W. JUDSON KENWORTHY

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BORN: May 22, 1950, New Haven, Conn., USA

MARITAL STATUS: Married, two children

EDUCATION: PhD Zoology, North Carolina State University, 1991
MSc Environmental Science, University of Virginia, 1981
BSc Marine Resources, University of Rhode Island, 1975

OTHER TRAINING:

NOAA Nitrox Certification Training, 1996
NOAA Divemaster Training, 1990
Long-term University Training, Zoology Department, North Carolina State University, Raleigh, NC, 1988
NOAA Operational Dry-Suit Training, 1986

HOBBIES: Recreational fishing, hunting

EMPLOYMENT: 1979-Present; Research Fisheries Biologist, Center for Coastal Fisheries and Habitat Research, National Centers for Coastal Ocean Science, National Ocean Service, National Oceanic and Atmospheric Administration, U.S. Dept. of Commerce, 101 Pivers Island Road, Beaufort, North Carolina, 28516. Currently serving as a Research Project Leader for laboratory and field ecology research programs located throughout the United States, Caribbean basin, and other regions of the world. As principle investigator I direct basic and applied research on the structure, function, and dynamics of coastal and estuarine ecosystems with special emphasis on marine seagrasses, coral reefs, benthic habitat utilization by marine organisms, and the environmental factors controlling the distribution, abundance and population dynamics of these communities. I write competitive research proposals and implement research covering a wide range of ecological studies in the coastal zone and at sea on board small vessels and ships. My research also directly addresses critical management issues in the coastal zone of the United States and particularly in the National Marine Sanctuaries. Daily, I work as part of a scientific team dealing with the conservation and restoration of coastal ecosystems by providing expert consultation in support of local, state and federal resource managers, for the conservation and protection of living marine resources.

ADJUNCT FACULTY APPOINTMENT: Nov. 1999 – present; Department of Biological Sciences, University of North Carolina Wilmington, N.C

SPECIAL INTERNATIONAL ASSIGNMENTS:

1995; One year temporary assignment to conduct collaborative research in Spain, Thailand and the Phillippines with Spanish, European, Philippine and Thai scientists in the Centre D'Estudis Avancats De Blanes, Consejo Superior de Investigaciones Cientificas, Blanes, Spain. The purpose of the assignment was to develop technical and applied scientific expertise in seagrass population ecology in order to develop models of seagrass population dynamics for use in management of living marine resources under the stewardship of NOAA.

1991-1993; NOAA's Gulf Program Office. Acted as co-principal investigator to assess the effects of the Gulf War oil spill on marine communities in the Persian Gulf. This work involved planning and implementing a 30 day

cruise on the NOAA ship Mt. Mitchell in the Persian Gulf, coordinating all phases of the cruise plan and collaborating with a multinational research team from the U.S., Saudi Arabia, Kuwait and Iran. The cruise resulted in a thorough assessment of the oil spill impacts that were summarized in an international meeting held in Kuwait and published in the Marine Pollution Bulletin.

OTHER SELECTED ASSIGNMENTS;

1995 - present; Assist NOAA National Marine Sanctuary Program, NOAA Damage Assessment Center and NOAA general Counsel in development and implementation of scientifically valid procedures for assessing injuries to seagrass and coral reef ecosystems, modeling the recovery dynamics of these ecosystems, and development of restoration plans for the ecological communities.

1990-present; Conduct the biological status review and provide expert advice to the U.S. National Marine Fisheries Service, Office of Protected Resources, for determining if a rare seagrass, *Halophila johnsonii*, should be listed as a threatened or endangered species. Serve as co-team leader for the development and implementation of the Recovery Plan and designation of critical habitat for *Halophila johnsonii*. *Halophila johnsonii* is the first marine plant ever to be listed under the United States Endangered Species Act and required specialized expertise and attention to research and management issues previously not encountered by the National Marine Fisheries Service and other Federal and State resource agencies.

1997 - 1998; Assist National Marine Fisheries Service Staff and the South Atlantic Fisheries Management Council in development and preparation of essential fish habitat requirements for fishery management plans of the South Atlantic Fishery Management Council. This assignment was in response to newly developed legislation that required fishery management councils to consider essential fish habitat in fishery management plans.

