

Historic, Archive Document

Do not assume content reflects current scientific knowledge, policies, or practices.



United States
Department of
Agriculture

Agricultural
Research
Service



National
Agricultural
Library



Bibliographies
And Literature
Of Agriculture
Number 124

August 1993

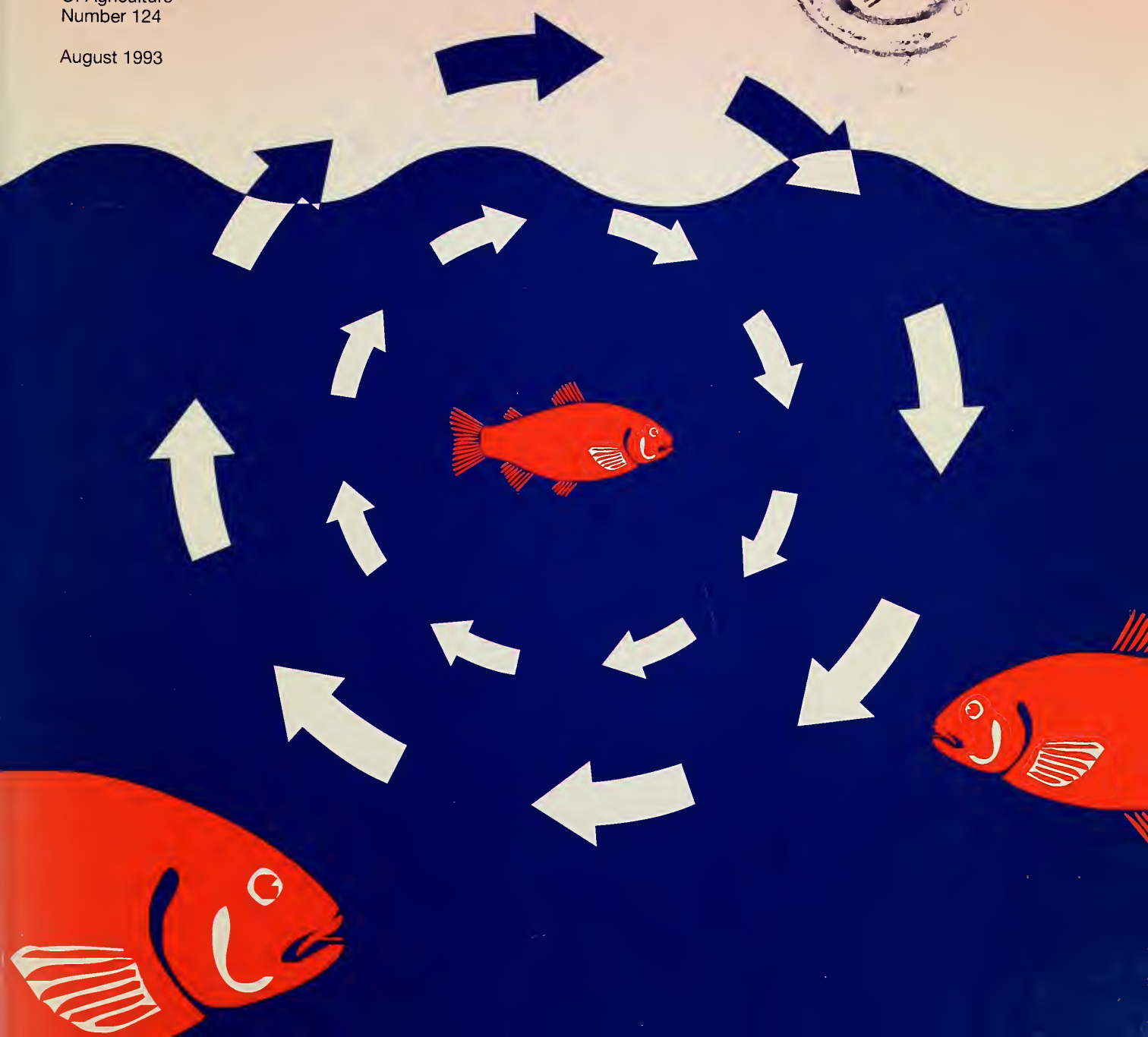
02.5074
A1U54
cz

Recirculation - Aeration

Bibliography for Aquaculture



NATIONAL AGRICULTURAL LIBRARY
OCT 20 1993





United States
Department of
Agriculture

Agricultural
Research
Service



National
Agricultural
Library



Bibliographies
And Literature
Of Agriculture
Number 124

August 1993

Recirculation - Aeration

Bibliography for Aquaculture

By

Peter W. Perschbacher

Rebecka V. Powell

Donald W. Freeman

Wendell J. Lorio

Agricultural Research Service
Aquaculture Research Project
Tishomingo, OK 73460

and

Deborah T. Hanfman

Aquaculture Information Center
National Agricultural Library
Beltsville, MD 20705

National Agricultural Library
Beltsville, Maryland
1993

National Agricultural Library Cataloging Record:

Recirculation-aeration : bibliography for aquaculture.

(Bibliographies and literature of agriculture ; no. 124)

1. Water – Air entrainment – Bibliography. 2. Water – Aeration – Bibliography. 3. Aquaculture – Bibliography.
I. Perschbacher, Peter W. II. Title. III. Recirculation aeration.

aZ5076.A1U54 no.124

Preface

Recirculation - Aeration Bibliography for Aquaculture contains literature citations through 1992 related to water recirculation and aeration in aquaculture. The focus is on filtration, aeration, and circulation techniques in various aquaculture situations. We attempt to provide broad exposure to water quality, organics removal, invertebrate and algal culture systems, diseases and sterilization, and economics. References on partial recycled systems utilizing wastewater treatment processes, and relevant sanitary engineering are also included.

This compilation is an indirect result of our research efforts in Oklahoma to develop alternative production technologies for catfish. We hope this bibliography will be of interest to aquaculture scientists and educators. We feel this document will be of value particularly to researchers in the rapidly developing fields of closed system aquaculture and water conservation.

Citations are divided into 19 sections by subject. Within each section, the citations are arranged alphabetically by author surname. Individual citations may appear under multiple subject categories. A few computer software packages have been developed in the area of recirculation systems. They are listed under Electronic Media and include relevant information about the product. This bibliography should not be considered as all inclusive.

Acknowledgments

The bibliography was reviewed by Drs. Robert Putz and John Heinen, Freshwater Institute; and Dr. Jim Davis, Texas A&M. Their helpful comments are appreciated. Drs. Barnaby Watten, U.S. Fish and Wildlife Service, and Thomas Losordo, North Carolina State University, kindly supplied recirculation references. Dr. Gary Jensen, U.S. Department of Agriculture Extension Service, made helpful suggestions to aid in distributing the document.

Inclusion of a publication in this bibliography does not constitute an endorsement by the U.S. Department of Agriculture.

AVAILABILITY OF THIS PUBLICATION

A limited number of copies of this document are available through the Aquaculture Information Center, National Agricultural Library, 10301 Baltimore Boulevard, Beltsville, MD 20705-2351; phone: (301) 504-5558. Please include a self-addressed gummed label with your request.

AVAILABILITY OF DOCUMENTS LISTED

Non-USDA Patrons

The documents listed in this bibliography are available on interlibrary loan through your local library. The librarian in your public, state, university, or corporate library can assist you in obtaining materials either in your area or directly from the National Agricultural Library (NAL). Current NAL charges are:

Photocopies: \$5 for the first 10 pages
\$3 for each additional 10 pages

Microfiche: \$5 for the first fiche
\$0.50 for each additional fiche

Microfilm: \$10 per NAL-owned reel of microfilm

Questions about the availability of these documents may be directed to:

USDA, National Agricultural Library
Document Delivery Services Branch
10301 Baltimore Boulevard
Beltsville, MD 20705-2351
(301) 504-5755

USDA Patrons

The documents listed in this bibliography may be obtained by submitting one Form AD-245 for each item requested to your local Agency or Regional Document Delivery System Library or directly to the address above.

Contents

BIBLIOGRAPHIES - REVIEWS	1
WATER QUALITY	4
FILTRATION	
RBC (rotating biodisk contactors)	17
Trickling Filters	18
Submerged Filters	20
Fluidized-Bed Filters	23
Charcoal and Zeolite Filters	24
Nitrifying - Denitrifying Bacterial Processes	26
Organics Removal	31
Hydroponics - Aquatic Plant Filters	34
AERATION - CIRCULATION	
Pure Oxygen	42
Aerators - Circulators	46
ASSOCIATED TECHNOLOGY	52
PRODUCTION SYSTEMS	
Fish	57
Invertebrate	67
Macroalgal	71
DISEASE - STERILIZATION	72
ECONOMICS	74
ELECTRONIC MEDIA	77

BIBLIOGRAPHIES - REVIEWS

Balarin, J.D. and R.D. Halley. 1982. **The intensive culture of tilapia in tanks, raceways and cages.** In: Recent Advances in Aquaculture by (Eds.) J.F. Muir and R.J. Roberts, Westview Press, Boulder, CO:265-356.

Colt, J., G. Tchobanoglous and B. Wong. 1975. **The Requirements and Maintenance of Environmental Quality in the Intensive Culture of Channel Catfish: An Annotated Bibliography.** Department of Civil Engineering, University of California, Davis, CA. 126 pgs.

European Inland Fisheries Advisory Commission. 1986. **Flow-Through and Recirculation Systems. Report of the Working Group on Terminology, Format and Units of Measurement.** EIFAC Technical Paper No. 49, Food and Agriculture Organization of the United Nations, Rome, Italy. 100 pgs.

Forster, J.R.M., J.P. Harman and G.R. Smart. 1979. **Water economy - Its effect on trout farm production.** Fish Farming International 4(1):10-13.

Forster, J.R.M. and G.R. Smart. 1979. **Water economy in aquaculture.** In: Power Plant Waste Heat Utilization in Aquaculture by (Eds.) B.L. Godfriaux, A.F. Eble, A. Farmanformaian, C.R. Guerra and C.A. Stephens, Allanheld & Co., Montclair, NY:3-11.

Gaither, W.S. 1981. **Progress and problems with recirculating system aquaculture.** In: Biotechnology in the Marine Sciences. Marine Science Seminar Series No. 25, MIT Sea Grant

Program, Cambridge, MA:61-79.

Hanfman, D.T. 1989. **Aquaculture Production Systems: Other Than Ponds January 1979-May 1989.** Quick Bibliography Series: QB 89-81, United States Department of Agriculture, National Agricultural Library, Washington, DC. 18 pgs.

Hao, O.J., A.P. Davis and K.K. Phull. 1990. **Biological fixed-film systems.** Research Journal of Water Pollution Control Federation 62(4):406-413.

Hepher, B. 1985. **Aquaculture intensification under land and water limitations.** GeoJournal 10(3):253-259.

Huguenin, J.E. and J. Colt. 1989. **Design and Operating Guide for Aquaculture Seawater Systems.** Developments in Aquaculture and Fisheries Science, Volume 20, Elsevier, New York, NY. 264 pgs.

Kaiser, G.E. and F.W. Wheaton. 1983. **Nitrification filters for aquatic culture systems: State of the art.** Journal of the World Mariculture Society 14:302-324.

Liao, P.B. 1981. **Treatment units used in recirculation systems for intensive aquaculture.** In: Aquaculture in Heated Effluents and Recirculation Systems, Vol. I, by (Ed.) K. Tiews, H. Heenemann, Berlin, Germany:183-196.

Liao, P.B. and R.D. Mayo. 1972. **Salmonid hatchery water reuse systems.** Aquaculture 1:317-335.

Lucchetti, G.L. and G.A. Gray. 1988. **Water reuse systems: A review of principal components.** The Progressive Fish-Culturist 50(1):1-6.

- Masser, M.P., J. Rakocy and T.M. Losordo. 1992. **Recirculating aquaculture tank production systems - management of recirculating systems**. SRAC Publication No. 452, Southern Regional Aquaculture Center. 11 pgs.
- Mayo, R.D. 1976. **A technical and economic review of the use of reconditioned water in aquaculture**. In: *Advances in Aquaculture* by (Eds.) T.V.R. Pillay and W.A. Dill, Fishing News Ltd. (Books), Farnham, UK:508-520.
- Mayo, R.D. 1991. **Review of water reuse systems - water reuse in hatcheries**. In: *Aquaculture and Water Quality* by (Eds.) D.E. Brune and J.R. Tomasso, World Aquaculture Society, Baton Rouge, LA:105-132.
- McCoy, H.D., II. 1986. **Intensive culture systems past, present and future. Part I**. *Aquaculture Magazine* 12(6):32-35.
- McCoy, H.D., II. 1987. **Intensive culture, the past, the present, and the future. Part II**. *Aquaculture Magazine* 13(1):35-40.
- McCoy, H.D., II. 1987. **Intensive culture, the past, the present and future: Part III**. *Aquaculture Magazine* 13(2):24-29.
- McVey, E.M. 1990. **Aquaculture in Recirculating Systems January 1979-December 1989**. Quick Bibliography Series: QB 90-26, United States Department of Agriculture, National Agricultural Library, Washington, DC. 9 pgs.
- McVey, E.M. 1991. **Aquaculture in Intensive Systems**. *Aqua-Topics*, July 1991, United States Department of Agriculture, National Agricultural Library, Aquaculture Information Center, Beltsville, MD. 4 pgs.
- MIT Sea Grant. 1977. **Closed-Cycle Aquaculture**. MITSG-77-15, Marine Industry Advisory Services, MIT Sea Grant Program, Cambridge, MA. 30 pgs.
- Muir, J.F. 1982. **Recirculated water systems in aquaculture**. In: *Recent Advances in Aquaculture* by (Eds.) J.F. Muir and R.J. Roberts, Westview Press, Boulder, CO:357-447.
- Parker, N.C. 1991. **Intensive fish culture in raceways, silos and tanks**. In: *Inland Aquaculture Handbook, Vol. I*, Texas Aquaculture Association, Austin, TX. 7 pgs.
- Parker, N.C. and M.C. Broussard, Jr. 1977. **Selected Bibliography of Water Reuse Systems for Aquaculture**. The Texas Agricultural Experimental Station, College Station, TX. 34 pgs.
- Parker, N.C., B.A. Simco and K. Strawn. 1975. **Recirculating raceways and mariculture: University research for the fish producer**. *Proceedings of the Fish Farming Conference and Annual Convention of the Catfish Farmers of Texas 1975:67-79*.
- Pearson, S. 1989. **Deciding on a treatment alternative**. In: *Biotreatment of Agricultural Wastewater* by (Ed.) M.E. Huntley, CRC Press, Boca Raton, FL:15-31.
- Pettigrew, T., E.B. Henderson, R.L. Saunders and J.B. Sochasky. 1978. **A Review of Water Reconditioning Re-use Technology for Fish Culture, with a Selected Bibliography**. Fisheries and Marine Service Technical Report No. 801, Fisheries and Oceans Canada, Biological Station, New Brunswick, Canada. 19 pgs.

- Rosati, R. 1990. **System design**. In: Regional Workshop on Commercial Fish Culture Using Water Reuse Systems by (Ed.) L. Swann, IL/IN Sea Grant Publication CES-237, Department of Agricultural Communication Service, Purdue University, West Lafayette, IN:13-27.
- Rosenthal, H. 1981. **Recirculation systems in Western Europe**. In: Aquaculture in Heated Effluents and Recirculation Systems, Vol. II, by (Ed.) K. Tiews, H. Heenemann, Berlin, Germany:305-315.
- Seymour, E.A. and A. Bergheim. 1991. **Towards reduction of pollution from intensive aquaculture with reference to the farming of salmonids in Norway**. Aquacultural Engineering 10:73-88.
- Smith, M. and E. McVey. 1989. **Aquaculture in Recirculating Systems January 1979-December 1988**. Quick Bibliography Series: QB 89-48, United States Department of Agriculture, National Agricultural Library, Beltsville, MD. 7 pgs.
- Smitherman, R.O. and C.E. Boyd. 1974. **Intensive management of water for fish production**. In: Water Resources Utilization and Conservation in the Environment by (Ed.) M.L. Blount, Fort Valley State College, Fort Valley, GA:152-166.
- Spotte, S. 1979. **Fish and Invertebrate Culture Water Management in Closed Systems**. John Wiley & Sons, New York, NY. 179 pgs.
- Tetzlaff, B. 1990. **Systems operation**. In: Regional Workshop on Commercial Fish Culture Using Water Reuse Systems by (Ed.) L. Swann, IL/IN Sea Grant Publication CES-237, Department of Agricultural Communication Service, Purdue University, West Lafayette, IN:28-34.
- Van Gorder, S. 1990. **Closed systems: A status report**. Aquaculture magazine. 16(5):40-47.
- Water Environment Federation. 1982. **Units of Expression for Wastewater Management**. Water Environment Federation, Alexandria, VA. 47 pgs.
- Water Environment Federation. 1983. **Nutrient Control**. Water Environment Federation, Alexandria, VA. 216 pgs.
- Water Environment Federation. 1988. **Aeration**. Water Environment Federation, Alexandria, VA. 167 pgs.
- Water Environment Federation. 1988. **Operation and Maintenance of Trickling Filters, RBC's and Related Processes**. Water Environment Federation, Alexandria, VA. 139 pgs.
- Water Environment Federation. 1991. **Operation of Municipal Wastewater Treatment Plants. Volume II - Liquid Processes**. Water Environment Federation, Alexandria, VA. 463 pgs.
- Wheaton, F. 1985. **Design considerations in marine aquaculture systems**. In: National Symposium on the Soft-Shell Blue Crab Fishery:57-65.
- Wheaton, F.W. 1991. **Biological filtration, design and operation**. In: Commercial Aquaculture Using Water Recirculation Systems by (Ed.) L. Swann, IL/IN Sea Grant Publication CES 240, Department of Agricultural Communication Service, Purdue University, West Lafayette, IN:14-28.

Wheaton, F.W., J.N. Hochheimer and G.E. Kaiser. 1991. **Fixed film nitrification filters for aquaculture**. In: *Aquaculture and Water Quality* by (Eds.) D.E. Brune and J.R. Tomasso, World Aquaculture Society, Baton Rouge, LA:272-303.

Wickins, J.F. 1982. **Opportunities for farming crustaceans in western temperate regions**. In: *Recent Advances in Aquaculture* by (Eds.) J.F. Muir and F.J. Roberts, Westview Press, Boulder, CO:87-178.

Woiwode, J.G. 1991. **Recent advances in predictive recirculating aquaculture technology**. *Journal of the World Aquaculture Society* 22(3):66.

Wong, B., G. Tchobanoglous and J. Colt. 1974. **Water Quality Management in Fish Culture with Specific Reference to Channel Catfish: An Annotated Bibliography**. Department of Civil Engineering, University of California, Davis, CA. 68 pgs.

WATER QUALITY

Allen, K.O. 1974. **Effects of stocking density and water exchange rate on growth and survival of channel catfish Ictalurus punctatus Rafinesque in circular tanks**. *Aquaculture* 4:29-39

Andrews, J.W. 1972. **Stocking density and water requirements for high-density culture of channel catfish in tanks or raceways**. *Feedstuffs* 44(6):40-41.

Andrews, J.W., L.H. Knight, J.W. Page, Y. Matsuda and E.E. Brown. 1971. **Interactions of stocking density and water turnover on growth and food conversion of channel catfish reared in intensively**

stocked tanks. *The Progressive Fish-Culturist* 33(4):197-203.

Andrews, J.W., T. Murai and G. Gibbons. 1973. **The influence of dissolved oxygen on the growth of channel catfish**. *Transactions of the American Fisheries Society* 102(4):835-838.

Ary, R.D., Jr. and M.A. Poirrer. 1989. **Acute toxicity of nitrite to the blue crab Callinectes sapidus**. *The Progressive Fish-Culturist* 51(2):69-73.

Atz, J.W. 1963. **Some principles and practices of water management for marine aquariums**. United States Department of the Interior Fish and Wildlife Service Research Report 63:3-16.

Avnimelech, Y. 1990. **Basic considerations for development and design of circulated fish ponds**. *European Aquaculture Society Publication* 11:31-44.

Avnimelech, Y., B. Weber, B. Hefher, A. Milstein and M. Zorn. 1986. **Studies in circulated fish ponds: Organic matter recycling and nitrogen transformation**. *Aquaculture and Fisheries Management*. 17:231-242.

Baker, R.F. and G.B. Ayles. 1990. **The effects of varying density and loading level on the growth of arctic charr Salvelinus alpinus L. and rainbow trout Oncorhynchus mykiss**. *World Aquaculture* 21(1):58-61.

- Banks, J. 1987. **Effects of Raceway Inflow and Rearing Density Interactions on Adult Returns of Coho and Spring Chinook Salmon.** In: *Oxygen Supplementation A New Technology in Fish Culture* by (Eds.) L. Visscher and W. Godby, Information Bulletin No. 1, United States Department of Interior Fish and Wildlife Service, Denver, CO. 6 pgs.
- Beveridge, M.C.M., M.J. Phillips and R.M. Clarke. 1991. **A quantitative and qualitative assessment of waters from aquatic animal production.** In: *Aquaculture and Water Quality* by (Eds.) D.E. Brune and J.R. Tomasso, World Aquaculture Society, Baton Rouge, LA:506-533.
- Blackburn, J. and W.C. Clarke. 1990. **Lack of density effect on growth and smolt quality in zero-age coho salmon.** *Aquacultural Engineering* 9:121-130.
- Bohl, M. 1977. **Some initial aquaculture experiments in recirculating water systems.** *Aquaculture* 11:323-328.
- Bower, C.E. 1978. **Ionization of ammonia in seawater: Effects of temperature, pH, and salinity.** *Journal of the Fisheries Research Board of Canada* 35:1012-1016.
- Bower, C.E. and T. Holm-Hansen. 1980. **A simplified hydrazine-reduction method for determining high concentrations of nitrate in recirculated seawater.** *Aquaculture* 21:281-286.
- Bower, C.E., D.T. Turner and S. Spotte. 1981. **PH maintenance in closed seawater culture systems: Limitations of calcareous filtrants.** *Aquaculture* 23:211-217.
- Boyd, C.E. 1982. **Water Quality Management for Pond Fish Culture.** Elsevier Science Publishing Company, New York, NY. 318 pgs.
- Boyd, C.E. 1985. **Chemical budgets for channel catfish ponds.** *Transactions of the American Fisheries Society* 114:291-298
- Boyd, C.E. 1990. **Water Quality in Ponds for Aquaculture.** Department of Fisheries and Allied Aquaculture, Alabama Agricultural Experiment Station, Auburn University, Auburn, AL. 482 pgs.
- Brune, D.E. 1991. **Pond aquaculture.** In: *Engineering Aspects of Intensive Aquaculture.* Northeast Regional Agricultural Engineering Service Publication 49, Cooperative Extension, Ithaca, NY:118-130.
- Busch, C.D., J.L. Koon and R. Allison. 1974. **Aeration, water quality and catfish production.** *Transactions of the American Society of Agricultural Engineers* 1974:433-435.
- Carlson, A.R., J. Blocher and L.J. Herman. 1980. **Growth and survival of channel catfish and yellow perch exposed to lowered constant and diurnally fluctuating dissolved oxygen concentrations.** *The Progressive Fish-Culturist* 42(2):73-78.
- Carter, P.P. and K.O. Allen. 1976. **Effects of flow rate and aeration on survival and growth of channel catfish in circular tanks.** *The Progressive Fish-Culturist* 38(4):204-206.
- Chen, J.C. and S.F. Chen. 1991. **Effects of nitrite on growth and molting of Penaeus monodon juveniles.** *Journal of the World Aquaculture Society* 22(3):19.

- Chen, J.C., P.C. Liu and S.C. Lei. 1989. **Toxicities of ammonia and nitrite to adolescent of tiger shrimp Penaeus monodon**. Journal of the World Aquaculture Society 20(1):23.
- Colberg, P.J. and A.J. Lingg. 1978. **Effect of ozonation on microbial fish pathogens, ammonia, nitrate, nitrite, and BOD in simulated reuse hatchery water**. Journal of the Fisheries Research Board of Canada 35:1290-1296.
- Cole, B.A. and C.E. Boyd. 1986. **Feeding rate, water quality and channel catfish production in ponds**. The Progressive Fish-Culturist 48(1):25-30.
- Collins, C. 1989. **Effects of ammonia on algae and catfish**. Aquaculture Magazine 15(1):53-56.
- Colt, J. 1986. **Gas supersaturation - impact on the design and operation of aquatic systems**. Aquacultural Engineering 5:49-85.
- Colt, J. 1987. **An Introduction to Water Quality Management in Intensive Aquaculture**. In: Oxygen Supplementation A New Technology in Fish Culture by (Eds.) L. Visscher and W. Godby, Information Bulletin No. 1. United States Department of Interior Fish and Wildlife Service, Denver, CO. 11 pgs.
- Colt, J.E. and D.A. Armstrong. 1981. **Nitrogen toxicity to crustaceans, fish and molluscs**. In: Proceedings of the Bio-Engineering Symposium for Fish Culture by (Eds.) L.J. Allen and E.C. Kinney, American Fisheries Society, Fish Culture Section Publication No. 1, Bethesda, MD:34-48.
- Colt, J., K. Orwicz and G. Bouck. 1991. **Water quality considerations and criteria for high density fish culture with supplemental oxygen**. In: Fisheries Bioengineering Symposium by (Eds.) J. Colt and R.J. White, American Fisheries Society Symposium No. 10, Bethesda, MD:372-385.
- Colt, J. and G. Tchobanoglous. 1976. **Evaluation of the short-term toxicity of nitrogenous compounds to channel catfish, Ictalurus punctatus**. Aquaculture 8:209-224.
- Colt, J. and G. Tchobanoglous. 1978. **Chronic exposure of channel catfish Ictalurus punctatus to ammonia: Effects on growth and survival**. Aquaculture 15:353-372.
- Crawford, R.E. and G.H. Allen. 1977. **Seawater inhibition of nitrate toxicity to chinook salmon**. Transactions of the American Fisheries Society 106(1):105-109.
- Daud, S.K., D. Hasbollah and A.T. Law. 1988. **Effects of unionized ammonia on red tilapia (Oreochromis mossambicus/O. niloticus hybrid) fry**. In: The Second International Symposium on Tilapia in Aquaculture by (Eds.) R.S.V. Pullin, T. Bhukaswan, K. Tonguthai and J.L. Maclean, ICLARM, Manila, Philippines:411-413.
- Deliman, P.N., J.W. Pote and T.P. Cathcart. 1989. **Water quality management for pH control in aquacultural ponds**. Journal of the World Aquaculture Society 20(1):31.
- Dezoni, G., D. Levanon and A. Meltzer. 1988. **Influence of high loading density on growth and survival of European glass eels**. The Progressive Fish-Culturist 50(3):178-182.

Doudoroff, P. and M. Katz. 1950. **Critical review of literature on the toxicity of industrial wastes and their components to fish I. Alkalies, acids and inorganic gases.** Sewage and Industrial Wastes 22(11):1432-1458.

Dwyer, W.P. 1990. **Effects of supersaturated levels of oxygen on ammonia toxicity to trout.** In: Oxygen Supplementation A New Technology in Fish Culture by (Eds.) L. Visscher and W.P. Dwyer, Information Bulletin No. 2, United States Department of Interior Fish and Wildlife Service, Denver, CO. 9 pgs.

Eddy, F.B. and R.I.G. Morgan. 1969. **Some effects of carbon dioxide on the blood of rainbow trout Salmo gairdneri Richardson.** Journal of Fisheries Biology 1:361-372.

Emerson, K., R.C. Russo, R.E. Lund and R.V. Thurston. 1975. **Aqueous ammonia equilibrium calculations: Effect of pH and temperature.** Journal of the Fisheries Research Board of Canada 32(12):2379-2383.

Epifanio, C.E. and R.F. Srna. 1975. **Toxicity of ammonia, nitrite ion, nitrate ion and orthophosphate to Mercenaria mercenaria and Crassostrea virginica.** Marine Biology 33:241-246.

Epifanio, C.E., R.F. Srna and G. Pruder. 1975. **Mariculture of shellfish in controlled environments: A prognosis.** Aquaculture 5:227-241.

Fagerlund, U.H.M., J.R. McBride and E.T. Stone. 1981. **Stress-related effects of hatchery rearing density on coho salmon.** Transactions of the American Fisheries Society 110:644-649.

Forster, J.R.M., J.P. Harman and G.R. Smart. 1979. **Water Economy - its effect on trout farm production.** Fish Farming International 4(1):10-13.

Forster, J.R.M. and G.R. Smart. 1979. **Water economy in aquaculture.** In: Power Plant Waste Heat Utilization in Aquaculture by (Eds.) B.L. Godfriaux, A.F. Eble, A. Farmanformaian, C.R. Guerra and C.A. Stephens, Allanheld & Co., Montclair, NY:3-11.

Gordon, J.A. 1974. **Waste characterization studies for high-density raceway production of catfish - the Gallatin catfish project.** Proceedings of the Industrial Waste Conference, Purdue University, West Lafayette, IN 29:115-128.

Griffin, B.R. and C.M. Collins. 1987. **Sodium bicarbonate: Properties and reports of its use in fish production.** Aquaculture Magazine 13(6):53-54.

Hampson, B.L. 1976. **Ammonia concentration in relation to ammonia toxicity during a rainbow trout rearing experiment in a closed freshwater-seawater system.** Aquaculture 9:61-70.

Hanfman, D.T. 1989. **Water Quality Management in Aquaculture. January 1979-December 1988.** Quick Bibliography Series: QB 89-56, United States Department of Agriculture, National Agricultural Library, Beltsville, MD. 9 pgs.

Hermanutz, R.O., S.F. Hedtke, J.W. Arthur, R.W. Andrew and K.N. Allen. 1987. **Ammonia effects on microinvertebrates and fish in outdoor experimental streams.** Environmental Pollution 7:249-283.

