

# FISHERIES AND MANAGEMENT PERSPECTIVES OF THE GOOSE BARNACLE *Pollicipes pollicipes* OF GALICIA (NW SPAIN)

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## INTRODUCTION

The goose barnacle, *Pollicipes pollicipes*, occurs in the Northeast Atlantic from around 48°N at Britain (France) to 14°N at (Senegal) (Barnes, 1996). Commercial fisheries have been developed in several countries, but except for a short local consumption, most of the production goes to the Spanish market (Girard, 1982; Cruz, T, 2000), where price can reach 90 euros (/ kg. *Pollicipes pollicipes* is a intertidal cirripede that lives attached to rocks in very exposed shores forming dense aggregations (Molares, 1993). This species has a metapopulation structure, with adult subpopulations sharing a common larval pool. The stock-recruitment relationship rarely holds in this kind of resource at the subpopulation scale. Advection of larvae depends largely of oceanographic conditions that govern larval transport and survival. Goose barnacle harvesting technique is simple but very risky: during low tide, fishers separate animals from rock surface with a scraper (Pérez, 1996).

Galicia is a region with an autonomous government located in NW Spain. In 1992, Galician Administration tried to rationalise the management of marine resources with a new Decree (59/1992, DOG nº 124), where sedentary shellfish harvesting in Galician waters was regulated. The importance of this Decree is that allowed to start a co-management system where shellfishers' organizations ("cofradías") distribute fishing activity in annual plans, where fishing (daily allocation of effort, maximum daily individual quotas and area of exploitation), surveillance and the marketing processes are established, and the Administration control the quality of plans and their fit with general guidelines provided by the fisheries service (Molares, 1998). The fact, these plans established a system of territorial use rights for fishers (TURFs) because they allocated segments of coastline to every organization with resources inside each segment being managed independently. A **generic model of the plan** (Text 1) accompanies the Decree. In 2000, an Order (6 of March of 2000, DOG nº56) defined a new **official model of plan** (Text 2) to manage the goose barnacle fisheries, where more information about daily production and effort distribution through year has to be provided. With this information, it is possible to evaluate the performance of previous plans and to make better assessments of new plans. To use this available information more efficiently, is necessary a database system to be used directly by fishers' organizations that allow to design and control management plans easily.

