0	70	0	0	*	0	0	10	1	2	0	6	0	*	*	*	*
999	9	2		786	28	0	110	0	0	*	0	0	4	2	0	1	0	0	*	*	*	*
1000	9	2		786	32	0	80	0	0	*	0	0	9	4	3	0	0	0	*	*	*	*
1005	9	2		786	34	0	30	0	0	*	0	0	6	0	2	1	1	0	*	*	*	*
1007	9	2		786	30	1	15	0	0	*	0	0	5	0	1	0	0	0	*	*	*	*
1008	9	2		786	31	0	6	0	0	*	0	0	1	0	1	0	0	0	*	*	*	*
1011	9	2		786	33	0	5	0	0	*	0	0	11	0	0	2	0	0	*	*	*	*
1012	9	2		786	34	0	25	0	0	*	0	0	9	1	0	1	2	0	*	*	*	*
1016	9	2		786	34	0	20	0	0	*	0	0	10	0	0	1	0	0	*	*	*	*
1018	9	2		786	31	0	40	0	0	*	0	0	3	1	3	0	0	0	*	*	*	*
1019	9	2		786	34	0	50	0	0	*	0	0	9	1	3	0	1	0	*	*	*	*
1020	9	2		786	33	0	0	0	0	*	0	0	5	0	0	2	0	0	*	*	*	*
1021	9	2		786	32	0	0	0	0	*	0	0	6	0	1	0	0	0	*	*	*	*
1023	9	2		786	34	0	*	0	0	*	0	0	3	0	2	4	0	0	*	*	*	*
1024	9	2		786	33	0	10	0	0	*	0	0	2	1	0	0	0	0	*	*	*	*
1026	9	2		786	33	*	10	0	0	*	0	0	2	0	3	0	0	0	*	*	*	*
1032	9	2		786	33	1	0	0	0	*	0	0	3	1	1	0	12	0	*	*	*	*
1036	9	2		786	33	*	80	0	0	*	0	0	15	2	3	4	7	0	*	*	*	*
1038	9	2		786	32	0	80	0	0	*	0	0	4	0	0	0	0	0	*	*	*	*
1043	9	2		786	33	0	1	0	0	*	0	1	1	2	0	0	0	0	*	*	*	*
1138	9	2		786	32	0	10	0	0	*	0	0	3	0	1	1	0	0	*	*	*	*
1139	9	2		786	32	*	10	0	1	*	0	0	3	0	2	1	0	0	*	*	*	*
1182	9	2		786	34	0	10	0	0	*	0	0	5	0	1	0	0	0	*	*	*	*
1197	9	2		786	33	0	80	0	1	*	0	0	10	5	1	0	2	2	*	*	*	*
1199	9	2		786	33	*	0	0	0	*	0	0	4	0	2	0	1	0	*	*	*	*
1200	9	2		786	33	0	150	0	0	*	0	0	6	1	2	0	1	0	*	*	*	*
1202	9	2		786	34	*	70	0	1	*	0	0	10	3	6	1	29	0	*	*	*	*
1204	9	2		786	34	0	100	0	0	*	0	0	11	1	3	0	0	0	*	*	*	*
1206	9	2		786	33	0	30	0	0	*	0	0	8	0	5	0	2	1	*	*	*	*
1210	9	2		786	33	0	40	1	0	*	0	0	8	1	1	1	0	0	*	*	*	*
1211	9	2		786	29	1	0	0	0	*	0	0	2	0	0	0	0	0	*	*	*	*
1288	10a	1	28	786	34	0	0	0	0	*	0	0	5	1	1	0	0	0	*	*	*	*
1289	10a	1		786	34	1	0	0	0	*	0	0	13	0	0	2	0	0	*	*	*	*
1290	10a	1		786	34	0	0	0	1	*	0	0	12	1	0	0	0	0	*	*	*	*
1298	10a	1		786	33	0	5	0	0	*	0	0	18	0	0	1	0	0	*	*	*	*
1307	10a	1		786	32	1	0	0	0	*	0	0	1	0	1	0	0	0	*	*	*	*
1324	10a	1		786	34	0	0	0	0	*	0	0	12	0	1	2	0	0	*	*	*	*
1326	10a	1		786	34	0	0	0	0	*	0	0	3	0	0	0	0	0	*	*	*	*
1329	10a	1		786	34	0	0	0	0	*	0	0	7	1	0	2	0	0	*	*	*	*
1333	10a	1		786	29	1	0	0	0	*	0	0	0	0	0	0	0	0	*	*	*	*
1334	10a	1		786	20	1	0	0	1	*	0	0	0	0	0	0	0	0	*	*	*	*
1338	10a	1		786	20	*	0	0	0	*	0	0	1	0	0	0	0	0	*	*	*	*
1342	10a	1		786	21	1	0	0	0	*	0	0	0	0	0	1	1	0	*	*	*	*
1343	10a	1		786	34	0	0	0	0	*	0	0	6	4	0	1	5	0	*	*	*	*
1353	10a	1		786	21	*	0	0	0	*	0	0	0	0	0	0	0	0	*	*	*	*
1360	10a	1		786	30	0	0	0	0	*	0	0	1	0	0	0	0	0	*	*	*	*
1364	10a	1		786	32	0	0	0	1	*	0	0	11	0	0	0	0	0	*	*	*	*
1366	10a	1		786	22	0	0	0	0	*	0	0	0	0	0	0	0	0	*	*	*	*
1367	10a	1		786	22	1	0	0	0	*	0	0	0	0	0	0	0	0	*	*	*	*
1368	10a	1		786	22	0	0	0	0	*	0	0	1	0	0	0	0	0	*	*	*	*
1369	10a	1		786	23	1	0	0	0	*	0	0	0	0	0	0	0	0	*	*	*	*
1237	10a	1		786	23	1	0	0	0	*	0	0	0	0	0	0	0	0	*	*	*	*
1241	10a	1		786	22	1	0	0	0	*	0	0	0	0	0	0	0	0	*	*	*	*
1250	10b	2		786	32	0	0	0	0	*	0	0	10	0	0	0	0	0	*	*	*	*
1251	10b	2		786	33	0	70	0	0	*	0	0	4	0	1	0	0	0	*	*	*	*
1257	10b	2		786	32	1	0	0	0	*	0	0	12	0	0	0	0	0	*	*	*	*
1266	10b	2		786	34	0	1	0	0	*	0	0	4	0	0	0	0	0	*	*	*	*

1267	10b	2	28	786	22	1	0	0	0	*	0	0	0	0	0	0	0	0	*	*	*
1271	10b	2		786	21	1	0	0	0	*	0	0	0	0	0	0	0	0	*	*	*
1273	10b	2		786	34	0	0	0	0	*	0	0	6	0	0	1	0	0	*	*	*
1274	10b	2		786	22	1	0	0	0	*	0	0	1	0	0	0	0	0	*	*	*
1275	10b	2		786	21	1	0	0	0	*	0	0	0	0	0	0	0	0	*	*	*
1279	10b	2		786	32	0	0	0	0	*	0	0	2	0	0	0	0	0	*	*	*
1285	10b	2		786	22	*	0	0	0	*	0	0	0	0	0	0	0	0	*	*	*
1286	10b	2		786	20	0	0	0	0	*	0	0	0	0	0	0	0	0	*	*	*
1374	10b	2		786	31	*	0	0	0	*	0	0	5	0	0	0	0	0	*	*	*
1385	10b	2		786	27	1	0	0	0	*	0	0	0	0	0	0	0	0	*	*	*
1388	10b	2		786	23	0	0	0	0	*	0	0	0	0	0	0	0	0	*	*	*
1398	10b	2		786	34	0	0	0	0	*	0	0	4	0	0	0	0	0	*	*	*
1048	11a	1		786	28	0	10	0	1	*	0	0	45	0	0	1	0	0	*	*	*
1059	11a	1		786	34	0	*	0	0	*	0	0	9	0	0	0	0	0	*	*	*
1075	11a	2		786	33	1	10	0	0	*	0	0	12	1	5	1	1	1	*	*	*
1082	11a	2		786	34	0	30	0	0	*	0	0	12	0	3	0	1	0	*	*	*
1339	10a	1	28	787	18	1	0	0	0	*	0	0	0	0	0	0	0	0	*	*	*
1344	10a	1		787	19	1	0	0	0	*	0	0	0	0	0	0	0	0	*	*	*
1352	10a	1		787	17	1	0	0	0	*	0	0	0	0	0	0	0	0	*	*	*
1365	10a	1		787	19	1	0	0	0	*	0	0	0	0	0	0	0	0	*	*	*
1262	10b	1	38	787	17	0	0	0	0	*	0	0	2	0	0	0	0	0	*	*	*
1276	10b	1		787	19	1	0	0	0	*	0	0	1	0	0	0	0	0	*	*	*

Table 5.   Numbers of parasites in medium H. atlanticus (35 to 39 cm LCF) from New Zealand.

912	9	1	13	786	35	0	20	0	1	*	0	0	7	0	0	0	8	0	*	*	*	*
926	9	1		786	35	0	140	0	0	*	0	0	15	0	1	2	3	0	*	*	*	*
997	9	1		786	35	0	450	0	1	*	0	0	9	7	9	3	8	0	*	*	*	*
1123	9	1		786	38	0	100	0	0	*	0	0	26	1	0	2	0	0	*	*	*	*
1151	9	1		786	39	0	0	0	0	*	0	0	12	3	8	3	0	0	*	*	*	*
1153	9	1		786	38	0	5	0	0	*	0	0	17	0	2	2	4	0	*	*	*	*
1171	9	1		786	39	0	90	0	0	*	0	0	17	4	1	3	4	1	*	*	*	*
1180	9	1		786	35	0	150	0	0	*	0	0	8	0	1	0	0	1	*	*	*	*
1181	9	1		786	35	0	0	0	0	*	0	0	8	4	1	0	0	0	*	*	*	*
1190	9	1		786	35	0	1	0	0	*	0	0	16	6	1	1	1	0	*	*	*	*
1192	9	1		786	37	0	0	0	0	*	0	0	7	0	0	1	0	0	*	*	*	*
902	9	2	7	786	37	0	130	0	0	*	0	0	16	12	2	0	1	0	*	*	*	*
904	9	2		786	38	0	150	0	0	*	0	0	17	4	9	2	2	0	*	*	*	*
905	9	2		786	39	0	60	0	0	*	0	0	17	2	4	2	1	0	*	*	*	*
916	9	2		786	38	0	130	0	0	*	0	0	13	3	8	4	13	0	*	*	*	*
917	9	2		786	35	0	30	0	0	*	0	0	10	1	0	0	0	0	*	*	*	*
921	9	2		786	37	0	400	0	0	*	0	0	20	2	1	4	2	0	*	*	*	*
990	9	2		786	38	0	120	0	0	*	0	0	7	5	3	7	1	0	*	*	*	*
1001	9	2		786	35	0	20	0	0	*	0	0	12	1	6	2	8	1	*	*	*	*
1002	9	2		786	35	0	30	0	0	*	0	0	4	1	0	3	0	0	*	*	*	*