1993-2002; Provide scientific expertise for NOAA, U.S. Department of Justice and U.S. Army Corps of Engineers effort to litigate for injuries to natural resources in the Florida Keys National Marine Sanctuary and Laguna Madre Texas This assignment included the preparation of expert reports on the ecological value of corals and seagrass communities, field review of injury sites and proposed restoration areas, and pre-trial and trial depositions. These efforts lead to the successful negotiation of a pre-trial settlement between the responsible parties and the Department of Justice that included the development and implementation of a restoration plan for the injured resources.
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PROFESSIONAL AWARDS:

1981; U.S. Department of Commerce, NOAA Unit Citation Award in recognition of outstanding individual and collective contributions in furthering NOAA's mission.

1982; United States Department of Commerce, NOAA Certificate of Recognition of outstanding performance during 1982.

1987; United States Department of Commerce, NOAA Certificate of Recognition of outstanding performance during 1987.

1991; United States Department of Commerce, NOAA Certificate of Recognition of outstanding performance during 1990 and 1991.

1992; United States Department of Commerce Bronze Metal Award for outstanding service to NOAA, the Gulf Program Office and the Interagency Assessment Team in Support of Operation Desert Storm.

1994; United States Department of Commerce, NOAA Certificate of Recognition of outstanding performance during 1993 and 1994.

1996; United States Department of Commerce, NOAA Certificate of Recognition of outstanding performance

during 1995 and 1996.

1998; NOAA Administrators Award for significant research achievements and contributions in obtaining settlements on claims pertaining to environmental impact to seagrass habitat.

1999; NOAA General Counsel Award for significant contribution to NOAA's mission to protect and conserve trustee resources in the Florida Keys National Marine Sanctuary.

SELECTED EXTERNAL FUNDING SOURCES:

1979; Co-principal Investigator (Co-PI), North Carolina Sea Grant 1-0-152-5220-RE153. $10K. Macrobenthic community Structure in a transplanted eelgrass (*Zostera marina*) meadow.

1981; Co-PI, Department of the Army, Coastal Engineering Research Center. $36K. Development of low cost transplanting techniques for eelgrass (*Zostera marina*).

1984-1985; Co-PI U.S, Army Corps of Engineers, Waterways Experiment Station. $54K. The use of fertilizer to enhance transplants of the seagrasses *Zostera marina* and *Halodule wrightii*.

1985; Co-PI, NOAA, National Undersea Research Program, Washington, D.C. $5K. The production and decomposition of the deepwater seagrass, *Halophila decipiens,* in a submarine Canyon, St. Croix, US Virgin Island.

1986; Co-PI, U.S. Army Corps of Engineers, Waterways Experiment Station. $48K. Transplanting of the seagrasses *Halodule wrightii*, *Syringodium filiforme*, and *Thalassia testudinum* for sediment stabilization and habitat development.

1987-1991; Principal Investigator (PI), Cooperative Agreement between U.S. Fish and Wildlife Service, Sirenia Project and the Beaufort Laboratory, NMFS, NOAA to conduct joint research on the ecology of seagrasses in the southern Indian River Lagoon and seagrass utilization by endangered West Indian manatees, *Trichecus manatus*. $145K.

1988-1990; Co-PI, NOAA Coastal Ocean Program, Estuarine Habitat Research Program, EHP-23. Plant and Faunal Development of Transplanted Seagrass Beds in Tampa Bay, Florida.

1989-1991; PI, NMFS, Office of Protected Species. $55K. Prepare the biological status review of a rare seagrass, *Halophila johnsonii.*

1989-1990; PI, South Florida Water Management District, West Palm Beach, FL. $70K. Examine the capability of water quality criteria, standards and monitoring programs to protect seagrasses.

1993; Co-PI Smithsonian Environmental Research Center, Edgewater, MD. $21K. Determination of optical water quality requirements for growth of seagrasses in the Indian River Lagoon near Ft. Pierce, FL.

1993; Co-PI, NOAA Coastal Ocean Program, Silver Spring, MD. $54K. Guidelines for the conservation and restoration of seagrasses in the United States and adjacent waters.

