



4 June 1992

These are entries additional to "An annotated bibliography of the red rock lobster Jasus edwardsii in New Zealand" by P.A. Breen & J.L. McKoy, 1988. N.Z. Fisheries Occasional Publication 3, 43 p.

AKROYD, J. 1989: Individual transferable quotas - a proposed new management regime for the New Zealand rock lobster fishery. In B.F. Phillips (Ed.) Workshop on rock lobster ecology and management. CSIRO Marine Laboratories Report 207: 3.

Abstract of a talk given to the workshop in Perth, November 1986.

ANDREW, N.L., and MacDIARMID, A.B. 1991: Interrelations between sea urchins and spiny lobsters in northeastern New Zealand. Marine Ecology progress Series 70: 211-222.

This paper examines the spatial distribution of lobsters and sea urchins in the Marine Reserve at Leigh, reports on laboratory studies of lobster feeding on sea urchins, reports on field experiments where kelp or sea urchins were removed and the effects on lobster density noted.

ANNALA, J.H., and BREEN, P.A. 1989: Yield- and egg-per-recruit analyses for the New Zealand rock lobster, Jasus edwardsii. N.Z. Journal of Marine and Freshwater Research 23: 93-105.

Analyses are provided based on growth, size at first maturity, and fecundity data from each of 10 geographic areas around New Zealand. At the current minimum legal size (approximated by 93 mm carapace length for males and 100 mm for males), lower F values would produce increased yield-per-recruit for males and increased egg production from females.

ANON., 1956: Fisheries. [Extract from Parliamentary Paper H.15] Marine Department, Wellington. 38 p. (not seen, reference in Commercial Fisheries Review 19(2): 77.)

Reported to be "A report on the fisheries of New Zealand which discusses spiny lobster or crayfish, fishing vessels and personnel, fish landings, methods of capture, landings at ports, ports in review, exports and imports,...marine research and legislation. Included also are statistical tables of detailed data on fisheries."

ANON., 1957: New Zealand spiny lobster fishery. Commercial Fisheries Review 19(7): 29-30.

A brief description of the fishery at that time. Quality problems resulting from the thawing of tails frozen at sea are discussed. Depletion of stocks was "reported as serious problem", and the decreased average size was cited as evidence of this. But the article suggests that the fishery would become unprofitable before the resource was seriously damaged.

ANON., 1989: Lost: 1000 tonnes of rock lobster. Found: 1000 tonnes of rock lobster - in a computer. N.Z. Professional Fisherman 3(1): 19.

An error in the FIB Annual Report is tracked down.

ANON., 1989: Southern zone tail width. N.Z. Professional Fisherman 3(2): 15.

Describes a Ministerial decision to phase in the tail width size limit for females in the Southern Controlled Fishery; and details enforcement restrictions on sales and exports.

ANON., 1989: Serious drop in lobster catch. Currents 5: 2.

This short article describes a 30% drop in 1988 catches from 1987 levels, from 3118 tonnes from 4529 tonnes for the North & South Islands combined. The drop is ascribed to a drop in recruitment. Possible causes are mentioned, and the relevance of recent puerulus settlement is discussed.

ANON., 1989: How to stuff up your fishery. N.Z. Professional Fisherman 3(6): 23.

This editorial discusses a MAF proposal to remove restrictions on how rock lobsters may be taken. It argues that diving and trawling should not be permitted in the commercial fishery for rock lobsters

ANON., 1989: Rock lobsters. N.Z. Fisheries Information Series 15: 2 p.

A popularised pamphlet describing the basic life history and fishery management.

ANON., 1990: Measuring rock lobsters. N.Z. Fisheries Information Series 19: 4 p.

A booklet describing the tail width measure for amateurs.

ANON., 1990: Quotas 'generally the same as last year'. Commercial Fishing 29(4): 9.

In this short article describing the allocation of individual quotas for the rock lobster fishery in April 1990, Phil Major from MAF Fisheries is quoted describing how the allocations were determined.

ANON., 1990: Amateurs brought into width. Commercial Fishing 29(4): 9.

Describes the implementation of the tail width size limit for amateurs on 1 April 1990.

ANON., 1990: Southern area rock lobster: A case for "Fair Go"?? NZ Professional Fisherman 4(4): 26.

An argument to retain the temporary 56 mm tail width size limit for females in the Southern fishery.

ANON., 1991: Rock lobster management: Towards 2001. NZ Professional Fisherman 5(10): 32.

The Rock Lobster Management Plan Steering Committee presented its report to the Minister of Fisheries on 1 October 1991. This article reproduces the covering letter from the Committee's Chairperson, and the letter of acceptance from the Minister.

BALLANTINE, B. 1991: Marine reserves for New Zealand. University of Auckland Leigh Laboratory Bulletin 25: 196 p.

On page 165 begins a small section discussing changes in rock lobster populations within the marine reserve at Leigh, with comments from Alistair MacDiarmid. The section then goes on to argue, by extrapolation, for more reserves as a management approach for rock lobsters.

BAUCKHAM, A.P. 1991: Rock lobster permits - new conditions. N.Z. Professional Fisherman 5(9): 56.

Describes the recent history of handgathering methods for commercial rock lobster fishers, and outlines changes that will prohibit non-potting methods except for fishers who previously handgathered under the Controlled Fishery system.