- Hilge, V., H. Delventhal and H. Klinger. 1981. **Influences of heated, recirculated water and heated well water on several physiological and hematological parameters of channel catfish, Ictalurus punctatus Rafinesque, reared at two stocking densities.** In: Aquaculture in Heated Effluents and Recirculation Systems, Vol. II by (Ed.) K. Tiews, H. Heenemann, Berlin, Germany:185-190.
- Hill, T.K. and J.L. Chesness. 1973. **Water Quality in a Recirculating Raceway System for Fish Culture.** American Society of Agricultural Engineers Paper No. 73-5508, St. Joseph, MI. 14 pgs.
- Hillaby, B.A. and D.J. Randall. 1979. **Acute ammonia toxicity and ammonia excretion in rainbow trout Salmo gairdneri.** Journal of the Fisheries Research Board of Canada 36:621-629.
- Hirayama, K., H. Mizuma and Y. Mizue. 1988. **The accumulation of dissolved organic substances in closed recirculation culture systems.** Aquacultural Engineering 7:73-87.
- Hovanec, T.A., J.M. Carlberg, J.C. Van Olst and M.J. Massingill. 1989. **Acute ammonia toxicity and ammonia excretion of striped bass Morone saxatilis.** Journal of the World Aquaculture Society 20(1):44.
- Huey, D.W., M.C. Wooten, L.A. Freeman and T.L. Beitinger. 1982. **Effect of pH and chloride on nitrite-induced lethality in bluegill (Lepomis macrochirus).** Bulletin of Environmental Contamination and Toxicology 28:3-6.
- Kaiser, H., G. Moskwa and O. Schmitz. 1989. **Growth of trout in a recirculated system with pH- stabilization by denitrification.** Journal of the World Aquaculture Society 20(1):46.
- Kaiser, H. and O. Schmitz. 1988. **Water quality in a closed recirculating fish culture system influenced by addition of a carbon source in relation to feed uptake by fish.** Aquaculture and Fisheries Management 19:265-273.
- Kilambi, R.V., J. Noble and C.E. Hoffman. 1970. **Influence of temperature and photoperiod on growth, food consumption and food conversion efficiency of channel catfish.** Proceedings of the Annual Conference of the Southeastern Association of Game and Fish Commissioners 24:519-531.
- Kincaid, H.L., W.R. Bridges, A.E. Thomas and M.J. Donahoo. 1976. **Rearing capacity of circular containers of different sizes for fry and fingerling rainbow trout.** The Progressive Fish-Culturist 38(1):11-17.
- Knepp, G.L. and G.F. Arkin. 1973. **Ammonia toxicity levels and nitrate tolerance of channel catfish.** The Progressive Fish-Culturist 35(4):221-224.
- Konikoff, M. 1975. **Toxicity of nitrite to channel catfish.** The Progressive Fish-Culturist 37(2):96-98.
- Kramer, G.L. 1975. **Studies on the lethal dissolved oxygen levels for young brown shrimp, Penaeus aztecus Ives.** Proceedings of the World Mariculture Society 6:157-170.
- Krom, M.D., A. Neori and J. van Rijn. 1989. **Importance of water flow rate in controlling water quality processes in marine and freshwater fish ponds.** The Israeli Journal of Aquaculture - Bamidgeh 41(1):23-33.

- Losordo, T.M., M. Masser and J. Rakocy. 1992. **Recirculating aquaculture tank production systems an overview of critical considerations.** In: Proceedings of the National Extension Aquaculture Workshop. Texas Agricultural Extension Service, Texas A&M University, College Station, TX:Facilities 25-29.
- Liao, P.B. and R.D. Mayo. 1972. **Salmonid hatchery water reuse systems.** *Aquaculture* 1:317-335.
- Lloyd, R. and D.W. Herbert. 1960. **The influence of carbon dioxide on the toxicity of un-ionized ammonia to rainbow trout Salmo gairdneri Richardson.** *Annals of Applied Biology* 48(2):399-404.
- Lloyd, R. and L.D. Orr. 1969. **The diuretic response by rainbow trout to sub-lethal concentrations of ammonia.** *Water Research* 3:335-344.
- MacConnell, E. 1989. **Effects of water reuse on lake trout.** *The Progressive Fish-Culturist* 51(1):33-37.
- Malinowski, S.M. and S.E. Siddall. 1989. **Passive water reuse in a commercial-scale hard clam, Mercenaria mercenaria, upflow nursery system.** *Journal of Shellfish Research* 8(1):241-248.
- Manthe, D.P., R.F. Malone and S. Kumar. 1984. **Limiting factors associated with nitrification in closed blue crab shedding systems.** *Aquacultural Engineering* 3:119-140.
- McBride, L.J. and R.G. Menzel. 1978. **Nutrient Recovery from Farm Ponds: Hydroponic Plant Production and Other Means. A Review.** United States Department of Agriculture Agriculture Research Service, Southern Region, New Orleans, LA. 21 pgs.
- McGee, M.V. and C.E. Boyd. 1983. **Evaluation of the influence of water exchange in channel catfish ponds.** *Transactions of the American Fisheries Society* 112:557-560.
- McVey, E.M. 1992. **Water Quality in Flow-Through and Recirculating Systems 1989-1992.** Aqua-Topics, Aquaculture Information Center, United States Department of Agriculture, National Agricultural Library, Beltsville, MD. 5 pgs.
- Meade, J.W. 1985. **Allowable ammonia for fish culture.** *The Progressive Fish-Culturist* 47(3):135-145.
- Meade, J.W. 1991. **Application of the production capacity assessment bioassay.** In: Fisheries Bioengineering Symposium by (Eds.) J. Colt and R.J. White, American Fisheries Society Symposium No. 10, Bethesda, MD:365-367.
- Meade, J.W. 1991. **Intensity of aquaculture production definitions, meanings, and measures.** In: Engineering Aspects of Intensive Aquaculture. Northeast Regional Agricultural Engineering Service Publication No. 49, Cooperative Extension, Ithaca, NY:301-310.
- Menasveta, P., P. Aranyakanonda, S. Rungsupa and N. Moree. 1989. **Maturation and larviculture of penaeid prawns in closed recirculating seawater systems.** *Aquacultural Engineering* 8:357-368.
- Merkens, J.C. and K.M. Downing. 1957. **The effect of tension of dissolved oxygen on the toxicity of un-ionized ammonia to several species of fish.** *Annals Applied Biology* 45(3):521-527.

- Miller, G.E. and G.S. Libey. 1985. **Evaluation of three biological filters suitable for aquacultural applications.** Journal of the World Mariculture Society 16:158-168.
- Milstein, A. 1990. **Water quality in an intensive outdoor commercial fish culture system with mechanically stirred ponds.** The Israeli Journal of Aquaculture - Bamidgheh 42(4):99-109.
- Mires, D. and Y. Amit. 1990. **Water quality in a recycled intensive fish culture system under field conditions.** The Israeli Journal of Aquaculture - Bamidgheh 42(4):110-121.
- Morrison, J.K. and R.G. Piper. 1986. **Effect of reused water on brown trout.** The Progressive Fish-Culturist 48:139-141.
- Morrison, J.K. and R.G. Piper. 1988. **Effect of reused water on Atlantic salmon.** The Progressive Fish-Culturist 50:110-112.
- Muir, J.F. 1982. **Recirculated water systems in aquaculture.** In: Recent Advances in Aquaculture by (Eds.) J.F. Muir and R.J. Roberts, Westview Press, Boulder, CO:357-447.
- Murai, T. 1979. **High-density rearing of channel catfish fry in shallow troughs.** The Progressive Fish-Culturist 41(2):57.
- Murphy, J.P. and R.I. Lipper. 1970. **BOD production of channel catfish.** The Progressive Fish-Culturist 32(4):195-198.
- Murray, S.A. 1980. **Effects of loading density on catfish blood.** Experientia 36:205-206.
- Neori, A., M.D. Krom, I. Cohen and H. Gordin. 1989. **Water quality conditions and particulate chlorophyll a of new intensive seawater fishponds in Eilat, Israel: Daily and diel variations.** Aquaculture 80:63-78.
- Olson, K.R. and P.O. Fromm. 1971. **Excretion of urea by two teleosts exposed to different concentrations of ambient ammonia.** Comparative Biochemistry and Physiology 40:999-1007.
- Paat, S., H. Sugita, A.S. Sidick, J. Sugimoto and Y. Deguchi. 1989. **The water quality and microflora of a carp rearing tank with a recirculating water system.** Bulletin of the Agricultural and Veterinary Medicine, Nihon University 46:28-33.
- Palachek, R.M. and J.R. Tomasso. 1984. **Toxicity of nitrite to channel catfish (*Ictalurus punctatus*), tilapia (*Tilapia aurea*), and largemouth bass (*Micropterus salmoides*): Evidence for a nitrite exclusion mechanism.** Canadian Journal of Fisheries and Aquatic Sciences 41:1739-1744.
- Page, W.P. and J.W. Andrews. 1974. **Chemical composition of effluent from high density culture of channel catfish.** Water, Air and Soil Pollution 3:365-369.
- Parker, N.C. and K.B. Davis. 1981. **Requirements of warmwater fish.** In: Proceedings of the Bio-Engineering Symposium for Fish Culture by (Eds.) L.J. Allen and E.C. Kinney, American Fisheries Society, Fish Culture Section Publication No. 1, Bethesda, MD:21-29.

- Payne, A.I., J. Ridgway and J.L. Hammer. 1989. **The influence of salt (NaCl) concentration and temperature on the growth of Oreochromis spilurus, O. mossambicus and a red tilapia hybrid.** In: The Second International Symposium on Tilapia in Aquaculture by (Eds.) R.S.V. Pullin, T. Bhukaswan, K. Tonguthai and J.L. Maclean, ICLARM, Manila, Philippines:481-487.
- Pecor, C.H. 1979. **Experimental intensive culture of tiger muskellunge in a water reuse system.** The Progressive Fish-Culturist 41(2):103-108.
- Pennington, C.H. and K. Strawn. 1977. **Stocking density: Its effect on caged-channel catfish production.** Proceedings of the Annual Conference of the Southeastern Association of Fish and Wildlife Agencies 31:514-518.
- Perrone, S.J. and T.L. Meade. 1977. **Protective effect of chloride on nitrite toxicity to coho salmon Oncorhynchus kisutch.** Journal of the Fisheries Research Board of Canada 34:486-492.
- Pettigrew, T., E.B. Henderson, R.L. Saunders and J.B. Sochasky. 1978. **A Review of Water Reconditioning Re-use Technology for Fish Culture, with a Selected Bibliography.** Fisheries and Marine Service Technical Report No. 801, Fisheries and Oceans Canada, Biological Station, St. Andrews, New Brunswick, Canada. 19 pgs.
- Poirrier, M.A. and R.D. Ary. 1988. **The effects of salinity on nitrite toxicity in the blue crab.** Journal of Shellfish Research 7(1):195.
- Porubcan, R.S. 1991. **Reduction of ammonia nitrogen and nitrite in tanks of Penaeus monodon using floating biofilters containing processed diatomaceous earth media pre-inoculated with nitrifying bacteria.** Journal of the World Aquaculture Society 22(3):48.
- Poston, H.A. and R.C. Williams. 1990. **Effects of ozonated-water reuse on salinity tolerance of Atlantic salmon.** The Progressive Fish-Culturist 52(1):36-40.
- Poxton, M.G. and S.B. Allouse. 1982. **Water quality criteria for marine fisheries.** Aquacultural Engineering 1:153-191.
- Poxton, M.G. and S.B. Allouse. 1987. **Cyclical fluctuations in ammonia and nitrite-nitrogen resulting from the feeding of turbot, Scophthalmus maximus (L.), in recirculating systems.** Aquacultural Engineering 6:301-322.
- Rakelmann, U.V. and V. Hilge. 1983. **Influence of anodic oxidation on selected parameters in recycled fish culture water.** Aquacultural Engineering 2:81-92.
- Randall, D. 1991. **The impact of variations in water pH on fish.** In: Aquaculture and Water Quality by (Eds.) D.E. Brune and J.R. Tomasso, World Aquaculture Society, Baton Rouge, LA:90-104.
- Redner, B.D. and R.R. Stickney. 1979. **Acclimation to ammonia by Tilapia aurea.** Transactions of the American Fisheries Society 108:383-388.
- Refstie, T. 1977. **Effect of density on growth and survival of rainbow trout.** Aquaculture 11:329-334.

Refstie, T. and A. Kittelsen. 1976. **Effect of density on growth and survival of artificially reared Atlantic salmon.** *Aquaculture* 8:319-326.

Rimon, A. and M. Shilo. 1982. **Factors which affect the intensification of fish breeding in Israel. I. Physical, chemical and biological characteristics of the intensive fish ponds in Israel.** *Bamidgeh* 34(3):87-100.

Robertson, L., P. Thomas, C.R. Arnold and J.M. Trant. 1987. **Plasma cortisol and secondary stress responses of red drum to handling, transport, rearing density, and a disease outbreak.** *The Progressive Fish-Culturist* 49(1):1-13.

Robinette, H.R. 1976. **Effect of selected sublethal levels of ammonia on the growth of channel catfish *Ictalurus punctatus*.** *The Progressive Fish-Culturist* 38(1):26-29.

Rogers, G.L. and A.W. Fast. 1988. **Potential benefits of low energy water circulation in Hawaiian prawn ponds.** *Aquacultural Engineering* 7:155-165.

Rogers, G.L. and S.L. Klemetson. 1981. **Evaluation of a biofilter water reuse system for *Macrobrachium rosenbergii* prawn aquaculture ponds.** *Proceedings of Water Reuse Symposium II, American Water Works Association Research Foundation, Denver, CO:908-923.*

Rogers, G.L. and S.L. Klemetson. 1985. **Ammonia removal in selected aquaculture water reuse biofilters.** *Aquacultural Engineering* 4:135-154.

Ross, L.G. and R.W. McKinney. 1989. **Photoperiod mediated variation in**

respiratory rate of *Oreochromis niloticus* and its implication for tilapia culture. In: *The Second International Symposium on Tilapia in Aquaculture* by (Eds.) R.S.V. Pullin, S. Bhukaswan, K. Tonguthai and J.L. Maclean, ICLARM, Manila, Philippines:421-428.

Rottmann R.W. and J.V. Shireman. 1986. **Management of Water Quality for Fish.** University of Florida Institute of Food and Agricultural Sciences Cooperative Extension Service Circular No. 715, Gainesville, FL. 18 pgs.

Russo, R.C. and R.V. Thurston. 1991. **Toxicity of ammonia, nitrite, and nitrate to fishes.** In: *Aquaculture and Water Quality* by (Eds.) D.E. Brune and J.R. Tomasso, World Aquaculture Society, Baton Rouge, LA:58-89.

Sandifer, P.A., J.S. Hopkins and A.D. Stokes. 1987. **Intensive culture potential of *Penaeus vannamei*.** *Journal of the World Aquaculture Society* 18(2):94-100.

Sandifer, P.A., J.S. Hopkins and A.D. Stokes. 1988. **Intensification of shrimp culture in earthen ponds in South Carolina: Progress and prospects.** *Journal of the World Aquaculture Society* 19(4):218-226.

Schroeder, G.L. 1975. **Nighttime material balance for oxygen in fish ponds receiving organic wastes.** *Bamidgeh* 27(3):65-74.

Schwedler, T.E. and C.S. Tucker. 1983. **Empirical relationship between percent methemoglobin in channel catfish and dissolved nitrite and chloride in ponds.** *Transactions of the American Fisheries Society* 112:117-119.

- Seegert, G.L. and A.S. Brooks. 1978. **Dechlorination of water for fish culture: Comparison of the activated carbon, sulfite reduction, and photochemical methods.** Journal of the Fisheries Research Board of Canada 35:88-92.
- Seymour, E.A. and A. Bergheim. 1991. **Towards reduction of pollution from intensive aquaculture with reference to the farming of salmonids in Norway.** Aquacultural Engineering 10:73-88.
- Sheehan, R.J. and W.M. Lewis. 1986. **Influence of pH and ammonia toxicity and water balance in young channel catfish.** Transactions of the American Fisheries Society 115:891-899.
- Shilo, M. and A. Rimon. 1982. **Factors which affect the intensification of fish breeding in Israel II. Ammonia transformations in intensive fish ponds.** Bamidgah 34(3):101-114.
- Short, Z. and P.R. Olson. 1970. **Oyster shells and foam formation used to improve quality of water recirculated in a fish hatchery incubator.** The Progressive Fish-Culturist 32:180-182.
- Siddall, S.E. 1974. **Studies of closed marine culture systems.** The Progressive Fish-Culturist 36(1):8-15.
- Simco, B.A. 1976. **The Reuse of Water in Commercial Raising of Catfish.** Water Resources Research Center Research Report No. 52, University of Tennessee, Knoxville, TN. 37 pgs.
- Smart, G. 1976. **The effect of ammonia exposure on gill structure of the rainbow trout *Salmo gairdneri*.** Journal of Fish Biology 8:471-475.
- Smart, G. 1978. **Investigations of the toxic mechanisms of ammonia to fish-gas exchange in rainbow trout (*Salmo gairdneri*) exposed to acutely lethal concentrations.** Journal of Fish Biology 12:93-104.
- Smart, G.R., D. Knox, J.G. Harrison, J.A. Ralph, R.H. Richards and C.B. Cowey. 1979. **Nephrocalcinosis in rainbow trout *Salmo gairdneri* Richardson; the effect of exposure to elevated CO₂ concentrations.** Journal of Fish Diseases 2:279-289.
- Smith, C.E. 1972. **Effects of metabolic products on the quality of rainbow trout.** American Fishes and U.S. Trout News 7(20):921.
- Smith, D.W. and R.H. Piedrahita. 1988. **The relation between phytoplankton and dissolved oxygen in fish ponds.** Aquaculture 68:249-265.
- Smith, C.E. and W.G. Williams. 1974. **Experimental nitrite toxicity in rainbow trout and chinook salmon.** Transactions of the American Fisheries Society 103(2):389-390.
- Soderberg, R.W. 1985. **Histopathology of rainbow trout, *Salmo gairdneri* Richardson, exposed to diurnally fluctuating unionized ammonia levels in static-water ponds.** Journal of Fish Diseases 8:57-64.
- Soderberg, R.W. 1990. **Temperature effects on the growth of blue tilapia in intensive aquaculture.** The Progressive Fish-Culturist 52:155-157.
- Soderberg, R.W., D.S. Baxter and W.F. Krise. 1987. **Growth and survival of fingerling lake trout reared at four densities.** The Progressive Fish-Culturist 49:284-285.

- Soderberg, R.W. and W.F. Krise. 1986. **Effects of rearing density on growth and survival of lake trout.** The Progressive Fish-Culturist 48:30-32.
- Soderberg, R.W., M.V. McGee, J.M. Grizzle and C.E. Boyd. 1982. **Comparative histology of rainbow trout and channel catfish grown in intensive static water aquaculture.** The Progressive Fish-Culturist 44:195-199.
- Soderberg, R.W. and J.W. Meade. 1987. **Effects of rearing density on growth, survival, and fin condition of Atlantic salmon.** The Progressive Fish-Culturist 49:280-283.
- Sousa, R.J., T.L. Meade and R.E. Wolke. 1974. **Reduction of ammonia toxicity by salinity and pH manipulation.** World Mariculture Society Workshop 5:343-354.
- Sousa, R.J. and T.L. Meade. 1977. **The influence of ammonia on the oxygen delivery system of coho salmon hemoglobin.** Comparative Biochemistry and Physiology 58:23-28.
- Stickney, R.R. 1991. **Effects of salinity on aquaculture production.** In: Aquaculture and Water Quality by (Eds.) D.E. Brune and J.R. Tomasso, World Aquaculture Society, Baton Rouge, LA:105-132.
- Stickney, R.R., T. Murai and G.O. Gibbons. 1972. **Rearing channel catfish fingerlings under intensive culture conditions.** The Progressive Fish-Culturist 34(2):100-102.
- Straus, D.L., H.R. Robinette and J.M. Heinen. 1989. **Toxicity of ammonia and high pH to post-larval and juvenile freshwater shrimp Macrobrachium rosenbergii.** Journal of the World Aquaculture Society 20(1):73.
- Swann, L. 1990. **Basic water quality for water reuse systems.** In: Regional Workshop on Commercial Fish Culture Using Water Reuse Systems by (ED.) L. Swann, IL/IN Sea Grant Publication CES-237, Department of Agricultural Communication Service, Purdue University, West Lafayette, IN:3-12.
- Thomforde, H.W. and C.E. Boyd. 1991. **Effects of aeration on water quality and channel catfish production.** The Israeli Journal of Aquaculture - Bamidgeh 43(1):3-26.
- Thurston, R.V., C. Chakoumakos and R.C. Russo. 1981. **Effect of fluctuating exposures on the acute toxicity of ammonia to rainbow trout (Salmo gairdneri) and cutthroat trout (S. clarki).** Water Research 15:911-917.
- Thurston, R.V., G.R. Phillips, R.C. Russo and S.M. Hinkins. 1981. **Increased toxicity of ammonia to rainbow trout (Salmo gairdneri) resulting from reduced concentrations of dissolved oxygen.** Canadian Journal of Fisheries and Aquatic Sciences 38:983-988.
- Thurston, R.V. and R.C. Russo. 1983. **Acute toxicity of ammonia to rainbow trout.** Transactions of the American Fisheries Society 112:696-704.
- Tidwell, J.H., C.D. Webster, J.A. Clark and D.H. Yancey. 1992. **Effects of Yucca shidigera extract on water quality and fish growth in recirculating-water aquaculture systems.** The Progressive Fish-Culturist 54:196-201.
- Tomasso, J.R. 1986. **Comparative toxicity of nitrite to freshwater fishes.** Aquatic Toxicology 8:129-137.

- Tomasso, J.R. and G.J. Carmichael. 1991. **Differential resistance among channel catfish strains and intraspecific hybrids to environmental nitrite.** *Journal of Aquatic Animal Health* 3(1):51-54.
- Tomasso, J.R., K.B. Davis and N.C. Parker. 1981. **Plasma corticosteroid dynamics in channel catfish, *Ictalurus punctatus* Rafinesque, during and after oxygen depletion.** *Journal of Fish Biology* 18:519-526.
- Tomasso, J.R., C.A. Goudie, B.A. Simco and K.B. Davis. 1980. **Effects of environmental pH and calcium on ammonia toxicity in channel catfish.** *Transactions of the American Fisheries Society* 109:229-234.
- Tomasso, J.R., B.A. Simco and K.B. Davis. 1979. **Inhibition of ammonia and nitrite toxicity to channel catfish.** *Proceedings of the Annual Conference of the Southeastern Association of Game and Fish Commissioners* 33:600-606.
- Tomasso, J.R., M.I. Wright, B.A. Simco and K.B. Davis. 1980. **Inhibition of nitrite-induced toxicity in channel catfish by calcium chloride and sodium chloride.** *The Progressive Fish-Culturist* 42(3):144-146.
- Tucker, C.S. 1990. **Nitrite toxicity in fish.** In: *Proceedings of the Auburn Symposium on Fisheries and Aquaculture* by (Eds.) R.O. Smitherman and D. Tave, Department of Research Information, Alabama Agricultural Experiment Station, Auburn University, Auburn, AL:207-219.
- Tucker, L. and C.E. Boyd. 1979. **Effects of feeding rate on water quality, production of channel catfish and economic returns.** *Transactions of the American Fisheries Society* 108:389-396.
- Tucker, C.S., R. Francis-Floyd and M.H. Bealeu. 1989. **Nitrite-induced anemia in channel catfish, *Ictalurus punctatus* Rafinesque.** *Bulletin of Environmental Contamination and Toxicology* 43:295-301.
- United States Department of the Interior Fish and Wildlife Service. 1972. **Factors Affecting the Growth and Production of Channel Catfish in Raceways.** United States Department of Commerce Economic Development Administration Technical Assistance Project 14-16-0008-571, Washington, DC. 98 pgs.
- van Rijn, J., S.R. Stutz, S. Diab and M. Shilo. 1986. **Chemical, physical and biological parameters of superintensive concrete fish ponds.** *The Israeli Journal of Aquaculture - Bamidgah* 38(2):35-43.
- Wagner, E.J. 1987. **Stress in cultured fish.** *Aquaculture Magazine* 13(6):24-29.
- Wangead, C., A. Geater and R. Tansakul. 1989. **Effects of acid water on survival and growth rate of Nile tilapia (*Oreochromis niloticus*).** In: *The Second International Symposium on Tilapia in Aquaculture* by (Eds.) R.S.V. Pullin, S. Bhukaswan, K. Tonguthai and J.L. Maclean, ICLARM, Manila, Philippines:433-437.
- Watanabe, W.O., L.J. Ellingson, R.I. Wicklund and B.L. Olla. 1989. **The effects of salinity on growth, food consumption and conversion in juvenile, monosex male Florida red tilapia.** In: *The Second International Symposium on Tilapia in Aquaculture* by (Eds.) R.S.V. Pullin, S. Bhukaswan, K. Tonguthai and J.L. Maclean, ICLARM, Manila, Philippines:515-523.

- Watanabe, W.O., K.E. French, L.J. Ellingson, R.I. Wicklund and B.L. Olla. 1989. **Further investigations on the effects of salinity on growth in Florida red tilapia: Evidence for the influence of behavior.** In: The Second International Symposium on Tilapia in Aquaculture by (Eds.) R.S.V. Pullin, S. Bhukaswan, K. Tonguthai and J.L. Maclean, ICLARM, Manila, Philippines:525-530.
- Watenpugh, D.E. and T.L. Beitinger. 1986. **Resistance of nitrite-exposed channel catfish Ictalurus punctatus, to hypoxia.** Bulletin of Environmental Contamination and Toxicology 37:802-807.
- Wedemeyer, G.A. 1976. **Physiological response of juvenile coho salmon Oncorhynchus kisutch and rainbow trout Salmo gairdneri to handling and crowding stress in intensive fish culture.** Journal of the Fisheries Research Board of Canada 33(12):2699-2702.
- Wedemeyer, G.A., N.C. Nelson and W.T. Yasutake. 1979. **Physiological and biochemical aspects of ozone toxicity to rainbow trout Salmo gairdneri.**
- Wedemeyer, G.A. and W.T. Yasutake. 1978. **Prevention and treatment of nitrite toxicity in juvenile steelhead trout Salmo gairdneri.** Journal of the Fisheries research Board of Canada 35:822-827.
- Westers, H. 1987. **Oxygen requirements of trout: Its application to intensive fish culture.** In: Oxygen Supplementation A New Technology in Fish Culture by (Eds.) L. Visscher and W. Godby, Information Bulletin No. 1, United States Department of Interior Fish and Wildlife Service, Denver, CO. 14 pgs.
- Westers, H. and K.M. Pratt. 1977. **Rational design of hatcheries for intensive salmonid culture based on metabolic characteristics.** The Progressive Fish-Culturist 39(4):157-165.
- Westin, D.T. 1974. **Nitrate and nitrite toxicity to salmonid fishes.** The Progressive Fish-Culturist 36(2):86-89.
- Wickins, J.F. 1976. **The tolerance of warm-water prawns to recirculated water.** Aquaculture 9:19-37.
- Wickins, J.F. 1981. **Water quality requirements for intensive aquaculture: A review.** In: Aquaculture in Heated Effluents and Recirculation Systems, Vol. I by (Ed.) K. Tiews, H. Heenemann, Berlin, Germany:17-38.
- Wickins, J.F. 1982. **Opportunities for farming crustaceans in western temperate regions.** In: Recent Advances in Aquaculture by (Eds.) J.F. Muir and F.J. Roberts, Westview Press, Boulder, CO:87-178.
- Wickins, J.F. 1985. **Organic and inorganic carbon levels in recycled seawater during the culture of tropical prawns Penaeus sp.** Aquaculture Engineering 4:59-84.
- Wilson, R.P., R.O. Anderson and R.A. Bloomfield. 1969. **Ammonia toxicity in selected fishes.** Comparative Biochemistry and Physiology 28:107-118.
- Wilson, J.L. and L.R. Hilton. 1982. **Effects of tilapia densities on growth of channel catfish.** The Progressive Fish-Culturist 44(4):207-209.
- Wold, E. 1973. **Surface agitators as a means to reduce nitrogen gas in a hatchery water supply.** The Progressive Fish-Culturist 35(3):143-146.

FILTRATION

RBC Filters

Anonymous. 1980. **Fish farm in a factory basement.** Fish Farming International September:16-19.

Hao, O.J., A.P. Davis and K.K. Phull. 1990. **Biological fixed-film systems.** Journal of the Water Pollution Control Federation 62(4):406-413.

Lewis, W.M. and G.L. Buynak. 1976. **Evaluation of a revolving plate type biofilter for use in recirculated fish production and holding units.** Transactions of the American Fisheries Society 6:704-708.

Libey, G.S. and G.E. Miller. 1985. **Comparison of Three Biofilter Types.** American Society of Agricultural Engineering Paper No. 85-5012, St. Joseph, MI. 10 pgs.

Lue-Hing, C., A.W. Obayashi, D.R. Zenz, B. Washington and B.M. Sawyer. 1976. **Biological nitrification of sludge supernatant by rotating disks.** Journal of the Water Pollution Control Federation 48(1):25-46.

Miller, G.E. and G.S. Libey. 1983. **Oxygen recharge and ammonia stripping capabilities of various closed culture configurations.** Aquacultural Engineering 2:263-277.

Moller, D. and O. Bjerk. 1981. **Smolt production in a recirculation system in northern Norway.** In: Aquaculture in Heated Effluents and Recirculation Systems, Vol. II, by (Ed.) K. Tiews, H. Heenemann, Berlin, Germany:415-429.

Parker, N.C. 1981. **An air-operated fish culture system with water-reuse and subsurface silos.** In: Proceedings of the Bio-Engineering Symposium for Fish Culture by (Eds.) L.J. Allen and E.C. Kinney, American Fisheries Society, Fish Culture Section Publication No. 1, Bethesda, MD:131-137.

Rakocy, J.E., J.A. Hargreaves and D.S. Bailey. 1991. **Comparative water quality dynamics in a recirculating system with solids removal and fixed-film or algal biofiltration.** Journal of the World Aquaculture Society 22(3):49.

Rogers, G.L. and S.L. Klemetson. 1981. **Evaluation of a biofilter water reuse system for Macrobrachium rosenbergii prawn aquaculture ponds.** In: Proceedings of Water Reuse Symposium II, American Water Works Association Research Foundation, Denver, CO:908-923.

Rogers, G.L. and S.L. Klemetson. 1985. **Ammonia removal in selected aquaculture water reuse biofilters.** Aquacultural Engineering 4:135-154.

Saxton, C.H. and D.E. Brune. 1985. **Maintaining water quality in recirculating trout culture; field evaluation of a retained biomass nitrification filter.** American Society of Agricultural Engineers Paper No. 85-5011, St. Joseph, MI. 7 pgs.

Steels, I.H. 1974. **Design basis for the rotating disc process.** Effluent and Water Treatment Journal 14(8):431-445.

