FACTORS INFLUENCING BIOLOGICAL COMMUNITIES AND STREAM ASSESSMENTS IN SOUTHEASTERN COASTAL PLAIN STREAMS, USA

by

THERESA ANNE THOM

(Under the Direction of C. Ronald Carroll)

ABSTRACT

The Clean Water Act establishes the basic structure for regulating discharges of pollutants into the surface waters of the United States. Under the Clean Water Act, states have primary responsibility for setting, reviewing, revising, and enforcing water quality standards including the protection of biological integrity. Biological monitoring methods have been developed using aquatic macroinvertebrates, fishes and periphyton for a variety of aquatic habitats, including streams. The reliance on biological tools for stream assessments has greatly increased within the last ten years, primarily as a response to litigation based on TMDL development and impaired waters listing as outlined in the CWA.

This work summarizes how species level data can be used for conservation initiatives and natural resource management. It also illustrates how biological community data informs management decisions such as road removal and other restoration efforts. This work shows how analysis of biological community data is greatly influenced by state policies and guidance for collecting, calculating and evaluating biological data which changes over time. Federal policies such as the Clean Water Act directly influence the types of biological monitoring conducted, mainly through state agencies. Litigation related to federal legislation also affects the types of stream assessment work conducted at the state level. These factors influence biological monitoring and stream assessments within the Southeast.

This dissertation summarizes four years of data collection supporting management of aquatic resources on Eglin Air Force Base in the Florida Panhandle. Over 200 biomonitoring samples were collected at 127 sites across Eglin, providing baseline characteristics of the biological communities in

wadeable streams. This biological data helped identify impaired sites and potential restorative actions for natural resource managers, as well as evaluate statewide changes in bioassessment criteria. Several new species records were recorded for Santa Rosa, Okaloosa and Walton counties for rare and sensitive aquatic insect taxa, including one dragonfly (Odonata) species never before described. As a result of this work, a long-term monitoring partnership program was developed, evaluated and implemented for natural resource management between the Department of Defense and the U.S. Fish and Wildlife Service.

INDEX WORDS: Streams, Bioassessment, Biomonitoring, Macroinvertebrates, Rare species, Metric recalibration, Policy, Clean Water Act, Impaired waterways, Southeast, Florida, Eglin Air Force Base, Coastal Plain, Florida Panhandle

FACTORS INFLUENCING BIOLOGICAL COMMUNITIES AND STREAM ASSESSMENTS IN SOUTHEASTERN COASTAL PLAIN STREAMS, USA

by

THERESA ANNE THOM

B.S., Emory University, 1996

M.S., The University of Georgia, 2000

A Dissertation Submitted to the Graduate Faculty of The University of Georgia in Partial Fulfillment of the Requirements for the Degree

DOCTOR OF PHILOSOPHY

ATHENS, GEORGIA

2005

FACTORS INFLUENCING BIOLOGICAL COMMUNITIES AND STREAM ASSESSMENTS IN SOUTHEASTERN COASTAL PLAIN STREAMS, USA

by

THERESA ANNE THOM

Major Professor:	C. Ronald Carroll
Committee:	Catherine M. Pringle Manuel L. Pescador Judy L. Meyer Laurie A. Fowler

Electronic Version Approved:

Maureen Grasso
Dean of the Graduate School
The University of Georgia
December 2005

DEDICATION

This dissertation is dedicated to the 44,147 individual aquatic macroinvertebrates who were sacrificed during the course of this project. This work attempts to inform sound natural resource management of stream ecosystems in the southeastern coastal plain. Maybe one day we will realize that fresh water really has the upper hand, as pointed out in Tom Robbins' *Another Roadside Attraction*; "...human beings were invented by water as a device for transporting itself from one place to another."

ACKNOWLEDGEMENTS

I am grateful for the support I received from the U.S. Fish and Wildlife Service Panama City Field Office in Panama City, Florida. Gail Carmody was exceptionally helpful as a mentor, friend and role model. My co-worker Jeff Herod continues to be a partner in crime, despite now working on the opposite coast. The Natural Resources Management staff at Eglin Air Force Base's Jackson Guard provided many learning opportunities in the field and the office where I learned a thing or two about cleaning floors. I will miss the spring frog call surveys, butterfly surveys and the holiday parties, but probably not safety meetings. I am honored to have worked in the field with Florida Department of Environmental Protection biologists Donald Ray, Laurence Donelan, and Frank Butera, as well as Andy Rasmussen from Florida A&M University. I am also grateful for adoption by the Dragonfly Society of the Americas. Their enthusiasm for Odonata is contagious! Special thanks go to John and Linda Epler, for providing an oasis for taxonomic expertise and development, with a healthy dose of humor and skepticism.

Many volunteers gave up their weekends, summers, and free time to assist with this work, and their efforts were much appreciated, especially the dedication of Veronica Mercado, Paige Green, Travis Douce, Trisha Dall and Jeneé Hensley. Student Conservation Association students Trent Jett and Hawaii Dave gave me a new perspective on "scrimps" and "crawdads." I think we all fulfilled our lifetime requirements of using machetes in blackberry briars and have a special place in our hearts for the Total Station. The true influence of nature must also be acknowledged; specifically hurricanes CHARLEY, FRANCES, IVAN, JEANNE and DENNIS – all re-shaped the Florida Panhandle and my research projects during my time in Florida.

Not to be outdone by any hurricane, in the Georgia Piedmont I thank my advisor/cheer-leader/coach/guru, Ron Carroll, and my committee; Laurie Fowler, Cathy Pringle, Judy Meyer, David Leigh and Manny Pescador, for guiding me through this process. Special thanks go to the

labs that adopted me (Judy Meyer's Meyerfauna and the Pringle Lab). I am so lucky they put up with my senatorial ways, gave excellent feedback and support, and even shared chocolate!

Thank you to my twin, who gave last minute statistical advice and even found a new locale for *Awaous banana* (Freshwater River Goby) on Eglin. My family was very patient, understanding and willing to be put to work in the Florida Panhandle with poisonous snakes, noxious weeds, 100% humidity, heat (no easy task for Minnesotans) and yellow flies (Tabanidae). Immense gratitude goes to my friend and training partner; fellow PhD candidate Bree Ettinger, who made sure we took our frustrations out on the bike and the road instead of our significant others. Finally, I want to acknowledge the support of my husband, Jed Schneider and our three loving cats, Rocky, Chili and Little Man. They contended with specimens, papers, books, piles, sand, office space eviction, and at times neglect, but made sure the joys of daily life weren't completely obliterated during this "adventure."

TABLE OF CONTENTS

CHAPTER 1

INTRODUCTION AND LITERATURE REVIEW

Biodiversity and Ecosystem Function

The relationship between biodiversity and ecosystem stability and function is a well-studied topic in ecology with an enormous body of literature focusing on multiple systems including terrestrial, marine and aquatic habitats (Lyons et al. 2005; Weisser and Siemann 2004; Bond and Chase 2002; Hector and Hooper 2002; Loreau at al. 2002; Wardle 2002; Kinzig et al. 2001; Chapin et al. 2000; Schwartz et al. 2000; Wilson 1999; Naeem 1998; D'Itri 1997; McGrady-Steed et al. 1997; Philipp et al. 1995; Jones and Lawton 1995; Naeem et al. 1994; Ricklefs and Schluter 1993, Frank and McNaughton 1991). An entire volume of "Issues in Ecology" published by the Ecological Society of America (Naeem 1999) was dedicated to biodiversity, ecosystem functioning, and maintaining vital ecosystem processes. Mittermeier and Forsyth (1997) state; "Maintenance of biological diversity is now recognized in many circles as the single highest conservation priority of our time." The importance of biodiversity is further evidenced within the context of invasive species research, and by the development of the discipline of Conservation Biology. Conservation Biology applies principles from broad disciplines to understand, conserve and maintain global biodiversity (Meffe and Carroll 1997).

Rare species can make significant contributions to ecosystem function (Lyons et al. 2005, Lyons and Schwarz 2001, Meffe and Carroll 1997; Lawton and Jones 1995), and typically constitute the largest component of species richness (Krebs 1985, Putman 1994). Rare species may also be considered indicator species of degradation, particularly in aquatic systems (Ford 1989, Minns et al. 1988, Lyons et al. 1995). Yet, consistently rare species are left out of state-wide biomonitoring threshold scoring and sensitive taxa lists, primarily due to lack of statistical significance at a broader scale. Cao et al. (1998) assert rare species are critical for bioassessment. Rare species are valuable components of biological systems, especially in areas with high levels of endemism such as the Florida panhandle.

Species Diversity in Florida

Florida has long been recognized for rich species diversity. As early as 1565, Nicolas le Challeux described the land surrounding the St. John's River as thickly forested hills full of wild game (Fishman 2000). From the late 1700's through the late 1800's, naturalists such as William Bartram, John James Audubon, Hardy Bryan Croom and Dr. Alvan W. Chapman traveled through Florida, documenting the presence of numerous plant and animal species, including many birds (Fishman 2000).

Attempts at subduing the landscape were equally quick – John Sparke wrote in 1589 that Florida would be the perfect place to raise cattle (Fishman 2000), and since then Florida has become one of the largest beef-producing states east of the Mississippi (USDA 2004). Sixty years ago, Thomas Barbour (1944) noted that, "Thirty years ago Florida was one of the most extraordinary states in the Union, but being flat and quite park-like in character it was an easy state for man to ruin, and he has ruined it with ruthless efficiency." Recent hurricane seasons have painfully illustrated how extensively we have developed the southeast and how dependent we are on Florida and the Gulf Coast. For example, 60.4% of the total Gulf Coast Region crude oil imports are from the Gulf of Mexico, as well as 47.4 % of the total Gulf Coast Region refinery capacity and 28.7% of the federal offshore crude oil production (EIA 2005). Populations in coastal watersheds are also growing rapidly, with 55 percent of the U.S. population already living within 50 miles of a coast (USEPA 2005), with 40% of new commercial development and 46% of new residential development within coastal areas (NOAA 1998). Specifically in Florida, what was considered even in 1904 to be a "frontier land where they had bears, snakes, crocodiles, panthers and Indians" (Rosasco-Soule 1987), has become one of the nation's premier vacation destinations. Tourism is the largest industry in Florida and contributes $53 billion a year to the state's economy (FWC 2005). In the last 50 years Florida's population has grown from less than three million people to more than 17 million, ranking fourth in U.S. population (U.S. Census Bureau 2000).

Human population growth exerts further pressure on what remains of Florida's extraordinary ecosystems and the plant and animal communities within them. Destruction and fragmentation of the long-leaf pine wiregrass ecosystem that once covered a significant portion of the southeastern coastal

plain has led to major species declines and loss (Frost 1993; Means and Grow 1985). Aquatic species diversity has also suffered major declines as a result of human influence and cumulative impacts (Benz and Collins 1997). Many species are becoming rare and more vulnerable to extinction. Rarity of a species is typically defined in terms of geographic range, habitat specificity and population size. Rabinowitz et al. (1986) describes seven different ways a species could be considered rare, based on different distributional patterns. Different types of rarity make species vulnerable to different extinction processes. Rarity of all types, whether natural or human-induced, is cause for special concern (Meffe and Carroll 1997).

Despite land use change and degradation across North America, a recent examination of the status of biodiversity in the United States by The Nature Conservancy and the Association for Biodiversity Information ranked the Panhandle of Florida as one of the six most significant biodiversity hot spots in the United States based on a species index weighted to incorporate rare and endemic species (Stein et al. 2000). Efforts to document and conserve species are not new phenomena, especially in Florida. Early appeals to protect the rare species in Florida resulted in the founding of organizations like the Florida Committee on Rare and Endangered Plants and Animals (FCREPA) in 1973, and The Florida Natural Areas Inventory in 1981. The main tasks of these groups are to help define, document and track the endangered, threatened, rare and sensitive biota of Florida.

The most recent conservation efforts within Florida involve the development of a statewide comprehensive conservation strategy. This initiative, lead by Florida's Fish and Wildlife Conservation Commission (FWC), includes multiple agencies, organizations, businesses and individuals with an interest in preventing wildlife declines and promoting conservation actions in Florida. The conservation strategy lists species and habitats in need of conservation, why they are in need and, most importantly, what is being done to protect and conserve them. Recent drafts have listed over 369 invertebrate species of greatest conservation need, with 74 species of aquatic insects (FWC 2005). The goal of this process as stated by FWC is "to prevent wildlife from becoming endangered and to keep common species common." The underlying theory of this program is that ecosystem function is maintained through conservation of biodiversity, especially rare and endemic species.

In the Southeast, protecting the natural environment and biological integrity is especially difficult due to the extremely high biodiversity of the region (Hackney et al. 1992; Laerm et al. 1980; Mac et al. 1998; Martin et al. 1993; Stein et al. 2000; Whitney et al. 2004) and ever increasing population growth. Based on population growth between 2000 and 2001, five out of the top ten fastest growing counties in the U.S. were within EPA Region IV; Forsyth, Henry and Paulding counties in Georgia, Spencer County in Kentucky and Flagler County in Florida (U.S. Census Bureau 2002). Aquatic habitats are sensitive to the major land use changes associated with population growth. Especially in the Southeast, freshwater habitats are experiencing significant declines, both in quantity and quality (Benz and Collins 1997). Such declines are attributed to changes in water quality, physical habitat alteration, loss of watershed integrity, removal of hydrologic connectivity, and the introduction of exotic species (Folkerts 1997).

Water Quality Assessment

Assessment of stream water quality often requires knowledge of baseline conditions, setting quality criteria and standards, monitoring temporal changes, and determining the impacts of specific disturbances (Canter 1985; Resh and Jackson 1993). Monitoring techniques, which include a combination of physical chemical and biological measurements, provide the optimal water quality monitoring approach. Biological monitoring (sometimes termed biomonitoring or bioassessment) provides information about both past and current conditions (Patterson and Morrison 1993), and can provide information that physical and chemical data cannot (Barbour et al. 1999). One aspect of biologically focused stream assessment involves sampling aquatic macroinvertebrates. Benthic macroinvertebrates are most frequently used as bioindicators of stream health (Hellawell 1986), and their value in biological monitoring studies is well documented (Rosenberg and Resh 1993).

For over 150 years, biological communities have been used to measure water quality conditions, define water quality problems, and protect water quality. For example, work in the mid-1800s documenting the relationship among human illness and poor drinking water conditions led to Great Britain's development of national legislation addressing water pollution (Davis 1995). Within the United

States, efforts to control pollution of surface water have historically been the responsibility of state and local agencies (Ferrey 2001). The Water Pollution Control Act of 1948 was the first effort by the U.S. federal government to regulate water pollution in the twentieth century (Ferrey 2001; Griffith et al 2001). As summarized by Griffith et al. (2001) and Ferrey (2001), growing public awareness and concern for controlling water pollution and enforcing water pollution violations led Congress in 1977 to adopt major amendments to the Federal Water Pollution Control Act Amendments of 1972. This law became commonly known as the Clean Water Act (EPA 2003). The Clean Water Act (CWA) establishes the basic structure for regulating discharges of pollutants into the surface waters of the United States. Subsequent revisions have streamlined grant and funding processes and have targeted other types of surface water pollution, including nonpoint source pollution (Section §319).

The United States Environmental Protection Agency (USEPA) develops regulations, policies, and guidance for implementation by the states, and oversees that states' activities are consistent with the CWA and relevant water quality standards regulations (40 CFR Part 131). Under the CWA, states have primary responsibility for setting, reviewing, revising, and enforcing water quality standards. Sates designate the use(s) of all State waters; acceptable uses include water contact recreation, protection of aquatic life, public water supply, etc.). States then adopt water quality criteria necessary to protect those uses (§303(c)). The designated uses describe the goal(s) of each water quality standard.

Biological integrity is a specific component of the CWA. For example, as stated within the Act's goals in §101(a),"The objective of this Act is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters." Within §303(c) subsection 2A, designated uses specific to biological integrity are mentioned ("propagation of fish and wildlife") along with the need for biological information when water quality standards are revised and new criteria adopted ("...such State shall adopt criteria based on biological monitoring or assessment methods..." §303(c)2B). Finally, under §303(d), waters of the United States can be listed as impaired based on biological criteria, "Each State shall identify those waters or parts thereof within its boundaries for which controls are not stringent enough to assure protection and propagation of a balanced indigenous population of shellfish, fish, and wildlife."

Dissertation Overview

The overall objective of this dissertation is to provide species community composition and natural history data for stream ecosystems to natural resource managers in support of biodiversity conservation, adaptive ecosystem management, and the military mission on Eglin Air Force Base, FL. This dissertation summarizes the baseline biological assessment data for wadeable stream ecosystems within Eglin boundaries. The compiled information has led to recommendations for development of a long-term aquatic ecosystem monitoring program on Eglin. This work also provides the framework for a partnership between the Department of Defense and the U.S. Fish and Wildlife Service for monitoring and adaptive management of rivers and streams to enhance military mission flexibility and success.

Chapter 2 of this work summarizes natural history collection information for 28 rare and sensitive species collected during biological assessment work on Eglin. Many of these species are documented for the first time in this region including one species (a dragonfly) that had never before been described. It reinforces the justification for inclusion of rare and sensitive species within bioassessment indices.

Chapter 3 summarizes four years of bioassessment work completed on Eglin. This summary includes data from over 200 biological monitoring samples collected at 127 sites. The baseline biological community data reported here provided the foundations for development of an integrated freshwater stream monitoring program on Eglin. The stream monitoring program provides data for restoring and maintaining biological integrity and ecosystem function. The effectiveness of recent bioassessment metric changes by the Florida Department of Environmental Protection is also evaluated. These metric changes illustrate the influence statewide policies have on public lands management.

Chapter 4 examines how the Environmental Protection Agency, the United States government and state biologists within EPA Region IV affect management of freshwater ecosystems within the Southeastern United States. Specifically, biological assessment programs within Region IV are compared between 1996 and 2004. This timeframe corresponds to enforcement of Section 303(d) guidance within the Clean Water Act. Changes in the numbers and types of biological assessments completed in support

of various state programs within Region IV illustrate the indirect effects Total Maximum Daily Load (TMDL) litigation has on biological monitoring data collection.

LITERATURE CITED

Barbour, M.T., J. Gerritsen, B.D. Snyder and J.B. Stribling. 1999. Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates, and Fish. Second Edition. EPA 841-B-99-002. US Environmental Protection Agency, Office of Water. Washington, D.C. 339 pp.

Barbour, T. 1944. That Vanishing Eden: A Naturalist's Florida. Little, Brown and Company, Boston, Massachusetts.1st edition. 250 pp.

Benz, G.W. and D.E. Collins. 1997. Aquatic Fauna in Peril: The Southeastern Perspective. Lenz Design and Communications. Decatur, GA. 554 pp.

Bond, E.M. and J.M. Chase. 2002. Biodiversity and ecosystem functioning at local and regional spatial scales. Ecology Letters 5: 467-470.

Canter, L. 1985. River water quality monitoring. Lewis Publishers, Inc., Chelsea, MI. 170 pp.

Cao, Y., D. D. Williams, and N.E. Williams. 1998. How Important are Rare Species in Aquatic Community Ecology and Bioassessment? Limnology and Oceanography, Vol. 43, No. 7. pp. 1403-1409.

Chapin, F.S., E.S. Zavaleta, V.T. Eviner, R.L. Naylor, P.M. Vitousek, H.L. Reynolds, D.U. Hooper, S. Lavorel, O.E. Sala, S.E. Hobbie, M.C. Mack and S. Diaz. 2000. Consequences of changing biodiversity. Nature 405: 234-242.

Davis, W.S. 1995. Biological Assessment and Criteria: Building on the Past, pp. 15-29. *In*: Biological Assessment and Criteria: Tools for Water Resource Planning and Decision Making. W.S. Davis and T.P. Simon (Eds.). Lewis Publishers, CRC Press, Inc., Boca Raton, FL. 415 pp.

D'Itri, F.M. 1997. Zebra Mussels and Aquatic Nuisance Species. CRC Press, London, England. 648 pp.

EIA (Energy Information Administration). 2005. EIA Report 11-22-2005 on Hurricane Impacts on U.S. Oil and Natural Gas Energy Markets. 3 pp. http://tonto.eia.doe.gov/oog/special/eia1_katrina.html

EPA (Environmental Protection Agency). 2003. Clean Water Act History. February 20th, 2003. http://www.epa.gov/region5/water/cwa.htm

Ferrey, S. 2001. Environmental Law: Examples and Explanations. Second Edition. Aspen Law & Business, New York, NY. 615 pp.

Fishman, G. 2000. Journeys Through Paradise: Pioneering Naturalists in the Southeast. University Press of Florida. Gainesville, FL. 306 pp.

Folkerts, G.W. 1997. State and fate of the world's aquatic fauna (pp. 1-16). *In:* G.W. Benz and D.E. Collins [Eds.] Aquatic Fauna in Peril: The Southeastern Perspective. Lenz Design and Communications. Decatur, GA. 554 pp.

Ford, J. 1989. The effects of chemical stress on aquatic species composition and community structure (pp. 99-114). *In:* S.A. Levin, M.A. Harwell, J.R. Kelly and K.D. Kimball [Eds.] Ecotoxicology: Problems and approaches. Springer-Verlag. New York, NY. 547 pp.

Frank, D.A. and S.J. McNaughton. 1991. Stability increases with diversity in plant communities: empirical eveidence for the 1988 Yellowstone drought. Oikos 62: 360-362.

Frost, C.C. 1993. Four centuries of changing landscape patterns in the Longleaf Pine ecosystem. (pp.17-43). *In:* S. Hermann (Ed.) Proceedings of the Tall Timbers Fire Ecology Conference, No.18, The longleaf Pine Ecosystem; Ecology, Restoration and Management. Tallahassee, FL: Tall Timbers Research Station.

FWC (Florida Fish and Wildlife Conservation Commission) 2005. Florida's Wildlife Legacy Initiative. Florida's Comprehensive Wildlife Conservation Strategy. Tallahassee, Florida. 540 pp.

Griffith, L.M., R.C. Ward, G.B. McBride and J.C. Loftis. 2001. Data Analysis Considerations in Producing Comparable Information for Water Quality Management Purposes. Colorado State University. 45 pp.

Hackney, C.T., S.M. Adams and W.H. Martin (Eds.). 1992. Biodiversity of the Southeastern United States: Aquatic Communities. John Wiley & Sons. New York, NY. 800 pp.

Hector, A. and R. Hooper. 2002. Darwin and the first ecological experiment. Science 295: 639-640.

Hellawell, J.M. 1986. Biological Indicators of Freshwater Pollution and Environmental Management. Elsevier, London. 546 pp.

Jones, C.G. and J.H. Lawton. 1995. Linking Species & Ecosystems. Chapman and Hall, New York, NY. 387 pp.

Kinzig, A.P., S.W. Pacala and D. Tilman. 2001. The functional consequences of biodiversity: empirical progress and theoretical extensions. Princeton University Press, Princeton, NJ. 368 pp.

Krebs, C.J. 1985. Ecology: The Experimental Analysis of Distribution and Abundance. Harper and Row. New York, NY. 3rd edition. 800 pp.

Laerm, J., B.J. Freeman and L.J. Vitt. 1980. Vertebrates of the Okefenokee Swamp. Brimleyana 4:47-73.

Lawton, J.H. and C.G. Jones. 1995. Linking Species and Ecosystems: Organisms as Ecosystem Engineers, (pp.141-150). *In*: Linking Species and Ecosystems. C. Jones and J. Lawton [Eds] Chapman and Hall, New York, NY. 387 pp.

Loreau, M, S. Naeem, and P. Inchausti. 2002. Biodiversity and Ecosystem Functioning: Synthesis and Perspectives. Oxford University Press, New York, NY. 304pp.

Lyons, J., S. Navarro-Perz, P.A. Cochran, E. Santana and M. Guzman-Arroyo. 1995. Index of biotic integrity based on fish assemblages for the conservation of streams and rivers in west-central Mexico. Conservation Biology. Vol.9, No. 3: 569-584.

Lyons, K.G., C.A. Brigham, B.H. Traut and M.W. Schwartz. 2005. Rare Species and Ecosystem Functioning. Conservation Biology. Vol. 19, No. 4: 1019-1024.

Lyons, K.G. and M.W. Schwartz. 2001. Rare species loss alters ecosystem function – invasion resistance. Ecology Letters 4: 1-8.

Mac, M.J., P.A. Opler, C.E. Haecker and P.D. Doran. 1998. Status and Trends of the Nation's Biological Resources. Department of the Interior. Geological Survey, Reston, VA. 964 pp.

Martin, W.H., S.G. Boyce and A.C. Echternacht (Eds.). 1993. Biodiversity of the Southeastern United States: Upland Terrestrial Communities. John Wiley and Sons, New York, NY. 373 pp.

McGrady-Steed, J., P. Harris and P. Morin. 1997. Biodiversity regulates ecosystem predictability. Nature 390: 162-165.

Meffe, G.K. and C.R. Carroll. 1997. Principles of Conservation Biology. 2nd edition. Sinauer Associates, Inc., Sunderland, MA. 729 pp.

Means, B., and G. Grow. 1985. The endangered longleaf pine community. ENFO Bulletin. Winter Park, Fl: Environmental Information Center.

Minns, C.K., V.W. Carins, R.G. Randall and J.E. Morre. 1988. An index of biotic integrity (IBI) for fish assemblages in the littoral zone of Great Lakes' area of concern. Canadian Journal of Fisheries and Aquatic Science. 51: 1804-1822.

Mittermeier, R.S. and A.B. Forsyth. 1997. Setting Priorities for Biodiversity Conservation: One Organization's Approach (pp.141-142). *In*: Principles of Conservation Biology. 2nd edition.G. Meffe and C. Carroll [Eds]. Sinauer Associates, Inc., Sunderland, MA. 729 pp.

Naeem, S. 1998. Species redundancy and ecosystem reliability. Conservation Biology 12: 39-45.

Naeem, S., F.S. Chapin III, R. Costanza, P.R. Ehrlich, F.B. Golley, D.U. Hooper, J.H. Lawton, R.V. O'Neill, H.A. Mooney, O.E. Sala, A.J. Symstad, and D. Tilman. 1999. Biodiversity and Ecosystem Functioning: Maintaining Natural Life Support Processes. Issues in Ecology 4: 1-14.

Naeem, S., L.J. Thompson, S.P. Lawler, J.H. Lawton and R.M. Woodfin. 1994. Declining biodiversity can alter the performance of ecosystems. Nature 368: 734-737.

NOAA (National Oceanic and Atmospheric Administration) 1998. International Year of the Ocean: Ocean facts on coastal development. 3 pp. http://www.yoto98.noaa.gov/facts/cdevel.htm

Patterson, G. and B. Morrison. 1993. Invertebrate animals as indicators of acidity in upland streams. Forestry Commission Field Book 13. HMSO Publications, London, England. 28pp.

Philipp, D.P., J.M. Epifanio, J.E. Marsden and J.E. Claussen. 1995. Protection of Aquatic Biodiversity: Proceedings of the World Fisheries Congress, Athens, Greece, Theme 3. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi. 282 pp.

Putman, R.J. 1994. Community Ecology. 1st edition, Chapman and Hall. New York, NY. 178 pp.

Rabinowitz, D., S. Cairns and T. Dillon. 1986. Seven forms of rarity and their frequency in the flora of the British Isles. (pp. 182-204). *In*: M.E. Soulé (Ed.), Conservation Biology: The Science of Scarcity and Diversity. Sinauer Associates, Sunderland, MA. 560 pp.

Resh, V.H. and J.K. Jackson. 1993. Rapid assessment approaches to biomonitoring using benthic macroinvertebrates, pp. 195-233. *In:* Freshwater biomonitoring and benthic macroinvertebrates. D.M. Rosenberg and V.H. Resh (Eds.). Chapman and Hall, NY. 488 pp.

Ricklefs, R.E. and D. Schluter. 1993. Species Diversity in Ecological Communities. The University of Chicago Press, Chicago, IL. 416 pp.

Rosasco-Soule, A. 1987. Panhandle Memories: A Lived History. West Florida Literary Federation and the Pensacola Press Club, Pensacola, Florida. 143 pp.

Rosenberg, D.M., and V.H. Resh. 1993. Introduction to freshwater biomonitoring and benthic macroinvertebrates, pp.1-9. *In:* Freshwater biomonitoring and benthic macroinvertebrates. D.M. Rosenberg and V.H. Resh (Eds.). Chapman and Hall, NY. 488 pp.

Schwartz, M.W., C.A. Brigham, J.D. Hoeksema, K.G. Lyons, M.H. Mills and P.J. van Mantgen. 2000. Linking biodiversity to ecosystem function: implications for conservation ecology. Oecologia 122: 297-305.

Stein, B.A., L.S. Kutner and J.S. Adams. 2000. Precious Heritage: The Status of Biodiversity in the United States. Oxford University Press, Inc., New York, New York. 399 pp.

U.S. Census Bureau. 2000. 2000 Census of Population and Housing. Washington, D.C. http://www.census.gov/main/www/cen2000.html

U.S. Census Bureau. 2002. Most of Nation's 10 Fastest-Growing Counties in South. US Census Bureau News. U.S. Department of Commerce, Washington, DC. http://www.census.gov/Press-Release/www/releases/archives/population/000453.html

USDA (United States Department of Agriculture). 2004. 2002 Census of Agriculture. United States: Summary and State Data, Vol.1: Geographic Series Part 51. AC-02-A-51. USDA-National Agriculture Statistics Service. Washington, DC. 663 pp.

USEPA (United States Environmental Protection Agency). 2005. EPA- NOAA Partnership on Coastal Community Growth. January 2005. http://www.epa.gov/smartgrowth/noaamoa.html

Wardle, D.A. 2002. Communities and Ecosystems. Princeton University Press, Princeton, NJ. 400 pp.

