



Marine Zoology

MAR 226 A1, A2, A3

Fall, 2013

Professor: Dr. Wayne Price. Office/Lab: SC 235, SC 226; 257-3639; email: wprice@ut.edu. Office Hours: MWF 10-11:30; M 1:30-2:30 pm, other times by appointment.

Class Meeting Times and Places: Lecture (A1), MWF-9:00-9:50am, SC 233B; Lab, T 8:00-10:50 am (A2), 2:00-4:50 pm (A3) in SC225.

Texts: 1) Marine Biology An Ecological Approach. 6th edition. J.W. Nybakken and M. B. Bertness, Pearson Education, Inc. 2005; This book is out-of-print, but will be available in ring-bound soft copies in the UT book store; 2) Seashore Animals of the Southeast. E.E. Ruppert and R.S. Fox. University of South Carolina Press, Columbia, S.C. 1988, and 3) Shells of the Atlantic and Gulf Coasts and the West Indies. Fourth edition. R.T. Abbott and P. A. Morris. Peterson Field Guide Series. Houghton Mifflin Co. 1995. Additional reading assignments are detailed later in the syllabus. Certain information pertinent to the course will be posted on Dr. Price's website:
<http://utweb.ut.edu/hosted/faculty/wprice/>

Prerequisites: BIO 203,204. Students are expected to be familiar with general biological principles covered in BIO 203 and 204, especially basic animal classification. It is the responsibility of the student to check prerequisites before enrolling in the class.

Course Description and Learning Objectives: This course is designed to provide an introduction to marine zoology, emphasizing ecological principles governing marine life on a worldwide basis. Ecological processes and adaptations that act to structure marine associations through time are stressed. In lecture, basic oceanographical and ecological principles and the ecology of the major marine habitats are discussed. In the laboratory, emphasis is placed on collection techniques and the natural history and taxonomy of marine organisms associated with a variety of local habitats. Special emphasis is placed on identification (using keys) of local species of crustaceans and molluscs. Specific learning objectives are given below.

- 1) Brief history of marine science and marine biology
- 2) Geological oceanography: topography of the ocean basin, basics of plate tectonics
- 3) Chemical oceanography: properties of water, concept of salinity, estuarine classification, dissolved gases, acidification of the oceans; major biogeographic regions, vertical profiles of salinity and temperature in the oceans
- 4) Physical oceanography: water masses, surface currents, upwelling, deep-water masses, thermohaline circulation
- 5) Major ecological principles: trophic levels, food webs, species diversity, factors regulating population size, reproductive strategies of marine benthos, major divisions of the ocean
- 6) The characteristics and components of the following ecosystems: seagrasses, unvegetated soft-bottoms, high energy sandy beaches, rocky shores intertidal, mangroves, oyster reefs, and coral reefs

- 7) Characteristics of marine zooplankton communities
- 8) Collection techniques, natural history, and taxonomy of organisms associated with the ecosystems and communities listed in objectives 6 and 7
- 9) Use of keys to identify local species of crustaceans and mollusks
- 10) Familiarity with marine biology primary literature.

Attendance Policy: Classes will begin on time: lectures at 9:00 am, laboratories at 8:00 am or 2:00 pm. You are expected to be in class at these times and preferably earlier. Attendance will be taken on a regular basis. Students are expected to attend all lectures and laboratories, including field trips. Several field trips will be taken; their dates are included in the syllabus; **all are mandatory**. More than **three** absences (excused & unexcused) from lecture and **one** lab absence will result in a **1%** reduction in the final grade for each additional absence in lecture and **2%** reduction for each additional absence in lab. If you miss a class, it is your responsibility to obtain missed material from other students in the class. Poor attendance is often correlated with poor academic performance. **Please turn off cell phones, beepers, and other communication devices before entering class.**