Strange, D.J. 1982. **Construction of a floating, motor-driven filter for fish culture.** Aquaculture Project, Rodale Research Center, Rodale Press Inc., Emmaus, PA. 28 pgs.

Strange, D.J. and S.V. Gorder. 1985. **Biodisc waterwheel: A design alternative and its application for an air-driven fish culture system.** Research Report RRC/AQ-84/5. Rodale Research Center, Rodale Press Inc., Emmaus, PA. 22 pgs.

Van Gorder, S.D. and J.D. Fritch. 1980. **Filtration techniques for small-scale aquaculture in a closed system.** Proceedings of the Annual Conference of the Southeastern Association of Fish and Wildlife Agencies 34:59-66.

Yong-liang, Z. 1990. **The development of closed rearing systems in China.** Aquacultural Engineering 9:167-173.

Trickling Filters

Barth, E.F., B.W. Jackson, R.F. Lewis and R.C. Brenner. 1969. **Phosphorus removal from wastewater by direct dosing of aluminate to a trickling filter.** Journal of the Water Pollution Control Federation 41:1932-1942.

Bohl, M. 1977. **Some initial aquaculture experiments in recirculating water systems.** Aquaculture 11:323-328.

Chu, C.L. and G.N. Greene. 1966. **Experiments on the use of a biofilter to remove wastes from fish tanks.** Proceedings of the Annual Conference of the Southeastern Association of Fish and Game Commissioners 20:446-457.

Cook, E.E. and M.L. Fleming. 1974. **Trickling filter performance as related to media surface area.** Public Works 105(1):69-72.

Craft, T.F. and R.S. Ingols. 1973. **Flow through time in trickling filters.** Water & Sewage Works 120(1):78-79.

Duddles, G.A. and S.E. Richardson. 1973. **Application of Plastic Media Trickling Filters for Biological Nitrification Systems.** United States Environmental Protection Agency Environmental Protection Technology Series R2-73-199. 73 pgs.

Duddles, G.A., S.E. Richardson and E.F. Barth. 1974. **Plastic-medium trickling filters for biological nitrogen control.** Journal of the Water Pollution Control Federation 46(5):937-946.

Forster, J.R.M. 1974. **Studies on nitrification in marine biological filters.** Aquaculture 4:387-397.

Gotaas, H.B. and W.S. Galler. 1973. **Design optimization for biological filter models.** Journal of Environmental Engineering Division September:831-850.

Greene, G.N. 1971. **Biological filters for increased fish production.** Proceedings of the Annual Conference of the Southeastern Association of Game and Fish Commissioners 25:483-489.

Griessinger, J.M., Th. Robin, Th. Pollet and M.J. Pierre. 1989. **Progress in use of biological filtration in mass production of Macrobrachium rosenbergii post-larvae in closed system, in French Guiana.** Journal of the World Aquaculture Society 20(1):41.

Hao, O.J., A.P. Davis and K.K. Phull. 1990. **Biological fixed-film systems.** Journal of the Water Pollution Control Federation 62(4):406-413.

- Hinton, S.W. and H.D. Stensel. 1991. **Experimental observation of trickling filter hydraulics.** *Water Research* 25(11):1389-1398.
- Hirayama, K. 1966. **Studies on water control by filtration through sand bed in a marine aquarium with closed circulating system - III. Relation of grain size of filter sand to purification of breeding water.** *Bulletin of the Japanese Society of Scientific Fisheries* 32(1):11-19.
- Hirayama, K. 1966. **Studies on water control by filtration through sand bed in a marine aquarium with closed circulating system - IV. Rate of pollution of water by fish, and the possible number and weight of fish kept in an aquarium.** *Bulletin of the Japanese Society of Scientific Fisheries* 32(1):20-27.
- Hirayama, K. 1974. **Water control by filtration in closed culture systems.** *Aquaculture* 4:369-385.
- Honn, K.V. and W. Chavin. 1975. **Prototype design for a closed marine system employing quarternary water processing.** *Marine Biology* 31:293-298.
- Illingworth, J., F.M. Patrick, P. Redfearn and D.M. Rodley. 1979. **Construction, operation and performance of a modified diatomaceous earth filter for shellfish hatcheries.** *Aquaculture* 17:181-187.
- Kol'man, R., M. Granops and G. Kol'man. 1990. **Efficiency of water treatment with a biological filter containing diatomite media in a closed system for trout rearing.** *Gidrobiologicheskii Zhurnal* 26(5):28-32.
- Kruner, G. and H. Rosenthal. 1983. **Efficiency of nitrification in trickling filters using different substrates.** *Aquacultural Engineering* 2:49-67.
- Lu, J.D. 1978. **A recirculating aquaculture system.** *Bamidgeh* 30(1):12-22.
- Manthe, D.P. 1991. **Biological rock filter design for closed aquaculture systems.** In: *Fisheries Bioengineering Symposium* by (Eds.) J. Colt and R.J. White, American Fisheries Society Symposium No. 10, Bethesda, MD:386-392.
- Miller, G.E. and G.S. Libey. 1983. **Oxygen recharge and ammonia stripping capabilities of various closed culture configurations.** *Aquacultural Engineering* 2:263-277.
- Miller, G.E. and G.S. Libey. 1984. **Evaluation of a trickling biofilter in a recirculating aquaculture system containing channel catfish.** *Aquacultural Engineering* 3:39-57.
- Miller, G.E. and G.S. Libey. 1985. **Evaluation of three biological filters suitable for aquacultural applications.** *Journal of the World Mariculture Society* 16:158-168.
- Mohapatra, R.K., R.K. Rout and S. Bandyopadhyay. 1989. **Performance of packed column aerator at low hydraulic loading.** *Aquacultural Engineering* 8:393-405.
- Nijhof, M. and J. Bovendeur. 1990. **Fixed film nitrification characteristics in sea-water recirculation fish culture systems.** *Aquaculture* 87:133-143.
- Parisot, T.J. 1967. **A closed recirculated sea-water system.** *The Progressive Fish-Culturist* 29:133-139.

- Poole, B.M. 1983. **Filtration technique for recirculating aquaculture systems.** Journal of the World Mariculture Society 14:485-494.
- Rennert, B. 1987. **Water aeration with trickling filters in recirculating systems.** Zeitschrift fuer die Binnenfischerei der DDR 34(2):42-45.
- Rogers, G.L. and S.L. Klemetson. 1985. **Ammonia removal in selected aquaculture water reuse biofilters.** Aquacultural Engineering 4:135-154.
- Watten, B.J. and R.L. Busch. 1984. **Tropical production of tilapia Sarotherodon aurea and tomatoes Lycopersicon esculentum in a small-scale recirculating water system.** Aquaculture 41:271-283.
- Wickins, J.F. 1985. **Organic and inorganic carbon levels in recycled seawater during the culture of tropical prawns Penaeus sp.** Aquacultural Engineering 4:59-84.
- Submerged Filters
- Anonymous. 1992. **Andritz Sprout-Bauer introduces filter.** The Catfish Journal 7(2):12
- Balakrishnan, S. and W.W. Eckenfelder. 1969. **Nitrogen relationships in biological treatment processes - II. Nitrification in trickling filters.** Water Research 3:167-174.
- Bruce, A.M. 1970. **Some factors affecting the efficiency of high-rate biological filters.** In: Advances in Water Pollution Research by (Ed.) S. Jenkins II, Water Pollution Research Laboratory, Elder Way, Stevenage, Herts, England:II-14/1-8.
- Bruce, A.M., J.C. Merkens and S.C. Macmillan. 1970. **Research developments in high-rate biological filtration.** Journal of Institutions of Public Health Engineers 69:178-207.
- Brune, D.E. and D.G. Gunther. 1981. **The design of a new high rate nitrification filter for aquaculture water reuse.** Journal of the World Mariculture Society 12(1):20-31.
- Coffin, D.E., J.E. Robin and R.F. Malone. 1991. **Effect of backflushing frequency on carrying capacity of upflow low-density media biofilters.** Journal of the World Aquaculture Society 22(3):20.
- Craig, S.R., S.J. Hatch and G.J. Holt. 1990. **Biological filter for conical tanks.** The Progressive Fish-Culturist 52(1):61-62.
- Eden, G.E., G.A. Truesdale and H.T. Mann. 1966. **Biological filtration using a plastic filter medium.** Journal and Proceedings of the Institute of Sewage Purification 31:562-574.
- Eighmy, T.T., M.R. Collins, S.K. Spanos and J. Fenstermacher. 1992. **Microbial populations, activities and carbon metabolism in slow sand filters.** Water Research 26(10):1319-1328.
- Gonzalez-Martinez, S. and J. Duque-Luciano. 1992. **Aerobic submerged biofilm reactors for wastewater treatment.** Water Research 26(6):825-833.
- Hackney, G.E. and J.E. Colt. 1982. **The performance and design of packed column aeration systems for aquaculture.** Aquacultural Engineering 1:275-295.
- Hao, O.J., A.P. Davis and K.K. Phull. 1990. **Biological fixed-film systems.** Journal of the Water Pollution Control Federation 62(4):406-413.

- Hess, W.J. 1981. **Performance ratings for submerged nitrification biofilters - development of a design calculation procedure.** In: Proceedings of the Bio-Engineering Symposium for Fish Culture by (Eds.) L.J. Allen and E.C. Kinney, American Fisheries Society, Fish Culture Section Publication No. 1, Bethesda, MD:63-71.
- Hughes, S.G. and R.C. Williams. 1985. **A pilot-scale reuse system for salmonids.** The Progressive Fish-Culturist 48(2):251-253.
- Lewis, W.M. and R.C. Heidinger. 1981. **Tank Culture of Striped Bass Production Manual.** Fishery Research Laboratory, Southern Illinois University, Carbondale IL. 115 pgs.
- Liao, P.B. and R.D. Mayo. 1974. **Intensified fish culture combining water reconditioning with pollution abatement.** Aquaculture 3:61-85.
- Libey, G.S. and G.E. Miller. 1985. **Comparison of three biofilter types.** American Society of Agricultural Engineers Paper No. 85-5012, St. Joseph, MI. 10 pgs.
- Lorio, W.J. 1990. **Pond recirculation increases fish production.** Aquaculture Magazine 16(2):40-43.
- Lorio, W.J. and P.W. Perschbacher. **Intensive production of channel catfish *Ictalurus punctatus* in ponds by recirculation techniques.** EIFAC/90/ Symposium on Production Enhancement in Still Water Pond Culture, 15-18 May 1990, Prague, Czechoslovakia. (In Press).
- Lorio, W.J. and P.W. Perschbacher. 1991. **Use of recirculation and biofiltration in maintaining water quality in aquaculture ponds.** In: Proceedings of the National Livestock, Poultry and Aquaculture Waste Management Workshop, American Society of Agricultural Engineers, St. Joseph, MI:340-343.
- Lorio, W.J., R.V. Powell and R. Houser. 1991. **ARS pond recirculation studies in Oklahoma: The third year.** Aquaculture Magazine 17(1):46-49.
- Malone, R.F. and D.G. Burden. 1988. **Design of Recirculating Soft Crawfish Shedding Systems.** Louisiana Sea Grant College Program, Center for Wetland Resources, Louisiana State University, Baton Rouge, LA. 74 pgs.
- Malone, R.F. and D.G. Burden. 1989. **Performance of upflow sand filters and a fluidized bed in commercial soft shell crawfish production facilities.** Journal of the World Aquaculture Society 20(1):54.
- Malone, R.F. and D.P. Manthe. 1985. **Chemical addition for accelerated nitrification of biological filters in closed blue crab shedding systems.** In: National Symposium on the Soft-Shelled Blue Crab Fishery:41-47.
- Malone, R.F., J.E. Robin and D.E. Coffin. 1991. **Low density biomedial filtration of a commercial recirculating soft crawfish production facility.** Journal of the World Aquaculture Society 22(3):38.
- Manthe, D.P. and R.F. Malone. 1987. **Chemical addition for accelerated biological filter acclimation in closed blue crab shedding systems.** Aquacultural Engineering 6:227-236.

- Manthe, D.P., R.F. Malone and S. Kumar. 1988. **Submerged rock filter evaluation using an oxygen consumption criterion for closed recirculating systems.** *Aquacultural Engineering* 7:97-111.
- Meade, T.L. 1974. **The Technology of Closed System Culture of Salmonids.** Marine Technical Report No. 30, University of Rhode Island, Kingston, RI.
- Meade, T.L. and B.R. Kenworthy. 1974. **Denitrification in water re-use systems.** *Proceedings of the World Mariculture Society* 5:333-354.
- Menasveta, P., P. Aranyakanonda, S. Rungsupa and N. Moree. 1989. **Maturation and larviculture of penaeid prawns in closed recirculating seawater systems.** *Aquacultural Engineering* 8:357-368.
- Nemoto K. 1981. **Eel culture in a recirculation and filtration system utilizing heated fresh water effluents.** In: *Aquaculture in Heated Effluents and Recirculation Systems, Vol. II*, by (Ed.) K. Tiews, H. Heenemann, Berlin, Germany:437-429.
- New, M.B., J.P. Scholl, J.C. McCarty and J.P. Bennett. 1974. **A recirculation system for experimental aquaria.** *Aquaculture* 3:95-103.
- Nirmalakhandan, N., Y.H. Lee and R.E. Speece. 1988. **Optimizing oxygen absorption and nitrogen desorption in packed towers.** *Aquacultural Engineering* 7:221-234.
- Ogle, J. 1980. **Design and overwintering of a solar heated recirculating marine polyculture system.** *Proceedings World Mariculture Society* 11:135-141.
- Paller, M.H. 1992. **An analytical model for predicting the carrying capacity of submerged biofilters used in aquaculture.** *Journal of Applied Aquaculture* 1(3):1-25.
- Paller, M.H. and W.M. Lewis. 1982. **Reciprocating biofilter for water reuse in aquaculture.** *Aquacultural Engineering* 1:139-151.
- Parker, N.C. and B.A. Simco. 1973. **Evaluation of recirculating systems for the culture of channel catfish.** *Proceedings of the Annual Conference of the Southeastern Association of Game and Fish Commissioners* 27:474-487.
- Porubcan, R.S. 1991. **Reduction of ammonia nitrogen and nitrite in tanks of Penaeus monodon using floating biofilters containing processed diatomaceous earth media pre-inoculated with nitrifying bacteria.** *Journal of the World Aquaculture Society* 22(3):48.
- Pottmann, R.W. and D.E. Crampton. 1989. **Multiple-tank aquarium system with recirculating water for laboratory studies of freshwater fishes.** *The Progressive Fish-Culturist* 51(4):238-243.
- Poxton, M.G., K.R. Murray, B.T. Linfoot and A.B.W. Pooley. 1981. **The design and performance of biological filters in an experimental mariculture facility.** In: *Aquaculture in Heated Effluents and Recirculation Systems, Vol. I* by (Ed.) K. Tiews, H. Heenemann, Berlin, Germany:369-382.
- Rakocy, J.E. 1989. **Vegetable hydroponics and fish culture a productive interface.** *World Aquaculture* 20(3):42-47.

- Risa, S. and H. Skjervold. 1975. **Water re-use system for smolt production.** *Aquaculture* 6:191-195.
- Rogers, G.L. and S.L. Klemetson. 1985. **Ammonia removal in selected aquaculture water reuse biofilters.** *Aquacultural Engineering* 4:135-154.
- Schlegel, S. 1988. **The use of submerged biological filters for nitrification.** *Water Science Technology* 20(4/5):177-187.
- Srna, R.F. 1975. **A modular nitrification filter design based on a study of the kinetics of nitrification of marine bacteria.** *Proceedings of the World Mariculture Society* 6:463-478.
- Sutterlin, A.M., C.Y. Couturier and T. Devereaux. 1984. **A recirculation system using ozone for the culture of Atlantic salmon.** *The Progressive Fish-Culturist* 46(4):239-244.
- Tackett, D.L. 1978. **Water conservation, reuse and use.** *The Commercial Fish Farmer* 4(6):48-49.
- Tomasso, J.R., D.J. Wise and C.R. Weirich. 1990. **Removable biofiltration system for use in hatchery troughs.** *The Progressive Fish-Culturist* 52(1):59-61.
- Uchida, R.N. and J.E. King. 1960. **Tank culture of tilapia.** In: *Fishery Bulletin* No. 199 of the Fish and Wildlife Service, United States Department of Interior, Washington, DC:21-52.
- United States Department of the Interior Fish and Wildlife Service. 1972. **Factors Affecting the Growth and Production of Channel Catfish in Raceways.** United States Department of Commerce Economic Development Administration Technical Assistance Project 14-16-0008-571, Washington, DC. 98 pgs.
- Van Gorder, S.D. and J.D. Fritch. 1980. **Filtration techniques for small-scale aquaculture in a closed system.** *Proceedings of the Annual Conference of the Southeastern Association of Fish and Wildlife Agencies* 34:59-66.
- Verlangieri, A.J., R.M. Lewis, A.W. Bannon and M.C. Wilson. 1988. **Novel biological recycling water purification system for use in fish toxicology studies.** *Bulletin of Environmental Contamination and Toxicology* 40:185-189.
- Vigneswarnan, S., V.L. Casiano and C. Polprasert. 1991. **Application of coarse-media slow sand filtration in aquaculture.** *Water Science Technology* 23:1817-1824.
- Weatherley, L.R. 1984. **Rate models for a marine biological filter.** *Aquacultural Engineering* 3:15-29.
- Yong-liang, Z. 1990. **The development of closed rearing systems in China.** *Aquacultural Engineering* 9:167-173.

Fluidized-bed Filters

Andrews, G. and R. Trapasso. 1985. **The optimal design of fluidized bed bioreactors.** *Journal of the Water Pollution Control Federation* 57(2):143-150.

Burden, D.G. and R.F. Malone. 1988. **Fluidized bed nitrification in recirculating aquaculture systems.** *Journal of the World Aquaculture Society* 9(1):19.

- Chen, S.J., C.T. Li and W.K. Shieh. 1988. **Anaerobic fluidized bed treatment of an industrial wastewater.** Journal of the Water Pollution Control Federation 60(10):1826-1832.
- Coleman, E. 1992. **From lab to market.** Coast & Sea 1(1):4-7.
- Hao, O.J., A.P. Davis and K.K. Phull. 1990. **Biological fixed-film systems.** Journal of the Water Pollution Control Federation 62(4):406-413.
- Jeris, J.S. and R.W. Owens. 1975. **Pilot-scale, high-rate biological denitrification.** Journal of the Water Pollution Control Federation 47(8):2043-2057.
- Jeris, J.S., R.W. Owens and R. Hickey. 1977. **Biological fluidized-bed treatment for BOD and nitrogen removal.** Journal of the Water Pollution Control Federation 49(5):816-831.
- Libey, G.S. and G.E. Miller. 1985. **Comparison of three biofilter types.** American Society of Agricultural Engineers Paper No. 85-5012, St. Joseph, MI. 10 pgs.
- Malone, R. 1992. **The bead filter for aquaculture systems.** Aquafacts. Louisiana Sea Grant, Louisiana State University, Baton Rouge, LA. 2 pgs.
- Malone, R.F. and D.G. Burden. 1988. **Design of Recirculating Blue Crab Shedding Systems.** Louisiana Sea Grant College Program, LSU Center for Wetland Resources, Baton Rouge, LA. 76 pgs.
- Malone, R.F. and D.G. Burden. 1988. **Design of Recirculating Soft Crawfish Shedding Systems.** Louisiana Sea Grant College Program, Center for Wetland Resources, Louisiana State University, Baton Rouge, LA. 74 pgs.
- Malone, R.F. and D.G. Burden. 1989. **Performance of upflow sand filters and a fluidized bed in commercial soft shell crawfish production facilities.** Journal of the World Aquaculture Society 20(1):54.
- Miller, G.E. and G.S. Libey. 1985. **Evaluation of three biological filters suitable for aquacultural applications.** Journal of the World Mariculture Society 16:158-168.
- Nutt, S.G., H. Melcer and J.H. Pries. 1984. **Two-stage biological fluidized bed treatment of coke plant wastewater for nitrogen control.** Journal of the Water Pollution Control Federation 56(7):851-857.
- Owsley, D.F., J.S. Jeris and R. Owens. 1989. **Ammonia removal allows effluent reuse at fish hatchery using fluidized bed reactors.** 43rd Purdue Industrial Waste Conference Proceedings, Lewis Publishers, Inc., Chelsea, MI:449-457.
- Paller, M.H. and W.M. Lewis. 1988. **Use of ozone and fluidized-bed biofilters for increased ammonia removal and fish loading rates.** The Progressive Fish-Culturist 50:141-147.

Charcoal and Zeolite Filters

- Anonymous. 1988. **Ole Miss studies recycling pond water.** The Catfish Journal II(8):11.
- Batchelor, B., P.D. Yang and R. Dennis. 1981. **Potential for treating domestic wastewater for reuse with inorganic oxide adsorbents.** In: Proceedings of the Water Reuse Symposium II, American Water Works Association Research Foundation, Denver, CO:1477-1495.

- Bower, C.E. and D.T. Turner. 1982. **Ammonia removal by clinoptilolite in the transport of ornamental freshwater fishes.** The Progressive Fish-Culturist 44:19-23.
- Bruin, W., J.W. Nightingale, L. Mumaw and D. Leonard. 1981. **Preliminary results and design criteria from an on-line zeolite ammonia removal filter in a semi-closed recirculating system.** In: Proceedings of the Bio-Engineering Symposium for Fish Culture by (Eds.) L.J. Allen and E.C. Kinney, American Fisheries Society, Fish Culture Section Publication No. 1, Bethesda, MD:92-97.
- Dawson, V.K., L.L. Marking and T.D. Bills. 1976. **Removal of toxic chemicals from water with activated carbon.** Transactions of the American Fisheries Society 1:119-123.
- Dryden, H.T. and L.R. Weatherley. 1987. **Aquaculture water treatment by ion-exchange: I. capacity of hector clinoptilolite at 0.01 - 0.05 N.** Aquacultural Engineering 6:39-50.
- Dryden, H.T. and L.R. Weatherley. 1987. **Aquaculture water treatment by ion-exchange: II. Selectivity studies with clinoptilolite at 0.01 N.** Aquacultural Engineering 6:51-68.
- Dryden, H.T. and L.R. Weatherley. 1989. **Aquaculture water treatment by ion exchange: Continuous ammonium ion removal with clinoptilolite.** Aquacultural Engineering 8:109-126.
- Gallop, R.A., A.W. Hydamaka and A.P. Stephen. 1981. **Conservation and reuse of water in the food industries per multi, integrated "closed-loop" processes.** In: Proceedings of the Water Reuse Symposium II, American Water Works Association Research Foundation, Denver, CO:839-861.
- Johnson, P.W. and J.M. Sieburth. 1974. **Ammonia removal by selective ion exchange, a backup system for microbiological filters in closed-system aquaculture.** Aquaculture 4:61-68.
- Jorgensen, S.E., O. Libor, K. Barkacs and L. Kuna. 1978. **Equilibrium and capacity data of clinoptilolite.** Water Research 13:159-165.
- Jorgensen, S.E., O. Libor, K.L. Graber and K. Barkacs. 1976. **Ammonia removal by use of clinoptilolite.** Water Research 10:213-224.
- Joyce, R.S., J.B. Allen and V.A. Sukenik. 1966. **Treatment of municipal wastewater by packed activated carbon beds.** Journal of the Water Pollution Control Federation 38(5):813-823.
- Lucchetti, G.L. and G.A. Gray. 1988. **Prototype water reuse system.** The Progressive Fish-Culturist 50(1):46-49.
- Marking, L.L. 1991. **Development of carbon filtration systems for removal of malachite green.** In: Fisheries Bioengineering Symposium by (Eds.) J. Colt and R.J. White, American Fisheries Society Symposium No. 10, Bethesda, MD:427.
- Marking, L.L. and T.D. Bills. 1982. **Factors affecting the efficiency of clinoptilolite for removing ammonia from water.** The Progressive Fish-Culturist 44(4):187-189.
- Marking L.L. and R.G. Piper. 1976. **Carbon filter for removing therapeutants from hatchery water.** The Progressive Fish-Culturist 38(2):69-72.

- Paller, M.H. and W.M. Lewis. 1988. **Use of ozone and fluidized-bed biofilters for increased ammonia removal and fish loading rates.** The Progressive Fish-Culturist 50:141-147.
- Reynolds, W.R. and C.W. Williford, Jr. 1988. **Zeolite Ammonia Removal from Catfish Pond Waters.** Water Resources Research Institute Technical Completion Report No. G1431-05 Mississippi State University, Mississippi State, MS. 16 pgs.
- Rhodes, W. and J.V. Merriner. 1973. **A preliminary report on closed system rearing of striped bass sac fry to fingerling size.** The Progressive Fish-Culturist 35(4):199-201.
- Seegert, G.L. and A.S. Brooks. 1978. **Dechlorination of water for fish culture: Comparison of the activated carbon, sulfite reduction, and photochemical methods.** Journal of the Fisheries Research Board of Canada 35:88-92.
- Semmens, M.J., J.T. Wang and A.C. Booth. 1977. **Biological regeneration of ammonium-saturated clinoptilolite II. Mechanism of regeneration and influence of salt concentration.** Environmental Science & Technology 11(3):260-265.
- Seymour, A.H. and J.R. Donaldson. 1953. **Occurrence of high mortality among chinook salmon fry after the recharge of a charcoal filter.** The Progressive Fish-Culturist 15:129-130.
- Sharp, R.W. 1951. **Chlorine removal unit at full-scale operating hatchery.** The Progressive Fish-Culturist 13:146-148.
- Slone, W.J., D.B. Jester and P.R. Turner. 1981. **A closed vertical raceway fish cultural system containing clinoptilolite as an ammonia stripper.** In: Proceedings of the Bio-Engineering Symposium for Fish Culture by (Eds.) L.J. Allen and E.C. Kinney, American Fisheries Society, Fish Culture Section Publication No. 1, Bethesda, MD:104-116.
- Watten, B.J. and M.J. English. 1985. **Effects of organic matter in aquacultural wastes on the ammonium exchange capacity of clinoptilolite.** Aquaculture 46:221-235.
- Nitrifying - Denitrifying Bacterial Processes
- Alleman, J. and K. Preston. 1991. **The biology of nitrifying bacteria.** In: Commercial Aquaculture Using Water Recirculating Systems by (Ed.) L. Swan, IL/IN Sea Grant Publication CES 240, Department of Agriculture Communication Service, Purdue University, West Lafayette, IN:1-13.
- Anthonisen, A.C., R.C. Loehr, T.B.S. Prakasam and E.G. Srinath. 1976. **Inhibition of nitrification by ammonia and nitrous acid.** Journal of the Water Pollution Control Federation 48(5):835-852.
- Atkinson, B., E.L. Swilley, A.W. Busch and D.A. Williams. 1967. **Kinetics, mass transfer, and organism growth in a biological film reactor.** Transactions of the Institute of Chemical Engineers 45:257-264.
- Avnimelech, Y., B. Weber, B. Hefner, A. Milstein and M. Zorn. 1988. **Organic matter recycling and nitrogen transformation in circulated fish ponds.** Fisheries Fish Breeders ISR 21(2):3-16.

- Bisogni, J.J., Jr. and M.B. Timmons. 1991. **Control of pH in closed cycle aquaculture systems.** In: Engineering Aspects of Intensive Aquaculture. Northeast Regional Agricultural Engineering Service Publication No. 49, Cooperative Extension, Ithaca, NY:333-348.
- Bower, C.E. and D.T. Turner. 1982. **Effects of seven chemotherapeutic agents on nitrification in closed seawater culture systems.** Aquaculture 29:331-345.
- Bower, C.E. and D.T. Turner. 1983. **Nitrification in closed seawater culture systems after washing of filter beds.** The Progressive Fish-Culturist 45(4):198-200.
- Bower, C.E. and D.T. Turner. 1984. **Evaluation of two commercial nitrification accelerators in closed seawater culture systems.** Aquaculture 41:155-159.
- Brauer, H. and A.P. Annachhatre. 1992. **Nitrification and denitrification in a system of reciprocating jet bioreactor.** Bioprocess Engineering 7:277-286.
- Brauer, H. and A.P. Annachhatre. 1992. **Wastewater nitrification kinetics using reciprocating jet bioreactor.** Bioprocess Engineering 7:269-275.
- Carmignani, G.M. and J.P. Bennett. 1977. **Rapid start-up of a biological filter in a closed aquaculture system.** Aquaculture 11:85-88.
- Collins, M.T., J.B. Gratzek, E.B. Shotts Jr., D.L. Dawe, L.M. Campbell and D.R. Senn. 1975. **Nitrification in an aquatic recirculating system.** Journal of the Fisheries Research Board of Canada 32(11):2025-2031.
- Davies, T.R. 1973. **Isolation of bacteria capable of utilizing methane as a hydrogen donor in the process of denitrification.** Water Research 7:575-579.
- Dawson, R.N. and K.L. Murphy. 1972. **The temperature dependency of biological denitrification.** Water Research 6:71-83.
- Diab, S. and M. Shilo. 1986. **Transformation of nitrogen in sediments of fish ponds in Israel.** Bamidgeh 38(3):67-88.
- Diab, S. and M. Shilo. 1988. **Effect of light on the activity and survival of *Nitrosomonas* sp. and *Nitrobacter* sp. isolates from fish ponds.** The Israeli Journal of Aquaculture-Bamidgeh 40(2):50-56.
- Du Toit, P.J. and T.R. Davies. 1973. **Denitrification studies with laboratory-scale continuous-flow units.** Water Research 7:489-500.
- Ehrlich, K.F., M.C. Cantin and A. Turcotte. 1989. **Bacterial augmentation: Biotechnology to improve aquacultural production and to protect and restore water bodies.** Journal of the World Aquaculture Society 20(1):35.
- Eighmy, T.T., M.R. Collins, S.K. Spanos and J. Fenstermacher. 1992. **Microbial populations, activities and carbon metabolism in slow sand filters.** Water Research 26(10):1319-1328.
- Hiscock, K.M., J.W. Lloyd and D.N. Lerner. 1991. **Review of natural and artificial denitrification of groundwater.** Water Research 25(9):1099-1111.