1994; Co-PI, NOAA Sanctuaries and Reserves and Restoration Center. $50K. Faunal use of transplanted seagrass meadows in the Florida Keys National Marine Sanctuary and development of a seagrass population dynamics model for implementation of seagrass restorations.

1994-1995; Co-PI, NOAA Restoration Center, Silver Spring MD. $30K. Restoration of propeller scars in tropical seagrass bed in the Florida Keys National Marine Sanctuary.

1995; PI, South Florida Water Management District, West Palm Beach, FL. $49K. Development of an optical water quality model for Biscayne Bay, FL.

1995; PI, Spanish Ministry of Science and Education, Madrid, Spain. $22K. Development of aging and demographic techniques for evaluating the population dynamics of seagrasses.

1995-present; Co-PI, NOAA Damage Assessment Center and Sanctuaries and Reserves Division, Silver Spring MD. $200K. Experimental evaluation of disturbance and recovery of seagrasses from injury in the Florida Keys National Marine Sanctuary and development of protocols and procedures to assess injuries to trustee resources, including seagrasses and coral reef ecosystems and the development and implementation of a seagrass spatial recovery model.

1998; Co-PI, U.S. Fish and Wildlife Service, South Florida Coastal Ecosystem Program, Vero Beach, Fl. $36K. Development of light targets and transplanting techniques for preservation and restoration of *Halophila johnsonii* (Johnson's seagrass).

1998- present; Co-PI, NMFS Recover Protected Species Program, Silver Spring, MD, $105K. Demography and genetic variability of natural and transplanted populations of a threatened seagrass, *Halophila johnsonii.*

1999-2000; Co-PI, U.S. Navy, Roosevelt Roads Naval Station, Ceiba, Puerto Rico. $60K. Cooperative Research Program between NOAA and USGS investigating habitat use by West Indian Manatees in Puerto Rico**.**

2000- present; Co-PI, National Marine Sanctuaries Program, Silver Spring, MD. $250K. Ecological characterization of the Dry Tortugas proposed ecological reserve, Florida Keys National Marine Sanctuary.

2001-2003; PI, NOAA, National Marine Sanctuaries Program, Silver Spring, MD. $87K Ecological characterization and assessment of vessel impacts to seagrass-porites coral bank in the Florida Keys National Marine Sanctuary.

2001-2002; Co-PI, NOAA Damage Assessment Center, Silver Spring, MD. $25K. Development of a Coral Reef Spatial Recovery Model.

2001-present; PI, NOAA, National Marine Sanctuaries Program, Silver Spring, MD. $50K Experimental Development of Restoration Tools for Tropical Seagrasses.

2002 - present; Co-PI,. U.S. Environmental Protection Agency, Star Grant, $100K. Seagrass Indicators and Bio-optical Model Development.

2002 – present; Co-PI, NOAA, Office of Ocean and Atmospheric Research, $125K. Marine Aquaculture Initiative: Development of Polyculture Systems for the Production of Juvenile Marine Reef Fish Preadapted for Stock Enhancement

2003; PI, NMFS Recover Protected Species Program, Silver Spring, MD. Experimental Analysis of the Effect of Sediment Burial on the threatened seagrass *Halophila johnsonii*.

2004; Co-PI, NOAA, National Marine Sanctuaries Program, Silver Spring, MD. $70K. Ecological evaluation of Bank-Channel Habitats in the Florida Keys National Marine Sanctuary.

2004; Co-PI, NOAA Damage Assessment Center, Silver Spring, MD. $30K. Calibration of a Seagrass Spatial Recovery Model.

OTHER ACTIVITIES:

July, 1998-October, 1999: Acted as co-editor with Dr. Michelle Waycott in organizing, implementing and supervising the scientific and editorial review for a special session on seagrass conservation at the Society for Conservation Biology meeting in Sydney Australia, July 1998. This meeting lead to the publication of a special issue of Pacific Conservation Biology dedicated to papers presented at this session and scheduled for publication in March 2000.