Academic Integrity: The University of Tampa is committed to the development of each student to become a productive and responsible citizen who embraces the values of honesty, trust, fairness, respect, and responsibility. The scholarly community at The University of Tampa strives to instill values that uphold academic integrity and promotes an ethical standard that does not condone academic misconduct. Violation of academic integrity and academic misconduct tarnish the reputation of the University and discredit the accomplishments of past and present students. Sanctions for violation of academic integrity and academic misconduct include a failing grade in an assignment or in the course, or suspension or expulsion from the University. I take integrity *very seriously*, including academic integrity. I will monitor all submissions and exams for violations of the academic integrity policy. **Students are held responsible for knowing and observing the University's Academic Integrity Policy** posted at: <http://www.ut.edu/provost>. If you have any questions about the policy, please feel free to talk with me.

Students with disabilities: If there is any student who has special needs because of any disability, please go directly to the Academic Center for Excellence in North Walker Hall. You may phone 813-258-7251, or e-mail jdellevalle@ut.edu to report your needs and provide documentation of your disability for certification. Jennifer Del Valle is the associate director of the Academic Center for Excellence, Student Disability Services. Please feel free to discuss this issue with me in private if you need more information.

Disruption Policy: See last page of syllabus

Lecture Schedule

Week	Topic	Lecture Text Chapters
Aug. 26	Introduction; Oceanographic principles	<u>1</u>
Sept. 2	Oceanography and ecological principles	<u>1,2</u> : 61
Sept. 9	Seagrass meadows	<u>5</u> : 233-241
Sept. 16	Seagrass meadows; TEST I (Fri, Sept. 20)	<u>5</u> : 233-241

Sept. 23	Shallow soft bottom benthic communities	<u>6</u> : 325-330; <u>5</u> : 196-214
Sept. 30	Shallow soft bottom benthic communities	<u>5</u> : 196-214
Oct. 7	Sandy Shores: High energy beaches	<u>6</u> : 308-325
Oct. 14	Intertidal ecology	<u>6</u> : 266-277
Oct. 21	TEST II (Mon, Oct. 21) ; Rocky shores	<u>6</u> : 266-308
Oct. 28	Rocky shores; Mangroves	<u>6</u> : 266-306; <u>9</u> : 453-466
Nov. 4	Mangroves; Oyster reefs	<u>9</u> : 453-466
Nov. 11	TEST III (Fri, Nov. 15) ; Zooplankton	<u>2</u> : 42-62, 72-76
Nov. 18	Zooplankton	<u>2</u> : 85-87, 89-94
Nov. 25	Coral reefs; Thanksgiving vacation	<u>9</u> : 407-453
Dec. 2	Coral reefs; Deep sea, Review	<u>4</u> : 144-169
Dec. 9	FINAL TEST, Comprehensive, Mon, Dec 9, 8:30-10:30 am; SC 233B	

Laboratory Schedule

Date	Topic
Aug. 27	Introduction, Identification of crustacean classes
Sept. 3	Identification of decapod crustaceans
Sept. 7,8 (Sat., Sun. field trip) (8 am- ~2-3 pm)	Hard substrate; seagrass meadows
Sept. 10	Identify hard substrate, seagrass organisms
Sept. 17 (Field Trip)	Gandy Bridge-subtidal soft bottom benthic community
Sept. 24	Sediment analysis; identification of soft bottom benthos
Sept. 28, 29 (Sat., Sun. field trip) (8 am- ~2:00 pm)	High energy beach, Anna Maria Island
Oct. 1	Identify high energy beach organisms
Oct. 8	Review
Oct. 15	LAB EXAM I
Oct. 22	Identification of mollusks

Oct. 27 (Sun. field trip) (morning lab: 8am- ~noon; afternoon lab: 12:45pm- ~4:30pm)	BIOS trawling trip; use of remote collecting gear
Oct. 29	Identification of corals, reef fishes
Nov. 2 (Sat trip; 9:45-noon)	Florida Aquarium trip: coral reef fish exercise
Nov. 5 (Field trip)	Gandy Bridge-mangroves, oyster reefs, salt marshes
Nov. 12	Identification of mangrove, oyster reef, salt marsh organisms
**Nov. 19	Zooplankton identification
Nov. 26	Zooplankton, Review
Dec. 3	LAB EXAM II