BEARDSSELL, M. 1988: Growth of Fiordland's rock lobsters. Catch 15(6): 21.

A popular account of Annala and Bycroft 1988.

BOOTH, J.D. 1987: Dispersal, settlement and movements of rock lobsters in New Zealand. In Kittaka, J. (Ed.) Ecological survey on rock lobster Jasus in southern hemisphere. Ecology and distribution of Jasus along the coasts of Australia and New Zealand (April 1984-March 1987), Report to the Ministry of Education, Culture and Science (Japan), pp. 199-208.

Larvae, larval life histories, current patterns and puerulus settlement patterns around New Zealand are described and discussed.

BOOTH, J.D. 1988: Potential for rock lobster farming. Catch 15(9): 17-19.

This article is based on a paper given at the AQUANZ '88 Conference (see next entry).

BOOTH, J.D. 1989: Rock lobster farming in New Zealand: problems and possibilities. In Beardsell, M.F. (Comp. and Ed.) Proceedings of AQUANZ '88: A National Conference on Aquaculture, pp. 100-104. N.Z. Fisheries Occasional Publication 4.

Dr. Booth describes the background biology, Japanese and New Zealand work with phyllosoma culture, puerulus capture, juvenile culture and diseases. Several alternative approaches to rock lobster culture are described and evaluated. The author believes that culture based on the growth of hatchery pueruli to 200 g will become a commercial reality.

BOOTH, J.D. 1989: Occurrence of the puerulus stage of the rock lobster, Jasus edwardsii at the New Plymouth power station, New Zealand. N.Z. Journal of Marine and Freshwater Research 23: 43-50.

Puerulus were collected in numbers on the screens of the cooling water intakes of this thermal power station, especially from July through September. Size differences were noted between years. The paper discusses puerulus settlement in relation to current patterns, and suggests that puerulus may be attracted to low-frequency vibrations.

BOOTH, J.D. 1989: New Zealand: Spiny lobster resources and research. The Lobster Newsletter 2(2): 6-7.

A brief awareness note aimed at the worldwide lobster scientific community describes the fishery, state of the resource, and current research work both at MAF and at universities.

BOOTH, J.D. 1989: Ecology and behaviour of the puerulus stage of the red rock lobster Jasus edwardsii. In B.F. Phillips (Ed.) Workshop on rock lobster ecology and management. CSIRO Marine Laboratories Report 207: 4.

Abstract of a talk given to the workshop in Perth, November 1986.

BOOTH, J.D. 1989: Probable trans-Tasman continuity in Australasian stocks of Jasus subgroup lalandii rock lobsters. In B.F. Phillips (Ed.) Workshop on rock lobster ecology and management. CSIRO Marine Laboratories Report 207: 4.

Abstract of a talk given to the workshop in Perth, November 1986.

BOOTH, J.D. 1989: History of biological research into the rock lobsters of New Zealand. In B.F. Phillips (Ed.) Workshop on rock lobster ecology and management. CSIRO Marine Laboratories Report 207: 35-52.

This history and bibliography comes with subject and bibliographic indices.

BOOTH, J.D. 1991: Intertidal settlement by pueruli of Jasus edwardsii in New Zealand. Lobster Newsletter 3(2): 1, 3.

Describes the intertidal settlement of puerulus larvae at Castlepoint, particularly the heavy settlement of July 1990. Apparently this species is the only spiny lobster to settle intertidally.

BOOTH, J.D. 1992: Rock lobster research: How, why, when, what! N.Z. Professional Fisherman 6(3): 39-42.

Describes the history of rock lobster fisheries research in New Zealand, some current research programs, and possible future directions.

BOOTH, J.D., and BREEN, P.A. 1993: Fishery status report: The New Zealand fishery for Jasus edwardsii and J. verreauxi. In B.F. Phillips, J.S. Cobb, & J. Kittaka (Eds.) Spiny lobster management. Blackwell Scientific (in press).

A review of the recent fishery, stock assessment and research.

BOOTH, J.D., & GRIMES, P. 1991: Tangaroa's first research. N.Z. Professional Fisherman 5(8): 61-62.

The new fisheries research vessel steamed from the builders' yard in Norway to New Zealand in June 1991. South of the equator, the vessel made plankton tows for rock lobster phyllosoma larvae to test recruitment hypotheses. An early outline of the work is provided here.

BOOTH, J.D., CARRUTHERS, A.D., BOLT, C.D., & STEWART, R.A. 1991: Measuring depth of settlement in the red rock lobster, Jasus edwardsii. N.Z. Journal of Marine and Freshwater Research 25(2): 123-132.

The subtidal puerulus collector that closes on lifting for surface servicing is described. The article describes the relation between puerulus settlement and depth: the authors claim it increases with depth to 10-12 m, then decreases with depth and distance from shore.

BOOTH, J.D., STREET, R.J., and SMITH, P.J. 1990: Systematic status of the rock lobsters Jasus edwardsii from New Zealand and J. novaehollandiae from Australia. N.Z. Journal of Marine and Freshwater Research 24: 239-249.

This paper examines the evidence that the two species might be the same species: currents in the Tasman Sea, larval rock lobsters found in the Tasman Sea, genetic evidence, morphology and life history characters. The authors conclude that there are no grounds for continuing the present distinction between the two "species". The name Jasus edwardsii has priority.