1003	9	2	786	37	0	50	0	1	*	0	0	23	1	2	1	0	0	*	*	*
1006	9	2	786	37	0	80	0	0	*	0	0	9	2	3	6	4	0	*	*	*
1010	9	2	786	37	0	0	0	0	*	0	0	5	0	1	7	1	0	*	*	*
1014	9	2	786	39	0	0	0	1	*	0	0	35	0	0	1	0	0	*	*	*
1015	9	2	786	39	0	230	0	1	*	0	0	11	3	10	1	3	1	*	*	*
1017	9	2	786	35	1	10	0	0	*	0	0	4	0	0	1	0	0	*	*	*
1025	9	2	786	39	0	0	0	0	*	0	0	12	0	1	0	0	0	*	*	*
1027	9	2	786	35	0	40	0	0	*	0	0	23	0	7	1	4	0	*	*	*
1028	9	2	786	39	0	10	0	0	*	0	0	18	1	5	3	0	0	*	*	*
1030	9	2	786	39	0	0	0	0	*	0	0	9	0	1	0	0	0	*	*	*
1031	9	2	786	38	0	0	0	0	*	0	0	6	4	1	1	0	0	*	*	*
1033	9	2	786	35	0	40	0	0	*	0	2	21	0	2	3	1	0	*	*	*
1034	9	2	786	37	0	160	0	0	*	0	0	20	3	18	2	6	1	*	*	*
1035	9	2	786	35	0	0	0	0	*	0	0	8	2	2	0	0	0	*	*	*
1037	9	2	786	39	0	0	0	0	*	0	0	5	0	1	4	1	0	*	*	*
1039	9	2	786	35	0	0	0	0	*	0	0	15	1	0	0	0	0	*	*	*
1040	9	2	786	37	0	0	0	0	*	0	0	23	1	1	0	0	0	*	*	*
1041	9	2	786	39	0	10	0	1	*	0	0	6	2	11	1	2	0	*	*	*
1044	9	2	786	35	0	20	0	0	*	0	0	8	0	0	0	0	0	*	*	*
1045	9	2	786	37	0	5	0	0	*	0	0	4	5	3	0	2	0	*	*	*
1046	9	2	786	37	0	80	0	1	*	0	0	12	7	3	2	11	1	*	*	*
1126	9	2	786	35	0	180	0	0	*	0	0	18	8	6	3	14	0	*	*	*
1134	9	2	786	37	0	40	0	0	*	0	0	25	11	3	0	1	0	*	*	*
1135	9	2	786	35	0	1	0	0	*	0	0	24	0	0	0	0	0	*	*	*
1137	9	2	786	38	0	40	0	1	*	0	0	20	1	4	3	0	0	*	*	*
1140	9	2	786	37	0	200	0	0	*	0	0	24	1	3	7	6	0	*	*	*
1141	9	2	786	35	0	10	0	0	*	0	0	31	1	4	6	3	0	*	*	*
1144	9	2	786	35	0	160	0	0	*	0	0	10	6	1	6	0	0	*	*	*
1145	9	2	786	35	0	70	0	0	*	0	0	12	2	5	0	0	0	*	*	*
1147	9	2	786	39	0	90	0	0	*	0	0	22	1	2	1	31	0	*	*	*
1150	9	2	786	39	0	180	0	0	*	0	0	30	1	2	4	7	0	*	*	*
1155	9	2	786	39	0	120	0	0	*	0	0	32	3	11	5	14	0	*	*	*
1158	9	2	786	37	0	50	0	0	*	0	0	18	1	2	2	1	0	*	*	*
1185	9	2	786	37	0	80	0	1	*	0	0	1	0	0	8	3	0	*	*	*
1194	9	2	786	39	0	200	0	0	*	0	0	19	0	1	12	0	0	*	*	*
1195	9	2	786	35	0	80	0	0	*	0	0	6	1	1	4	0	0	*	*	*
1201	9	2	786	37	0	220	0	0	*	0	0	3	0	2	1	1	0	*	*	*
1203	9	2	786	38	0	250	0	0	*	0	0	22	3	0	0	4	0	*	*	*
1205	9	2	786	37	0	30	0	0	*	0	0	5	2	3	2	2	0	*	*	*
1207	9	2	786	39	1	10	0	0	*	0	0	21	1	1	8	0	0	*	*	*
1208	9	2	786	38	0	40	0	0	*	0	0	21	0	3	0	3	0	*	*	*
1209	9	2	786	37	1	30	0	0	*	0	0	6	3	3	0	1	0	*	*	*
1212	9	2	786	38	0	80	0	0	*	0	0	20	2	4	17	2	1	*	*	*
1293	10a	1	786	38	0	0	0	0	*	0	0	19	0	0	1	0	0	*	*	*
1294	10a	1	786	37	0	0	0	0	*	0	0	11	0	2	3	0	0	*	*	*
1295	10a	1	786	39	0	50	0	0	*	0	0	19	1	0	1	1	0	*	*	*
1299	10a	1	786	39	0	0	0	1	*	0	0	22	0	0	0	0	0	*	*	*
1300	10a	1	786	39	0	20	0	0	*	0	0	13	0	0	6	0	0	*	*	*
1301	10a	1	786	35	0	1	0	0	*	0	0	11	0	0	0	0	0	*	*	*
1305	10a	1	786	35	0	0	0	0	*	0	0	8	0	3	1	5	0	*	*	*
1308	10a	1	786	35	0	*	0	0	*	0	0	6	0	0	1	0	0	*	*	*
1309	10a	1	786	37	0	*	0	0	*	0	0	12	0	2	0	0	0	*	*	*
1312	10a	1	786	37	0	0	0	0	*	0	0	15	1	0	9	2	0	*	*	*
1314	10a	1	786	38	0	0	0	0	*	0	0	9	1	1	0	0	0	*	*	*
1316	10a	1	786	38	0	0	0	1	*	0	0	21	0	0	0	1	0	*	*	*
1318	10a	1	786	39	0	0	0	0	*	0	0	40	0	0	9	0	0	*	*	*
1319	10a	1	786	35	0	*	0	0	*	0	0	3	3	0	0	1	0	*	*	*
1322	10a	1	786	38	0	80	0	0	*	0	0	31	0	11	10	11	0	*	*	*
1323	10a	1	786	37	0	60	0	0	*	0	0	12	1	2	1	0	0	*	*	*

1325	10a	1	28	786	37	0	0	0	0	*	0	0	15	0	1	2	0	0	* * *
1328	10a	1		786	38	0	0	0	1	*	0	0	16	0	0	1	0	0	* * *
1330	10a	1		786	38	0	*	0	1	*	0	0	23	0	1	3	0	0	* * *
1331	10a	1		786	38	0	0	0	1	*	0	0	20	0	1	0	0	0	* * *
1332	10a	1		786	39	0	80	0	0	*	0	0	17	4	3	4	5	0	* * *
1335	10a	1		786	37	0	0	0	0	*	0	0	21	0	0	1	0	0	* * *
1337	10a	1		786	35	0	20	0	0	*	0	0	12	0	0	1	1	0	* * *
1340	10a	1		786	35	0	0	0	0	*	0	0	4	0	0	0	0	0	* * *
1346	10a	1		786	38	0	0	0	0	*	0	0	16	0	0	0	0	0	* * *
1347	10a	1		786	38	*	0	0	0	*	0	0	14	0	0	0	0	0	* * *
1348	10a	1		786	39	0	0	0	0	*	0	0	13	0	0	0	0	0	* * *
1349	10a	1		786	37	0	10	0	0	*	0	0	14	1	4	7	3	0	* * *
1351	10a	1		786	37	0	0	0	0	*	0	0	8	0	0	1	0	0	* * *
1354	10a	1		786	37	0	0	0	0	*	0	0	7	0	0	4	0	0	* * *
1358	10a	1		786	37	0	0	0	0	*	0	0	15	0	0	1	0	0	* * *
1359	10a	1		786	35	0	0	0	0	*	0	0	12	0	0	0	0	0	* * *
1361	10a	1		786	35	0	0	0	0	*	0	0	19	0	0	0	0	0	* * *
1362	10a	1		786	35	0	0	0	0	*	0	0	8	0	0	1	0	0	* * *
1363	10a	1		786	35	0	0	0	0	*	0	0	20	9	0	1	1	0	* * *
1370	10a	1		786	38	0	0	0	0	*	0	0	15	0	1	0	0	0	* * *
1238	10a	1		786	39	0	0	0	0	*	0	0	13	1	0	1	0	0	* * *
1239	10a	1		786	37	0	0	0	1	*	0	0	5	0	0	2	0	0	* * *
1244	10a	1		786	39	0	0	0	2	*	0	0	21	0	2	2	0	0	* * *
1245	10a	1		786	35	0	0	0	0	*	0	0	12	0	0	0	0	0	* * *
1246	10a	1		786	39	0	0	0	0	*	0	0	12	2	1	5	0	0	* * *
1247	10b	1	38	786	39	0	0	0	0	*	0	0	9	0	3	1	0	0	* * *
1248	10b	1		786	35	1	0	0	0	*	0	0	13	0	0	0	0	0	* * *
1249	10b	1		786	35	0	0	0	0	*	0	0	10	0	0	0	1	0	* * *
1253	10b	1		786	38	0	30	0	0	*	0	0	18	1	0	1	3	0	* * *
1256	10b	1		786	38	*	*	0	1	*	0	0	22	0	0	2	0	0	* * *
1258	10b	1		786	37	0	0	0	0	*	0	0	15	0	1	0	0	0	* * *
1259	10b	1		786	35	*	0	0	0	*	0	0	1	1	2	0	0	0	* * *
1260	10b	1		786	39	0	0	0	0	*	0	0	22	0	0	5	0	0	* * *
1264	10b	1		786	39	0	0	0	1	*	0	0	36	0	1	2	0	0	* * *
1270	10b	1		786	38	0	0	0	1	*	0	0	10	0	0	0	0	0	* * *
1277	10b	1		786	39	0	0	0	0	*	0	0	21	5	1	11	0	1	* * *
1278	10b	1		786	39	0	0	0	1	*	0	0	9	0	2	0	0	0	* * *
1281	10b	1		786	39	0	10	0	2	*	0	0	24	0	3	2	0	0	* * *
1282	10b	1		786	39	0	0	0	0	*	0	0	18	0	0	0	0	0	* * *
1283	10b	1		786	38	0	0	0	0	*	0	0	8	0	0	0	0	0	* * *
1284	10b	1		786	37	0	100	0	0	*	0	0	3	1	0	3	0	0	* * *
1287	10b	1		786	37	0	0	0	0	*	0	0	11	0	2	0	0	0	* * *
1377	10b	2	28	786	39	0	0	0	0	*	0	0	21	0	0	1	1	0	* * *
1380	10b	2		786	35	0	0	0	0	*	0	0	14	0	0	0	0	0	* * *
1381	10b	2		786	38	0	0	0	0	*	0	0	12	0	1	6	0	0	* * *
1382	10b	2		786	38	0	0	0	1	*	0	0	21	0	0	0	0	0	* * *
1383	10b	2		786	39	0	0	0	1	*	0	0	13	1	1	1	7	0	* * *
1386	10b	2		786	38	0	0	0	0	*	0	0	16	0	0	0	0	1	* * *
1387	10b	2		786	35	0	0	0	0	*	0	0	7	1	5	2	1	0	* * *
1389	10b	2		786	37	*	0	0	0	*	0	0	6	0	0	0	0	0	* * *
1399	10b	2		786	38	0	0	0	0	*	0	0	11	0	0	0	2	0	* * *
1055	11a	1	24	786	35	0	2	0	0	*	0	0	19	0	2	0	0	0	* * *
1056	11a	1		786	38	0	60	0	0	*	0	0	36	1	0	11	4	0	* * *
1058	11a	1		786	38	0	20	0	0	*	0	0	34	1	0	2	0	0	* * *
1060	11a	1		786	38	0	0	0	0	*	0	0	16	0	0	1	0	0	* * *
1062	11a	1		786	37	0	1	0	0	*	0	0	6	0	0	2	0	0	* * *
1070	11a	1		786	38	0	0	0	0	*	0	0	25	1	0	0	1	0	* * *
1073	11a	2		786	38	0	20	0	0	*	0	0	59	0	1	5	1	0	* * *
1076	11a	2		786	37	0	40	0	0	*	0	0	12	0	1	0	0	0	* * *