****Lab will be held the day before Thanksgiving Break**

Examinations and Grading Policy:

Three (3) lecture exams (~100 points each)	~300 points
Final exam (comprehensive)	~150 points
Two (2) laboratory exams (100-120 points each)	~200-240 points
Two (2) typed journal summaries (15 points)	30 points
Internet careers assignment	15 points
Various take-home lab assignments	~50-75 points

Exams will be given on the dates indicated in the schedule. Lecture exams will include all lecture material, handouts, and assigned readings. Lab exams will address all material covered in lab sessions. The final exam is comprehensive and will cover lecture aspects of the course only. **All lecture exams will be kept by the instructor for purposes of outcomes assessment.**

NO make-up exams in lecture or laboratory will be given. A student who misses a lecture or lab exam without a valid excuse from the Dean of Students or Dean of CLAS will receive a grade of "0" for that exam. For an exam missed with a valid excuse, the Final Exam will be weighted an additional grade. When an exam is missed, the student must notify me within **24 hours** after the exam date or receive a grade of "0" for the exam.

Grading Scale:

92.0+	A
88.0-91.9	AB
82.0-87.9	B
78.0-81.9	BC
72.0-77.9	C
68.0-71.9	CD
60.0-67.9	D
< 60.0	F

Journal Summary: During the course of the semester, choose two articles from the primary literature (see list of journals) and summarize them. **You may not summarize articles assigned to the entire class.** The first article should deal with an aspect of marine zoology covered in the first half of the semester (e.g. seagrass, soft bottom benthic communities, high energy beaches, oceanographic or ecological principles) and the second article with an aspect dealt with in the second half (intertidal ecology, mangroves, oysters, zooplankton, coral reefs, deep sea). The first summary will be due on **Friday, Oct. 11, 2013 at 9:00 am** and the second on **Monday, Nov. 18, 2013 at 9:00 am**. **No credit will be given for summaries turned in later than 11 am on those days.** The summaries must be **2 1/2 or more pages in length**, typed, double-spaced, and in a font no larger than 12 point. The summary you submit should be a hard copy (paper), include the complete citation at the beginning, and **a photocopy of the article**. Use the citation format contained in the **Literature Cited** section of the article that is summarized. **If the citation is not completely correct, one point will be deducted.** Deductions will be made for errors in spelling (0.5 point/word), grammar, incomplete sentences, incoherent statements, etc... If additional authors are cited in the text of a summary e.g. "Jones (1983) found...", a complete citation of that author and article must appear in a Literature Cited section at the end of the summary. **See an example in the sample article included at the end of the syllabus.**

When choosing a journal article, make sure that you understand the main points of the article. This requires you to read through the paper and then the abstract (summary of paper). If the paper seems a proper choice, copy it and read it thoroughly at least twice, underlining and making notes as needed. If, at this time, you are having trouble comprehending the major points of the paper, discard it and choose another one.

Use the following guidelines when writing summaries:

- 1) Give full citation of paper (using format in Literature Cited of your paper) at beginning of summary.** Citations may be a challenge with online articles. Check with me if you have questions.
- 2) Give a brief background and justification for performing the study.** What was the purpose of the study? What hypothesis (es) was being tested?
- 3) Summarize the main procedures used (Materials and Methods).** Some review articles may not have a Materials and Methods section.
- 4) Summarize the main results.** Does the research answer the question(s) posed in # 2?
- 5) Discuss the significance of the findings.** Compare findings with other studies, if appropriate. How do these findings fit into the broader context of marine zoology.
- *6) Give a brief critique of the study.** A critique is often difficult for students. Think about the following points. Was the purpose of the study accomplished satisfactorily? Was the writing clear and concise? If the study was experimental, were statistical analyses included in the results? Were sufficient replicates done? Do standard deviations/standard errors overlap? In the discussion, are methodological problems explained sufficiently; are the ramifications of the results discussed thoroughly? Just because a paper is published does not mean that it is good science. Be critical.
- 7) If you cite sources other than the specific article being summarized, you must list complete citations for these sources in a Literature Cited section at the end of the summary.**

