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**COMPUTER SOFTWARE, DATABASES  
AND LISTSERVERS FOR AQUACULTURE AND  
FISHERIES MANAGEMENT AND RESEARCH**

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## FOREWORD

**Computer Software, Databases and Listservers for Aquaculture and Fisheries Management and Research** is a compilation of information on recent advances in computer software and related Internet information sources on aquaculture and fisheries.

The advent of Internet in research and management of fisheries is now a globally accepted fact. The involvement of specially created software for pond management like POND of the Bio-resource Engineering Division of the Oregon State University, USA and for eco-management like the ECOPATH series of software of ICLARM, Manila, the Philippines, are indispensable tools for fisheries research and production management.

Computer software enable substantial saving of time and are cost effective. Simulating aquaculture production by incorporating various biological, physico-chemical and cost economics parameters is very easy. Many of the software are available on demand or are freely down-loadable from the Internet.

Internet has made the world very small. Online databases and listservers enable enormous time-saving and do not require the tedious procedure of writing down data for analysis. Ready-for-analysis data and partially analysed data in worksheet structures are now available. Listservers enable free interaction on a specified subject right across the globe. Any person may join the specific listserver to get deluged with information on the same.

This compilation does not purport to be complete and will never be. The availability of information on the net is one of the best things that has ever happened to researchers. The Extension, Economics and Information Unit of this institute is making every effort to keep abreast of happenings in the field of information-technology especially related to aquaculture and fisheries. The institute also hosted its home page on the Internet at - <http://www/nic.in/ciba>. The site will be interesting and informative. This institute is also striving to manage an online database for coastal fishery resources of India.

It gives me great pleasure to record my appreciation to Dr. M. Krishnan, Senior Scientist and Scientist-in-charge, Agricultural Research and Information System (ARIS) Cell of the Institute and Dr. K. Gopinathan, Senior Scientist and Scientist-in-charge, Extension, Economics and Information Unit of this institute for bringing out this Bulletin using an innovative approach at an appropriate time when the need for compiled information on computer software and related information on fisheries and aquaculture is much sought after.

Chennai  
18.8.98

G.R.M. Rao  
Director.

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## **INTRODUCTION**

A variety of decisions have to be made by aquaculture planners and managers with respect to site selection, target fish species, stocking density, fertilization, liming, appropriate feeding, aeration and water exchange. Often these decisions influence the economics of an aquaculture practice as well as the environment that surrounds it. They require considerable knowledge of the principles of aquaculture and the implications of various factors on facility level economics. Knowledge may be acquired through formal education or by trial and error.

For improving aquaculture practices, the available technology has to be recommended for testing at one location. Such tested technology may be location-specific and may not be suitable in other sites. This may be due to climate, soil and water characteristics, availability of inputs and related cost-economics. In order to arrive at a correct decision, the use of an appropriate analytical tool is a pre-requisite to integrate various components of knowledge-base on the subject. Such tools are called decision support systems. These systems integrate knowledge in the form of mathematical models, systematic rules or procedures and / or database into user-friendly software systems for developing, analysing and optimising management and decision-making strategies.

## **SELECTED SOFTWARE**

Some of the salient features of selected software are given below :

**POND 3.0** has the capability for facility level or pond level analysis, multiple pond definitions, multiple fish lot definitions, user definable model parameterization and selection, multi-level simulation (1-3), graphical viewing of simulation results, parameter estimation for species customization, fertilizer, feed, lime, water and other requirement determination and enterprise budget analysis, including user definable costs.

**SAMCALC 2.1** includes calculations for fish hauling, static treatment, flow-through treatment, length-weight relationships, dissolved oxygen solubility, 2 x 2 contingency tables, experimental design and ANOVA relationships.

**FISHY 3.2** is a programme for fish production management. The capabilities include simulating changes in fish population (add, change, delete), drain ponds, add fingerlings, water quality management and transactions report.

**LANDFORM 2.0** is a mathematical model and is useful in earthmoving design and planning estimates. It is compiled on Microsoft Quick Basic version 2.0 and is menu driven. It eliminates the need to manually design land forming projects and thus greatly reduces the problem of limited personnel resources. This software is especially useful for those involved in design of agricultural land forming projects.

**SLOSS** (Soil Loss) is an interactive model for microcomputers. The model is developed to help in extension and education of soil conservation treatments and for answering 'what if' questions about alternative combinations of soil conservation practices. It uses the lumped parameter approach so that inputs are minimal and may not be as accurate as sophisticated modelling procedures.