BRASHER, D.J, OVENDEN, J.R., BOOTH, J.D., and WHITE, R.W.G. 1992: Genetic subdivision of Australian and New Zealand populations of Jasus verreauxi (Decapoda: Palinuridae) - preliminary evidence from the mitochondrial genome. NZ Journal of Marine and Freshwater Research. 26: 53-58.

This study is similar to that of Ovenden *et al.* 1992 on Jasus edwardsii, but with contrasting results. The packhorse rock lobster appears to differ genetically between Australia and New Zealand.

BREEN, P.A. 1988: Rock lobster catch sampling. What it is; why we do it; how it affects the industry. N.Z. Professional Fisherman 2(4): 32.

A proposed programme of catch sampling is described in detail. The article addresses how sampling is done, how data are treated, what estimates are made from the results, and how these estimates are then used.

BREEN, P.A. 1988: Rock lobster stock assessment. N.Z. Fisheries Assessment Research Document 88/1. 37 p.

The 1988 stock assessment. Contains tables showing historical catches and effort, and has a brief literature review of assessment-related topics. Recent surplus-production and yield-per-recruit results are discussed.

BREEN, P.A. 1989: New Zealand fisheries in 1914. Professional Fisherman 2(6): 26-28.

Quotes the Prince Report (1914) describing the under-use of rock lobsters at that time and suggestions for fishery expansion.

BREEN, P.A. 1989: Rock lobster stock assessment 1989. N.Z. Fisheries Assessment Research Document 89/6. 36 p.

The 1989 stock assessment background paper describes 1988 landings provided by the new data system; examines Maori, amateur, illegal and unreported commercial catches; evaluates the effect of such catches on surplus-production estimates; and presents simulation model results in an examination of the effect of various catch levels on future stocks.

BREEN, P.A. 1989: Management research on the New Zealand rock lobster Jasus edwardsii. In B.F. Phillips (Ed.) Workshop on rock lobster ecology and management. CSIRO Marine Laboratories Report 207: 4.

Abstract of a talk given to the workshop in Perth, November 1986.

BREEN, P.A. 1990: Ghost fishing: A review. In R.S. Shomura & M.L. Godfrey (Eds.) Proceedings of the Second International Conference on Marine Debris, Honolulu, April 1989. NOAA Technical Memorandum NMFS NOAA-TM-NMFS-SWFSC-154: 571-599.

The red rock lobster, and its ability to escape from beehive pots in unpublished studies by John Booth, are described on p. 576.

BREEN, P.A. 1991: Assessment of the red rock lobster (Jasus edwardsii) North & South Island stock, November 1991. N.Z. Fisheries Assessment Research Document 91/16: 35 p.

Extends the surplus-production analysis and forward simulation modelling approaches of Breen & Stocker (1991). A sensitivity analysis is provided for the surplus-production results, showing that results are sensitive to various components of the procedure used; but that the conclusions are quite robust. Previous assessments are supported: the stock is overfished and must be rebuilt through reduced catches..

BREEN, P.A. 1991: State of the red rock lobster fishery, NSI stock. New Zealand Professional Fisherman 5(11): 57-60.

A popular version of the preceding stock assessment document. Badly mauled by the layout people, the last page of this article is all there but requires detective work to put into sequence.

BREEN, P.A. 1991: Forward simulation modelling with a dynamic Fox model for the red rock lobster (Jasus edwardsii) North and South Island stock, December 1991. New Zealand Fisheries Assessment Research Document 91/16 Supplement: 14 p.

This is an extension of the 1991 stock assessment two entries above. The CY&P model was used to make the forward simulations; six fishery indicators are calculated; and trajectories of biomass are presented. The result is a set of statistical predictions for the response of the fishery at each possible TAC option.

BREEN, P.A., & BOOTH, J.D. 1989: Juvenile and puerulus abundance in the rock lobster Jasus edwardsii at Stewart Island, New Zealand. N.Z. Journal of Marine and Freshwater Research 23(4): 519-523.

Puerulus settlement correlates well with subsequent juvenile abundance in the first three years of their life on shallow inshore reefs, indicating that puerulus abundance may be a good index of later recruitment. Survival may be density-dependent in the first year; growth may be density-dependent in the third year.

BREEN, P.A., & BOOTH, J.D. 1990: Rock lobster stock assessment, 1990. NZ Fisheries Assessment Research Document (in press).

The 1990 stock assessment reviewed evidence presented in previous documents and updates the catch statistics. The 1988 and 1989 catches fell sharply below 1987 levels for the North and South Islands stock, and this was a cause for concern and recommendation for a reduced TAC (the fishery was now managed under an individual quota system).

BREEN, P.A., BOOTH, J.D., and TYSON, P.J. 1988: Juvenile rock lobsters at Stewart Island. Catch 15(9): 21-22.

Comparisons between puerulus settlement and juvenile abundance estimates near Halfmoon Bay are made for the first time. The relation appears to be quite good, and density-dependent survival is suggested for juveniles in their first year after settlement. The prospects for use of puerulus settlement monitoring as a valuable predictive tool appear to be good. Note that Figs 2 and 3 are transposed.

BREEN, P.A., GILBERT, D.J., and CHANT, K. 1992: Bioeconomic modelling of the New Zealand fishery for red rock lobsters (*Jasus edwardsii*). NZ Fisheries Assessment Research Document 92/1: 21 p.