Weisser, W.W. and E. Siemann. 2004. Insects and Ecosystem Function. Springer-Verlag, New York, NY. 413 pp.

Whitney, E.D., B. Means and A. Rudloe. 2004. Priceless Florida. Pineapple Press, Sarasota, FL. 423 pp.

Wilson, E.O. 1999. The Diversity of Life. Reissue edition, W.W. Norton & Company, Inc. New York, NY. 424 pp.

CHAPTER 2

RARE AND SENSITIVE AQUATIC INSECTS IN THE FLORIDA PANHANDLE[1]

[1] Thom, T.A., A.K. Rasmussen, and M.L. Pescador. To be submitted to *Bulletin of the Florida State Museum*.

ABSTRACT

Florida is a diverse state, with particularly high numbers of rare and endemic species, including aquatic invertebrate species, primarily within the panhandle region. Current initiatives for developing a statewide conservation plan and documenting the status and trends of rare and threatened species include invertebrates. However, despite being listed as species requiring special conservation efforts, the majority of these invertebrates are listed as having an "unknown" status and "unknown" population trends. This paper lists 28 aquatic insect species (representing five orders; Ephemeroptera, Plecoptera, Trichoptera, Odonata and Coleoptera) considered as sensitive and rare within freshwater coastal plain systems based primarily on a combination of known geographic range and habitat requirements. We update collection locality information for these species in an effort to better inform the current statewide conservation strategy planning and natural resource managers. This paper includes current biomonitoring work completed on Eglin Air Force Base in northwest Florida.

INTRODUCTION

Florida has long been recognized for rich species diversity. As early as 1565, Nicolas le Challeux described the land surrounding the St. John's River as thickly forested hills full of wild game (Fishman 2000). Naturalists such as William Bartram, John James Audubon, Hardy Bryan Croom and Dr. Alvan W. Chapman traveled throughout Florida, documenting the presence of numerous plant and animal species, including many birds (Fishman 2000). Attempts at subduing the landscape were equally quick – John Sparke wrote in 1589 that Florida would be the perfect place to raise cattle (Fishman 2000), and since then Florida has become one of the largest beef-producing states east of the Mississippi (USDA 2002). Sixty years ago, Thomas Barbour (1944) lamented that, "Thirty years ago Florida was one of the most extraordinary states in the Union, but being flat and quite park-like in character it was an easy state for man to ruin, and he has ruined it with ruthless efficiency." What was considered even in 1904 to be a "frontier land where they had bears, snakes, crocodiles, panthers and Indians" (Rosasco-Soule 1987), has become one of the nation's premier vacation destinations. Tourism is the largest industry in Florida and

contributes $53 billion a year to the state's economy (FWC 2005). In the last 50 years Florida's population has grown from less than three million people to more than 17 million, ranking fourth in U.S. population (U.S. Census Bureau 2000).

Human population growth exerts further pressure on what remains of Florida's extraordinary ecosystems and the species communities within them. Destruction and fragmentation of the long-leaf pine wiregrass ecosystem that once covered a significant portion of the southeastern coastal plain has lead to major species declines and loss (Frost 1993; Means and Grow 1985). Aquatic species diversity has also suffered major declines as a result of human influence and cumulative impacts (Benz and Collins 1997). Many species are becoming rare and more vulnerability to extinction. Rarity of a species is typically defined in terms of geographic range, habitat specificity and population size. Rabinowitz et al. (1986) describes seven different ways a species could be considered rare, based on different distributional patterns. Different types of rarity make species vulnerable to different extinction processes. Rarity of all types, whether natural or human-induced, is cause for special concern (Meffe and Carroll 1997).

Despite land use change and degradation across North America, a recent examination of the status of biodiversity in the United States by The Nature Conservancy and the Association for Biodiversity Information ranked the Panhandle of Florida as one of the six most significant biodiversity hot spots in the United States based on a species index weighted to incorporate rare and endemic species (Stein et al. 2000). Efforts to document and conserve species are not new phenomena, especially in Florida. Early appeals to protect the rare species in Florida resulted in the founding of organizations like the Florida Committee on Rare and Endangered Plants and Animals (FCREPA) in 1973. The main task of this group was to determine which species should be considered for special classification and concern within Florida. FCREPA published an initial five volume set in 1976 documenting the rare and endangered biota of Florida, including invertebrates. FCREPA also defined status categories (i.e. endangered, threatened, rare, species of special concern) based on geographic range, population size and vulnerability to extinction (Appendix A). Since then, these volumes have been updated with new species lists, natural history information and locality data – the latest volumes appearing in 1994.

Documenting the occurrence of rare and sensitive species within Florida is also a priority for the Florida Natural Areas Inventory (FNAI), a non-profit organization founded in 1981 through Florida State University. FNAI compiles data critical to biological conservation, predominantly through maintenance of a comprehensive database of the biological resources of Florida. This database provides site locality data for 994 rare and sensitive species and 82 natural communities tracked by FNAI (FNAI 2005). FNAI has also undertaken extensive habitat surveys in an effort to generate tiered habitat quality maps and document locations of high-quality natural communities at a landscape level across the state – all available in a Geographic Information Systems (GIS) database for mapping and analysis. Recent efforts by FNAI focus on freshwater, terrestrial and marine invertebrates, because it is thought that invertebrates may outnumber the combined total number of plant and vertebrate species in Florida by a factor of 10 or more, yet have received the least conservation attention from natural resource agencies (Jackson 2005). This effort includes compiling invertebrate data from experts and published literature with the goal of adding 50-100 species to the 280 invertebrate species already tracked by FNAI (FNAI 2005). The majority of the species currently tracked by FNAI are also listed as rare and sensitive by FCREPA.

Documentation of species diversity across the state has also been conducted by various individuals, universities and state agencies, including Florida A&M University and The Florida Department of Environmental Protection (FDEP). Especially for freshwater invertebrates, much effort has been invested into the development of identification keys for multiple life stages and standardized collection protocols allowing statewide comparison, higher efficiency, and accuracy.

The most recent conservation efforts within Florida involve the development of a statewide comprehensive conservation strategy. This initiative, lead by Florida's Fish and Wildlife Conservation Commission (FWC), includes multiple agencies, organizations, businesses and individuals with an interest in preventing wildlife declines and promoting conservation actions in Florida. This Wildlife Legacy Initiative is FWC's long-term approach to wildlife conservation, designed to implement actions at the local level. Florida's Comprehensive Wildlife Conservation Strategy is a blueprint for protecting ecological diversity and conserving Florida's wildlife, including fish and invertebrates. The conservation

strategy lists species and habitats in need of conservation, why they are in need and, most importantly, what is being done to protect and conserve them. Recent drafts have listed over 369 invertebrate species of greatest conservation need, with 74 species of aquatic insects (FWC 2005). The goal of this process as stated by FWC is "to prevent wildlife from becoming endangered and to keep common species common." The underlying theory of this program is that ecosystem function is maintained through conservation of biodiversity, especially rare and endemic species.

The relationship between biodiversity and ecosystem stability and function is a well studied topic in ecology with an enormous body of literature focusing on multiple systems including terrestrial, marine and aquatic habitats (Lyons et al. 2005; Weisser and Siemann 2004; Bond and Chase 2002; Hector and Hooper 2002; Loreau at al. 2002; Wardle 2002; Kinzig et al. 2001; Chapin et al. 2000; Schwartz et al. 2000; Wilson 1999; Naeem 1998; D'Itri 1997; McGrady-Steed et al. 1997; Philipp et al. 1995; Jones and Lawton 1995; Naeem et al. 1994; Ricklefs and Schluter 1993, Frank and McNaughton 1991). An entire volume of "Issues in Ecology" published by the Ecological Society of America (Naeem 1999) was dedicated to biodiversity, ecosystem functioning and maintaining vital ecosystem processes. Mittermeier and Forsyth (1997) state; "Maintenance of biological diversity is now recognized in many circles as the single highest conservation priority of our time." The importance of biodiversity is further evidenced within the context of invasive species research, and by the development of the discipline of Conservation Biology. Conservation Biology applies principles from broad disciplines to understand, conserve and maintain global biodiversity (Meffe and Carroll 1997). Setting priorities for biodiversity conservation, including addressing rare species and critical habitats are ways agencies like the FWC are trying to examine, understand and develop solutions for the patterns and extent of biodiversity loss.

Rare species can make significant contributions to ecosystem function (Lyons et al. 2005, Lyons and Schwarz 2001, Meffe and Carroll 1997; Lawton and Jones 1995), and typically constitute the largest component of species richness (Krebs 1985, Putman 1994). Rare species may also be considered indicator species of degradation, particularly in aquatic systems (Ford 1989, Minns et al. 1988, Lyons et al. 1995). Yet, consistently rare species are left out of state-wide biomonitoring threshold scoring and sensitive taxa

lists, primarily due to lack of statistical significance at a broader scale. Cao et al. (1998) assert rare species are critical for bioassessment. Especially in the Florida panhandle and areas with similarly high levels of endemism, rare species are valuable components of biological systems.

This paper lists sensitive and rare aquatic insect species within coastal plain streams including species within the order Plecoptera (stoneflies) which previously have not been considered by FCREPA, FNAI or FWC. This work summarizes collection locality information for 28 rare and sensitive species documented in the Florida Panhandle through biomonitoring work completed on Eglin Air Force Base, Florida by the U.S. Fish and Wildlife Service with the help of numerous volunteers. The goal of this work is to provide baseline species location data on rare and sensitive aquatic species in support of biodiversity conservation, natural resource management, and the military mission on Eglin.

METHODS

Site Description

Eglin Air Force Base is approximately 464,000 acres (185,600 ha), occupying parts of Santa Rosa, Okaloosa and Walton counties in northwest Florida. Eglin is the largest forested Department of Defense installation in the country. The Florida Natural Areas Inventory (FNAI) documents 34 natural community types within Eglin, which includes many species categorized as threatened, endangered, or globally rare (Kindell et al., 1997). The mission of the Natural Resources Branch at Eglin is to maintain and restore ecosystem viability and resiliency, maintain or recover native biodiversity, and allow for multiple public uses (e.g. recreation and silviculture) while supporting the testing and development of weapons systems. There are 13 management areas delineated within Eglin's boundaries, which have been subdivided into approximately 127 watersheds by the Florida Department of Environmental Protection. Several types of streams can be distinguished, including: seepage streams, spring runs, hardwood forest streams, and steephead streams. Over 1200 perennial stream miles are located on Eglin (based on USGS maps at 1:24000 scale).

Sampling Methods

This work focused on both biomonitoring using state-wide standard operating procedures for freshwater bioassessment (FDEP 2004), and specific surveys aimed at documenting species level endemism and distribution across the Florida Panhandle using adult specimen collection methods including blacklight trapping, beat-netting, and emergence traps (Rasmussen 2004). Biomonitoring sites were distributed across Eglin and selected based on a stratified random serial survey design, with additional sites selected to ensure broad coverage across all drainages for inventory (Thom and Herod 2005). Biomonitoring samples were collected beginning in 1999 through March of 2005. Benthic macroinvertebrate communities were "kick-sampled" in wadeable streams using D-nets (500 μm mesh). Kick samples were collected from in-stream microhabitats (submerged and emergent macrophytes, leaf packs, woody debris, sand substrate, and undercut banks). Macroinvertebrates were picked in the field after each kick-net sample, preserved and stored in 70% isopropyl alcohol. Samples were later sorted and individual specimens were identified to the lowest possible taxonomic level (typically genus or species) using a dissecting microscope using the most current taxonomic keys (Berner and Pescador 1988; Dunkle 2000; Epler 1996; Lam 2004; McCafferty 1981; Merritt and Cummins 1996; Needham et al. 2000; Pescador et al. 2000; Pescador et al. 2004; Pescador and Richard 2004; Rasmussen and Pescador 2002; Richardson 2003; Westfall and May 1996; Wiggins 1998). Data were entered into both MS-Access databases and Excel spreadsheets.

Criteria for Status Determination and Inclusion as "Rare"

The criteria for determining rarity were based on earlier summaries of species ranks as listed by FWC, FCREPA and FNAI. Of the 28 species listed in this paper, the majority of species are already considered rare, threatened or endangered by one or more of these agencies. The exceptions are the Coleoptera and Plecoptera species listed. These species are included based on geographic range extent, environmental specificity, potential short-term and long-term threats, and expert opinion.

RESULTS

EPHEMEROPTERA
BAETISCIDAE

Baetisca obesa (Say) 1839
Common Name: Armored Mayfly
Larval Functional Feeding Group: Collector-Gatherer, Scraper
Larval Habitat: Cool, clear flowing streams with submerged leaf material and woody debris.

The genus *Baetisca*, the only extant genus of the bigeneric family Baetiscidae, is endemic to North America with species occurring over most of the eastern part of the continent into the Great Plains and northwestward to the Northwest Territories of Canada. The genus has 12 nominal species. Berner and Pescador (1988) describe larvae of *Baetisca* to be the most unusual looking mayfly larvae in North America because of the massive thoracic notal shield that covers the thorax and the anterior half of the abdomen. The adults of the genus are generally not as readily identified to species as are the larvae. There are six species of *Baetisca* known to occur in Florida. *Baetisca obesa* is widely distributed in the central plains and the southeastern region of the United States.

In Florida, the species has been recorded from several northern counties including Calhoun, Escambia, Gadsden, Gulf, Hamilton, Jefferson, Madison, Santa Rosa, Okaloosa and Walton counties. On Eglin, larval collections have confirmed the presence of *Baetisca obesa* in Santa Rosa, Okaloosa and Walton counties. Specimens were collected in tributaries within the Yellow River, East Bay River, Turkey Creek, Rocky Creek, Basin Creek and Alaqua Creek (Figure 2-1). Larval specimens were present in samples year-round, throughout the sample period (2000-2005).

On Eglin, specimens were collected in both tannic and clear-water streams. *Baetisca obesa* has been collected in a variety of stream habitats over much of northern Florida. The larvae are common on the underside of submerged logs and among packed leaves in flowing streams. The species appears to have a univoltine life cycle with adults emerging in cooler spring months (typically February – May). An apparent decline of some species populations of *Baetisca* (especially *B. escambiensis* and *B. gibbera*) is reported in Pescador and Richard (2004). Currently, *Baetisca obesa* is not listed by FNAI as rare or as a species of special concern. This species is not listed federally or by the State, and is not considered by

FCREPA or within FWC's Comprehensive Wildlife Conservation Strategy (Appendix A), however it is considered to be a sensitive species, particularly to increases in water temperature and nutrients.

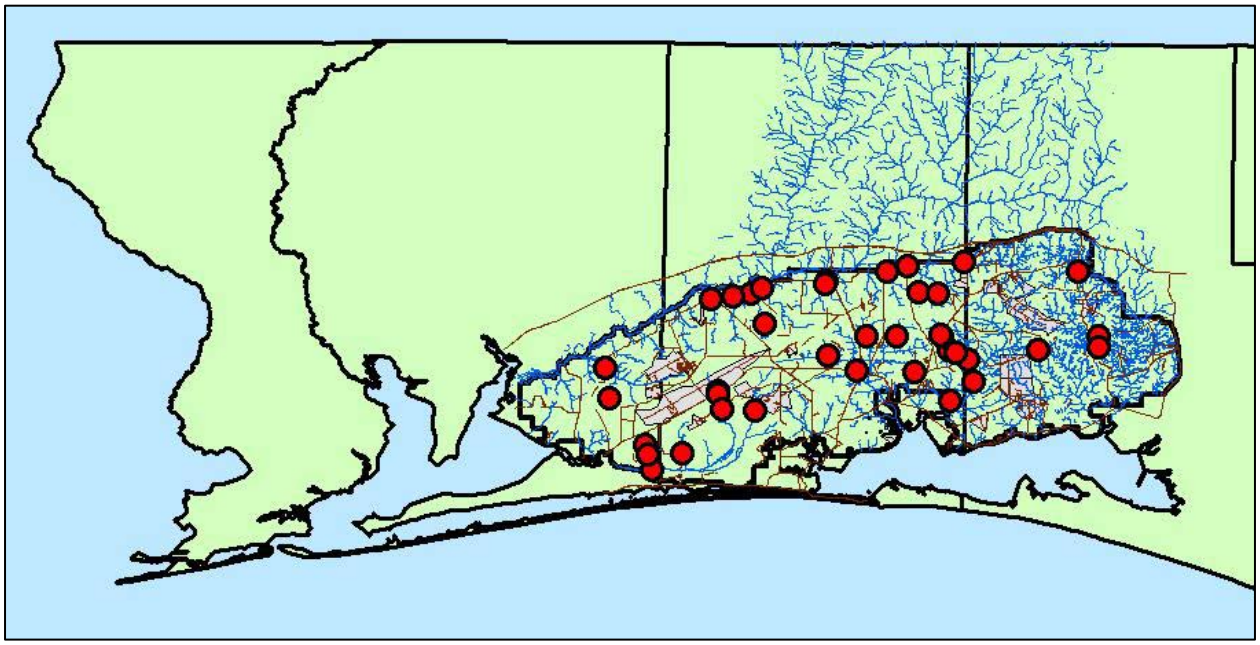

Figure 2-1. Distribution of *Baetisca obesa* in streams on Eglin AFB, FL collected from 1999-2005. Distribution includes Santa Rosa, Okaloosa and Walton counties, FL.

Baetisca rogersi Berner 1940
Common Name: Armored Mayfly
Functional Feeding Group: Collector-Gatherer, Scraper – detritus, diatoms, filamentous algae
Habitat: Clear sand-bottom streams with woody debris and patches of pebble substrate

Baetisca rogersi ranges in northwest Florida, from the Apalachicola River Drainage westward into southern Alabama and northward into Georgia and South Carolina. In Florida, *Baetisca rogersi* has been collected in Bay, Calhoun, Escambia, Gadsden, Liberty, Santa Rosa, Okaloosa and Walton counties. On Eglin, larval collections have confirmed the presence of *Baetisca rogersi* in Santa Rosa, Okaloosa and Walton counties. Specimens were collected in tributaries within the Yellow River, East Bay River, Turkey Creek, Rocky Creek, Basin Creek, Alaqua Creek and LaGrange Bayou (Figure 2-2). Larval specimens were present in samples year-round at multiple sites throughout the sample period. On Eglin, larvae were collected in both tannic and clear-water streams.

The life history and ecology of *Baetisca rogersi* was explored in detail by Pescador and Peters (1974) and documented the species to have a univoltine life cycle (one generation per year) as well as parthenogenetic reproduction (reproduction by development of an unfertilized egg) at low levels in the population (0.7%). An apparent decline of some species populations of *Baetisca* (especially *B. escambiensis* and *B. gibbera*) is reported in Pescador and Richard (2004). *Baetisca rogersi* is considered by FNAI to have a global rank of G4 (apparently secure globally although may be rare in parts of range) and an FNAI State Rank of S3 (very rare and local in Florida or found locally in a restricted range or vulnerable to extinction factors). *Baetisca rogersi* is not listed federally or by the State, it was not listed by FCREPA, but is currently listed within FWC's Comprehensive Wildlife Conservation Strategy as a species of greatest conservation need (Appendix A).

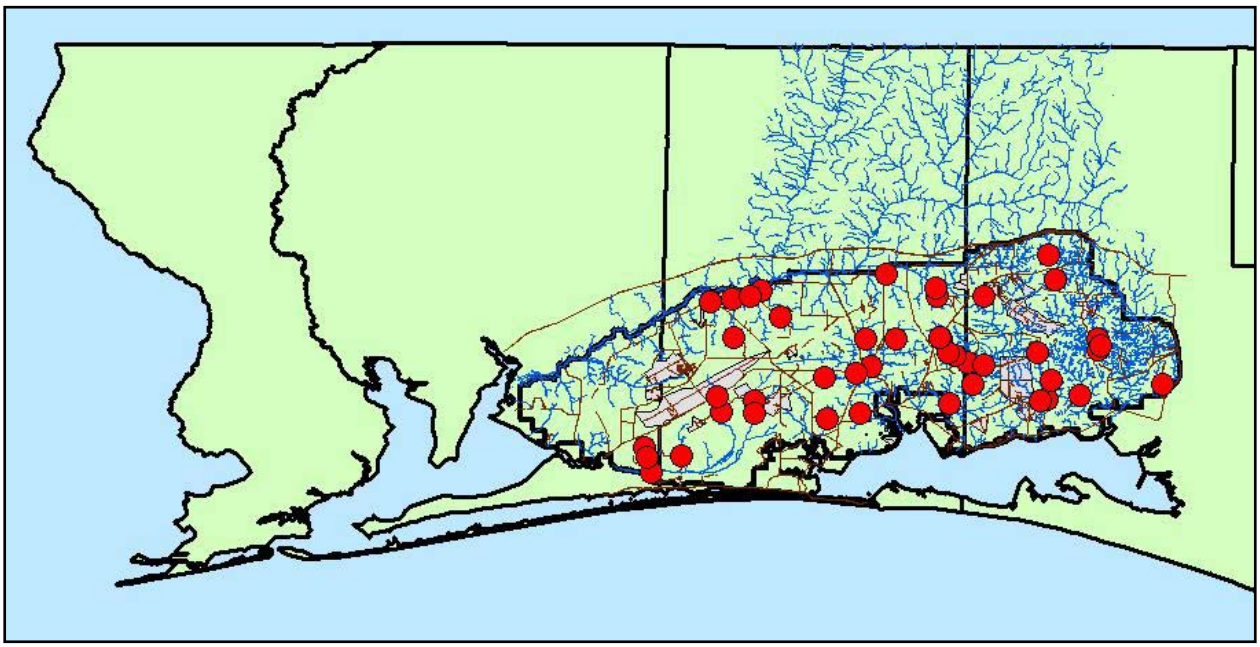

Figure 2-2. Distribution of *Baetisca rogersi* in streams on Eglin AFB, FL collected from 1999-2005. Distribution includes Santa Rosa, Okaloosa and Walton counties, FL.

BEHNINGIIDAE
Dolania americana Edmunds and Traver 1959
Common Name: American Sand-burrowing Mayfly
Functional Feeding Group: Predator – primarily consumes Chironomidae at all life stages. For in-depth treatment of prey items of *Dolania americana*, see Tsui and Hubbard (1979).
Larval Habitat: Clean, clear flowing sand-bottom streams with shifting sand substrate.

The family Behningiidae consists of three interesting but rare and little known genera of mayflies. The sand-burrowing larvae lack mandibular tusks but have unique dorsal pads of long, dense spines on the head and thorax. The eggs are by far the largest known of any mayfly. The family is Holarctic in distribution, ranging from Poland to Siberia and in North America (Berner and Pescador 1988). The monotypic genus *Dolania* is the Nearctic representative of the family and ranges from the northern United States south to Florida. In Florida, Berner and Pescador (1988) reported *Dolania americana* to be present in Dixie, Holmes, Lafayette, Okaloosa, Santa Rosa, Walton and Washington counties.

Larval biomonitoring surveys on Eglin Air Force Base have documented the presence of *Dolania americana* in Okaloosa and Walton counties. Specimens were collected in 2nd, 3rd and 4th order streams within Rocky and Turkey Creek drainages (Figure 2-3). Larvae were associated with higher flow and shifting sand substrate. Last instar larvae were collected on Eglin in late March and early April and persistent throughout the sample period. *Dolania americana* has a two year life cycle (Harvey et al. 1980) with highly synchronous adult emergence generally occurring over a two-to three-week period near the end of April to mid-May in Florida (Peters and Peters 1977).

Dolania americana is considered by FNAI to have a global rank of G4 (apparently secure globally although may be rare in parts of range) and an FNAI State Rank of S1/S2 (Critically imperiled in Florida because of extreme rarity or because of vulnerability to extinction due to natural or man-made factors). *Dolania americana* is not listed federally or by the State. This species is listed as “Threatened” by FCREPA, and is currently listed within FWC’s Comprehensive Wildlife Conservation Strategy as a species of greatest conservation need (Appendix A).

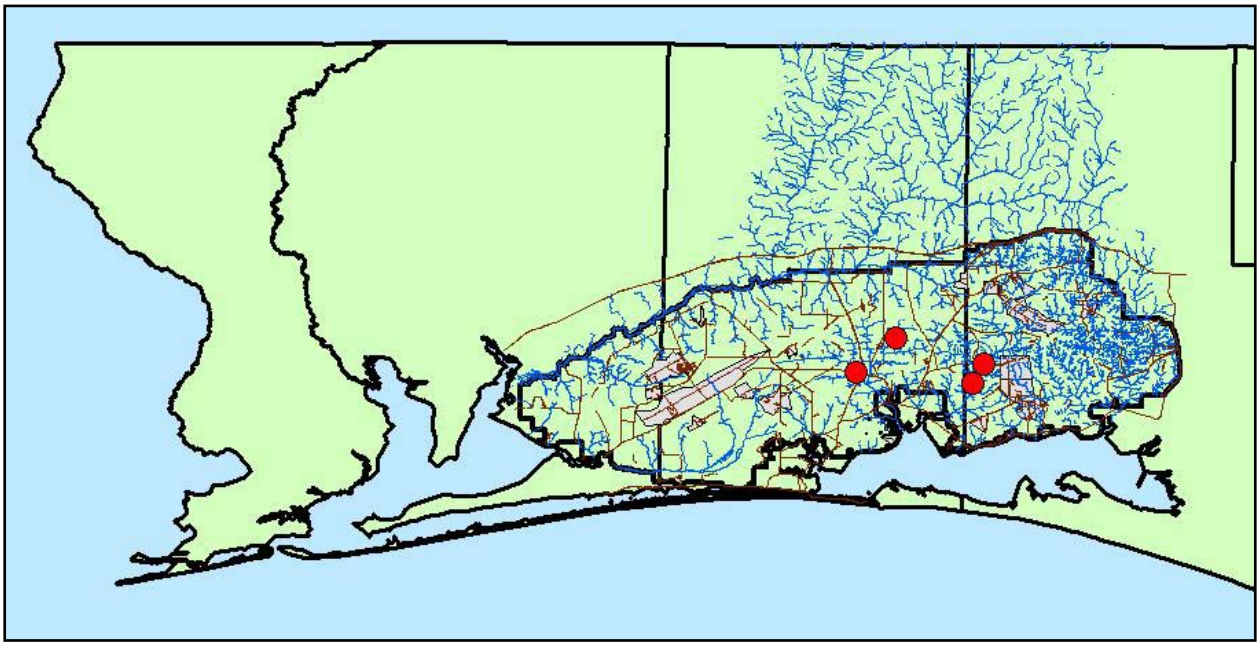

Figure 2-3. Distribution of *Dolania americana* in streams on Eglin AFB, FL collected from 1999-2005. Distribution includes Okaloosa and Walton counties, FL.

EPHEMERELLIDAE
Serratella deficiens (Morgan) 1911
Common Name: Dark Lead-winged Olive (Mayfly)
Functional Feeding Group: Collector-Gatherers
Habitat: Clear streams, associated with leaf packs, root mats and macrophytes.

Serratella has a Holarctic distribution and in North America, the species are found mostly in eastern Canada and southward into California, New Mexico and Florida (Berner and Pescador 1988). The largest concentration of *Serratella* is in the southeastern United States. Only one species, *Serratella deficiens*, is found in Florida (Pescador and Richard 2004). *Serratella deficiens* ranges over a large territory extending from central Canada eastward and southward through Michigan in the west and in the east from Maine to Alabama, Georgia, Mississippi and Florida. Within Florida, *S. deficiens* is geographically restricted to the panhandle section of Florida, from the Apalachicola River drainage westward. Specimens have been collected in Bay, Calhoun, Escambia, Gadsden, Jackson, Liberty, Okaloosa and Walton counties (Berner and Pescador 1988).

Larval collections of *Serratella deficiens* on Eglin Air Force Base confirm previous collection records in both Okaloosa and Walton counties. New county records of *Serratella deficiens* were collected

from tributaries to the Yellow River and East Bay River in Santa Rosa County. Larval specimens were collected in tributary streams within the Yellow River, East Bay River, Rocky Creek, Turkey Creek, Basin Creek and Alaqua Creek drainages (Figure 2-4). Larvae were collected in both tannic and clear water streams. Immature *Serratella deficiens* were primarily associated with root mats along undercut banks as well as areas of slower flow in submerged aquatic macrophyte beds. *Serratella deficiens* larvae were abundant and persistent at sites, and were present in streams year-round throughout the study period. No clear emergence patterns have been determined for *Serratella deficiens*, but it is likely that emergence begins in spring and extends through midsummer (Berner and Pescador 1988).

Currently, *Serratella deficiens* is not considered to be a species of special conservation consideration by FNAI, FCREPA, FWC or by any other federal or state agency (Appendix A). This species, however, has a restricted range in Florida and is sensitive to environmental degradation including increases in stream temperature, nutrients, and sedimentation.