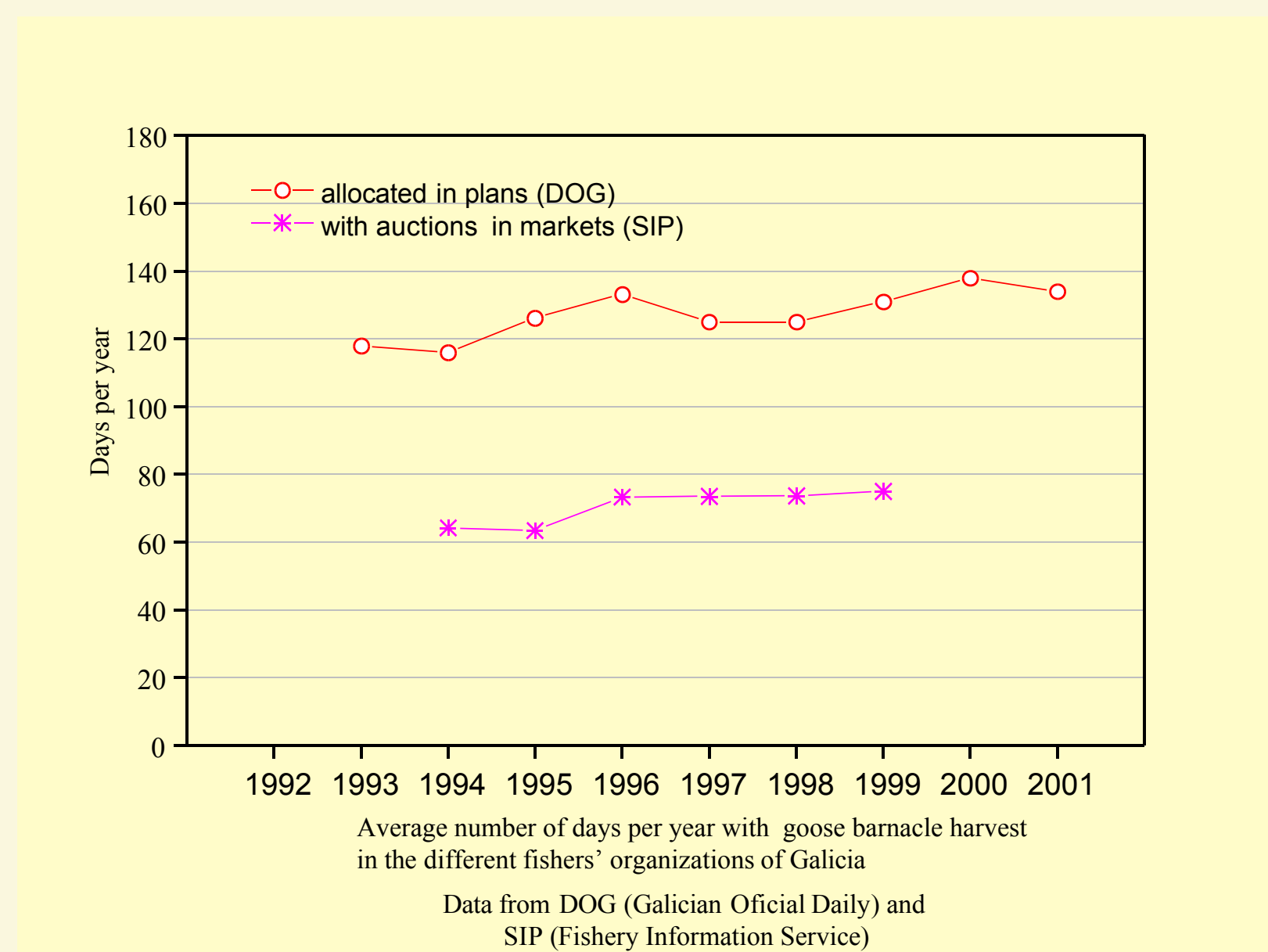