See below: this is the fully detailed version of the study.

BREEN, P.A., GILBERT, D.J., and CHANT, K. 1993: Bioeconomic modelling of the New Zealand fishery for red rock lobsters (*Jasus edwardsii*). In B.F. Phillips, J.S. Cobb, & J. Kittaka (Eds.) Spiny lobster management. Blackwell Scientific (in press).

A condensed description of bioeconomic modelling of fishery surpluses. The economic model was initialised from Department of Statistics economic surveys, which indicated there was no economic surplus in 1987. A rebuilt fishery could return a surplus of \$40-50 million annually. The net present values of various rebuilding strategies were compared: many were on the order of \$250 million, compared with \$0 for not rebuilding the fishery.

BREEN, P.A. & PEACEY, J. 1988: Tail width. N.Z. Professional Fisherman 2(4): 2-3.

In this letter to the editor, two MAF scientists describe why tail width was chosen as the new minimum legal size for rock lobsters and list both opportunities for industry consultation and the various previous publications describing the work.

BREEN, P.A. & STOCKER, M. 1991: Surplus production and simulation modelling for the red rock lobster (*Jasus edwardsii*) North and South Island stock. N.Z. Fisheries Assessment Research Document 91/1: 24 p.

The authors use a graphical and two statistical approaches to analyse catch and effort from the NSI stock from 1945-87; also for the North & South Islands separately for 1963-86. They conclude that effort is too high in the NSI fishery no matter what model is used. Simulation modelling was used to predict the distribution of possible future stock states as a function of quota level.

BREEN, P.A., & STOCKER, M. 1990: Update of the state of the red rock lobster fishery. N.Z. Professional Fisherman 4(6): 26-27.

A popular article describing results from the study described above.

BRETT, A.L.R. 1989: The effect of artificial photoperiods on the growth rate of juvenile spiny lobsters Jasus edwardsii (Hutton). Dip. Applied Science Thesis, Victoria University of Wellington, 61 p.

Lobsters were grown in laboratory situation under artificial light with different photoperiod patterns. Growth was poorest under continuous light and better under more than one cycle per day.

CAVE, E. 1991: Time to face reality. N.Z. Professional Fisherman 5(6): 41-43.

A popular article written by a fisher aimed at fishers reviews the scientific work on rock lobsters since 1979 and lists the concerns of fishery biologists. The author argues that the resource needs to be rebuilt through a variety of approaches.

CLEMENT, G. 1991: Rock Lobster Management. Time to bite the bullet. N.Z. Professional Fisherman 5(3): 8-11.

From an Industry perspective, a list of topics that should be addressed in a comprehensive management plan for the rock lobster fishery.

COLE, R.G., AYLING, T.M., AND CREESE, R.G. 1990: Effects of marine reserve protection at Goat Island, northern New Zealand. N.Z. Journal of Marine and Freshwater Research 24(2): 197-210.

Sampling conducted in the marine reserve near Leigh during 1976 and 1988 was compared. Changes in abundance could be demonstrated for only rock lobsters and red moki, highlighting the need for rigorous sampling designs.

FENAUGHTY, C.M., TRACEY, D.M., AND LOCK, J.W. 1988: Heavy metal and organochlorine concentrations in New Zealand aquatic fish, crustaceans, and molluscs. N.Z. Fisheries data Report 34: 44 p.

Reports data on concentrations of mercury, cadmium, copper, zinc and lead in rock lobsters and a wide variety of other species. Concentrations in rock lobsters were beneath permissible levels, except that cadmium in some individual rock lobsters was higher than the maximum permitted value.

GABITES, B.P. 1990: Ghost trapping of rock lobsters (Jasus edwardsii) by lost traps. N.Z. Marine Sciences Newsletter 32: 11.

This abstract describes a study (then in progress) to examine the possibility of ghost fishing by lost traps.

GABITES, B.P. 1990: Shelter related distribution of the lobster Jasus edwardsii. Msc. Thesis, University of Auckland. 110 p.

This study was conducted at Waterfall Reef in the Marine Reserve at Leigh. The reef and lobster shelter sites were mapped and the distribution of lobsters studied through diving censuses. Physical features of the shelters were measured.

Shelter width appeared to be the most important variable; other physical variables explained little of the occupancy variation. Lobsters appeared to prefer shelters with alternative entrances. Seasonal patterns and ecological implications are discussed.

HARRIS, G.P. 1989: The relationship between climate, interannual variability in the oceans and stocks lobster in Australia and New Zealand. In B.F. Phillips (Ed.) Workshop on rock lobster ecology and management. CSIRO Marine Laboratories Report 207: 10.

Abstract of a talk given to the workshop in Perth, November 1986.

HARRIS, G.P., DAVIES, P., NUNEZ, M., and MEYERS, G. 1988: Interannual variability in climate and fisheries in Tasmania. Nature 333(6175): 754-757.

The authors observed good correlations between climate and fishery landings immediately (climate affects fishing effort) and after biologically realistic time lags (climate affects recruitment processes). Otago landings appeared related to zonal westerlies and summer sea surface temperatures in the same year and with maximum sea surface temperature at Maria Island after 3 years.