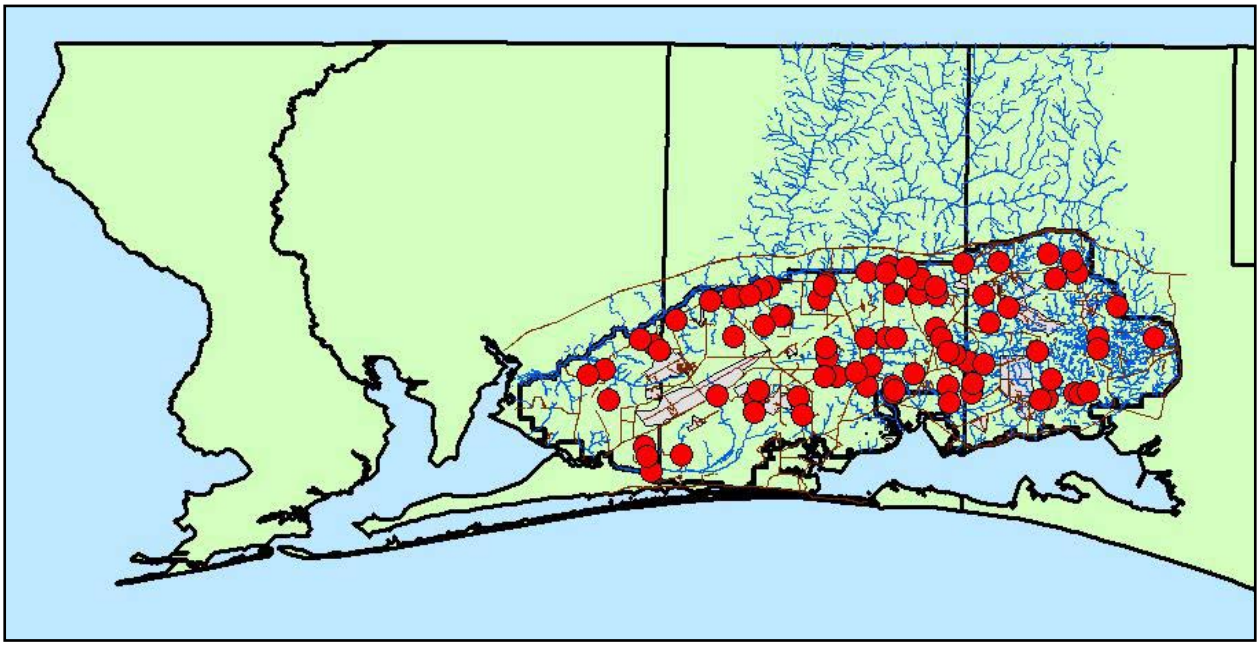

Figure 2-4. Distribution of *Serratella deficiens* in streams on Eglin AFB, FL collected from 1999-2005. Distribution includes Santa Rosa, Okaloosa & Walton counties, FL.

HEPTAGENIIDAE
Stenacron floridense Lewis 1974
Common Name: Flatheaded Mayfly
Functional Feeding Group: Collector/gatherers and scrapers
Habitat: Clear streams, associated with leaf packs and snags.

There are seven species of *Stenacron* in North America, with only two species (*S. floridense* and *S. interpunctatum*) occurring in Florida (Pescador and Richard 2004). Larvae are common and abundant in streams and rivers where they are associated with leaf packs, snags and submerged macrophytes. The larvae are clingers and opportunistic feeders. The life cycle of *Stenacron floridense* is unknown, although this species emerges year round in Florida. Recent collection records indicate that *S. floridense* is restricted to the panhandle of Florida (Pescador and Richard 2004). On Eglin, biomonitoring surveys have documented the presence of larval *Stenacron floridense* in tributary streams within the Yellow River, East Bay River, Turkey Creek, Rocky Creek, Basin Creek, Alaqua Creek and LaGrange Bayou (Figure 2-5). Collection locations include streams within Santa Rosa, Okaloosa and Walton counties.

Stenacron floridense has an FNAI global rank of G4 (apparently secure globally although may be rare in parts of range) and an FNAI State Rank of S3/S4 (very rare and local in Florida and apparently secure). *Stenacron floridense* is not listed federally or by the State. This species is listed as and additional species of concern by FCREPA, and is currently listed within FWC's Comprehensive Wildlife Conservation Strategy as a species of greatest conservation need (Appendix A).

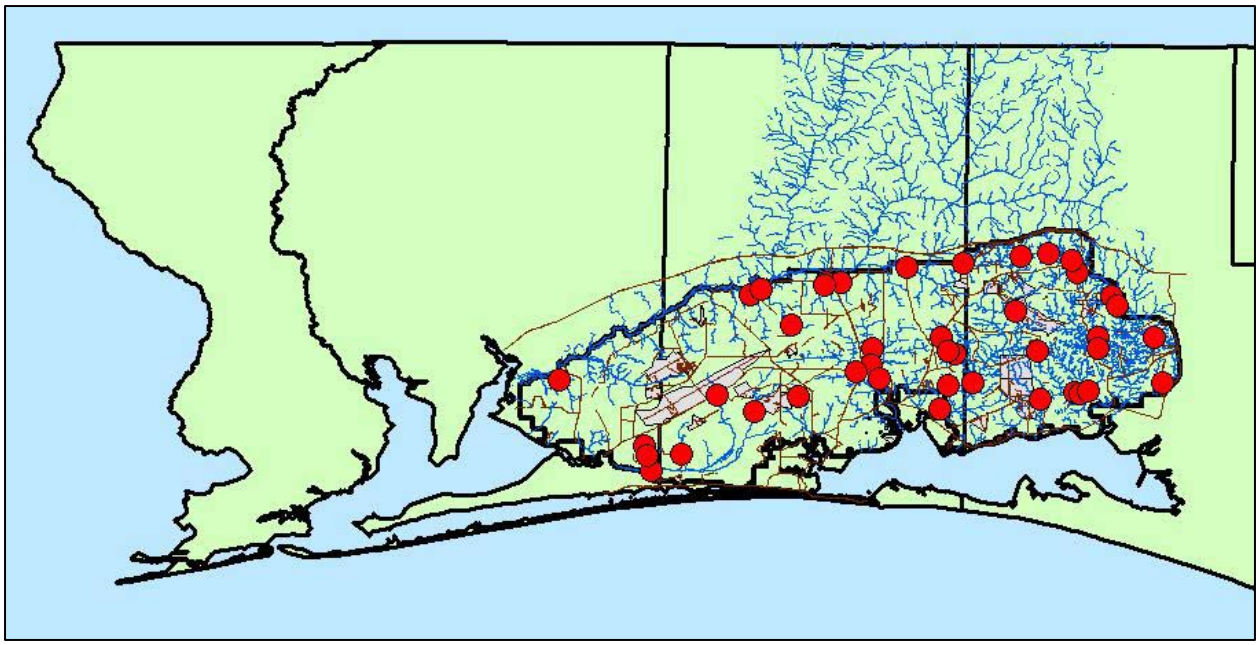

Figure 2-5. Distribution of *Stenacron floridense* in streams on Eglin AFB, FL collected from 1999-2005. Distribution includes Santa Rosa, Okaloosa & Walton counties, FL.

LEPTOPHLEBIIDAE
Habrophlebia vibrans Needham 1907
Common Name: (Mayfly)
Functional Feeding Group: not yet documented – most likely Collector/Gatherer – Scraper
Habitat: Sand bottom streams along depositional areas and leaf packs with fine organic matter.

The genus *Habrophlebia* is found in both Europe and North America, however only one species (*Habrophlebia vibrans*) is known to occur in North America. The larvae are most easily distinguished from other mayflies by the two clusters of long, slender almost filamentous abdominal gills. *Habrophlebia vibrans* is known in North America only from the east and the southeast, ranging from Canada and New York to Florida, Alabama, Georgia, North Carolina, South Carolina and Tennessee (Berner and Pescador 1988). In Florida, Berner and Pescador (1988) documented collections of *Habrophlebia vibrans* from Escambia, Gadsden, Jackson, Okaloosa and Walton counties – collection locations all within the panhandle.

Larval collections on Eglin further document the presence of this species within Okaloosa and Walton counties in tributaries to the Yellow River, Rocky Creek, Turkey Creek, Basin Creek, Alaqua Creek and LaGrange Bayou (Figure 2-6). Larval surveys on Eglin from tributaries within the Yellow

River and East Bay River document the presence of *Habrophlebia vibrans* in Santa Rosa County for the first time (Figure 2-6). Larvae were persistent at sites and were present in streams year-round throughout the study period. Lauzon and Harper (1986) provide detailed information about the life history and ecology of *Habrophlebia vibrans*. Currently, *Habrophlebia vibrans* is not considered to be a species of special conservation consideration by FNAI, FCREPA, FWC or by any other federal or state agency (Appendix A). This species, however, is rare, restricted in range to the Florida Panhandle, and sensitive to environmental degradation.

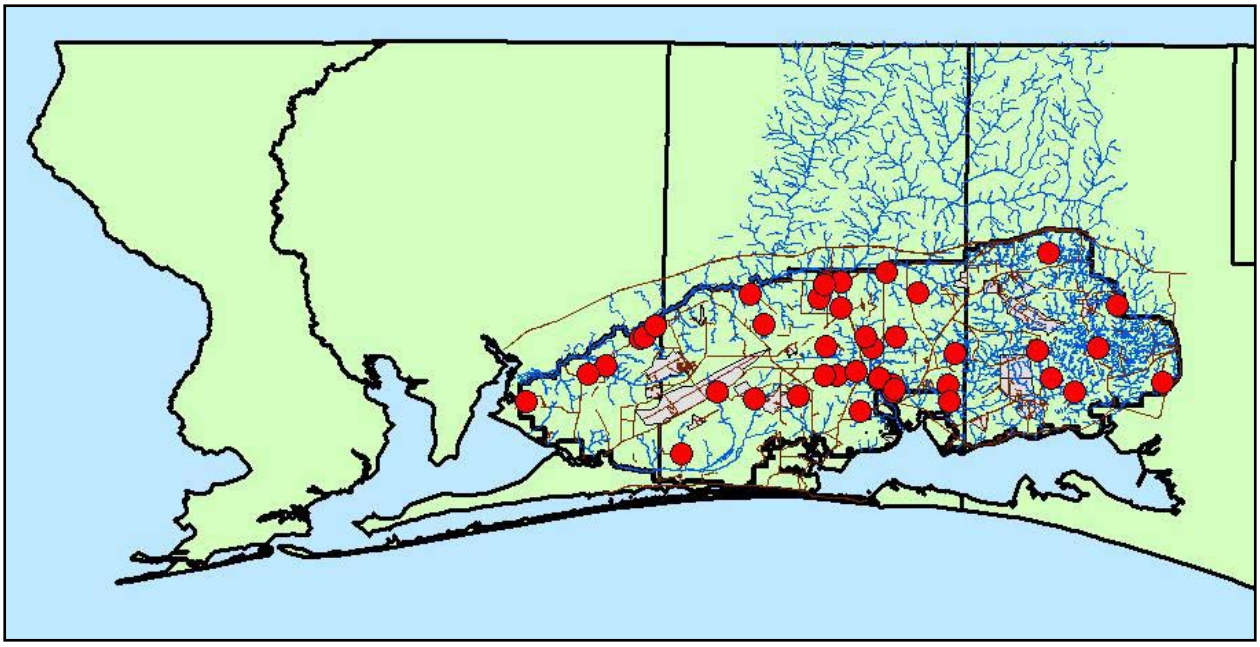

Figure 2-6. Distribution of *Habrophlebia vibrans* in streams on Eglin AFB, FL collected from 1999-2005. Distribution includes Santa Rosa, Okaloosa & Walton counties, FL.

ODONATA – ANISOPTERA

CORDULEGASTRIDAE
Cordulegaster sayi Selys 1854
Common Name: Say's Spiketail (Dragonfly)
Functional Feeding Group: Predator (both larval and adult life stages)
Habitat: Seepages in forested landscapes near open weedy fields.

Cordulegaster sayi is a relatively large dragonfly that forages along forest edges and flies from late February to late April. This species is considered to be rare, currently known only from eight localities in northern Florida, and one in central Georgia (Deyrup and Franz 1994). On Eglin, adult

dragonfly surveys recorded adults patrolling seepage slopes within the Turkey Creek and Alaqua Creek drainages within Okaloosa (a new county record) and Walton counties (Figure 2-7). The species was persistent at collection sites, as they were recorded from late March to early May consistently across multiple survey years.

Cordulegaster sayi has an FNAI global rank of G2 (imperiled globally because of extreme rarity or because of vulnerability to extinction due to some natural or man-made factor) and an FNAI State Rank of S1/S2 (critically imperiled in Florida because of rarity or because of vulnerability to extinction due to some natural or man-made factor). *Cordulegaster sayi* is not listed federally or by the State. This species is listed as "Threatened" by FCREPA, and is currently listed within FWC's comprehensive conservation plan as a species of greatest conservation need (Appendix A).

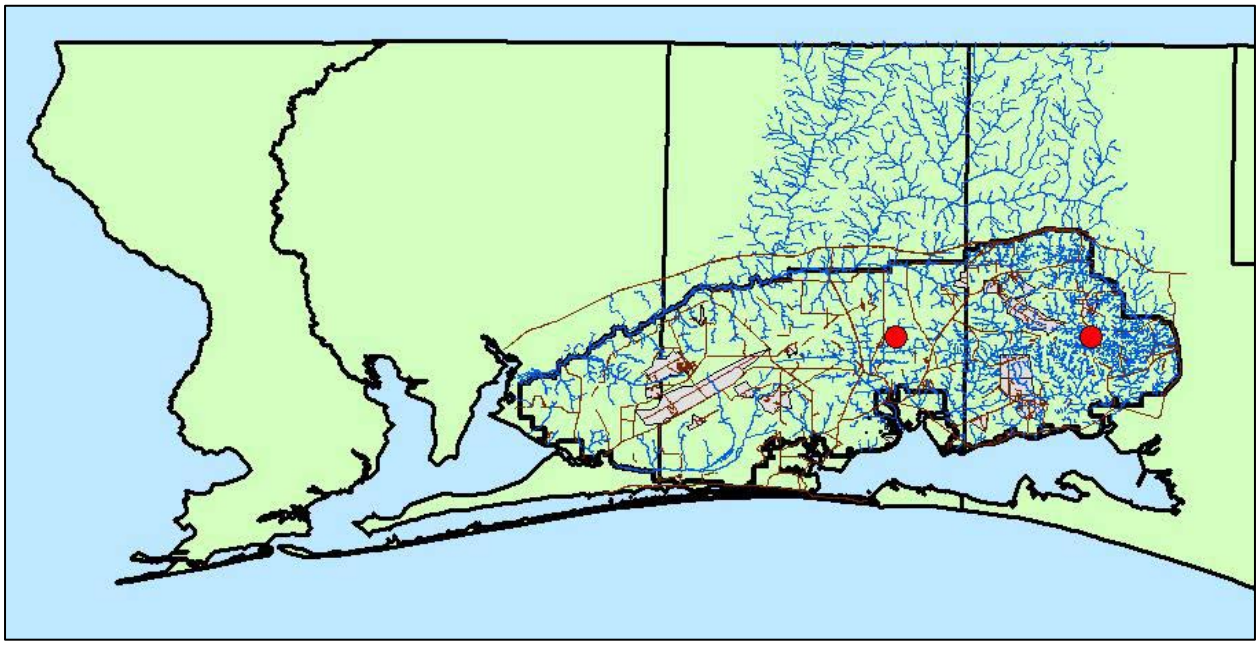

Figure 2-7. Distribution of *Cordulegaster sayi* in streams on Eglin AFB, FL collected from 2002-2005. Distribution includes Okaloosa and Walton counties, FL.

GOMPHIDAE
Dromogomphus armatus Selys 1854
Common Name: Southeastern Spinyleg (Dragonfly)
Functional Feeding Group: Predator (both larval and adult life stages)
Habitat: Shallow, clear, typically small spring-fed sand bottom streams in forested landscapes.

Dromogomphus armatus is distributed throughout streams on Eglin, and is locally common despite being described as scarce in the southeast by Dunkle (2000). Distribution is restricted to the southeastern states; AL, FL, GA, LA, NC, MS and SC. On Eglin, larval collections show a wide distribution; larvae were collected in Santa Rosa, Okaloosa and Walton counties within all major watersheds on Eglin property (Figure 2-8). Larvae were persistent at sites and were present in streams year-round throughout the study period. Adult collections in conjunction with the Dragonfly Society of the Americas have shown *Dromogomphus armatus* to be common in mid-May. Adults can be observed flying from early May to late November and are most common in late summer (Needham et al. 2000).

Dromogomphus armatus has an FNAI global rank of G4 (apparently secure globally) and an FNAI State Rank of S3 (found locally in a restricted range and vulnerable to extinction). *Dromogomphus armatus* is not listed federally or by the State. This species is listed as "Rare" by FCREPA, and is currently listed within FWC's Comprehensive Wildlife Conservation Strategy as a species of greatest conservation need (Appendix A).

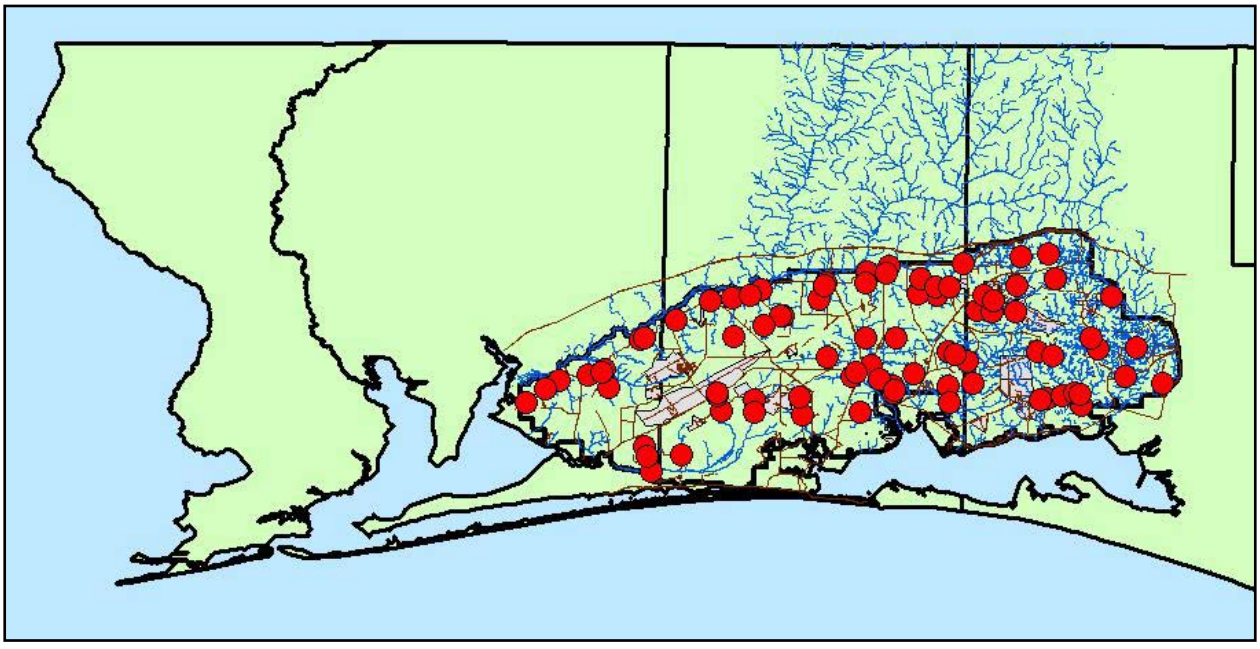

Figure 2-8. Distribution of *Dromogomphus armatus* in streams on Eglin AFB, FL collected from 1999-2005. Distribution includes Santa Rosa, Okaloosa and Walton counties, FL.

Gomphus (Hylogomphus) geminatus Carle 1979
Common Name: Twin-striped Clubtail (Dragonfly)
Functional Feeding Group: Predator (both larval and adult life stages)
Habitat: Clean clear and tannic sand-bottom streams

Gomphus geminatus distribution is restricted to the southeast; primarily in Alabama, Florida and Georgia. Adults can be observed flying from early April to early June. It is locally abundant in streams on Eglin Air Force Base and in the Florida Panhandle. Larvae and adults were collected in tributaries to the Yellow River and East Bay River, and within the Alaqua, Rocky and Turkey Creek drainages. Hundreds of exuviae have been collected in early April and late March from streams. Specimens have been collected from Santa Rosa, Okaloosa and Walton counties (Figure 2-9).

Gomphus geminatus has an FNAI global rank of G3 (either very rare and local throughout its range or found locally in a restricted range or vulnerable) and an FNAI State Rank of S3 (found locally in a restricted range and vulnerable to extinction). *Gomphus geminatus* is not listed federally or by the State. This species is listed as "Rare" by FCREPA, and is currently listed within FWC's Comprehensive Wildlife Conservation Strategy as a species of greatest conservation need (Appendix A).

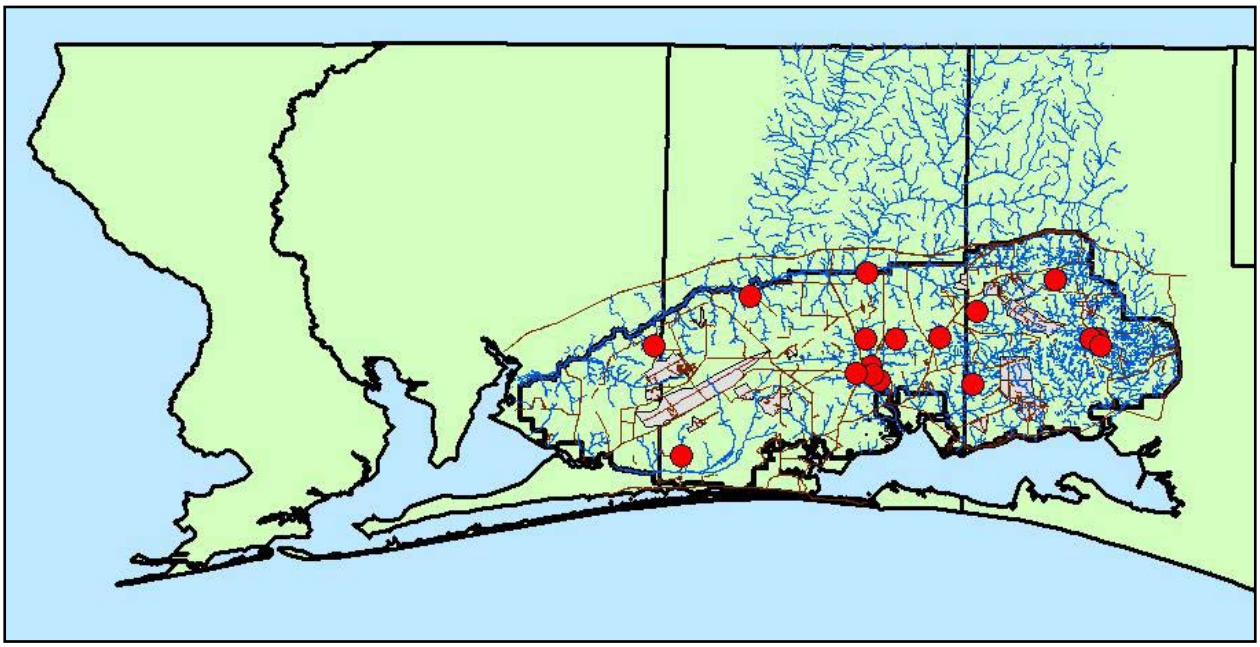

Figure 2-9. Distribution of *Gomphus geminatus* in streams on Eglin AFB, FL collected from 1999-2005. Distribution includes Santa Rosa, Okaloosa and Walton counties, FL.

Gomphus (Phanogomphus) hodgesi Needham 1950
Common Name: Hodges' Clubtail (Dragonfly)
Functional Feeding Group: Predator (both larval and adult life stages)
Habitat: Clean clear and tannic sand-bottom streams

Gomphus hodgesi ranges throughout the Florida panhandle and west to Louisiana, and is considered scarce throughout its range (Deyrup and Franz 1994). Adults can be seen flying from early March to late May. Adult surveys on Eglin from 2002-2005 have documented the presence of *Gomphus hodgesi* within Okaloosa, Walton and Santa Rosa counties (Figure 2-10). Adult specimens were collected within tributaries to East Bay River and Alaqua Creek, as well as streams within Turkey and Rocky Creek.

Gomphus hodgesi has an FNAI global rank of G3 (either very rare and local throughout its range or found locally in a restricted range or vulnerable) and an FNAI State Rank of S3 (found locally in a restricted range and vulnerable to extinction). *Gomphus hodgesi* is not listed federally or by the State. This species is listed as "Rare" by FCREPA, and is currently listed within FWC's Comprehensive Wildlife Conservation Strategy as a species of greatest conservation need (Appendix A).

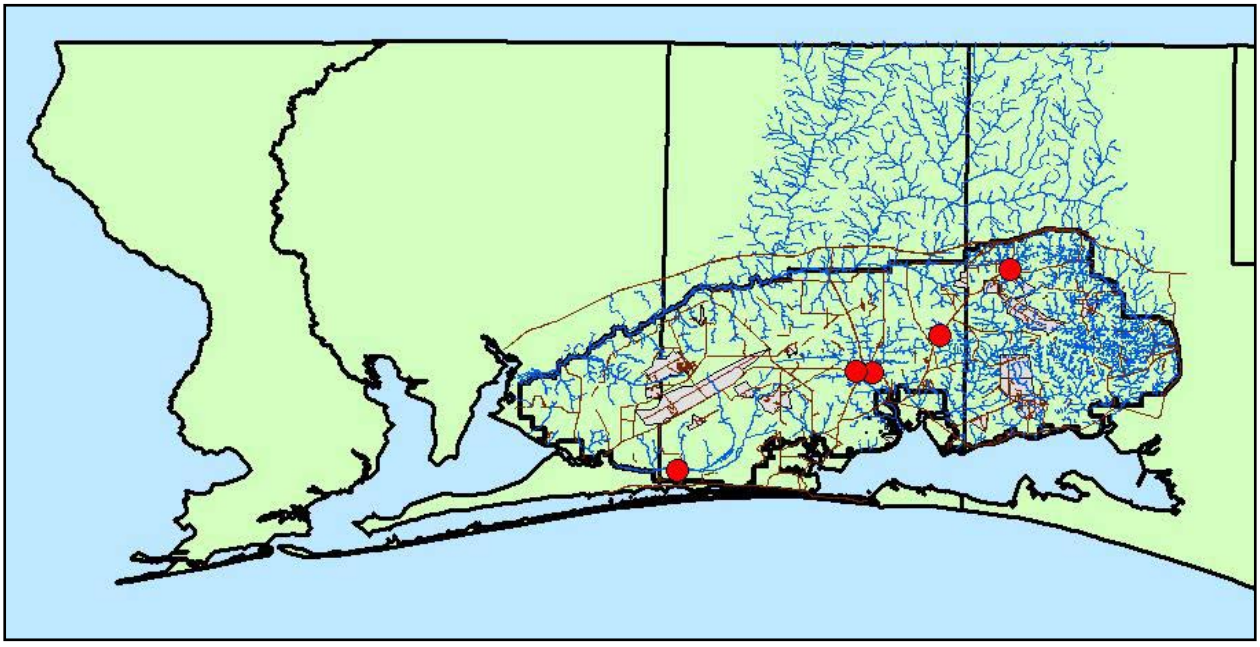

Figure 2-10. Distribution of *Gomphus hodgesis* in streams on Eglin AFB, FL collected from 2002-2005. Distribution includes Santa Rosa, Okaloosa and Walton counties, FL.

Gomphus westfalli Carle and May 1987
Common Name: Westfall's Clubtail (Dragonfly)
Functional Feeding Group: Predator (both larval and adult life stages)
Habitat: Clean sand-bottom streams and rivers

Gomphus westfalli is endemic to the western Florida Panhandle. Deyrup and Franz (1994) state that *G. westfalli* has an entire known range of 25km in diameter primarily in Santa Rosa County, within the Blackwater River State Forest. Adult surveys conducted on Eglin Air Force Base from 2002-2005, reveal a potentially wider range, including Okaloosa County (a new county record) (Figure 2-11). These surveys have documented the presence of *Gomphus westfalli* at multiple sites within the Rocky and Turkey Creek drainages (Figure 2-11). *Gomphus westfalli* has an FNAI global rank of G1/G2 (imperiled globally because of extreme rarity or because of vulnerability to extinction due to a natural or man-made factor) and an FNAI State Rank of S1 (critically imperiled in Florid because of rarity or vulnerability to extinction). *Gomphus westfalli* is not listed federally or by the State. This species is listed as "Threatened" by FCREPA primarily due to its restricted range, and is currently listed within FWC's comprehensive conservation plan as a species of greatest conservation need (Appendix A).

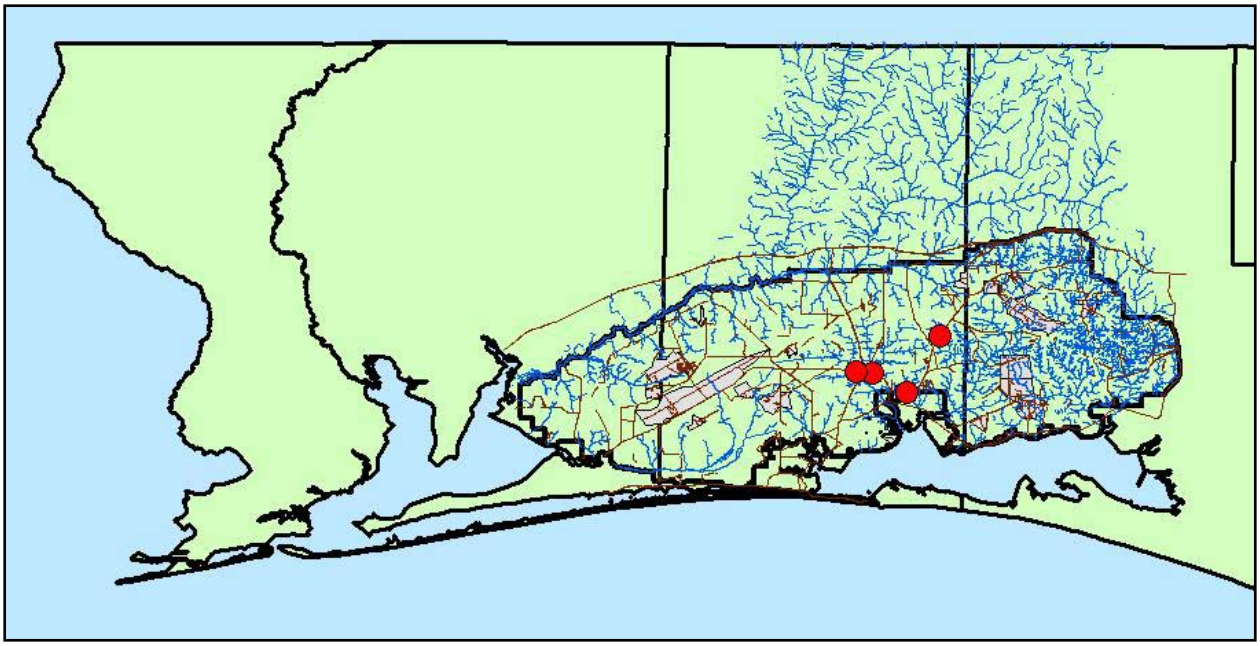

Figure 2-11. Distribution of *Gomphus westfalli* in streams on Eglin AFB, FL collected from 2002-2005. Distribution includes Okaloosa County, FL.