995 and 2000: Planned and organized a national workshop sponsored by NOAA to evaluate the methods for determining the value of ecological services provided by seagrasses, seagrass injury assessment, and seagrass restoration.

1992: Acted as a scientific advisor on the steering committee to the National Biological Survey and U.S. EPA in development of the agenda and planning for a national workshop on Seagrass monitoring and Research in the Gulf of Mexico. This resulted in a published proceedings and continued research in the Gulf of Mexico.

November, 1990: Planned, organized and implement a national workshop to examine the capability of water quality criteria, standards and monitoring programs to protect seagrasses. This resulted in a published proceedings which has lead directly to development of a number of research and management programs intended for the protection of seagrasses throughout the United States.

1989: Served on the Scientific Advisory Committee to the management team preparing the program plan and request for proposals for the habitat component of NOAA's Coastal Ocean Program.

PUBLICATIONS:

Whitfield, P.E., **W. Judson Kenworthy**, Michael J. Durako, Kamille K. Hammerstrom, and Manuel F. Merello. 2004. Recruitment of *Thalassia testudinum* Seedlings Into Physically Disturbed Seagrass Beds. Mar. Ecol. Prog. Ser. 267:121-131.

Fonseca, M.S., Paula E. Whitfield, W. J. Kenworthy, David R. Colby, and Brian E. Julius. In press. Use of two spatially explicit models to determine the effect of injury geometry on natural resource recovery. Aquatic Conservation: Marine and Freshwater Ecosystems.

Durako, M.J., J.I. Kunzelman, **W.J. Kenworthy** and K.K. Hammerstrom. 2003. Depth-related variability in the photobiology of two populations of *Halophila johnsonii* and *Halophila decipiens*. Mar. Biol. 142:1219-1228.

Hammerstrom, K.K. and **W. Judson Kenworthy**. 2003. A new method for estimation of Halophila decipiens Ostenfeld seed banks using density separation. Aquatic Botany, Volume 76, pp. 79-86.

Waycott, M., D. Wilson Freshwater, R.A. York, A. Calladine and **W. Judson Kenworthy.** 2002. Evolutionary trends in the seagrass genus *Halophila* (Thouars): Insights from molecular phylogeny. Bull. Mar. Sci. 71:1299-1308.

Kenworthy, W.J. Fonseca, M.S., Whitfield, P.E., Hammerstrom, K. 2002. Analysis of seagrass recovery in experimental excavations and propeller-scar disturbances in the Florida Keys National Marine Sanctuary. J. Coastal Research. 37:75-85.

Whitfield, P.E., **Kenworthy, W.J.**, Fonseca, M.S., Hammerstrom, K. 2002. The Role of a Hurricane in expansion of disturbances initiated by motor vessels on subtropical seagrass banks. J. Coastal Research. 37:86-99.

Hovel, K.A., M.S. Fonseca, D.L. Meyer, **W.J. Kenworthy**, and P.E. Whitfield. 2002. Effects of seagrass landscape structure, structural complexity and hydrodynamic regime on macro-faunal densities in North Carolina seagrass beds. Mar. Ecol. Prog. Ser. 243:11-24.

Fonseca, M.S., **W.J. Kenworthy**, B.E. Julius, S. Shutler, and S. Fluke. 2002. Seagrasses, pp. 149-770 In M. R. Perrow and A.J. Davy (eds.), Handbook of Ecological Restoration. University Press, Cambridge.

Kenworthy, W.J., Fonseca, M.S., Whitfield, P.E., Hammerstrom, K. 2000. Experimental manipulation and analysis of recovery dynamics in physically disturbed tropical seagrass communities of North America: implications for restoration and management. Proc. Fourth International Seagrass Biology Workshop. Biologia Marina Mediterranea 7:385-388.

Fonseca, M.S., **Kenworthy, W.J.**, Whitfield, P.E. 2000. Temporal dynamics of seagrass landscapes: a preliminary comparison of chronic and extreme disturbance events. Proc. Fourth International Seagrass Biology Workshop. Biologia Marina Mediterranea 7:373-376.

Kenworthy, W.J. 2000. The role of sexual reproduction in maintaining populations of *Halophila decipiens*: implications for the biodiversity and conservation of tropical seagrass ecosystems. Pacific Conservation Biology 5:251-259.

