calculated using methods discussed in the Sicily conference paper.

Figures 1 and 2 show an example, based on male spiny lobsters, Panulirus marginatus, taken in 1977 on Maro Reef in the Northwestern Hawaiian Islands (data compliments of J.J. Polovina, Honolulu Laboratory). Out of the entire sample of 1,766 lobsters, 904 lobsters had a carapace longer than the assumed knife-edge selection length of 93 mm. Measurements from these lobsters were partitioned into 10 overlapping subsamples, based on arbitrary cutoff lengths of 93 mm, 97 mm, 101 mm, 105, ..., 129 mm. The linear regression was run using reciprocals of the variances of subsample means as statistical weights. Estimates of the intercept and slope were α = 0.251 mm and β = 0.743 mm^{-1}. Step 2 yielded the final results, L_∞ = 131.1 mm and θ = 2.89.

USE OF ELEFAN PROGRAMS FOR EMIGRATING SPECIES

by
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Mangroves and seagrass beds are the nursery grounds of many juvenile marine fishes in the tropics. If one undertakes an ecological study in such an environment with population dynamics as an aspect, one is faced with a number of problems when using the ELEFAN programs. In using the programs, at one stage approximate L_∞ and K are needed to begin the analysis of length-frequency data gathered from the field. Since, only juveniles are found in these habitats, L_∞ cannot readily be estimated from the samples collected and estimates have to be obtained from published data. If the approximate K for the same species is not available, the parameter ϕ' for the species or genus might be obtained from the relationship of Pauly and Munro (1984), where

$$\phi' = \log_{10}K + 2 \log_{10}L_\infty$$

Substituting L_∞ for the stock and ϕ' for the species or genus, an approximate K can be found for the stock. Using this approximate K and L_∞ thus obtained, ELEFAN I program can be run to extract the best K value from the length-frequency data for juvenile fishes.

Another problem is encountered when using the ELEFAN II program to estimate mortality rates of those fish species which emigrate from their nursery grounds. The apparent Z derived from the catch curve is likely to be an over-estimate, which includes both mortality and emigration. That is,

$$Z' = Z + I \quad \text{or} \quad Z = Z' - I$$

where, Z' is the apparent total mortality coefficient obtained from ELEFAN II, Z is the true mortality coefficient and I is the instantaneous rate of emigration out of the mangroves.

For a fish community in which the different species are of approximately the same size, occupy the same microhabitat and have similar behavior, individuals ought to have the same chance of being caught by a particular fishing gear. In such a community, the older individuals of large species may emigrate out of it while the other species may remain in the same environment throughout their lives. Emigrating species can be identified if the L_{max} in nearby fishing grounds is very much greater than the L_{max} in the samples from the mangroves. Thus the average fishing mortality for resident species should approximate the fishing mortality for emigrating species. The average fishing mortality (F') is the fishing mortality for the community which can be substituted in the equation

$$Z = M + \bar{F}$$

where, M is an estimate of the natural mortality of the species, obtained from the empirical equation developed by Pauly (1982) which is incorporated into ELEFAN-II. The $\bar{F}$ obtained for the resident species in the community in Table 1 is 0.91 which is also the fishing mortality coefficient for the

Table 1. Growth parameters, total mortality (Z), natural mortality (M), fishing mortality (F) and emigration (I) for two emigrating species from the mangroves of Pagbilao, Philippines. Large individuals of *Ambassis kopsi* had mature gonads whereas the other two species did not.

Species	L_{max} (in records)*	L_{max} (in mangroves)	L_∞
Leiognathus brevirostris	12.00	9.40	9.75
Lutjanus johni	70.00	23.80	66.70
Ambassis kopsi	—	10.90	10.20

Species	K	Z	F	M	I
Leiognathus brevirostris	1.20	3.66	0.91	2.75	4.65
Lutjanus johni	0.13	1.29	0.91	0.38	0.44
Ambassis kopsi	0.73	2.88	0.91	1.96	0

*Data from Fischer and Whitehead (1974).

abundant resident species, Ambassis kopsi. Thus, knowing Z and Z', the instantaneous rate of emigration (I) can be estimated. Table 1 also shows the results obtained for such emigrating species from the mangroves of Pagbilao, Philippines using the ELEFAN programs.

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DEMERSAL RESOURCES IN SICILY

by

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The real impact of fisheries on demersal fish stocks in the Western and Southern Sicilian Continental shelf is unknown. Historical information on the structure by length or by age for each species in the landings do not exist for the area, nor are there records on catch and effort data. Nevertheless, there are reasons to think that many species are very intensely exploited. This makes it urgently necessary to assess the real effect of fishing activity on the stocks.

In this zone, many fishing strategies are utilized, many species are involved and conspicuous changes in fishing intensity take place during the exploited phase of many resources. Deep water basins (more than 1000 m deep), determine very clearly the limits between the Italian and African continental shelves and constitute true geographic barriers for the distribution of many benthonic and demersal species. The oceanographical conditions seem to be very homogeneous for the whole area. Fishing grounds included in the area are exploited at different rates depending mainly on the relative importance of the nearer ports.

The lack of catch and effort time series, the difficulties related to the partition of fishing effort in these multispecies-multigear fisheries, the standarization of units of effort, etc., should discourage us from attempting a stock assessment approach based on the likely relationship between catch and effort. In situations like that, simplified versions of "Analytical Models" have been proposed as the appropriate way to follow for the stock assessment. However, taking in consideration the particular characteristics of the area, we have proposed to