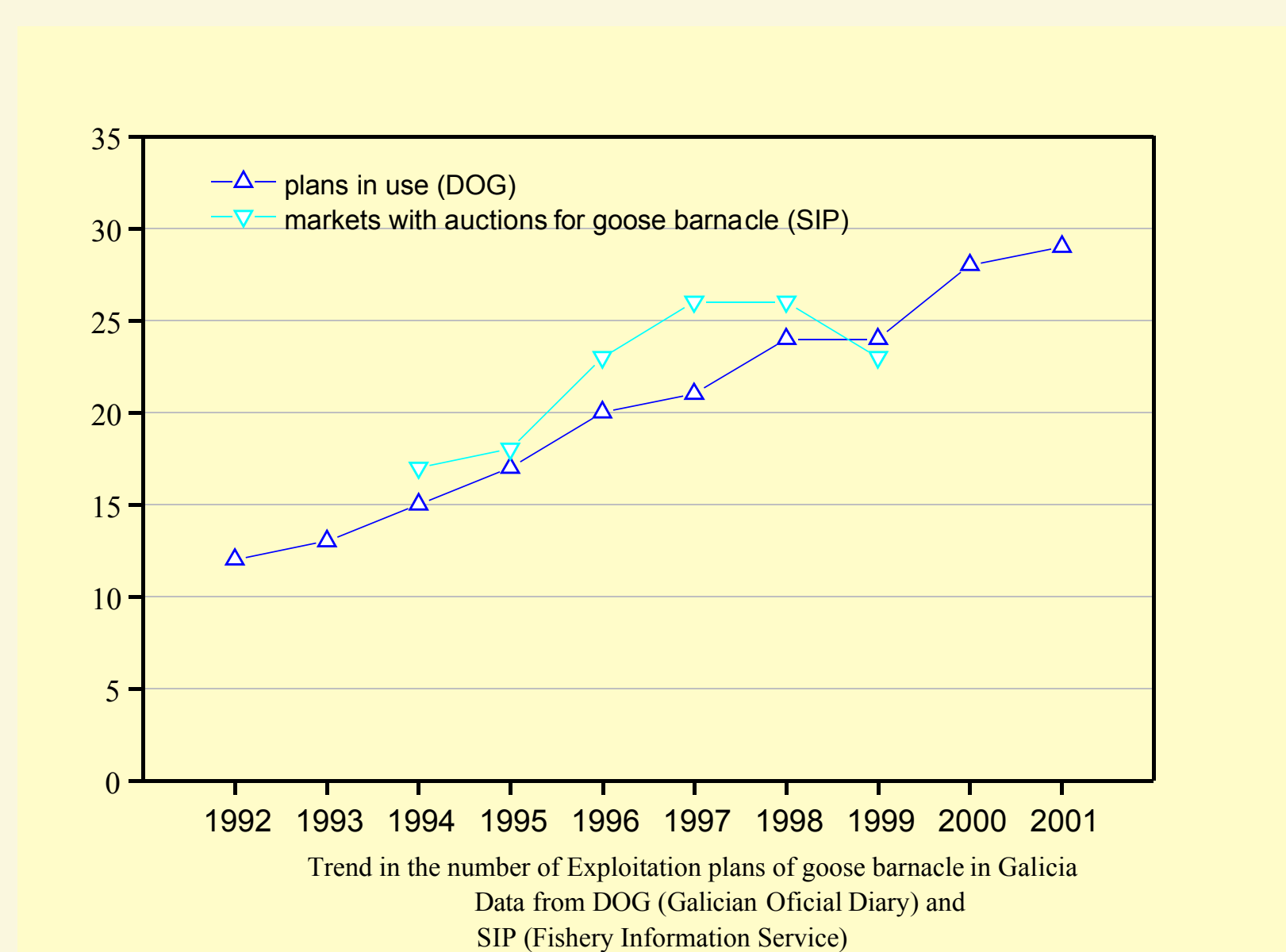


