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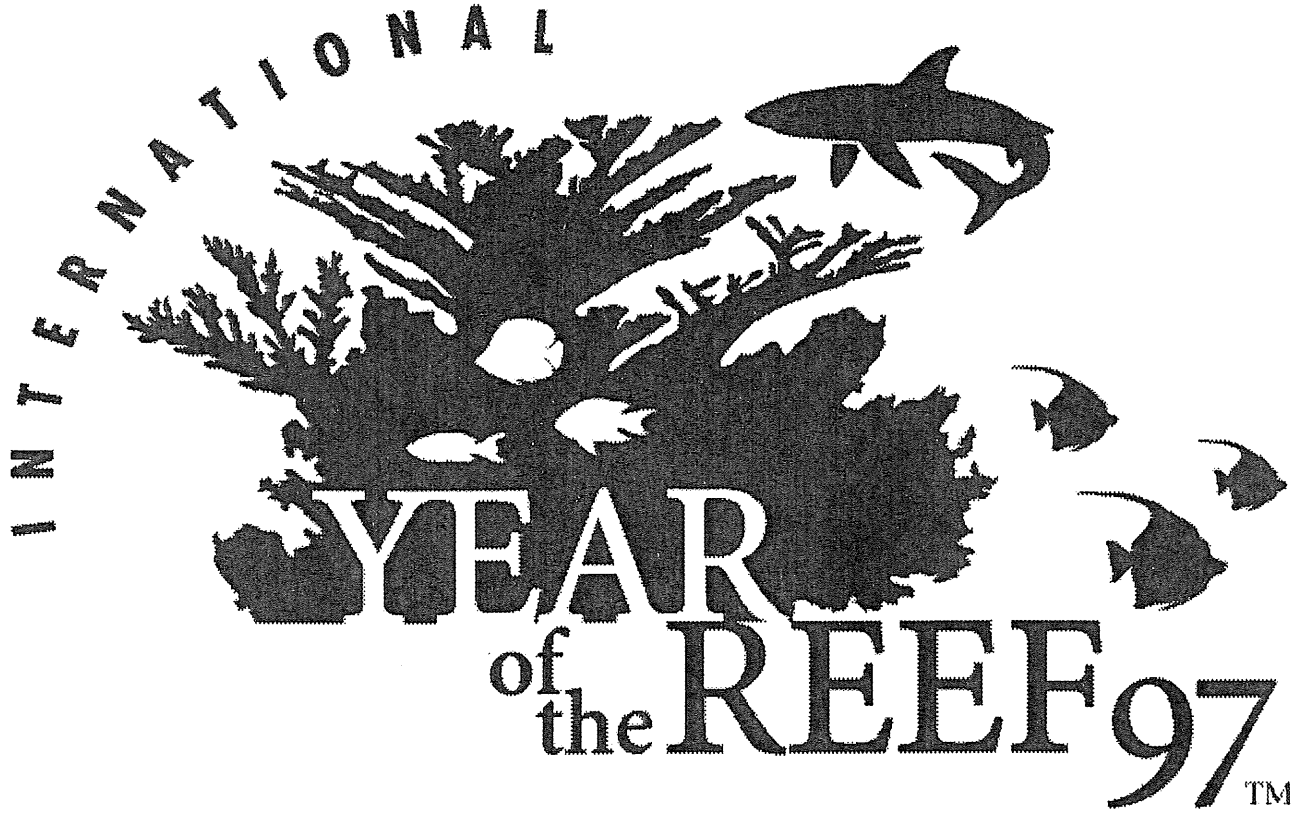
REEF ENCOUNTER

Newsletter of the International Society for Reef Studies

Number 19 June 1996



Membership 1992–1995

	mid 1992	Dec 1992	Dec 1993	Dec 1994	Dec 1995
Honorary	4	7	6	6	6
Family	15	24	23	23	24
Student	39	78	77	74	89
Individual	251	399	451	506	584
Total	**309**	**508**	**557**	**609**	**703**

