DOC. 101

SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY

SAULT STE. MARIE, ONTARIO

COURSE OUTLINE

Course Title: FISHERIES BIOLOGY/MANAGEMENT

Code No.: FOR 327-3

Program: FISH AND WILDLIFE TECHNOLOGY

Semester: V

Date: JANUARY, 1989

Author: V. WALKER

New: _____ Revision: X

APPROVED: _____ Jan 10/89
Chairperson Date

CALENDAR DESCRIPTION

FISHERIES BIOLOGY/MANAGEMENT	FOR 327-3
COURSE NAME	COURSE NUMBER

PHILOSOPHY/GOALS:

A practical course dealing with anatomy, physiology, identification and biology of Ontario's sport and commercial fish. Emphasis is placed on management techniques for the survival and reproductive success of important fish species. A large segment of the course will be in tutorial format to deal with the principles, philosophy and application of fisheries management in Ontario. In addition, objectives and requirements of fish culture are addressed.

METHOD OF ASSESSMENT (GRADING METHOD):

A+ - 90% - 100%
A - 80% - 89%
B - 70% - 79%
C - 60% - 69%
R - less than 60%

	MARKS
Unit Tests	25
Laboratory Tests	20
Oral Presentation	10
Tutorials	30
Management Report	15
TOTAL	100

Due to the lab and tutorial aspect of this course, regular attendance is required. "In-class" quizzes and tests can be expected and students missing such evaluations without a legitimate reason will receive an "I" grade for that segment of the evaluation.

TEXTBOOK(S):

Ministry of Natural Resources. Aquaculture in Ontario. Fisheries Branch, Toronto, Ontario

Wallace, R.G. 1976. About Baitfish in Ontario. Ministry of Natural Resources, Toronto, Ontario.

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FISHERIES BIOLOGY

LECTURE OUTLINE

UNIT I Structure and Form

- introduction to fishes
- form and movement
- respiration, circulation, reproduction, (gonadal development) embrylogy
- sensory perception
- age and growth

UNIT II Systematics and Nomenclature

- fish classification; families, genus, species
- larval fish identification
- biology of sports fish (oral presentations)
- larval fish identification

UNIT III FISHERIES MANAGEMENT

- management strategies in Ontario
- Ontario's Symposiums on Management (SCOL, PERCID, STOCKS, SLIS)
- Community Fisheries Involvement Programs (CFIP)
- stocking programs; policies, objectives, trends
- fisheries management plans
- public relations

UNIT IV FISH CULTURE

- policies, objectives, (speaker: Algoma Fish and Rec Assoc.)
- fish handling, egg collection
- systems; cage culture, closed systems (video; Espanola)
- fertilization and feeding (video; Dorion)
- breeding and hybredization (video; L. Manitou)
- disease and parasites (speaker: University of Guelph)
- control of undesirable species
- field trip

FISHERIES BIOLOGY

STUDENT EVALUATION

A. Term Test

Term tests will be based on lecture and tutorial material. Term tests will account for 25% of the course grade.

B. Laboratory Test

Several practical lab tests based on the identification of Ontario's freshwater fish will comprise 20% of the course grade.

A Grade of 85% is mandatory for each lab test on species identification.

Scientific names must accompany common names only for major game species of Ontario.

Students will also be tested on the use of identification keys.

C. Presentation

Students are required to give a 20 minute oral presentation outlining the:

1. identification features
2. range
3. habitat food preferences
4. life history of one (possibly two) important commercial/sport fish in Ontario.
5. importance

Each student will present a typed handout to each class member (instructor will photocopy) which summarizes important points of the presentation and references prior to delivery. Oral presentation is valued at 10% of the course grade.

D. Tutorials

Students will select a minimum of one (1) topic of interest from the following list. Students are encouraged to research their topic thoroughly and present the facts in an organized 20 minute presentation (Some reference material is available from instructor). In addition, each student will distribute to class members, a typed summary of the main points of the presentation. A class discussion will follow.

Where possible, guest speakers specializing in various aspects of fisheries management will lead the tutorial.

Tutorial Topics

1. Identification of over-exploitation
2. Harvest Control (slot-size limits, etc.)
3. Splake in Ontario (Genetic engineering in fisheries)
4. Course Fish Removal (including discussion on Rotenone)
5. MNR Salmonid Stocking Rates and Policies
6. Pros and Cons of Ontario's Hatcheries
7. Fish Population Estimates (Petersen, Schnatel, Catch Curve)
8. Tagging and Marking Fish
9. Ontario Rish Yield Estimates
10. SPOF
11. SCOL
12. PERCID
13. STOCKS
14. SLIS
15. CFIP

E. Management Report

Students will select an important sport or commercial fish (including bait fish) and submit a report valued at 15% of the course grade. Report details to follow.