These software enable an enormous saving on research resources as they simulate 'virtual reality' situations. Such software have been developed for particular domains. The end result of most of these programmes or routines are changes in production as a result of simulating pond physico-chemical and biological characteristics.

Applications of simulation software in modelling decision support are available for plant diseases (Michalski *et al.*, 1982), crop production (Smith *et al.*, 1985), analysing marketing alternatives (Uhrig *et al.*, 1986) and selection of appropriate crop cultivars (Bolte *et al.*, 1990). In aquaculture, several decision-making support software have been created that are available for common use for particular domains. Essential details of such software are listed below. It is important to note that ponds are dynamic, complex and unpredictable ecosystems. Therefore, ecosystem-level validation of the models in any software is a difficult task. Further, data may not be available for validation of some model components. However, models have been validated with favourable results (Bolte *et al.*, 1995).

## SOFTWARE PACKAGES

This compilation of information on software packages is expected to serve as an useful support system to aquaculturists in decision making (Table 1). It has been divided into software for :

1. Financial management
2. Production system management
3. Disease diagnostics and engineering
4. Water quality, soil loss and environmental management
5. Utility and
6. Information software

*Table 1: A List of Software for Decision Support Modelling in Aquaculture*

Name of the software 1	Source 2	Use 3	Computer 4
<b>I. Financial Management Software</b>			
1. AQUADEC	Sea Grant Advisory Programme, G022 McCarty Hall, University of Florida, Gainesville, Florida 32611, USA.	A combination of budget and decision support tools that can be used for both start-up and ongoing aquaculture businesses.	IBM-compatible PC and DEC, 320 KB RAM. Required SW: Lotus 123 ver. 1.A
2. AQUASIM PC	Dept. of Agricultural and Resource Economics, Univ. of Maryland at College Park, 2200 Symons Hall, College Park, Maryland 20742-5535, USA.	A unique financial management programme for aquaculture enterprises incorporating uncertainty and adaptive management practices.	IBM-compatible PC, 200 KB RAM, 250 KB hard disk
3. Aquaculture Price Analysis	Texas Agricultural Extension Service, Extension Computer Technology Group, Special Services Building, Room 105, College Station, Texas 77843-2468, USA.	Generates enterprise budgets for freshwater fish farms (catfish, crawfish and other freshwater fish).	IBM-compatible PC, 128 KB RAM



*Table 1. Contd.*

Name of the software 1	Source 2	Use 3	Computer 4
4. Mariculture Price Analysis	Texas Agricultural Extension Service, Extension Computer Technology Group, Special Services Building, Room 105, College Station, Texas 77843-2468, USA.	Generates enterprise budgets for marine fish farms (shrimp, redfish and other marine fish).	IBM-compatible PC, 128 KB RAM
5. Financial Analysis of Commercial Shrimp Mariculture Enterprise	Texas A&M University Sea Grant College Programme, Texas A&M University, College Station, Texas 77843-4115, USA.	Provides a complete 12-year financial analysis for a defined shrimp mariculture facility. Intended for illustrative purposes.	IBM-compatible PC, 256 KB RAM Required software: Lotus 123.
6. Softcrab Educational Programme	Louisiana Sea Grant College Programme, Marine Resource Economics, Knapp Hall, Louisiana State University, Baton Rouge, Louisiana 70803, USA.	Educates potential investors in recirculating soft shell crab shedding systems. Generates income and cash flow statements.	IBM compatible PC, 64 KB RAM

**II. Production Systems Management Software**

7. POND	Biosystems Analysis Group, Bioresource Engineering, Oregon State Univ., Corvallis, OR 97331-3906, USA.	Simulation-based pond dynamics and fish performance projections, provides a comprehensive and integrated analytical framework to compare alternative production strategies for warm water finfish production.	IBM-compatible PC, 3.1 Microsoft Windows, 386 CPU or higher, 4 MB RAM, 1.5 MB hard disk
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*Table 1. Contd.*