- Hochheimer, J.N. and F.W. Wheaton. 1991. **Understanding biofilters - practical microbiology for ammonia removal in aquaculture.** In: Engineering Aspects of Intensive Aquaculture. Northeast Regional Agricultural Engineering Service Publication No. 49, Cooperative Extension, Ithaca, NY:57-79.
- Hooper, A.H. and K.R. Terry. 1974. **Photoinactivation of ammonia oxidation in Nitrosomonas.** Journal of Bacteriology 119(3):899-906.
- Horan, N.J. and A.A. Azimi. 1992. **The effects of transient nitrogen loadings on nitrifying activated sludges in completely mixed and plug-flow reactors.** Water Research 26(3):279-284.
- Jacquez, R.B., P.R. Turner, H. El-Reyes and C.M. Lou. 1987. **Characterization and treatment of wastewater generated from saline aquaculture of channel catfish.** Proceedings of the Industrial Waste Conference, Purdue University, West Lafayette, IN 41:530-538.
- Kawai, A., Y. Yoshida and M. Kimata. 1964. **Biochemical studies on the bacteria in aquarium with circulating system - I. Changes of the qualities of breeding water and bacterial population of the aquarium during fish cultivation.** Bulletin of the Japanese Society of Scientific Fisheries 30(1):55-62.
- Kawai, A., Y. Yoshida and M. Kimata. 1965. **Biochemical studies on the bacteria in the aquarium with a circulating system - II. Nitrifying activity of the filter-sand.** Bulletin of the Japanese Society of Scientific Fisheries 31(1):65-71.
- Klontz, G.W. 1981. **Recent advances in evaluating biofilter performance.** In: Proceedings of the Bio-Engineering Symposium for Fish Culture by (Eds.) L.J. Allen and E.C. Kinney, American Fisheries Society, Fish Culture Section Publication No. 1, Bethesda, MD:90-92.
- Knowles, G., A.L. Downing and M.J. Barrett. 1965. **Determination of kinetic constants for nitrifying bacteria in mixed culture, with the aid of an electronic computer.** Journal of General Microbiology 38:263-278.
- Koopman, B., E.P. Lincoln and R.A. Nordstedt. 1981. **Anaerobic-photosynthetic reclamation of swine waste.** In: Proceedings of the Water Reuse Symposium II, American Water Works Association Research Foundation, Denver, CO:924-934.
- Labomascus, D.C., E.H. Robinson and T.C. Linton. 1987. **Use of water conditioners in water-recirculation systems.** The Progressive Fish-Culturist 49(1):64-66.
- Laudelout, H., P.C. Simonart and R.V. Droogenbroeck. 1968. **Calorimetric measurement of free energy utilization by Nitrosomonas and Nitrobacter.** Archives of Microbiology 63:256-277.
- Lee, P.G., P.E. Turk and J. Whitson. 1991. **Computer automation and expert systems for the control of recirculating aquaculture filtration systems.** Journal of the World Aquaculture Society 22(3):35.
- Liao, P.B. 1970. **Salmonid hatchery wastewater treatment.** Water & Sewage Works 117(12):439-443.

- Maier, W. and Kh. Krauth. 1988. **Optimizing nitrification in aeration basins with surface aerators.** Water Science Technology 20(4/5):23-28.
- Malone, R.F. and D.P. Manthe. 1985. **Chemical addition for accelerated nitrification of biological filters in closed blue crab shedding systems.** In: National Symposium on the Soft-Shelled Blue Crab Fishery:41-47.
- Manthe, D.P. and R.F. Malone. 1987. **Chemical addition for accelerated biological filter acclimation in closed blue crab shedding systems.** Aquacultural Engineering 6:227-236.
- McCarty, P.L., L. Beck and P. St. Amant. 1969. **Biological denitrification of wastewaters by addition of organic materials.** Proceedings of the Industrial Waste Conference, Purdue University, West Lafayette, IN 23:1271-1285.
- Meade, T.L. 1974. **The Technology of Closed System Culture of Salmonids.** Marine Technical Report No. 30, University of Rhode Island, Kingston, RI.
- Meade, T.L. and B.R. Kenworthy. 1974. **Denitrification in water re-use systems.** Proceedings of the World Mariculture Society 5:333-354.
- Nelson, D.W., L.B. Owens and R.E. Terry. 1973. **Denitrification as a pathway for nitrate removal in aquatic systems.** Water Resources Research Center Technical Report No. 42, Purdue University, West Lafayette, IN. 82 pgs.
- Nijhof, M. and J. Bovendeur. 1990. **Fixed film nitrification characteristics in sea-water recirculation fish culture systems.** Aquaculture 87:133-143.
- Painter, H.A. 1970. **A review of the literature on the inorganic metabolism in micro-organisms.** Water Research 4:393-450.
- Perfettini, J. and M. Bianchi. 1990. **The comparison of two simple protocols designed to initiate and stimulate ammonia oxidation in closed aquaculture systems.** Aquaculture 88:179- 188.
- Pistelok, F. 1991. **The effect of water recirculation on the rearing conditions of 2-year carp in closed system.** Polskie Archwum Hydrobiologh 38(1):135-150.
- Sawyer, C.N., H.E. Wild, Jr. and T.C. McMahon. 1974. **Nitrification and Denitrification Facilities Wastewater Treatment.** United States Environmental Protection Agency, Washington, DC. 33 pgs.
- Schmitz, O. and H. Kaiser. 1989. **Activation of biofilters for adequate nitrification in recirculating fish culture systems.** Journal of the World Aquaculture Society 20(1):68.
- Sherrard, J.H. and L.D. Benefield. 1976. **Elemental distribution diagrams for biological wastewater treatment.** Journal of the Water Pollution Control Federation 44(3):562-569.
- Siddall, S.E. 1974. **Studies of closed marine culture systems.** The Progressive Fish-Culturist 36(1):8-15.
- Shilo, M. and A. Rimon. 1982. **Factors which affect the intensification of fish breeding in Israel. II. Ammonia transformations in intensive fish ponds.** Bamidgeh 34(3):101-114.

- Shin, H. and H. Jun. 1992. **Development of excess phosphorus removal characteristics in a sequencing batch reactor.** *Water Science Technology* 25(4-5):433-440.
- Smith, J.M., A.N. Masse, W.A. Feige and L.J. Kamphake. 1972. **Nitrogen removal from municipal waste water by columnar denitrification.** *Environmental Science & Technology* 6(3):260-267.
- Srinath, E.G., T.B.S. Prakasam and R.C. Loehr. 1974. **A technique for estimating active nitrifying mass and its application in design nitrifying systems.** *Proceedings of the Industrial Waste Conference, Purdue University, West Lafayette, IN* 28:1038-1048.
- Srna, R.F. and A. Baggaley. 1975. **Kinetic response of perturbed marine nitrification systems.** *Journal of the Water Pollution Control Federation* 47(3):472-486.
- St. Amant, P.P. and P.L. McCarty. 1969. **Treatment of high nitrate waters.** *Journal of the American Water Works Association* 61(12):659-662.
- Stankewich, M.J., Jr. 1972. **Biological nitrification with the high purity oxygenation process.** *Proceedings of the Industrial Waste Conference, Purdue University, West Lafayette, IN* 26:1-23.
- Tam, N.F.Y., Y.S. Wong and G. Leung. 1992. **Effect of exogenous carbon sources on removal of inorganic nutrient by the nitrification-denitrification process.** *Water Resources* 26(9):1229-1236.
- Wanner, J., J.S. Cech and M. Kos. 1992. **New process design for biological nutrient removal.** *Water Science Technology* 25(4-5):445-448.
- Water Environment Federation. 1987. **Anaerobic sludge digestion.** Water Environment Federation, Alexandria, VA. 118 pgs.
- Water Environment Federation. 1990. **Wastewater Biology: The Microlife.** Water Environment Federation, Alexandria, VA. 214 pgs.
- Weatherley, L.R. 1982. **Application of simple dynamic response analysis to a recirculating aquaculture system: A preview.** *Aquacultural Engineering* 1:93-113.
- Weatherley, L.R. 1984. **Rate models for a marine biological filter.** *Aquacultural Engineering* 3:15-29.
- Wheaton, F.W., J.N. Hochheimer, G.E. Kaiser and M.J. Kronos. 1991. **Principles of biological filtration.** In: *Engineering Aspects of Intensive Aquaculture.* Northeast Regional Agricultural Engineering Service Publication No. 49, Cooperative Extension, Ithaca, NY:1-31.
- Whitson, J. and A.L. Lawrence. 1991. **A prediction of feasibility of denitrification of closed recirculating marine systems.** *Journal of the World Aquaculture Society* 22(3):65.
- Wickins, J.F. 1983. **Studies on marine biological filters.** *Water Research* 17(12):1769-1780.
- Wild, H.E. Jr., C.N. Sawyer and T.C. McMahan. 1971. **Factors affecting nitrification kinetics.** *Journal of the Water Pollution Control Federation* 43(9):1845-1854.

- Wilderer, P.A., M.A. Rubio and L. Davids. 1991. **Impact of the addition of pure cultures on the performance of mixed culture reactors.** *Water Research* 25(11):1307-1313.
- Wortman, B. and F. Wheaton. 1991. **Temperature effects on biodrum nitrification.** *Aquacultural Engineering* 10:183-205.
- Yontarsi, T., A. Garcia III and D.E. Brune. 1989. **Thermodynamic considerations of nitrification in a water recirculation system.** *Journal of the World Aquaculture Society* 20(1):82.
- Zickefoose, C. and R.B.J. Hayes. 1977. **Operations Manual - Stabilization Ponds.** United States Environmental Protection Agency, Office of Water Program Operations Publication No. 430/9-77-012, Washington, DC. 42 pgs.
- Organics Removal
- Avnimelech, Y., B. Weber, B. Hefner, A. Milstein and M. Zorn. 1988. **Organic matter recycling and nitrogen transformation in circulated fish ponds.** *Fisheries Fish Breeders ISR* 21(2):3-16.
- Boersen, G. and H. Westers. 1986. **Waste solids control in hatchery raceways.** *The Progressive Fish-Culturist* 48(2):151-154.
- Bohl, M. 1977. **Some initial aquaculture experiments in recirculating water systems.** *Aquaculture* 11:323-328.
- Boon, A.G. and D.R. Burgess. 1972. **Effects of diurnal variation in flow of settled sewage on the performance of high-rate activated-sludge plants.** *Journal of the Water Pollution Control Federation* 71:493-514.
- Brown, C.M. and C.E. Nash. 1981. **Aquaculture as a method for meeting hatchery discharge standards.** In: *Proceedings of the Bio-Engineering Symposium for Fish Culture* by (Eds.) L.J. Allen and E.C. Kinney, American Fisheries Society, Fish Culture Section Publication No.1, Bethesda, MD:183-190.
- Bruchner, G.W. 1981. **Use of infiltration/percolation beds to produce a high quality renovated water in cold climate regions.** In: *Proceedings of the Water Reuse Symposium II*, American Water Works Association Research Foundation, Denver, CO:228-239.
- Burns, D.E., E.R. Baumann and C.S. Oulman. 1970. **Particulate removal on coated filter media.** *Journal of the American Water Works Association* 62:121-126.
- Buttner, J.K. 1986. **Biology of corbicula in catfish rearing ponds.** *American Malacological Bulletin* 2:211-218.
- Camp, T.R. 1946. **Sedimentation and the design of settling tanks.** *Transactions of the American Society of Civil Engineers* 111:895-958.
- Chen, S. and R.F. Malone. 1991. **Suspended solids control in recirculating aquacultural systems.** In: *Engineering Aspects of Intensive Aquaculture*. Northeast Regional Agricultural Engineering Service Publication No. 49, Cooperative Extension, Ithaca, NY:170-186.

- Chesness, J.L., K.S. Obenauf and T.K. Hill. 1975. **Chemical flocculation of catfish raceway effluent.** American Society of Agricultural Engineers Paper No. 75-5541, St. Joseph, MI. 11 pgs.
- Chesness, J.L., W.H. Poole and T.K. Hill. 1975. **Settling basin design for raceway fish production systems.** Transactions of the American Society of Agricultural Engineers 18(1):159-162.
- Cheung, P., K. Krauth and M. Roth. 1980. **Investigation to replace the conventional sedimentation tank by a microstrainer in the rotating disc system.** Water Research 14:67-75.
- Chudoba, J., P. Strakova and M. Kondo. 1991. **Compartmentalized versus completely-mixed biological wastewater treatment systems.** Water Research 25(8):973-978.
- Clift, R.C. and M.T. Garrett. 1988. **Improved oxygen dissolution control for oxygen activated sludge.** Water Science Technology 101-108.
- Diaper, E.W.J. 1969. **Tertiary treatment by microstraining.** Water and Sewage Works 115(6):202-207.
- Ehrlich, K.F., M.C. Cantin and A. Turcotte. 1989. **Bacterial augmentation: Biotechnology to improve aquacultural production and to protect and restore water bodies.** Journal of the World Aquaculture Society 20(1):35.
- Eighmy, T.T., M.R. Collins, S.K. Spanos and J. Fenstermacher. 1992. **Microbial populations, activities and carbon metabolism in slow sand filters.** Water Research 26(10):1319-1328.
- Eisenberg, D.M., J.R. Benemann and W.J. Oswald. 1981. **Recent advances in the utilization of high rate photosynthetic wastewater treatment systems.** In: Proceedings of the Water Reuse Symposium II, American Water Works Association Research Foundation, Denver, CO:1615-1637.
- Fujita, M., M. Ike and S. Hashimoto. 1991. **Feasibility of wastewater treatment using genetically engineered microorganisms.** Water Research 25(8):979-984.
- Goldman, J.C., K.R. Tenore, J.H. Ryther and N. Corwin. 1974. **Inorganic nitrogen removal in a combined tertiary treatment-marine aquaculture system - I. Removal efficiencies.** Water Research 8:45-54.
- Guibai, L. and J. Gregory. 1991. **Flocculation and sedimentation of high-turbidity waters.** Water Research 25(9):1137-1143.
- Hansen, S.P. and G.L. Culp. 1967. **Applying shallow depth sedimentation theory.** Journal of the American Water Works Association 59:1134-1148.
- Henderson, J.P. and N.R. Bromage. 1988. **Optimising the removal of suspended solids from aquacultural effluents in settlement lakes.** Aquacultural Engineering 7:167-181.
- Heukelekian, H., H.E. Orford, and R. Manganelli. 1951. **Factors affecting the quantity of sludge production in the activated sludge process.** Sewage and Industrial Wastes 23(8):945-958.

Hughes, S.G. and R.C. Williams. 1985. **A pilot-scale reuse system for salmonids.** The Progressive Fish-Culturist 48(2):251-253.

Kown, B.T. 1971. **The effects of column height and diameter on the effectiveness of a continuous bubble fractionation system.** Water Research 5:93-102.

Krofta, M. and L.K. Wang. 1981. **Development of an innovative process system for water purification and recycle.** In: Proceedings of the Water Reuse Symposium II, American Water Works Association Research Foundation, Denver, CO:1292-1315.

Kugelman, I.J. and S. Van Gorder. 1991. **Water and energy recycling in closed aquaculture systems.** In: Engineering Aspects of Intensive Aquaculture. Northeast Regional Agricultural Engineering Service Publication No. 49, Cooperative Extension, Ithaca, NY:80-87.

Lewicke, C.K. 1973. **Microstraining water and waste water.** Environmental Science and Technology 7(2):104-105.

Lynam, B., G. Ettelt and T. McAloon. 1968. **Tertiary treatment at metro Chicago by means of rapid sand filtration and microstrainers.** Journal of the Water Pollution Control Federation 41(2):247-279.

Meske, Ch. 1976. **Fish culture in a recirculating system with water treatment by activated sludge.** In: Advances in Aquaculture by (Eds.) T.V.R. Pillay and W.A. Dill, Fishing News Ltd. (Books), Farnham, UK:527-531.

Mudrak, V.A. 1981. **Guidelines for economical commercial fish hatchery**

wastewater treatment systems. In: Proceedings of the Bioengineering Symposium on Fish Culture by (Eds.) L. Allen and E. Kinney, American Fisheries Society, Bethesda, MD:174-182.

Naegel, L.C.A. 1977. **Combined production of fish and plants in recirculating water.** Aquaculture 10:17-24.

Osada, T., K. Haga and Y. Harada. 1991. **Removal of nitrogen and phosphorus from swine wastewater by the activated sludge units with the intermittent aeration process.** Water Research 25(11):1377-1388.

Patry, G.G. and I. Takacs. 1992. **Settling of flocculent suspensions in secondary clarifiers.** Water Research 26(4):473-479.

Scott, K.R. and L. Allard. 1983. **High-flow rate water recirculation system incorporating a hydrocyclone prefilter for rearing fish.** The Progressive Fish-Culturist 45(3):148-153.

Scott, K.R. and L. Allard. 1984. **A four-tank water recirculation system with a hydrocyclone prefilter and a single water reconditioning unit.** The Progressive Fish-Culturist 46(4):254-261.

Short, Z. and P.R. Olson. 1970. **Oyster shells and foam formation used to improve quality of water recirculated in a fish hatchery incubator.** The Progressive Fish-Culturist 32:180-182.

Spies, P.J. and C.F. Seyfried. 1988. **Ammonia controlled activated sludge process for nitrification-denitrification.** Water Science Technology 20(4/5):29-36.

Strand, J.A., J.T. Cummins and B.E. Vaughan. 1967. **A fast-flow sealed disk filter system for marine aquaria.** *Limnology and Oceanography* 14:444-448.

Strumm, W. 1977. **Chemical interaction in particle separation.** *Environmental Science and Technology* 11(12):1066-1070.

Tetzlaff, B. 1991. **Suspended solids filtration.** In: *Commercial Aquaculture Using Water Recirculating Systems* by (Ed.) L. Swann IL/IN Sea Grant Publication CES 240, Department of Agricultural Communication Service, Purdue University, West Lafayette, IN:29-38.

Van Gorder, S. and D.J. Strange. 1981. **Clarification of intensive fish culture systems.** Research Report No. AQ-81-2, Aquaculture Department, Rodale Research Center, Rodale Press Inc., Emmaus, PA. 25 pgs.

Van Gorder, S.D. and D.J. Strange. 1981. **Small-scale fish culture systems: Methods for increased production.** Research Report No. 81-10, Aquaculture Department, Rodale Research Center, Rodale Press Inc., Emmaus, PA. 41 pgs.

Water Environment Federation. 1991. **Operation of Municipal Wastewater Treatment Plants. Volume III - Solids Processes.** Water Environment Federation, Alexandria, VA. 471 pgs.

Zickefoose, C. and R.B.J. Hayes. 1977. **Operations Manual-Stabilization Ponds.** United States Environmental Protection Agency, Office of Water Program Operations Publication No. 430/9-77-012, Washington, DC. 42 pgs.

Hydroponics - Aquatic Plant Filters

Adey, W.H. and K. Loveland. 1991. **Dynamic Aquaria Building Living Ecosystems.** Academic Press, Inc., New York, NY. 643 pgs.

Alderson, R. and B.R. Howell. 1973. **The effect of algae on the water conditions in fish rearing tanks in relation to the growth of juvenile sole, Solea solea (L.).** *Aquaculture* 2:281-288.

Amjad, S. and D.A. Jones. 1989. **Role of algae in conditioning water quality for penaeid larval culture.** *Journal of the World Aquaculture Society* 20(1):12.

Anonymous. 1992. **Oklahoma fish farm announces system.** *The Catfish Journal* 7(3):3.

Baig, N. and E.M. Grenning. 1976. **The use of bacteria to reduce clogging of sewer lines by grease in municipal sewage.** In: *Biological Control of Water Pollution* by (Eds.) J. Toulrier and R.W. Pierson, Jr., University of Pennsylvania Press, Philadelphia, PA:245-252.

Bird, K. 1992. **Aquatic plants new profits aquaculturists.** *Aquaculture Magazine* 18(1):30-40.

Bogaert, R.M. 1981. **Nocturnal dissolved oxygen and un-ionized ammonia cycles in the wastewater fed marshes at Mt. View sanitary district.** In: *Proceedings of the Water Reuse Symposium II*, American Water Works Association Research Foundation, Denver, CO:1669-1692.

- Bouwer, H. 1976. **Improvement of wastewater quality by movement through soils and aquifers.** In: *Biological Control of Water Pollution* by (Eds.) J. Toulter and R.W. Pierson, Jr., University of Pennsylvania Press, Philadelphia, PA:259-268.
- Boyd, C.E. 1969. **The nutritive value of three species of water weeds.** *Economic Botany* 22(2):123-127.
- Boyd, C.E. 1970. **Vascular aquatic plants for mineral nutrient removal from polluted waters.** *Economic Botany* 23(1):95-103.
- Boyd, C.E. 1976. **Accumulation of dry matter, nitrogen, and phosphorus by cultivated water hyacinth.** *Economic Botany* 30:51-56.
- Carpenter, R.L., M.S. Coleman and R. Jarman. 1976. **Aquaculture as an alternative wastewater treatment system.** In: *Biological Control of Water Pollution* by (Eds.) J. Toulter and R.W. Pierson, Jr., University of Pennsylvania Press, Philadelphia, PA. 24:215-224.
- Colt, J., S. Mitchell, G.T. Tchobanoglous and A. Knight. 1979. **The use and potential of aquatic species for wastewater treatment.** California State Water Resources Control Board Publication No. 65, Sacramento, CA. 240 pgs.
- Cornwell, D.A., J. Zoltek, Jr., C.D. Patrinely, T. des Furman and J.I. Kim. 1977. **Nutrient removal by water hyacinth.** *Journal of the Water Pollution Control Federation* 49:57-65.
- Corpron, K.E. and D.A. Armstrong. 1983. **Removal of nitrogen by an aquatic plant, Elodea densa, in recirculating macrobrachium culture systems.** *Aquaculture* 32:347-360.
- Czerwenka, W. and K. Seidel. 1976. **The combination of biological and chemical treatment at the Krefeld Water Treatment Works.** In: *Biological Control of Water Pollution* by (Eds.) J. Toulter and R.W. Pierson, Jr., University of Pennsylvania Press, Philadelphia, PA:287-293.
- Diab, S., M. Kochba, D. Mires and Y. Avnimelech. 1992. **Combined intensive-extensive (CIE) pond system A: Inorganic nitrogen transformations.** *Aquaculture* 101:33-39.
- Dinges, R. 1976. **A proposed integrated biological wastewater treatment system.** In: *Biological Control of Water Pollution* by (Eds.) J. Toulter and R.W. Pierson, Jr., University of Pennsylvania Press, Philadelphia, PA:225-230.
- Drapcho, C.M. and D.E. Brune. 1989. **Design of a partitioned aquaculture system.** American Society of Agricultural Engineers Paper No. 89-7527, St. Joseph, MI. 18 pgs.
- Edwards, P., M.S. Hassan, C.H. Chao and C. Pacharaprakiti. 1992. **Cultivation of duckweeds in septage-loaded earthen ponds.** *Bioresource Technology* 40:109-117.
- Finlayson, M., A. Chick, I. Von Oertzen and D. Mitchell. 1987. **Treatment of piggery effluent by an aquatic plant filter.** *Biological Wastes* 19:179-196.
- Garbisu, C., J.M. Gil, M.J. Bazin, D.O. Hall and J.L. Serra. 1991. **Removal of nitrate from water by foam-immobilized Phormidium laminosum in batch and continuous-flow bioreactors.** *Journal of Applied Phycology* 3:221-234.

- Gearheart, R.A. and B.A. Finney. 1981. **Vascular plants in wetland wastewater treatment systems - a pilot project.** In: Proceedings of the Water Reuse Symposium II, American Water Works Association Research Foundation, Denver, CO:1648-1668.
- Gillette, B. 1992. **South Mississippi producer develops pond filtration system.** The Catfish Journal 6(12):16, 21.
- Goldman, J.C. and J.H. Ryther. 1976. **Waste reclamation in an integrated food chain system.** In: Biological Control of Water Pollution by (Eds.) J. Toulrier and R.W. Pierson, Jr., University of Pennsylvania Press, Philadelphia, PA:197-214.
- Goldman, J.C., K.R. Tenore, J.H. Ryther and N. Corwin. 1974. **Inorganic nitrogen removal in a combined tertiary treatment marine aquaculture system-I. Removal efficiencies.** Water Research 8:45-54.
- Harvey, R.M. and J.L. Fox. 1973. **Nutrient removal using Lemna minor.** Journal of the Water Pollution Control Federation 45(9):1928-1938.
- Honn, K.V. and W. Chavin. 1975. **Prototype design for a closed marine system employing quarternary water processing.** Marine Biology 31:293-298.
- Huebert, D.B. and J.M. Shay. 1991. **The effect of external phosphorus, nitrogen and calcium on growth of Lemna trisulca.** Aquatic Botany 40:175-183.
- Hunt, P.G. and C.R. Lee. 1976. **Land treatment of wastewater by overland flow for improved water quality.** In: Biological Control of Water Pollution by (Eds.) J. Toulrier and R.W. Pierson, Jr., University of Pennsylvania Press, Philadelphia, PA:151-160.
- Huntley, M.E., A.M. Nonomura and J. de la Noue. 1989. **Algal culture systems.** In: Biotreatment of Agricultural Wastewater by (Ed.) M.E. Huntley, CRC Press, Boca Raton, FL:111-130.
- Inara, K. 1992. **Quantitative assessment of natural purification in wetland for linear alkylbenzenesulfonates.** Water Research 26(7):893-898.
- Jewell, W.J., R.M. Kabrick and J.J. Madras. 1981. **Reclamation of wastewater with plants in nutrient films.** In: Proceedings of the Water Reuse Symposium II, American Water Works Association Research Foundation, Denver, CO:1599-1614.
- Jong, J.D. 1976. **The purification of wastewater with the aid of rush or reed ponds.** In: Biological Control of Water Pollution by (Eds.) J. Toulrier and R.W. Pierson, Jr., University of Pennsylvania Press, Philadelphia, PA:133-139.
- Journey, W.K., P. Skillicorn and W. Spira. 1991. **Duckweed Aquaculture and Its Use in Fish Culture and Waste Water Treatment.** Emena Technical Department, Agricultural Division, World Bank, Washington, DC. 68 pgs.
- Knipling, E.B., S.H. West and W.T. Haller. 1970. **Growth characteristics, yield potential, and nutritive content of water hyacinths.** Proceedings of the Soil and Crop Science Society of Florida 30:51-63.

- Koopman, B., E.P. Lincoln and R.A. Nordstedt. 1981. **Anaerobic-photosynthetic reclamation of swine waste.** In: Proceedings of the Water Reuse Symposium II, American Water Works Association Research Foundation, Denver, CO:924-934.
- Lapointe, B.E., L.D. Williams, J.C. Goldman and J.H. Ryther. 1976. **The mass outdoor culture of macroscopic marine algae.** *Aquaculture* 8:9-21.
- Levi, C. 1991. **Growing fish salad. An experiment in integrated aquaculture.** MIT Sea Grant 3(1):15-17.
- Lewis, W.M., J.H. Yopp, A.M. Brandenburg and K.D. Schnoor. 1981. **On the maintenance of water quality for closed fish production systems by means of hydroponically grown vegetable crops.** In: *Aquaculture in Heated Effluents and Recirculation Systems, Vol I*, by (Ed.) K. Tiews, H. Heenemann, Berlin, Germany:121-130.
- Lewis, W.M., J.H. Yopp, H.L. Schramm, Jr. and A.M. Brandenburg. 1978. **Use of hydroponics to maintain quality of recirculated water in a fish culture system.** *Transactions of the American Fisheries Society* 107(1):92-99.
- Llorens, M., J. Saez and A. Soler. 1992. **Influence of thermal stratification on the behaviour of a deep wastewater stabilization pond.** *Water Research* 26(5):569-577.
- Loyacano, H.A., Jr. and R.B. Grosvenor. 1973. **Effects of Chinese waterchestnut in floating rafts on production of channel catfish in plastic pools.** Proceedings of the Annual Conference of the Southeastern Association of Game and Fish Commissioners 27:471-473.
- MacDonald, C.R., T.L. Meade and J.M. Gates. 1975. **A Production Cost Analysis of Closed System Culture of Salmonids.** University of Rhode Island Marine Advisory Service Marine Technical Report No. 41, Narragansett, RI. 11 pgs.
- MacKay, K.T. and W.V. Toever. 1981. **An Ecological approach to a water recirculating system for salmonids: Preliminary experience.** In: Proceedings of the Bio-Engineering Symposium for Fish Culture by (Eds.) L.J. Allen and E.C. Kinney, American Fisheries Society, Fish Culture Section Publication No. 1, Bethesda, MD:249-259.
- McBride, L.J. and R.G. Menzel. 1978. **Nutrient recovery from farm ponds: Hydroponic plant production and other means. A review.** United States Department of Agriculture Agriculture Research Service, Southern Region, New Orleans, LA. 21 pgs.
- McGriff, E.C., Jr. and R.E. McKinney. 1972. **The removal of nutrients and organics by activated algae.** *Water Research* 6:1155-1164.
- McMurty, M.R., P.V. Nelson, D.C. Sanders and L. Hodges. 1990. **Sand culture of vegetables using recirculated aquaculture effluents.** *Applied Agricultural Research* 5(4):280-284.
- McNabb, C.D., Jr. 1976. **The potential of submersed vascular plants for reclamation of wastewater in temperate zone ponds.** In: *Biological Control of Water Pollution* by (Eds.) J. Toulter and R.W. Pierson, Jr., University of Pennsylvania Press, Philadelphia, PA:123-132.