Ophiogomphus sp. Selys 1854
Common Name: Snaketail (Dragonfly)
Functional Feeding Group: Predator (both larval and adult life stages)
Habitat: Clear streams at low elevations with patches of gravel substrate.

The genus *Ophiogomphus* is represented by eighteen species in North America with the center of diversity for this genus in the northeastern United States and Canada, and a second group on the Pacific Coast (Needham et al. 2000). The species identification of *Ophiogomphus* collected on Eglin is underway by the primary author. Prior to aquatic monitoring on Eglin, the genus *Ophiogomphus* had not been collected in the state of Florida. *Ophiogomphus* have been collected on Eglin at five locations (Figure 2-12). Both larvae and adults were collected from streams within Turkey, Rocky and Alaqua basins in both Okaloosa and Walton counties. The larvae are associated with pea-sized gravel. It is one of the first dragonflies to emerge in early spring; last instar larvae were collected in February and early March with adults collected from mid to late March. Dunkle (2000) considers *Ophiogomphus* to be a trout among dragonflies – sensitive to changes in land use and water quality. Currently *Ophiogomphus* is not listed by FNAI as rare or as a species of special concern. This species is not listed federally or by the State, and is not considered by FCREPA or within FWC's comprehensive conservation strategy (Appendix A).

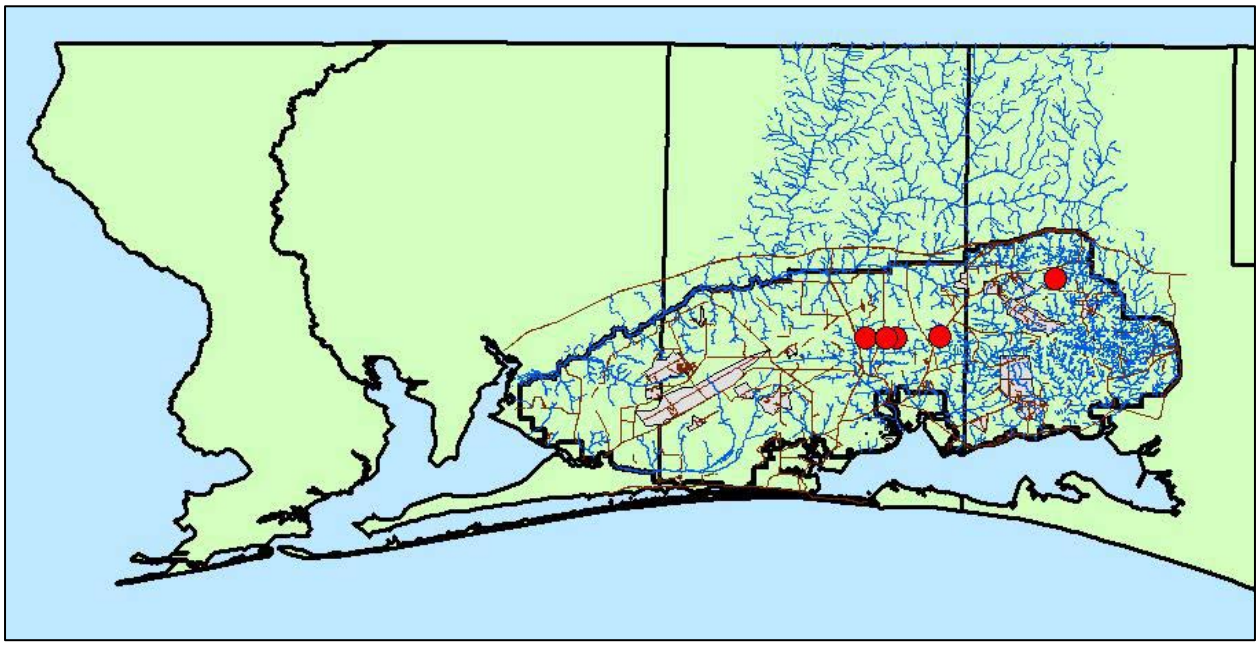

Figure 2-12. Distribution of *Ophiogomphus sp.* in streams on Eglin AFB, FL collected from 2000-2005. Distribution includes Okaloosa and Walton counties, FL.

Progomphus bellei Knopf & Tennessen 1980
Common Name: Belle's Sanddragon (Dragonfly)
Functional Feeding Group: Predator (both larval and adult life stages)
Habitat: Small, open sandy creeks and clear sandy lakes

A relatively large, southeastern Coastal Plain species, *Progomphus bellei* has a limited distribution within the Florida panhandle and North Carolina. Larval and adult collections on Eglin AFB have documented its presence in tributaries of the Yellow River and East Bay River, as well as at sites within Turkey and Rocky Creek drainages (Figure 2-13). This work documents new collection sites within Santa Rosa County, and documents the presence of this species for the first time in Okaloosa County (Figure 2-13). Adults can be seen flying from early May to mid-August. The stream-dwelling larvae are adept burrowers and have special larval characteristics such as closely indrawn legs with stiff out-curving bristles, and a smooth head. *Progomphus bellei* has an FNAI global rank of G3 (either very rare and local throughout its range or vulnerable to extinction) and an FNAI State Rank of S3 (found locally in a restricted range and vulnerable to extinction). *Progomphus bellei* is not listed federally or by the State. This species is listed as "Rare" by FCREPA, and is currently listed within FWC's Comprehensive Wildlife Conservation Strategy as a species of greatest conservation need (Appendix A).

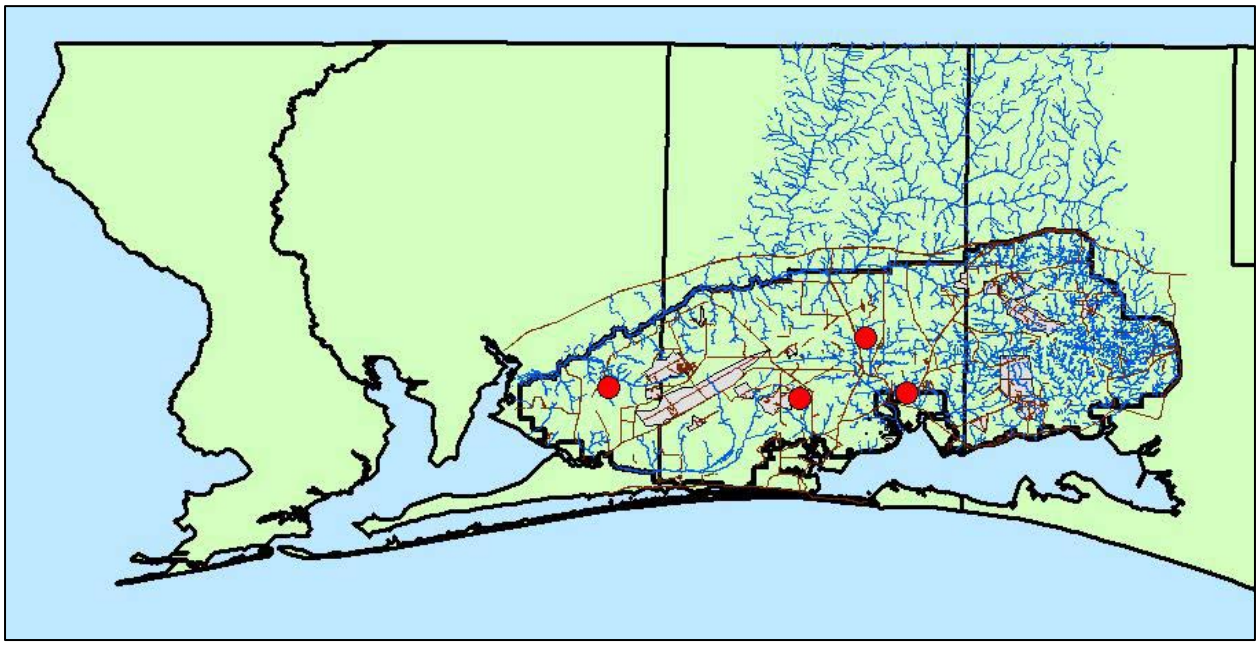

Figure 2-13. Distribution of *Progomphus bellei* in streams on Eglin AFB, FL collected from 1999-2005. Distribution includes Santa Rosa and Okaloosa counties, FL.

LIBELLULIDAE
Nannothemis bella Uhler 1857 (*Nannophyla*)
Common Name: Elfin Skimmer (Dragonfly)
Functional Feeding Group: Predator (both larval and adult life stages)
Habitat: Bogs near pond and impounded stream margins with emergent plant growth

Nannothemis bella is the smallest North American dragonfly, with a body length of only 21 mm (Dunkle 2000). This species ranges north to Maine and west to Wisconsin, Illinois and Louisiana. Within Florida it was previously only known west of the Apalachicola River in Santa Rosa, Walton and Calhoun counties. Adult dragonfly collections have documented new records of *Nannothemis bella* in new records in Okaloosa County (Figure 2-14). *Nannothemis bella* has an FNAI global rank of G3 (either very rare and local throughout its range or vulnerable to extinction) and an FNAI State Rank of S3 (rare and found locally in a restricted range and vulnerable to extinction). *Nannothemis bella* is not listed federally or by the State. This species is listed as "Rare" by FCREPA, and is currently listed within FWC's Comprehensive Wildlife Conservation Strategy as a species of greatest conservation need (Appendix A).

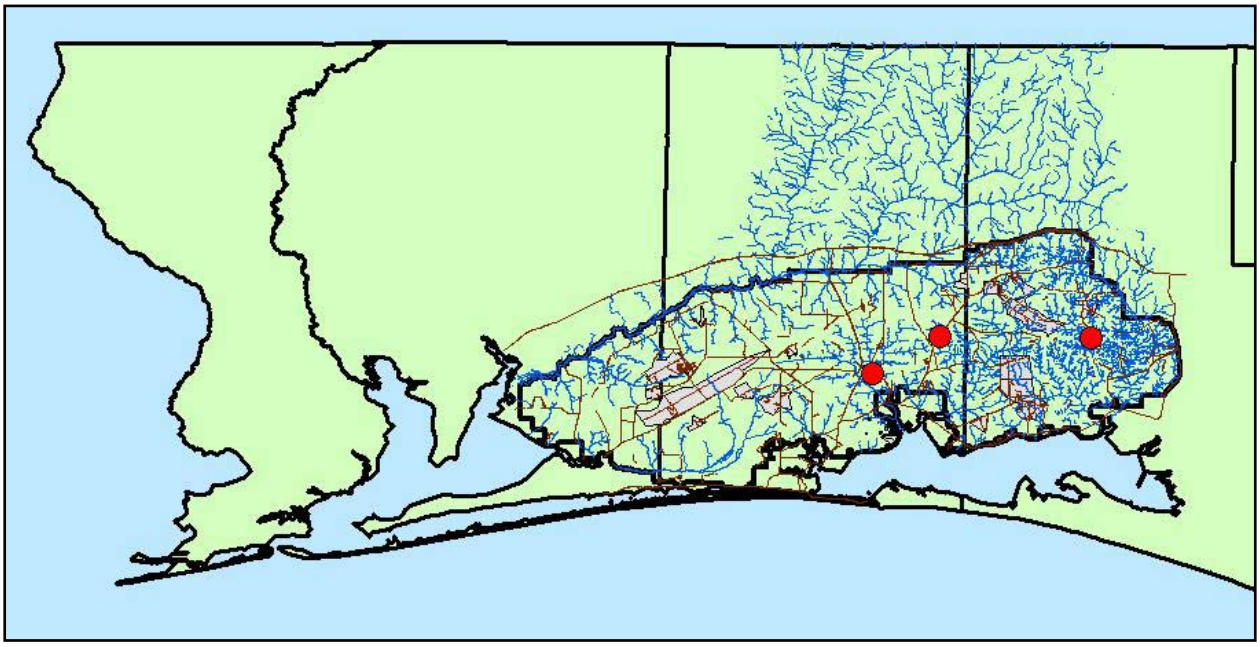

Figure 2-14. Distribution of *Nannothemis bella* in streams on Eglin AFB, FL collected from 2002-2005. Distribution includes Okaloosa and Walton counties, FL

PETALURIDAE
Tachopteryx thoreyi Hagen 1858 (Uropetala)
Common Name: Gray Petaltail (Dragonfly)
Functional Feeding Group: Predator (both larval and adult life stages)
Habitat: Seepage areas within forested areas; It routinely perches vertically on tree trunks.

This species is of particular scientific interest because it is a "living fossil," an example of a family of which 9 relict species are scattered around the world (Deyrup and Franz 1994). It is one of the few dragonflies that habitually perches on tree trunks. The life cycle takes several years, and the ecology and behavior was studied in detail by Dunkle (1981). *Tachopteryx thoreyi* within Florida was documented in Santa Rosa, Okaloosa, Liberty, Gadsden, Leon and Alachua counties (Deyrup and Franz 1994).

Adult surveys on Eglin have documented the presence of this species at new sites within Okaloosa County (Rocky and Turkey Creeks) and several sites within Walton County (a new county record) in the Alaqua drainage (Figure 2-15). Adult specimens were collected from mid-March to early April and consistently observed at collection sites during the study period. *Tachopteryx thoreyi* has an FNAI global rank of G4 (globally secure) and an FNAI State Rank of S3 (rare and found locally in a restricted range). It is not listed federally or by the State, but is listed as "Rare" by FCREPA, and is currently listed within FWC's comprehensive conservation plan as a species of greatest conservation need (Appendix A).

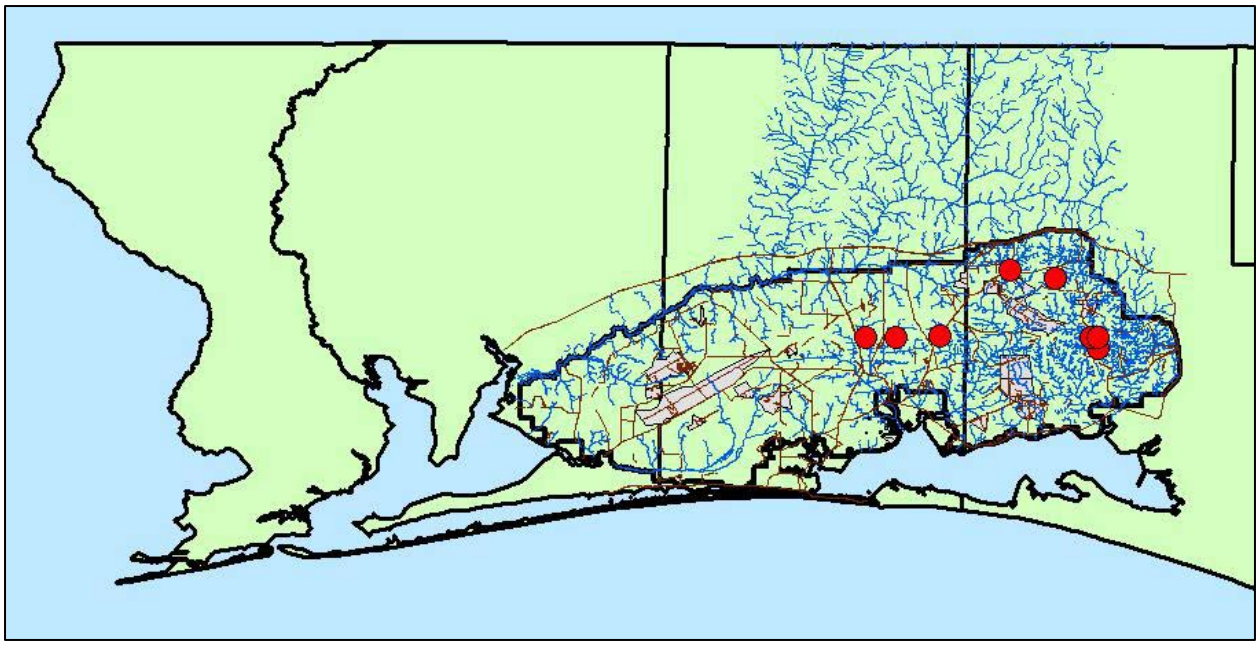

Figure 2-15. Distribution of *Tachopteryx thoreyi* in streams on Eglin AFB, FL collected from 2002-2005. Distribution includes Okaloosa and Walton counties, FL.

ODONATA – ZYGOPTERA
CALOPTERYGIDAE
Hetaerina americana Fabricius 1798
Common Name: American Rubyspot (Damselfly)
Functional Feeding Group: Predator
Habitat: Rivers and streams of various sizes and flows

The genus *Hetaerina* consists of many species in Central and South America, but it is represented in Florida by only four species including *Hetaerina americana* (Westfall and May 1996). Surveys conducted on Eglin AFB document the presence of both larvae and adults in drainages on Eglin in Santa Rosa and Okaloosa counties (Figure 2-16) including streams within the Yellow River, East Bay River, Turkey Creek and Alaqua drainages. Surveys conducted on Eglin with the Dragonfly Society of the Americas documented the presence of this species for the first time in the Florida Panhandle (Tennessen 2004). A comprehensive account of the distribution patterns of *Hetaerina americana* can be found in Johnson (1973). Johnson (1961) also published a summary of its breeding behavior and oviposition. Garrison (1990) reviewed and provided keys and extensive illustrations for adults of the entire genus. *Hetaerina americana* has an FNAI global rank of G5 (globally secure) and a state rank of S1 (critically

imperiled in Florida due to extreme rarity). It is not listed federally or by the State, but is listed as a "species of special concern" by FCREPA and in FWC's comprehensive conservation plan (Appendix A).

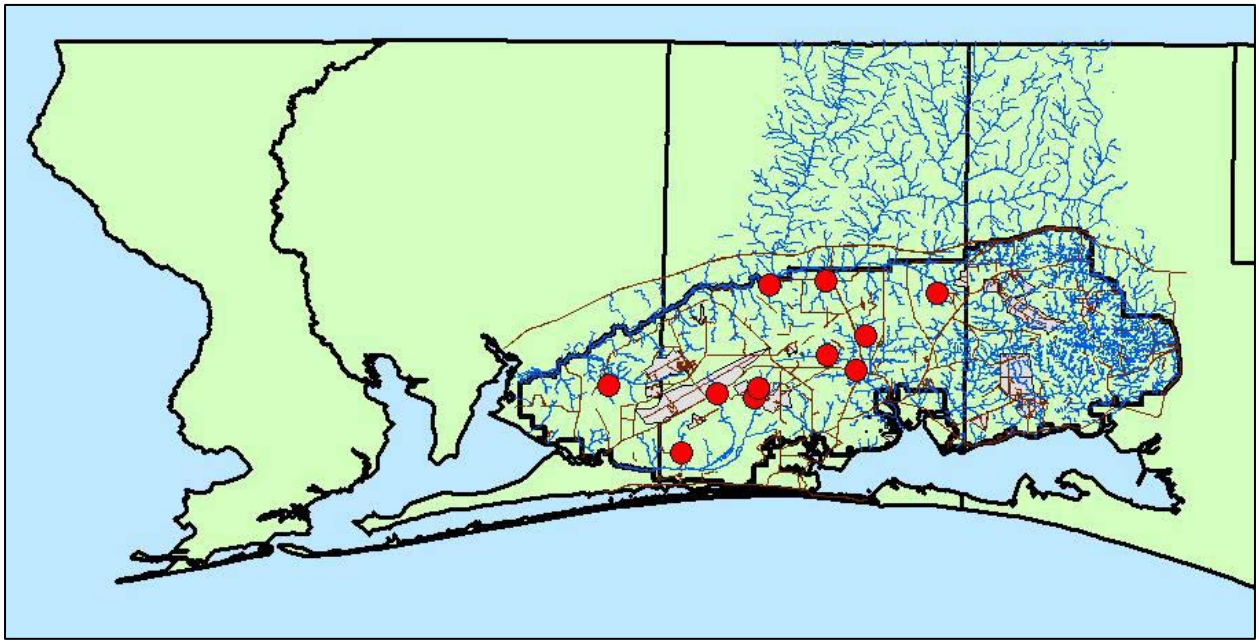

Figure 2-16. Distribution of *Hetaerina americana* in streams on Eglin AFB, FL, collected from 2002-2005. Distribution includes Santa Rosa and Okaloosa counties, FL.

PLECOPTERA
PELTOPERLIDAE
Tallaperla cornelia Needham and Smith 1916
Common Name: (Stonefly)
Functional Feeding Group: Shredder – detritus and diatoms
Habitat: Swiftly flowing streams and rivers with leaf packs of deciduous tree species and detritus.

The genus *Tallaperla* has an eastern Nearctic distribution, with six species in North America – all known from the southeast (Pescador et al. 2000). Only *Tallaperla cornelia* is found in Florida. According to Pescador et al. (2000), *Tallaperla* larvae have been collected from several localities in the western panhandle from Escambia, Okaloosa and Walton counties. Biomonitoring surveys on Eglin AFB have documented the presence of *Tallaperla cornelia* in tributaries of Alaqua Creek in Walton County (Figure 2-17). Larvae were collected in leaf packs and detritus in swift flowing stretches. Wallace et al. (1970) and Woodall and Wallace (1972) found the diet of *Tallaperla* consists primarily of detritus and diatoms. Wallace et al. (1986) concluded that larvae of *Tallaperla* were among the primary processors (shredders)

of allochthonous input to some streams of the southern Appalachians. *Tallaperla* have a semi-voltine life-cycle (Elwood and Cushman 1975) with adults generally emerging in late spring (April to June). Despite its restricted range within the Florida Panhandle, and its ecologically important role as a processor of organic material in streams, *Tallaperla cornelia* is not listed by FNAI, federally or by the State, by FCREPA, or within FWC's Comprehensive Wildlife Conservation Strategy (Appendix A).

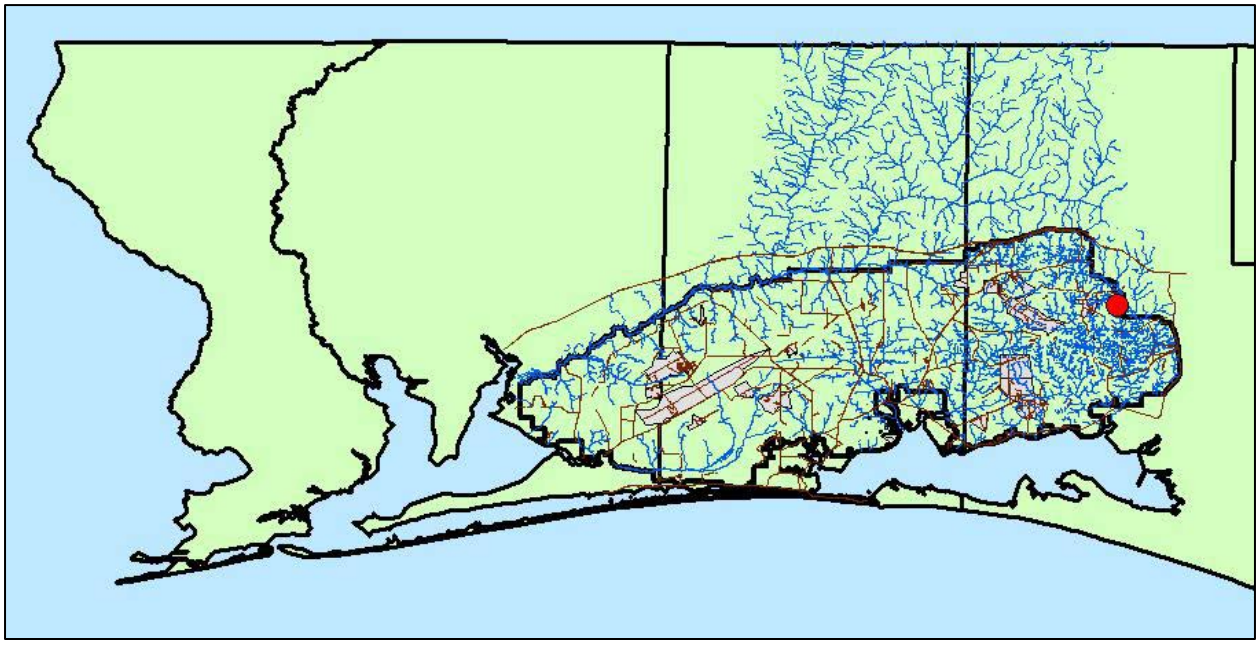

Figure 2-17. Distribution of *Tallaperla cornelia* in a tributary to Alaqua Creek on Eglin AFB, FL.

PERLIDAE
Neoperla carlsoni Stark and Baumann 1978
Common Name: (Stonefly)
Functional Feeding Group: Predator
Habitat: Clear flowing streams of various sizes – associated with leaf packs and woody debris

For the genus *Neoperla*, fifteen species are recognized in North America, two of which are represented in Florida (*Neoperla carlsoni* and *Neoperla clymene*). *Neoperla carlsoni* appears to be geographically confined to the northwestern region of the state – the species has never been collected east of the Ochlockonee River Basin (Pescador et al. 2000). Biomonitoring surveys on Eglin AFB document the presence of *Neoperla carlsoni* from 1st thru 4th order streams in Santa Rosa, Okaloosa, and Walton counties. Larvae were collected from streams within the Yellow River, East Bay River, Turkey Creek,

Rocky Creek, Basin Creek and Alaqua Creek (Figure 2-18). Adults emerge in March to early September (Pescador et al. 2000). Despite its restricted range within Florida and its sensitivity to aquatic habitat degradation, *Neoperla carlsoni* is not listed by FNAI, federally or by the State, by FCREPA, or within FWC's Comprehensive Wildlife Conservation Strategy (Appendix A).

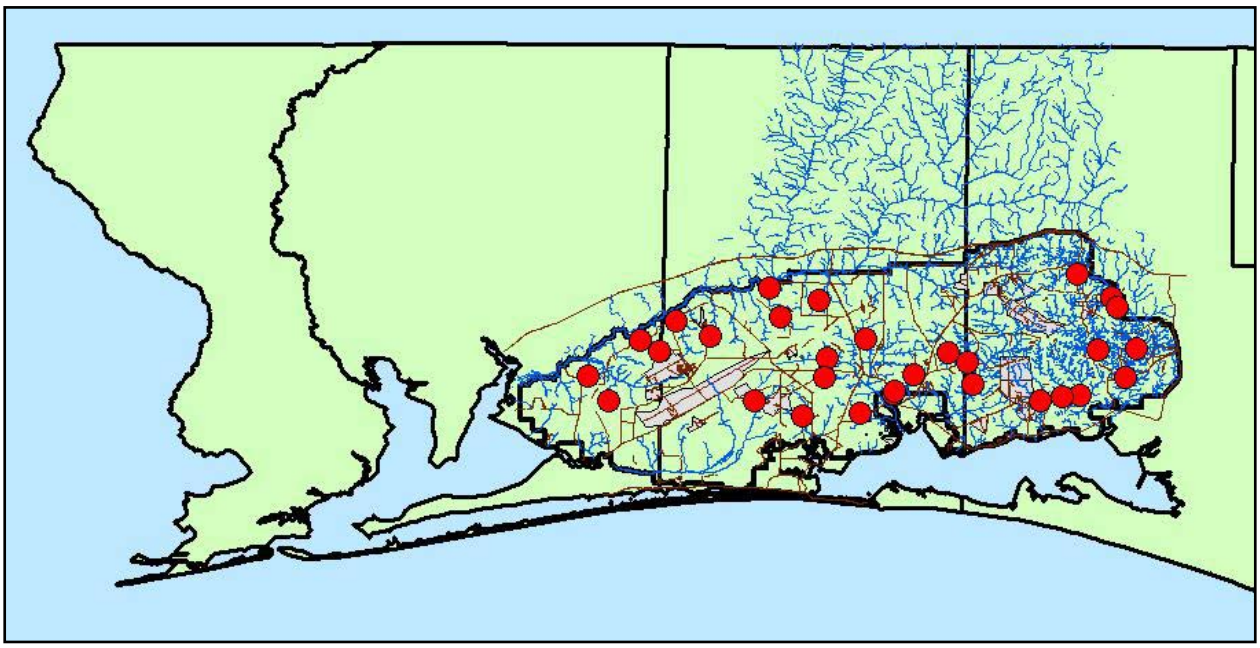

Figure 2-18. Distribution of *Neoperla carlsoni* in streams on Eglin AFB, FL collected from 1999-2005. Distribution includes Santa Rosa, Okaloosa and Walton counties, FL.

Paragnetina fumosa (Banks) 1902
Common Name: (Stonefly)
Functional Feeding Group: Predator
Habitat: Small to moderately sized swiftly flowing rivers in leaf packs, snags and woody debris.