Name of the software 1	Source 2	Use 3	Computer 4
8. NAN-SIS	FAO of Rome, FAO Computerised Informatics Series, Fisheries, No. 4, 1992.	A user friendly general database system for scientific fishery research surveys	IBM-compatible PC
9. SPATIAL	FAO of Rome, FAO Computerised Informatics Series, Fisheries, No. 6, 1994.	A simulation package developed to model the space / time distribution of fishing intensity using alternative approaches	IBM-compatible PC
10. POPDYN	FAO of Rome, FAO Computerised Informatics Series, Fisheries, No. 7, 1994.	A database software with procedures for data entry, cataloguing, search and reporting	IBM-compatible PC
11. SPECIES DAB	FAO of Rome, FAO Computerised Informatics Series, Fisheries, No. 9, 1994.	Describes the use of software created to assist in the retrieval of information relevant to species of interest to fisheries.	IBM-compatible PC
12. Length based Fish Stock Assessment (LFSA)	FAO of Rome,	Fishery data handling, data processing and stock assessment	IBM-compatible PC
13. COMPLEAT ELEFAN (Electronic Length Frequency Analysis)	ICLARM, Philippines.	Fishery data handling data processing and stock assessment	IBM-compatible PC
14. FISAT (FAO-ICLARM Stock Assessment Tools)	ICLARM, Philippines.	Fishery data handling, data processing and stock assessment	IBM-compatible PC

*Table 1. Contd.*

Name of the software 1	Source 2	Use 3	Computer 4
15. ANACO	FAO of Rome.	Virtual population analysis (stock assessment), sequential analyses of catch-at-age data	IBM-compatible PC
16. ANALEN	FAO of Rome.	Analysis of catch-at-length data for simulation of multigear fisheries	IBM-compatible PC
17. BEAM 1 BEAM 2 BEAM 3 BEAM 4	FAO of Rome.	Bio-economic modelling on shrimp fisheries, realistic simulations of fisheries	IBM-compatible PC
18. ECOPATH I & II	ICLARM, Philippines.	Simulation modelling of aquaculture in a systems approach	IBM-compatible PC
19. CLIMPROD	FAO of Rome, 1993.	Combination of environmental variables with surplus production models	IBM-compatible PC
20. CARP plus and CARP plus II	Aquasoft PO Box 853, Gresham, Oregon 97030, USA.	A hatchery and grow-out management tool applicable to any fish species. Calculates fish feed, growth, number and harvest schedules.	IBM-compatible PC and Apple, 64 KB RAM. Required software: BASIC
21. ProManager, Harvest Optimizer Wizard, Water Wizard, Foodman	Island Science, PO Box 564, 1650 Indian Valley Road, Novato, California 94948, USA.	An integrated and complementary set of software tools for aquaculture production management.	IBM-compatible PC, 386 CPU, colour monitor, hard disk

*Table 1. Contd.*

Name of the software 1	Source 2	Use 3	Computer 4
22. Shrimp Mariculture Production Analysis	Texas Agricultural Extension Service, Extension Computer Technology Group, Special Services Building Room, No. 105, College Station, Texas 77843-2468, USA.	Provides decision support for shrimp farm management by aiding comparison of different strategies to maximise revenues above selected costs.	IBM compatible PC, 128 KB RAM
23. Pisces	Software Development Group, PO BOX 18027, Boulder, Colorado 80308, USA.	Supports fish culture research activities, including calculation of oxygen saturation estimated biomass and recommended feeding rates.	Apple, IBM RAM

**III. Disease diagnostics and engineering software**

24. Hawaii Aquaculture Module Expert System (HAMES)	The Centre for Tropical and Subtropical Aquaculture, Maku'u Point, Waimanalo, Hawaii 967995, USA.	Expert system that aids in the diagnosis and treatment of Tilapia diseases and syndromes, in both fresh and saltwater environments.	IBM-compatible PC, MS DOS or Windows, 5.25" or 3.5" disk. VGA color graphics monitor, 640 KB RAM, 4 MB hard drive space.
25. Fish Vet	Fish Vet, Inc., 12620, Ivy Mill Road, Reisterstown, Maryland 136, USA.	Multi-media diagnosis programme that aids in the diagnosis of fish diseases. Considers disease symptoms, water quality and nutrition parameters.	IBM compatible PC, Windows. Colour Monitor

**Table 1. Contd.**

Name of the software 1	Source 2	Use 3	Computer 4
26. Levee	Mississippi Cooperative Extension Service, Computer Application and Services Department, Mississippi State Univ., Mississippi 39762, USA.	Calculates earth moving requirements for pond construction considering user-supplied pond and levee dimensions. Requires familiarity with US Soil Conservation Service codes.	IBM compatible PC, 256 K RAM
27. Fishpond Construction Planning Templates	Texas Agriculture Extension Service, Extension Computer Technology Group, Special Services Building, Room 105, College Station, Texas 77843-2468, USA.	Provides construction information and supports estimation of excavation and dam volumes. User should be familiar with spreadsheet software.	IBM compatible PC, 256 K RAM. Required software: Super-Calc or Lotus
28. LAND-FORM 2.0	Department of Agricultural Economics, Mississippi Agricultural and Forestry Experiment Station, Mississippi State University, Mississippi State, MS 39762, USA.	A micro-computer programme to design cost effective land-forming projects.	IBM compatible PC