Careers in Marine Science- Internet Exercise: So you want to be a marine biologist? Many of you are taking this class because you are considering marine biology as a career. Others of you have an interest in the marine environment, but are setting your sights on other biologically related careers: environmental science, biomedicine, conservation, molecular biology etc... This exercise allows you to

explore the various career paths of marine science and decide which one you would most like to follow at this stage in your academic development. Many of you may simply say that you want to be marine biologists, but you must be more specific than that. Marine biology consists of many educational, research and applied subdisciplines such as aquaculture, behavior, biochemistry, botany, conservation, ecology, environmental biology and toxicology, fisheries, genetics, food technology, microbiology, molecular biology, parasitology and pathology, pharmacology, physiology and taxonomy just to name a few. You may want to work with a specific group of marine organisms such as mammals. In this case you would be a mammalogist who works with marine mammals. If you studied fish, molluscs or crustaceans, you would be an ichthyologist, malacologist or carcinologist, respectively. You might decide to study non-biological aspects of marine science-geology, physics, chemistry, engineering etc... or combine marine biology with another discipline e.g. maritime law, psychology (dolphin-assisted therapy), marine engineering.

Information for this exercise will come from the Internet, specifically web sites. I will provide the first web site, which is a comprehensive guide to careers in oceanography, marine science and marine biology from the University of California at San Diego. The URL is <http://ocean.peterbrueggeman.com/career.html> (see handout). Another good general site about marine biology is hosted by Dr. Jeffrey Levinton-SUNY at Stony Brook (<http://life.bio.sunysb.edu/marinebio/mbweb.html>; see handout). Using these sites as starting points, explore the variety of careers available in marine science, and then write a 2 1/2-3 page paper explaining the career path you have chosen. Write the paper in paragraph form and answer the following questions

- 1) Why have you chosen your particular field?
- 2) Give a general description of the duties of a person in this field.
- 3) How much education do you need for this career path? Bachelors, Masters, Ph.D.?
- 4) What sort of out-of-class experience e.g. internship, research, should you strive for while in college?
- 5) What non-biological skills will you need e.g. strong verbal communication, knowledge of computers, GPS, or statistics, to succeed? Be specific.
- 6) Where are the jobs in your chosen field - government, education, private industry, not-for-profit organizations? What are the job prospects? What is the pay range? **Make sure that you answer this last question concerning salary.**

You may include any other information or sources that you deem pertinent to your career choice. For instance, you may interview professors or other professionals. **At the end of your paper in a section entitled, References, list from 3-6 URLs with their titles or persons interviewed, using the following formats:**

www.uq.edu.au/amsa/TOC.html. Careers in Marine Science (Australian Marine Science Association)

Paul Anderson, Ph. D. Biologist at Florida Aquarium.

The paper is due on Friday, Sept 13 at the beginning of lecture. This gives you three weeks to complete the assignment.

Additional Reading Assignments MAR 226, Marine Zoology

All articles are on reserve (2 hour check-out) in the library behind the circulation desk, available online **OR** will be handed out in class.

TEST I

Ecological principles and Oceanography

*Roemmich, D. and J. McGowan. 1995. Climatic warming and the decline of zooplankton in the California current. *Science* 267:1324-1326; Hill, D. K. 1995. Pacific warming unsettles ecosystems. *Science* 267: 1911-1912.- **class handout**

*Jackson, J. B. C. 2001. What was natural in the coastal oceans? *Proceedings of the National Academy of Sciences* 98: 5411-5418. also available through ejournals –UT library website.

*Miller, G. 2011. Killer whales earn their name. *Science* 331: 274-276.-**class handout**

Seagrasses

Zieman, J.C. 1982. The ecology of the seagrasses of South Florida: A community profile. Chapters 1-6.