HAYAKAWA, Y., BOOTH, J.D., NISHIDA, S., SEKIGUCHI, H., SAISHO, T., & KITTAKA, K. 1990: Daily settlement of the puerulus stage of the red rock lobster Jasus edwardsii at Castlepoint, New Zealand. Nippon Suisan Gakkaishi 56(11): 1703-1716.

The authors monitored daily settlement on collectors at Castlepoint during January and February 1989. Variability in settlement rate are described, but could not be related to any of the environmental variables measured. Importantly, moon phase appears not to be significant.

HILL, A. 1969: Time running out for Chathams crayfish bonanza. N.Z. Weekly News 5511: 3-4, 7. [14 July 1969].

A feature article describes the rock lobster boom at the Chathams, its effect on the local economy and social structure, and discusses the probable end of the boom. As it turned out, 1969 was the peak year for the Chathams fishery, and landings declined very quickly in the next three years.

HOLLINGS, T. 1988: Aquaculture of the N.Z. rock lobster. Unpublished report, N.Z. Fishing Industry Board, 51 p.

An illustrated report describing a study in which small rock lobsters were grown under various conditions. Warmer water led to faster growth but also to higher mortalities. An economic analysis of rock lobster culture is presented.

HOLLINGS, T. 1991: Rock lobster farming - is it a runner? N.Z. Professional Fisherman 5(9): 24-25.

A rough economic analysis of the potential profitability of rock lobster farming.

HOLTHUIS, L.B. 1991: Marine lobsters of the world. An annotated and illustrated catalogue of species of interest to fisheries known to date. FAO Fisheries Synopsis 125(13): viii + 292 p.

Contains a brief summary of the taxonomy, distribution and fishery for Jasus edwardsii.

HORN, P.L. 1988: The escapement efficiency of rock lobster pots: escape gaps v. minimum mesh size. Central Fisheries Region Internal Report 9. 20 p.

Describes results of experimental potting with traps having the regulation escape gaps, traps with no escape gaps, and traps made entirely from 54 mm steel mesh. All three types caught similar numbers of legal fish. Significant reductions in sub-legal catches were seen in the other two trap types.

JEFFS, A. 1988: Leigh Marine Reserve a decade on. Catch 15(8): 12-13.

After 10 years, rock lobsters were reported by the former Director of the University of Auckland Marine Laboratory to be 20 times as numerous inside the Reserve as outside. Their numbers were thought to be still increasing.

KIDD, D. 1992: Rock lobster management. NZ Professional Fisherman 6(2): 42.

A press release from the Minister of Fisheries detailing changes to the quotas, enforcement, minimum legal sizes and escape gaps for the 1992-93 season.

KILNER, A.R., & J.D. BELL 1992: Marine recreational fishing survey: Fishing habits, perceptions and attitudes of marine recreational fishers residing in MAF Fisheries, (sic) Central Region, New Zealand. [NZ MAF Fisheries] Central Region Internal Report 18: 38 p.

Has a page on "crayfish".

KITTAKA, J. (Ed.) 1987: Ecological survey on rock lobster Jasus in southern hemisphere. Ecology and distribution of Jasus along the coasts of Australia and New Zealand (April 1984-March 1987). Report to the Ministry of Education, Culture and Science (Japan). 232 p.

This illustrated report describes the basic distribution, ecological habitats, and the fisheries for the three Jasus species in Austral-Asia. Professor Kittaka describes his experiments in larval rearing with these species and with hybrids. B.F. Phillips, J.D. Booth and T. Saisho describe larval dispersal mechanisms in spiny lobsters.

KITTAKA, J. 1989: Breeding and rearing of genus Jasus. In B.F. Phillips (Ed.) Workshop on rock lobster ecology and management. CSIRO Marine Laboratories Report 207: 13.

Abstract of a talk given to the workshop in Perth, November 1986. J. lalandii was considered a better candidate for larval rearing than J. edwardsii, J. novaehollandiae or Panulirus japonicus.

KITTAKA, J., BOOTH, J.D., SEKIGUCHI, H., & NISHIDA, S. 1991: Transport and culture of phyllosomas of the palinurid Jasus edwardsii collected in the ocean. Nippon Suisan Gakkaishi 57(12): 2143.

Phyllosomas were caught at sea off the east coast from the research vessel James Cook. They were transported to Japan and grown under laboratory conditions. Of 17 phyllosomas originally shipped, three survived transport and one was successfully reared to puerulus.

MacDIARMID, A.B. 1989: Seasonal changes in the depth distribution of the red rock lobster, Jasus edwardsii (Hutton) in northeast New Zealand. In B.F. Phillips (Ed.) Workshop on rock lobster ecology and management. CSIRO Marine Laboratories Report 207: 13.

Abstract of a talk given to the workshop in Perth, November 1986.

MacDIARMID, A.B. 1989: Comparison of densities and size frequency of rock lobster (Palinuridae) populations amongst localities in northeast New Zealand. In B.F. Phillips (Ed.) Workshop on rock lobster ecology and management. CSIRO Marine Laboratories Report 207: 14.

Abstract of a talk given to the workshop in Perth, November 1986. Density was compared between the Marine Reserve at Leigh and five other locales. Density was highest in the Reserve and the greatest proportion of legal sized animals in the size frequency was observed there.

MacDIARMID, A.B. 1989: Moulting and reproduction of the spiny lobster Jasus edwardsii (Decapoda: Palinuridae) in northern New Zealand. Marine Biology 103: 303-310.