**IV. Water quality, soil loss and environmental management software**

29. NID-Tech	Environmental Research Laboratory Cooperative Fish and Wildlife Research Unit, School of Renewable Natural Resources, Univ. of Arizona, Tucson, Arizona 85721, USA.	Water quality management and environmental assessment, aquaculture and fisheries calculations.	PC's
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*Table 1. Contd.*

Name of the software 1	Source 2	Use 3	Computer 4
30. SLOSS	Mississippi Cooperative Extension Service, Computer Applicaton & Services, P. O. Box 5446, Mississippi State, MS 39762, USA.	Estimation of average annual soil loss resulting from a specific set of crop, soil management and climatic conditions.	IBM compatible PC
31. DSS for Mariculture Regulation	Habitat Ecology Division, Biological Sciences Branch, Dept. of Fisheries and Oceans, Bedford Institute of Oceanography, P.O. Box 1006, Dartmouth, Nova Scotia B2Y 4 A2.	Uses models and 'expert systems' to assess environmental impacts of finfish aquaculture in coastal environments.	IBM compatible PC

**V. Utility Software**

32. Aquacalc	Aquasoft, P.O.Box 853, Gresham, Oregon 97030, USA.	Converts units of measure. Calculates the amount of chemical that provides a given concentration	IBM compatible PC or Apple, 64 KB RAM.
33. SAMCALC	San Marcos National Fish Hatchery and Technology Centre, US Fish and Wildlife Service, 500 East McCarty Lane, San Marcos, Texas 78666, USA.	Aids fish culturists with calculations for fish transport, chemical treatments, weight-length relations, injections and oxygen solubility.	IBM compatible PC or Apple, 220 KB RAM, graphics card.

*Table 1. Contd.*

Name of the software 1	Source 2	Use 3	Computer 4
<b>VI. Information Software</b>			
34. REGIS	US Department of Agriculture, National Agricultural Library, Room 304, 10301, Baltimore Blvd., Beltsville, Maryland 20705, USA.	A regional information system for African Aquaculture.	IBM compatible PC XT or AT, hard disk, graphics, 1.5 MB hard disk, 640 KB RAM. Required Software: runtime version of KnowledgePro and access to Aquatic Sciences and Fisheries Abstracts (ASFA) through CD-ROM or Dialog via modem.

## LISTING OF DATABASES

Information related to databases on bibliography, literature search services, document delivery services and critical compilations are also available. These include issues specific databases for mangrove eco-system information, farmers' rights and integrated intensive farming systems (Table 2).

*Table 2: A list of databases for facilitating research in aquaculture and fisheries*

Name of the Database	Source	Use	Computer
1-D. Bibliographic Database	National Information Centre for Marine Sciences (NICMAS), NICMAS Library, National Institute of Oceanography, Dona Paula - 403 004, Goa, India e-mail: murari@csnio.ren.nic.in or murari@begoa.ernet.in	<ol style="list-style-type: none"> <li>1. Aquatic Sciences &amp; Fisheries Abstracts</li> <li>2. CD-ROM based Patent scan</li> <li>3. Published literature on the Indian Ocean</li> <li>4. NIO publications</li> <li>5. On line Public Access Catalogue</li> <li>6. Indian National Directory of Marine Scientists (INDMS)</li> </ol>	PC
2-D. Literature Search Services	-do-	<ol style="list-style-type: none"> <li>1. Searching on databases using terms such as authors, document types, languages, dates, etc., for effective and specific choice</li> </ol>	PC
3-D. Document & Delivery Services	-do-	<ol style="list-style-type: none"> <li>1. Photocopies of literature for personal use for research,</li> </ol>	NIL
4-D. Bibliographies & Critical Compilations	-do-	<ol style="list-style-type: none"> <li>1. Bibliographic compilations/ with/ without abstracts.</li> <li>2. Critical compilations on particular subjects require 30 to 45 days</li> </ol>	NIL / PC