Paragnetina is represented by six species in North America: 2 species are known to occur in Florida; *Paragnetina fumosa* and *Paragnetina kansensis*. Stark and Gaufin (1979) reported the occurrence of these two species in the state and included a key for the adults. *Paragnetina fumosa* occurs in North Florida from Levy County northwest to Escambia County. Biomonitoring surveys on Eglin AFB document the presence of *Paragnetina fumosa* from 1st-4th order streams in Okaloosa and Walton counties. Larvae were collected from streams within the Yellow River, East Bay River, Rocky Creek, Turkey Creek, Basin Creek and Alaqua Creek basins (Figure 2-19). The life cycle of *Paragnetina fumosa*

is not documented, but is suspected to have a two-year life cycle (Pescador et al. 2000). Larvae of *Paragnetina fumosa* occur all year in the state and adults appear to emerge in April to early July. Despite its restricted range and its sensitivity to aquatic habitat degradation, *Paragnetina fumosa* is not listed by FNAI, federally or by the State, by FCREPA, or in FWC's wildlife conservation strategy (Appendix A).

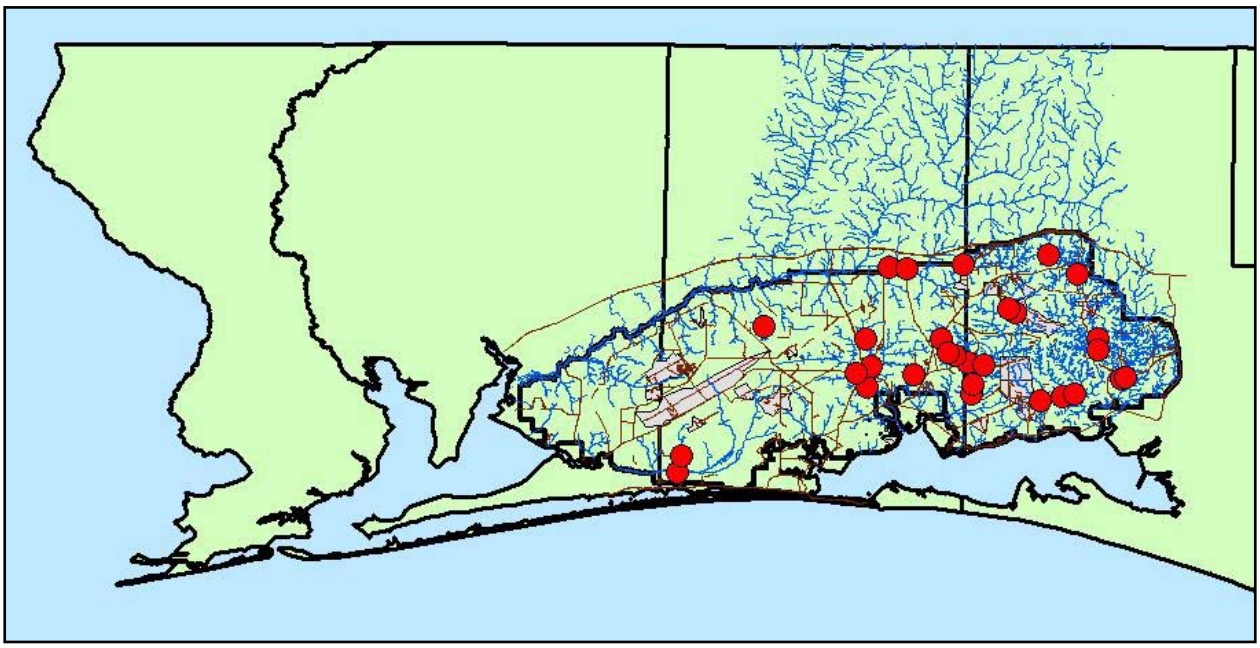

Figure 2-19. Distribution of *Paragnetina fumosa* in streams on Eglin AFB, FL collected from 1999-2005. Distribution includes Okaloosa and Walton counties, FL.

Perlinella drymo (Newman) 1839
Common Name: (Stonefly)
Functional Feeding Group: unknown
Habitat: Small to moderately sized flowing streams in leaf packs, snags and woody debris.

All three known *Perlinella* species (*P. drymo, P. ephyre, P. zwicki*) occur in Florida, and are geographically limited to the panhandle region of Florida. *Perlinella drymo* has been collected from Hamilton County northwest to Santa Rosa County (Pescador et al. 2000). *Perlinella* larvae are not as commonly collected as other stoneflies in the Perlidae family, even though they occur in similar habitats. Biomonitoring surveys on Eglin AFB document the presence of *Perlinella drymo* in 1st, 2nd and 3rd order streams in Santa Rosa, Okaloosa and Walton counties. Larvae were collected within the Yellow River, East Bay River, Turkey Creek, Rocky Creek, Basin Creek and Alaqua Creek drainages (Figure 2-20).

Knowledge of the biology of *Perlinella* is very limited. In Florida, *Perlinella drymo* larvae occur all year and adults emerge in March through June (Pescador et al. 2000). Despite its restricted range and its sensitivity to aquatic habitat degradation, *Perlinella drymo* is not listed by FNAI, federally or by the State, by FCREPA, or in FWC's Comprehensive Wildlife Conservation Strategy (Appendix A).

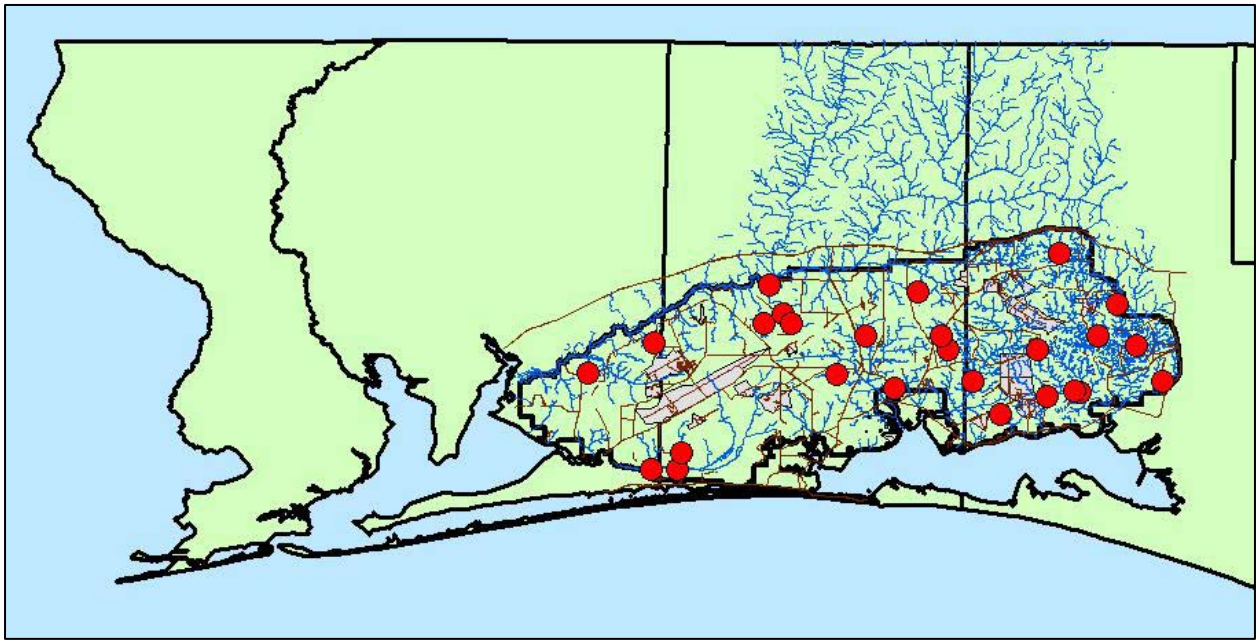

Figure 2-20. Distribution of *Perlinella drymo* in streams on Eglin AFB, FL collected from 1999-2005. Distribution includes Santa Rosa, Okaloosa and Walton counties, FL.

PTERONARCYIDAE
Pteronarcys dorsata Say 1823
Common Name: (Stonefly)
Functional Feeding Group: Shredder
Habitat: Small to moderately sized streams and rivers in leaf packs, snags and woody debris.

The genus *Pteronarcys* is found throughout North America, including Florida. Of the eight North American species of *Pteronarcys*, only one species (*Pteronarcys dorsata*) is known to occur in Florida, although the larvae of *Pteronarcys* cannot presently be identified to the species level. *Pteronarcys* has been collected in Florida throughout the panhandle in various habitats including small streams and large rivers including the Blackwater, Chipola and Choctawhatchee (Pescador et al. 2000).

Biomonitoring surveys on Eglin AFB document the presence of *Pteronarcys* from 1st- 5th order streams in Okaloosa and Walton counties. Larvae were collected from streams within Turkey Creek,

Basin Creek, and Alaqua Creek (Figure 2-21). The larvae are shredders and contribute to the processing of allochthonous material in lotic habitats. *Pteronarcys* species have a semivoltine life-cycle, requiring more than one year to attain adult size. Adult emergence typically occurs in the spring (mid-February through May). Despite its restricted range and its sensitivity to aquatic habitat degradation, *Pteronarcys* is not listed by FNAI, federally or by the State, by FCREPA, or in FWC's wildlife conservation strategy (Appendix A).

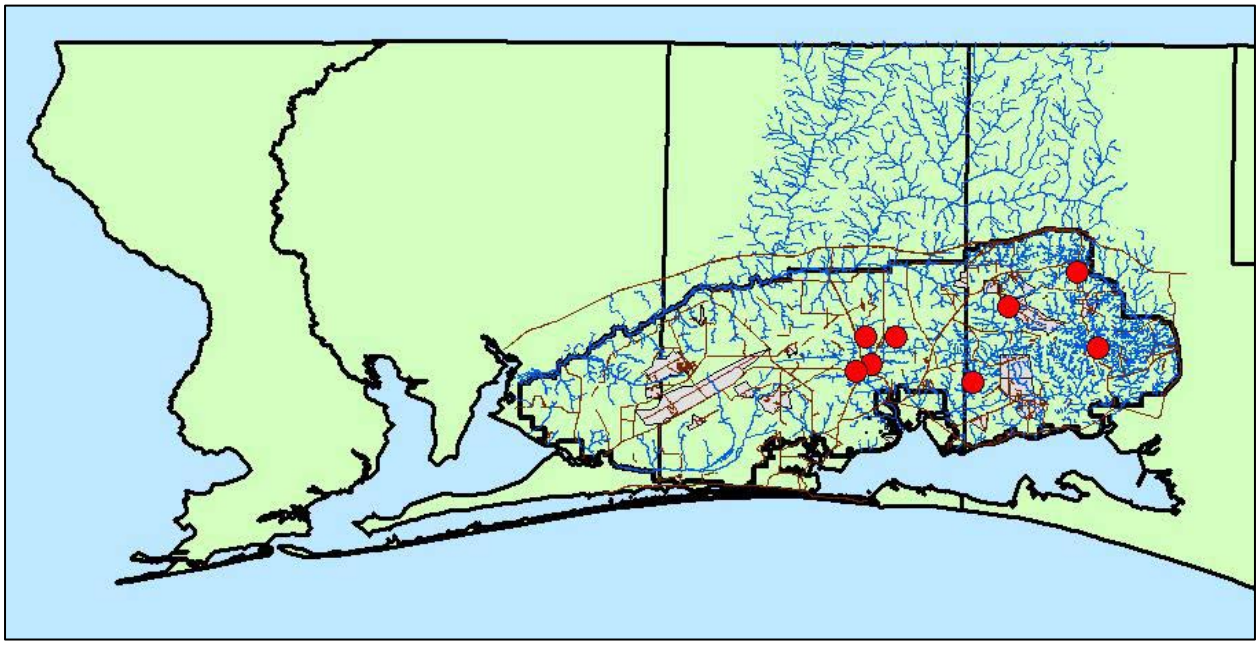

Figure 2-21. Distribution of *Pteronarcys dorsata* on Eglin AFB, FL collected from wadeable streams during 1999-2005. Distribution includes Okaloosa and Walton counties, FL.

COLEOPTERA
ELMIDAE
Ancyronyx variegata Germar 1824
Common Name: Riffle Beetle
Functional Feeding Group: Collector/Scraper
Habitat: Flowing streams of various sizes – associated with submerged woody debris and roots

Ancyronyx variegata is the only species of *Ancyronyx* to occur in North America (Epler 1996). In Florida, it is known to occur from Alachua County northward. Biomonitoring surveys on Eglin AFB document the presence of *Ancyronyx variegata* in 1st-4th order streams within Santa Rosa, Okaloosa and Walton counties. Larvae and adults were collected from streams within the Yellow River, East Bay River,

Turkey Creek, Rocky Creek, Basin Creek Alaqua Creek and LaGrange Bayou drainages (Figure 2-22). *Ancyronyx variegata* were persistent at sites and were present in streams year-round throughout the study period. Sinclair (1964) noted that *Ancyronyx variegata* is sensitive to sewage and industrial wastes. Despite its restricted range within northern Florida and its sensitivity to aquatic habitat degradation, *Ancyronyx variegata* is not listed by FNAI, federally or by the State, by FCREPA, or in FWC's Comprehensive Wildlife Conservation Strategy (Appendix A).

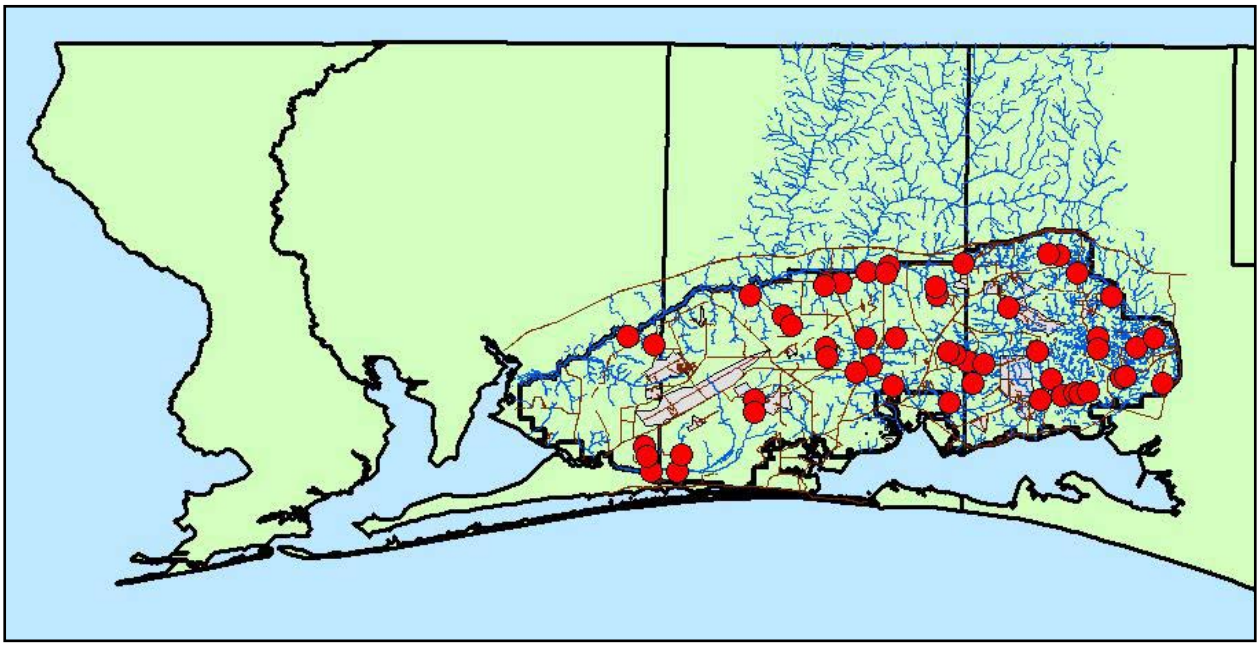

Figure 2-22. Distribution of *Ancyronyx variegata* in streams on Eglin AFB, FL collected from 1999-2005. Distribution includes Santa Rosa, Okaloosa and Walton counties, FL.

Gonielmis dietrichi Musgrave 1933
Common Name: Riffle Beetle
Functional Feeding Group: Collector/Scraper
Habitat: Flowing streams of various sizes – associated with submerged woody debris and roots

Gonielmis is a monotypic genus, with *Gonielmis dietrichi* found in Florida streams from Leon County westward (Epler 1996). Biomonitoring surveys conducted on Eglin AFB document the presence of *Gonielmis dietrichi* from the majority of surveyed wadeable streams in Santa Rosa, Okaloosa and Walton counties. Both adults and larvae were collected from wadeable streams in all the drainages on Eglin including the Yellow River, East Bay River, Alaqua Creek and LaGrange Bayou (Figure 2-23).

Larvae and adults were abundant and persistent at sites, and were present in streams year-round throughout the study period. Brown (1972) noted that *Gonielmis dietrichi* was tolerant of moderate organic enrichment, turbidity and siltation, but sensitive to paper mill effluent. Despite its restricted range within northern Florida and relative sensitivity to aquatic habitat degradation, *Gonielmis dietrichi* is not listed by FNAI, federally or by the State, by FCREPA, or in FWC's Comprehensive Wildlife Conservation Strategy (Appendix A).

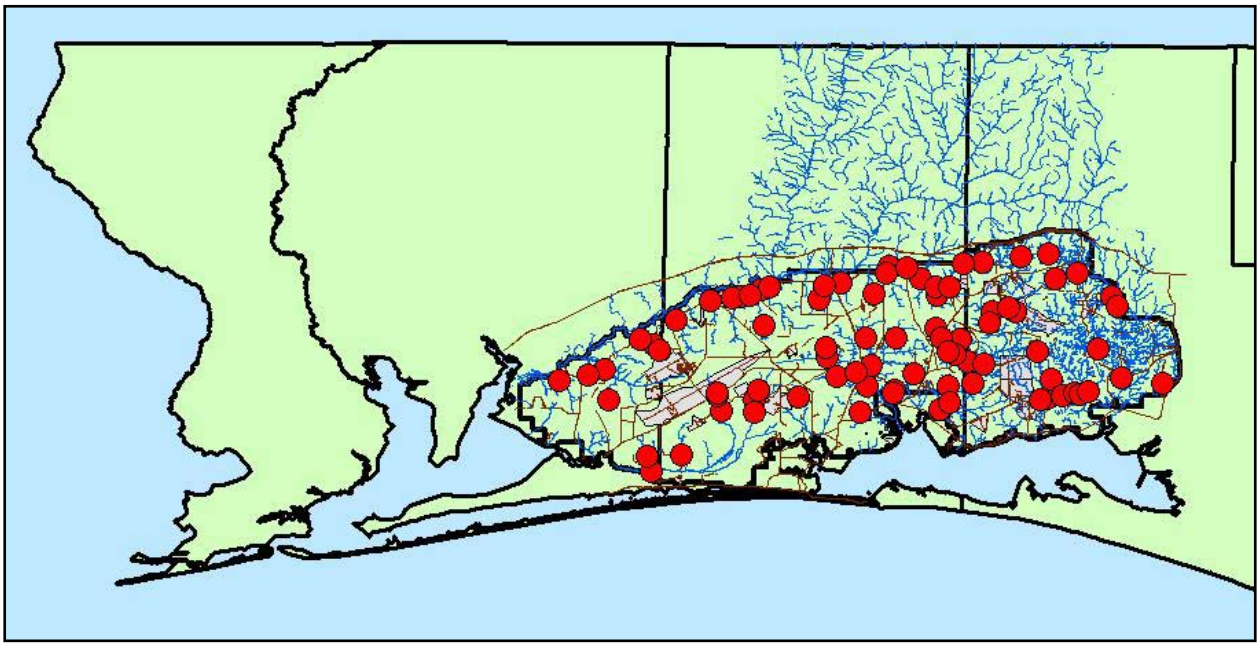

Figure 2-23. Distribution of *Gonielmis dietrichi* in streams on Eglin AFB, FL collected from 1999-2005. Distribution includes Santa Rosa, Okaloosa and Walton counties, FL.

GYRINIDAE
Gyretes iricolor Young 1947
Common Name: Whirligig Beetles
Functional Feeding Group: Predator
Habitat: Found on the water surface of flowing streams of various sizes – associated with undercut banks and snags along stream margins.

Four species of *Gyretes* are known to occur in North America. Only one species, *Gyretes iricolor*, occurs in Florida (Epler 1996). According to Epler (1996), *Gyretes iricolor* was only known to occur in a tributary to the Choctawhatchee River in Holmes County, the Blackwater River in Okaloosa County, the Choctawhatchee River in Walton County, and Pine Log Creek in Bay County. Biomonitoring surveys on Eglin AFB document the presence of *Gyretes iricolor* from wadeable streams in Santa Rosa, Okaloosa and Walton counties. Adults were collected from late February through August from the Yellow River, East Bay River, Turkey Creek, Rocky Creek, Basin Creek, Alaqua Creek and LaGrange Bayou (Figure 2-24). This significantly increases the number of known collection locations for this species within Florida. *Gyretes iricolor* has also been collected in Alabama and Mississippi. Despite its restricted range and relative rarity within the southeast, *Gyretes iricolor* is not listed by FNAI, federally or by the State, by FCREPA, or in FWC's Comprehensive Wildlife Conservation Strategy (Appendix A).

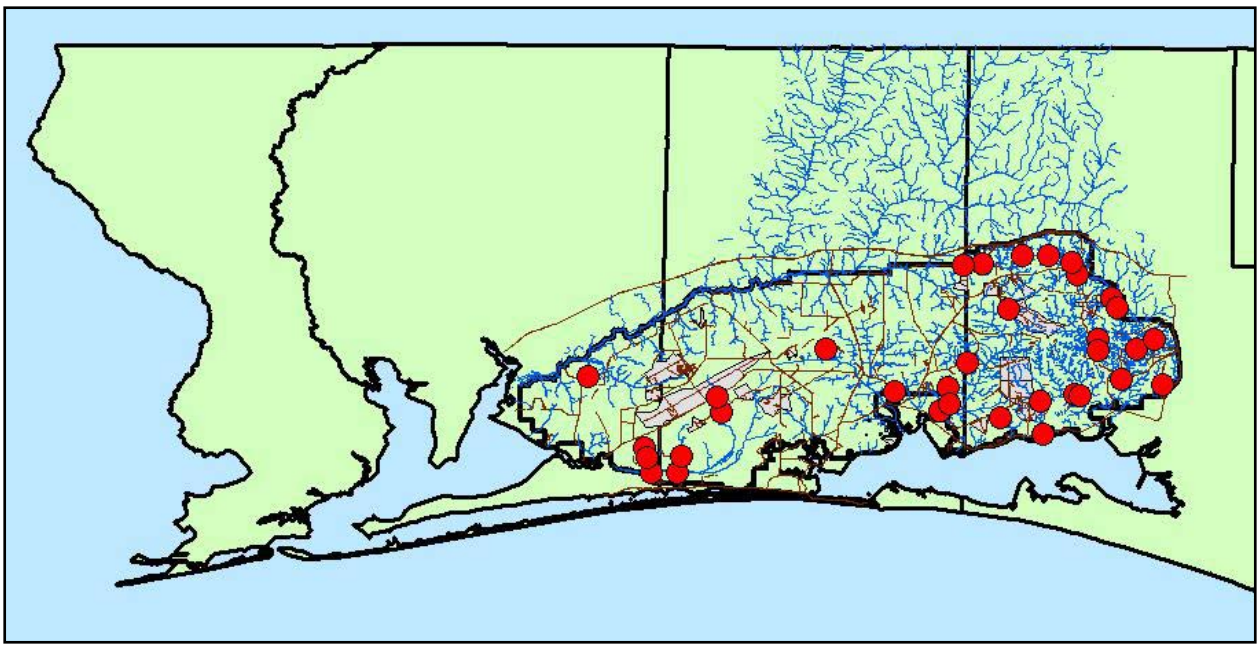

Figure 2-24. Distribution of *Gyretes iricolor* in streams on Eglin AFB, FL collected from 1999-2005. Distribution includes Santa Rosa, Okaloosa and Walton counties, FL

TRICHOPTERA – SPICIPALPIA (closed-cocoon makers)
RHYACOPHILIDAE
Rhyacophila carolina Banks 1911
Common Name: (Caddisfly)
Functional Feeding Group: Predator
Habitat: Fast flowing unpolluted clear streams

Rhyacophila is the largest genus in the Trichoptera with close to 500 species widely distributed through the Holarctic and Oriental regions (Wiggins 1998). *Rhyacophila* occurs in the eastern United States, extending its geographic range from the Northeast to Florida (Pescador et al. 1995). More than 100 species are known in North America (Dixon and Wrona 1992), only the species *Rhyacophila carolina* has been reported in Florida. Harris et al. (1982) reported the presence of *Rhyacophila carolina* for the first time in Florida based on adult collections from tributary streams within the Rocky and Yellow River drainages on Eglin. Another species, *R. ledra*, may eventually appear in the state because it has recently been reported to occur near the Alabama-Florida line (Harris et al. 1991). According to Pescador et al. (1995), *Rhyacophila carolina* appears to be geographically confined to the panhandle section of the state.

Historical collections document this species at two locations on Eglin AFB; Wildcat Creek and Bull Creek within the Rocky Creek and Yellow River drainages respectively. Recent biomonitoring collections in wadeable streams on Eglin document the presence of *Rhyacophila carolina* larvae in Santa Rosa, Okaloosa and Walton counties, within the Yellow River, Turkey Creek, Rocky Creek, Basin Creek, Alaqua Creek and tributaries to LaGrange Bayou (Figure 2-25). Larval specimens were present in collections year-round, but were more common in spring biomonitoring samples.

Unlike other caddisflies, which construct larval cases or retreats, *Rhyacophila* larvae are basically free living, and attachment to the substrate is facilitated by the secretion of a silk thread anchor line. The larvae are generally found in fast-flowing streams and many species are predaceous while a few are herbivorous feeding on living or dead plant tissues. Despite its restricted range and relative rarity within Florida, *Rhyacophila carolina* is not listed by FNAI, federally or by the State, by FCREPA, or listed within FWC's Comprehensive Wildlife Conservation Strategy (Appendix A).

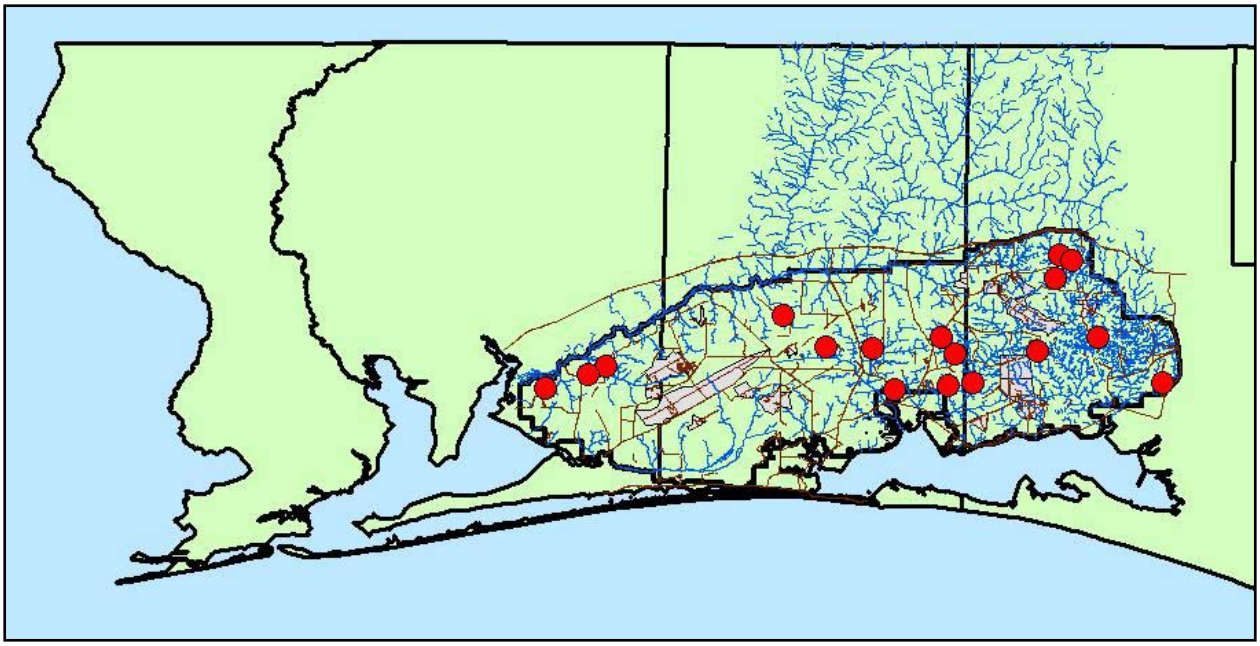

Figure 2-25. Distribution of *Rhyacophila carolina* in streams on Eglin AFB, FL collected from 1999-2005. Distribution includes Santa Rosa, Okaloosa & Walton counties, FL.

TRICHOPTERA – INEGRIPALPIA (portable-case makers)
LIMNEPHILIDAE – Limnephilinae
Pycnopsyche antica/indiana. (*P. antica* Walker 1852; *P. indiana* Ross 1938)
Common Name: (Caddisfly)
Functional Feeding Group: Shredder
Habitat: Cool, small to moderately sized streams and rivers in forested areas.

Pycnopsyche is confined to North America, and comprises a dominant group of 15 species over much of the eastern half of the continent (Wiggins 1998). In Florida, *Pycnopsyche* appears to be geographically confined to the northern part of the state (Pescador et al. 1995). Two species of *Pycnopsyche* are known to occur in Florida (*P. antica* and *P. indiana*). *Pycnopsyche antica* appears to be the more common of the two and has been reported from Leon, Gadsden and Okaloosa counties (Wojtowicz 1982). The lack of larval characters makes it very difficult to distinguish between these two species of *Pycnopsyche*, and work done by Wojtowicz (1982) indicates that *P. indiana* and *P. antica* cannot be reliably separated based on larval or case morphology. Recent biomonitoring collections in wadeable streams on Eglin document the presence of *Pycnopsyche* larvae in Okaloosa and Walton counties; within the Yellow River, Turkey Creek, Rocky Creek, Basin Creek, Alaqua Creek and

tributaries to LaGrange Bayou (Figure 2-26). Larval specimens were present in collections in spring biomonitoring samples (mid-January to late May).