A paper based on field and lab studies at the Marine Reserve at Leigh. Moulting was accompanied by inshore migrations. Most males moulted in October/November. Females moulted in late April/June, which is later than southern females. Large females moulted earlier and waited up to 38 days before mating, smaller females moulted later but waited only up to 9 days. Larvae hatched in September-November.

MacDIARMID, A.B. 1989: Size at onset of maturity and size-dependent reproductive output of female and male spiny lobsters *Jasus edwardsii* (Hutton) (Decapoda, Palinuridae) in northern New Zealand. *Journal of Experimental Marine Biology and Ecology* 127: 229-243.

The size at 50% female maturity (as determined by the presence of eggs or exopodital setae) was 87.5 mm carapace length in the Marine Reserve at Leigh. Most males were mature at 85 mm. The length-fecundity relation is given. Large males were involved in all courting; smaller males were excluded by the seasonal aggression of the larger males.

MacDIARMID, A.B. 1991: Seasonal changes in depth distribution, sex ratio and size frequency of spiny lobster *Jasus edwardsii* on a coastal reef in northern New Zealand. *Marine Ecology Progress Series* 70: 129-141.

During a 3 year study in the Marine Reserve near Leigh, total population size was stable, but marked seasonal differences were seen in sex ratio, density and size between depths and times. These appear related to seasonal moulting, breeding and feeding cycles. Females were most dense inshore in May; then moved deeper during the egg-bearing period. Males moved inshore briefly to moult in October-November. They inhabited deep patch reefs in summer and fed on bivalves in the adjacent sand flats.

MacDIARMID, A.B., HICKEY, B., and MALLER, R.A. 1991: Daily movement patterns of the spiny lobster *Jasus edwardsii* (Hutton) on a shallow reef in northern New Zealand. *Journal of Experimental Marine Biology and Ecology* 147: 185-205.

The movements of tagged lobsters were observed in a mapped area within the Marine Reserve at Leigh. Lobsters were mostly nocturnal. Movements were unrelated to any of the environmental variables measured. The median movement was 41 m per night, but the median foraging range was only 24 m. Behaviour during the mating season is described.

McLELLAN, J. 1989: Fiordland in the 50's. *N.Z. Professional Fisherman* 3(3): 31-

McLELLAN, J. 1989: Fiordland re-visited. *N.Z. Professional Fisherman* 3(4): 2-10.

McLELLAN, J. 1989: Flying from Chathams. *N.Z. Professional Fisherman* 3(6): 12-14.

McLELLAN, J. 1990: More on the Chathams. Kiangarooa - the 1960's. *N.Z. Professional Fisherman* 4(1): 4-8.

McLELLAN, J. 1990: Remember the time... *N.Z. Professional Fisherman* 4(3): 26-29.

McLELLAN, J. 1990: Remember the time - Part II. *N.Z. Professional Fisherman* 4(4): 38-40.

A set of aural-history style articles by a well known fisherman, describing lobster fishing in Fiordland and the Chatham Islands in the 1950's and '60s.

McKENZIE, G. 1991: Theft of rock lobsters and pots. N.Z. Professional Fisherman 5(3): 46-47.

A short review of the law respecting thefts of rock lobsters from pots and of pots themselves, with short case histories. Based on a 1983 study.

MADDEN, T. 1991: Rock lobster seminar at Port Lincoln. Professional Fisherman [Australia] [July 1991]: 10.

A popular article describing the seminar held by South Australia's Department of Fisheries. John Booth attended the meeting and discussed stock structure. The article misquotes his presentation on the state of the New Zealand fishery.

NISHIDA, S., & KIITAKA, J. 1992: Integumental organs of the phyllosoma larva of the rock lobster Jasus edwardsii (Hutton). Journal of Plankton Research 14(4): 563-573.

Describes and shows scanning electron micrographs of the surface organs (setae, pores, cuticular and other organs) of stage XI phyllosomas; discusses the possible functions of these organs; and makes comparison with the western rock lobster Panulirus cygnus.

NISHIDA, S., QUIGLEY, B.D., BOOTH, J.D., NEMOTO, T., and KITAKA, J. 1990: Comparative morphology of the mouthparts and foregut of the final-stage phyllosoma of the rock lobster Jasus edwardsii (Decapoda: Palinuridae). Journal of Crustacean Biology 10(2): 293-305.

The morphology of late-stage phyllosoma were examined and compared with those of early-stage juveniles. The former appear to be adapted for processing large, soft items; the latter for hard as well as soft materials. The authors suggest that puerulus larvae do not feed, or feed only on small, soft items.

OVENDEN, J.R., BRASHER, D.J., and WHITE, R.W.G. 1992: Mitochondrial DNA analyses of the red rock lobster Jasus edwardsii supports an apparent absence of population subdivision throughout Australasia. Marine Biology 112: 319-326.

Lobsters were examined from southern Australia and New Zealand, using nucleotide sequence polymorphisms. Genetic subdivision was not detected with this method, although populations were distributed over 4600 km. The results suggest that significant genetic exchange, and perhaps significant larval recruitment, takes place from west to east.

POLLOCK, D.E. 1990: Paleoceanography and speciation in the spiny lobster genus Jasus. Bull. Mar. Sci. 46(2): 387-405.

A discussion of how species evolved in the southern hemisphere from the ancestral species, dispersal patterns and maintenance of the present species.