*Table 2. Contd.*

Name of the Database	Source	Use	Computer
5-D. Agricultural Research Information System (ARIS)	Indian Council of Agricultural Research, Krishi Bhavan, New Delhi - 110 001.	Network of ICAR institutes and agricultural universities in India	Computer network connectivity
6-D. MSSRF database	M.S.Swaminathan Research Foundation, 3rd Cross Street, Taramani Institutional Area, Chennai - 600 113	<ol style="list-style-type: none"> <li>1. Mangrove Eco-System Information Services</li> <li>2. Farmers Rights Information Services (CD-ROM DB)</li> <li>3. Integrated Intensive Farming System (IIFS) (CD-ROM DB)</li> </ol>	PC with multi-media equipment

## LISTSERVERS ON INTERNET

The most recent form of facilitating interaction and information exchange is via the listservers on the internet. Listservers enable the creation of a site for serving specific information on a subject for those who may subscribe to for receiving and contributing information. In effect, listservers enable free exchange of information world-wide on the specified subject. Some listservers that cater to aquaculture and fisheries interests are given below:

**ABNET** is an abalone aquaculture network.

To subscribe, send a command to the listserver: listserver @uct.ac.za, with the following text in the body of the message: subscribe abnet. To post information to the list, use address : abnet@uct.ac.za and in order to receive general information about ABNET, send a message to the listserver with the command: information abnet

**AERE-L** is the discussion list of the association of agricultural and resource economists. It is sited at the University of Kentucky, Lexington, Kentucky, USA.

To subscribe, send a message to: listserv@ukcc.uky.edu, with the following message in the body of the text: sub aere-l (Your name) and to post information to the whole list, use address : aere-l@ukcc.ukc.edu

**AQUA-L** is a list for discussion of aquaculture of all types. The purpose of the list is to promote discussion amongst individuals interested in the

**AQUA-L** is a list for discussion of aquaculture of all types. The purpose of the list is to promote discussion amongst individuals interested in the science, technology and business of rearing aquatic species. In the spirit of open discussion, membership in the list is public and unrestricted. Potential topics include: Who's doing what and where? Problems and solutions for rearing aquatic larvae; diseases, parasites and pathology; water quality; recirculation technology and applications; research in aquatic systems design and operation; commercial aquatic systems design and operation, site selection and environmental impact; new species under culture; genetics, sex reversal and hormonal manipulation; computers in aquaculture; public perceptions of aquaculture and aqua-business.

Messages sent to the list should be of general interest although specific requests for information are quite welcome. It is hoped that this forum will provide a basis for rapid exchange of new ideas and provide an access for persons seeking information and advice.

To subscribe, send a message to: [listproc@upei.ca](mailto:listproc@upei.ca) with the following text in the body of the message: sub aqua-l (Your name)

**BRINE-L** is a brine-shrimp discussion group.

To subscribe to this list, send an e-mail message to: [listserv@uga.bitnet](mailto:listserv@uga.bitnet) (or [listserv@uga.cc.uga.edu](mailto:listserv@uga.cc.uga.edu)). To post information to the whole list, use address: [brine-l@uga.cc.uga.edu](mailto:brine-l@uga.cc.uga.edu)

**CICHLID-L** is a cichlid systematics distribution list run by the Swedish Museum of Natural History, Stockholm, Sweden.

To subscribe to this list, send a message to: [listserv@freeside.nrm.se](mailto:listserv@freeside.nrm.se), with the following text in the body of the message: sub cichlid-l (Your name) and to post information to the whole list, use address: [cichlid-l@freeside.nrm.se](mailto:cichlid-l@freeside.nrm.se)

**COASTGIS** is a list for people interested in using GIS for coastal zone science and/or management.

To subscribe, send a message to: [listserv@irlearn.ucd.ie](mailto:listserv@irlearn.ucd.ie), with the following text in the body of the message: subscribe coastgis (Your name)

**COASTNET** is a coastal management conference, put on line in August of 1993 to discuss national and international coastal management issues. It is facilitated jointly by The Coastal Resources Center and The Department of Marine Affairs at The University of Rhode Island (USA). This forum encourages dialogue on coastal management issues from all nations and is based on the belief that coastal resource planners, managers, researchers and users from the developed and developing world have much to learn from and contribute to each other.