*Heck, K.L., Jr., G. Hays, R. J. Orth. 2003. Critical evaluation of the nursery role hypothesis for seagrass meadows. *Marine Ecology Progress Series* 253: 123-136. available through <http://www.int-res.com/journals/meps/>

TEST II

Intertidal Ecology

*Peterson, C.H. 1991. Intertidal zonation of marine invertebrates in sand and mud. *American Scientist*. 79: 236-249. also available through ejournals –UT library website.

High Energy Beaches

*Eilers, Olaf. 1995. Behavioral control of swash-riding in the clam *Donax variabilis*. *Biological Bulletin* 189: 120-127. Available through <http://www.biolbull.org/>. Look under archives.

TEST III

Rocky Intertidal

*Wayne, T. A. 1987. Responses of a mussel to shell-boring shells: defensive behavior in *Mytilus edulis*? *Veliger* 30: 138-147. I will try to provide a pdf of this article.

Little, C. and J. A. Kitching. 1996. The Biology of Rocky Shores

Mangroves

Odum, W.E. et. al. 1982. The ecology of the mangroves of South Florida: a community profile; Ch 1 - 1.1-1.5; Ch 2 - 2.1-2.3, 2.6-2.7; Ch 3 - 3.4; Ch 11

*Alongi, D. M. 2008. Mangrove forests: resilience, protection from tsunamis, and responses to global climate change. *Estuarine Coastal and Shelf Science*. 76: 1-13. also available through ejournals –UT library website.

Oysters

*Grabowski, J. H. and J. H. Peterson. 2007. Restoring oyster reefs to recover ecosystem services. In: Cuddington, K., J. E. Byers, W. G. Wilson and A. Hastings (eds). *Ecosystem Engineers: concepts, theory and applications*. Elsevier-Academic Press, Amsterdam, p 281-293. Goggle Grabowski and Peterson for pdf of this article. Pdf is missing pp. 290-91. I will provide these pages.

Bahr, L.M. and W.P. Lanier. 1981. The ecology of intertidal oyster reefs. pp. 18-27.

Kennedy, V. S., R. I. E. Newell and A. F. Eble. 1996. The Eastern Oyster *Crassostrea virginica*. Ch. 9. Reproductive Processes; Ch. 10. Biology of Larvae; Ch. 13 Natural Environmental Factors; Ch. 16 Predators etc...; Ch. 17 Diseases etc...

FINAL TEST

Coral Reefs

*Bellwood, D. R., T. P. Hughes, C. Folke and M. Nystrom. 2004. Confronting the coral reef crisis. *Nature* 429: 827-833. available through ejournals –UT library website.

Plankton

Enright, J.R., 1977, Diurnal vertical migration etc...pp. 856-859

***You are responsible for the material in these articles whether or not they are discussed in class.**

LIST OF MARINE BIOLOGY JOURNALS

- *+ Advances in Marine Biology, London and New York--review articles
- Anales del Centrol de Clencias del Mar y Limnologia, Universidad Nacional Autonoma de Mexico, Mexico City
- Annales Biologiques. Copenhagen
- Annales de l'Institut Oceanographique, Paris. Nouvelle serie. Paris
- + = Aquaculture, Amsterdam
- + Aquatic Botany, Amsterdam
- Aquaculture Engineering, Darking, Essex
- Aquatic Toxicology, Amsterdam
- Archiv fur Fischerelwissenschaft. Hamburg
- Archivio di Oceanografia e Limnologia, Venice
- Atoll Reasearch Bulletin;
- http://www.sil.si.edu/digitalcollections/atollresearchbulletin/ARB_About.cfm