1079	11a	2	24	786	39	0	20	0	0	*	0	0	31	0	2	3	0	0	*	*	*
1080	11a	2		786	39	0	10	0	0	*	0	0	20	2	6	7	10	0	*	*	*
1081	11a	2		786	38	0	70	0	1	*	0	0	41	2	1	0	0	0	*	*	*
1083	11a	2		786	39	0	290	0	0	*	0	0	21	0	1	1	0	0	*	*	*
1084	11a	2		786	37	1	20	0	0	*	0	0	10	0	1	0	0	0	*	*	*
1085	11a	2		786	39	0	10	0	0	*	0	0	49	0	1	2	0	0	*	*	*
1086	11a	2		786	37	*	15	0	0	*	0	0	15	0	2	1	1	0	*	*	*
1088	11a	2		786	39	1	60	0	1	*	0	1	35	0	4	4	1	0	*	*	*
1089	11a	2		786	39	0	20	0	0	*	0	0	11	0	1	7	2	0	*	*	*
1090	11a	2		786	39	0	40	0	0	*	0	0	24	1	2	4	0	0	*	*	*
1092	11a	2		786	37	0	0	0	0	*	0	0	20	0	0	6	0	0	*	*	*
1093	11a	2		786	39	0	0	0	0	*	0	0	62	1	0	0	0	0	*	*	*
1096	11a	2		786	37	0	0	0	0	*	0	0	19	0	0	1	0	0	*	*	*
1098	11a	2		786	38	0	40	0	1	*	0	0	63	0	3	31	3	0	*	*	*
1100	11a	2		786	38	0	120	0	0	*	0	0	16	2	2	6	0	0	*	*	*
1101	11a	2		786	35	0	80	0	0	*	0	0	21	0	0	0	1	0	*	*	*
1112	11a	2		786	38	0	0	0	0	*	0	0	19	1	2	3	1	0	*	*	*
1113	11a	2		786	38	0	40	0	1	*	0	0	23	1	1	1	0	0	*	*	*
1115	11a	2		786	38	0	5	0	0	*	0	0	11	0	3	0	0	0	*	*	*
1116	11a	2		786	38	0	30	0	0	*	0	0	27	0	0	4	1	0	*	*	*
1118	11a	2		786	38	0	200	0	0	*	0	0	24	2	2	3	9	0	*	*	*
1120	11a	2		786	37	0	0	0	0	*	0	0	4	0	1	0	0	0	*	*	*
943	11b	1	10	786	35	0	0	0	0	*	0	0	20	0	0	0	0	0	*	*	*
950	11b	1		786	38	0	0	0	0	*	0	0	18	0	0	0	0	0	*	*	*
951	11b	1		786	38	0	100	0	1	*	0	0	28	0	1	10	1	0	*	*	*
957	11b	1		786	38	0	10	0	0	*	0	0	48	0	0	1	0	0	*	*	*
959	11b	1		786	38	0	130	0	2	*	0	0	29	0	0	16	7	0	*	*	*
961	11b	1		786	38	0	15	0	0	*	0	0	25	3	0	1	0	1	*	*	*
963	11b	1		786	38	0	3	0	0	*	0	0	30	0	0	0	0	0	*	*	*
968	11b	2	26	786	37	0	0	0	0	*	0	0	11	0	0	0	0	0	*	*	*
969	11b	2		786	38	0	100	0	0	*	0	0	14	1	0	2	4	0	*	*	*
971	11b	2		786	39	0	140	0	0	*	0	0	23	0	0	3	0	2	*	*	*
972	11b	2		786	38	0	10	0	0	*	0	0	18	0	0	1	2	0	*	*	*
974	11b	2		786	38	0	10	0	0	*	0	0	23	0	1	1	0	0	*	*	*
976	11b	2		786	37	*	6	0	0	*	0	0	18	0	0	1	0	0	*	*	*
977	11b	2		786	37	*	0	0	0	*	0	0	16	1	3	0	0	0	*	*	*
978	11b	2		786	38	0	110	0	0	*	0	0	14	1	1	4	0	0	*	*	*
980	11b	2		786	39	0	0	0	0	*	0	0	21	0	0	0	1	0	*	*	*
982	11b	2		786	39	0	0	0	0	*	0	0	11	0	2	10	1	0	*	*	*
984	11b	2		786	39	0	20	0	0	*	0	0	23	0	2	3	0	0	*	*	*
985	11b	2		786	39	0	25	0	0	*	0	0	25	1	0	8	0	0	*	*	*
986	11b	2		786	38	0	180	0	0	*	0	0	27	1	2	4	5	0	*	*	*
973	9	2	7	786	39	0	30	0	1	*	0	0	62	1	7	8	1	1	*	*	*
1008	9	2		786	37	0	6	0	0	*	0	0	1	0	1	0	0	0	*	*	*
1013	9	2		786	35	*	110	0	0	*	0	0	11	0	1	0	0	0	*	*	*
1052	11a	1	24	786	39	0	140	0	0	*	0	0	28	0	0	8	0	0	*	*	*
1063	11a	1		786	39	0	2	0	0	*	0	0	17	0	2	1	0	0	*	*	*
1066	11a	1		786	39	0	20	0	2	*	0	0	19	0	1	1	0	1	*	*	*
1068	11a	1		786	39	1	10	0	0	*	0	0	26	0	1	0	0	0	*	*	*
1069	11a	1		786	39	1	*	0	1	*	0	0	17	1	1	0	1	0	*	*	*
1077	11a	2	24	786	39	0	80	0	1	*	0	0	26	0	2	1	0	0	*	*	*
1078	11a	2	24	786	39	*	0	0	0	*	0	0	20	1	1	4	0	0	*	*	*
954	11b	1	10	786	39	0	25	0	0	*	0	0	32	0	1	1	0	1	*	*	*

Table 6.   Numbers of parasites in large H. atlanticus (40 to 48 cm

LCF) from New Zealand.