- Mock, C.R., R.A. Neal and B.R. Salser. 1973. **A closed raceway for the culture of shrimp**. Proceedings of the World Mariculture Society 4:247-259.
- Naegel, L.C.A. 1977. **Combined production of fish and plants in recirculating water**. Aquaculture 10:17-24.
- Ogle, J. 1980. **Design and overwintering of a solar heated recirculating marine polyculture system**. Proceedings World Mariculture Society 11:135-141.
- Oron, G., A. De-Vegt. and D. Porath. 1988. **Nitrogen removal and conversion by duckweed grown on waste-water**. Water Resources 22:179-184.
- Oron, G., G. Granoth and D. Porath. 1983. **Intensified controlled fish growth in tanks implementing a multipurpose flow device**. Biotechnology and Bioengineering 25:351-361.
- Oron, G., D. Porath, J. Pollock and A. Richmond. 1981. **Ammonia stripping of fish influent by duckweed in a circulating system**. In: Proceedings of the Water Reuse Symposium II, American Water Works Association Research Foundation, Denver, CO:1638-1647.
- Oron, G., L.R. Wildschut and D. Porath. 1984. **Waste water recycling by duckweed for protein production and effluent renovation**. Water Science Technology 17:803-817.
- Oswald, W.J., P.H. Chen, M.B. Gerhardt, F.B. Green, Y. Nurdogan, D.F. Von Hippel, R.D. Newman, L. Shown and C.S. Tom. 1989. **The role of microalgae in removal of selenate from subsurface tile drainage**. In: Biotreatment of Agricultural Wastewater by (Ed.) M.E.Huntley, CRC Press, Boca Raton, FL:131-142.
- Pierce, B.A. 1980. **Water reuse aquaculture systems in two solar greenhouses in northern Vermont**. Proceedings of the World Mariculture Society 11:118-127.
- Porath, D. and J. Pollock. 1992. **Ammonia stripping by duckweed and its feasibility in circulating aquaculture**. Aquatic Botany 13:125-131.
- Rakocy, J.E. 1988. **Hydroponic lettuce production in a recirculating fish culture system**. Island Perspectives 3:4-10.
- Rakocy, J.E. 1989. **Vegetable hydroponics and fish culture a productive interface**. World Aquaculture 20(3):42-47.
- Rakocy, J.E. 1990. **A recirculating system for tilapia culture and vegetable hydroponics**. In: Proceedings of the Auburn Symposium on Fisheries and Aquaculture by (Eds.) R.O. Smitherman and D. Tave, Department of Research Information, Alabama Agriculture Experiment Station, Auburn University, Auburn, AL:103-114.
- Rakocy, J.E. and R. Allison. 1981. **Evaluation of a closed recirculating system for the culture of tilapia and aquatic macrophytes**. In: Proceedings of the Bio-Engineering Symposium for Fish Culture by (Eds.) L.J. Allen and E.C. Kinney, American Fisheries Society, Fish Culture Section Publication No. 1, Bethesda, MD:296-307.
- Rakocy, J.E., J.A. Hargreaves and D.S. Bailey. 1989. **Effects of hydroponic vegetable production on water quality in a closed recirculating system**. Journal of the World Aquaculture Society 20(1):68.

- Rakocy, J.E., J.A. Hargreaves and D.S. Bailey. 1991. **Comparative water quality dynamics in a recirculating system with solids removal and fixed-film or algal biofiltration.** Journal of the World Aquaculture Society 22(3):49
- Rakocy, J.E., T.M. Losordo and M.P. Masser. 1992. **Recirculating aquaculture tank production systems - integrating fish and plant culture.** SRAC Publication No. 454, Southern Regional Aquaculture Center. 6 pgs.
- Rasmussen, K. 1981. **Culture of whitefish *Coregonus* sp. in recirculated water with reuse of dissolved nutrients.** In: Aquaculture in Heated Effluents and Recirculation Systems, Vol. I, by (Ed.) K. Tiews, H. Heenemann, Berlin, Germany:395-404.
- Redalje, D.G., E.O. Dierr, J. de la Noue, P. Mayzand, A.M. Nonomura and R.C. Cassin. 1989. **Algae as ideal waste removers: Biochemical pathways.** In: Biotreatment of Agricultural Wastewater by (Ed.) M.E. Huntley, CRC Press, Boca Raton, FL:48-51.
- Reddy, K.R. 1984. **Nutrient transformations in aquatic macrophyte filters used for water purification.** In: Proceedings of the Water Reuse Symposium III, AWWA Research Foundation, Denver, CO:660-678.
- Reddy, K.R. and W.F. Debusk. 1984. **Growth characteristics of aquatic macrophytes cultured in nutrient-enriched water: I. Water hyacinth, water lettuce, and pennywort.** Economic Botany 38(2):229-239.
- Reddy, K.R. and W.F. DeBusk. 1985. **Nutrient removal potential for selected aquatic macrophytes.** Journal of Environmental Quality 14(4):459-462.
- Reddy, K.R., P.D. Sacco, D.A. Graetz, K.L. Campbell and L.R. Sinclair. 1982. **Water treatment by an aquatic ecosystem: Nutrient removal by reservoirs and flooded fields.** Environmental Management 6:261-271.
- Rennert, B. and M. Drews. 1989. **A possibility of combined fish and vegetable production in greenhouses.** Advanced Fish Science 8:19-27.
- Ryther, J.H., J.C. Goldman, C.E. Gifford, J.E. Huguenin, A.S. Wing, J.P. Clarnier, L.D. Williams and B.E. Lapointe. 1975. **Physical models of intergrated waste recycling-marine polyculture systems.** Aquaculture 5:163-177.
- Sanders, D.C. 1992. **Production of integrated greenhouse cucumber and fish system.** Hortscience 27(6):587.
- Seidel, K. 1976. **Macrophytes and water purification.** In: Biological Control of Water Pollution by (Eds.) J. Toulrier and R.W. Pierson, Jr., University of Pennsylvania Press, Philadelphia, PA:109-121.
- Serfling, S. and D. Mendola. 1978. **Aquaculture using controlled environment ecosystems.** The Commercial Fish Farmer and Aquaculture News 4(6):15-18.
- Shelbourne, J.E. 1964. **Experimental sea-water systems for rearing fish larvae.** In: Sea-Water Systems for Experimental Aquariums. United States Department of Interior Fish and Wildlife Service, Bureau of Sport Fisheries and Wildlife Research Report No. 63, Washington, DC:81-93.

- Siddall, S.E. 1974. **Studies of closed marine culture systems.** The Progressive Fish-Culturist 36(1):8-15.
- Smith, D.W. and J.B. Marr. 1990. **Lagoons and ponds.** Journal of the Water Pollution Control Federation 62(4):413-416.
- Sopper, W.E. 1976. **Renovation of municipal wastewater for groundwater recharge by the living filter method.** In: Biological Control of Water Pollution by (Eds.) J. Toulter and R.W. Pierson, Jr., University of Pennsylvania Press, Philadelphia, PA:269-281.
- Spangler, F., W. Sloey and C.W. Fetter. 1976. **Experimental use of emergent vegetation for the biological treatment of municipal wastewater in Wisconsin.** In: Biological Control of Water Pollution by (Eds.) J. Toulter and R.W. Pierson, Jr., University of Pennsylvania Press, Philadelphia, PA:161-171.
- Stowell, R., R. Ludwig, J. Colt and G. Tchobanoglous. 1980. **Toward the Rational Design of Aquatic Treatment Systems.** Department of Civil Engineering, University of California, Davis, CA. 59 pgs.
- Stowell, R., R. Ludwig, J. Colt and G. Tchobanoglous. 1981. **Concepts in aquatic treatment system design.** Proceedings of the American Society of Civil Engineers 107(EE5):919-940.
- Sutton, R.J. and W.M. Lewis. 1982. **Further observations on a fish production system that incorporates hydroponically grown plants.** The Progressive Fish-Culturist 44(1):55-59.
- Sutton, R.J. and W.H. Ornes. 1975. **Phosphorus removal from static sewage effluent using duckweed.** Journal of Environmental Quality 4:367-370.
- Sutton, R.J. and W.H. Ornes. 1977. **Growth of Spirodela polyrrhiza in static sewage effluent.** Aquatic Botany 3:231-237.
- Syrett, P.J. 1981. **Nitrogen metabolism of microalgae.** In: Physiological Bases of Phytoplankton Ecology by (Ed.) T. Platt, Canadian Bulletin of Fisheries and Aquatic Sciences:182-210.
- Tucker, C.S., S.W. Lloyd and R.L. Busch. 1984. **Relationships between phytoplankton periodicity and concentrations of total and unionized ammonia in channel catfish ponds.** Hydrobiologia 111:75-79.
- United States Environmental Protection Agency. 1982. **Benefits and Implementation Potential of Wastewater Aquaculture.** Office of Water Regulation and Standards Criteria and Standards Division, Washington, DC. 141 pgs.
- United States Fish and Wildlife Service. 1972. **Factors Affecting the Growth and Production of Channel Catfish in Raceways.** United States Department of Commerce, Economic Development Administration Technical Assistance Project No. 14-16-0008-571, Washington, DC. 98 pgs.
- Vandermeulen, H. and H. Gordin. 1990. **Ammonium uptake using *Ulva* (Chlorophyta) in intensive fishponds systems: Mass culture and treatment of effluent.** Journal of Applied Phycology 2:363-374.

- Van Gorder, S.D. and D.J. Strange. 1981. **Small-scale fish culture systems: Methods for increased production.** Research Report 81-10, Aquaculture Department, Rodale Research Center, Rodale Press Inc., Emmaus, PA. 41 pgs.
- Van Gorder, S. and D. Strange. 1983. **The effects of algae on a recirculation fish culture system and observation trials for summer 1982.** RRC/AQ-83/4, Aquaculture Department, Rodale Research Center, Rodale Press Inc., Emmaus, PA. 32 pgs.
- Van Gorder, S., L. Gusman, D. Strange and D. Bailey. 1985. **The effects of polyculture and fertilization in recirculating systems - summer 1984.** RRC/AQ-84/4, Aquaculture Department, Rodale Research Center, Rodale Press, Inc., Emmaus, PA. 14 pgs.
- Van Toever, W. and K.T. Mackay. 1981. **A modular recirculation hatchery and rearing system for salmonids utilizing ecological design principles.** In: Aquaculture in Heated Effluents and Recirculation Systems, Vol. II, by (Ed.) K. Tiews, H. Heenemann, Berlin, Germany:403-413.
- Wahlquist, H. 1969. **Effect of water hyacinths and fertilization on fish-food organisms and production of bluegill and redear sunfish in experimental ponds.** Proceedings of the Annual Conference of the Southeastern Association of Game and Fish Commissioners 23:373-384.
- Wahlquist, H. 1972. **Production of waterhyacinths and resulting water quality in earthen ponds.** Hyacinth Control Journal 10:9-11.
- Watten, B.J. and R.L. Busch. 1984. **Tropical production of tilapia *Sarotherodon aurea* and tomatoes *Lycopersicon esculentum* in a small-scale recirculating water system.** Aquaculture 41:271-283.
- Watten, B.J. and R.P. Johnson. 1990. **Comparative hydraulics and rearing trial performance of a production scale cross-flow rearing unit.** Aquacultural Engineering 9:245-266.
- Whigham, D.F. and R.L. Simpson. 1976. **The potential use of freshwater tidal marshes in the management of water quality in the Delaware River.** In: Biological Control of Water Pollution by (Eds.) J. Toulter and R.W. Pierson, Jr., University of Pennsylvania Press, Philadelphia, PA:173-186.
- Wolverton, B.C., R.M. Barlow and R.C. McDonald. 1976. **Application of vascular aquatic plants for pollution removal, energy, and food production in biological system.** In: Biological Control of Water Pollution by (Eds.) J. Toulter and R.W. Pierson, Jr., University of Pennsylvania Press, Philadelphia, PA:141-149.
- World Bank. 1991. **Duckweed Aquaculture and Its Use in Fish Culture and Waste Treatment.** Emena Technical Department, Agricultural Division, World Bank, Washington, DC. 68 pgs.
- Yount, J.L. and R.A. Crossman, Jr. 1970. **Eutrophication control by plant harvesting.** Journal of the Water Pollution Control Federation 42(5)173-183.
- Zickefoose, C. and R.B.J. Hayes. 1977. **Operations Manual - Stabilization Ponds.** United States Environmental Protection Agency, Office of Water Program Operations Publication No. 430/9-77-012, Washington, DC. 42 pgs.

Zweig, R.D. 1986. **An integrated fish culture hydroponic vegetable production system.** *Aquaculture Magazine* 12(3):34-40.

Zweig, R.D., J.R. Wolfe, J.H. Todd, D.G. Engstrom and A.M. Doolittle. 1981. **Solar aquaculture: An ecological approach to human food production.** In: *Proceedings of the Bio-Engineering Symposium for Fish Culture* by (Eds.) L.J. Allen and E.C. Kinney, American Fisheries Society, Fish Culture Section Publication No. 1, Bethesda, MD:210-227.

AERATION - CIRCULATION

Pure Oxygen

Ashley, K.I., D.S. Mavinic and K.J. Hall. 1992. **Bench-scale study of oxygen transfer in coarse bubble diffused aeration.** *Water Research* 26(10):1289-1295.

Boersen, G. 1987. **Michigan's use of pure oxygen for gas supersaturation control.** In: *Oxygen Supplementation A New Technology in Fish Culture* by (Eds.) L. Visscher and W. Godby, United States Department of Interior Fish and Wildlife Service Information Bulletin No. 1, Denver, CO. 8 pgs.

Boersen, G. and J. Chesney. 1987. **Engineering consideration in supplemental oxygen.** In: *Oxygen Supplementation A New Technology in Fish Culture* by (Eds.) L. Visscher and W. Godby, United States Department of Interior Fish and Wildlife Service Information Bulletin No. 1, Denver, CO. 7 pgs.

Brock, I.R. 1987. **Use of pure oxygen in fish culture.** In: *Oxygen Supplementation A New Technology in Fish Culture* by (Eds.) L.

Visscher and W. Godby, United States Department of Interior Fish and Wildlife Service Information Bulletin No. 1, Denver, CO. 11 pgs.

Collins, C. 1987. **Using liquid oxygen for increasing channel catfish production in concrete raceways.** *Aquaculture Magazine* 13(1):50-52.

Colt, J. and B. Watten. 1987. **Pure oxygen in fish culture.** In: *Oxygen Supplementation A New Technology in Fish Culture* by (Eds.) L. Visscher and W. Godby, United States Department of Interior Fish and Wildlife Service Information Bulletin No. 1, Denver, Co. 17 pgs.

Colt, J. and B. Watten. 1988. **Applications of pure oxygen in fish culture.** *Aquacultural Engineering* 7:397-441.

Colt, J., W. Dwyer and D. Owsley. 1990. **Injecting pure oxygen into sealed columns - mass transfer modeling.** In: *Oxygen Supplementation A New Technology in Fish Culture* by (Eds.) L. Visscher and W.P. Dwyer, United States Department of Interior Fish and Wildlife Service Information Bulletin No. 2, Denver, CO. 9 pgs.

Creer, R.D. 1989. **Managing a hatchery with oxygen injection.** *Aquaculture Magazine* 15(1):33-36.

Dartez, J. 1990. **Continuous dissolved oxygen monitoring and control systems.** In: *Oxygen Supplementation A New Technology in Fish Culture* by (Eds.) L. Visscher and W.P. Dwyer, United States Department of Interior Fish and Wildlife Service Information Bulletin No. 2, Denver, CO. 4 pgs.

Doulos, S.K. and G.A. Kindschi. 1990. **Effects of oxygen supersaturation on the culture of cutthroat trout, Oncorhynchus clarki Richardson, and rainbow trout, Oncorhynchus mykiss Richardson.** *Aquaculture and Fisheries Management* 21:39-46.

Dwyer, W.P. 1990. **Effects of supersaturated levels of oxygen on ammonia toxicity to trout.** In: *Oxygen Supplementation A New Technology in Fish Culture* by (Eds.) L. Visscher and W.P. Dwyer, United States Department of Interior Fish and Wildlife Service Information Bulletin No. 2, Denver, CO. 9 pgs.

Dwyer, W.P., J. Colt and D.E. Owsley. 1990. **Efficiency of injecting pure oxygen into sealed columns.** United States Department of Interior Fish and Wildlife Service, Bozeman Information Leaflet No. 58, Bozeman, MT. 14 pgs.

Dwyer, W., G.A. Kindschi and C.E. Smith. 1991. **Evaluation of high- and low-pressure oxygen injection techniques.** In: *Fisheries Bioengineering Symposium* by (Eds.) J. Colt and R.J. White, American Fisheries Society Symposium No. 10, Bethesda, MD:428-436.

Edsall, D.A. 1990. **Oxygen induced gas bubble disease in rainbow trout Oncorhynchus mykiss.** In: *Oxygen Supplementation A New Technology in Fish Culture* by (Eds.) L. Visscher and W.P. Dwyer, United States Department of Interior Fish and Wildlife Service Information Bulletin No. 2, Denver, CO. 4 pgs.

Edsall, D.A. and C.E. Smith. 1990. **Effect of demand feeders on performance of rainbow trout reared in oxygen**

supersaturated water. In: *Oxygen Supplementation A New Technology in Fish Culture* by (Eds.) L. Visscher and W.P. Dwyer, United States Department of Interior Fish and Wildlife Service Information Bulletin No. 2, Denver, CO. 8 pgs.

Edsall, D.A. and C.E. Smith. 1990. **Performance of rainbow trout and Snake River cutthroat trout reared in oxygen supersaturated water.** In: *Oxygen Supplementation A New Technology in Fish Culture* by (Eds.) L. Visscher and W.P. Dwyer, United States Department of Interior Fish and Wildlife Service Information Bulletin No. 2, Denver, CO. 18 pgs.

Gowan, R. 1987. **Use of supplemental oxygen to rear chinook in seawater.** In: *Oxygen Supplementation A New Technology in Fish Culture* by (Eds.) L. Visscher and W. Godby, United States Department of Interior Fish and Wildlife Service Information Bulletin No. 1, Denver, CO. 5 pgs.

Haskell, D.C. and L.G. Bouchard. 1956. **A device for emergency aeration of a rearing pond.** *The Progressive Fish-Culturist* 18:107.

Johnson, T. 1987. **Use of pressure swing absorption (PSA).** In: *Oxygen Supplementation A New Technology in Fish Culture* by (Eds.) L. Visscher and W. Godby, United States Department of Interior Fish and Wildlife Service Information Bulletin No. 1, Denver, CO. 8 pgs.

Kindschi, G.A., C.E. Smith and S.K. Doulos. 1989. **Use of the aquatector oxygenation system for improving the quality of fish-rearing water.** *The Progressive Fish-Culturist* 51(3):140-146.

- Klar, G.T. and N.C. Parker. 1990. **Oxygen transfer efficiency of the aquatector and application to warmwater fish culture.** The Progressive Fish-Culturist 52(1):41-45.
- Lorio, W.J. and P.W. Perschbacher. 1991. **The effect of recirculation, biological filtration, and injected oxygen on catfish production in small ponds.** Journal of the World Aquaculture Society 22(3):37.
- Ludwig, B. and G. Gale. 1991. **Evaluation of two methods for oxygenating hatchery water supplies.** In: Fisheries Bioengineering Symposium by (Eds.) J. Colt and R.J. White, American Fisheries Society Symposium No. 10, Bethesda, MD:437-444.
- Meade, J.W., W.F. Krise, D. Erdahl, J. Ortiz and A.J. Becker, Jr. 1991. **Effect of oxygen versus air on fish in serial production.** In: Fisheries Bioengineering Symposium by (Eds.) J. Colt and R.J. White, American Fisheries Society Symposium No. 10, Bethesda, MD:482-486.
- Meade, J.W., B.J. Watten, W.F. Krise and P.W. Halliburton. 1991. **Use of oxygen-filled enclosures for aeration and degassing.** In: Fisheries Bioengineering Symposium by (Eds.) J. Colt and R.J. White, American Fisheries Society Symposium No. 10, Bethesda, MD:459-464.
- Rosenberry, R. 1987. **The big O₂.** Aquaculture Digest April:9-13.
- Schutte, A.R. 1988. **Evaluation of the Aquatector: An oxygenation system for intensive fish culture.** The Progressive Fish-Culturist 50(4):243-245.
- Severson, R.F., J.L. Stark and L.M. Poole. 1987. **Use of oxygen to commercially rear coho salmon.** In: Oxygen Supplementation A New Technology in Fish Culture by (Eds.) L. Visscher and W. Godby, United States Department of Interior Fish and Wildlife Service Information Bulletin No. 1, Denver, CO. 10 pgs.
- Sills, J.B. 1964. **A new method for supplying oxygen to holding tanks.** The Progressive Fish-Culturist 26:166.
- Sowerbutts, B.J. and J.R.M. Forster. 1981. **Gases exchange and reoxygenation.** In: Aquaculture in Heated Effluents and Recirculation Systems Vol. I, by (Ed.) K. Tiews, H. Heenemann, Berlin, Germany:201-215.
- Speece, R.E. 1981. **Management of dissolved oxygen and nitrogen in fish hatchery waters.** In: Proceedings of the Bio-Engineering Symposium for Fish Culture by (Eds.) L.J. Allen and E.C. Kinney, American Fisheries Society, Fish Culture Section Publication No. 1, Bethesda, MD:53-63.
- Speece, R.E., N. Nirmalakhandan and Y. Lee. 1988. **Design for high purity oxygen absorption and nitrogen stripping for fish culture.** Aquacultural Engineering 7:201-210.
- Watten, B.J. 1990. **Design of packed columns for commercial oxygen addition and dissolved nitrogen removal based on effluent criteria.** Aquacultural Engineering 9:305-328.
- Watten, B.J. 1991. **Application of pure oxygen in raceway culture systems.** In: Engineering Aspects of Intensive Aquaculture. Northeast Regional Agricultural Engineering Service Publication No. 49, Cooperative Extension, Ithaca, NY:311-332.

Watten, B.J. and L.T. Beck. 1985. **Modeling gas transfer in a u-tube oxygen absorption system: Effects of off-gas recycling.** *Aquacultural Engineering* 4:271-297.

Watten, B.J. and C.E. Boyd. 1989. **Gas phase axial dispersion in a packed column oxygen absorber.** *Aquacultural Engineering* 8:421-434.

Watten, B.J., J. Colt and C.E. Boyd. 1990. **Impact of dissolved nitrogen and carbon dioxide on the operation of pure oxygen systems.** In: *Oxygen Supplementation A New Technology in Fish Culture* by (Eds.) L. Visscher and W.P. Dwyer, United States Department of Interior Fish and Wildlife Service Information Bulletin No. 2, Denver, CO. 22 pgs.

Watten, B.J., J. Colt and C.E. Boyd. 1991. **Modeling the effect of dissolved nitrogen and carbon dioxide on the performance of pure oxygen absorption systems.** In: *Fisheries Bioengineering Symposium* by (Eds.) J. Colt and R.J. White, American Fisheries Society Symposium No. 10, Bethesda, MD:474-482.

Watten, B.J., J.W. Meade and C.E. Boyd. 1990. **Modelling the effects of serial off-gas reuse on the performance of a hooded surface oxygen absorption system.** *Aquacultural Engineering* 9:97-120.

Westers, H. 1987. **Engineering advances related to new production capabilities in aquaculture.** In: *Oxygen Supplementation A New Technology in Fish Culture* by (Eds.) L. Visscher and W. Godby, United States Department of Interior Fish and Wildlife Service Information Bulletin No. 1, Denver, CO. 10 pgs.

Westers, H. 1987. **The use of pure oxygen in fish hatcheries.** In: *Oxygen Supplementation A New Technology in Fish Culture* by (Eds.) L. Visscher and W. Godby, United States Department of Interior Fish and Wildlife Service Information Bulletin No. 1, Denver, CO. 6 pgs.

Westers, H. 1990. **The role and application of oxygen in intensive fish culture.** In: *Oxygen Supplementation A New Technology in Fish Culture* by (Eds.) L. Visscher and W.P. Dwyer, United States Department of Interior Fish and Wildlife Service Information Bulletin No. 2, Denver, CO. 44 pgs.

Westers, H. 1991. **Application of pure oxygen in recirculating systems.** In: *Commercial Aquaculture Using Water Recirculating Systems* by (Ed.) L. Swann, IL/IN Sea Grant Publication CES 240, Department of Agriculture Communication Service, Purdue University, West Lafayette, IN:57-64.

Westers, H., V. Bennett and J. Copeland. 1987. **Michigan's experience with supplemental oxygen in salmonid rearing.** In: *Oxygen Supplementation A New Technology in Fish Culture* by (Eds.) L. Visscher and W. Godby, United States Department of Interior Fish and Wildlife Service Information Bulletin No. 1, Denver, CO. 5 pgs.

Westers, H., G. Boersen and V. Bennett. 1991. **Design and operation of sealed columns to remove nitrogen and add oxygen.** In: *Fisheries Bioengineering Symposium* by (Eds.) J. Colt and R.J. White, American Fisheries Society Symposium No. 10, Bethesda, MD:445-449.

Aerators - Circulators

Ahmad, T. and C.E. Boyd. 1988. **Design and performance of paddle wheel aerators.** *Aquacultural Engineering* 7:39-62.

Anonymous. 1991. **Researchers testing the horizontal water circulator.** *The Catfish Journal* 6(6):21.

Armstrong, M.S. and C.E. Boyd. 1982. **Oxygen transfer calculations for a tractor-powered paddlewheel aerator.** *Transactions of the American Fisheries Society* 111:361-366.

Arnold, C.R., B. Brawner and M. Pattillo. 1987. **High density recirculating grow-out systems.** In: *Manual on Red Drum Aquaculture* by (Eds.) G.W. Chamberlain, R.J. Miget and M.G. Hoby, Texas Agriculture Extension Service and Sea Grant College:V52-58.

Avnimelech, Y., B. Weber, B. Hefner, A. Milstein and M. Zorn. 1986. **Studies in circulated fish ponds: Organic matter recycling and nitrogen transformation.** *Aquaculture and Fisheries Management* 17:231-242.

Barnard, J.L. and P.G.J. Meiring. 1988. **Dissolved oxygen control in the activated sludge process.** *Water Science Technology* 20(4/5):93-100.

Boyd, C.E. 1982. **Developing better aeration tests for comparison.** *Aquaculture Magazine* 8(4):28-31.

Boyd, C.E. 1990. **Water Quality in Ponds for Aquaculture.** Department of Fisheries and Allied Aquaculture, Alabama Agricultural

Experiment Station, Auburn University, Auburn, AL. 482 pgs.

Boyd, C.E. 1991. **Experiences in evaluating surface and diffused-air aerators.** In: *Fisheries Bioengineering Symposium* by (Eds.) J. Colt and R.J. White, American Fisheries Society Symposium No. 10, Bethesda, MD:465-473.

Boyd, C.E. 1991. **Types of aerators and design considerations.** In: *Commercial Aquaculture Using Water Recirculation Systems* by (Ed.) L. Swann, IL/IN Sea Grant Publication CES 240, Department of Agriculture Communication Service, Purdue University, West Lafayette, IN:39-47.

Boyd, C.E. and T. Ahmad. 1987. **Evaluation of Aerators for Channel Catfish Farming.** Bulletin No. 584, Alabama Agricultural Experiment Station, Auburn University, Auburn, AL. 52 pgs.

Boyd, C.E., T. Ahmad and Z. La-fa. 1988. **Evaluation of plastic pipe, paddle wheel aerators.** *Aquacultural Engineering* 7:63-72.

Boyd, C.E. and H.V. Daniels. 1987. **Performance of surface aerators in saline pond waters.** *The Progressive Fish-Culturist* 49:306-308.

Boyd, C.E. and D.J. Martinson. 1984. **Evaluation of propeller-aspirator-pump aerators.** *Aquaculture* 36:283-292.

Boyd, C.E. and C.S. Tucker. 1979. **Emergency aeration of fish ponds.** *Transaction of the American Fisheries Society* 108:299-306.

Boyd, C.E. and B.J. Watten. 1989. **Aeration systems in aquaculture.** *CRC Critical Reviews in Aquatic Sciences* 1(3):425-472.

- Busch, C.D. 1980. **Water circulation for pond aeration and energy conservation.** Proceedings of the World Mariculture Society 11:93-101.
- Busch, C.D., C.A. Flood, Jr. and R. Allison. 1977. **Multiple paddlewheels influence on fish pond temperature and aeration.** American Society of Agricultural Engineers Paper No. 77-5024, St. Joseph, MI. 10 pgs.
- Busch, C.D. and R.K. Goodman. 1981. **Water circulation - an alternative to emergency aeration.** Journal of the World Mariculture Society 12(1):13-19.
- Busch, C.D., J.L. Koon and R. Allison. 1974. **Aeration, water quality and catfish production.** Transactions of the American Society of Agricultural Engineers 17:433-435.
- Castro, W.E. and P.B. Zielinski. 1980. **Pumping characteristics of small airlift pumps.** Proceedings of the World Mariculture Society 11:163-174.
- Castro, W.E., P.B. Zielinski and P.A. Sandifer. 1975. **Performance characteristics of air lift pumps of short length and small diameter.** Proceedings of the World Mariculture Society 6:451-461.
- Chen, S. 1991. **Bubble size and rising velocity in foam separation and aeration applied to recirculating aquacultural systems.** Journal of the World Aquaculture Society 22(3):19.
- Chesness, J.L., L.J. Fussell and T.K. Hillk. 1973. **Mechanical efficiency of a nozzle aerator.** Transactions of the American Society of Agricultural Engineers 16(1):67-68.
- Chesness, J.L. and J.L. Stephens. 1971. **A model study of gravity flow aerators for catfish raceway systems.** Transactions of the American Society of Agricultural Engineers 14(6):1167-1169,1174.
- Chesness, J.L., J.L. Stephens and T.K. Hill. 1972. **Gravity Flow Aerators for Raceway Fish Culture Systems.** Research Report No. 137, College of Agricultural Experiment Stations, University of Georgia, Athens, GA. 21 pgs.
- Clift, R.C. and M.T. Garrett. 1988. **Improved oxygen dissolution control for oxygen activated sludge.** Water Science Technology 20(4/5):101-108.
- Cochran, J.O. and W.H. Babcock. 1974. **A device for maintaining constant oxygen concentration in flowing water.** The Progressive Fish-Culturist 36(3):177-178.
- Colt, J.E. and G. Bouck. 1984. **Design of packed columns for degassing.** Aquacultural Engineering 3:251-273.
- Colt, J. and C. Orwicz. 1991. **Aeration in intensive culture.** In: Aquaculture and Water Quality by (Eds.) D.E. Brune and J.R. Tomasso, World Aquaculture Society, Baton Rouge, LA:198-271.
- Colt, J. and G. Tchobanoglous. 1981. **Design of aeration systems for aquaculture.** In: Proceedings of the Bio-Engineering Symposium for Fish Culture by (Eds.) L.J. Allen, and E.C. Kinney, American Fisheries Society, Fish Culture Section Publication No. 1, Bethesda, MD:138-148.
- Colt, J. and H. Westers. 1982. **Production of gas supersaturation by aeration.** Transactions of the American Fisheries Society 111:342-360.