To subscribe, send a message to: [listserv@uriacc.uri.edu](mailto:listserv@uriacc.uri.edu) (or [listserv@uriacc.bitnet](mailto:listserv@uriacc.bitnet)) with the following text in the body of the message: subscribe coastnet (Your name) and to send a message to all the people currently subscribed to the list, send mail to [coastnet@uriacc.uri.edu](mailto:coastnet@uriacc.uri.edu)

**CONSGIS** is a biological conservation and GIS list.

To subscribe, send a message to: [listserv@uriacc.uri.edu](mailto:listserv@uriacc.uri.edu) with the following text in the body of the message: sub consgis (Your name). To post information to the whole list, use address: [consgis@uriacc.uri.edu](mailto:consgis@uriacc.uri.edu)

**CORAL-LIST** is a coral discussion list produced by the Coral Health and Monitoring Programme (CHAMP).

To subscribe, send an e-mail message to: [majordomo@reef.aoml.noaa.gov](mailto:majordomo@reef.aoml.noaa.gov), with the following text (only) in the body of the message: subscribe coral-list (Your Name). The Home Page may be found at URL: <http://coral.aoml.noaa.gov>

**CRUST-L** is a crustacean discussion group.

To subscribe, send an e-mail message to: [listserv@sivm.si.edu](mailto:listserv@sivm.si.edu) with the following text (only) in the body of the message: SUBSCRIBE CRUST-L Crustacean systematics, distribution, ecology (Your name)

**EIM** is a discussion list for environmental interactions of mariculture.

To subscribe send a message to: [Lists@scotia.dfo.ca](mailto:Lists@scotia.dfo.ca) (or [Majordomo@biome.bio.ns.ca](mailto:Majordomo@biome.bio.ns.ca)) with the following text (only) in the body of the message: subscribe eim(Your Name). To post information to the whole list, use address: [eim@biome.bio.dfo.ca](mailto:eim@biome.bio.dfo.ca)

**ELAN** (Environment in Latin America Network), is a listserver which was established in July, 1994 by the Environment and Natural Resources Working Group of the Latin American Studies Association.

To subscribe, send a message to: [listserv@csf.colorado.edu](mailto:listserv@csf.colorado.edu), with the following text in the body of the message: sub elan (Your name). If you have technical problems subscribing, please communicate directly with Lynn Schaper at the host site, Communications for a Sustainable Future: [schaper@csf.colorado.edu](mailto:schaper@csf.colorado.edu)

**FISH-ECOLOGY** is an international computer conference for academic and other personnel involved in empirical and theoretical research and assessment issues related to the ecology of fish and fisheries: all bio-geo-scientific topics, analytical tools and procedures related to fisheries ecology and fish are covered by this network, particularly: behavioural-evolutionary-paleo-theoretical and community ecology, stock dynamics, assessment and management by applied mathematics, statistics and modelling, mathematical bioeconomics, applied oceanography and GIS, genetics, limnology, chemical ecology, etc. Also, related scientific public domain software is covered in this network. Membership is open to all interested parties. However, fish-ecology is not the right forum to discuss the political, social and anthropological aspects of fisheries.

To subscribe to the list, send a message to: [listserv@seam.sunet.se](mailto:listserv@seam.sunet.se), with the following text in the body of the message: subscribe fish-ecology (Your name). To post information to the whole list, use address: [fish-ecology@seam.sunet.se](mailto:fish-ecology@seam.sunet.se).

**FISHERIES** is the fisheries discussion list which includes both biological and social sciences. It is for general discussion of fisheries related issues, including stock dynamics and fisheries management and is maintained by Bill Silvert.

To subscribe, send an e-mail message to: [Majordomo@biome.bio.dfo.ca](mailto:Majordomo@biome.bio.dfo.ca), with the following text in the body of the message: subscribe fisheries(Your name). To send a message to the network, the address is: [fisheries@scotia.dfo.ca](mailto:fisheries@scotia.dfo.ca) or [fisheries@biomo.bio.dfo.ca](mailto:fisheries@biomo.bio.dfo.ca)

**FISHFOLK** is a discussion list covering all social science aspects of fisheries, including sociology, anthropology and economics, with a fair amount of news and management information also provided.

To subscribe, send a message to: [listserv@mitvma.mit.edu](mailto:listserv@mitvma.mit.edu), with the following text (only) in the body of the message: subscribe fishfolk (Your name). Send messages you wish to post on the network to: [fishfolk@mitvma.mit.edu](mailto:fishfolk@mitvma.mit.edu)

**FISICOMP- L** is a comparative physiology discussion list (for those interested in physiology of marine animals).

To subscribe, send an e-mail message to: [listserv@if.usp.br](mailto:listserv@if.usp.br), with the following text (only) in the body of the message: subscribe fisicomp-l (Your e-mail).

**IAMSLIC** is the International Association of Aquatic & Marine Science Libraries & Information Centers discussion list. The list owner/contact is: Peter Brueggeman ([pbrueggeman@ucsd.edu](mailto:pbrueggeman@ucsd.edu)), Head of Public Services, Scripps Institution of Oceanography Library, University of California, San Diego.