910	9	1	⌐3	786	41	0	120	0	0	*	0	0	17	3	5	13	1	0	*	*	*
913	9	1		786	41	0	30	0	1	*	0	0	22	0	1	11	0	0	*	*	*
922	9	1		786	44	0	140	0	1	*	0	0	36	2	2	11	1	0	*	*	*
923	9	1		786	41	0	40	0	0	*	0	0	7	1	9	3	0	0	*	*	*
927	9	1		786	41	0	340	0	0	*	0	0	39	4	0	6	0	0	*	*	*
929	9	1		786	43	0	60	0	0	*	0	0	13	1	7	9	0	1	*	*	*
930	9	1		786	44	0	10	0	0	*	0	0	40	0	3	1	1	0	*	*	*
931	9	1		786	42	0	30	0	0	*	0	0	21	0	2	7	1	0	*	*	*
935	9	1		786	40	0	10	0	0	*	0	0	21	0	11	7	2	0	*	*	*
938	9	1		786	42	0	50	0	0	*	0	0	28	4	13	6	3	1	*	*	*
941	9	1		786	42	0	280	0	0	*	0	0	23	5	18	3	17	0	*	*	*
991	9	1		786	41	0	400	0	0	*	0	0	130	4	4	59	23	0	*	*	*
993	9	1		786	40	0	340	0	1	*	0	0	44	1	9	14	2	0	*	*	*
996	9	1		786	42	0	300	0	0	*	0	0	32	3	12	18	2	0	*	*	*
1125	9	1		786	42	0	200	0	0	*	0	0	20	1	3	19	4	0	*	*	*
1130	9	1		786	44	0	30	0	0	*	0	4	43	4	8	9	11	1	*	*	*
1131	9	1		786	43	0	10	0	0	*	0	0	15	6	2	2	0	0	*	*	*
1132	9	1		786	44	0	15	0	1	*	0	1	27	2	1	10	0	0	*	*	*
1148	9	1		786	44	0	120	0	0	*	0	0	24	2	16	5	1	0	*	*	*
1157	9	1		786	42	0	270	0	0	*	0	0	34	3	10	10	7	0	*	*	*
1164	9	1		786	40	0	10	0	0	*	0	0	23	2	0	4	1	0	*	*	*
1165	9	1		786	42	0	270	0	0	*	0	0	28	5	1	9	3	0	*	*	*
1166	9	1		786	41	0	80	0	1	*	0	0	15	0	5	7	2	1	*	*	*
1170	9	1		786	43	0	90	0	0	*	0	0	28	10	19	3	16	1	*	*	*
1184	9	1		786	41	0	140	0	0	*	0	0	31	4	0	2	3	0	*	*	*
1186	9	1		786	43	0	250	0	0	*	0	0	24	0	2	24	3	1	*	*	*
1189	9	1		786	42	0	110	0	1	*	0	0	36	8	12	3	18	1	*	*	*
1191	9	1		786	41	0	*	0	0	*	0	0	76	1	0	26	0	1	*	*	*
1193	9	1		786	41	0	0	0	0	*	0	0	32	2	9	3	7	0	*	*	*
1196	9	1		786	41	0	250	0	0	*	0	0	38	8	13	28	8	1	*	*	*
1004	9	2	7	786	40	0	0	0	0	*	0	0	21	1	0	1	2	0	*	*	*
1009	9	2		786	41	*	25	0	0	*	0	0	10	2	0	0	2	0	*	*	*
1022	9	2		786	42	0	0	0	1	*	0	0	12	0	2	6	1	0	*	*	*
1029	9	2		786	40	0	60	0	0	*	0	0	18	2	16	9	18	2	*	*	*
1042	9	2		786	40	0	30	0	0	*	0	0	16	2	6	7	1	0	*	*	*
1146	9	2		786	41	0	170	0	0	*	0	0	30	0	2	4	3	0	*	*	*
1188	9	2		786	41	0	60	0	0	*	0	0	36	0	1	8	4	0	*	*	*
1291	10a	1	28	786	40	0	0	0	0	*	0	0	16	0	1	1	0	0	*	*	*
1292	10a	1		786	42	0	4	0	1	*	0	0	31	0	2	1	1	0	*	*	*
1296	10a	1		786	40	0	20	0	0	*	0	0	14	0	4	5	1	0	*	*	*
1297	10a	1		786	42	0	130	0	1	*	0	0	27	1	3	17	2	0	*	*	*
1302	10a	1		786	41	0	0	0	0	*	0	0	22	0	2	1	0	0	*	*	*
1303	10a	1		786	43	0	8	0	0	*	0	0	26	2	1	3	0	0	*	*	*
1304	10a	1		786	42	0	0	2	0	*	0	0	114	0	2	4	5	0	*	*	*
1306	10a	1		786	41	0	*	0	0	*	0	0	17	1	0	1	0	0	*	*	*
1310	10a	1		786	40	0	0	0	0	*	0	0	38	0	1	3	0	0	*	*	*
1311	10a	1		786	41	0	0	0	0	*	0	0	27	1	0	0	0	1	*	*	*
1313	10a	1		786	40	*	0	0	0	*	0	0	22	1	0	5	0	0	*	*	*
1315	10a	1		786	43	0	3	0	0	*	0	0	24	1	1	5	1	0	*	*	*
1317	10a	1		786	41	0	2	0	1	*	0	0	12	0	1	2	1	0	*	*	*
1320	10a	1		786	42	0	0	0	2	*	0	0	23	2	1	6	0	0	*	*	*
1321	10a	1		786	40	0	0	0	0	*	0	0	24	0	0	1	0	0	*	*	*
1327	10a	1		786	40	0	0	0	0	*	0	0	7	0	1	0	0	0	*	*	*

ID	code	n	grp																					
1336	10a	1	2	886	40	0	0	0	0	*	0	0	31	1	1	5	0	0	*	*	*	
1341	10a	1		786	42	0	0	0	0	*	0	0	19	0	0	1	0	0	*	*	*	
1345	10a	1		786	40	0	0	0	0	*	0	0	9	0	0	2	0	1	*	*	*	
1350	10a	1		786	42	0	40	0	0	*	0	0	19	1	4	17	6	0	*	*	*	
1355	10a	1		786	42	0	0	0	0	*	0	0	35	2	4	3	0	0	*	*	*	
1356	10a	1		786	40	0	0	0	0	*	0	0	26	0	0	0	0	0	*	*	*	
1357	10a	1		786	41	0	0	0	0	*	0	0	34	0	3	12	1	0	*	*	*	
1240	10a	1		786	42	0	6	0	0	*	0	0	23	1	7	17	8	0	*	*	*	
1242	10a	1		786	41	0	90	0	0	*	0	0	14	3	0	2	3	0	*	*	*	
1243	10a	1		786	44	0	0	0	0	*	0	0	37	0	2	2	0	0	*	*	*	
1254	10b	1	3	886	41	0	0	0	0	*	0	0	12	0	3	2	2	0	*	*	*	
1268	10b	1		786	40	1	0	0	1	*	0	0	16	0	0	4	0	0	*	*	*	
1269	10b	1		786	41	0	0	0	0	*	0	0	14	0	0	3	0	0	*	*	*	
1272	10b	1		786	40	0	0	0	2	*	0	0	44	3	0	63	0	0	*	*	*	
1280	10b	1		786	40	0	0	0	0	*	0	0	20	0	0	0	0	0	*	*	*	
1371	10b	2	2	886	40	0	0	0	0	*	0	0	5	0	0	1	1	0	*	*	*	
1372	10b	2		786	40	0	0	0	0	*	0	0	16	1	4	3	8	0	*	*	*	
1373	10b	2		786	44	0	0	0	0	*	0	0	9	0	0	1	1	0	*	*	*	
1375	10b	2		786	41	0	0	0	1	*	0	0	14	0	3	2	0	0	*	*	*	
1376	10b	2		786	41	0	0	0	0	*	0	0	13	0	5	0	1	0	*	*	*	
1378	10b	2		786	44	0	0	0	0	*	0	0	75	0	2	1	3	0	*	*	*	
1379	10b	2		786	43	0	0	0	0	*	0	0	22	0	0	5	0	0	*	*	*	
1384	10b	2		786	40	0	0	0	0	*	0	0	32	0	0	6	0	0	*	*	*	
1390	10b	2		786	40	0	0	0	0	*	0	0	12	0	1	0	1	0	*	*	*	
1391	10b	2		786	41	1	0	0	1	*	0	0	16	0	0	3	0	1	*	*	*	
1392	10b	2		786	40	0	0	0	0	*	0	0	16	0	1	0	0	0	*	*	*	
1393	10b	2		786	41	0	0	0	0	*	0	0	14	0	0	37	0	0	*	*	*	
1394	10b	2		786	42	*	80	0	0	*	0	0	23	0	5	5	1	0	*	*	*	
1395	10b	2		786	40	0	10	0	1	*	0	0	22	1	1	0	0	0	*	*	*	
1396	10b	2		786	42	0	0	0	0	*	0	1	60	0	0	8	0	0	*	*	*	
1397	10b	2		786	41	0	0	0	0	*	0	0	11	0	0	0	0	0	*	*	*	
1047	11a	1	24	786	41	0	40	0	0	*	0	0	56	0	0	2	1	0	*	*	*	
1049	11a	1		786	41	0	20	0	0	*	0	0	46	0	1	3	0	0	*	*	*	
1050	11a	1		786	41	0	5	0	2	*	0	0	36	3	0	1	1	0	*	*	*	
1051	11a	1		786	44	0	20	0	1	*	0	0	34	0	1	44	0	0	*	*	*	
1053	11a	1		786	40	0	0	0	0	*	0	0	48	0	1	1	0	1	*	*	*	
1054	11a	1		786	40	0	10	0	0	*	0	0	29	0	1	8	0	0	*	*	*	
1057	11a	1		786	41	0	2	0	0	*	0	0	19	0	1	0	0	0	*	*	*	
1061	11a	1		786	41	0	0	0	0	*	0	0	18	1	1	8	0	0	*	*	*	
1064	11a	1		786	41	0	130	0	0	*	0	0	18	0	1	12	1	0	*	*	*	
1065	11a	1		786	44	0	0	0	0	*	0	0	36	0	0	3	0	0	*	*	*	
1067	11a	1		786	44	1	0	0	0	*	0	0	56	1	0	48	0	0	*	*	*	
1071	11a	1		786	41	0	50	0	1	*	0	0	27	0	0	4	9	0	*	*	*	
1072	11a	2	24	786	44	0	0	0	0	*	0	0	20	0	0	5	0	0	*	*	*	
1074	11a	2		786	41	0	140	0	0	*	0	0	26	3	7	6	1	0	*	*	*	
1087	11a	2		786	40	*	80	0	0	*	0	0	32	0	1	4	0	0	*	*	*	
1091	11a	2		786	41	0	160	0	0	*	0	0	28	1	0	14	0	0	*	*	*	
1094	11a	2		786	43	0	250	0	0	*	0	0	50	0	0	12	0	0	*	*	*	
1095	11a	2		786	41	0	0	0	0	*	0	0	24	0	0	2	0	0	*	*	*	
1097	11a	2		786	43	0	200	0	1	*	0	0	35	0	0	9	1	0	*	*	*	
1099	11a	2		786	41	0	55	0	1	*	0	0	39	1	2	12	9	0	*	*	*	
1102	11a	2		786	41	0	900	0	1	*	0	0	81	3	1	17	0	0	*	*	*	
1103	11a	2		786	42	0	5	0	0	*	0	0	38	0	2	14	0	0	*	*	*	
1104	11a	2		786	42	0	0	0	0	*	0	0	38	0	2	3	0	0	*	*	*	
1105	11a	2		786	42	0	30	0	0	*	0	0	38	0	0	2	1	0	*	*	*	
1106	11a	2		786	43	0	0	0	0	*	0	0	29	0	0	3	0	0	*	*	*	
1107	11a	2		786	43	0	0	0	0	*	0	0	33	0	0	1	1	0	*	*	*	
1108	11a	2		786	41	0	80	0	2	*	0	0	50	2	1	6	0	0	*	*	*	
1109	11a	2		786	40	0	10	0	1	*	0	0	24	2	4	19	1	0	*	*	*	