Lefebvre, L.W., J.P. Reid, **W.J. Kenworthy**, and J.A. Powell. 2000. Characterizing Manatee habitat used and seagrass grazing in Florida and Puerto Rico: implications for conservation and management. Pacific Conservation Biology 5:289-298.

Fonseca, M.S., B.E. Julius, **W. Judson Kenworthy**. 2000. Integrating biology and economics in seagrass restoration: How much is enough and why? Ecological Engineering 15:227-237.

Rose, C.D., W.C. Sharp, **W.J. Kenworthy,** J.H. Hunt, W.G. Lyons, E.J. Prager, J.F. Valentine, M.O. Hall, P. Whitfield, and J.W. Fourqurean. 1999. Sea urchin overgrazing of a large seagrass bed in outer Florida Bay. Mar. Ecol. Prog. Ser. 190:211-222

Heidelbaugh, W.S., L.M. Hall, **W.J. Kenworthy**, P. Whitfield, R.W. Virnstein, L.J. Morris, and M.D. Hanisak. 1999. Reciprocal transplanting of the threatened seagrass *Halophila johnsonii* (Johnson's seagrass) in the Indian River Lagoon, Florida. In S. Bortone (ed.), Seagrasses: Monitoring Ecology, Physiology, and Management. CRC Press, Boca Raton, Florida, pp. 197-210.

Kenworthy, W.J. and A.C. Schwarzschild. 1998. Vertical growth and short-shoot demography of *Syringodium filiforme* in outer Florida Bay, USA. Mar. Ecol. Prog. Ser. 173:25-37

Terrados, J., C.M. Duarte, M.D. Fortes, J. Borum, N.S.R. Agawin, S. Bach, U. Thampanya, L. Kamp-Nielson, **W.J. Kenworthy**, O. Gertz-Hansen and J. Vermaat. 1998. Changes in community structure and biomass of seagrass communities along gradients of siltation in SE Asia. Estuar. Coast. Shelf Sci. 46:757-768.

Fonseca, Mark S., **W. Judson Kenworthy**, and Gordon W. Thayer. 1998. Guidelines for the Conservation and Restoration of Seagrasses in the United States and Adjacent Waters. NOAA, Coastal Ocean Program, Decision Analysis Series No. 12. U.S. Department of Commerce, NOAA, Coastal Ocean Office, Silver Spring, MD. 222pp.

Jewett-Smith, J., C. McMillan, **W. Judson Kenworthy**, and K. Bird. 1997. Flowering and genetic banding patterns of *Halophila johnsonii* and conspecifics. Aquat. Bot. 59:323-331.

Terrados, J., C.M. Duarte, and **W.J. Kenworthy**. 1997. Experimental evidence for apical dominance in the seagrass *Cymodocea nodosa*. Mar. Ecol. Prog. Ser. 148:263-268.

Duarte, C.M., J. Terrados, N.S.R. Agawin, M.D. Fortes, S. Bach, and **W. Judson Kenworthy.** 1997. Response of a mixed Philippine seagrass meadow to experimental burial. Mar. Ecol. Prog. Ser. 147:285-294.

Thayer, G.W., Mark S. Fonseca, and **W. Judson Kenworthy**. 1997. Ecological value of seagrasses. In C. Dianne Stephan and T.E. Bigford (eds.). Atlantic Coastal Submerged Aquatic Vegetation: A review of its ecological role, anthropogenic impacts, state regulation, and value to Atlantic coastal fish stocks. Atlantic States Marine Fisheries Commission. Pp 5-11.

Kenworthy, W.J. and M.S. Fonseca. 1996. Light Requirements of Seagrasses *Halodule wrightii* and *Syringodium filiforme* derived from the relationship between diffuse light attenuation and maximum depth distribution. Estuaries 19:740-750.

Gallegos, C.L. and **W.J. Kenworthy**. 1996. Seagrass depth limits in the Indian River Lagoon (Florida, U.S.A.): Application of an optical water quality model. Estuar. Coast. Shelf Sci. 42:267-288.