To subscribe, send a message to: [listserv@ucsd.edu](mailto:listserv@ucsd.edu), with the following text in the body of the message: subscribe <your E-Mail address> IAMSLIC. To join the discussion, send mail to: [iamslic@ucsd.edu](mailto:iamslic@ucsd.edu)

**ICAM-L** is the integrated coastal area management list, managed by the FAO of UN via delle Terme di Caracalla 00153, Rome, Italy.

To subscribe, send a message to: [listserv%irmfao01.bitnet@listserv.net](mailto:listserv%irmfao01.bitnet@listserv.net), with the following text in the body of the message: sub icam-l (Your name). To join the discussion, send mail to: [icam-l-%irmfao01.bitnet@listserv.net](mailto:icam-l%irmfao01.bitnet@listserv.net)

**INFOTERRA** is a subscription list run by the UN Environment Programme (UNEP) for the exchange of information on environmental topics.

To subscribe, send e-mail to [listproc@pan.cedar.univie.ac.at](mailto:listproc@pan.cedar.univie.ac.at). Leave the subject line blank. In the first line of your message, type:subscribe infoterra (your name). To post messages to the list, address them to:

infoterra@pan.cedar.univ.ac.at. For more information, contact the listowner at: kahn@pan.cedar.univ.ac.at.

**MARINE-L** is an open forum for the discussion and development of marine related topics. Interest areas include: marine education and training institutes; marine navigation and new technologies; marine engineering, ship design, shipbuilding and shipyard management; marine electronic communications, networking, maintenance; marine management-shipping, port, finance, personnel; marine resources management and environmental protection initiatives; marine search and rescue (SAR) training and operations; vessel traffic management training and operations; marine meteorology; fisheries science, protection and international policy; marine/maritime publishing and publications; oceanography; sail-training. Development of discussion of the needs for new technology in the fields of marine communications, ship operation and distance education which reflect the changing requirements in the marine profession is also encouraged.

To subscribe to marine-l, send a message to: listproc@ccgc.tc.gc.ca with the following command in the body of the text: subscribe marine-l (Your name). To join the discussion on this list, send a message to: listserver@ccgc.tc.gc.ca.

**MARBIO** is a new discussion list on all aspects of marine biology.

To subscribe to the list, send a message to: majordomo@marinelab.sarasota.fl.us, with the following text (only) in the body of the message: subscribe marbio(Your Name). Additional instructions will be sent automatically.

**MAR-FACIL** is a mailing list for managers and technical staff at marine research facilities, aquaculture operations, public aquaria and other facilities supplying seawater for the support of marine life. The list is intended as a forum for the discussion of technical and business topics.

To subscribe, send a message to: mailserv@ac.dal.ca. with the single line message: subscribe mar-facil (Your Name). When a person's e-mail address has been added to the list, he will receive two e-mail messages, one to confirm his addition to the list and a second with a "welcome" announcement.

**MARINE PATHOL** is an informal forum for people involved in all aspects of marine and aquatic pathology including invertebrate and vertebrate hosts and pathological conditions caused by micro-organisms, parasites, and chemical contaminants. The list is unmoderated and open. The goal of the forum is to encourage communication between members. The list is supported by the Virginia Institute of Marine Science (VIRSEA) located at Gloucester Point, Virginia. Any problems or comments can be reported to Dr. Jeffrey Shields ([jeff@back.vims.edu](mailto:jeff@back.vims.edu)). A FAQ file for the list is currently being developed.

To subscribe, send a message to: [majordomo@virsea.vims.edu](mailto:majordomo@virsea.vims.edu), with the following text (only) in the body of the message: subscribe. To send a message to the list: [marine\\_pathol@virsea.vims.edu](mailto:marine_pathol@virsea.vims.edu)

**MARMAM** is the marine mammals research and conservation discussion. It is a news group about marine animals, courses, jobs, etc., with lots of mail.