1110	11a	2	24	786	41	0	20	0	1	*	0	0	32	0	0	22	2	0	*	*	*	:
1111	11a	2		786	42	0	0	0	1	*	0	0	32	0	0	1	0	0	*	*	*	
1114	11a	2		786	41	0	5	0	0	*	0	0	19	0	1	16	0	2	*	*	*	
1117	11a	2		786	42	0	70	0	0	*	0	0	56	1	3	2	0	0	*	*	*	
1119	11a	2		786	43	0	170	0	1	*	0	0	39	0	1	24	0	0	*	*	*	
1121	11a	2		786	42	0	0	0	0	*	0	0	25	0	1	3	4	0	*	*	*	
944	11b	1	10	786	44	0	90	0	1	*	0	0	25	0	3	22	0	0	*	*	*	
946	11b	1		786	42	0	120	0	0	*	0	0	22	0	0	3	1	1	*	*	*	
947	11b	1		786	41	0	100	0	0	*	0	0	59	0	1	3	1	1	*	*	*	
948	11b	1		786	41	0	70	0	0	*	0	1	40	0	1	2	0	0	*	*	*	
949	11b	1		786	42	0	100	0	2	*	0	0	29	0	0	11	0	0	*	*	*	
953	11b	1		786	42	0	10	0	0	*	0	0	27	1	0	2	0	0	*	*	*	
955	11b	1		786	44	0	0	0	0	*	0	0	51	0	1	1	0	0	*	*	*	
956	11b	1		786	44	0	20	0	0	*	0	0	28	1	1	10	0	0	*	*	*	
958	11b	1		786	40	0	3	0	0	*	0	0	27	0	2	6	0	1	*	*	*	
960	11b	1		786	40	0	60	0	0	*	0	0	32	1	0	7	0	0	*	*	*	
962	11b	1		786	40	0	0	0	0	*	0	0	23	0	2	0	1	0	*	*	*	
964	11b	2	26	786	41	0	35	0	0	*	0	0	34	7	0	3	0	0	*	*	*	
965	11b	2		786	40	0	0	0	0	*	0	0	42	0	3	2	0	0	*	*	*	
966	11b	2		786	44	0	70	0	0	*	0	0	28	2	0	2	0	1	*	*	*	
967	11b	2		786	45	0	50	0	0	*	0	0	17	5	0	27	1	0	*	*	*	
970	11b	2		786	40	0	35	0	0	*	0	0	61	0	1	3	0	0	*	*	*	
975	11b	2		786	45	0	120	0	0	*	0	0	31	0	1	4	0	0	*	*	*	
979	11b	2		786	41	*	0	0	1	*	0	0	19	0	0	1	0	0	*	*	*	
981	11b	2		786	40	0	5	0	0	*	0	0	19	0	0	2	0	0	*	*	*	
983	11b	2		786	41	0	60	0	0	*	0	0	39	0	0	18	0	0	*	*	*	
987	11b	2		786	41	0	200	0	0	*	0	0	61	2	6	7	0	0	*	*	*	
988	11b	2		786	41	1	140	0	0	*	0	0	28	0	2	6	0	0	*	*	*	
906	9	1	13	786	43	0	30	0	0	*	0	0	41	1	0	5	1	0	*	*	*	
907	9	1		786	45	0	140	0	0	*	0	0	14	0	9	8	0	0	*	*	*	
1169	9	1		786	45	0	90	0	0	*	0	0	29	3	7	7	5	0	*	*	*	
992	9	2	7	786	49	0	0	0	1	*	0	0	279	0	0	58	0	0	*	*	*	
1255	10b	1	3 8	787	40	0	100	0	0	*	0	0	18	0	0	3	0	0	*	*	*	
1261	10b	1		787	40	0	50	0	0	*	0	0	10	0	1	0	0	0	*	*	*	
1263	10b	1		787	40	0	0	0	0	*	0	0	26	0	7	2	0	0	*	*	*	
1265	10b	1		787	40	0	0	0	1	*	0	0	9	2	2	10	0	0	*	*	*	

Table 7. Details on the sources of the samples. (The number in each sample refers to those used in the analysis and does not include the short and long fish removed to equalize the areas.)

Area	Sample number	Capture date	Number in sample			Position
			Sml	Med	Lge	
1	1	5/6/83	10	2	0	33° 44' S, 129° 40' E
1	2	9/11/84	1	15	15	34° 06' S, 131° 57' E
1	3	10/11/84	10	13	8	33° 42' S, 130° 31' E
1	4	12/11/84	8	31	7	33° 53' S, 131° 07' E
1	5	3/6/85	10	12	7	"Great Australian Bight"
1 TOTAL			**39**	**73**	**37**	
2	1	unknown	9	6	0	"off Port McDonnell"
2	2	83	3	6	0	"off Robe"
2	3	31/10/84	50	11	5	37° 46' S, 139° 28' E
2	4	15/12/84	26	11	5	37° 55' S, 139° 44' E
2 TOTAL			**88**	**34**	**10**	
3	1	12/10/83	6	0	4	40° 26' S, 143° 20' E
3	2	13/10/83	7	15	14	40° 28' S, 143° 18' E
3 TOTAL			**13**	**15**	**18**	
4	1	20/6/84	14	23	16	41° 44' S, 144° 23' E
4	2	27/7/84	0	0	5	"off Sandy Cape"
4	3	18/10/85	12	9	14	41° 37' S, 144° 21' E
4 TOTAL			**26**	**32**	**35**	
5	1	21/10/83	2	10	8	42° 13' S, 144° 38' E
5	2	22/10/83	0	2	0	unknown
5	3	23/10/83	10	8	7	42° 16' S, 144° 42' E
5 TOTAL			**12**	**20**	**15**	

Area	Sample number	Capture date	Sml	Med	Lge	Position
6	1	unknown	Ø	2	14	"Cascade Plateau"
6	2	24/9/85	7	4	1Ø	43° 56' S, 15Ø° 35' E
6	3	29/11/85	Ø	Ø	3	43° 56' S, 15Ø° 35' E
6	4	17/3/86	Ø	4	13	47° 29' S, 148° 3Ø' E
6	5	31/3/86	Ø	8	23	47° 28' S, 148° 39' E
TOTAL			7	18	63	
7	1	3/9/83	14	4	1	41° 43' S, 148° 38' E
7	2	28/1Ø/83	4	4	6	41° 44' S, 148° 39' E
7	3	1Ø/6/84	Ø	4	7	"off Paddy's Head"
7	4	17/1/85	13	9	23	41° 37' S, 148° 42' E
7	5	11/9/85	14	5	15	"off Paddy's Head"
7	6	26/4/85	13	17	22	"off Paddy's Head"
7	7	27/6/85	3	9	8	"off Paddy's Head"
TOTAL			61	52	82	
8	1	12/2/86	1Ø	5	Ø	33° 29' S, 152° 13' E
8	2	12/2/86	23	14	Ø	33° 3Ø' S, 152° 12' E
TOTAL			33	19	Ø	
9	1	13/7/86	51	11	31	39° 48.2' S, 168° 5.2' E
9	2	7/7/86	35	52	7	4Ø° 4.7'S, 167° 59.1' E
TOTAL			86	63	38	
1Øa	1	2/8/86	22	41	26	43° 6.7' S, 168° 51.6' E
TOTAL			22	41	26	
1Øb	1	3/8/86	12	17	5	43° 8.5' S, 168° 52.1' E
1Øb	2	2/8/86	4	9	16	43° 19.9' S, 168° 36.5' E
TOTAL			16	26	21	
11a	1	24/7/86	2	6	12	42° 49.5' S, 177° 15.7' W
11a	2	24/7/86	2	24	22	42° 49.1' S, 177° 5.6' W
TOTAL			4	3Ø	34	
11b	1	1Ø/7/86	Ø	7	11	42° 5Ø.2' S, 177° Ø.6' W
11b	2	26/7/86	Ø	13	11	42° 49.2' S, 177° 2.2' W
TOTAL			Ø	2Ø	22	

Table 8. Accession numbers for representative specimens of parasites of <u>Hoplostethus</u> <u>atlanticus</u> lodged in the Queensland Museum, Brisbane, Australia.

Parasite species	Accession number
<u>Sphaeromyxa</u> sp.	GL 10024
Spirurid sp.	GL 10025
<u>Hepatoxylon</u> <u>trichiuri</u>	GL 10026
<u>Tentacularia</u> sp.	GL 10027
<u>Sphyriocephalus</u> sp.	GL 10028
<u>Callitetrarhynchus</u> sp.	GL 10029
<u>Anisakis</u> type 1	GL 10030
<u>Anisakis</u> type 2	GL 10031
<u>Anisakis</u> type 3	GL 10032
<u>Terranova</u> sp.	GL 10033
<u>Echinorhynchus</u> sp.	GL 10034
<u>Ascarophis</u> sp.	GL 10035
<u>Glomericirrus</u> <u>amadai</u>	GL 10036
<u>Pseudopecoelus</u> sp.	GL 10037

Stock discrimination of orange roughy <u>Hoplostethus</u> <u>atlanticus</u> by parasite analysis

R.J.G. Lester[1], K.B. Sewell[1], A. Barnes[2] and K. Evans[3]

[1]Department of Parasitology, University of Queensland, Brisbane, Australia 4067

[2]Faculty of Science, University of Queensland, Brisbane, Australia 4067

[3]Department of Sea Fisheries, Hobart, Australia 7000

Abstract

The parasite fauna of the viscera of 1251 orange roughy
Hoplostethus atlanticus from eight areas off southern Australia
and three areas off New Zealand was examined for evidence of
discrete host populations. Fish from each area were divided into
three length groups which averaged close to 28, 37 and 42 cm.
Canonical multivariate analysis of data on larval nematodes
(Anisakis spp., Terranova sp., and a spirurid) and larval
cestodes (Hepatoxylon trichiuri and Callitetrarhynchus sp.)
discriminated five Australian and three New Zealand stocks. These
were: Great Australian Bight; South Australia/west Victoria/west
and south Tasmania; Cascade Plateau/Tasman Rise; north-east
Tasmania; New South Wales; north-east New Zealand; south-east New
Zealand; and west New Zealand. No significant differences in
parasite fauna were detected between samples of fish taken within
the spawning season and those taken outside the spawning season
in the same area. In one southern Australian stock there was a
north-south cline in the numbers of Anisakis spp. This was
apparent in both small (immature) and medium-sized (mature) fish.
We conclude that H. atlanticus is a sedentary species with little
movement between fish management zones.

Introduction

Orange roughy Hoplostethus atlanticus is the basis of an
established trawl fishery in New Zealand (Robertson, Grimes and

McMillan, 1982) and an emerging deep water trawl fishery in
Australia (Wilson, 1982). The fish occurs in 900 to 1200 metres.
A feasible means to tag it has not yet been developed.

The New Zealand fishery is based on aggregations thought to
be associated with spawning. Robertson et al. (1982) suggested
that between spawnings, fish were dispersed over several
management areas, and that fish on the west of New Zealand
probably constituted a single spawning stock. Isoenzyme studies
on New Zealand and Atlantic fish showed that the species had high
heterozygosity (Smith, 1986). Smith suggested that the species
was widely distributed in the world at the 1000 metre isobar and
the genetic similarity between the New Zealand and North Atlantic
fish could be maintained by gene flow along the slope edge and
gene-hopping between ocean ridges and sea mounts. He was unable
to distinguish any stocks around New Zealand.