1996 Budget

Income	**US$**
Dues	43,000.00
Subsidy for editorial expenses from Springer	2,300.00
Page charges	500.00
Interest	2,000.00
Other (proceeds from sale of t-shirts, NGBR, etc.)	500.00
Total	**48,300.00**

Outgoings	
Coral Reefs (printing and postage)	46,000.00**
Reef Encounter (printing and postage)	6,000.00
Editorial expenses	2,300.00
Membership administration	8,000.00
Membership directory	3,000.00
Office supplies and miscellaneous	250.00
Bank and card charges	1,000.00
Balance for best paper plaques, displays and t-shirts	800.00
Postage and shipping	200.00
Total	**67,550.00**

**This represents payment for both volumes 14 and 15.

Daphne Fautin

ISRS T-SHIRTS

These are dark blue with the Society logo in gold. Available for US$20 ($16. plus $4 shipping and handling). Specify Large or Extra Large. Buy yours at the ISRS desk at the Panama Congress or send cheques, drawn in US funds only, to: *John Ogden, Florida Institute of Oceanography, 830 First Street South, St. Petersburg, Florida 33701, USA.*

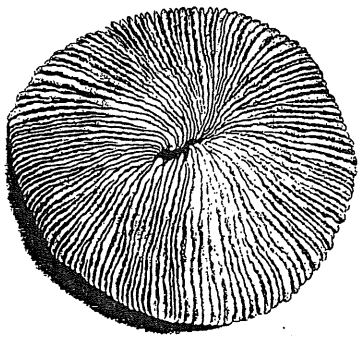
STILL AVAILABLE: Copies of THE NORTHERN GREAT BARRIER REEF: a Royal Society discussion organised by Dr Stoddart and Sir Maurice Yonge FRS, 28–29 January 1976, published in 1978, are available from the ISRS Treasurer. Prices: US$20.00 (surface mail), US$30.00 (airmail). Payment must be by US$ money order or cheque drawn on a US bank. Contact: *Daphne Fautin, Kansas Geological Survey, 1930 Constant Ave, University of Kansas, Lawrence KS 66047, USA.*

COPY DEADLINE FOR REEF ENCOUNTER 20 (due out December 1996) IS 1 OCTOBER 1996

FUTURE ISRS MEETINGS

JOINT PACIFIC SCIENCE ASSOCIATION/ ISRS MEETING, 1997

The Pacific Science Association's Scientific Committee on Coral Reefs (PSA-SCCR) is organising a joint symposium with the ISRS at the PSA Inter-Congress, 13-19 July 1997. This will be one of the major scientific events during the International Year of the Reef. A field trip is being arranged to the exceptionally beautiful Astrolabe Reef and the outstanding Marine Laboratory at Dravuni (max. 16 people), and day trips to Suva Barrier Reef and Bequa Lagoon and Reef will also be organised. *Further details available from Charles Birkeland, Chairman, Pacific Science Association Scientific Committee on Coral Reefs, Marine Laboratory, University of Guam, Mangilao, Guam 96923, USA. Tel: +671 735 2184; Fax: +671 734 6767; email: birkelan@uog9.uog.edu.*



Fungia *sp.*

UPWELLINGS

WHAT IS "RECRUITMENT LIMITATION" ANYWAY?

Mark A. Hixon

The mechanisms driving population dynamics of coral reef fishes (and other marine organisms with locally open populations) are controversial. During the 1960s and 1970s, it was hypothesized repeatedly that settling larvae were sufficiently abundant to saturate a reef, so that some form of post-settlement competition within and between species was the primary determinant of local population sizes. In 1981, Peter Doherty formalized the revolutionary idea of recruitment limitation, hypothesizing that larval supply is insufficient to saturate local populations, thus precluding post-settlement competition, and that variation in larval recruitment is the major mechanism driving local population dynamics. Recent literature has reported data supposedly corroborating both these hypotheses, as well as a more pluralistic alternative that both pre-and post-settlement

processes have major effects on the local density of reef fishes. At times, it seems as if the advocates of different perspectives are talking past each other (e.g., Doherty 1991 vs. Jones 1991), and I suggest that one problem exacerbating this controversy involves fundamental definitions.