Fonseca, M.S., **W. Judson Kenworthy** and F.X. Courtney. 1996. Development of planted seagrass beds in Tampa Bay, Florida, USA. I. Plant components. Mar. Ecol. Prog. Ser. 132:127-139.

Jupp, B.P., M.J. Durako, **W.J. Kenworthy**, G.W. Thayer, and L. Schillak. 1996. Distribution, abundance, and species composition of seagrasses at several sites in Oman. Aquat. Bot. 53:199-213.

Fourqurean, J.W., G.V.N. Powell, **W. Judson Kenworthy**, and J.C. Zieman. 1995. The effects of long-term manipulation of nutrient supply on competition between the seagrasses *Thalassia testudinum* and *Halodule wrightii* in Florida Bay. Oikos 72:349-358.

Dawes, C.J., D. Hanisak, and **W.J. Kenworthy**. 1995. Seagrass biodiversity in the Indian River Lagoon. Bull. Mar. Sci. 57:59-66.

Fonseca, M.S., **W.J. Kenworthy**, F.X. Courtney, and M.O. Hall. 1994. Seagrass transplanting in the southeastern United States: methods for accelerating habitat development. Restoration Ecology 2:198-212.

Kenworthy, W.J., M.J. Durako, S.M.R. Fatemy, H. Valavi, and G.W. Thayer. 1993. Ecology of seagrasses in northeastern Saudi Arabia one year after the Gulf War oil spill. Mar. Poll. Bull., 27: 213-222.

M.J. Durako, **Kenworthy, W.J.,** S.M.R. Fatemy, H. Valavi, and G.W. Thayer. 1993. Assessment of the toxicity of Kuwait crude oil on the photosynthesis and respiration of seagrasses of the Northern Gulf. Mar. Poll. Bull., 27:223-227.

Kenworthy, W.J. 1993. Defining the ecological light compensation pint of seagrass in the Indian River, Lagoon, FL. In: L. Morris and D. Tomasko (eds..). Proceedings and conclusions of workshops on: submerged aquatic vegetation initiative and photosynthetically active radiation. Indian River Lagoon National Estuary Program and St. Johns River Water Management District, Palatka, FL., pp 195-210.

Kenworthy, W.J. and M.S. Fonseca. 1992. The use of fertilizer to enhance growth of transplanted seagrasses Zostera marina L. and Halodule wrightii Aschers. J. Exp. Mar. Biol. Ecol. 163:141-161.

Kenworthy, W.J. 1992. Conservation and restoration of the seagrasses of the Gulf of Mexico through a better understanding of their minimum light requirements and factors controlling water transparency. In: H. Neckles (ed.). Indicator Development: Seagrass monitoring and research in the Gulf of Mexico. U.S. Environmental Protection

Agency, Office of Research and Development, Environmental Research Laboratory, Gulf Breeze, FL. EPA/620/R-94029. pp. 17-32.

Fonseca, Mark S., **W. Judson Kenworthy**, and Gordon Thayer. 1992. Seagrass beds: nursery for coastal species. In: R.H. Stroud (ed.). Proceedings of a symposium on conservation of coastal fish Habitat, pp 141-147.

Powell, G.V.N., J.W. Fourqurean, **W.J. Kenworthy**, and J.C. Zieman. 1991. Bird colonies cause seagrass enrichment in a subtropical estuary: observational and experimental evidence. Estuar. Coast. Shelf Sci. 32:567-579.

Kenworthy, W.J. and D.E. Haunert. 1991. The light requirements of seagrasses. Proceedings of a workshop to examine the capabilities of water quality criteria, standards, and monitoring programs to protect seagrasses. National Oceanic and Atmospheric Administration Technical Memorandum NMFS-SEFC-287.

Thayer, Gordon W., Mark S. Fonseca, and **W. Judson Kenworthy**. 1990 Seagrass Transplantation–Is it a viable habitat mitigation option? In: R.L. Lazor and R. Medina (eds.). Beneficial uses of dredged material. Proceedings of the Gulf Coast Regional Workshop. Technical Report D-90-3, U.S. Army Corps of Engineers, Environmental Effects of Dredging Programs. pp 194-204.