NOTE

Submision of all assignments is mandatory. Students with outstanding assignments will receive an "R" grade regardless of their accumulated

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MANAGEMENT REPORT

Students to select an important sport or commercial fish (including bait-fish) and submit a typed report including the following topics:

NOTE: Species selected should be a fish other than that researched for oral presentation.

A. Introduction

A brief statement of the species importance as well as it's distributio in Ontario, (include a map).

B. History

A history of the species (in Ontario) up to and including it's present status.

C. Economic Value

- Direct and indirect (spin-offs)
- Trends

D. Problems and Issues

- exploitation
- user conflicts
- habitat loss and/or degradation
- undesirable species introduction

E. Management Strategies

- A general statement of present.

  i) season restrictions
  ii) size limitations
  iii) bag limits/quotas
  iv) gear restrictions
  etc

- Present and future management strategies (harvest control, stocking, breeding, habitat rehabilitation, fishways etc) to ensure survival and reproductive success.

- Include present government/special interest programs in Ontario (be specific).

- Future proposals/targets' objectives.

F. References

ONTARIO FISH SPECIES FOR ORAL PRESENTATIONS

Common Name(s)	Scientific Name
1. Lake trout	Salvelinus namaycush
2. Brook trout	Salvelinus fontinalis
3. Rainbow trout	Salmo gairdneri
4. Brown trout	Salmo trutta
5. Lake whitefish	Coregonus clupeaformis
6. Cisco	Coregonus artedii
7. Smallmouth bass	Micropterus dolomieui
8. Largemouth bass	Micropterus salmoides
9. Rock bass	Ambloplites rupestris
10. Pumpkinseed	Lepomis gibbosus
11. White bass	Morone chrysops
12. Brown bullhead	Ictalurus nebulosus
13. Channel catfish	Ictalurus punctatus
14. Northern Pike	Esox lucius
15. Muskellunge	Esox masquinongy
16. Carp	Cyprinus carpio
17. White sucker	Catostomus commersonii
18. Walleye	Stizostedion vitreum
19. Yellow perch	Perca flavescens
20. Rainbow smelt	Osmerus mordax
21. Coho salmon	Oncorhynchus kisutch
22. Chinook salmon	Oncorhynchus tshawytscha

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MINNOW COLLECTION

SPECIMEN NO. _____

COMMON NAME _____

GENUS _____

SPECIES _____

CAPTURE DATE _____

LOCATION _____

WATER DEPTH _____ (meters)

WATER TEMPERATURE _____ (^{o}C)

SUBSTRATE _____

AQUATIC VEGETATION _____

COLLECTOR _____

FISHERIES BIOLOGY & MANAGEMENT REFERENCES

Bennett, G.W. 1971. Management of Lakes and Ponds. 2nd edition. Va Nostrand Reinhold, Toronto.

Davis, H.S. 1973. Culture and Diseases of Game Fishes. University o California Press, Berkeley.

Everhart, W.H.. A.W. Eipper and W.D. Youngs. 1981. Principles of Fisheries Science. Cornell University. Press, Ithaca, London.

Johnson, L. and B. Burns (eds. 1984. Biology of Arctic Harr. Proceedings after International Symposium, 1981. University Manitoba Press. Winnipeg, Manitoba.

Lackey R.T. and L.A. Nielson (eds). 1980. Fisheries Management. John Wiley and Sons. Toronto, Ontario.

Lagler, K.F., J.E. Bardach and R.R. Miller, 1962. Ichthyology. John Wiley and Sons Inc. New York.

McKeown, B.A. 1984. Fish Migration. Timber Press. Portland, Oregon.

Moyle, P.B. and J.J. Cech, Jr. 1982. Fishes: An Introduction to Ichthyology. Prentice-Hall Inc., New Jersey.

Page, Lawrence M. 1983. Handbook of Darters. TFH Publications, Inc. Ltd. Neptune City, New Jersey.

Post, G. 1983. Textbook of Fish Health. TFH Publications, Inc. Ltd. Neptune, New Jersey.

Potts, G.W. and R.J. Wooton. 1984. Fish Reproduction: Strategies an Tactics. Academic Press, Inc., New York, New York

Royce, W.R. 1984. Introduction to the Practice of Fishery Science. Academic Press, Inc. New York, New York.

Scott, W.B. and E.J. Crossman, 1973. Freshwater Fishes of Canada. Bulletin 184. Fish Res. Board of Can., Ottawa.

Sedgwick, Stephen Drummond. 1982. The Salmon Handbook. Andre Deutsch Ltd London.

Thompson, P. 1980. The Game Fishes of New England and S.E. Canada. Down East Books. Camden, M.E.