PAUL, L.J. 1990: Marine fish, fisheries, and aquaculture. In Climate change: Impacts on New Zealand for the environment, economy and society. Ministry for the Environment, Wellington, pp. 85-94.

This article discusses the possible effects of climate change on New Zealand fisheries. A section is devoted to rock lobsters. The effects of decreased westerly winds and increased seawater temperatures are discussed under two assumed scenarios. The effects would be mainly distributional (shifts caused by temperature tolerance) and in the pattern of larval settlement.

PEACEY, J. 1991: Implementation of a tail width measure in the New Zealand rock lobster fishery. Unpublished paper, currently Senior Fisheries Management Committee draft paper.

Gives the background, describes the change from a tail length measure to tail width, and describes the impact of the measure.

PRINCE, E.E. 1914: Preliminary report on the fisheries of New Zealand. House of Representatives 1-H. 15C. 31 p.

Prince described rock lobsters as an under-utilized species despite their abundance, although he considered them "not quite equal to the true lobster". He made suggestions for marketing the tail meat in conjunction with Canadian Homarus claw meat.

PROVENZANO, A.J. 1988: Trends in crustacean aquaculture. Catch 15(11): 17-20.

An article comprising quotes from Dr. Provenzano's talk at the AQUANZ '88 Conference. The focus is a worldwide perspective, but he suggests that post-larval rock lobsters could be caught and reared, or even produced in hatcheries, and raised to sizes that the market demands. Because of the high value he suggests such projects would be cost-effective.

PROVENZANO, A.J. 1989: Current and future trends in crustacean aquaculture. In Beardsell, M.F. (Comp. and Ed.) Proceedings of AQUANZ '88: A National Conference on Aquaculture, pp. 105-109. N.Z. Fisheries Occasional Publication 4.

This paper is a review of crustacean aquaculture worldwide. The short section dealing with Jasus edwardsii focuses on the question of whether settled puerulus could be collected from the wild for commercial growth.

QUIGLEY, B.D. 1988: Behavioural and morphological aspects of feeding in the puerulus stage of the red rock lobster Jasus edwardsii. Bsc (Hons.) Thesis, Victoria University of Wellington, 65 p.

This study examined the role of puerulus larvae through feeding experiments and morphological examination. The puerulus larva appears to be adapted for benthic feeding, but there are morphological differences between the puerulus and juvenile mouthparts. Pueruli fed in captivity, but at a lower rate than juveniles.

RAYNS, N.D. 1989: Initial research into growing-on of New Zealand rock lobster, Jasus edwardsii. In B.F. Phillips (Ed.) Workshop on rock lobster ecology and management. CSIRO Marine Laboratories Report 207: 15.

Abstract of a talk given to the workshop in Perth, November 1986 on the effects of diet, density, eyestalk ablation and downstream inhibition on growth in small juveniles.

ROYDHOUSE, N. 1988: Diver's ear in pain or claws two. New Zealand Journal of Sports Medicine [December 1987]: 67.

An experienced SCUBA diver experienced ear pain during a rock lobster collecting dive. It persisted and so he consulted a physician, who discovered a rock lobster puerulus in the diver's left ear, apparently having sought shelter there after being disturbed by the diver.

ROCK LOBSTER STEERING COMMITTEE, 1991: Towards 2001: A ten year plan for the management of rock lobster fisheries. Unpublished document distributed by the Office of the Minister of Fisheries, October 1991.

In June 1991 the Minister of Fisheries appointed a Steering Committee to develop a management plan for rock lobsters in New Zealand. This report contains the background, terms of reference, and a variety of recommendations.

SANDERS, D. 1990: Fiordland - tail width problems continue. N.Z. Professional Fisherman 4(3): 8-9.

Industry resistance to increasing the tail width size limit for females from 56 (a special concession size for the 1989-90 season).

STEVENS, P. 1991: Rock lobster N.S.I. 1991 T.A.C.C. N.Z. Professional Fisherman 5(3): 12-13.

Describes a reduction in quota for the NSI stock, from 3200 t to 3000 t, to take place on 1 April 1991. A table gives the individual area TACCs.

SMITH, P.J. 1991: MAF Fisheries (Marine Research) report to the Foundation for Research, Science and Technology for the 1990-91 financial year. MAF Fisheries Greta Point Internal Report 164: 18 p. (Draft report held in Maf Fisheries Greta Point library, Wellington.)

Brief descriptions (abstracts from the confidential reports) are given of 5 rock lobster culture projects. The first was to develop a cost-effective system for culturing brine shrimp to feed to phyllosomas; the second was concerned with growing the brine shrimp effectively, the third was to rear lobsters from eggs through the larval stages to puerulus. The fourth was to establish optimum feeding rates and stocking densities for phyllosomas, and the fifth was to use temperature to manipulate the breeding cycle of egg-bearing females.

Overall, the project was unsuccessful because an infection killed most of the phyllosomas. However, phyllosomas were hatched out successfully and showed good survival to Stage VIII. The culture tanks worked well, and the brine shrimp culture was apparently successful. A project overview is given, and the report contains a brief discussion of the technical problems of rock lobster culture.

STOCKER, M. 1990: Red rock lobster: Where do we go from here? N.Z. Professional Fisherman 4(6): 28-30.