## GENERIC MODEL OF EXPLOITATION PLAN

- General objectives:
  - Production objectives
  - Economic objectives
  - Number of fishers
- Assessment of resources:
  - Methods
  - Conclusions
- Harvesting plan and marketing:
  - Foreseeable dates
  - Number of total days
  - Maximum individual quotas
  - Market system
  - Market roles
- Improvement actions:
  - Description
  - Cost
- Financial plan:
  - Expenses
  - Capitalization funds
  - Income

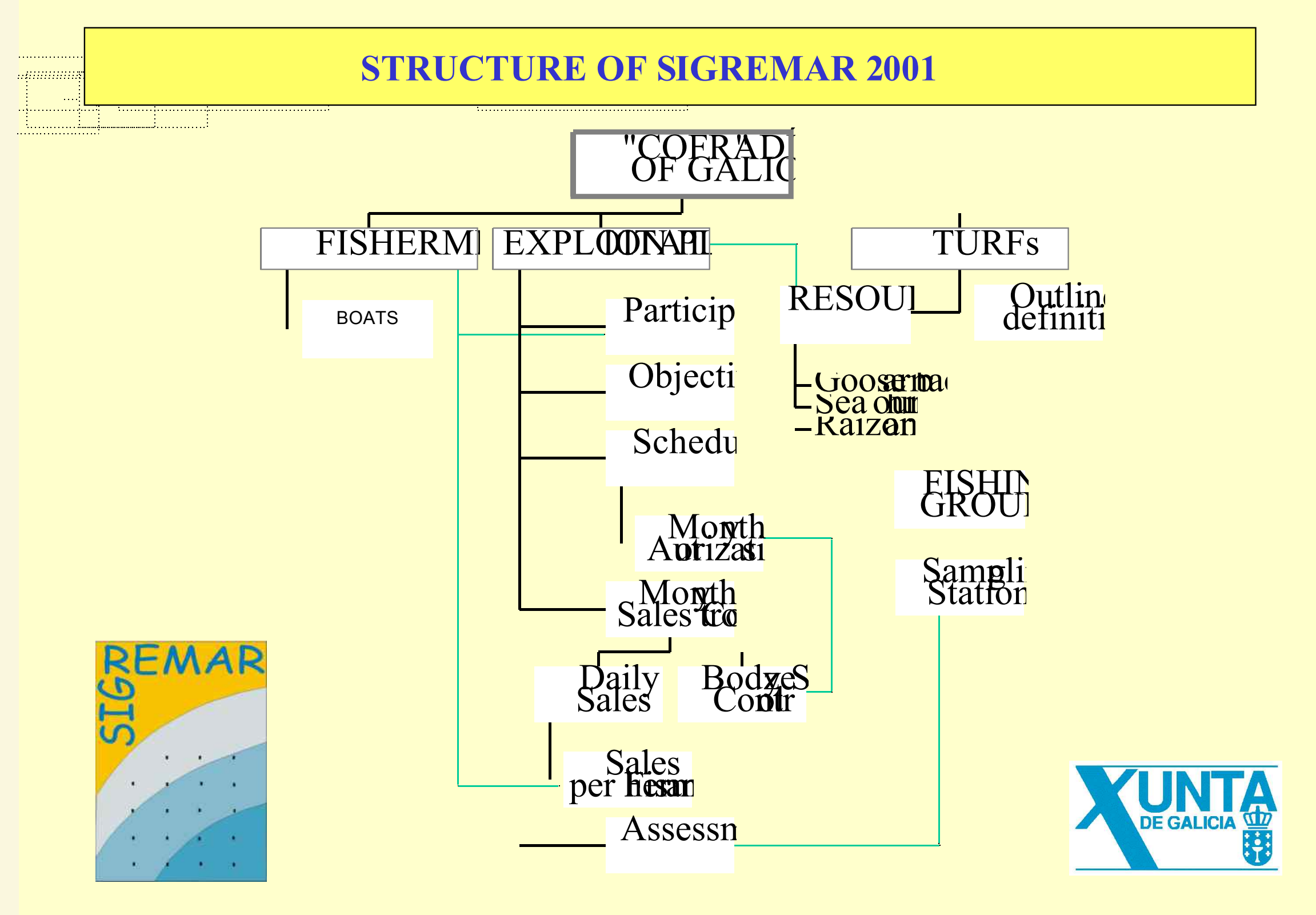
## OFFICIAL PLAN MODEL FOR GOOSE BARNACLE