Since 1981, the definitions of both "recruitment" and "limitation" have undergone vague and ambiguous changes, which have obfuscated the meaning of "recruitment limitation." Let's first consider "limitation" so that we can place the definition of "recruitment" in proper context. As indicated above, Doherty (1981) suggested that larval supply could limit local population sizes below levels where competition would otherwise occur. However, Doherty and Williams (1988) and Doherty and Fowler (1994) later expanded this definition to include the idea that limited larval supply resulted in post-settlement mortality being density-independent. There is an important distinction here because density-dependent mortality can be caused by a variety of processes – not just competition (Hassell 1986). Thus, the original definition of "recruitment limitation" predicted only that post-recruitment competition did not drive local population dynamics, whereas the later definition predicts that no source of population regulation operates after recruitment (since population regulation necessarily requires density dependence [Hassell 1986]).

The definition of "recruitment" has also evolved. Originally, recruitment was equated with larval settlement from the plankton onto reefs (Doherty 1981, Doherty and Williams 1988). Subsequently, the time of recruitment was extended to months following settlement, both explicitly (e.g., Victor's 1986 "secondary recruitment limitation," where recruitment occurs when fish become adults), and implicitly (e.g., Doherty and Fowler's 1994 sampling schedule, where new recruits were collected months after the settlement season). The problem is that, the closer the time of recruitment is defined operationally relative to the time of sexual maturity, the more linear will be the correlation between recruit density and subsequent adult density, i.e. the more likely post-recruitment mortality will be density-independent. (This is one reason why fishery biologists have long defined recruitment as occurring when subadult or adult fish enter the harvestable stock, thus assuming a linear recruit-stock relationship. Fishery biology thus focuses more on the reciprocal stock-recruit relationship, which usually covers most of the life span of the fish [see Rothschild 1986].) It is well-documented that reef fishes often face a major predatory gauntlet shortly after settling from the plankton (Hixon 1991). The greater the time between settlement and the sampling of "recruitment," the greater the possibility that such sources of post-settlement mortality have altered patterns of abundance established by larval supply. If the recruitment limitation hypothesis indeed predicts that larval supply entering a reef is the major factor driving local population dynamics, then it is imperative that "recruitment" be defined operationally as occurring as close to the time of larval settlement as logistically possible. If it is not feasible logistically to sample new recruits at the time of settlement, then density-independent mortality between the time of settlement and the time new recruits are sampled is a risky assumption that requires testing in its own right.

The bottom line is that we are now in a situation where each author will have to identify which definition of "recruitment limitation" he or she is addressing by explicitly defining what is meant by both "recruitment" and "limitation." Although recruitment limitation was originally a viable hypothesis for explaining the mechanisms underlying local population dynamics of reef fishes, it has subsequently become a vague and ambiguous concept lacking self-evident meaning.

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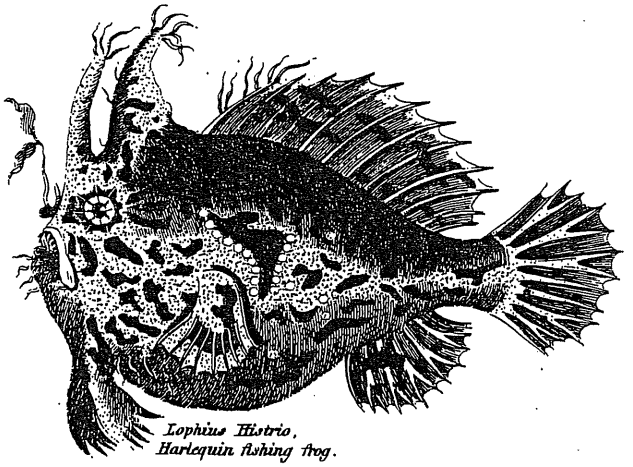
Mark A. Hixon, Department of Zoology, Oregon State University, Corvallis, Oregon 97331-2914, USA. hixonm@bcc.orst.edu



Lophius Histrio,
Harlequin fishing frog.