- Australian Journal of Marine and Freshwater Research. Melbourne
 Beltrage zur Meereskunde, Berlin
 Berichte zur Polariorschung. Bremerhaven
 *+= Biological Bulletin; <http://www.biolbull.org/>
 Biological Reviews of the Cambridge Philosophical Society. London
 Biologiya Morya (Vladivostok). Vladivostok.
 Boletin del Instituto Espanol de Oceanografia, Madrid
 Bollettino de Pesca, Piscicoltura e Idrobiologia, Rome
 Bollettino di Oceanologia Teorica e Applicata, Trieste
 Botanica Marina. Hamburg
 Bulletin. Far Seas Fisheries Research Laboratory. Shimizu
 Bulletin of the Hokkaido Regional Fisheries Research Laboratory. Yoichi
 Bulletin de l'Institut Oceanographique, Monaco. Monaco
 Bulletin of the Japan Sea Regional Fisheries Research Laboratory.
 Nligata
 Bulletin of the Japanese Society of Fisheries Oceanography. Tokyo
 Bulletin of the Japanese Society of Scientific Fisheries. Tokyo
 *+= **Bulletin of Marine Science. Miami, FL**
 Bulletins of Marine Ecology. Plymouth
 Cahiers de Biologie Marine. Paris
 += Canadian Journal of Fisheries and Aquatic Sciences. Ottawa, Ont.
 = Ciencias Marinas. Ensenada, Mex.
 Coastal Engineering. Amsterdam
 Comparative Biochemistry and Physiology. Part A. Comparative Physiology. Oxford,
 New York
 = Comparative Biochemistry and Physiology. Part B. Comparative
 Biochemistry. Oxford, New York.
 Continental Shelf Research. Oxford
 Contributions in Marine Science. Port Aransas, TX
 += Copeia, New York
 = Coral Reefs
 += Crustaceana, Leiden-ejournal
 Cryptogamies Algologie, Paris
 Cybium. Paris
 Dane, Copenhagen
 += Deep-sea Research. Part A. Oceanographic research papers. Oxford, New York
 Deutsche Hydrographische Zeitschrift. Hamburg
 Diseases of Aquatic Organisms. Amelinghausen, FDR
 Dynamics of Atmosphere and Oceans. Amsterdam
 *+= Ecology. Durham, NC
 Environmental Biology of Fishes. Dordrecht
 *+= Estuaries
 += Estuarine, Coastal and Shelf Science. London etc.-ejournal
 Finnish Marine Research. Helsinki
 Fischerel-Forschung. Rostock
 Fisheries Oceanography
 Fisheries Research. Amsterdam

- *+= Fishery Bulletin. Seattle, WA; <http://fishbull.noaa.gov/fcontent.htm>
- * Gulf and Caribbean Research. Ocean Springs, MS
- Helgolander Meeresuntersuchungen. Hamburg
- = Hydrobiologia
- Indian Journal of Fisheries. Ernakulam
- Indian Journal of Marine Sciences. New Delhi
- Indo-malayan Zoology. Rotterdam
- International Hydrographic Review. Monaco
- Internationale Revue der Pesamten Hydrobiologie. Berlin
- = Invertebrate Biology
- Investigacion pesquera (Barcelona). Barcelona
- Journal of Applied Phycology
- Journal of Aquaculture and Aquatic Sciences. Kansas City, MO
- Journal of Coastal Research. Fort Lauderdale, FL
- Journal du conseil. Conseil International pour L'Exploration de La Mar. Charlottenlund
- += Journal of Crustacean Biology. Lawrence, KS
- += Journal of Experimental Marine Biology and Ecology**
- Journal of Fish Biology. London, New York
- Journal of Fish Diseases
- Journal of Fisheries and Aquatic Science: <http://jfas.ege.edu.tr/>
- Journal of Fisheries of China. Shanghai
- Journal of the Marine Biological Associations of India. Cochin
- Journal of the Marine Biological Association of the United Kingdom, Plymouth
- Journal of Marine Research. New Haven, CT
- Journal of Micropalaeontology. Surrey
- Journal of Northwest Atlantic Fishery Science. Dartmouth
- Journal of the Oceanographical Society of Japan. Tokyo
- Journal of Phycology. Columbus OH
- Journal of Physical Oceanography. Boston
- = Journal of Plankton Research. London
- Journal de Resherche Oceanographique. Paris.
- = Journal of Sea Research
- Journal of Shellfish Research
- Journal of the Tokyo University of Fisheries. Tokyo
- *+ Journal of the World Aquaculture Society
- Kieler Meeresforschungen. Kiel
- += Limnology and Oceanography-
- Marine and Freshwater Behaviour and Physiology, London
- Marine Biological Assoc of the United Kingdom
- + Marine Biology.** 1997-present (behind circulation desk of library)
- Marine Biology Letters. Amsterdam
- = Marine Biology Research
- Marine Chemistry. Amsterdam
- = Marine Ecology
- += Marine Ecology - Progress Series.** Hamburg; <http://www.int-res.com/journals/meps/>
- Marine Environmental Research. Darking, Essex.