The use of parasites for separating marine stocks is a well
established technique (Sindermann, 1983; MacKenzie, 1983,1987).
Parasites, particularly larval stages, survive for extended
periods in fish and some persist until the fish dies. As
parasite species are rarely distributed uniformly over the host
range, juveniles in one area will acquire a parasite species but
not those in another. Thus the parasite fauna of adult fish
reflects the environment in which it has grown. Margolis (1965)
separated sockeye salmon in the north Pacific Ocean into those of
North American or Asian origin using parasites acquired during
the fishes' juvenile freshwater phase. In 1939 Dogiel and
Bykhovski distinguished two stocks of sturgeon in the Caspian Sea
using parasites common in the northern less saline waters but

largely absent from the south (Dogiel, 1961).

We used the natural parasite fauna of orange roughy to determine if there were consistent differences between fish from different geographical areas around Australia and New Zealand.

Materials and methods

Orange roughy were collected from 11 areas off southern Australia and eastern and western New Zealand (Fig. 1); these were: Great Australian Bight (area 1), South Australia (area 2), west Tasmania (areas 3 to 5), Cascade Plateau and Tasman Rise (area 6), east Tasmania (area 7), New South Wales (area 8), Challenger Plateau (area 9), combined Cook and Moeraki Canyons (area 10), and the Chatham Rise (area 11). Of the 1422 fish examined, 874 were provided by the Tasmanian Department of Sea Fisheries, 74 by the New South Wales Department of Agriculture Fisheries Division, and 474 by the New Zealand MAF Fisheries Research Centre. Fish were either gutted at sea or held in chilled brine for a maximum of 3 days and gutted immediately on landing. The viscera were stored frozen after being placed in a plastic bag with a label giving the fish caudal fork length (LCF), cruise number and haul number. They were later thawed and separated into their component parts for parasitological examination.

Parasites (Table 1) were recorded using the following methods. Prevalence of Sphaeromyxa sp. was assessed by searching for spores in gall bladder fluid using a compound microscope (x40 objective) for a maximum of five minutes. Trypanorhynch larvae (Hepatoxylon trichiuri, Callitetrarhynchus sp., Sphyriocephalus sp. and Tentacularia sp.), the larval anisakid nematodes

(*Anisakis* spp. and *Terranova* sp.) and an unidentified species of larval spirurid were found in the mesentery and gut wall using the naked eye and a dissecting microscope with transmitted light. Digenea (*Glomericirrus amadai* and *Pseudopecoelus* sp.), Acanthocephala (*Echinorhynchus* sp.), tetraphyllidean larvae (Scolex polymorphus) and the nematode *Ascarophis* sp. found in the washings from the lumen of the stomach and intestine using a dissecting microscope. Representative specimens of these parasites have been lodged in the Queensland Museum; for accession numbers and a listing of the raw data see Sewell and Lester (in press).

The data were analysed in three ways: summary statistics, investigation into the similarities and disimilarities of the parasite fauna between areas, and investigation of seasonal differences in average parasite numbers between areas.

Fish from each sample were divided into three size groups, small (20 to 34 cm LCF), medium (35 to 39 cm LCF) and large (40 to 48 cm LCF). Short or long fish were removed from each size group until the average length of each group was approximately 28, 37 and 42 cm LCF respectively, except for New Zealand samples where the average length of the small category was 29.8 cm LCF. Of the total number of fish dissected (1422), 1251 were used in the analyses. For each size group, the similarities and dissimilarities between areas were examined using canonical multivariate analysis (Mardia et al. 1979). The method was essentially as described by Lester, Barnes and Habib (1985) for their analysis of data from skipjack tuna. A single transformation of the natural logarithm of the number of

parasites plus one, was used on all parasite numbers. To
further remove bias due to associations between parasite numbers
and fish length, within each fish size group, transformed counts
were adjusted for fish length. For each parasite species, a
regression of transformed parasite number on fish length was
undertaken, and the resulting relationship used to adjust the
parasite numbers to that expected for a fish of 28, 37 or 42 cm
LCF. No adjustment was made if the parasite number was zero.

A random number between -0.05 and $+0.05$ was added to all
parasite data. This allowed matrix inversion in the canonical
variate analysis which was otherwise impossible as some
parasites were absent from some samples. The small addition did
not significantly affect the outcome. The results of the
canonical analyses were displayed as plots of the first, second
and third canonical axes. Confidence limits (99%) for the points
are presented as circles with radius equal to the square root of,
9.21 divided by the number of fish in the sample. Confidence
limits at 95% were visualised as circles with radius equal to the
square root of 5.99/number of fish in sample (Mardia et al.
1979).

The differences in average log (parasite number +1) between
fish taken during the spawning season and those taken from the
same site outside the spawning season, were investigated on 4
separate pairs of samples by an analysis of that variance which
remained after each of a series of 5 models were fitted to the
data. Model 1 was the total variability about the mean in the
237 fish tested. Unexplained variability was progressively
reduced by successive models as follows: model 2 removed simple
linear length effects; model 3, average differences between

sites; model 4, common seasonal differences between sites; and model 5, seasonal differences between sites. Using hierarchical and other analyses of variance constructed from the results of these models, it was possible to determine whether evidence existed for the presence of seasonal differences, either as common differences over all sites or as differences at particular sites.

Results

The 17 categories of parasites recognized (Table 1) were first evaluated for their probable longevity in fish and hence their reliability as host population markers. Intestinal helminths (No.s 13 to 17) were considered likely to be unreliable as their number could be affected by changes in diet (Lester et al., 1985). Some of these, such as the digenean Pseudopecoelus sp. (No. 11), the acanthocephalan Echinorhynchus sp. (No. 13), and the ascarophid (No. 14) showed negative correlations with host length (last column, Table 1) which suggested that they were parasites of juvenile fish which were lost as the fish grew. The prevalence of the gall bladder parasite Sphaeromyxa sp. (No. 1), also decreased as host length increased, suggesting a short-lived infection. The larval cestode Sphyriocephalus sp. (No. 6) encapsulated in the wall of the gut was too rare to be useful. Cysts containing Tentacularia sp. (No. 5) were common in the stomach serosa but many of them were degenerating. This and their small size made identification difficult and time consuming; they were not counted after 165 fish.

Parasites counted in all fish and used in the analyses were:

an unidentified larval spirurid (No. 2); the larval cestodes
Hepatoxylon trichiuri (No.s 3 and 4) and Callitetrarhynchus sp.
(No. 7); and the larval anisakid nematodes Anisakis type 1,
Anisakis type 2, Anisakis 3, degenerate Anisakis spp. and
Terranova sp. (No.s 8 to 12).

The spirurid (No. 2) was embedded in small brown cysts <0.5
mm. diameter in the wall of the stomach. Hepatoxylon trichiuri
was encapsulated in the mesentery. It was identified from its
large size, globular shaped tentacles and solid hooks the
largest of which were longer than 180 um. Though it was
uncommon, it was used because both live and dead worms were
readily detected as a result of their large size and persistent
hooks. Data on live (No. 3) and degenerate (No. 4) worms were
combined for the analyses. Anisakis type 1 (No. 8) had a
relatively long ventriculus with an oblique ventriculo-intestinal
junction and a rounded mucron-bearing tail. Anisakis type 2 (No.
9) had a short ventriculus, a horizontal ventriculo-intestinal
junction and a pointed tail with no mucron. Anisakis type 3 (No.
10) was a stout worm with a short ventriculus, a horizontal
ventriculo-intestinal junction and a short mucron. Live and dead
Anisakis were common in the mesentery and encysted in the wall
of the gut, especially the stomach. Terranova sp. (No. 12) was a
much smaller worm than any of the Anisakis species, had a
prominent intestinal caecum and was usually found encapsulated
in the stomach wall and occasionally the mesentery.

The nine parasite categories used in the analysis (No.s 2 to
4 and 7 to 12) showed positive correlations with host length
(Table 1) suggesting they accumulated as the fish aged. This and
the observations of other workers on closely related parasites

(MacKenzie, 1982) suggested that they may be reliable host markers.

Multivariate analyses of these data showed that for the small Australian fish the parasite fauna in NSW (area 8) was distinct from other Australian areas, most of which were clumped together (Fig. 2). In this analysis, the first two canonical axes accounted for 86% of the total variability. The third canonical axis, not shown, accounted for a further 6% and pulled 4 and 5 to one side but did not separate them from the main group at the 95% level of confidence. The parasite with the greatest discriminating power was Terranova sp.

Analysis of data from the medium and large Australian fish showed greater discrimination of areas (Figs. 3 and 4). For the medium fish, the first two canonical axes accounted for 80% of the total variation and again separated area 8, NSW, from the others (Fig. 3). The Great Australian Bight (area 1) and the Cascade Plateau/Tasman Rise (area 6) were pulled aside and separated by these axes at the 95% level of confidence but not at the 99% level. The third canonical axis, not shown, accounted for a further 13% of the variation and separated north eastern Tasmania (area 7) from the other areas at the 99% level of confidence.

For the large fish, the first two canonical axes accounted for 86% of the total variation and clearly separated the Great Australian Bight (area 1) and the Cascade Plateau/Tasman Rise (area 6) from the other areas (Fig. 4). No large fish were sampled from area 8. The third canonical axis, not shown, accounted for a further 11% of the variation and pulled area 7 to

one side separating it from the other areas at the 95% level of
confidence but not at the 99% level. The parasite with the
greatest discriminating power for the medium and large fish was
the spirurid. These results show that five parasite faunas could
be distinguished (at the 95% level), those of areas 1, 6, 7 and
8, all of which were different from each other and from areas 2,
3, 4 and 5 whose faunas were indistinguishable.

Plots of the New Zealand data indicated that the parasite
fauna of fish from the three areas, Challenger Plateau (area 9),
combined Cook and Moeraki Canyons (area 10), and the Chatham Rise
(area 11) were distinct (Figs. 5, 6 and 7). Duplicate samples
taken in the same month from areas 10 (10a and 10b) and 11 (11a
and 11b) fell close together. The first two canonical axes
accounted for 94%, 96% and 93% of the total variation
respectively for small, medium and large size groups. The
parasites with the greatest discriminating powers for these
analyses were Anisakis type 3 for small fish, and the spirurid
for the medium and large fish.