Larvae of most *Pycnopsyche* live in cool small to moderately sized streams and small to medium sized rivers largely in forested areas. Life history data is unknown, except for collection dates; Pescador et al. (1995) collected *Pycnopsyche antica* adults in late October and early December, and Harris et al. (1982) collected *P. antica* adults from Rocky Creek on Eglin AFB in November and December. The time of hatching coincides with autumn leaf fall in September and October, and the larvae are important detrital processors. *Pycnopsyche* larvae construct cases of firmly attached wood pieces or of leaf fragments arranged to form a 3-sided case, or a combination of both (Pescador et al. 2004). They are found in slow-flowing parts of the stream where leaves and organic detritus accumulate.

Despite its sensitivity to aquatic habitat degradation, restricted range and relative rarity within Florida, *Pycnopsyche* is not listed by FNAI, federally or by the State, by FCREPA, or listed within FWC's Comprehensive Wildlife Conservation Strategy (Appendix A).

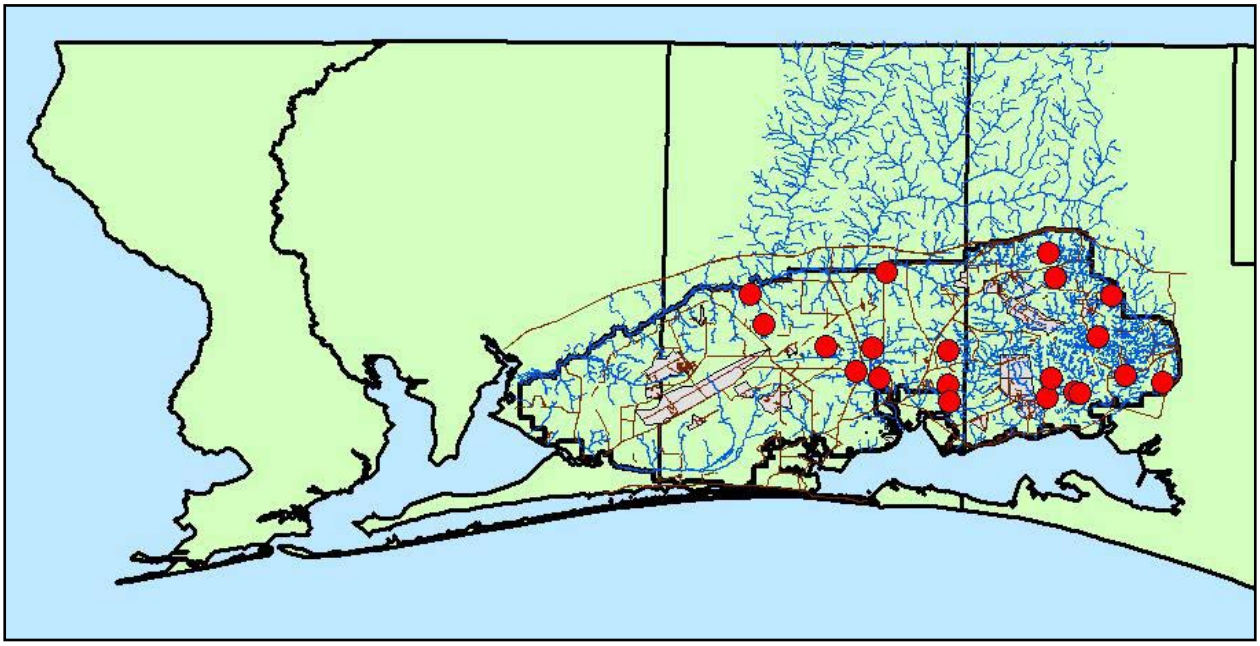

Figure 2-26. Distribution of *Pycnopsyche antica/indiana* in streams on Eglin AFB, FL collected from 1999-2005. Distribution includes Okaloosa and Walton counties, FL.

LEPTOCERIDAE – Leptocerinae
Oecetis morsei/sphyra (*O. morsei* Bueno-Soria 1981; *O. sphyra* Ross 1941)
Common Name: Morse's Long-horn Sedge (Caddisfly)
Functional Feeding Group: Predator
Habitat: Small to medium cool streams with submerged macrophytes and detritus.

Oecetis is a large genus represented in all regions of the world, and as a group they are widely distributed and often abundant (Wiggins 1998). In North America, approximately 30 species are known to occur north of Mexico, 18 of which are known or are likely to occur in Florida (Pescador et al. 1995). *Oecetis* larvae are highly diverse in terms of habitat preferences and have succeeded in exploiting nearly every type of aquatic habitat (Pescador et al. 1995). Larvae of *Oecetis* are strictly predaceous, as evidenced by their long, bladelike mandibles. Larval case construction is variable between species in terms of materials and architecture. *Oecetis morsei* larvae, although they cannot be distinguished from *O. sphyra* (Floyd 1994), are considered to be rare in the state of Florida.

Adult specimens have only been reported in Florida from Ramer Branch on Eglin Air Force Base, Okaloosa County (Harris et al. 1982). Recent biomonitoring collections on Eglin document *Oecetis morsei/sphyra* larvae in Santa Rosa, Okaloosa and Walton counties within the Yellow River, East Bay River, Turkey Creek, Rocky Creek, Basin Creek, and Alaqua Creek (Figure 2-27). Larvae were collected in streams in spring and summer biomonitoring samples, and were persistent at sampling locations.

Despite sensitivity to aquatic habitat degradation, restricted range and relative rarity within Florida, *Oecetis moresi* is not listed by FNAI, federally or by the State, or listed within FWC's Comprehensive Wildlife Conservation Strategy (Appendix A). However, *Oecetis moresi* was listed in 1994 as rare by FCREPA (Deyrup and Franz 1994).

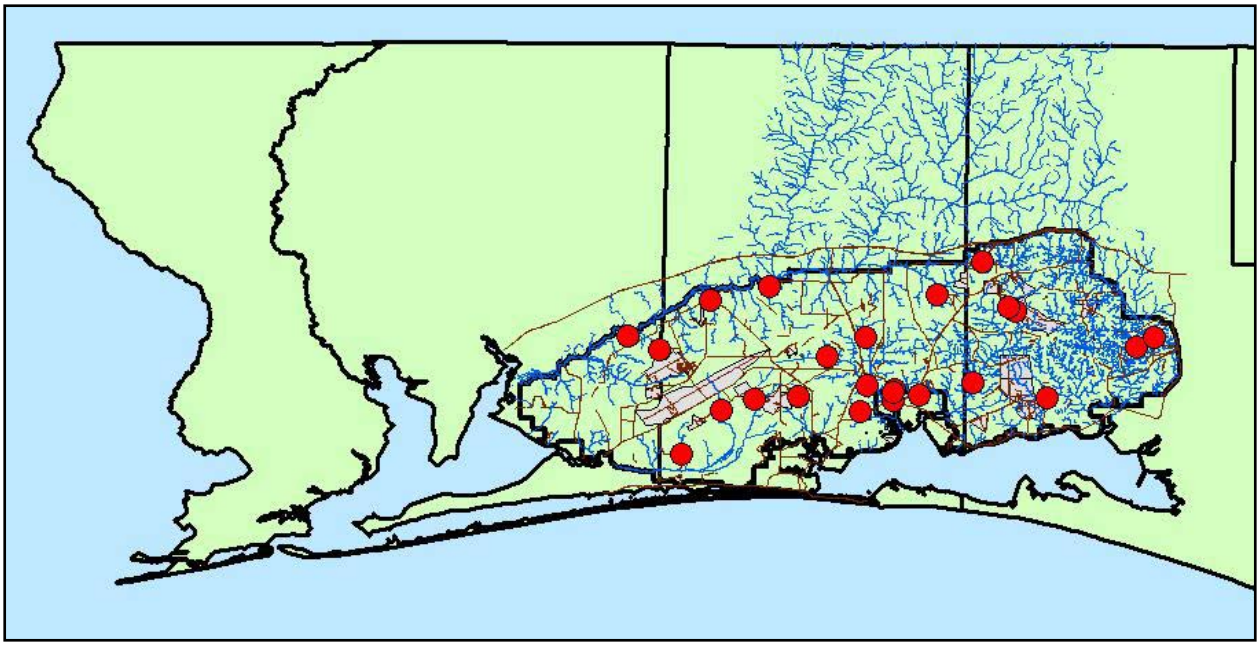

Figure 2-27. Distribution of *Oecetis morsei/sphyra* in streams on Eglin AFB, FL collected from 1999-2005. Distribution includes Santa Rosa, Okaloosa and Walton counties, FL.

CALAMOCERATIDAE
Heteroplectron americanum (Walker) (syn. *Ganonema nigrum* Llyod) 1852
Common Name: (Caddisfly)
Functional Feeding Group: Shredder – decomposing vascular plant tissue
Habitat: Clean small sand-bottom flowing streams with woody debris and plant material.

Heteroplectron contains only two species (*H. americanum* and *H. californicum*). *Heteroplectron americanum* was previously thought to occur only as far south as the Appalachians of Georgia and Alabama, and was first reported to occur in Florida by Pescador et al. (1995). Larvae were collected in Liberty County within the Apalachicola Bluffs and Ravines Preserve from small ravine streams and at the time, Pescador et al. (1995) stated they were unaware of its occurrence anywhere else in Florida, although Pescador et al. (2004) mention collections of both larvae and adults in ravines on Eglin.

Recent biomonitoring collections on Eglin AFB document the presence of *Heteroplectron americanum* larvae in wadeable streams in Santa Rosa, Okaloosa and Walton counties; within the Yellow River, East Bay River, Turkey Creek, Rocky Creek, Basin Creek and Alaqua Creek drainages (Figure 2-28). Larvae were predominantly found in 1st and 2nd order streams with high percentages of leaves, leaf packs, detritus, small twigs, branches and larger woody debris. Larval cases of *Heteroplectron*

americanum consist of a hollowed-out twig lined with silk, thus being difficult to detect in the field by the untrained eye.

Despite its restricted range and relative rarity within Florida, *Heteroplectron americanum* is not listed by FNAI, federally or by the State, by FCREPA, or listed within FWC's Comprehensive Wildlife Conservation Strategy (Appendix A).

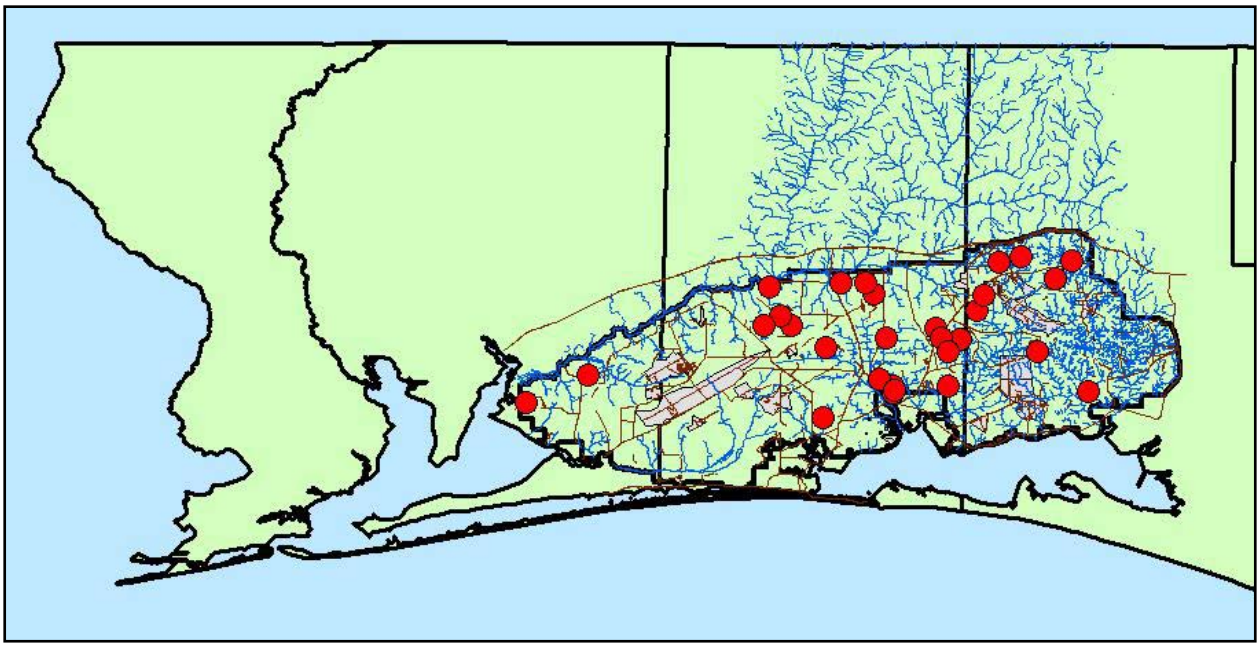

Figure 2-28. Distribution of *Heteroplectron americanum* in streams on Eglin AFB, FL collected from 1999-2005. Distribution includes Santa Rosa, Okaloosa and Walton counties, FL

DISCUSSION

Documenting the location, abundance and basic natural history information for species is a critical first step in biodiversity conservation. E.O. Wilson (Wilson 1999) and various private, state and federal agencies have championed basic natural history work including baseline surveys and systematics. An ecosystem approach to conservation management incorporates this type of scientific data as the basis for decision making, along with monitoring and adaptive management to fill data gaps and allow incorporation of the new information as it is discovered and evaluated (Meffe and Carroll 1997). This paper summarizes baseline biomonitoring and survey work conducted on Eglin Air Force Base, Florida

which provides data for natural resource management, including non-paved road reclamation and stream restoration (Thom and Herod 2005). Currently, an effort is underway within the state of Florida to document the ecosystems and species of greatest conservation need, including species that are thought to be rare but require future research. The primary goal of this work is to help prioritize conservation efforts in Florida (FWC 2005). Agencies in Florida such as the Florida Natural Areas Inventory (FNAI), the Florida Fish and Wildlife Conservation Commission (FWC) and the Florida Committee for Rare and Endangered Plants and Animals (FCREPA) have all contributed to the development of rare species lists (Appendix A). This paper documents new collection locality information within the Florida Panhandle for 28 species – significantly increasing known collection locations for the majority of these species. We offer recommendations for additional species of concern, including stoneflies (Plecoptera) and aquatic beetles previously not addressed on rare species lists. These recommendations are based on geographic range extent, environmental specificity, potential short-term and long-term threats, and expert opinion.

A cautionary tale comes from the terrestrial realm; although a useful prioritization tool, conservation status (rare, threatened, etc.) as a biodiversity trend indicator does not necessarily reflect changes in the status of the taxa they represent (Quayle and Ramsay 2005). In a review of national and international biodiversity indicators, "Conservation Status of Species" was the most popular state indicator of biodiversity reported (Saunders et al. 1998), despite the criticism that the use of threatened species lists to monitor biodiversity trends potentially tracks changes in knowledge base and status assessment procedures rather than actual changes in species status (Possingham et al. 2002; Keith and Burgman 2004; Quayle and Ramsay 2005). Basically, lists of rare, threatened and endangered species like those compiled by FNAI, FCREPA, and FWC, while important tools to help prioritize and direct future research and conservation efforts, should not be used in place of actual species data when assessing statewide biodiversity trends.

One necessary tool for species conservation is accurate distribution data. Especially for small or isolated populations, it is essential to determine if known distributions represent the actual species range, or are an artifact of an incomplete sampling effort (O'Connell et al. 2005; Stockwell and Peterson 2002).

Both Ponder et al. (2001) and O'Connell et al. (2005) illustrate an evaluation of sampling effort for specific taxa. Biomonitoring work examining macroinvertebrate communities completed on Eglin is some of the most extensive work completed to date within the region.

Documentation of rare and sensitive species occurrence and abundance is also biased by the sampling techniques used and the timing of sampling. Biomonitoring samples were conducted year-round, but predominantly focused on early spring (February-March) and summer (June-August) sampling (to target the two main pulses of aquatic insect emergence). Surveys for adult dragonflies targeted early spring emergent species (March and April); although several special surveys were conducted in the summer and fall (May-September) and adult species were noted while conducting other fieldwork. The majority of this sampling work was conducted at a relatively broad scale across Eglin, using a variety of methods in order to target multiple life stages of the species in question.

This paper currently only discusses 28 taxa, and relatively few aquatic insects are listed by FCREPA, FNAI or FWC (Appendix A). Further taxonomic resolution for species, especially aquatic larvae, may significantly change the conservation lists for Florida. For example, taxa not discussed here such as the stonefly *Leuctra* (Plecoptera:Leuctridae) or some larval Chironomidae (Diptera) may contain several endemic species in need of special conservation consideration (currently species level identification using both larval and adult specimens within these families is difficult and time intensive).

Ultimately, aquatic biomonitoring surveys on Eglin Air Force Base have documented the presence of numerous rare and sensitive aquatic invertebrate species within the Florida panhandle. This is a testament to the importance of natural resource management on Eglin Air Force Base and within the Gulf Coastal Plain Ecosystem. This example in Florida highlights the role Department of Defense lands play in the conservation and national security of biodiversity. Continued support of the Natural Resource Management Branch at Eglin AFB, and the continued collaboration and participation of managers and resource personnel in processes like FWC's statewide wildlife legacy initiative is necessary for successful conservation of the unique and globally rare species found in the Florida panhandle.

REFERENCES CITED

Barbour, T. 1944. That Vanishing Eden: A Naturalist's Florida. Little, Brown and Company, Boston, Massachusetts.1st edition. 250 pp.

Bednarik, A.F. and W.P. McCafferty. 1979. Biosystematic revision of the genus *Stenonema* (Ephemeroptera: Heptageniidae). Canad. Bull. Fish. and Aquatic Sci., Bull. No. 201.vi. 73 pp.

Benz, G.W. and D.E. Collins. 1997. Aquatic Fauna in Peril: The Southeastern Perspective. Lenz Design and Communications. Decatur, GA. 554 pp.

Berner, L. and M.L. Pescador. 1988. The Mayflies of Florida. University Presses of Florida. Gainesville, Florida. 416 pp.

Bond, E.M. and J.M. Chase. 2002. Biodiversity and ecosystem functioning at local and regional spatial scales. Ecology Letters 5: 467-470.

Brown, H.P. 1972. Aquatic dryopoid beetles (Coleoptera) of the United States. Biota of Freshwater Ecosystems Identification Manual No. 6. Water Pollution Control Research Series, USEPA, Cincinnati, Ohio. 82 pp.

Cao, Y., D. D. Williams, and N.E. Williams. 1998. How Important are Rare Species in Aquatic Community Ecology and Bioassessment? Limnology and Oceanography, Vol. 43, No. 7. pp. 1403-1409.

Chapin, F.S., E.S. Zavaleta, V.T. Eviner, R.L. Naylor, P.M. Vitousek, H.L. Reynolds, D.U. Hooper, S. Lavorel, O.E. Sala, S.E. Hobbie, M.C. Mack and S. Diaz. 2000. Consequences of changing biodiversity. Nature 405: 234-242.

D'Itri, F.M. 1997. Zebra Mussels and Aquatic Nuisance Species. CRC Press, London, England. 648 pp.

Dixon, R.W.J. and F.J. Wrona. 1992. Life history and production of the predatory caddisfly *Rhyacophila vao* Milne in a spring-fed stream. Freshwater Biology 27:1-11.

Dunkle, S.W. 1981. The ecology and behavior of *Tachopteryx thoreyi* (Hagen) (Anisoptera:Petaluridae). Odonatologica 10:189-199.

Dunkle, S.W. 2000. Dragonflies Through Binoculars: A Field Guide to Dragonflies of North America. Oxford University Press. New York, NY. 266 pp.

Elwood, J.E. and R.M. Cushman. 1975. The life history and ecology of *Peltoperla maria* (Plecoptera: Peltoperlidae) in a small springfed stream. Verh.Int.Verein. Limnol. 19: 3050-3056.

Epler, J.H. 1996. Identification Manual for the Water Beetles of Florida (Coleoptera: Dryopidae, Dytiscidae, Elmidae, Gyrinidae, Haliplidae, Hydraenidae, Hydrophilidae, Noteridae, Psephenidae, Ptilodactylidae, Scirtidae). State of Florida Department of Environmental Protection, Division of Water Facilities, Tallahassee, Florida. 263 pp.

FDEP (Florida Department of Environmental Protection). 2004. Standard Operation Procedures (SOPs) effective June 8, 2004. DEP-SOP-001/01-FS 7000, General Biological Community Sampling; DEP-SOP-002/01-LT 7000 Determination of Biological Indices; DEP-SOP-002/01-LT 7100 BioRecon Determination. http://www.floridadep.org/labs/qa/sops.htm

Fishman, G. 2000. Journeys Through Paradise: Pioneering Naturalists in the Southeast. University Press of Florida. Gainesville, FL. 306 pp.

Floyd, M.A. 1994. Larvae of the caddisfly genus *Oecetis* (Trichoptera: Leptoceridae) in North America. Ph.D. Dissertation, Clemson University. Clemson, SC. 152 pp.

FNAI (Florida Natural Areas Inventory) 2005. FNAI Tracking List: Florida-All Counties-Invertebrates. April 2005. http://www.fnai.org/data.cfm

Ford, J. 1989. The effects of chemical stress on aquatic species composition and community structure (pp. 99-114). *In* S.A. Levin, M.A. Harwell, J.R. Kelly and K.D. Kimball [Eds.] Ecotoxicology: Problems and approaches. Springer-Verlag. New York, NY. 547 pp.

Frank, D.A. and S.J. McNaughton. 1991. Stability increases with diversity in plant communities: empirical eveidence for the 1988 Yellowstone drought. Oikos 62: 360-362.

Frison, T.H. 1942. Studies of North American Plecoptera, with special reference to the fauna of Illinois. Bull. Ill. Nat. Hist. Surv. 22: 235-355.

Frost, C.C. 1993. Four centuries of changing landscape patterns in the Longleaf Pine ecosystem. (pp.17-43). *In:* S. Hermann (Ed.) Proceedings of the Tall Timbers Fire Ecology Conference, No.18, The longleaf Pine Ecosystem; Ecology, Restoration and Management. Tallahassee, FL: Tall Timbers Research Station.

Fuller, R.L. and R.J. Mackay. 1981. Effects of food quality on growth of three *Hydropsyche* species (Trichoptera: Hydropsychidae). Can. J. Zool. 59:1133-1140.

FWC (Florida Fish and Wildlife Conservation Commission) 2005. Florida's Wildlife Legacy Initiative. Florida's Comprehensive Wildlife Conservation Strategy. Tallahassee, Florida. 540 pp.

Garrison, R.W. 1990. A synopsis of the genus *Hetaerina* with descriptions of four new species (Odonata:Calopterygidae). Transactions of the American Entomological Society 116: 175-259.

Gordon, E.A. and J.B. Wallace. 1975. Distribution of the family Hydropsychidae (Trichoptera) in the Savannah River Basin of North Carolina, South Carolina and Georgia. Hydrobiologia 46: 405-302.

Harris, S.C., P.K. Lago, and J.F. Scheiring. 1982. Annotated list of Trichoptera of several streams of Eglin Air Force Base, Florida. Entomol. News. 93:79-84.

Harris, S.C., P.E. ONeil, and P.K. Lago. 1991. Caddisflies of Alabama. Geological Survey of Alabama. Bull. No. 142. 442 pp.

Harvey, R.S., R.L. Vannote, and B.W. Sweeney. 1980. Life history, developmental processes, and energetics of the burrowing mayfly *Dolania americana*, (pp. 211-230). *In*: Advances in Ephemeroptera Biology, J.F. Flannagan and K.E. Marshall [Eds]. Plenum Press, New York. 552 pp.

Hector, A. and R. Hooper. 2002. Darwin and the first ecological experiment. Science 295: 639-640.

Jackson, D.R. 2005. Database on the Status, Distribution and Biology of Florida's Rare Invertebrates. Florida's State Wildlife Grants Program. Florida Fish and Wildlife Conservation Commission. Tallahassee, FL. 19 pp.

Johnson, C. 1961. Breeding behavior and oviposition in *Hetaerina americana* (Fabricius) and *H. titia* (Drury) (Odonata:Agriidae). Canadian Entomologist 93: 260-266.

Johnson, C. 1973. Distributional patterns and their interpretation in *Heterina* (Odonata:Calopterygidae). Florida Entomologist 56:24-42.

Jones, C.G. and J.H. Lawton. 1995. Linking Species & Ecosystems. Chapman and Hall, New York, NY. 387 pp.

Keith, D.A. and M.A. Burgman. 2004. The Lazarus effect: can the dynamics of extinct species lists tell us anything about the status of biodiversity? Biological Conservation 117: 41-48.

Kindell, C.E., B.J. Herring, C. Nordman, J. Jensen, A.R. Schotz, and L.G. Chafin. 1997. Natural community survey of Eglin Air Force Base, 1993-1996: Final Report. Florida Natural Areas Inventory, Tallahassee, Florida. 124 pp.

Kinzig, A.P., S.W. Pacala and D. Tilman. 2001. The functional consequences of biodiversity: empirical progress and theoretical extensions. Princeton University Press, Princeton, NJ. 368 pp.

Krebs, C.J. 1985. Ecology: The Experimental Analysis of Distribution and Abundance. Harper and Row. New York, NY. 3rd edition. 800 pp.

Lam, E. 2004. Damselflies of the Northeast: A guide to the species of eastern Canada & the northeastern United States. Biodiversity Books, Forest Hills, NY. 96 pp.

Lauzon, M. and P.P. Harper. 1986. Life history and production of the stream-dwelling mayfly *Habrophlebia vibrans* Needham (Ephemeroptera: Leptophlebiidae). Canadian Journal of Zoology 64: 2038-2045.

Lawton, J.H. and C.G. Jones. 1995. Linking Species and Ecosystems: Organisms as Ecosystem Engineers, (pp.141-150). *In*: Linking Species and Ecosystems. C. Jones and J. Lawton [Eds] Chapman and Hall, New York, NY. 387 pp.

Loreau, M, S. Naeem, and P. Inchausti. 2002. Biodiversity and Ecosystem Functioning: Synthesis and Perspectives. Oxford University Press, New York, NY. 304pp.

Lyons, J., S. Navarro-Perz, P.A. Cochran, E. Santana and M. Guzman-Arroyo. 1995. Index of biotic integrity based on fish assemblages for the conservation of streams and rivers in west-central Mexico. Conservation Biology. Vol.9, No. 3: 569-584.

Lyons, K.G., C.A. Brigham, B.H. Traut and M.W. Schwartz. 2005. Rare Species and Ecosystem Functioning. Conservation Biology. Vol. 19, No. 4: 1019-1024.

Lyons, K.G. and M.W. Schwartz. 2001. Rare species loss alters ecosystem function – invasion resistance. Ecology Letters 4: 1-8.

Mathews, R.C., Jr. 1982. Predator stoneflies: role in freshwater stream communities. Journal of the Tennessee Academy of Science. 57: 82-83.

McCafferty, W.P. 1981. Aquatic Entomology: The Fisherman's and Ecologists' Illustrated Guide to Insects and Their Relatives. Jones and Bartlett Publishers, Sudbury, MA. 448 pp.

McGrady-Steed, J., P. Harris and P. Morin. 1997. Biodiversity regulates ecosystem predictability. Nature 390: 162-165.

Means, B., and G. Grow. 1985. The endangered longleaf pine community. ENFO Bulletin. Winter Park, Fl: Environmental Information Center.

Meffe, G.K. and C.R. Carroll. 1997. Principles of Conservation Biology. 2nd edition. Sinauer Associates, Inc., Sunderland, MA. 729 pp.

Merritt, R.W. and J.B. Wallace. 1981. Filter-feeding insects. Sci. Am. 244: 132-144.

Merritt, R.W. and K.W. Cummins. 1996. An Introduction to the Aquatic Insects of North America. Kendall and Hunt Publishing Company; Dubuque, Iowa. 3rd edition. 862 pp.

Minns, C.K., V.W. Carins, R.G. Randall and J.E. Morre. 1988. An index of biotic integrity (IBI) for fish assemblages in the littoral zone of Great Lakes' area of concern. Canadian Journal of Fisheries and Aquatic Science. 51: 1804-1822.

Mittermeier, R.S. and A.B. Forsyth. 1997. Setting Priorities for Biodiversity Conservation: One Organization's Approach (pp.141-142). *In*: Principles of Conservation Biology. 2nd edition.G. Meffe and C. Carroll [Eds]. Sinauer Associates, Inc., Sunderland, MA. 729 pp.

Morihara, D. and W.P. McCafferty. 1979. The *Baetis* larvae of North America (Ephemeroptera:Baetidae). Trans. Amer. Entomol. Soc. 105: 139-221.

Naeem, S. 1998. Species redundancy and ecosystem reliability. Conservation Biology 12: 39-45.

Naeem, S., F.S. Chapin III, R. Costanza, P.R. Ehrlich, F.B. Golley, D.U. Hooper, J.H. Lawton, R.V. O'Neill, H.A. Mooney, O.E. Sala, A.J. Symstad, and D. Tilman. 1999. Biodiversity and Ecosystem Functioning: Maintaining Natural Life Support Processes. Issues in Ecology 4: 1-14.

Naeem, S., L.J. Thompson, S.P. Lawler, J.H. Lawton and R.M. Woodfin. 1994. Declining biodiversity can alter the performance of ecosystems. Nature 368: 734-737.

Needham, J.G., M.J. Westfall Jr., M.L. May. 2000. Dragonflies of North America. Scientific Publishers. Gainesville, FL. 940 pp.

O'Connell, M.T., A.M. Uzee O'Connell and J.D. Williams. 2005. Assessment of rarity of the Blackmouth Shiner *Notropis melanostomus* (Cyprinidae) based on museum and recent survey data. Southeastern Naturalist 4(2): 247-260.