- Crunkilton, R. and W. LeGrande. 1978. **Low-cost, large-volume air supply for experimental tanks.** The Progressive Fish-Culturist 40(2):75-76.
- Engle, C. 1992. **Electric floating paddlewheel aerators more efficient, less expensive.** Water Farming Journal 7(5):4-5.
- Fridirici, T.C. and L.T. Beck. 1985. **A self-supporting, inexpensive gravity aerator.** The Progressive Fish-Culturist 47(4):248-250.
- Garton, J.E., R.G. Strecker and R.C. Summerfelt. 1976. **Performance of an axial flow pump for lake destratification.** Proceedings of the Annual Convention of the Southeastern Association of Game and Fish Commissioners 30:336-347.
- Grabbe, S., P. Huppe and D.C. Hempel. 1987. **Evaluation of the pressure aerator.** In: Oxygen Supplementation A New Technology in Fish Culture by (Eds.) L. Visscher and W. Godby, United States Department of Interior Fish and Wildlife Service Information Bulletin No. 1, Denver, CO. 23 pgs.
- Hackney, G.E. and J.E. Colt. 1982. **The performance and design of packed column aeration systems for aquaculture.** Aquacultural Engineering 1:275-295.
- Hale, L.J. 1963. **A fast-flow closed-circuit marine aquarium.** In: United States Department of the Interior Fish and Wildlife Service, Bureau of Sport Fisheries and Wildlife Research Report No. 63, Washington, DC:69-75.
- Hollerman, W.D. and C.E. Boyd. 1980. **Nightly aeration to increase production of channel catfish.** Transactions of the American Fisheries Society 109:446-452.
- Ito, T., J. Toi and Y. Satomi. 1974. **The effect of artificial pond water circulation and feeding on productivity in carp culture ponds.** Bulletin of Freshwater Fisheries Research Laboratory (Tokyo) 24(2):65-77.
- Jensen, G.L., J.D. Bankston and J.W. Jensen. 1992. **Pond aeration.** SRAC Publication No. 370, Southern Regional Aquaculture Center. 3 pgs.
- Jensen, G.L., J.D. Bankston and J.W. Jensen. 1992. **Pond aeration types and uses of aeration equipment.** SRAC Publication No. 371, Southern Regional Aquaculture Center. 4 pgs.
- Kelly, H.D., E.V. Wright, and J.C. Bush. 1983. **Field evaluation of an axial flow pump in channel catfish production ponds.** American Society of Agricultural Engineers Paper No. 83-5039. St. Joseph, MI. 9 pgs.
- Lai-Fa, Z. and C.E. Boyd. 1988. **Nightly aeration to increase the efficiency of channel catfish production.** The Progressive Fish-Culturist 50(4):237-242.
- Laurell, C. and T. Palmgren. 1992. **Experience with rubber membrane diffusers at the Kappala Sewage Treatment Plant.** Water Science Technology 25(4-5):421-422.
- Lawson, T.B., F.E. Baker and J.D. Bankston. 1989. **Recirculating ponds for crawfish culture.** American Society of Agricultural Engineers Paper No. 89-7012, St. Joseph, MI. 7 pgs.
- Lorio, W.J. 1990. **Pond recirculation increases fish production.** Aquaculture Magazine 16(2):40-43.

Lorio, W.J. and P.W. Perschbacher. **Intensive production of channel catfish *Ictalurus punctatus* in ponds by recirculation techniques.** EIFAC/90/Symposium on Production Enhancement in Still Water Pond Culture, 15-18 May 1990, Prague, Czechoslovakia. (In Press).

Lorio, W.J. and P.W. Perschbacher. 1991. **The effect of recirculation, biological filtration, and injected oxygen on catfish production in small ponds.** Journal of the World Aquaculture Society 22(3):37.

Lorio, W.J. and P.W. Perschbacher. 1991. **Use of recirculation and biofiltration in maintaining water quality in aquaculture ponds.** In: Proceedings of the National Livestock, Poultry and Aquaculture Waste Management Workshop, American Society of Agricultural Engineers, St. Joseph, MI:340-343.

Lorio, W.J., R.V. Powell and R. Houser. 1991. **ARS pond recirculation studies in Oklahoma: The third year.** Aquaculture Magazine 17(1):46-49.

Ludwig, B. and G. Gale. 1991. **Evaluation of two methods for oxygenating hatchery water supplies.** In: Fisheries Bioengineering Symposium by (Eds.) J. Colt and R.J. White, American Fisheries Society Symposium No. 10, Bethesda, MD:437-444.

MacKinlay, D.D. 1991. **Bulk box aerators: Advantages and design.** In: Fisheries Bioengineering Symposium by (Eds.) J. Colt and R.J. White, American Fisheries Society Symposium No. 10, Bethesda, MD:450-458.

Maier, W. and Kh. Krauth. 1988. **Optimizing nitrification in aeration basins**

with surface aerators. Water Science Technology 20(4/5):23-28.

Martin, J.F. 1992. **New approaches studied for off-flavor management.** The Aquaculture News 6(6):9-10.

Matsuoka, H., S. Fukada and K. Toda. 1992. **High oxygen transfer rate in new aeration system using hollow fiber membrane.** Biotechnology and Bioengineering 40:346-362.

Mavinic, D.S. and J.K. Bewtra. 1971. **Oxygen transfer efficiency in counter and co-current air-water flow.** Proceedings of the Canadian Symposium on Water Pollution Research 6:229-248.

Meade, J.W., W.F. Krise, D. Erdahl, J. Ortiz and A.J. Becker, Jr. 1991. **Effect of oxygen versus air on fish in serial production.** In: Fisheries Bioengineering Symposium by (Eds.) J. Colt and R.J. White, American Fisheries Society Symposium No. 10, Bethesda, MD:482-486.

Mearns, G. 1992. **Circulator may enhance pond aeration.** Water Farming Journal 7(5):4.

Miller, G.E. and G.S. Libey. 1983. **Oxygen recharge and ammonia stripping capabilities of various closed culture configurations.** Aquacultural Engineering 2:263-277.

Milstein, A. 1990. **Water quality in an intensive outdoor commercial fish culture system with mechanically stirred ponds.** The Israeli Journal of Aquaculture - Bamidgah 42(4):99-109.

Mires, D. and Y. Amit. 1990. **Water quality in a recycled intensive fish culture system under field conditions.** The Israeli Journal of Aquaculture - Bamidgah 42(4):110-121.

- Mitchell, P.E. and A.M. Kirby, Jr. 1976. **Performance characteristics of pond aeration devices.** Proceedings of the World Mariculture Society 8:561-582.
- Mock, C.R., R.A. Neal and B.R. Salser. 1973. **A closed raceway for the culture of shrimp.** Proceedings of the World Mariculture Society 4:247-259.
- Mohapatra, R.K., R.K. Rout and S. Bandyopadhyay. 1989. **Performance of packed column aerator at low hydraulic loading.** Aquacultural Engineering 8:393-405.
- Morrissy, N.M. 1979. **Experimental pond production of morron, Cherax tenuimanus Smith. Decapoda: Parastacidae.** Aquaculture 16:319-344.
- Murray, K.R., M.G. Poxton, B.T. Linfoot and D.W. Watret. 1981. **The design and performance of low pressure air lift pumps in a closed marine recirculation system.** In: Aquaculture in Heated Effluents and Recirculation Systems, Vol. I, by (Eds.) K. Tiews and H. Heenemann, Berlin, Germany:413-427.
- Nicklin, D.J. 1963. **The air-lift pump: Theory and optimization.** Transactions of the Institute of Chemical Engineers 41:29-39.
- Oron, G., G. Granoth and D. Porath. 1983. **Intensified controlled fish growth in tanks implementing a multipurpose flow device.** Biotechnology and Bioengineering 25:351-361.
- Parker, N.C. 1979. **Channel catfish production in continuously aerated ponds.** Proceedings of the Fish Farming Conference and Annual Convention of the Catfish Farmers of Texas 1979:39-52.
- Parker, N.C. 1979. **Striped bass culture in continuously aerated ponds.** Proceedings of the Annual Conference of the Southeastern Association of Fish and Wildlife Agencies 33:353-360.
- Parker, N.C. 1981. **An air-operated fish culture system with water-reuse and subsurface silos.** In: Proceedings of the Bio-Engineering Symposium for Fish Culture by (Eds.) L.J. Allen and E.C. Kinney, American Fisheries Society, Fish Culture Section Publication No. 1, Bethesda, MD:131-137.
- Parker, N.C. 1981. **Performance of four aeration devices in channel catfish ponds.** In: Catfish Farmers of America Research Workshop:8-9.
- Parker, N.C. 1982. **Airlift Pumps Powered by Regenerative Blowers as a Means of Aeration in Aquaculture Ponds.** United States Department of Fish and Wildlife Service Information Bulletin No. 82-35, Washington, DC. 2 pgs.
- Parker, N.C. 1983. **Airlift pumps and other aeration techniques.** In: Water Quality in Channel Catfish Ponds by (Ed.) C.S. Tucker, Southern Cooperative Service Bulletin No. 290, Mississippi Agriculture and Forestry Experiment Station, Mississippi State University, Mississippi State, MS:24-27.
- Parker, N.C. 1991. **Airlift pumps in recirculating systems.** In: Commercial Aquaculture Using Water Recirculating Systems by (Ed.) L. Swann, IL/IN Sea Grant Publication CES 240, Department of Agriculture Communication Service, Purdue University, West Lafayette, IN: 48-56.

- Parker, N.C., M.A. Suttle and K. Fitzmayer. 1984. **Total gas pressure and oxygen and nitrogen saturation in warmwater ponds aerated with airlift pumps.** *Aquacultural Engineering* 3:91-102.
- Parker, N.C. and M.A. Suttle. 1987. **Design of airlift pumps for water circulation and aeration in aquaculture.** *Aquacultural Engineering* 6:97-110.
- Petrille, J. and C.E. Boyd. 1984. **Comparisons of oxygen-transfer rates and water circulating capabilities of emergency aerators for fish ponds.** *Aquaculture* 37:377-386.
- Plemmons, B. and J.W. Avault, Jr. 1980. **Six tons of catfish per acre with constant aeration.** *Louisiana Agriculture* 23:6-7&9.
- Rappaport, A., S. Sarig and M. Marek. 1976. **Results of tests of various aeration systems on the oxygen regime in the genosar experimental ponds and growth of fish there in 1975.** *Bamidgeh* 28(3):35-49.
- Reinemann, D.J. and M.B. Timons. 1989. **Prediction of oxygen transfer and total dissolved gas pressure in airlift pumping.** *Aquacultural Engineering* 8:29-46.
- Rennert, B. 1987. **Water aeration with trickling filters in recirculating systems.** *Zeitschrift fuer die Binnenfischerei der DDR* 34(2):42-45.
- Rogers, G.L. 1989. **Aeration and circulation for effective aquaculture pond management.** *Aquacultural Engineering* 8:349-355.
- Rogers, G.L. and A.W. Fast. 1988. **Potential benefits of low energy water circulation in Hawaiian prawn ponds.** *Aquacultural Engineering* 7:155-165.
- Rogers, G.L., C.P. Madenjian and A.W. Fast. 1991. **Estimation of oxygen transfer rates for mechanical aerators in brackishwater aquaculture ponds.** *Journal of Applied Aquaculture* 1(2):63-77.
- Ruttanagosrigit, W., Y. Musig, C.E. Boyd and L. Sukchareon. 1991. **Effect of salinity on oxygen transfer by propeller-aspirator-pump and paddle wheel aerators used in shrimp farming.** *Aquacultural Engineering* 10:121-131.
- Scott, K.R. 1972. **Comparison of the efficiency of various aeration devices for oxygenation of water in aquaria.** *Journal of the Fisheries Research Board of Canada* 29(11):1641-1643.
- Shell, G. and T. Cassady. 1973. **Selecting mechanical aerators.** *Industrial Water Engineering* 10(4):21-25.
- Shelton, J.L., Jr. and C.E. Boyd. 1983. **Correction factors for calculating oxygen-transfer rates of pond aerators.** *Transactions of the American Fisheries Society* 112:120-122.
- Shepherd, B.G. and D.D. MacKinloy. 1988. **Integrated aeration systems.** *The Progressive Fish-Culturist* 50(1):61-63.
- Soderberg, R.W. 1982. **Aeration of water supplies for fish culture in flowing water.** *The Progressive Fish-Culturist* 44(2):89-93.
- Sowerbutts, B.J. and J.R.M. Forster. 1981. **Gases exchange and reoxygenation.** In: *Aquaculture in Heated Effluents and Recirculation Systems, Vol. I*, by (Ed.) K. Tiews, H. Heenemann, Berlin, Germany:201-215.

Speece, R.E. 1981. **Management of dissolved oxygen and nitrogen in fish hatchery waters.** In: Proceedings of the Bio-Engineering Symposium for Fish Culture by (Eds.) L.J. Allen and E.C. Kinney, American Fisheries Society, Fish Culture Section Publication No. 1, Bethesda, MD:53-63.

Steichen, J.M., J.E. Garton and C.E. Rice. 1979. **The effect of lake destratification on water quality.** Journal of the American Water Works Association 71:219-225.

Stone, N. 1991. **Water circulation in catfish production ponds.** Arkansas Aquafarming 9(3):4.

Symons, J.M., J.K. Carswell and G.G. Robeck. 1970. **Mixing of water supply reservoirs for quality control.** Journal of the American Water Works Association 62(1-6):322-334.

Szyper, J.P. and C.K. Lin. 1990. **Techniques for assessment of stratification and effects of mechanical mixing in tropical fish ponds.** Aquacultural Engineering 9:151-165.

Tebbutt, T.H.Y. 1972. **Some studies on reaeration in cascades.** Water Research 6:297-304.

Thomforde, H.W. and C.E. Boyd. 1991. **Effects of aeration on water quality and channel catfish production.** The Israeli Journal of Aquaculture - Bamidgeh 43(1):3-26.

Vandermeulen, H. 1992. **Design and testing of a propellor aerator for reservoirs.** Water Research 26(6):857-861.

Warriner, R. 1988. **Oxygen transfer measurements and air distribution for an aeration basin with fine bubble diffusers.** Water Science Technology 20(4/5):77-84.

Wold, E. 1973. **Surface agitators as a means to reduce nitrogen gas in a hatchery water supply.** The Progressive Fish-Culturist 35(3):143-146.

Wurts, W.A., S.G. McNeill and D.G. Overhults. 1992. **Performance characteristics of airlift pumps in the field.** In: Proceedings of the National Extension Aquaculture Workshop. Texas Agriculture Extension Service, Texas A&M University, College Station, TX:Facilities 1-6.

Wyban, J.A., G.D. Pruder and K.M. Leber. 1989. **Paddlewheel effects on shrimp growth, production and crop value in commercial earthen ponds.** Journal of The World Aquaculture Society 20(1):18-23.

ASSOCIATED TECHNOLOGY

Anonymous. 1992. **Instrumentation management is limited primarily by your priorities, faith and budget.** Water Farming Journal 7(5):7,10.

Anonymous. 1992. **Sensors-with all of their challenges-remain the core of the system.** Water Farming Journal 7(5):8,10.

Baklien, A. 1989. **Floating raceway.** World Aquaculture 20(1):75-76.

Balchem, J.G. 1988. **Instrumentation, information and control systems in aquaculture.** In: Instrumentation in Aquaculture by (Eds.) J.A. Wyban and E. Antill, Oceanic Institute, Honolulu, HI:1-10.

Blair, A. and W.H. Burgess. 1979. **Rotating, floating cage for fish culture simplifies cleaning and replacement of panels.** The Progressive Fish-Culturist 41(2):74-76.

Bouck, G.R. 1982. **Gasometer: An inexpensive device for continuous monitoring of dissolved gases and supersaturation.** Transactions of the American Fisheries Society 111:505-516.

Brandt, T.M. and J.C. Morrow. 1987. **Drain modifications and a crowding net for circular tanks.** The Progressive Fish-Culturist 49(1):73-75.

Brauhn, J., K. Hamel, B. Kohler and D. Miller. 1975. **A portable high-pressure cleaner for tanks and raceways.** The Progressive Fish-Culturist 37(4):234-235.

Brown, P. 1990. **Nutrition and feeding.** In: Regional Workshop on Commercial Fish Culture Using Water Reuse Systems by (Ed.) L. Swann, IL/IN Sea Grant Publication CES-237, Department of Agricultural Communication Service, Purdue University, West Lafayette, IN:49-52.

Burley, R. and A. Klapsis. 1985. **Flow distribution studies in fish rearing tanks. Part 2-analysis of hydraulic performance of 1m square tanks.** Aquacultural Engineering 4:113-134.

Cripps, S.J. and M.G. Poxton. 1992. **A review of the design and performance of tanks relevant to flatfish culture.** Aquacultural Engineering 11:71-91.

Dartez, J. 1988. **Continuous dissolved oxygen monitoring and control systems for aquaculture.** In: Instrumentation in

Aquaculture by (Eds.) J.A. Wyban and E. Antill, Oceanic Institute, Honolulu, HI:45-53.

DeFoe, D.L. 1977. **Temperature safety device for aquatic laboratory systems.** The Progressive Fish-Culturist 39(3):131.

Ebeling, J.M. 1991. **A computer based water quality monitoring and management system for pond aquaculture.** In: Engineering Aspects of Intensive Aquaculture. Northeast Regional Agricultural Engineering Service Publication No. 49, Cooperative Extension, Ithaca, NY:233-248.

Ebeling, J.M. 1991. **Computer monitoring of water quality.** In: Commercial Aquaculture Using Water Recirculating Systems by (Ed.) L. Swann, IL/IN Sea Grant Publication CES 240, Department of Agriculture Communication Service, Purdue University, West Lafayette, IN: 108-121.

Ebeling, J.M. 1992. **Computer monitoring of recirculation systems "an alarming thought".** In: Proceedings of the National Extension Aquaculture Workshop. Texas Agricultural Extension Service, Texas A&M University, College Station, TX:Facilities 31-35.

Ebeling, J.M. and T.M. Lasordo. 1988. **Continuous environmental monitoring systems for aquaculture.** In: Instrumentation in Aquaculture by (Eds.) J.A. Wyban and E. Antill, Oceanic Institute, Honolulu, HI:54-70.

Edsall, D.A. and C.E. Smith. 1990. **Effect of demand feeders on performance of rainbow trout reared in oxygen supersaturated water.** In: Oxygen Supplementation A New Technology in Fish Culture by (Eds.) L. Visscher, and W.P. Dwyer, United States Department of Interior Fish and Wildlife Service Information Bulletin No. 2, Denver, CO. 8 pgs.

- Everest, F.H. 1982. **Two economical photoperiod controls for laboratory studies.** *The Progressive Fish-Culturist* 44(2):113-114.
- Fridley, R.B. and C.E. Bordner. 1988. **Opportunities for automation and control in aquaculture.** In: *Instrumentation in Aquaculture* by (Eds.) J.A. Wyban and E. Antill, Oceanic Institute, Honolulu, HI:11-24.
- Fuss, J.T. 1983. **Evaluation of a heat pump for an aquacultural application.** *The Progressive Fish-Culturist* 45(2):121-123.
- Gaigher, I.G., D. Porath and G. Granoth. 1984. **Evaluation of duckweed (Lemna gibba) as feed for tilapia (Oreochromis niloticus x O. aureus) in a recirculating unit.** *Aquaculture* 41:235-244.
- Gibbs, C.R. 1991. **Advances in on-line water quality monitoring.** In: *Aquaculture and Water Quality* by (Eds.) D.E. Brune and J.R. Tomasso, World Aquaculture Society, Baton Rouge, LA:304-321.
- Goss, L.B. and R.J. Ruane. 1975. **Factors to consider in designing a high-density catfish raceway system.** *American Society of Agricultural Engineers Paper No. 75-5540*, St. Joseph, MI. 19 pgs.
- Harrell, R.M., J.N. Hochheimer, D.W. Meritt and D.A. Rhoades. 1989. **A new system for control of temperature and salinity for experimental and production tank culture.** *Aquacultural Engineering* 8:155-163.
- Hawke, S.P. and M.S. Field-Dodgson. 1987. **Simple low-cost circular ponds.** *The Progressive Fish-Culturist* 49(1):75-76.
- Heard, W.R. and F.H. Salter. 1978. **Simple venturi device for mixing freshwater and seawater in an estuarine culture system.** *The Progressive Fish-Culturist* 40(3):101-103.
- Hoy, J.B. 1985. **A microcomputer-based system for feed control, temperature control and temperature recording in an experimental fish hatchery.** *Computers and Electronics in Agriculture* 1:105-109.
- Hueguenin, J.E. 1977. **Heat exchangers for use in culturing of marine organisms.** *Chesapeake Science* 17(1):61-64.
- Jordan, C.T. and A.J. Sonski. 1987. **Hatchery alarm system for monitoring air pressure.** *The Progressive Fish-Culturist* 49(2):152-154.
- Kaiser, G.E. and F.W. Wheaton. 1991. **Engineering Aspects of water quality monitoring and control.** In: *Engineering Aspects of Intensive Aquaculture*. Northeast Regional Agricultural Engineering Service Publication No. 49, Cooperative Extension, Ithaca, NY:201-232.
- Kaiser, G.E., F.W. Wheaton and B. Wortman. 1991. **Automated water quality analysis and control.** In: *Fisheries Bioengineering Symposium* by (Eds.) J. Colt and R.J. White, American Fisheries Society Symposium No. 10, Bethesda, MD:507-515.
- Kerr, N.M. 1981. **Design of equipment and selection of materials - an engineer's assessment.** In: *Aquaculture in Heated Effluents and Recirculation Systems, Vol I*, by (Ed.) K. Tiews, H. Heenemann, Berlin, Germany:151-171.
- Kinghorn, B.P. 1982. **Central system for monitoring the quality of water from many sources.** *The Progressive Fish-Culturist* 44(1):30-32.

- Klapsis, A. and R. Burley. 1984. **Flow distribution studies in fish rearing tanks. Part 1 Design Constraints.** *Aquacultural Engineering* 3:103-118.
- Krise, W.F., W.J. Ridge and L.J. Mengel. 1991. **System for continuously monitoring dissolved gas in multiple water sources.** In: *Fisheries Bioengineering Symposium* by (Eds.) J. Colt and R.J. White, American Fisheries Society Symposium No. 10, Bethesda, MD:495-506.
- Lawson, T.B., C.M. Drapcho, S. McNamara, H.J. Braud, and W.R. Wolters. 1989. **A heat exchange system for spawning red drum.** *Aquacultural Engineering* 8:177-191.
- Lee, P.G. 1991. **Automation of aquaculture systems: A review and practical guide to implementation.** In: *Engineering Aspects of Intensive Aquaculture. Northeast Regional Agricultural Engineering Service Publication No. 49, Cooperative Extension, Ithaca, NY:284-300.*
- Lee, P.G., P.E. Turk and J. Whitson. 1991. **Computer automation and expert systems for the control of recirculating aquaculture filtration systems.** *Journal of the World Aquaculture Society* 22(3):35.
- Lovell, R.T. 1973. **Essentiality of vitamin C in feeds for intensively fed caged channel catfish.** *Journal of Nutrition* 103(1):134-138.
- Martinez-Palacios, C.A., A. Flores and M.A. Olvera. 1987. **Inexpensive pressure-drop detector for water recirculation systems.** *The Progressive Fish-Culturist* 49(3):239-240.
- McCarter, N.H. 1990. **Inexpensive sensors for a hatchery alarm system.** *The Progressive Fish-Culturist* 52:136-139.
- McCraen, J.P. and R.M. Jones. 1978. **Suggested approach to computing and reporting loading densities for fish transport units.** *The Progressive Fish-Culturist* 40(4):169.
- McIntosh, D. 1992. **Guidelines for establishing a monitoring/ controlling system on an aquaculture farm.** *Water Farming Journal* 7(7):20.
- McLean, W.E., J.O.T. Jensen and P.J. Rombough. 1991. **Microcomputer models for salmonid hatcheries.** In: *Fisheries Bioengineering Symposium* by (Eds.) J. Colt and R.J. White, American Fisheries Society Symposium No. 10, Bethesda, MD:516-528.
- Meade, J.W. 1988. **A bioassay for production capacity assessment.** *Aquacultural Engineering* 7:139-146.
- Millett, K.M., J.G. Trial and J.G. Stanley. 1983. **Inexpensive monitor for aeration motors and transportation tanks.** *The Progressive Fish-Culturist* 45(1):59-60.
- Morrison, J.R., B.Q. Epps, W. Peters and W. Ward. 1992. **Design and performance evaluation of a hatchery water-heating system that incorporates a two-stage heat pump.** *The Progressive Fish-Culturist* 54:208-211.
- Omar, E.A. and K.D. Gunther. 1987. **Studies on feeding of mirror carp *Cyprinus carpio* L. in intensive culture 2. Effects of frequency and increased levels of feeding.** *Journal of Animal Physiology and Animal Nutrition*:172-180.

- Parker, N.C. and G.A. Jackson. 1980. **External standpipe drain system for fish tanks.** *The Progressive Fish-Culturist* 42(1):53-54.
- Perfettini, J. and M. Bianchi. 1990. **The comparison of two simple protocols designed to initiate and stimulate ammonia oxidation in closed aquaculture systems.** *Aquaculture* 88:179-188.
- Raymond, L.P. 1990. **Commercial shellfish finishing within an inland, closed system.** *Journal of Shellfish Research* 9(1):239-255.
- Ribakoff, S. and C. Pelton. 1977. **Solid-state environmental controller for aquaculture systems (SECAS).** *The Progressive Fish-Culturist* 39(3):109-111.
- Rosati, R. 1991. **Converting livestock production buildings for aquaculture.** In: *Commercial Aquaculture Using Water Recirculating Systems* by (Ed.) L. Swann, IL/IN Sea Grant Publication CES 240, Department of Agriculture Communication, Purdue University, West Lafayette, IN:92-107.
- Rusch, K.A. and R.F. Malone. 1988. **Development of an automated continuous algal culture production system.** In: *Instrumentation in Aquaculture* by (Eds) J.A. Wyban and E. Antill, Oceanic Institute, Honolulu, HI:71-83.
- Savage, C.R. and R.J. Petrell. 1991. **Computer interfaces for two water quality meters commonly used in marine aquaculture.** In: *Engineering Aspects of Intensive Aquaculture.* Northeast Regional Agricultural Engineering Service Publication No. 49, Cooperative Extension, Ithaca, NY:256-270.
- Schuur, A.M. 1991. **A bioenergetic model for application to intensive fish culture system management.** In: *Fisheries Bioengineering Symposium* by (Eds.) J. Colt and R.J. White, American Fisheries Society Symposium No. 10, Bethesda, MD:393-401.
- Shepherd, B.G. and J.G. Morris. 1987. **A review of practical emergency procedures for fish culturists.** *Aquacultural Engineering* 6:155-169.
- Smith, Q. and I.W. Jones. 1970. **Turning-vane brush for recirculating ponds.** *The Progressive Fish-Culturist* 32(2):119-120.
- Statler, D.P. 1982. **Use of self-feeders for rearing steelhead trout at Dworshak National Fish Hatchery.** *Progressive Fish-Culturist* 44(4):195.
- Stickney, R.R. and N.K. Person. 1985. **An efficient heating method for recirculating water systems.** *The Progressive Fish-Culturist* 47(1):71-73.
- Stine, P.A. 1978. **Hatchery alarm system to protect against catastrophic egg or fish kills.** *The Progressive Fish-Culturist* 40(4):167-168.
- Stone, E.T. and D.D. MacKinlay. 1991. **An inexpensive water inflow meter for rearing troughs.** *The Progressive Fish-Culturist* 53:51-53.
- Strange, D.J. and S.V. Gorder. 1984. **Demand feeding in a recirculating fish culture system and summer 1983 observations.** RRC/AI-84/2, Rodale Research Center, Rodale Press Inc., Emmaus, PA. 20 pgs.

Tackett, D.L. 1974. **Yield of channel catfish and composition of effluents from shallow-water raceways.** The Progressive Fish-Culturist 36(1):46-48.

Theis, G.L. 1976. **Motorized crowding system for hatchery raceways.** The Progressive Fish-Culturist 38(1):46-47.

Tipping, J.M., R.L. Rathvon and S.T. Moore. 1986. **Use of demand feeders on large steelhead rearing ponds.** The Progressive Fish-Culturist 48(4): 303-304.

Trosclair, C. 1992. **Instrumentation: The force that will power aquaculture's wave into the future.** Water Farming Journal 7(5):8.

Water Environment Federation. 1984. **Prime movers: Engines, motors, turbines, pumps, blowers and generators.** Water Environment Federation, Alexandria, VA. 181 pgs.

Watten, B.J. and L.T. Beck. 1987. **Comparative hydraulics of a rectangular cross-flow rearing unit.** Aquacultural Engineering 6:127-140.

Wheaton, F. 1977. **Aquacultural Engineering.** John Wiley and Sons, NY, NY. 708 pgs.

White, T.B. 1990. **Practical management of recirculated culture facilities.** Bulletin of the Aquaculture Association of Canada 7:90-93.

Woods, L.C., III, J.H. Kerby, M.T. Huish and G. M. Gafford. 1981. **Circular tank for intensive culture of hybrid striped bass.** The Progressive Fish-Culturist 43(4):199-200.

Wyban, J.A. 1988. **Current and future use of instrumentation in U.S. aquaculture.** In: Instrumentation in Aquaculture by (Eds.) J.A. Wyban and E. Antill, Oceanic Institute, Honolulu, HI:84-100.

Yang, J.Y. 1981. **Nonlinear programming for analyzing wastewater reclamation and reuse systems.** In: Proceedings of the Water Reuse Symposium II, American Water Works Association Research Foundation, Denver, CO:2500-2526.

Yuschak, P. and F.M. Richards. 1987. **Passive solar system for maintaining and rearing marine organisms.** The Progressive Fish-Culturist 49(2):146-152.

PRODUCTION SYSTEMS

Fish

Allen, K.O., and R.R. Carter. 1976. **Polyculture of channel catfish, Tilapia, and hybrid buffalo in divided raceways.** The Progressive Fish-Culturist 38(4):188-191.

Allison, R., J.E. Rakocy and D.D. Moss. 1981. **A comparison of two closed recirculating systems for the culture of tilapia.** In: Advances in Food Producing Systems for Arid and Semiarid Lands, Academic Press, New York, Inc., NY:979-1019.

Allison, R., R.O. Smitherman and J. Cabrero. 1976. **Effects of high density culture and form of feed on reproduction and yield of Tilapia aurea.** In: Advances in Aquaculture by (Eds.) T.V.R. Pillay and W.A. Dill, Fishing News (Books), Farnham, UK:168-170.