Fonseca, M.S., **W.J. Kenworthy**, D.R. Colby, K.A. Rittmaster, and G.W. Thayer. 1990. Comparisons of fauna among natural and transplanted eelgrass *Zostera marina* meadows: criteria for mitigation. Mar. Ecol. Prog. Ser. 65:251-264.

Powell, G.V.N., **W.J. Kenworthy**, and J.W. Fourqurean. 1989. Experimental evidence for nutrient limitation of seagrass growth in a tropical estuary with restricted circulation. Bull. Mar. Sci. 44:324-340.

Kenworthy, W. J., G. W. Thayer, and M. S. Fonseca. 1988. The utilization of seagrass meadows by fishery organisms. In D. D. Hook, W. H. McKee, Jr., H. K. Smith, G. Gregory, V. G. Burrell, Jr., M. R. Devoe, R. E. Sojka, S. Gilbert, R. Banks, L. H. Stolzy, C. Brooks, T. D. Matthews, and T. H. Shear (eds.). The ecology and management of wetlands. Vol. I, Ecology of wetlands. Timber press, Oregon. pp. 548-560.

Thayer, G.W., Mark S. Fonseca, and **W. Judson Kenworthy**. 1988. Critical and sensitive coastal and estuarine habitats. Sea Winds 2:7-13.

Kenworthy, W.J., C.A. Currin, M.S. Fonseca, and G. Smith. 1987. Production, decomposition, and heterotrophic utilization of the seagrass, *Halophila decipiens* in a submarine canyon. Mar. Ecol. Prog. Ser., 51: 277-290.

Kenworthy, W.J., C. Currin, G. Smith, and G.W. Thayer. 1987. The abundance, biomass, and acetylene reduction activity of bacteria associated with decomposing rhizomes of two seagrasses, *Zostera marina* and *Thalassia testudinum*. Aquat. Bot. 27:97-119.

Fonseca, M.S., G. W. Thayer and **W.J. Kenworthy**. 1987. The use of ecological data in the implementation and management of seagrass restorations. Fl. Mar. Res. Publ. 42:175-188.

Fonseca, M.S. and **W.J. Kenworthy**. 1987. Effects of current on photosynthesis and distribution of seagrasses. Aquat. Bot. 27:59-78.

Kenworthy, W. Judson and G.W. Thayer. 1984. Production and decomposition of the roots and rhizomes of seagrasses, *Zostera marina* and *Thalassia testudinum*, in temperate and subtropical marine ecosystems. Bull. Mar. Sci. 35:364-379.

Thayer, Gordon W., **W. Judson Kenworthy**, and Mark S. Fonseca. 1984. The ecology of eelgrass meadows of the Atlantic coast: a community profile. U.S. Fish and Wildl. Serv. FWS/OBS-84/02. 147pp.

Kenworthy, W.J., J.C. Zieman, and G.W. Thayer. 1982. Evidence for the influence of seagrasses on the benthic nitrogen cycle in a coastal plain estuary near Beaufort, North Carolina (USA). Oecologia. 54:152-158.

Homziak, J., Mark S. Fonseca, and **W. Judson Kenworthy**. 1982. Macrobenthic community structure in a transplanted eelgrass (*Zostera marina*) meadow. Mar. Ecol. Prog. Ser. 9:211-221.

Fonseca, M.S., **W. Judson Kenworthy**, and R.C. Phillips. 1982. A cost-evaluation technique for restoration of seagrass and other plant communities. Environ. Conserv. 9:237-241.

Thayer, G.W., H. Hoffman Stuart, **W. Judson Kenworthy**, J.F. Ustach, and A.B. Hall. 1978. Habitat values of salt marshes, mangroves, and seagrasses for aquatic organisms. In P.E. Greeson, J.R. Clark and J.E. Clark (eds.). Wetland functions and values: the state of our understanding. American Water Resources Association, Washington, D.C. pp. 235-247.

Kenworthy, W.J. and M.S. Fonseca. 1977. Reciprocal transplant of the seagrass, *Zostera marina* L. effect of substrate on growth. Aquaculture 12:197-213.