Osborne, L.L. and E.E. Herricks.1987. Microhabitat characteristics of *Hydropsyche* (Trichoptera: Hydropsychidae) and the importance of body size. J. N. Am. Benthol. 6:115-124.

Peckarsky, B.L. 1979. A review of the distribution, ecology, and evolution of he North American species of *Acroneuria* and six related genera (Plecoptera:Perlidae). Journal of the Kansas Entomological Society 52: 787-809.

Pescador, M.L., A.K. Rasmussen and B.A. Richard. 2000. A Guide to the Stoneflies (Plecoptera) of Florida. State of Florida Department of Environmental Protection, Division of Water Facilities, Tallahassee, Florida. 166 pp.

Pescador, M.L., A.K. Rasmussen and S.C. Harris. 1995. Identification Manual for the Caddisfly (Trichoptera) Larvae of Florida. State of Florida Department of Environmental Protection, Division of Water Facilities, Tallahassee, Florida. 117 pp.

Pescador, M.L., A.K. Rasmussen and S.C. Harris. 2004. Identification Manual for the Caddisfly (Trichoptera) Larvae of Florida – revised edition 2004. State of Florida Department of Environmental Protection, Division of Water Resource Management, Tallahassee, Florida. 136 pp.

Pescador, M.L. and B.A. Richard. 2004. Guide to the Mayfly (Ephemeroptera) Nymphs of Florida. State of Florida Department of Environmental Protection, Division of Water Resource Management, Tallahassee, Florida. 168pp.

Pescador, M.L. and W.L. Peters. 1974. The life history and ecology of *Baetisca rogersi* Berner (Ephemeroptera: Baetiscidae). Bull. Fla. State Mus., Biol. Sci. Ser. 17: 151-209.

Peters, W.L. and J.G. Peters. 1977. Adult life and emergence of *Dolania americana* in northwestern Florida. Intern. Revue ges. Hydrobiol. 62: 409-438.

Philipp, D.P., J.M. Epifanio, J.E. Marsden and J.E. Claussen. 1995. Protection of Aquatic Biodiversity: Proceedings of the World Fisheries Congress, Athens, Greece, Theme 3. Oxford and IBH Publishing Co. Pvt. Ltd., New Dhlhi. 282 pp.

Ponder, W.F., G.A. Carter, P. Flemons and R.R. Chapman. 2001. Evaluation of museum collections data for use in a biodiversity assessment. Conservation Biology 15: 648-657.

Possingham, H.P., S.J. Andelman, M.A. Burgman, R.A. Medellin, L.L. Master, and D.A. Keith. 2002. Limits to the use of threatened species lists. Trends in Ecology and Evolution 17: 503-507.

Putman, R.J. 1994. Community Ecology. 1st edition, Chapman and Hall. New York, NY. 178 pp.

Quayle, J. and L.R. Ramsay. 2005. Conservation status as a biodiversity trend indicator: recommendations from a decade of listing species at risk in British Columbia. Conservation Biology 19 (4): 1306-1311.

Rabinowitz, D., S. Cairns and T. Dillon. 1986. Seven forms of rarity and their frequency in the flora of the British Isles. (pp. 182-204). *In*: M.E. Soulé (Ed.), Conservation Biology: The Science of Scarcity and Diversity. Sinauer Associates, Sunderland, MA. 560 pp.

Rasmussen, A.K. 2004. Species diversity and ecology of Trichoptera (Caddisflies) and Plecoptera (Stoneflies) in ravine ecosystems of northern Florida. Dissertation; University of Florida, Gainesville, FL. 139 pp.

Rasmussen, A.K. and M.L. Pescador. 2002. A Guide to the Megaloptera and Aquatic Neuroptera of Florida. Division of Water Resources Management. Florida Department of Environmental Protection. Tallahassee, FL. 75 pp.

Richardson, J.S. 2003. Identification Manual for the Dragonfly Larvae (Anisoptera) of Florida. Division of Resource Assessment and Management. Florida Department of Environmental Protection. Tallahassee, FL. 122 pp.

Ricklefs, R.E. and D. Schluter. 1993. Species Diversity in Ecological Communities. The University of Chicago Press, Chicago, IL. 416 pp.

Rosasco-Soule, A. 1987. Panhandle Memories: A Lived History. West Florida Literary Federation and the Pensacola Press Club, Pensacola, Florida. 143 pp.

Saunders, D., C. Margules and B. Hill. 1998. Environmental indicators for national state of the environment reporting-Biodiversity, Australia: State of the Environment (Environmental Indicator Reports), Department of Environment, Canberra, Australian Capital Territory. 72 pp.

Schwartz, M.W., C.A. Brigham, J.D. Hoeksema, K.G. Lyons, M.H. Mills and P.J. van Mantgen. 2000. Linking biodiversity to ecosystem function: implications for conservation ecology. Oecologia 122: 297-305.

Sinclair, R.M. 1964. Water quality requirements of the family Elmidae (Coleoptera) [with keys to the larvae and adults of the eastern genera]. Tennessee Stream Pollution Control Board, Tenn. Dept. Public Health, Nashville, TN. 14 pp.

Stark, B.P. and A.R. Gaufin. 1979. The stoneflies (Plecoptera) of Florida. Trans. Am. Entomol. Soc. 104: 391-433.

Stein, B.A., L.S. Kutner and J.S. Adams. 2000. Precious Heritage: The Status of Biodiversity in the United States. Oxford University Press, Inc., New York, New York. 399 pp.

Stockwell, D.R.B. and A.T. Peterson. 2002. Effects of sample size on accuracy of species distribution models. Ecological Modeling 148: 1-13.

Tennessen, K. 2004. *Hetaerina americana* in Florida. Argia 16(2): 7.

Thom, T.A. and J.J. Herod. 2005. Aquatic Inventory of Eglin Air Force Base and Recommendations for Long-Term Aquatic Ecosystem Management. Technical Report to Eglin Air Force Base. 244 pp & appendices.

Tsui, P. and M. Hubbard. 1979. Feeding habits of the predaceous nymphs of *Dolania americana* in northwestern Florida (Ephemeroptera: Behningiidae). Hydrobiologia 67(2): 119-123.

United States Census Bureau. 2000. 2000 Census of Population and Housing. Washington, D.C. http://www.census.gov/main/www/cen2000.html

United States Department of Agriculture. 2004. 2002 Census of Agriculture. United States: Summary and State Data, Vol.1: Geographic Series Part 51. AC-02-A-51. USDA-National Agriculture Statistics Service. Washington, DC. 663 pp.

Wallace, J.B. 1975. Food partitioning in net-spinning Trichoptera larvae: *Hydropsyche venularis*, *Cheumatopsyche etrona*, and *Macronema zebratum* (Hydropsychidae). Annals of the Entomological Society of America 68(3): 463-472.

Wallace, J.B. 1976. The significance of the elongate, rectangular mesh found in capture nets of fine particle filter feeding Trichoptera larvae. Archiv für Hydrobiologie 77(2): 205-212.

Wallace, J.B. and Sherberger, F.F. 1974. The larval retreat and feeding net of *Macronema carolina* Banks (Trichoptera: Hydropsychidae). Hydrobiologia 45 (2-3): 177-184.

Wallace, J.B., D.S. Vogel and R.F. Cuffney. 1986. Recovery of a headwater stream from an insecticide-induced community disturbance. J.N. Am. Benthol. Soc. 5: 115-126.

Wallace, J.B., J.R. Webster, and W.R. Woodall. 1977. The role of filter feeders in flowing waters. Archiv für Hydrobiologie 79:506-532.

Wallace, J.B., W.R. Woodall, and F.F. Sherberger. 1970. Breakdown of leaves by feeding of Peltoperla maria nymphs (Plecoptera: Peltoperlidae). Ann. Entomol. Soc. Am. 63:562-567.

Waltz, R.D. and McCafferty, W.P. 1987. New genera of Baetidae for some Nearctic species previously included in *Baetis* Leach (Ephemeroptera). Ann. Entomol. Soc. Amer. 80: 667-670.

Wardle, D.A. 2002. Communities and Ecosystems. Princeton University Press, Princeton, NJ. 400 pp.

Weisser, W.W. and E. Siemann. 2004. Insects and Ecosystem Function. Springer-Verlag, New York, NY. 413 pp.

Westfall, M.J. Jr., and M.L. May. 1996. Damselflies of North America. Scientific Publishers, Inc., Gainesville, Florida. 650pp.

Wiggins, G.B. 1998. Larvae of the North American Caddisfly Genera (Trichoptera), 2nd edition. University of Toronto Press, Toronto, Canada. 457 pp.

Wilson, E.O. 1999. The Diversity of Life. Reissue edition, W.W. Norton & Company, Inc. New York, NY. 424 pp.

Wojtowicz, J.A. 1982. A review of the adults and larvae of the genus *Pycnopsyche* (Trichoptera: Limnephilidae) with revision of the *Pycnopsyche scabripennis* (Rambur) and *Pycnopsyche lepida* (Hagen) Complexes. Ph.D. dissertation, University of Tennessee. 292 pp.

Woodall, W.R., Jr., and J.B. Wallace. 1972. The benthic fauna in four small southern Appalachian streams. Am. Midl. Nat. 88: 393-407.

CHAPTER 3

EVALUATION OF BIOASSESSMENT METRIC CHANGES IN FLORIDA [1]

[1] Thom, T.A. To be submitted to the *Journal of the North American Benthological Society*.

ABSTRACT

Biological assessment using specific metrics to document effects of pollution on benthic macroinvertebrate assemblages in Florida streams was proposed and implemented at the state level beginning in 1996. In June 2004, the Florida Department of Environmental Protection replaced these existing criteria with new metrics and revised site evaluation criteria. It was suggested that due to the high regionalized diversity within the Florida Panhandle, the metric changes would result in a decreased ability to detect varying degrees of biological impairment for wadeable streams in this region. This paper reports results of stream bioassessments on Eglin Air Force Base in the western Florida Panhandle as part of a long-term aquatic monitoring strategy. Of the 127 sites surveyed over a four year period, 84 sites were considered "healthy" based on aquatic invertebrate bioassessment (66% of the sites sampled), 29 sites were determined to be impaired (23% of sites sampled), and 14 sites were designated as suspect (11% of sites sampled) using the previous BioRecon Index metric criteria. Using the new criteria, 97 sites "passed" and 31 sites "failed" based on aquatic invertebrate bioassessment data. The site condition evaluations changed as a result of changes in analysis, not actual site condition. A level of resolution was lost ("suspect") with the new BioRecon Index. The majority of suspect sites (11 of 14) were classified as passing sites using the new BioRecon Index. This evaluation illustrates the role of metrics and threshold scores in bioassessments and management strategies for freshwater streams within the Gulf Coastal Plain.

INTRODUCTION

Biological Monitoring

Assessment of stream water quality often requires knowledge of baseline conditions, setting quality criteria and standards, monitoring temporal changes, and determining the impacts of specific disturbances (Canter 1985; Resh and Jackson 1993). Monitoring techniques which include a combination of physical, chemical and biological measurements provide the optimal water quality monitoring approach. Biological monitoring (sometimes termed biomonitoring or bioassessment) provides information about both past and current conditions (Patterson and Morrison 1993), and can provide

information that physical and chemical data cannot (Barbour et al. 1999). One aspect of biologically focused stream assessment involves sampling aquatic macroinvertebrates. Benthic macroinvertebrates are most frequently used as bioindicators of stream health (Hellawell 1986), and their value in biological monitoring studies is well documented (Rosenberg and Resh 1993a).

Aquatic insects are widely distributed, diverse, abundant, and are present in most types of aquatic habitats. Despite their success in different aquatic environments, insects are only incompletely or secondarily adapted for aquatic life (Wallace and Anderson 1996). With very few exceptions, aquatic insects are directly dependent on the terrestrial environment for part of the life cycle. Thus, distribution of aquatic insect populations is ultimately set by an array of environmental parameters including physical, chemical and biological factors that are well documented at multiple temporal and spatial scales within the scientific literature (Cummins and Merritt 1996; Hamilton and Morse 1990; Berner and Pescador 1988; Anderson 1971; Ward and Stanford 1979; Neill 1957; Rogers 1933).

Their dependence on both the aquatic and terrestrial environments makes aquatic insects excellent indicators of anthropogenic disturbance. Individual organisms, populations, and species assemblages of benthic macroinvertebrates have been used to characterize the environment, as they respond to a variety of anthropogenic stresses including heavy metals, domestic, industrial and agricultural pollutants, organic enrichment, altered hydrologic regimes, altered stream temperature, riparian clearing and land-use changes as well as stream restoration activities such as riparian restoration (Johnson et al. 1993; Resh and McElravy 1993; Resh and Jackson 1993; Norris and Georges 1993). Observations about the presence or absence of certain taxa in conjunction with environmental stressors such as pollution have led to the development of lists of indicator organisms, or indicator communities (Resh and Rosenberg 1996). Certain species are considered more or less tolerant to different stressors and aquatic/terrestrial disturbances. Biomonitoring provides a qualitative, and in some cases quantitative, method for freshwater quality evaluation.

For over 150 years, biological communities have been used to measure water quality conditions, define water quality problems, and protect water quality. For example, work in the mid-1800s

documenting the relationship among human illness and poor drinking water conditions led to Great Britain's development of national legislation addressing water pollution (Davis 1995). Within the United States, efforts to control pollution of surface water have historically been the responsibility of state and local agencies (Ferrey 2001). The Water Pollution Control Act of 1948 was the first effort by the U.S. federal government to regulate water pollution in the twentieth century (Ferrey 2001; Griffith et al 2001). As summarized by Griffith et al. (2001) and Ferrey (2001), growing public awareness and concern for controlling water pollution and enforcing water pollution violations led Congress in 1977 to adopt major amendments to the Federal Water Pollution Control Act Amendments of 1972. This law became commonly known as the Clean Water Act (EPA 2003). The Clean Water Act (CWA) establishes the basic structure for regulating discharges of pollutants into the surface waters of the United States. Subsequent revisions have streamlined grant and funding processes and have targeted other types of surface water pollution, including nonpoint source pollution (Section §319).

Under the CWA, states are responsible for identifying water quality problems and evaluating the effectiveness of point and nonpoint source water quality controls (EPA 2003). The states have primary responsibility for setting, reviewing, revising, and enforcing water quality standards. States designate the use(s) of all state waters; acceptable uses include water contact recreation, protection of aquatic life, public water supply, etc.). They then adopt water quality criteria necessary to protect those uses (§303(c)). The designated uses describe the goal(s) of each water quality standard.

Biological integrity is a specific component of the CWA. For example, as stated within the Act's goals in §101(a),"The objective of this Act is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters." Within §303(c) subsection 2A, designated uses specific to biological integrity are mentioned ("propagation of fish and wildlife") along with the need for biological information when water quality standards are revised and new criteria adopted ("...such State shall adopt criteria based on biological monitoring or assessment methods..." §303(c)2B). Finally, under §303(d), waters of the United States can be listed as impaired based on biological criteria, "Each State shall

identify those waters or parts thereof within its boundaries for which controls are not stringent enough to assure protection and propagation of a balanced indigenous population of shellfish, fish, and wildlife."

The United States Environmental Protection Agency (USEPA) develops regulations, policies, and guidance for implementation by the states, and oversees that states' activities are consistent with the CWA and relevant water quality standards regulations (40 CFR Part 131). For example, the Assessment and Watershed Protection Division of the USEPA published rapid bioassessment protocols (RBPs) designed to provide a framework for states' stream sampling and habitat surveys. These are based on aquatic life data (Plafkin et al. 1989; Barbour et al. 1999). Resource management agencies at the local, state, tribal, and national levels have recognized the importance of biological assessments in the evaluation of water quality and ecological integrity. The USEPA summarizes the status of biological monitoring and assessment in stream and wadeable river management programs (Plafkin et al. 1989; USEPA 1996; USEPA 2002). The most recent report (USEPA 2002) based on 2001 program information showed that benthic macroinvertebrates, fish and algae (periphyton) were the three major groups of biological organisms or assemblages monitored as part of comprehensive biological assessment programs. Macroinvertebrates were the most common indicator assemblage used by state water quality agencies, and were a part of all state bioassessment programs except in Hawaii where it is currently under development. The majority of agencies used a multimetric index (e.g. fish or macroinvertebrate Index of Biotic Integrity (IBI)) to assess biological condition, water quality, and overall site condition (USEPA 2002). All surveyed agencies with bioassessment programs assessed physical habitat quality in combination with other measurements and established reference conditions to help discern human impacts from natural variation. Reference conditions were either regional or site-specific, with the overwhelming majority of agencies using an ecoregion regionalization approach (Hughes et al. 1986; Bailey 1987; Gallant et al. 1989; Omernik 1995) for stream stratification/characterization (USEPA 2002).

Surface Water Quality Monitoring in Florida

Beginning in 1991, the Florida Department of Environmental Protection (FDEP) began testing

the EPA Rapid Bioassessment Protocols (Plafkin et al. 1989) for Florida stream assessment. Further work by Tetra Tech, Inc. from 1992-1994 resulted in a framework using benthic macroinvertebrates for biological criteria for use in Florida streams (Barbour et al., 1996). Barbour et al. (1996) outlined an initial list of 32 metrics for consideration, which included diversity measures, measures of community composition, measures of sensitivity and tolerance, and trophic metrics such as functional feeding groups and density. The sensitivity of the metrics was tested within aggregated sub-ecoregions (Florida Panhandle, Florida Peninsula and Northeast Florida). Barbour et al. (1996) evaluated inter-annual variability between sampling years and determined it to be negligible, but did not sample intra-annual variability – which was recommended as a research need. From the proposed 32 metrics, 8 core metrics were selected for use in Florida stream bioassessment.

From the original analysis by Barbour et al. (1996), two multimetric indexes using the above metrics were developed for Florida streams based on different sampling and identification protocols; an SCI (Stream Condition Index) Index and a BioRecon (Biological Reconnaissance) Index. These two protocols differ in the number of kick-net samples collected, the location of sample sorting (field vs. laboratory), and the final index used for assessment. The SCI was derived from more intensive sampling, and laboratory processing and identification of samples. The BioRecon (biological reconnaissance) index was based on fewer kick-net samples, field sorting and laboratory identification. Detailed descriptions of the two methods are found in the current Standard Operating Procedures for biological assessment (FDEP 2004). The BioRecon sampling protocol was designed to be an initial and relatively quick field assessment. The SCI sampling protocol was designed to follow BioRecon sampling when further analysis was required. Both protocols use a D-frame dip net with a 0.25 m opening and a 500 µm-mesh net. Both protocols distribute the sweeps among the best available microhabitats (i.e. woody debris, leaf packs) on an approximately equal basis.

Until June 2004, FDEP used a modified version of Barbour et al. (1996) for the BioRecon Index, which was a combination of three of the eight core metrics for the BioRecon index: Total Taxa (the total number of species collected in the sample), EPT Index (the total number of Ephemeroptera [mayflies],

Plecoptera [stoneflies] and Trichoptera [caddisflies] species collected in the sample), and Florida Index (a sensitivity/tolerance score for individual species based on work from Beck (1965)). The other five metrics: number of Chironomidae taxa, percent dominant taxa, percent Diptera, percent gatherers, and percent filterers, were not used for the BioRecon Index calculation. Each metric had a regionalized threshold score for which the site "passed" the metric if the bioassessment sample equaled or exceeded the value, and "failed" the metric if the sample score was lower than the threshold. A site condition was then assigned to the bioassessment collection site, based on how many of these three metrics were passed. A site was considered "Healthy" if all three metric threshold scores were met or exceeded, "Suspect" if two metric threshold scores were met or exceeded, and "Impaired" if only one or non of the metric threshold scores were met or exceeded. This suite of metrics only reflects diversity indices (Total Taxa and EPT Taxa) and one community index (FL Index).

New Florida Biological Assessment Metrics

In June 2004, the Florida Department of Environmental Protection replaced the above criteria with new metrics and revised metric threshold scores as described in Fore (2004). The new Florida metrics were based on their correlation with a gradient of human disturbance (Bryce et al., 1999) stratified using aggregate sub-ecoregions as defined in Barbour et al. (1996). Based on Karr et al. (1986) and Karr et al. (2000), the Human Disturbance Gradient (HDG) in Florida was calculated using four metrics; 1) hydrologic alteration, 2) habitat condition, 3) NH_3 and 4) the Land Development Intensity (LDI) index (Brown and Vivas 2004). The LDI index was calculated as the percentage area within the catchment of a particular type of land use multiplied by the coefficient of energy use associated with that land use, summed over all land use types found in the catchment. Bioassessment data collected using two methods (BioRecon and Stream Condition Index) were tested against the HDG for metric correlation within each of the sub-ecoregions (Panhandle, Peninsula, Northeast Florida).

A suite of 36 candidate metrics were tested, along with the sensitivity and tolerance of 1195 individual taxa to the HDG (Fore 2004). A total of 631 site visits across all Florida ecoregions were used

to test the candidate metrics. Based on this analysis, six metrics were chosen for analysis of the BioRecon Index: Total Taxa, Ephemeroptera Taxa, Trichoptera Taxa, Long-lived Taxa, Clinger Taxa, and Sensitive Taxa. The threshold scores for all the metrics were based on the median values of the data sets and were regionalized (Panhandle, Peninsula, Northeast). Species lists were developed for "Long-lived Taxa," "Clinger Taxa," and "Sensitive Taxa." Long-lived taxa were defined as species that require more than one year to complete their life cycles (as documented in the current scientific literature), resulting in a list of 1349 taxa names. Clinger taxa were based on habit as assigned to species in Merritt and Cummins (1996), resulting in a list of 235 taxa names. Sensitive taxa were determined using the sensitivity and frequency of occurrence for 1195 taxa names from 226 sites along the HDG, resulting in a list of 1349 taxa names.

Evaluation of Metric Changes in the Florida Panhandle

A recent examination of the status of biodiversity in the United States by The Nature Conservancy and the Association for Biodiversity Information ranked the Panhandle of Florida as one of the six most significant biodiversity hot spots in the United States based on a species index weighted to incorporate rare and endemic species (Stein et al. 2000). Eglin Air Force Base, in the heart of northwestern Florida's imperiled species hot spot, is primarily forested. Combined with the unique and diverse terrestrial and aquatic habitats represented there, it affords an excellent location to examine how effective changes in analysis of bioassessment data (specifically the BioRecon Index metrics) are in evaluating Florida's freshwater stream habitats. Eglin has been especially vigorous in land management for biodiversity maintenance (Leslie et al. 1996). Beginning in 1999, Eglin managers, in partnership with the U.S. Fish and Wildlife Service, began developing, testing and implementing a long-term aquatic monitoring program as part of its ongoing natural resource management program.

Biological Assessment on Eglin Air Force Base, Florida

Aquatic biomonitoring using freshwater macroinvertebrates has been conducted for various reasons on Eglin, primarily to support management of the federally endangered Okaloosa darter

(*Etheostoma okaloosae*) (Scheiring et al. 1981; Harris et al. 1982; Lago and Harris 1983; Scheiring and Crews 1983; Harris and Armitage 1987; Harris 2002; and Rasmussen 2004). The current monitoring program uses a rotating stratified random sampling design to sample wadeable streams on a broad scale to maximize the diversity of aquatic habitats sampled and potential aquatic insect community diversity. The preliminary objectives of the program were to define species expected across Eglin and landscape variables that may influence this spatial pattern. This work was designed to assess freshwater resource quality on Eglin, as well as to identify and support adaptive management actions initiated for locations with varying levels of impairment based on region-specific standards for biological, chemical or physical measures. Baseline stream conditions were evaluated on Eglin Air Force Base using both old and new (as of June 2004) BioRecon assessment techniques used by the State of Florida. Measures of stream health included insect metrics (diversity and sensitivity), water chemistry, and physical parameters such as flow, substrate characteristics, in-stream habitat availability, and riparian zone quality. Assessed sites not meeting state water quality standards prompted further verification by the Florida Department of Environmental Protection (FDEP) using the Stream Condition Index (SCI).

METHODS

Site Description

Eglin Air Force Base is approximately 464,000 acres (185,600 ha), occupying parts of Santa Rosa, Okaloosa and Walton counties in northwest Florida. Eglin is the largest forested Department of Defense installation in the country. Eglin lands support 34 natural community types--as documented by the Florida Natural Areas Inventory (FNAI) – including many species categorized as threatened, endangered, or globally rare (Kindell et al., 1997). The mission of the Natural Resources Branch at Eglin is to maintain and restore ecosystem viability and resiliency, maintain or recover native biodiversity, and allow for multiple public uses (e.g. recreation and silviculture) while supporting the testing and development of weapons systems. There are 13 management areas delineated within Eglin's boundaries, which have been subdivided into approximately 127 watersheds by the Florida Department of

Environmental Protection. Several types of streams can be distinguished, including: seepage streams, spring runs, hardwood forest streams, and steephead streams. Over 1200 perennial stream miles are located on Eglin (based on USGS maps at 1:24000); this represents approximately 5% of the perennial stream miles reported in Florida (USEPA 2002).

Sampling and Analysis Methods

Biomonitoring sites were selected based on a stratified random serial survey design, with 18 sites surveyed annually on a four year rotation. Additional sites beyond those 18 sites were selected to ensure broad coverage across all drainages for inventory, and some specific sites were selected to assess the effectiveness of various restoration practices (e.g. road closure, reclamation and revegetation). Semi-qualitative collection methods, sample processing and taxonomic methodology including quality assurance/quality control (QA/QC) protocols as outlined within the Standard Operating Procedures for freshwater aquatic macroinvertebrates (FDEP 2004) were followed.

Macroinvertebrates were preserved and stored in 70% isopropyl alcohol. Samples were sorted, and individuals identified to the lowest possible taxonomic level (genus or species) using the most current taxonomic keys (Berner and Pescador 1988; Dunkle 2000; Epler 1996; Lam 2004; McCafferty 1981; Merritt and Cummins 1996; Needham et al. 2000; Pescador et al. 2000; Pescador et al. 2004; Pescador and Richard 2004; Rasmussen and Pescador 2002; Richardson 2003; Westfall and May 1996; Wiggins 1998). Data were entered into both an MS-Access database and Excel spreadsheets, and analyzed using various statistical programs including Ecological Methodology, PC-ORD, and SAS.

Two separate groups of metrics were calculated based on benthic macroinvertebrate data collected at each site in order to evaluate the stream quality (Table 3-1). The first group ("Old BioRecon Metrics") consisted of the three metrics used for BioRecon water quality evaluation in Florida prior to June 2004: Total Taxa, EPT Index and Florida Index. These three metrics have regionalized threshold scores as described in Barbour et al. (1996) (Table 3-1), used for overall site evaluation. Sites were ranked

as either healthy, suspect or impaired depending on how many of the three metric threshold scores were equaled or exceeded (Table 3-2).

The second group ("New BioRecon Metrics") consisted of the six metrics used for water quality evaluation in Florida after June 2004: Total Taxa, Ephemeroptera Taxa, Trichoptera Taxa, Long-lived Taxa, Clinger Taxa and Sensitive Taxa. These six metrics have regionalized ranges as described in Fore (2004) (Figure 3-1). Metric scores were transformed into unit-less scores by dividing each measured metric value by the regionalized range. Based on these ranges, each metric received a score from 0 to 1, that when added together, gives an overall site score (between 0 and 10) for the combined group of six metrics. Based on the overall cumulative score (0-10) from these six metrics, sites were ranked as either "Pass" (a score of ≥6) or "Fail" (< 6) (Table 3-2). Using both old and new metrics, sites considered impaired or failing must then be verified as such, using the SCI method (FDEP 2004).

Table 3-1. Comparison between scoring evaluation for BioRecon Indices used by Florida Department of Environmental Protection for stream assessment summarized from FDEP (2004) and Fore (2004).

"OLD" BioRecon Index				
Metric	Threshold Score West Panhandle	Threshold Score East Panhandle	Threshold Score Peninsula	Threshold Score Northeast Florida
Total Taxa	≥24	≥24	≥18	≥17
EPT Taxa	≥22	≥19	≥10	≥6
Florida Index	≥17	≥9	≥4	≥3

"NEW" BioRecon Index			
Metric	Metric Range Panhandle	Metric Range Peninsula	Metric Range Northeast Florida
Total Taxa	16–49	11–36	14–37
Ephemeroptera Taxa	0–12	0–5	0–3.5
Trichoptera Taxa	0–7	0–7	0–6.5
Long-lived Taxa	0–10	0–7	0–6
Clinger Taxa	0–15.5	0–8	0–7
Sensitive Taxa	0–19	0–9	0–11

Table 3-2. Criteria for site evaluation in the Florida using BioRecon sampling techniques as reported by Florida Department of Environmental Protection for stream assessment in FDEP (2004) and Fore (2004).		
OLD BioRecon Index		
Metric List	**Criteria**	**Evaluation**
Total Taxa	3 metrics ≥ thresholds	HEALTHY
EPT Taxa	2 metrics within thresholds	SUSPECT
Florida Index	< 2 metrics within thresholds	IMPAIRED
NEW BioRecon Index		
Metric List	**Criteria**	**Evaluation**
Total Taxa	Combined total score for all six metrics	
Ephemeroptera Taxa	[6–10]	PASS
Trichoptera Taxa	[0–6]	FAIL
Long-lived Taxa		
Clinger Taxa		
Sensitive Taxa		

Habitat data (stream width, water depth, presence/absence of gravel, woody debris, etc.) were collected concurrently with macroinvertebrate samples as were basic stream chemical parameters including water temperature, dissolved oxygen (mg/l), conductivity (µS), turbidity (NTU) and stream velocity (m/s) (Table 3-3). Sites were selected with a stratified random design using stream order (Strahler 1952) and stream catchment area based on remote sensing data at a map scale of 1:24000. Data were recorded on field sheets and entered into a write-protected local networked MS-Access Database.