To subscribe, send a message to: [listserv@uvvm.uvic.ca](mailto:listserv@uvvm.uvic.ca), with the following text in the body of the message: subscribe marmam (Your name). To send a message to multiple recipients of list:marmam@uvvm.uvic.ca

**MOLLUSCA** is a mollusc discussion group.

To subscribe to the list, send a message to: [listproc@ucmpl.berkeley.edu](mailto:listproc@ucmpl.berkeley.edu) with the following text (only) in the body of the message: subscribe (your name) mollusca. There is also the newsgroup: [bionet.molbio.molluscs](mailto:bionet.molbio.molluscs)

**NEODAT** is a database of fishes. The list linked to NEODAT is NIA-NET. [nia-net@cr-am.rnp.br](mailto:nia-net@cr-am.rnp.br) (See NIA-NET\* below)

**NIA-NET** is an electronic mail distribution list of the Neotropical Ichthyological Association. The list was established to promote and exchange communication among NIA members and anyone else that has an interest in neotropical fishes. Members are invited to use NIA-NET to broadcast information and queries that are of general interest to neotropical ichthyologists.

For subscription and more information on NIA send the list manager, Paulo Petry, a message ([petryp@cr-am.rnp.br](mailto:petryp@cr-am.rnp.br)). For help on any other problems, send mail to: [nia-net-request@cr-am.rnp.br](mailto:nia-net-request@cr-am.rnp.br).

**NIA-NET\*** is the official communication channel for the NEODAT project, a database for fish biodiversity in the neotropics.

To subscribe to the nia-net mailing list, send a message to: [majordomo@cr-am.rnp.br](mailto:majordomo@cr-am.rnp.br) with the line: subscribe nia-net "Your name" (Your-Email-Address) Please follow the syntax stated above with the quotes and brackets. Messages to the list should be sent to: [nia-net@cr-am.rnp.br](mailto:nia-net@cr-am.rnp.br)

**OCEANTECH** is Scripps Institution of Oceanography's ocean technology forum. It is an international informal computer conference for discussion of applied technology related topics in freshwater, marine, and brackishwater environments. Conference membership is open to all interested parties. The contact is: Kevin Hardy ([khardy@uesd.edu](mailto:khardy@uesd.edu)), University of California-San Diego, Scripps Institution of Oceanography.

To subscribe, send mail to: [listserv@uesd.edu](mailto:listserv@uesd.edu), with the following text in the body of the message: subscribe (Your E-Mail address) oceantech. To send mail to the list, the address is: [nceantech@uesd.edu](mailto:nceantech@uesd.edu)

**PHYCOTOXINS** is a Phycotoxins discussion list.

To subscribe send a message to [Lists@scotia.dfo.ca](mailto:Lists@scotia.dfo.ca), with the following text in the body of the message: subscribe phycotoxins (Your Name). To send a message to the list, use address: [phycotoxins@biome.bio.dfo.ca](mailto:phycotoxins@biome.bio.dfo.ca)

**SEAFOOD** is a list for discussion about seafood safety, especially issues such as HACCP programming and training.

To subscribe, send a message to: [listproc@ucdavis.edu](mailto:listproc@ucdavis.edu), with the following text in the body of the message: subscribe seafood (Your name). To send mail to the list, the address is: [seafood@ucdavis.edu](mailto:seafood@ucdavis.edu)

**SHELLFISH** is a discussion list managed by the National Shellfisheries Association (U.S) which covers shellfish culture and related issues.



To subscribe to this list, send a subscription request to: shellfish-request@kenyon.edu, with the following text (only) in the body of the message: subscribe. Messages for distribution are sent to shellfish@kenyon.edu

**THEORETICAL-ECOLOGY** is a new theoretical ecology mailing list. The kinds of topics that the listowner has suggested as being appropriate for this list are: alternate modelling approaches, such as network analysis, loop analysis, stability studies applications of catastrophe theory and chaos theory to ecosystems; complexity and reviews of different software programmes for modelling and analysis. Fundamental questions about the structure and dynamics of ecosystems might also be appropriate for this list.

To subscribe, send a message to: Lists@scotia.dfo.ca, with the following text in the body of the message: subscribe theoretical-ecology (Your name)

**WILDNET** is a mailing list which was established in 1987 for the exchange of ideas, questions and solutions in the area of fisheries and wildlife computing and statistics. Possibilities include reviews of literature, reports on conferences, questions on experimental design, field techniques, relevant hardware, software, databases, discussions on geographic information systems, biological information management and so on. It is a moderated list, pending acquisition of more modern software.

For addition or removal of a name from the list, contact the administrator: Eric Woodsworth, Canadian Wildlife Service (CWS), Saskatoon, Saskatchewan, Canada, at the "Subscriptions" address: wildnet-request@tribune.usask.ca. The list is not yet being run via automated listserv software. To submit mail to the list send your message to: wildnet@tribune.usask.ca

**Note:** Please send requests for addition/deletion, etc, to the "Subscriptions" address.

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