AQUACULTURE REFERENCES

Bonn, E.W. et al. 1976. Guidelines for Striped Bass Culture. AFS Publishing Co., Bethesda, MA.

Brown, E. Evan. 1985. Crustacean and Mollusk Aquaculture in the United States. AVI Publishing Co., Inc. Westport, CT.

Brown, E. Evan. 1980. Fish Farming Handbook. AVI Publishing Co., Inc. Westport, CT.

Goldman, Charles R. 1983. Freshwater Crayfish V. AVI Publishing Co., Inc. Westport, CT.

Hall, G.E. (ed) 1986. Managing Muskies. Papers from the International Muskie Symposium at LaCrosse, Wisconsin, April 4-6, 1984. AFS Publishing Co., Bethesda, MA

Lannan, J.E. 1986. Principles and Practices of Pond Aquaculture. AVI Publishing Co., Inc. Westport, CT.

McLarney, William, O. 1984. The Freshwater Aquaculture Book: A Handbook for Small Scale Fish Culture in North America. Hartley and Marks, Inc.

Piper, Robert G. et al. 1982. Fish Hatchery Management. United States Dept. of the Interior. Fish and Wildlife Service, Washington, DC

Sedgwick, Stephen Drummond. 1973. Trout Farming Handbook. Seeley Service, London.

Swift, Donald R. 1985. Aquaculture Training Manual, Fishing News Books Ltd., Surrey, England

Thorpe, J.E. 1980. Salmon Ranching. Academic Press, Inc. New York, New York.

FISH DISEASE REFERENCES

GENERAL

MAWDESLEY THOMAS, L.E., ed. 1972. Diseases of Fish. No. 30. Symposia of the Zoological Society of London, Acamdemic Press, London and New York.

RIBELIN. W.E., and G. MIGAKI, eds. 1975. Pathology of Fishes. University of Wisconsin Press, Madison, WI. pp. 1004.

ROBERTS, R.J., ed., 1978. Fish Pathology. Bailliere Tindall, London. pp. 1978.

ROBERTS, R.J. and C.J. SHEPHERD, 1974. Handbook of Trout and Salmon Diseases. Fishing News (Books) Ltd., Surrey, England. pp. 168

WARREN, J.C. 1978. Diseases of hatchery fish. United States Fish and Wildlife Service. Twin Cities, Minnesota. pp. 94

WOOD, J.W. 1968. Diseases of Pacific Salmon, their Prevention and Treatment. Hatchery Division, Department of Fisheries, State of Washington, Olympia, WA. pp. 82.

BACTERIAL AND FUNGAL (see also GENERAL references above)

BULLOCK, G.L., D.A. CONROY, S.F. SNIEZSKO 1971. Bacterial diseases of fishes. In Snieszko S.K. and H.R. Axelrod, eds. Book 2A of Diseases of Fishes. T.F.H. Publications, Inc., Neptune City, N.J. pp. 151.

VIRAL (see also GENERAL references above).

SNIESZKO, S.F., R.F. NIGRELLI, K. WOLF. 1965. Viral Disease of Poikilothermic Vertebrates. New York Academy of Sciences. Annals of the New York Academy of Sciences, New York, N.J. pp. 680

FISH DISEASE REFERENCES (cont'd)

PARASITIC (see also GENERAL references above).

HOFFMAN. G.L., 1967. Parasites of North American Freshwater Fishes, Universit of California Press, Berkeley, CA pp. 486.

HOFFMAN, G.L. AND F.P. MEYER. 1974. Parasites of Freshwater Fishes. T.F.H. Publications, Inc., Neptune City, N.J. pp. 224.

KABATA, Z. 1970. Crustacea As Enemies of Fishes. In S.F. Snieszko and H.R. Axelrod, eds. Book 1 of Diseases of Fishes. T.F.H. Publications, Inc., Neptune City, N.J. pp. 171.

NUTRITIONAL

ASHLEY, L.M. 1972. Nutritional Pathology. In Halver, J.W., ed. fish Nutrition. Academic Press, New York N.Y. pp. 439-537.

HALVER, J.E. 1976. Nutritional Deficiency Diseases In Salmonids. Fish Pathology 10: 165-180.

ENVIRONMENTAL AND EFFECTS OF ENVIRONMENT OF INFECTIOUS DISEASES (see also GENERAL references above).

FRYER, J.L. AND K.S. PILCHER. 1974 Effects of Temperature of Diseases of Salmonid Fishes. U.S. Environmental Protection Agency. Washington, D.C. pp. 115.

WEDEMEYER, G.A., F.P. MEYER, L. SMITH. 1976. Environmental Stress and Fish Diseases. In S.F. Snieszko and H.R. Axelrod, eds. Book 5 of Diseases of Fishes. T.F.H. Publications, Inc., Neptune City, N.J. pp. 192