To determine whether significant parasitological differences
occurred between fish from New Zealand and Australia, those from
both countries were analysed together. Only the medium and
large size fish were analysed in this way, because the 'small'
size groups we used differed in average lengths between the two
countries. Data from areas 2,3,4 and 5 were combined into a
single sample for this analysis, as were the duplicate New
Zealand samples from area 10 and area 11.

For the medium fish, the first two canonical axes took out
84% of the total variation and separated all areas from each

other at the 99% level of confidence except for the Cascade

Plateau/Tasman Rise (area 6) and the Chatham Rise (area 11) which

were not clearly distinguished, even when the third axis was

taken into account. For the large fish, the first two canonical

axes took out over 81% of the total variation and separated all

areas at the 99% level of confidence except the combined

Australian areas 2, 3, 4 and 5, and the Challenger Plateau (area

9) whose confidence rings overlapped. They were separate at the

95% level of confidence. The parasite with the most

discriminating power for the medium and large fish was the

spirurid. We concluded that there was no parasitological

evidence that Australian and New Zealand roughy stocks mixed

because the overlapping samples were not geographically

contiguous and the results were inconsistent between the two size

groups.

Orange roughy in southern Australian waters are believed to

spawn from June to August (Evans and Wilson, 1987). We examined

our parasite data to see whether we could detect any difference

between fish taken near the spawning season and those taken in

the same place well outside the spawning season. If a difference

existed it would be evidence for a spawning migration. We had

four pairs of samples where this could be tested. Analysis of

the variance in the data showed few statistically significant

differences between the pairs of samples with respect to

individual parasites (Table 2) indicating that the parasite faunas

of fish taken near the spawning season were similar to those

taken outside the spawning season. We concluded that there was

no parasitological evidence that spawning fish migrate in from

other areas. A similar comparison for New Zealand fish was not

possible because all New Zealand samples were taken during the spawning season.

Though the multivariate analyses could not distinguish between individual areas in the South Australia/west Victoria/west Tasmania complex (areas 2, 3, 4 and 5), examination of the data of Anisakis spp. suggested that nevertheless there were consistent differences. All four Anisakis categories were more abundant in the more southerly fish. In Table 3 the four categories have been combined and the average log (x+1) of the total given for the four areas, reading from north to south, for the three fish size groups. An analysis of the correlation between latitude and transformed parasite number indicated a positive correlation for the small and medium sized fish at the 99% level of confidence, and no significant correlation for the large fish. As the small size category contained predominantly juvenile fish and the medium size category mature fish (length at first maturity 30 cm LCF for males and 33 cm LCF for females; Evans and Wilson, 1987), it appears that medium-sized mature fish do not move far from the area where they lived as juveniles. The cline is not evident in the large fish, possibly because of the small sample sizes.

Discussion

The use of parasites to identify stocks, that is population units for fisheries management purposes, relies on the assumption that spawning fish release eggs which repopulate the same area. Orange roughy eggs are less dense than sea water and rise in the water column (Pankhurst, McMillan and Tracey, 1987). Though they

appear to have low energy reserves the duration of their pelagic phase is unknown.

Multivariate analyses of the data from the 263 medium and the 260 large southern Australian fish discriminated more areas than analysis of data from the 279 small fish. This was evidently because more parasites were present in the medium and large fish than in the small fish. It illustrates a general rule concerning the use of parasites as population markers which is, that within a species the older the fish sampled the more likely it is to be parasitised and therefore the more chance there is of discriminating one stock from another.

One other study has made extensive use of canonical variate analysis in the interpretation of fish parasite abundance, that of Lester et al. (1985). They used data from skipjack tuna in the central and southwestern Pacific, and their results differ dramatically from those presented here. Using long-lived parasites they could not discriminate between skipjack samples taken 4000 km apart even at a 95% level of confidence. They concluded that extensive mixing occurred, as had been predicted by tagging studies (Kleiber and Kearney, 1983). The torpedo shape of a skipjack is consistent with high mobility; the blunt irregular head of a roughy suggests a more sedentary life style.

There was no evidence in the parasitological data that fish from one of our 5 identified Australian stocks moved into the area of another identified stock to spawn. As far as we could determine, fish caught during the spawning season had a similar parasite fauna to those caught in the same locality outside the spawning season. In New Zealand, the fishery is based on

spawning season aggregations possibly formed from fish that migrate in from other areas (Robertson et al., 1984). Whether or not this is so may be determined by comparing the parasite fauna of New Zealand spawning fish with that of fish taken from the same sites outside the spawning season.

In contrast to our parasitological findings, Smith (1986) found little genetic separation in samples of orange roughy from several sites in Australia and New Zealand. In some fisheries, parasitological and isoenzyme studies have lead to similar conclusions with regard to stock composition, such as the work by Lester et al.(1984) and Richardson (1983), where neither study was able to detect more than one stock of skipjack in the central and southwest Pacific. In other fisheries, the parasitological and isoenzyme findings have appeared to be at variance, as is the case here. MacKenzie (1983) using parasites concluded that there were at least two sources of recruitment for herring around Scotland, and that adult herring on the west coast comprised a small proportion of fish that were recruited locally and a large proportion that had come from the eastern North Sea. Grant (1982) using isoenzymes was not able to differentiate any European populations.

There are two reasons for apparent conflict in the conclusions from the two methods. First, parasite data relate to differences in the history of individual fish; genetic studies detect changes over an evolutionary time scale. Recently isolated fish populations may not have developed sufficient differences for them to be distinguished genetically though they may have different parasite faunas. The short time scale to which parasite data relates is similar to that of tag data except

that the parasite fauna reflects the environment of the fish up to the time it is caught whereas tag data relates to the history of the fish only for the time between tagging and recapture. A combination of parasite and tag data is a powerful tool in evaluating the movement of fish, see for example the work on whiting by Hislop and MacKenzie (1976).

Second, a small amount of gene flow will make it difficult to recognise semi-isolated stocks. Certainly the movement of only a few fish were considered by Grant (1982) sufficient to obscure any differences that might have been present in European herring. The high genetic diversity in orange roughy found by Smith (1986) may be caused by low rates of gene exchange between partly isolated populations. This is consistent with the relatively sedentary mode of life for this fish that we propose.

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Table 1. Average numbers of parasites found in the viscera of 1251 orange roughy from 11 areas, and their overall correlation coefficient to fish length (r). (Untransformed data). A full listing of the data is given in Sewell and Lester (in press).

Area	1	2	3	4	5	6	7	8
Number of fish	149	132	46	93	47	88	195	52
Average LCF	36.3	31.4	35.7	36.3	36.4	40.0	36.2	31.4
1. Sphaeromyxa [+]	8	59	30	18	21	0	15	58
2. Spirurid	257	65	412	116	225	137	197	169
3. Hepatoxylon	0.03	0.01	0.04	0.01	0.02	0.00	0.02	0.00
4. Degenerate Hepatoxylon	0.07	0.05	0.00	0.06	0.06	0.05	0.06	0.00
5. Tentacularia*	4.1	0.7	-	1.2	0.8	-	3.8	-
6. Sphyriocephalus	0.01	0.01	0.00	0.00	0.02	0.00	0.02	0.00
7. Callitetrarhynchus	0.12	0.01	0.00	0.05	0.00	0.06	0.11	0.00
8. Anisakis type 1	38	8	19	23	25	59	22	6
9. Anisakis type 2	4.0	0.5	0.6	1.0	1.0	1.4	2.9	1.6
10. Anisakis type 3	0.9	0.5	1.1	1.5	1.8	1.4	3.4	7.6
11. Degenerate Anisakis	5.4	1.1	4.1	4.0	4.9	10.1	7.3	1.3
12. Terranova	2.5	0.8	1.7	2.5	2.6	4.1	5.2	18.5
13. Echinorhynchus	1.31	0.14	0.14	0.20	0.10	0.10	0.24	1.06
14. Ascarophis	4	4	6	6	10	-	8	-
15. Glomericirrus*	0.9	0.4	1.0	0.3	0.4	-	0.7	-
16. Pseudopecoelus*	0.04	0.37	0.26	0.42	0.59	-	1.58	-
17. Scolex polymorphus	0.8	0.7	2.8	1.6	2.1	-	21.3	-

[+] Percent infected

* Based on only 165 fish in total

- parasite not counted in any fish from this area

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Table 1, continued

	9	10a	10b	11a	11b	r
Number of fish	187	89	63	68	42	
Average LCF	35.5	36.0	36.2	39.4	40.0	
1. Sphaeromyxa +	9	11	16	6	3	-0.43
2. Spirurid	66	8	5	55	51	0.28
3. Hepatoxylon	0.01	0.02	0.00	0.00	0.00	0.05
4. Degenerate Hepatoxylon	0.11	0.18	0.22	0.26	0.17	0.17
5. Tentacularia*	–	–	–	–	–	0.01
6. Sphyriocephalus	0.00	0.00	0.00	0.00	0.00	0.03
7. Callitetrarhynchus	0.05	0.00	0.02	0.01	0.02	0.08
8. Anisakis type 1	14	16	14	30	28	0.56
9. Anisakis type 2	1.5	0.5	0.3	0.5	0.6	0.26
10. Anisakis type 3	2.7	0.9	0.8	1.2	0.9	0.24
11. Degenerate Anisakis	3.1	2.3	2.9	6.4	4.9	0.35
12. Terranova	2.4	0.7	0.5	1.0	0.6	0.17
13. Echinorhynchus	0.16	0.02	0.05	0.06	0.17	-0.11
14. Ascarophis	–	–	–	–	–	-0.22
15. Glomericirrus*	–	–	–	–	–	0.15
16. Pseudopecoelus*	–	–	–	–	–	-0.25
17. Scolex polymorphus*	–	–	–	–	–	0.08

Table 2. Results of tests of the hypothesis that the numbers of parasites found in fish caught close to the spawning season (June) did not differ from the numbers found in fish taken in the same area outside the spawning season (September to January). '-' indicates a non-significant result.

Area	1	1	4	4	7	7	7	7
Month sampled	Nov	Jun	Oct	Jun	Sep+Oct+Jan	Apr+Jun	Sep+Oct+Jan	Apr+Jun
Spirurid	<0.05		-		-		-	
Hepatoxylon	-		-		-		-	
Callitetrarhychus	-		-		-		<0.05	
Anisakis 1	-		-		-		-	
Anisakis 2	-		-		-		-	
Anisakis 3	-		-		-		-	
deg. Anisakis	-		-		-		-	
Terranova	-		<0.05		<0.05		-	
No. of fish	59	14	14	16	22	30	45	37
Av. length	37.0	37.5	41.0	41.4	37.2	37.0	42.0	41.7

Table 3. Average log(x+1) number of <u>Anisakis</u> spp. in <u>H.</u> <u>atlanticus</u> of three length groups from four areas. Data from small fish adjusted to a fish of length 28 cm, those from medium fish to 37 cm, and those from large to 42 cm. Sample sizes are given in parentheses.