- Anonymous. 1980. **Fish farm in a factory basement.** Fish Farming International September:16-19.
- Anonymous. 1991. **Cornell develops finfish recirculating system priced under \$4,000.** Water Farming Journal 6(8):12.
- Anonymous. 1992. **Exploring an indoor tank system for tilapia.** Water Farming Journal 7(2):11-12.
- Anonymous. 1992. **NAIAD'S water re-use system producing huge harvests.** Water Farming Journal 7(5):5,17.
- Anonymous. 1992. **Richard Pratt adds tilapia to catfish operation.** The Catfish Journal 7(1):14.
- Avault, J.W., Jr. 1989. **Research report: How will fish be grown in the future?** Aquaculture Magazine 15(1):57-59.
- Ayles, G.B., K.R. Scott, J. Barica and J.G.I. Lark. 1981. **Combination of a solar collector with water recirculation units in a fish culture operation.** In: Aquaculture in Heated Effluents and Recirculation Systems, Vol. I, by (Ed.) K. Tiews, H. Heenemann, Berlin, Germany:309-325.
- Bjorn, R. 1989. **Start-feeding of Atlantic salmon in a water recycling plant.** Aquacultural Engineering 8:241-256.
- Bovendeur, J., E.H. Eding and A.M. Henken. 1987. **Design and performance of a water recirculation system for high-density culture of the African catfish *Clarias gariepinus* (Burchell 1822).** Aquaculture 63:329-353.
- Breder, C.M., Jr. 1963. **Miniature circulating systems for small laboratory aquariums.** In: United States Department of the Interior Fish and Wildlife Service, Bureau of Sport Fisheries and Wildlife Research Report No. 63, Washington, DC:39-53.
- Broussard, M.C., Jr., N.C. Parker and B.A. Simco. 1973. **Culture of channel catfish in a high flow recirculating system.** Proceedings of the Annual Conference of the Southeastern Association of Game and Fish Commissioners 27:745-750.
- Broussard, M.C., Jr. and B.A. Simco. 1976. **High-density culture of channel catfish in a recirculating system.** The Progressive Fish-Culturist 38(3):138-141.
- Brown, E.E., J.L. Chesness and S.R. Chapman. 1971. **Raceway and pond economics.** In: Conference Proceedings Producing and Marketing Catfish in the Tennessee Valley, Tennessee Valley Authority, Knoxville, TN:90-93.
- Burrows, R.E. 1971. **Reconditioning and water recirculation techniques for use in Atlantic salmon rearing.** In: International Atlantic Salmon Foundation:83-88.
- Burrows, R.E. and H.H. Chenoweth. 1970. **The rectangular circulating rearing pond.** The Progressive Fish-Culturist 32(2):67-80.
- Burrows, R.E. and B.P. Combs. 1968. **Controlled environments for salmon propagation.** The Progressive Fish-Culturist 30(3):123-136.
- Buss, K., D.R. Graff and E.R. Miller. 1970. **Trout culture in vertical units.** The Progressive Fish-Culturist 32(4):187-191.

- Buttner, J.K. 1986. **Biology of corbicula in catfish rearing ponds.** American Malacological Bulletin 2:211-218.
- Carreon, J.A., L.V. Laureta, F.A. Estocapio and T.U. Abalos. 1984. **Milkfish seedling survival in raceways of freshwater recirculating systems.** Aquaculture 36:257-272.
- Chesness, J.L., W.H. Poole and T.K. Hill. 1975. **Settling basin design for raceway fish production systems.** Transactions of the American Society of Agricultural Engineers 18(1):159-162.
- Crandall, T., C.A. Busack and G.A.E. Gall. 1981. **An easily constructed recirculating aquarium system for research requiring many small groups of animals.** Aquaculture 22:193-199.
- Csavas, I. and L. Varadi. 1981. **Design and operation of a large-scale experimental recycling system heated with geothermal energy at the fish culture research institute, Szarvas, Hungary.** In: Aquaculture in Heated Effluents and Recirculation Systems by (Ed.) K. Tiew, H. Heenemann, Berlin, Germany:445-454.
- Diab, S., M. Kochba, D. Mires and Y. Avnimelech. 1992. **Combined intensive-extensive (CIE) pond system A: Inorganic nitrogen transformations.** Aquaculture 101:33-39.
- Dezoni, G., D. Levanon and A. Meltzer. 1988. **Influence of high loading density on growth and survival of European glass eels.** The Progressive Fish-Culturist 50(3):178-182.
- Doulos, S.K. and G.A. Kindschi. 1990. **Effects of oxygen supersaturation on the culture of cutthroat trout, Oncorhynchus clarki Richardson, and rainbow trout, Oncorhynchus mykiss Richardson.** Aquaculture and Fisheries Management 21:39-46.
- Drapcho, C.M. and D.E. Brune. 1989. **Design of a partitioned aquaculture system.** American Society of Agricultural Engineers Paper No. 89-7527, St. Joseph, MI. 18 pgs.
- Dreschel, T.W., C.R. Bauer, M.S. Koller and J.C. Sager. 1991. **A prototype closed aquaculture system for controlled ecological life support applications.** In: Engineering Aspects of Intensive Aquaculture, Northeast Regional Agricultural Engineering Service Publication No. 49, Cooperative Extension, Ithaca, NY:48-56.
- Eikebrokk, B. 1991. **System BIOFISH - the future way of water reuse in fish farming.** Journal of the World Aquaculture Society 22(3):23.
- Ellison, D.G., J.A. Gleim and D. Kapke. 1983. **Overwintering threadfin shad through intensive culture.** The Progressive Fish-Culturist 45(2):90-93.
- Epifanio, C.E., G. Pruder, M. Hartman and R. Srna. 1973. **An interdisciplinary study on the feasibility of recirculating systems in mariculture.** Proceedings of the World Mariculture Society 4:37-52.
- Giudice, J.J. 1966. **An inexpensive recirculating water system.** The Progressive Fish-Culturist 28:28.

- Hall, M.D. 1971. **Design and operation of a fish barn.** American Society of Agricultural Engineers Paper No. 71A553, St. Joseph, MI. 7 pgs.
- Hall, M.D. 1972. **The fish barn.** Agricultural Engineering 53(5):16.
- Heinen, J.M. and J.A. Hankins. 1991. **Evaluation of recirculating fish culture systems utilizing cross-flow raceways, multi-stage oxygenators, microscreen particulate filters, and fluidized-bed biofilters.** Journal of the World Aquaculture Society 22(3):29.
- Heinsbroek, L.T.N. and A. Kamstra. 1990. **Design and performance of water recirculation systems for eel culture.** Aquacultural Engineering 9:187-207.
- Helfrich, L.A. and G. Libey. 1991. **Fish Farming in Recirculating Aquaculture Systems (RAS).** Virginia State Publication No. 420-008, Cooperative Extension, Virginia Polytechnic Institute, Blacksburg, VA. 23 pgs.
- Henderson-Arzapalo, A. and R.R. Stickney. 1979. **Effects of stocking density on two tilapia species raised in an intensive culture system.** Proceeding of the Annual Conference of the Southeastern Association of Fish and Wildlife Agencies 34:379-387.
- Hepher, B. 1985. **Aquaculture intensification under land and water limitations.** GeoJournal 10(3):253-259.
- Hilge, V. 1976. **Biological and economic aspects of fish production in a closed warm-water system.** In: Advances in Aquaculture by (Eds.) T.V.R. Pillay and W.A. Dill, Fishing News Ltd. (Books), Farnham, UK:505-508.
- Hilge, V. 1981. **Rearing of channel catfish *Ictalurus punctatus* Rafinesque in a closed warm water system.** In: Aquaculture in Heated Effluents and Recirculation Systems, Vol.II, by (Ed.) K. Tiews, H. Heenemann, Berlin, Germany: 178-184.
- Hill, T.K. 1976. **An experiment in growing rainbow trout in recirculated water.** In: Advances in Aquaculture by (Eds.) T.V.R. Pillay and W.A. Dill, Fishing News Ltd. (Books), Farnham, UK:523-525.
- Hill, T.K., J.L. Chesness and E.E. Brown. 1972. **Utilization of rainbow trout, *Salmo gairdnerii* Richardson, in a double-crop fish culture system in south Georgia.** Proceedings of the Annual Conference of the Southeastern Association of Game and Fish Commissioners 26:368-377.
- Hill, T.K., J.L. Chesness and E.E. Brown. 1973. **A two-crop fish production system.** Transactions of the American Society of Agricultural Engineers 16(5):930-933.
- Hirayama, K. 1966. **Studies on water control by filtration through sand bed in a marine aquarium with closed circulating system-IV. Rate of pollution of water by fish, and the possible number and weight of fish kept in an aquarium.** Bulletin of the Japanese Society of Scientific Fisheries 32(1):20-27.
- Holmberg, L. 1980. **Fish farm in a factory basement.** Fish Farming International 7:16-19.
- Honn, K.V. and W. Chavin. 1975. **Prototype design for a closed marine system employing quarternary water processing.** Marine Biology 31:293-298.

- Hope, S.J. 1982. **Holding Atlantic menhaden in a closed system for environmental research.** The Progressive Fish-Culturist 44(1):50-52.
- Hughes, S.G. and R.C. Williams. 1985. **A pilot-scale reuse system for salmonids.** The Progressive Fish-Culturist 48(2):251-253.
- Jernelov, A., H. Kossmann and J. Martin. 1980. **Sweden develops a closed system.** Fish Farming International 7(4):7.
- Kaiser, H., G. Moskwa and O. Schmitz. 1989. **Growth of trout in a recirculated system with pH-stabilization by denitrification.** Journal of the World Aquaculture Society 20(1):46.
- Kugelman, I.J. and S. Van Gorder. 1991. **Water and energy recycling in closed aquaculture systems.** In: Engineering Aspects of Intensive Aquaculture. Northeast Regional Publication No. 49, Cooperative Extension, Ithaca, NY:80-87.
- Levi, C. 1991. **Growing fish salad. An experiment in integrated aquaculture.** MIT Sea Grant 3(1):15-17.
- Lewis, W.M. and G.L. Buynak. 1976. **Evaluation of a revolving plate type biofilter for use in recirculated fish production and holding units.** Transactions of the American Fisheries Society 6:704-708.
- Lewis, W.M. and R.C. Heidinger. 1981. **Tank Culture of Striped Bass Production Manual.** Fishery Research Laboratory, Southern Illinois University, Carbondale, IL. 115 pgs.
- Lewis, W.M., J.H. Yopp, A.M. Brandenburg and K.D. Schnoor. 1981. **On the maintenance of water quality for closed fish production systems by means of hydroponically grown vegetable crops.** In: Aquaculture in Heated Effluents and Recirculation Systems, Vol I, by (Ed.) K. Tiews, H. Heenemann, Berlin, Germany:121-130.
- Loadman, N.L., J.A. Mathias and G.E.E. Moodie. 1989. **Method for intensive culture of walleye.** The Progressive Fish-Culturist 51(1):1-10.
- Lorio, W.J. 1990. **Pond recirculation increases fish production.** Aquaculture Magazine 16(2):40-43.
- Lorio, W.J. and P.W. Perschbacher. **Intensive production of channel catfish *Ictalurus punctatus* in ponds by recirculation techniques.** EIFAC/90/Symposium on Production Enhancement in Still Water Pond Culture, 15-18 May 1990, Prague, Czechoslovakia. (In Press).
- Lorio, W.J. and P.W. Perschbacher. 1991. **The effect of recirculation, biological filtration, and injected oxygen on catfish production in small ponds.** Journal of the World Aquaculture Society 22(3):37.
- Lorio, W.J. and P.W. Perschbacher. 1991. **Use of recirculation and biofiltration in maintaining water quality in aquaculture ponds.** In: Proceedings of the National Livestock, Poultry and Aquaculture Waste Management Workshop, American Society of Agricultural Engineers, St. Joseph, MI:340-343.
- Lorio, W.J., R.V. Powell and R. Houser. 1991. **ARS pond recirculation studies in Oklahoma: The third year.** Aquaculture Magazine 17(1):46-49.

- Losordo T.M. 1991. **An introduction to recirculating production systems design.** In: Engineering Aspects of Intensive Aquaculture. Northeast Regional Agricultural Engineering Service Publication No. 49, Cooperative Extension, Ithaca, NY:32-47.
- Lucchetti, G.L. and G.A. Gray. 1988. **Prototype water reuse system.** The Progressive Fish-Culturist 50(1):46-49.
- Ludwig, G.M. and H.E. Bryant. 1987. **Two-pond polyculture: May be a more profitable way to raise minnows and catfish.** Aquaculture Magazine 13(4):59-62.
- MacDonald, C.R., T.L. Meade and J.M. Gates. 1975. **A Production Cost Analysis of Closed System Culture of Salmonids.** Marine Advisory Service Technical Report No. 41, University of Rhode Island, Narragansett, RI. 11 pgs.
- Mackay, K.T. and W.V. Toever. 1981. **An ecological approach to a water recirculating system for salmonids: Preliminary experience.** In: Proceedings of the Bio-Engineering Symposium for Fish Culture by (Eds.) L.J. Allen and E.C. Kinney, American Fisheries Society, Fish Culture Section Publication No. 1, Bethesda, MD:249-259.
- Masser, M. and K. Yoo. 1992. **Summary of prototype floating raceway culture system for channel catfish - 1991.** In: Proceedings of the National Extension Workshop. Texas Agricultural Extension Service, Texas A&M University, College Station, TX:Facilities 7-9.
- McCrimmon, H.R. and A.H. Berst. 1966. **A water recirculation unit for use in fishery laboratories.** The Fish-Culturist 28:165-170.
- McLarney, W. 1984. **The Freshwater Aquaculture Book.** Hartley & Marks, Point Roberts, WA. 583 pgs.
- Meade, T.L. 1974. **The Technology of Closed System Culture of Salmonids.** Marine Technical Report No. 30, University of Rhode Island, Kingston, RI.
- Meske, Ch. 1976. **Fish culture in a recirculating system with water treatment by activated sludge.** In: Advances in Aquaculture by (Eds.) T.V.R. Pillay and W.A. Dill, Fishing News Ltd. (Books), Farnham, UK:527-531.
- Miller, G.E. and G.S. Libey. 1984. **Evaluation of a trickling biofilter in a recirculating aquaculture system containing channel catfish.** Aquacultural Engineering 3:39-57.
- Milstein, A. 1990. **Water quality in an intensive outdoor commercial fish culture system with mechanically stirred ponds.** The Israeli Journal of Aquaculture - Bamidgeh 42(4):99-109.
- Mires, D. and Y. Amit. 1990. **Water quality in a recycled intensive fish culture system under field conditions.** The Israeli Journal of Aquaculture - Bamidgeh 42(4):110-121.
- Moller, D. and O. Bjerk. 1981. **Smolt production in a recirculation system in Northern Norway.** In: Aquaculture in Heated Effluents and Recirculation Systems, Vol. II, by (Ed.) K. Tiews, H. Heenemann, Berlin, Germany:415-429.
- Naegel, L.C.A. 1977. **Combined production of fish and plants in recirculating water.** Aquaculture 10:17-24.

Nemoto, K. 1981. **Eel culture in a recirculation and filtration system utilizing heated fresh water effluents.** In: *Aquaculture in Heated Effluents and Recirculation Systems, Vol. II*, (Ed.) K. Tiews, H. Heenemann, Berlin, Germany:437-429.

Neori, A., M.D. Krom, I. Cohen and H. Gordin. 1989. **Water quality conditions and particulate chlorophyll a of new intensive seawater fishponds in Eilat, Israel: Daily and diel variations.** *Aquaculture* 80:63-78.

New, M.B., J.P. Scholl, J.C. McCarty and J.P. Bennett. 1974. **A recirculation system for experimental aquaria.** *Aquaculture* 3:95-103.

Ogle, J. 1980. **Design and overwintering of a solar heated recirculating marine polyculture system.** *Proceedings of the World Mariculture Society* 11:135-141.

Oron, G., G. Granoth and D. Porath. 1983. **Intensified controlled fish growth in tanks implementing a multipurpose flow device.** *Biotechnology and Bioengineering* 25:351-361.

Otte, G. and H. Rosenthal. 1979. **Management of a closed brackish water system for high-density fish culture by biological and chemical water treatment.** *Aquaculture* 18:169-181.

Papoutsoglou, S.E., G. Petropoulos and R. Barbieri. 1992. **Polyculture rearing of Cyprinus carpio (L.) and Oreochromis aureus (St.) using a closed circulated system.** *Aquaculture* 103:311-320.

Parisot, T.J. 1967. **A closed recirculated sea-water system.** *The Progressive Fish-Culturist* 29:133-139.

Parker, N.C. 1979. **Channel catfish production in continuously aerated ponds.** *Proceedings of the Fish Farming Conference and Annual Convention of the Catfish Farmers of Texas* 1979:39-52.

Parker, N.C. 1979. **Striped bass culture in continuously aerated ponds.** *Proceedings of the Annual Conference of the Southeastern Association of Fish and Wildlife Agencies* 33:353-360.

Parker, N.C. 1981. **An air-operated fish culture system with water-reuse and subsurface silos.** In: *Proceedings of the Bio-Engineering Symposium for Fish Culture* by (Eds.) L.J. Allen and E.C. Kinney, American Fisheries Society, Fish Culture Section Publication No. 1, Bethesda, MD:131-137.

Pierce, B.A. 1980. **Water reuse aquaculture systems in two solar greenhouses in northern Vermont.** *Proceedings World Mariculture Society* 11:118-127.

Pistelok, F. 1991. **The effect of water recirculation on the rearing conditions of 2-year carp in closed system.** *Polskie Archwum Hydrobiologh* 38(1):135-150.

Poston, H.A. and R.C. Williams. 1988. **Interrelations of oxygen concentration, fish density, and performance of Atlantic salmon in ozonated water reuse system.** *The Progressive Fish-Culturist* 50(2):69-77.

- Pottmann, R.W. and D.E. Crampton. 1989. **Multiple-tank aquarium system with recirculating water for laboratory studies of freshwater fishes.** The Progressive Fish-Culturist 51(4):238-243.
- Poxton, M.G., K.R. Murray and B.T. Linfoot. 1982. **The growth of turbot (*Scophthalmus maximus*) in recirculating systems.** Aquacultural Engineering 1:23-34.
- Provenzano, A.J., Jr. and J.G. Winfield. 1987. **Performance of a recirculating fish production system stocked with tilapia hybrids.** Aquacultural Engineering 6:15-26.
- Pruginin, Y., L. Fishelson, and A. Koren. 1988. **Intensive tilapia farming in brackishwater from an Israeli desert aquifer.** In: The Second International Symposium on Tilapia in Aquaculture by (Eds.) R.S.V. Pullin, T. Bhukaswan, K. Tonguthai and J.L. Maclean, ICLARM, Manila, Philippines:75-81.
- Rakocy, J.E. 1989. **Tank Culture of Tilapia.** SRAC Publication No. 282, Southern Regional Aquaculture Center. 4 pgs.
- Rakocy, J.E. 1989. **Vegetable hydroponics and fish culture a productive interface.** World Aquaculture 20(3):42-47.
- Rakocy, J.E. 1990. **A recirculating system for tilapia culture and vegetable hydroponics.** In: Proceedings Auburn Symposium on Fisheries and Aquaculture by (Eds.) R.O. Smitherman and D. Tave, Department of Research Information, Alabama Agriculture Experiment Station, Auburn University, Auburn, AL:103-114.
- Rakocy, J.E. and R. Allison. 1981. **Evaluation of a closed recirculating system for the culture of tilapia and aquatic macrophytes.** In: Proceedings of the Bio-Engineering Symposium for Fish Culture by (Eds.) L.J. Allen and E.C. Kinney, American Fisheries Society, Fish Culture Section Publication No. 1, Bethesda, MD:296-307.
- Rasmussen, K. 1981. **Culture of whitefish *Coregonus* sp. in recirculated water with reuse of dissolved nutrients.** In: Aquaculture in Heated Effluents and Recirculation Systems, Vol. I, by (Ed.) K. Tiews, H. Heenemann, Berlin, Germany:395-404.
- Rennert, B. and M. Drews. 1989. **A possibility of combined fish and vegetable production in greenhouses.** Advanced Fish Science 8:19-27.
- Rhodes, W. and J.V. Merriner. 1973. **A preliminary report on closed system rearing of striped bass sac fry to fingerling size.** The Progressive Fish-Culturist 35(4):199-201.
- Risa, S. and H. Skjervold. 1975. **Water re-use system for smolt production.** Aquaculture 6:191-195.
- Rosati, R., P. O'Rourke and R.D. Henry. 1989. **Commercial tilapia production in a water reuse system.** American Society of Agricultural Engineers Paper No. 89-7531, St. Joseph, MI. 4 pgs.
- Rosenthal, H., R. Andjus and G. Kruner. 1981. **Daily variations of water quality parameters under intensive culture conditions in a recycling system.** In: Aquaculture in Heated Effluents and Recirculation Systems, Vol. I, by (Ed.) K. Tiews, H. Heenemann, Berlin, Germany:113-119.
- Rusten, B. 1989. **Start-feeding of Atlantic salmon in a water recycling plant.** Aquacultural Engineering 8:241-256.

- Saeki, A. 1965. **Studies on fish culture in filtered closed-circulating aquaria II - on the carp culture experiments in the systems.** Bulletin of the Japanese Society of Scientific Fisheries 31(11):916-923.
- Sawyer, E.S. and P.J. Sawyer. 1981. **A water reuse hatchery for smolt production.** In: Proceedings of the Water Reuse Symposium II, American Water Works Association Research Foundation, Denver, CO:895-907.
- Schliedler, R.A. 1984. **Environmentally controlled seawater systems for maintaining large marine finfish.** Progressive Fish-Culturist 46(4):285-288.
- Schmitz, O. 1989. **Breeding and growth of rainbow trout Salmo gairdnerii Richardson in a closed recirculating fish culture system.** Journal of the World Aquaculture Society 20(1):68.
- Scott, K.R. and L. Allard. 1983. **High-flow rate water recirculation system incorporating a hydrocyclone prefilter for rearing fish.** The Progressive Fish-Culturist 45(3):148-153.
- Scott, K.R. and L. Allard. 1984. **A four-tank water recirculation system with a hydrocyclone prefilter and a single water reconditioning unit.** The Progressive Fish-Culturist 46(4):254-261.
- Serfling, S. and D. Mendola. 1978. **Aquaculture using controlled environment ecosystems.** The Commercial Fish Farmer and Aquaculture News 4(6):15-18.
- Shelbourne, J.E. 1964. **Experimental sea-water systems for rearing fish larvae.** In: Sea-Water Systems for Experimental Aquariums. United States Department of Interior Fish and Wildlife Service, Bureau of Sport Fisheries and Wildlife Research Report No. 63, Washington, DC:81-93.
- Simco, B.A. 1976. **The reuse of water in commercial raising of catfish.** Water Resources Research Center Research Report No. 52, University of Tennessee, Knoxville, TN. 37 pgs.
- Slone, W.J., D.B. Jester and P.R. Turner. 1981. **A closed vertical raceway fish cultural system containing clinoptilolite as an ammonia stripper.** In: Proceedings of the Bio-Engineering Symposium for Fish Culture by (Eds.) L.J. Allen and E.C. Kinney, American Fisheries Society, Fish Culture Section Publication No. 1, Bethesda, MD:104-116.
- Stone, N. 1989. **Closed recirculating systems for catfish culture.** Arkansas Aquafarming 7:1-2.
- Strange, D.J. 1980. **Techniques for small-scale spawning and rearing of channel catfish Ictalurus punctatus.** Aquaculture Department Publication No. 80-16, Rodale Press Inc., Emmaus, PA. 17 pgs.
- Strange, D.J. and S.V. Gorder. 1984. **Demand feeding in a recirculating fish culture system and summer 1983 observations.** Rhodale Research Center Publication RRC/AI-84/2, Rodale Press Inc., Emmaus, PA. 20 pgs.
- Strange, D.J. and S.V. Gorder. 1985. **Biodisc waterwheel: A design alternative and its application for an air-driven fish culture system.** Rodale Research Center Publication RRC/AQ-84/5, Rodale Press Inc., Emmaus, PA. 22 pgs.

- Sutterlin, A.M., C.Y. Couturier and T. Devereaux. 1984. **A recirculation system using ozone for the culture of Atlantic salmon.** *The Progressive Fish-Culturist* 46(4):239-244.
- Sutton, R.J. and W.M. Lewis. 1982. **Further observations on a fish production system that incorporates hydroponically grown plants.** *The Progressive Fish-Culturist* 44(1):55-59.
- Taylor, J.L. 1988. **Minnow culture in a small-scale recirculation system.** Aquaculture Project Publication RRC/AQ-84/1, Rodale Research Center, Rodale Press, Inc., Emmaus, PA. 9 pgs.
- Uchida, R.N. and J.E. King. 1960. **Tank culture of tilapia.** In: *Fishery Bulletin* No. 199 of the Fish and Wildlife Service, United States Department Of Interior, Washington, DC:21-52.
- United States Fish and Wildlife Service. 1972. **Factors Affecting the Growth and Production of Channel Catfish in Raceways.** United States Department of Commerce Economic Development Administration Technical Assistance Project No. 14-16-0008-571, Washington, DC. 98 pgs.
- Vahoviak, G.R. 1992. **Instructor's manual - PSU Ag Ed/State College FFA Demonstration Recirculation System for tilapia production.** In: *Proceedings of the National Extension Aquaculture Workshop.* Texas Agricultural Extension Service, Texas A&M University, College Station, TX:Facilities 11-23.
- Van Gorder, S.D. 1980. **Small-scale fish culture systems.** Aquaculture Department Publication No. 81-12, Rodale Research Center, Rodale Press Inc., Emmaus, PA. 71 pgs.
- Van Gorder, S.D. and J.D. Fritch. 1980. **Filtration techniques for small-scale aquaculture in a closed system.** *Proceedings of the Annual Conference of the Southeastern Association of Fish and Wildlife Agencies* 34:59-66.
- Van Gorder, S., L. Gusman, D. Strange and D. Bailey. 1985. **The effects of polyculture and fertilization in recirculating systems - summer 1984.** Aquaculture Department Publication RRC/AQ-84/4, Rodale Research Center, Rodale Press Inc., Emmaus, PA. 14 pgs.
- Van Gorder, S. and D.J. Strange. 1981. **Clarification of intensive fish culture systems.** Aquaculture Department Publication AQ-81-2, Rodale Research Center, Rodale Press Inc., Emmaus, PA. 25 pgs.
- Van Gorder, S.D. and D.J. Strange. 1981. **Small-scale fish culture systems: Methods for increased production.** Aquaculture Department Publication No. 81-10, Rodale Research Center, Rodale Press Inc., Emmaus, PA. 41 pgs.
- Van Gorder, S. and D. Strange. 1983. **The effects of algae on a recirculation fish culture system and observation trials for summer 1982.** Aquaculture Department Publication RRC/AQ-83/4, Rodale Research Center, Rodale Press Inc., Emmaus, PA. 32 pgs.
- Van Toever, W. and K.T. Mackay. 1981. **A modular recirculation hatchery and rearing system for salmonids utilizing ecological design principles.** In: *Aquaculture in Heated Effluents and Recirculation Systems, Vol. II,* by (Ed.) K. Tiews, H. Heenemann, Berlin, Germany:403-413.

Verlangieri, A.J., R.M. Lewis, A.W. Bannon and M.C. Wilson. 1988. **Novel biological recycling water purification system for use in fish toxicology studies.** Bulletin of Environmental Contamination and Toxicology 40:185-189.

Vigneswaran, S., V.L. Casiano and C. Polprasert. 1991. **Application of coarse-media slow sand filtration in aquaculture.** Water Science Technology 23:1817-1824.

Williams, R.C., S.G. Hughes and G.L. Rumsey. 1982. **Use of ozone in a water reuse system for salmonids.** The Progressive Fish-Culturist 44(2):102-105.

Wohlfarth, G. and M. Lahman. 1971. **Preliminary experiments in growing carp in recirculating water.** Bamidgeh 23(4):103-116.

Woiwode, J.G. and I.R. Adelman. 1984. **The Effects of Density Multipass Water Use and Diet on Channel Catfish Cultured in Power Plant Recirculating Cooling Water.** Miscellaneous Publication No. 28, Agricultural Experimental Station and University of Minnesota, St. Paul, MN. 36 pgs.

Yen, H. 1992. **Maryland fish farm touted as aquaculture model.** The Aquaculture News 8(1):23.

Yong-liang, Z. 1990. **The development of closed rearing systems in China.** Aquacultural Engineering 9:167-173.

Zweig, R.D. 1986. **An integrated fish culture hydroponic vegetable production system.** Aquaculture Magazine 12(3):34-40.

Zweig, R.D., J.R. Wolfe, J.H. Todd, D.G. Engstrom and A.M. Doolittle. 1981. **Solar aquaculture: An ecological approach to human food production.** In: Proceedings of the Bio-Engineering Symposium for Fish Culture by (Eds.) L.J. Allen and E.C. Kinney, American Fisheries Society, Fish Culture Section Publication No. 1, Bethesda, MD:210-227.

Invertebrate

Beard, T.W., P.R. Richards and J.F. Wickins. 1985. **The Techniques and Practicability of Year-Round Production of Lobsters, Homarus gammarus L., in Laboratory Recirculation Systems.** Fisheries Research Technical Report No. 79, Ministry of Agriculture, Fisheries and Food Directorate of Fisheries Research, Lowestoft, UK. 22 pgs.

Breder, C.M., Jr. 1963. **Miniature circulating systems for small laboratory aquariums.** In: United States Department of the Interior Fish and Wildlife Service, Bureau of Sport Fisheries and Wildlife Research Report No. 63, Washington, DC:39-53.

Chen, F., B. Reid and C.R. Arnold. 1991. **Maturing, spawning and egg collecting of the white shrimp Penaeus vannamei Boone in a recirculating system.** Journal of the World Aquaculture Society 22(3):167-172.

Chen, J.C., P.C. Liu, Y.T. Lin and C.K. Lee. 1988. **Super intensive culture of red-tailed shrimp Penaeus penicillatus.** Journal of the World Aquaculture Society 19(3):127-131.