- Marine Geology. Amsterdam.
- Marine Geophysical Researches. Dordrecht
- Marine Geotechnology. New York
- Marine Mammal Science. Lawrence, KS
- Marine Micropaleontology. Amsterdam.
- Marine Policy. Gullford.
- Marine and Petroleum Geology. Gullford, Surrey
- Marine Pollution Bulletin. London
- Marine Resource Economics. New York
- Marine Technology Society Journal. Washington
- Meeresforschung/report on Marine Research. Hamburg
- NAFO Scientific Council studies. Dartmouth, N. S.
- Nautilus
- Netherlands Journal of Sea Research. Hamburg
- New Zealand Journal of Marine and Freshwater Research. Wellington
- North American Journal of Fisheries Management. Bethesda, MD
- Ocean Engineering. Oxford.
- Ocean Managment. Amsterdam
- Oceanis. Paris
- Oceanographic Tropicale. Paris
- *+ Oceanography and Marine Biology. London - review articles
- Oceanography and Meteorology. Nagasaki
- Oceanologia. Sepot
- Oceanologica acia. Paris
- Oceanus. Woods Hole, MA
- Okeanologiya. Moscow
- + Ophelia. Elsimore
- P.S.Z.N. 1: Marine Ecology. Berlin and Hamburg
- Phycologia. London
- Physis (A, B y C) (B. Aires). Buenos Aires
- = Polar Biology-<http://www.springerlink.com/content/100450/>
- = Proceedings of the Gulf and Caribbean Fisheries Institute, Miami FL
- = Progressive Fish-Culturist
- Progress in Oceanography. New York
- Rapports et proces-verbaux des reunions. Commission internationale pour l'Exploration scientifique de la Mer Mediterranee. Monaco
- Rapports et proces-verbaux des reunions. Consell international pour L'Exploration de La Mer. Copenhagen.
- Revista de Biologia Marine. Vina del Mar
- Revue d'hydrobiologie tropicale. Dandy
- Revue Internationale d'oceanographic Medicale. Nice
- Revue des travaux de Institut des Peches maritimes, Nantes. Nantes
- Sarsia. Bergen
- = Scientia Marina; <http://www.icm.csic.es/scimar/>
- South African Journal of Marine Science
- Soviet Journal of Marine Biology. New York NY
- Tethys. Marselle

- Thalassographica. Athens
- = Transactions of the American Fisheries Society. Washington
- Travaux du Centre de Recherches et d'Etudes oceanographiques, Paris.
- Nouvelle serie. Paris
- Trudy Vsesoyuznoga nauchno-issledovatel'skogo Institute morskogo rybnogo khozyajstva i okeanograill. Moscow
- Vie et milieu. Serie A B: Biologie marine et oceanographic.

- * UT Library
- + USF Tampa Library
- = available through internet

Using the UT On-line Library

Using UT library resources, you may search on-line by subject or journal title and in many cases may be able to download full-text articles. Go to the library web site (<http://utopia.ut.edu/>) and click on e-search, full text databases or indexes, or e journals. Useful data bases include Aquatic Sciences and Fisheries Abstracts, Biological Abstracts, Bioone, and JSTOR.