A popular article describing and discussing 8 hypotheses that address why the 1988 and subsequent landings were so much lower than 1987 landings.

STREET, R.J. 1988: Video surveillance. Commercial Fishing 27(8): 2-4.

Use of underwater video in monitoring lobster abundance and behaviour in southern New Zealand is described.

STREET, R.J. 1988: Video tape on rock lobster available to industry. Commercial Fishing 27(12): 2-3.

The article first describes a video on rock lobsters available from the author. The remainder is a summary of oceanography, habitat considerations (especially geological aspects), and the moult cycle.

STREET, R.J. 1990: Migrations subject of many studies over past 20 years. Commercial Fishing 29(2): 2-4.

This article summarises what is known about rock lobster migrations generally in New Zealand, gives size at maturity data for the Big River, southern Fiordland, area, and describes results from tagging lobsters at Big River and the Snares Islands. Recaptures show a tendency to migrate into the Southland Current.

STREET, R.J. 1990: Fishery investigations in southern New Zealand. Private publication by the author, 7 Gala Street, Dunedin. unpagged.

After a general introduction, this report describes the previously unpublished results of tagging conducted at the Snares Islands and Big River in 1984. Size at maturity data for Big River females are also given. Ten returns (5%) have been obtained from the Snares tagging, 8 of which moved 100 km or more. One hundred thirty-six (17%) tagged females were recaptured from the Big River tagging, about half near the area in the first year and about half from Fiordland and Westland after one year. Data from one individual suggest a migration speed of 7 km/day.

SULLIVAN, K.J. 1988: Recreational fishing: Survey results. N.Z. Fisheries Assessment Research Document 88/30. 10 p. (Draft)

The Department of Statistics approached 3078 dwellings in a survey requested by MAF in 1987. Results were 'scaled up' to the N.Z. population as a whole. From this procedure, the report estimated that 41 000 recreational landings were made by amateurs, mostly divers, in the preceding year.

SYKES, D. 1991: So you want to be a rock-lobster star? N.Z. Professional Fisherman 5(8): 29.

A commercial rock lobster fisher discusses various aspects of the rock lobster business for new entrants to the fishery.

SYKES, D. 1991: Escape gaps. N.Z. Professional Fisherman 5(11): 33-34.

The problem of sub-legal capture is described as a possible area where mortality could be decreased and "savings" realised. Anecdotal evidence from Victoria indicates that the catch of legal sized animals could increase and octopus predation be reduced. This article is a call to the catching sector for suggestions.

SYKES, D. 1992. R.L.T.A.C.C.s 1992-93. N.Z. Professional Fisherman 6(3): 10.

Documenting the changes to TACCs and escape gap regulations for the 1992-93 rock lobster fishing year, which began 1 April 1992.

SYKES, D. 1992. The rock lobster fishery: Where from - to where? N.Z. Professional Fisherman 6(3): 11-13.

A recent informal history of management actions and present options.

THOMSON, G.M., and ANDERTON, T.F. 1921: History of the Portobello Marine Fish-hatchery and Biological Station. Dominion of New Zealand Board of Art and Science Bulletin 2: 131 pp.

Migrations of males in August off Otago are described, in which rock lobsters were so numerous that up to 2000 could be taken in a single trawl haul. A decline in numbers in Otago Harbour is described.

TEIRNEY, L., KILNER, A., & SYLVESTER, T. 1991: Maine Recreational Fisheries Working Group Report - November 1991. N.Z. Fisheries Assessment Working Group Report 91/1: 27 p.

Contains a brief description (p. 6) of the importance of rock lobsters to amateur fishers, with a very brief review of existing amateur data. Projects designed to make amateur catch estimates are described.

VOLLER, R.W. 1987: The effectiveness of escape gaps in beehive rock lobster pots at Cape Campbell, New Zealand. (Unpublished report, held in Fisheries Research Centre library, Wellington.)

Escape gaps appeared to have no effect on catches in soak times less than 12 hours. After 12 hours they decrease the number of sublegals caught. Legal catches are unaffected. Octopus predation is decreased by escape gaps.

WALKER, M. 1988: FOs trained to use new lobster measure. Catch 15(5): 18.

The minimum legal size introduced on 1 June 1988 requires proper use of a specially designed tail width gauge. Fishermen were advised to contact their local Fisheries Officer for instructions on proper use of the gauge.

WEEBER, B. 1988: Judge rules out review of tail regulations. Catch 15(8): 8-9.

In July 1988 the High Court heard an application by fishermen from the Southern Controlled Fishery claiming that the new tail width size limit affected them unreasonably, that it had been imposed without proper consultation, and that the Court should review the regulation. Justice Ellis rejected these claims and advised the applicants to pursue their contentions with the Minister.

WILLIAMS, A.B. 1986: Lobsters - identification, world distribution, and U.S. trade. Marine Fisheries Review 48(2): 68 p.

Describes the world distribution of lobsters, presents keys to lobster families and to species of spiny lobsters, including Jasus edwardsii. The keys are based on tails. Colour plates are included.

WILLIAMS, B.G., and DEAN, I.C. 1989: Timing of locomotor activity in the New Zealand rock lobster, Jasus edwardsii. N.Z. Journal of Marine and Freshwater Research 23: 215-224.

The authors describe a laboratory study of the timing of activity, as affected by light, season and internal rhythms.