	Latitude	Small		Medium		Large	
Area 2	$37.9°S$	1.22	(87)	2.40	(34)	3.92	(10)
Area 3	$40.5°S$	1.32	(13)	2.77	(15)	3.59	(18)
Area 4	$41.6°S$	1.69	(26)	3.06	(32)	3.85	(35)
Area 5	$42.2°S$	1.97	(12)	2.86	(20)	3.84	(15)

Figure captions

Fig. 1.   Origins of the eleven samples of <u>Hoplostethus</u> <u>atlanticus</u> from Australia and New Zealand, and the 1000 m isobath.

Fig. 2.   Results of multivariate analysis on small fish from southern Australia using 8 parasites (no.s 2, 3+4, and 7 to 12) from 8 areas indicated in Fig. 1.   99% confidence rings given for samples of more than 10 fish.

Fig. 3.   Results of multivariate analysis on medium fish from southern Australia using 8 parasites (no.s 2, 3+4, and 7 to 12) from 8 areas indicated in Fig. 1.   99% confidence rings given for samples of more than 10 fish.

Fig. 4.   Results of multivariate analysis on large fish from southern Australia using 8 parasites (no.s 2, 3+4, and 7 to 12) from 7 areas indicated in Fig. 1.   99% confidence rings given for samples of more than 10 fish.

Fig. 5.   Results of multivariate analysis on small fish from New Zealand using 8 parasites (no.s 2, 3+4, and 7 to 12) from 3 areas indicated in Fig. 1 with 99% confidence rings.

Fig. 6.   Results of multivariate analysis on medium fish from New Zealand using 8 parasites (no.s 2, 3+4, and 7 to 12) from 3 areas indicated in Fig. 1 with 99% confidence rings.

Fig. 7.   Results of multivariate analysis on large fish from New Zealand using 8 parasites (no.s 2, 3+4, and 7 to 12) from 3 areas indicated in Fig. 1 with 99% confidence rings.
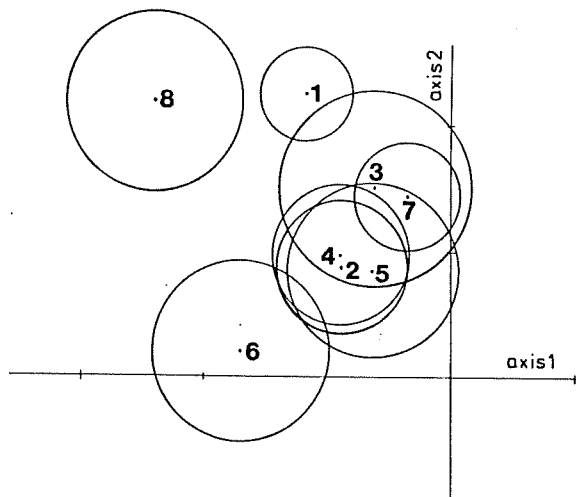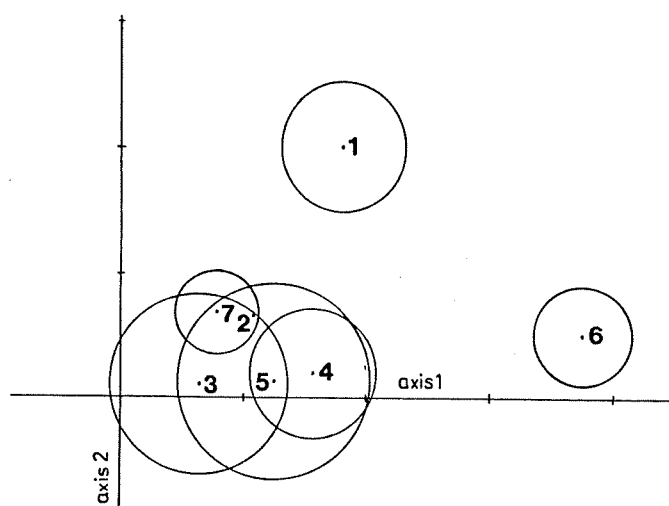
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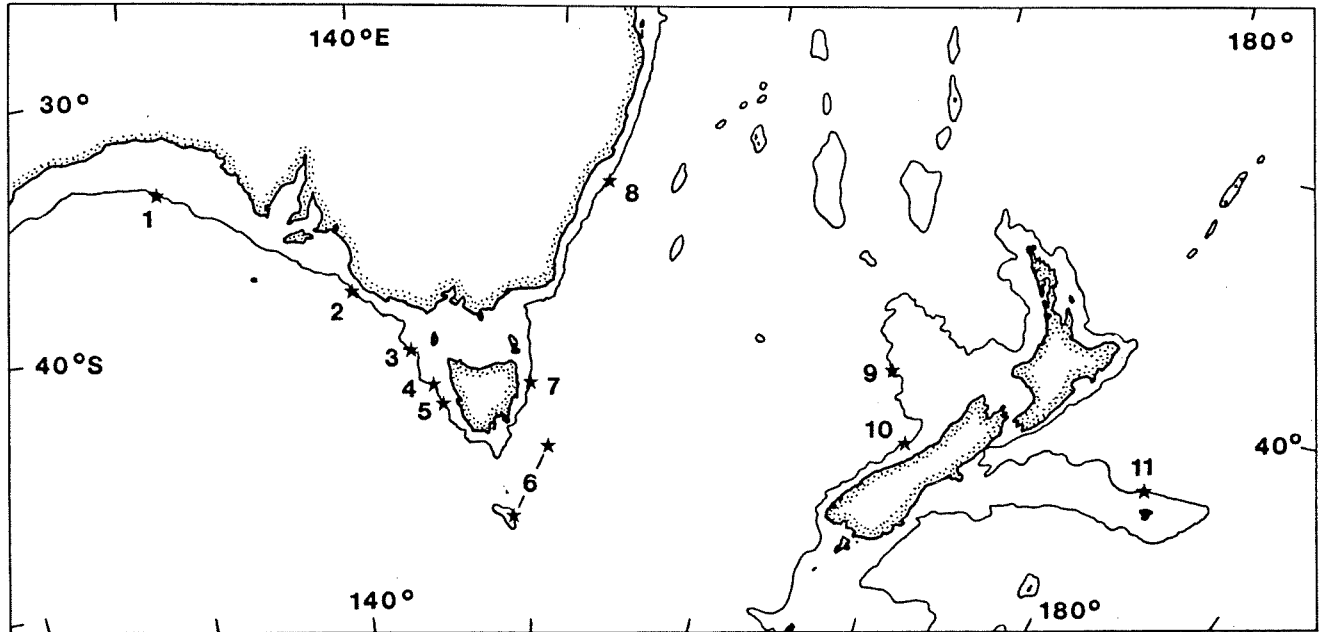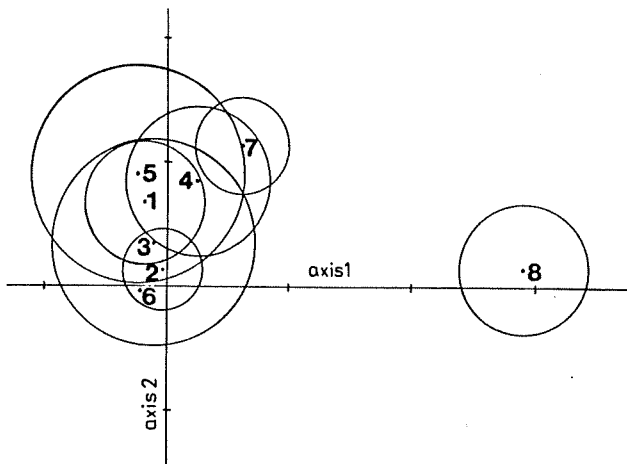
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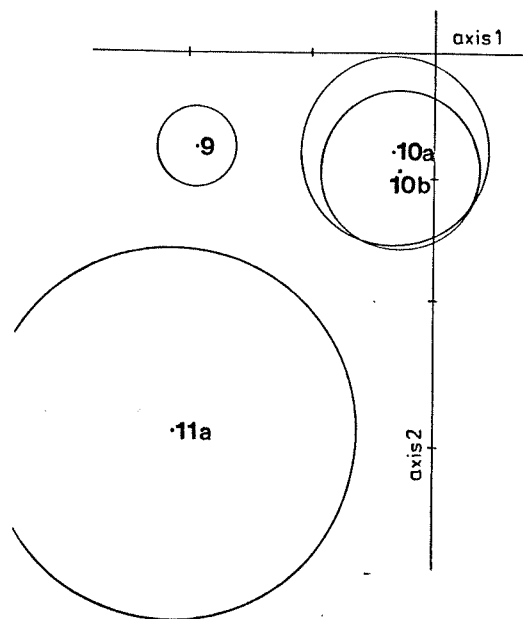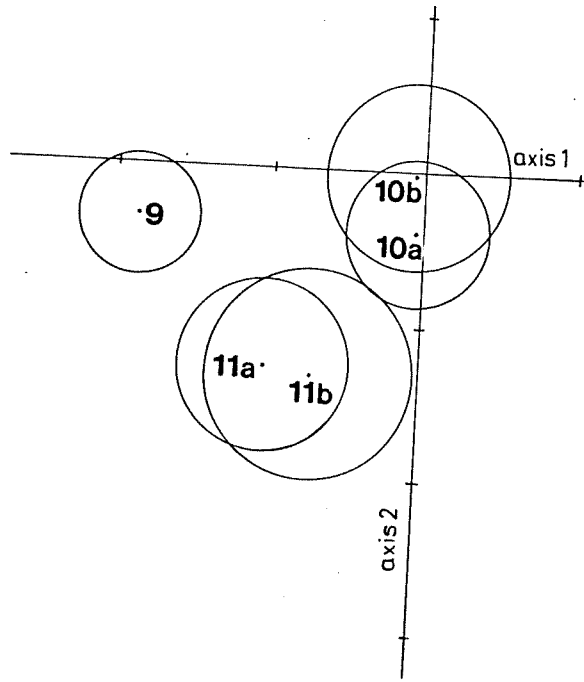
Lester et al. Fig 4

Lester et al. Fig 5

Lester et al. Fig. 6

Lester et al. Fig. 7