- **General Data:**
  - Number of fishers (nominal relation)**
  - Number of boats (nominal relation of crewmen)**
  - Production zones (detail map)**
- General objectives:
  - Production objectives
  - Economic objectives
- Assessment of resources:
  - Methods
  - Conclusions
- **Control of exploitation:**
  - Daily effort**
  - Daily production**
- Harvesting plan and commercialisation:
  - Foreseeable calendar
  - Number of total days
  - Maximum individual quotas
  - Gears used
  - Control points
  - Market system
  - Vigilant organization
- Improvement actions:
  - Description
  - Cost
- Financial plan :
  - Income
  - Expenses, inversions and capitalization



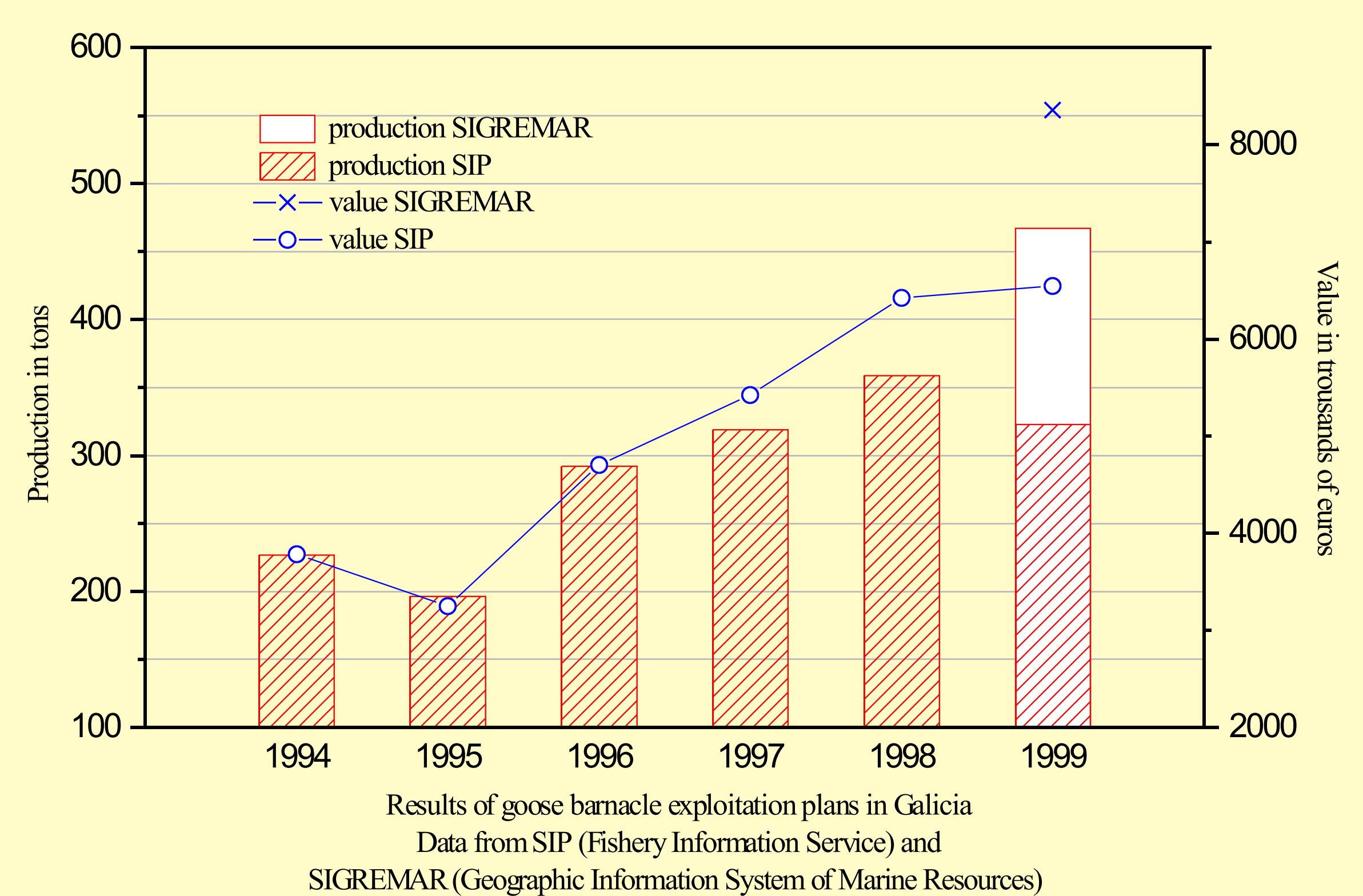
## METHODS

The main problem for the development of the plans has been the estimation of the adequate fishing effort to be applied to each barnacle fishing ground. This year we developed a computer application, SIGREMAR 2001 (Fig 3), designed in Microsoft Access, to improve the design and control of new management plans using the available data (constrained by the small-scale spatial structure of the resource and artisanal nature of the fishery). This tool is distributed free to "cofradías" and workshops are organized where workers of those organizations learn to use the database and essential notions about assessment and management of goose barnacle population (size limits, direct effort regulations, rotation, etc.). Data from annual management plans developed by fishers' organizations are entered directly by them and stored in the system. The databases of each organization could be used isolated or networked with information of all goose barnacle plans of Galicia. Results of general analyses of plans are connected to a web page (<http://sigremar.cesga.es>) (Fig 1), made in HTML, using JAVA for graphs, and ArcView and Map Objects Internet Map Server of Esri for the presentation of maps. A demonstration of the use of the web page, to obtain information about the fishery of goose barnacle in Galicia, is also made during the workshops.



## RESULTS

The number of management plans for goose barnacle approved by the Galician Administration increased a 142 % from 1992 to 2001 (Fig 2). Fishery effort (measured as harvest days per plan) increased also, but only a 14 % in the same period (Fig 3). The performance of the fisheries managed according to the plans was positive in general terms, and production (both in biomass and economic value) showed an increasing trend from 1995 (Fig 4). In this figure is showed the difference between official data and result of the database analysis in the last year, 41.6 % more in biomass and 27.7 % in economic value. These results indicate that part of production go directly to consumers without official control. Of course, to manage a fishing ground with that kind of information only, is not possible. But if all production is register in control points, strategic situated closed to fishing grounds and monthly body size controls were done, is quite simple recognise an over-fishing situation. If besides, information is analysed in real time, managers of plans can modify the schedule and reduce fishing effort or change of fishing ground, if the plan is exploited with rotation system. Using SIGREMAR 2001 and encourage to control fishing, this interactive model of management is enough to avoid over-fishing. A more adequate model of management need historical series of data that this database will provide if the system is maintained alive a long period of time. A large part of organizations involved in goose barnacle fisheries in Galicia will use this computer tool to design and assess plans during the next year. To involve all "cofradías" in use of this system, database include some applications that give to users important advantages (Text 3). However, some "cofradías" still need to solve urgent problems like illegal fishing, excess of fishing force and price collusion at auctions, before they could apply successfully this new tool.



<http://sigremar.cesga.es>



Advantages that offer the use of the database system SIGREMAR 2001

- Bureaucratic forms to administration:
  - To obtain printed copies of the official model of plan
  - To obtain printed copies of the official requests to open fishing areas
- Statistical analyses of daily catch and revenues
- Assessment of exploited natural populations
- Control of goose barnacle body sizes in markets
- Comparative analysis between plans
- Analysis of the system of rotation of barnacle fishing grounds
- Trends in fishery activity
- Consultation of tides (to organize daily activity schedules)

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