- Cohen, D., A. Sagi, Z. Ra'anan and G. Zohar. 1988. **The production of Macrobrachium rosenbergii in monosex populations III. Yield characteristics under intensive monoculture conditions in earthen ponds.** *Bamidgeh* 40(2):57-64.
- Corpron, K.E. and D.A. Armstrong. 1983. **Removal of nitrogen by an aquatic plant, Elodea densa, in recirculating macrobrachium culture systems.** *Aquaculture* 32:347-360.
- Crandall, T., C.A. Busack and G.A.E. Gall. 1981. **An easily constructed recirculating aquarium system for research requiring many small groups of animals.** *Aquaculture* 22:193-199.
- Doelling, N. 1981. **Progress in Controlled Environment Aquaculture and Algae Husbandry.** Marine Industry Collegium Opportunity Brief No. 24, MIT Sea Grant Program, Cambridge, MA. 26 pgs.
- Epifanio, C.E., C.M. Logan and C. Turk. 1976. **Culture of six species of bivalves in a recirculating seawater system.** Tenth European Symposium on Marine Biology (Del-SG-1-76, College of Marine Studies, University of Delaware, Newark, DE). 19 pgs.
- Epifanio, C.E. and C.A. Mootz. 1976. **Growth of oysters in a recirculating maricultural system.** Proceedings of the National Shellfisheries Association 65:32-37 (Del-SG-2-77, College of Marine Studies, University of Delaware, Newark, DE).
- Epifanio, C.E., G. Pruder, M. Hartman and R. Srna. 1973. **An interdisciplinary study on the feasibility of recirculating systems in mariculture.** Proceedings of the World Mariculture Society 4:37-52.
- Gaither, W.S. 1981. **Progress and problems with recirculating system aquaculture.** In: *Biotechnology in the Marine Sciences*, MIT Sea Grant Program, Marine Science Seminar Series 25, Cambridge, MA:61-79.
- Gaither, W.S. and C.A. Thoroughgood. 1982. **Research in recirculating aquaculture systems for growing commercially valuable bivalves.** Del-SG-06-82, College of Marine Studies, University of Delaware, Newark, DE. 16 pgs.
- Goyert, J.C. and J.W. Avault, Jr. 1978. **Effects of stocking density and substrate on growth and survival of crawfish (Procambarus clarkii) grown in a recirculating system.** Proceedings of the World Mariculture Society 9:731-735.
- Griessinger, J.M., Th. Robin, Th. Pollet and M.J. Pierre. 1989. **Progress in use of biological filtration in mass production of Macrobrachium rosenbergii post-larvae in closed system, in French Guiana.** *Journal of the World Aquaculture Society* 20(1):41.
- Hartman, M., C.E. Epifanio, G. Pruder and R. Srna. 1973. **Farming the artificial sea: Growth of clams in a recirculating seawater system.** Proceedings of the Gulf and Caribbean Fisheries Institute 26:59-74.
- Heinen, J. 1987. **A recirculating-water system for rearing aquatic crustaceans in individual cages.** *The Progressive Fish-Culturist* 49(2):119-124.
- Hepher, B. 1985. **Aquaculture intensification under land and water limitations.** *GeoJournal* 10(3):253-259.

- Homziak, J. 1989. **Producing soft crawfish: Is it for you?** *Aquaculture Magazine* 15(1):26-32.
- Justo, E.C. and J.R.R. Ochon. 1983. **Larval rearing recirculating system for the freshwater prawn Macrobrachium rosenbergii**. *Journal of the World Mariculture Society* 14:126-127.
- Kelemec, J.A. and I.R. Smith. 1980. **Induced ovarian development and spawning of Penaeus plebejus in a recirculating laboratory tank after unilateral eyestalk enucleation**. *Aquaculture* 21:55-62.
- Lellis, W.A., R.A. Winfree and F.A. Prah. 1988. **A recirculating culture system for small-scale experimental work on juvenile caribbean king crabs Mithrax spinosissimus**. *Journal of the World Aquaculture Society* 19(1):46.
- Liu, P.C. and J.C. Chen. 1989. **Larviculture of Penaeus monodon in a recirculation and a semi-static system**. *Journal of the World Aquaculture Society* 20(1):51.
- Malinowski, S.M. and S.E. Siddall. 1989. **Passive water reuse in a commercial-scale hard clam, Mercenaria mercenaria, upflow nursery system**. *Journal of Shellfish Research* 8(1):241-248.
- Malone, R.F. and D.G. Burden. 1988. **Design of Recirculating Blue Crab Shedding Systems**. Louisiana Sea Grant College Program, LSU Center for Wetland Resources, Baton Rouge, LA. 76 pgs.
- Malone, R.F. and D.G. Burden. 1988. **Design of Recirculating Soft Crawfish Shedding Systems**. Louisiana Sea Grant College Program, Center for Wetland Resources, Louisiana State University, Baton Rouge, LA. 74 pgs.
- Malone, R.F. and D.P. Manthe. 1985. **Chemical addition for accelerated nitrification of biological filters in closed blue crab shedding systems**. In: *National Symposium on the Soft-Shell Blue Crab Fishery*:41-47.
- Malone R.F., J.E. Robin and D.E. Coffin. 1991. **Low density biomedial filtration of a commercial recirculating soft crawfish production facility**. *Journal of the World Aquaculture Society* 22(3):38.
- Malone, R.F., M.P. Thomasson and D.G. Burden. 1989. **Micro-computer based design of recirculating systems for the production of soft-shell crawfish**. *Journal of the World Aquaculture Society* 20(1):54.
- Manthe, D.P., R.F. Malone and S. Kumar. 1984. **Limiting factors associated with nitrification in closed blue crab shedding systems**. *Aquacultural Engineering* 3:119-140.
- Manthe, D.P. and R.F. Malone. 1987. **Chemical addition for accelerated biological filter acclimation in closed blue crab shedding systems**. *Aquacultural Engineering* 6:227-236.
- Menasveta, P., P. Aranyakanonda, S. Rungsupa and N. Moree. 1989. **Maturation and larviculture of penaeid prawns in closed recirculating seawater systems**. *Aquacultural Engineering* 8:357-368.
- Menasveta, P., A.W. Fast, S. Piyatiratitivorakul and S. Rungsupa. 1991. **An improved, closed seawater recirculation maturation system for giant tiger prawn (Penaeus monodon Fabricus)**. *Aquacultural Engineering* 10:173-181.

- Millamena, O.M., C.M. Casalmir and P.F. Subosa. 1991. **Performance of recirculating systems for prawn hatchery and broodstock maturation tanks.** *Aquacultural Engineering* 10:161-171.
- Mock, C.R., R.A. Neal and B.R. Salser. 1973. **A closed raceway for the culture of shrimp.** *Proceedings of the World Mariculture Society* 4:247-259.
- Mock, C.R., L.R. Ross and B.R. Salser. 1977. **Design and preliminary evaluation of a closed system for shrimp.** *Proceedings of the World Mariculture Society* 8:335-369.
- Morrissy, N.M. 1979. **Experimental pond production of morron, Cherax tenuimanus Smith. Decapoda: Parastacidae.** *Aquaculture* 16:319-344.
- Neal, R.A. and C.R. Mock. 1976. **A model closed system for aquaculture incorporating the recycling of wastes.** In: *Advances in Aquaculture* by (Eds.) T.V.R. Pillay and W.A. Dill, Fishing News Ltd. (Books), Farnham, UK:521-523.
- New, M.B., J.P. Scholl, J.C. McCarty and J.P. Bennett. 1974. **A recirculation system for experimental aquaria.** *Aquaculture* 3:95-103.
- Price, K.S., M.R. Carriker, C.E. Epifanio, R.F. Srna, G.D. Pruder, E.T. Bolton and K.P. Smith. 1976. **Mariculture in controlled environmental seawater systems - a review of research at the University of Delaware (1968-75).** In: *Advances in Aquaculture* by (Eds.) T.V.R. Pillay and W.A. Dill, Fishing News Ltd. (Books), Farnham, UK:525-527.
- Pruder, G.D. 1975. **Engineering aspects of bivalve molluscan mariculture: Culture system configuration.** *Proceedings of the World Mariculture Society* 6:203-212.
- Pruder, G.D., E.T. Bolton and S.F. Faunce. 1978. **System configuration and performance: Bivalve and molluscan mariculture.** *Proceedings of the World Mariculture Society* 9:747-759.
- Raymond, L.P. 1990. **Commercial shellfish finishing within an inland, closed system.** *Journal of Shellfish Research* 9(1):239-255.
- Reid, B. and C.R. Arnold. 1992. **The intensive culture of penaeid shrimp Penaeus vannamei Boone in a recirculating raceway system.** *Journal of the World Aquaculture Society* 22(2):146-153.
- Rogers, G.L. and S.L. Klemetson. 1981. **Evaluation of a biofilter water reuse system for Macrobrachium rosenbergii prawn aquaculture ponds.** In: *Proceedings of the Water Reuse Symposium II, American Water Works Association Research Foundation, Denver, CO:908-923.*
- Rondelle, R.F., S. Chen and R.F. Malone. 1991. **Vertical distribution in an automated recirculating softshell crawfish separator.** *Journal of the World Aquaculture Society* 22(3):52.
- Sandifer, P.A. and T.I.J. Smith. 1975. **Effects of population density on growth and survival of Macrobrachium rosenbergii reared in recirculating water management systems.** *Proceedings of the World Mariculture Society* 6:43-54.

Sandifer, P.A., P.B. Zielinski and W.E. Castro. 1974. **A simple airlift-operated tank for closed-system culture of decapod crustacean larvae and other small aquatic animals.** *Helgolander wiss Meeresunters* 26:82-87.

Serfling, S. and D. Mendola. 1978. **Aquaculture using controlled environment ecosystems.** *The Commercial Fish Farmer and Aquaculture News* 4(6):15-18.

Serfling, S.A., J.C. Van Olst and R.F. Ford. 1974. **A Recirculating culture system for larvae of the American lobster, Homarus americanus.** *Aquaculture* 3:303-309.

Smith, T.I.J. and P.A. Sandifer. 1975. **Increased production of tank-reared Macrobrachium rosenbergii through use of artificial substrates.** *Proceedings of the World Mariculture Society* 6:55-66.

Thielker, J.L. 1981. **Design and test operation of an intensive controlled-environment oyster production system.** Del-SG-07-81, College of Marine Studies, University of Delaware, Newark, DE. 28 pgs.

Turk, P.E. and P.G. Lee. 1991. **Design and economic analyses of airlift versus electrical pump driven recirculating aquaculture systems.** In: *Engineering Aspects of Intensive Aquaculture*. Northeast Regional Agricultural Engineering Service Publication No. 49, Cooperative Extension, Ithaca, NY:271-283.

Uar, O.B. 1983. **Progress in selecting an appropriate culture system for a small-scale Macrobrachium rosenbergii (De Man).** *Aquaculture* 35:267-272.

Yang, W.T., R.T. Hanlon, P.G. Lee and P.E. Turk. 1989. **Design and function of closed seawater systems for culturing loliginid squids.** *Aquacultural Engineering* 8:47-65.

Macroalgal

Bird, K. 1989. **Intensive seaweed cultivation.** *Aquaculture Magazine* 15(6):29-34.

Braud, J.P. and R. Delepine. 1980. **Growth Response of Chondrus crispus Rhodophyta, gigartinales to light and temperature in laboratory and outdoor tanks culture.** In: *Proceedings of the International Seaweed Symposium No. 10*:553-558.

Morgan, K.C., P.F. Shacklock and F.J. Simpson. 1980. **Some aspects of the culture of Palmaria palmata in greenhouse tanks.** *Botanica Marina* XXIII:765-770.

Strand, J.A., J.T. Cummins and B.E. Vaughan. 1967. **A fast-flow sealed disk filter system for marine aquaria.** *Limnology and Oceanography* 14:444-448.

Ugarte, R. and B. Santelices. 1992. **Experimental tank cultivation of Gracilaria chilensis in central Chile.** *Aquaculture* 101:7-16.

Vandermeulen, H. and H. Gordin. 1990. **Ammonium uptake using Ulva (Chlorophyta) in intensive fishpond systems: Mass culture and treatment of effluent.** *Journal of Applied Phycology* 2:363-374.

DISEASES - STERILIZATION

- Akamine, Y. and J.L. Moores. 1989. A preliminary study on disinfection methods of Penaeid shrimp hatcheries contaminated by Baculovirus penaei. Journal of the World Aquaculture Society 20(1):11.
- Bullock, G.L. and H.M. Stuckey. 1977. Ultraviolet treatment of water for destruction of five gram-negative bacteria pathogenic to fishes. Journal of the Fisheries Research Board of Canada 34:1244-1249.
- Burleson, G.R., T.M. Murray and M. Pollard. 1975. Inactivation of viruses and bacteria by ozone, with and without sonication. Applied Microbiology 29(3):340-344.
- Caufield, J.D. 1991. Specifying and monitoring ultraviolet systems for effective disinfection of water. In: Fisheries Bioengineering Symposium by (Eds.) J. Colt and R.J. White, American Fisheries Society Symposium No. 10, Bethesda, MD:421-426.
- Colberg, P.J. and A.J. Lingg. 1978. Effect of ozonation on microbial fish pathogens, ammonia, nitrate, nitrite, and BOD in simulated reuse hatchery water. Journal of the Fisheries Research Board of Canada 35:1290-1296.
- Colt, J. 1986. Gas supersaturation - impact on the design and operation of aquatic systems. Aquacultural Engineering 5:49-85.
- Crecelius, E.A. 1979. Measurements of oxidants in ozonized seawater and some biological reactions. Journal of the Fisheries Research Board of Canada 36:1006-1008.
- Cross, V.K. and L. Peterson. 1987. Efficacy of ultraviolet water treatment at the Green Lake, Maine, National Fish Hatchery. The Progressive Fish-Culturist 49(3):233-236.
- Dupree, H.K. 1981. An overview of the various techniques to control infectious diseases in water supplies and in water reuse aquacultural systems. In: Proceedings of the Bio-Engineering Symposium for Fish Culture by (Eds.) L.J. Allen and E.C. Kinney, American Fisheries Society, Fish Culture Section Publication No. 1, Bethesda, MD:83-90.
- Edsall, D.A. 1990. Oxygen induced gas bubble disease in rainbow trout Oncorhynchus mykiss. In: Oxygen Supplementation A New Technology in Fish Culture by (Eds.) L. Visscher and W.P. Dwyer, United States Department of Interior Fish and Wildlife Service Information Bulletin No. 2, Denver, CO. 4 pgs.
- Flagg, R.M. and L.W. Hinck. 1977. Influence of ammonia on aeromonad susceptibility in channel catfish. Proceedings of the Annual Conference of the Southeastern Association of Fish and Wildlife Agencies 32:415-419.
- Flatow, R.E. 1981. High dosage ultraviolet water purification: An indispensable tool for recycling fish hatcheries and heated effluent aquaculture. In: Aquaculture in Heated Effluents and Recirculation Systems, Vol I, by (Ed.) K.Tiews, H. Heenemann, Berlin, Germany:455-466.
- Gratzek, J.B., J.P. Gilbert, A.L. Lohr, E.B. Shotts, Jr. and J. Brown. 1983. Ultraviolet light control of Ichthyophthirius multifiliis Fouquet in a closed fish culture recirculation system. Journal of Fish Diseases 6:145-153.

- Hilge, V., H. Delventhal and H. Klinger. 1981. **Influences of heated, recirculated water and heated well water on several physiological and hematological parameters of channel catfish, *Ictalurus punctatus* Rafinesque, reared at two stocking densities.** In: *Aquaculture in Heated Effluents and Recirculation Systems, Vol. II*, by (Ed.) K. Tiews, H. Heenemann, Berlin, Germany:185-190.
- Honn, K.V. 1979. **Ozonation as a critical component of closed marine system design.** *Science and Engineering* 1:11-29.
- Johnson, A.K. 1961. **Ichthyophthiriasis in a recirculating closed-water hatchery.** *The Progressive Fish-Culturist* 23:79-82.
- Kimura, T., M. Yoshimizu, D. Tajima, Y. Ezura and M. Sakai. 1976. **Disinfection of hatchery water supply by ultraviolet (U.V.) irradiation - I. Susceptibility of some fish-pathogenic bacterium and microorganisms inhabiting pond waters.** *Bulletin of the Japanese Society of Scientific Fisheries* 42(2):207-211.
- Lightner, D., R. Redman, L. Mohny, G. Dickenson and K. Fitzsimmons. 1988. **Major diseases encountered in controlled environmental culture of tilapias in fresh-and brackishwater over a three-year period in Arizona.** In: *Second International Symposium on Tilapia in Aquaculture* by (Eds.) R.S.V. Pullin, T. Bhukaswan, K. Tonguthai and J.C. Maclean, ICARM, Manila, Philippines:111-116.
- Lovell, R.T. 1973. **Essentiality of vitamin C in feeds for intensively fed caged channel catfish.** *Journal of Nutrition* 103(1):134-138.
- Lovell, R.T. 1975. **Nutritional deficiencies in intensively cultured catfish.** In: *The Pathology of Fishes* by (Eds.) W.E. Ribelin and G. Migaki, The University of Wisconsin Press, Madison, WI: 721-731.
- Maise, G., M. Dorson and C. Torchy. 1981. **Inactivation de deux virus pathogenes pur les salmonides (virus de la necrose pancreatique infectieuse et de la septicemie hemorrhagique virale) par les rayons ultraviolets.** In: *Aquaculture in Heated Effluents and Recirculation Systems, Vol. I*, by (Ed.) K. Tiews, H. Heenemann, Berlin, Germany:467-473.
- Moore, A.A. 1990. **Effects of ozone and photozone on waterborne bacteria, fish survival and plumbing equipment.** In: *Iowa Department of National Resources Technical Bulletin No. 2*:1-15.
- Murray, S.A. 1980. **Effects of loading density on catfish blood.** *Experientia* 36:205-206.
- Oakes, D., F. Cooley, L.L. Edwards, R.W. Hirsch and V.G. Miller. 1979. **Ozone disinfection of fish hatchery waters: Pilot plant results, prototype design and control considerations.** *Proceedings of the World Mariculture Society* 10:854-870.
- Owsley, D.E. 1991. **Ozone for disinfecting hatchery rearing water.** In: *Fisheries Bioengineering Symposium* by (Eds.) J. Colt and R.J. White, American Fisheries Society Symposium No. 10, Bethesda, MD:417-420.
- Paller, M.H. and W.M. Lewis. 1988. **Use of ozone and fluidized-bed biofilters for increased ammonia removal and fish loading rates.** *The Progressive Fish-Culturist* 50:141-147.

- Poston, H.A. and R.C. Williams. 1988. **Interrelations of oxygen concentration, fish density, and performance of Atlantic salmon in ozonated water reuse system.** *The Progressive Fish-Culturist* 50(2):69-77.
- Poston, H.A. and R.C. Williams. 1990. **Effects of ozonated-water reuse on salinity tolerance of Atlantic salmon.** *The Progressive Fish-Culturist* 52(1):36-40.
- Rakelmann, U.V. and V. Hilge. 1983. **Influence of anodic oxidation on selected parameters in recycled fish culture water.** *Aquacultural Engineering* 2:81-92.
- Roem, A.J., R.R. Stickney and C.C. Kohler. 1990. **Vitamin requirements of blue tilapias in a recirculating water system.** *The Progressive Fish-Culturist* 52(1):15-19.
- Rosenthal, H. 1981. **Ozonation and sterilization.** In: *Aquaculture in Heated Effluents and Recirculated Systems*, Vol. 1, by (Ed.) K. Tiews, H. Heenemann, Berlin, Germany:219-275.
- Seymour, A.H. and J.R. Donaldson. 1953. **Occurrence of high mortality among chinook salmon fry after the recharge of a charcoal filter.** *The Progressive Fish-Culturist* 15:129-130.
- Sutterlin, A.M., C.Y. Couturier and T. Devereaux. 1984. **A recirculation system using ozone for the culture of Atlantic salmon.** *The Progressive Fish-Culturist* 46(4):239-244.
- Tipping, J.M. 1988. **Ozone control of ceratomyxosis: Survival and growth benefits to steelhead and cutthroat trout.** *The Progressive Fish-Culturist* 50(4):202-211.
- Tomasso, J.R., B.A. Simco and K.B. Davisk. 1979. **Inhibition of ammonia and nitrite toxicity to channel catfish.** *Proceedings of the Annual Conference of the Southeastern Association of Game and Fish Commissioners* 33:600-606.
- Tucker, C.S., R. Francis-Floyd and M.H. Bebeau. 1989. **Nitrite-induced anemia in channel catfish, *Ictalurus punctatus* Rafinesque.** *Bulletin of Environmental Contamination and Toxicology* 43:295-301.
- Uchida, R.N. and J.E. King. 1960. **Tank culture of tilapia.** In: *Fishery Bulletin No. 199 of the Fish and Wildlife Service, United States Department of Interior, Washington, DC:21-52.*
- Wedemeyer, G.A., N.C. Nelson and C.A. Smith. 1978. **Survival of the salmonid viruses infectious hematopoietic necrosis (IHNV) and infectious pancreatic necrosis (IPNV) in ozonated, chlorinated and untreated waters.** *Journal of the Fisheries Research Board of Canada* 35:875-879.
- Wedemeyer, G.A., N.C. Nelson and W.T. Yasutake. 1979. **Physiological and biochemical aspects of ozone toxicity to rainbow trout *Salmo gairdneri*.** *Journal of the Fisheries Research Board of Canada* 36(6):605-614.
- Williams, R.C., S.G. Hughes and G.L. Rumsey. 1982. **Use of ozone in a water reuse system for salmonids.** *The Progressive Fish-Culturist* 44(2):102-105.

ECONOMICS

- Allen, G.D., L.W. Botsford, A.M. Schuur and W.E. Johnston. 1984. **Bioeconomics of Aquaculture.** Elsevier, N.Y., NY. 35 pgs.

Anonymous. 1992. **Richard Pratt adds tilapia to catfish operation.** The Catfish Journal 7(1):14.

Botsford, L.W. 1977. **Current economic status of lobster culture research.** Proceedings of the World Mariculture Society 8:723-739.

Botsford, L.W., H.E. Ranch, A.M. Schuur and R.A. Shleser. 1975. **An economically optimum aquaculture facility.** Proceedings of the World Mariculture Society 6:407-420.

Boyd, C.E., R.B. Rajendren and J. Durda. 1989. **Economic considerations in aquaculture.** CRC Critical Reviews in Aquatic Sciences 1(3):425-472.

Clary, G. and J. Lock. 1992. **Financial analysis of alternative commercial catfish production systems.** In: Proceedings of the National Extension Aquaculture Workshop. Texas Agricultural Extension Service, Texas A&M University, College Station, TX: Economics 1-22.

Dharmappa, H.B., J. Verink, O. Fujiwara and S. Vigneswaran. 1992. **Optimization of granular bed filtration treating polydispersed suspension.** Water Research 26(10):1307-1318.

Engle, C.R. 1988. **The economics of adopting new technology in aquaculture.** In: Instrumentation in Aquaculture by (Eds.) J.A. Wyban and E. Antill, Oceanic Institute, Honolulu, HI:25-39.

Engle, C.R. 1989. **An economic comparison of aeration devices for aquaculture ponds.** Aquacultural Engineering 8:193-207.

Engle, C.R. 1992. **Electric floating paddlewheel aerators more efficient, less expensive.** Water Farming Journal 7(5):4-5.

Engle, C.R. and V. Hatch. 1988. **Economic assessment of alternative aquaculture aeration strategies.** Journal of the World Aquaculture Society 19(3):35-96.

Gallop, R.A., A.W. Hydamaka and A.P. Stephen. 1981. **Conservation and reuse of water in the food industries per multi, integrated "closed-loop" processes.** In: Proceedings of the Water Reuse Symposium II, American Water Works Association Research Foundation, Denver, CO:839-861.

Gempesaw, C.M., II, V. Varma, D. Lipton and J.R. Bacon. 1992. **A comparative economic analysis of hybrid striped bass production in ponds and tanks.** In: Proceedings of the National Extension Aquaculture Workshop. Texas Agricultural Extension Service, Texas A&M University, College Station, TX: Economics 31-41.

Johnston, W.E. and L.W. Botsford. 1981. **System analysis for lobster aquaculture.** In: Aquaculture in Heated Effluents and Recirculation Systems, Vol. II, by (Ed.) K. Tiews, H. Heenemann, Berlin, Germany:455-464.

Juan, Y.S., W.L. Griffin and A.L. Lawrence. 1988. **Production costs of juvenile penaeid shrimp in an intensive greenhouse raceway nursery system.** Journal of the World Aquaculture Society 19(3): 149-160.

- Lambregis, J.A.D., W.L. Griffin, R.D. Lacewell, J.T. Davis and G.M. Clary. 1991. **A preliminary investigation into the costs and returns of catfish farms with recirculating ponds along the upper Texas coast.** Texas A&M University Department of Agricultural Economics Faculty Paper Series 91-2, College Station, TX. 38 pgs.
- MacDonald, C.R., T.L. Meade and J.M. Gates. 1975. **A Production Cost Analysis of Closed System Culture of Salmonids.** Marine Advisory Service Marine Technical Report No. 41, University of Rhode Island, Narragansett, RI. 11 pgs.
- MIT Sea Grant. 1977. **Closed-Cycle Aquaculture.** Marine Industry Advisory Services Publication MITSG-77-15, Cambridge, MA. 30 pgs.
- Muir, J.F. 1981. **Management and cost implications in recirculating water systems.** In: Proceedings of the Bio-Engineering Symposium for Fish Culture by (Eds.) L.J. Allen and E.C. Kinney, American Fisheries Society, Fish Culture Section Publication No. 1, Bethesda, MD:116-127.
- Neal, R.A. 1973. **Alternatives in aquacultural development: Consideration of extensive versus intensive methods.** Journal of the Fisheries Research Board of Canada 30(12):2218-2222.
- Nerrie, B.L., L.U. Hatch, R.O. Smitherman and C.R. Engle. 1989. **The economics of intensifying catfish production in West Alabama.** Journal of the World Aquaculture Society 20(1):60.
- Nerrie, B.L., L.U. Hatch, R.O. Smitherman and C.R. Engle. 1990. **The economics of intensifying catfish production: A production function analysis.** Journal of the World Aquaculture Society 21(3):216-224.
- Nirmalakhandan, N., Y.H. Lee and R.E. Speece. 1988. **Optimizing oxygen absorption and nitrogen desorption in packed towers.** Aquacultural Engineering 7:221-234.
- Oha, Paul. 1991. **New York co-op betting on new closed system, restaurant survey.** Water Farming Journal 6(8):13.
- O'Rourke, P. 1990. **Economics.** In: Regional Workshop on Commercial Fish Culture Using Water Reuse Systems by (Ed.) L. Swann, IL/IN Sea Grant Publication CES-237, Department of Agricultural Communication Service, Purdue University, West Lafayette, IN:35-43.
- O'Rourke, P. 1991. **Current status on profits in recirculating systems.** In: Commercial Aquaculture Using Water Recirculating Systems by (Ed.) L. Swann, IL/IN Sea Grant Publication CES 240, Department of Agriculture Communication Service, Purdue University, West Lafayette, IN:65-77.
- Parker, N.C. 1976. **A comparison of intensive culture systems.** Proceedings of the Fish Farming Conference and Annual Conference of the Catfish Farmers of Texas 1976:110-118.
- Pearson, S. 1989. **Deciding on a treatment alternative.** In: Biotreatment of Agricultural Wastewater by (Ed.) M.E. Huntley, CRC Press, Boca Raton, FL:15-31.

Rakocy, J.E. 1990. **A recirculating system for tilapia culture and vegetable hydroponics.** In: Proceedings Auburn Symposium on Fisheries and Aquaculture by (Eds.) R.O. Smitherman and D. Tave, Department of Research Information, Alabama Agriculture Experiment Station, Auburn University, Auburn, AL:103-114.

Riche, M. and P. Brown. 1991. **Real life experiences with recirculating systems.** In: Commercial Aquaculture Using Water Recirculating Systems by (Ed.) L. Swann, IL/IN Sea Grant Publication CES 240, Department of Agriculture Communication Service, Purdue University, West Lafayette, IN:122-131.

Rosati, R. 1991. **Converting livestock production buildings for aquaculture.** In: Commercial Aquaculture Using Water Recirculating Systems by (Ed.) L. Swann, IL/IN Sea Grant Publication CES 240, Department of Agriculture Communication, Purdue University, West Lafayette, IN:92-107.

Rosati, R., P. O'Rourke and R.D. Henry. 1989. **Commercial tilapia production in a water reuse system.** American Society of Agricultural Engineers Paper No. 89-7531, St. Joseph, MI. 4 pgs.

Roberts, K.J. 1985. **Profitability components of closed blue crab shedding systems in the Gulf of Mexico.** In: National Symposium on the Soft-Shelled Blue Crab Fishery:67-70.

Schrader, L. and J. Riepe. 1990. **Marketing.** In: Regional Workshop on Commercial Fish Culture Using Water Reuse Systems by (Ed.) L. Swann, IL/IN Sea Grant Publication CES-237, Department of

Agricultural Communication Service, Purdue University, West Lafayette, IN:44-48.

Thoroughgood, C.A. 1979. **Evaluation of palatability and selected nutrients of bivalve molluscs grown in controlled environment mariculture and natural systems.** Proceedings of the World Mariculture Society 10:110-115.

Trosclair, C. 1992. **It's tough to separate trends and adventures as American aquaculture copes with growth pains.** Water Farming Journal 7(8):3-6,11.

Turk, P.E. and P.G. Lee. 1991. **Design and economic analyses of airlift versus electrical pump driven recirculating aquaculture systems.** In: Engineering Aspects of Intensive Aquaculture. Northeast Regional Agricultural Engineering Service Publication No. 49, Cooperative Extension, Ithaca, NY:271-283.

Van Gorder, S. 1990. **Closed systems: A status report.** Aquaculture magazine 16(5):40-47.

Watten, B.J. and R.L. Busch. 1984. **Tropical production of tilapia *Sarotherodon aurea* and tomatoes *Lycopersicon esculentum* in a small-scale recirculating water system.** Aquaculture 41: 271-283.

ELECTRONIC MEDIA

Joint Subcommittee on Aquaculture, Aquaculture Information and Technology Transfer Task Force. 1992. **Aquaculture Recirculating Systems.** Proceedings of the Workshop on Design of High Density Recirculating Aquaculture Systems, Sept. 25-27, 1991, Louisiana State University, Baton Rouge, LA. Aquaculture Information Center, National Agricultural Library, USDA, Beltsville, MD. 3-1/2" diskettes 5-1/4" diskettes (requires windows). Limited distribution at no charge.

Thomasson, M.P. and R.F. Malone. 1989.
**Soft Crabs and Crawfish Computer
Application Program Optimum.** Louisiana
Sea Grant College Program Communications
Department, Baton Rouge, LA. 5-1/4"
diskette and user's manual (requires IBM
systems and DOS 2.0 or later versions). \$10
charge.