Table 3-3. Mean annual baseline chemical parameters for stream ecosystems on Eglin AFB, FL.		
Measured Parameter	**Mean Annual Value**	**Range**
Mean Annual Stream Temperature (^{o}C)	20.0 ± 1.9 ^{o}C	17.8 – 23.3 ^{o}C
Mean Annual Dissolved Oxygen (ppm)	8.32 ± 0.37 ppm	6.68 – 8.94 ppm
Mean Annual Stream pH	5.47 ± 0.68	4.56 – 6.08
Mean Annual Total Alkalinity (ppm)	4.37 ± 0.93 ppm	4.21 – 5.17 ppm
Mean Annual Stream Conductivity (µS)	13.0 ± 4.21 µS	1.3 – 21.2 µS
Mean Annual Stream Turbidity (NTU) at Baseflow	1.58 ± 1.75 NTU	0.11 – 6.13 NTU

Because bioassessment work was conducted in areas including headwater streams inhabited by the federally endangered Okaloosa darter (*Etheostoma okaloosae*), an intra-service Section 7 Biological

Evaluation was completed for Baseline Macroinvertebrate Biomonitoring on Eglin Air Force Base on 16 April 2001 with the U.S. Fish and Wildlife Service Panama City Field Office. A potential for incidental take while collecting macroinvertebrates was listed as a possible impact, but with slightly modified collection techniques, a determination of NA (no affect) was given (FWS# 4-P-01-137). This consultation is on file at the Panama City Field Office, Panama City, Florida.

RESULTS

Current Status and Baseline Aquatic Inventory Data

Beginning September 1999 through September 2004, 207 bioassessments using aquatic insects were collected at 127 unique sites within the watershed drainages of Alaqua Bayou, Basin Bayou, Garnier Bayou, Rocky Bayou, Turkey Bayou, East Bay River, the Yellow River and LaGrange Bayou (Table 3-4, Figure 3-1). Sites were selected based on a random sampling design stratified by longitudinal position within the watershed. A complete list of all aquatic sampling locations completed on Eglin Air Force Base, FL (including surveys, bioassessments, fish collections etc.) is listed in Appendix B.

From the 207 bioassessment samples collected and analyzed, using the initial three metrics ("Old BioRecon Index") for BioRecon analysis 144 samples showed "Healthy" site conditions using aquatic insect assessment metrics (Figure 3-1, Table 3-4). Twenty-four samples indicated "Suspect"(potentially having some type of impairment) stream conditions based on invertebrate communities, and 39 samples indicated impaired biological resources (Figure 3-1, Table 3-4). Because 49 sites were sampled multiple times, these samples are from 127 unique sites. Of those, 84 sites were determined to be healthy based on aquatic invertebrate bioassessment (66% of the sites sampled), 29 sites were determined to be impaired (23% of sites sampled), and 14 sites were designated as suspect (11% of sites sampled).

Table 3-4. Aquatic insect stream bioassessment site locations on Eglin AFB, FL separated by drainage (Alaqua, Basin, Rocky, Mill, Turkey, Garnier, East Bay, Yellow and LaGrange) with index scores and resultant site quality determinations using two separate BioRecon Indices from the FL DEP (2004).

			"OLD" BioRecon Metrics Florida Depart. Environmental Protection						**"NEW" BioRecon Metrics** Florida Department of Environmental Protection							
Eglin Field Number	**Stream Name**	**Locality**	EPT Taxa	FL Index	Total Taxa	Total Indiv	**Quality**	**Date**	Total Taxa	Ephemeropter Taxa	Trichoptera Taxa	Long-Lived Taxa	Clinger Taxa	Sensitive Taxa	**Score**	**Quality**
DEP98-005	Alaqua Creek	at road crossing at Eglin 210	21	34	41	156	Healthy	21-May-98	41	9	6	10	17	17	9	Pass
TAT00-009	Blount Mill Creek	at road crossing at Eglin 200/201	**14**	22	38	234	**Suspect**	09-May-00	38	7	4	8	10	10	6	Pass
TAT00-010	Alaqua Creek	at road crossing at Eglin 200	18	24	37	158	Healthy	10-May-00	37	8	5	6	9	11	6	Pass
TAT00-023	Alaqua Creek	at road crossing at Eglin 210	**15**	22	33	174	**Suspect**	07-Jun-00	33	8	4	5	9	10	6	**Fail**
TAT00-062	Little Alaqua Creek	at road crossing at Eglin 205	**14**	25	31	70	**Suspect**	12-Jul-00	31	3	7	8	8	10	6	**Fail**
TAT00-063	Live Oak Branch	Up of bridge blowout @ Eglin 382	20	30	39	159	Healthy	14-Jul-00	39	8	8	7	12	14	8	Pass
TAT01-017	Blount Mill Creek	at road crossing at Eglin 200/201	19	29	37	287	Healthy	09-Apr-01	37	9	6	10	14	14	8	Pass
TAT01-025	Little Alaqua Creek	at road crossing at Eglin 208	23	31	43	197	Healthy	23-Apr-01	43	14	2	8	14	20	8	Pass
TAT01-032	Oakie Creek	at road crossing at Eglin 208	20	28	45	179	Healthy	29-May-01	45	8	9	10	10	15	8	Pass
TAT01-033	Bear Bay Branch	Eglin Range Road 381	21	29	41	315	Healthy	29-May-01	41	5	13	11	13	11	8	Pass
TAT02-005	Little Alaqua Creek	at road crossing at Eglin 208	22	27	42	211	Healthy	13-Feb-02	42	10	10	4	11	15	8	Pass
TAT02-006	Alaqua Creek	at road crossing at Eglin 205	20	24	35	119	Healthy	13-Feb-02	35	7	11	9	11	10	7	Pass
TAT02-016	Live Oak Branch	Up of bridge blowout @ Eglin 382	27	28	49	243	Healthy	19-Mar-02	49	13	10	13	13	16	9	Pass
TAT02-044	Alaqua Creek	at road crossing at Eglin 205	17	28	44	149	Healthy	12-Aug-02	44	8	7	8	9	9	7	Pass
TAT02-046	Live Oak Branch	Up of bridge blowout @ Eglin 382	31	42	65	321	Healthy	14-Aug-02	65	12	13	15	17	18	10	Pass
TAT02-047	Little Alaqua Creek	at road crossing at Eglin 208	24	34	47	296	Healthy	15-Aug-02	47	11	9	7	12	15	9	Pass
DEP04-03	Tallaperla Creek	powerline cut SE of Eglin 330	20	28	40	141	Healthy	30-Mar-04	40	7	7	11	13	14	8	Pass
TAT04-13	Tallaperla Creek	powerline cut SE of Eglin 330	22	28	43	284	Healthy	30-Mar-04	43	7	9	12	14	16	9	Pass
TAT04-35	Bullhide Creek	Eglin 213	19	26	43	314	Healthy	07-Aug-04	43	7	8	13	13	13	8	Pass
TAT04-36	Bear Bay Branch	Eglin 381	25	33	50	324	Healthy	07-Aug-04	50	9	12	14	15	14	9	Pass
TAT04-37	White Branch	Eglin 200	25	30	52	343	Healthy	08-Aug-04	52	9	12	13	15	18	9	Pass
JCD00-002	Basin Creek	at road crossing at Eglin 212	**16**	22	35	146	**Suspect**	17-Feb-00	35	6	4	8	18	17	7	Pass
TAT00-003	Watering Creek	at road crossing at Eglin 212	20	24	42	210	Healthy	27-Mar-00	42	9	7	8	9	13	8	Pass
TAT00-011	Little Basin Creek	at road crossing at Eglin 359	19	25	42	161	Healthy	15-May-00	42	7	8	7	8	13	7	Pass
TAT00-017	Basin Creek	at road crossing at Eglin 433	23	30	50	175	Healthy	26-May-00	50	11	8	9	11	15	9	Pass
TAT01-020	Pochanee Branch	road crossing at Eglin 370	19	23	44	217	Healthy	12-Apr-02	44	10	7	6	10	10	7	Pass

Table 3-4. Aquatic insect stream bioassessment site locations on Eglin AFB, FL separated by drainage (Alaqua, Basin, Rocky, Mill, Turkey, Garnier, East Bay, Yellow and LaGrange) with index scores and resultant site quality determinations using two separate BioRecon Indices from the FL DEP (2004).

			"OLD" BioRecon Metrics Florida Depart. Environmental Protection						**"NEW" BioRecon Metrics** Florida Department of Environmental Protection							
Eglin Field Number	**Stream Name**	**Locality**	EPT Taxa	FL Index	Total Taxa	Total Indiv	**Quality**	**Date**	Total Taxa	Ephemeropter Taxa	Trichoptera Taxa	Long-Lived Taxa	Clinger Taxa	Sensitive Taxa	**Score**	**Quality**
TAT01-021	Basin Creek	at Eglin AFB Range Rd 427/222	28	28	51	236	Healthy	12-Apr-02	51	15	10	4	11	15	8	Pass
TAT02-014	Basin Creek	at Eglin AFB Range Rd 427/222	22	26	40	282	Healthy	26-Feb-02	40	9	9	8	14	17	8	Pass
TAT02-015	Bear Branch	at road crossing at Eglin 359	28	36	54	319	Healthy	19-Mar-02	54	10	13	8	17	21	9	Pass
TAT02-018	Pochanee Branch	road crossing at Eglin 370	22	28	48	193	Healthy	20-Mar-02	48	11	8	8	12	11	8	Pass
TAT02-036	Basin Creek	at Eglin AFB Range Rd 427/222	29	37	60	280	Healthy	3-Aug-02	60	13	12	9	15	18	10	Pass
TAT02-043	Pochanee Branch	road crossing at Eglin 370	30	37	58	508	Healthy	10-Aug-02	58	12	15	13	13	15	9	Pass
TAT04-16	Bear Branch	at road crossing at Eglin 359	27	40	63	658	Healthy	3-Apr-04	63	8	14	13	17	17	9	Pass
TAT04-19	Little Basin Creek	at road crossing at Eglin 359	25	31	54	449	Healthy	16-Apr-04	54	8	13	10	12	18	9	Pass
TAT04-38	Little Basin Creek	Eglin 351	25	30	53	312	Healthy	14-Aug-04	53	9	12	13	13	20	9	Pass
DEP00-002	Swift Creek	S. of old railroad crossing culvert	19	26	35	142	Healthy	11-Jul-00	35	8	7	6	14	14	7	Pass
DEP00-003	Open Branch	at intersection at Eglin 214/374	17	30	43	120	Healthy	13-Jul-00	43	8	7	9	11	12	8	Pass
DEP00-004	Open Branch	at intersection at Eglin 214/374	**4**	**5**	**20**	62	**Impaired**	18-Jul-00	20	2	2	3	1	1	2	**Fail**
DEP00-005	Rocky Creek	at Eglin Range Road 214/374	20	26	31	79	Healthy	18-Jul-00	31	10	8	4	11	10	7	Pass
DEP00-006	Rocky Creek	at Eglin Range Road 214/374	18	24	37	130	Healthy	20-Jul-00	37	9	7	4	10	12	7	Pass
DEP00-009	Shaw Still Branch	0.2 miles S of 190: In subdivision	**7**	**8**	**17**	46	**Impaired**	27-Jul-00	**17**	2	5	0	4	3	2	**Fail**
DEP00-010	East Turkey Creek	1.5 miles E of routes 285 and 190	**16**	**21**	32	122	**Impaired**	27-Jul-00	32	8	8	1	7	9	5	**Fail**
DEP00-012	Exline Creek	trib of Exline @ Eglin 503	**16**	**20**	35	146	**Impaired**	03-Aug-00	35	6	7	9	8	9	7	Pass
DEP00-014	Mt. Sinai Branch	road crossing at Eglin 412	19	25	33	110	Healthy	10-Aug-00	33	8	8	8	12	11	7	Pass
TAT00-019	Swift Creek	S. of old railroad crossing culvert	17	25	34	121	Healthy	03-Jun-00	34	7	7	8	10	9	7	Pass
TAT00-028	Rocky Creek	trib at Eglin 420	20	23	40	382	Healthy	12-Jun-00	40	7	10	6	13	11	7	Pass
TAT00-048	Little Rocky Creek	road crossing @ Eglin 434	20	26	37	222	Healthy	26-Jun-00	37	7	9	9	12	12	8	Pass
TAT00-049	Little Rocky Creek	at road crossing at Eglin 515	22	30	35	97	Healthy	26-Jun-00	35	9	8	7	12	12	7	Pass
TAT00-053	Little Rocky Creek	at road crossing at Eglin 200	**16**	25	34	104	**Suspect**	27-Jun-00	34	5	9	6	11	10	6	Pass
TAT00-054	Rocky Creek	at road crossing at Eglin 219	**5**	**8**	**12**	**27**	**Impaired**	29-Jun-00	**12**	2	3	0	4	2	2	**Fail**
TAT00-071	Exline Creek	tributary of Exline @ Eglin 503	19	24	33	262	Healthy	03-Aug-00	33	6	10	7	10	9	6	Pass
TAT00-073	Mt. Sinai Branch	road crossing at Eglin 412	23	22	40	278	Healthy	10-Aug-00	40	9	11	9	11	12	8	Pass
TAT01-003	Rocky Creek	at Eglin Range Road 214/374	19	33	41	405	Healthy	2-Feb-01	41	7	9	8	13	15	8	Pass

Table 3-4. Aquatic insect stream bioassessment site locations on Eglin AFB, FL separated by drainage (Alaqua, Basin, Rocky, Mill, Turkey, Garnier, East Bay, Yellow and LaGrange) with index scores and resultant site quality determinations using two separate BioRecon Indices from the FL DEP (2004).

			"OLD" BioRecon Metrics Florida Depart. Environmental Protection						**"NEW" BioRecon Metrics** Florida Department of Environmental Protection							
Eglin Field Number	**Stream Name**	**Locality**	EPT Taxa	FL Index	Total Taxa	Total Indiv	**Quality**	**Date**	Total Taxa	Ephemeropter Taxa	Trichoptera Taxa	Long-Lived Taxa	Clinger Taxa	Sensitive Taxa	**Score**	**Quality**
TAT01-018	Little Rocky Creek	at road crossing at Eglin 515	20	23	36	221	Healthy	11-Apr-01	36	11	5	10	12	12	8	Pass
TAT01-019	Little Rocky Creek	at road crossing at Eglin 499	19	25	35	110	Healthy	11-Apr-01	35	9	6	8	18	15	8	Pass
TAT01-024	Long Creek	trib at road crossing at Eglin 406	23	**20**	41	183	**Suspect**	13-Apr-01	41	7	12	10	10	11	8	Pass
TAT01-034	Dogwood Head Brch	at Eglin Road 485	**12**	**21**	34	149	**Impaired**	31-May-01	34	6	3	8	7	8	5	**Fail**
TAT01-035	Green Head Branch	at Eglin Road 485	**15**	**18**	29	107	**Impaired**	31-May-01	29	8	4	6	8	11	6	**Fail**
TAT01-042	Exline Creek	trib to Exline Creek at Eglin 492	**10**	**16**	27	193	**Impaired**	29-Jun-01	27	3	7	2	5	6	4	**Fail**
TAT02-009	Little Rocky Creek	at road crossing at Eglin 200	29	34	48	235	Healthy	16-Feb-02	48	14	9	9	15	17	10	Pass
TAT02-010	Little Rocky Creek	at road crossing at Eglin 499	30	30	54	217	Healthy	16-Feb-02	54	14	10	10	20	20	10	Pass
TAT02-011	Long Creek	trib at road crossing at Eglin 406	22	**20**	31	169	**Suspect**	16-Feb-02	31	8	10	7	9	12	7	Pass
TAT02-034	Rocky Creek	at road crossing at Eglin 200	23	31	45	223	Healthy	29-Jul-02	45	11	8	9	15	16	9	Pass
TAT02-041	Little Rocky Creek	at road crossing at Eglin 499	23	34	46	352	Healthy	8-Aug-02	46	11	5	14	17	18	9	Pass
TAT02-042	Long Creek	trib at road crossing at Eglin 406	25	27	46	265	Healthy	9-Aug-02	46	10	11	17	11	14	9	Pass
TAT02-050	Little Rocky Creek	at end of Eglin 477	32	39	55	241	Healthy	5-Sep-02	55	14	12	12	16	19	10	Pass
DEP02-050	Little Rocky Creek	at end of Eglin 477	34	50	64	202	Healthy	5-Sep-02	64	13	13	17	19	21	10	Pass
DEP04-01	Little Rocky Creek	above railroad trestle - pre-restore	21	25	50	132	Healthy	11-Mar-04	50	9	9	8	9	10	8	Pass
DEP04-02	Little Rocky Creek	below railroad trestle - pre-restore	35	38	58	255	Healthy	11-Mar-04	58	14	17	14	20	19	10	Pass
TAT04-05	Little Rocky Creek	below railroad trestle - pre-restore	35	38	58	249	Healthy	11-Mar-04	58	14	17	14	20	19	10	Pass
TAT04-06	Little Rocky Creek	above railroad trestle - pre-restore	21	25	50	132	Healthy	11-Mar-04	50	9	9	8	10	11	8	Pass
TAT04-18	Long Creek	Eglin 469 – restoration - road gone	28	37	60	469	Healthy	12-Apr-04	60	13	14	7	11	18	9	Pass
TAT04-44	Little Rocky Creek	at end of Eglin 477	25	43	52	212	Healthy	5-Sep-04	52	10	10	14	12	17	9	Pass
TAT04-45	Little Rocky Creek	at road crossing at Eglin 515	27	37	44	269	Healthy	5-Sep-04	44	14	9	8	15	18	9	Pass
DEP00-007	Mill Creek	N. S.R. 190 btw teebox & 13	21	32	44	174	Healthy	25-Jul-00	44	9	8	9	12	15	8	Pass
DEP00-008	Mill Creek	north of SR 190, near hole 9	**15**	**14**	30	97	**Impaired**	25-Jul-00	30	8	5	9	6	9	6	**Fail**
DEP98-003	Mill Creek	N. S.R. 190 btw teebox & 13	22	30	47	120	Healthy	13-Aug-98	47	7	11	13	14	15	9	Pass
DEP98-004	Mill Creek	Blw Eglin Golf Course Trout Lake	**4**	**4**	**14**	162	**Impaired**	13-Aug-98	**14**	2	2	1	1	0	1	**Fail**
DEP99-001	Mill Creek	north of SR 190, near hole 9	**15**	**19**	30	110	**Impaired**	29-Jul-99	30	4	8	10	10	11	7	Pass
JCD99-016	Mill Creek	first non-culverted section S.R. 190	**4**	**11**	**20**	75	**Impaired**	11-Sep-99	**20**	2	2	3	4	3	2	**Fail**

Table 3-4. Aquatic insect stream bioassessment site locations on Eglin AFB, FL separated by drainage (Alaqua, Basin, Rocky, Mill, Turkey, Garnier, East Bay, Yellow and LaGrange) with index scores and resultant site quality determinations using two separate BioRecon Indices from the FL DEP (2004).

			"OLD" BioRecon Metrics Florida Depart. Environmental Protection						**"NEW" BioRecon Metrics** Florida Department of Environmental Protection							
Eglin Field Number	**Stream Name**	**Locality**	EPT Taxa	FL Index	Total Taxa	Total Indiv	**Quality**	**Date**	Total Taxa	Ephemeropter Taxa	Trichoptera Taxa	Long-Lived Taxa	Clinger Taxa	Sensitive Taxa	**Score**	**Quality**
TAT00-018	Mill Creek	first non-culverted section S.R. 190	23	24	41	157	Healthy	2-Jun-00	41	10	9	8	10	13	8	Pass
TAT01-041	Mill Creek	N. S.R. 190 btw teebox & 13	31	35	58	548	Healthy	26-Jun-01	58	11	15	13	14	17	10	Pass
DEP00-001	Juniper Creek	trib upstream of borrow pit runoff	**14**	**17**	33	145	**Impaired**	18-Jan-00	33	5	7	9	12	9	7	Pass
JCD99-009	Rogue Creek	Upstream of culvert at 233	17	**15**	31	94	**Suspect**	13-Sep-99	31	9	6	5	7	10	6	**Fail**
JCD99-014	Point Lookout Creek	Upstream of Culvert @ Eglin 221	**16**	22	34	189	**Suspect**	28-Oct-99	34	7	7	7	9	8	6	Pass
JCD99-015	Bens Creek	old intersection with Eglin 604E	17	**20**	36	327	**Suspect**	4-Nov-99	36	5	8	5	15	12	7	Pass
JLH01-005	Rogue Creek	Upstream of culvert at 233	**16**	**19**	26	77	**Impaired**	12-Jul-01	26	6	8	5	8	11	6	Pass
JLH01-006	Tenmile Creek	at road crossing at Eglin 231	23	33	49	340	Healthy	17-Jul-01	49	8	12	9	11	14	8	Pass
TAT00-001	Juniper Creek	upstream of bridge X-ing on 221	19	28	36	123	Healthy	9-Mar-00	36	8	8	7	10	9	7	Pass
TAT00-015	Toms Creek	no # powerline rd W 85 by RR 631	26	28	43	162	Healthy	20-May-00	43	14	10	6	8	15	8	Pass
TAT00-020	Pinelog Creek	at road crossing at Eglin 221	19	24	35	180	Healthy	5-Jun-00	35	7	9	6	12	10	7	Pass
TAT00-021	Point Lookout Creek	at road crossing at Eglin 434	17	**21**	36	197	**Suspect**	6-Jun-00	36	8	5	8	8	10	6	Pass
TAT00-022	Turkey Creek	at stream crossing at Eglin 232	18	**20**	35	109	**Suspect**	6-Jun-00	35	11	6	1	9	10	6	**Fail**
TAT00-059	Turkey Creek	at stream crossing at Eglin 626	17	35	31	306	Healthy	10-Jul-00	31	3	9	7	12	11	6	Pass
TAT00-060	Turkey Creek	at stream crossing at Eglin 233	22	27	40	263	Healthy	10-Jul-00	40	11	7	5	11	14	8	Pass
TAT00-064	Bens Creek	old intersection with Eglin 604E	17	**21**	38	281	**Suspect**	17-Jul-00	38	5	9	6	13	11	7	Pass
TAT00-065	Rogue Creek	at road crossing at Eglin 625	28	28	43	284	Healthy	17-Jul-00	43	9	15	6	15	14	8	Pass
TAT00-079	Point Lookout Creek	Upstream of Culvert @ Eglin 221	29	31	49	329	Healthy	30-Aug-00	49	12	13	6	14	17	9	Pass
TAT01-009	Juniper Creek	upstream of bridge Xing on 221	29	32	49	391	Healthy	21-Mar-01	49	12	13	5	13	15	9	Pass
TAT01-010	Turkey Creek	LANDFILL trib Turkey (2nd well)	**4**	**6**	**23**	153	**Impaired**	22-Mar-01	**23**	2	2	3	1	3	2	**Fail**
TAT01-011	Turkey Creek	at stream crossing at Eglin 232	20	31	41	193	Healthy	23-Mar-01	41	10	8	3	12	12	7	Pass
TAT01-012	Turkey Creek	LANDFILL trib to Turkey (ref)	17	**17**	34	193	**Suspect**	27-Mar-01	34	7	10	9	5	9	6	Pass
TAT01-014	Bens Creek	old intersection with Eglin 604E	17	**20**	34	115	**Suspect**	30-Mar-01	34	6	7	10	11	12	7	Pass
TAT01-044	Rogue Creek	at Eglin Road 693	**8**	**20**	25	154	**Impaired**	7-Aug-01	25	2	6	3	4	3	3	**Fail**
TAT02-002	Turkey Creek	at stream crossing at Eglin 232	19	28	42	166	Healthy	5-Feb-02	42	9	8	8	11	11	8	Pass
TAT02-007	Point Lookout Creek	Upstream of Culvert @ Eglin 221	30	27	49	302	Healthy	15-Feb-02	49	15	13	6	15	16	9	Pass
TAT02-008	Juniper Creek	upstream of bridge Xing on 221	18	24	36	162	Healthy	15-Feb-02	36	9	5	7	15	14	7	Pass

Table 3-4. Aquatic insect stream bioassessment site locations on Eglin AFB, FL separated by drainage (Alaqua, Basin, Rocky, Mill, Turkey, Garnier, East Bay, Yellow and LaGrange) with index scores and resultant site quality determinations using two separate BioRecon Indices from the FL DEP (2004).

			"OLD" BioRecon Metrics Florida Depart. Environmental Protection						**"NEW" BioRecon Metrics** Florida Department of Environmental Protection							
Eglin Field Number	**Stream Name**	**Locality**	EPT Taxa	FL Index	Total Taxa	Total Indiv	**Quality**	**Date**	Total Taxa	Ephemeropter Taxa	Trichoptera Taxa	Long-Lived Taxa	Clinger Taxa	Sensitive Taxa	**Score**	**Quality**
TAT02-038	Point Lookout Creek	Upstream of Culvert @ Eglin 221	29	32	55	330	Healthy	5-Aug-02	55	17	8	10	11	18	9	Pass
TAT02-039	Juniper Creek	upstream of bridge Xing on 221	29	50	54	377	Healthy	6-Aug-02	54	10	10	16	18	20	10	Pass
TAT02-040	Turkey Creek	at stream crossing at Eglin 232	29	41	54	285	Healthy	6-Aug-02	54	16	9	10	15	18	10	Pass
DEP98-001	Lightwood Knot Crk	at main Lightwood Knot Crk	**1**	**2**	**8**	8	**Impaired**	6-Aug-98	**8**	0	1	1	1	1	1	**Fail**
DEP98-002	Lightwood Knot Crk	Headwaters above claypit	20	24	43	113	Healthy	6-Aug-98	43	9	8	10	11	11	8	Pass
JLH01-001	Garnier Creek	new powerline Xing E. of RR 636	**1**	**0**	**7**	107	**Impaired**	19-Jun-01	**7**	1	0	0	0	0	0	**Fail**
JLH01-002	Lightwood Knot Crk	at road crossing at Eglin 632	17	**19**	34	172	**Suspect**	21-Jun-01	34	8	8	6	10	8	6	Pass
TAT04-01	Garnier Creek	powerline crossing E of Eglin 636	17	**17**	**22**	77	**Impaired**	1-Mar-04	22	6	7	9	9	10	6	Pass
TAT00-004	Piney Creek	Eglin Road 354	**12**	**13**	25	144	**Suspect**	28-Mar-00	25	5	4	2	4	6	3	**Fail**
TAT04-11	Fourmile Creek	north of Eglin 312	23	29	48	332	Healthy	25-Mar-04	48	8	10	11	15	16	9	Pass
DEP00-011	Turtle Creek	at powerline road near Eglin 181	24	35	48	243	Healthy	01-Aug-00	48	10	9	9	15	16	9	Pass
DEP00-013	Turtle Creek	no # road, near B165 (B-82)	19	30	38	160	Healthy	08-Aug-00	38	9	6	9	12	13	8	Pass
DEP00-015	Live Oak Creek	at road crossing at Eglin 234	**16**	**17**	31	110	**Impaired**	15-Aug-00	31	7	8	4	5	6	5	**Fail**
DEP00-016	Live Oak Creek	road crossing at Eglin 235	**8**	**9**	**22**	193	**Impaired**	17-Aug-00	**22**	4	3	4	3	3	3	**Fail**
DEP00-017	Live Oak Creek	no # crossing Eglin road 235	30	39	51	197	Healthy	22-Aug-00	51	16	10	8	18	16	9	Pass
DEP00-018	Panther Creek	road crossing at Eglin 678	24	33	45	153	Healthy	24-Aug-00	45	10	12	9	14	14	9	Pass
DEP00-019	Prairie Creek	road crossing at Eglin 678	26	46	56	197	Healthy	29-Aug-00	56	10	11	11	18	19	10	Pass
DEP01-001	East Bay River	at road crossing at Eglin 259	20	41	44	156	Healthy	8-Mar-01	44	7	8	12	17	14	9	Pass
TAT00-070	Turtle Creek	powerline road near Eglin 181	25	42	55	435	Healthy	01-Aug-00	55	10	11	10	14	16	9	Pass
TAT00-072	Turtle Creek	no # road, near B165 (B-82)	19	32	37	300	Healthy	08-Aug-00	37	9	7	6	11	12	7	Pass
TAT00-074	Live Oak Creek	at road crossing at Eglin 234	**13**	**18**	32	208	**Impaired**	15-Aug-00	32	5	6	5	3	3	4	**Fail**
TAT00-075	Live Oak Creek	road crossing at Eglin 235	**8**	**6**	24	108	**Impaired**	17-Aug-00	24	4	4	0	1	0	2	**Fail**
TAT00-076	Live Oak Creek	no # road by Eglin 235 (gate 82C)	23	38	49	509	Healthy	22-Aug-00	49	11	8	10	11	13	9	Pass
TAT00-077	Panther Creek	road crossing at Eglin 678	22	33	46	317	Healthy	24-Aug-00	46	8	10	8	8	10	7	Pass
TAT00-078	Prairie Creek	road crossing at Eglin 678	26	43	55	507	Healthy	29-Aug-00	55	8	13	10	17	15	9	Pass
TAT01-027	Prairie Creek	road crossing at Eglin 678	27	37	57	247	Healthy	26-Apr-01	57	13	9	12	17	17	10	Pass
TAT01-028	Panther Creek	at road crossing at Eglin 255	22	33	46	245	Healthy	26-Apr-01	46	11	9	9	15	15	9	Pass

Table 3-4. Aquatic insect stream bioassessment site locations on Eglin AFB, FL separated by drainage (Alaqua, Basin, Rocky, Mill, Turkey, Garnier, East Bay, Yellow and LaGrange) with index scores and resultant site quality determinations using two separate BioRecon Indices from the FL DEP (2004).

			"OLD" BioRecon Metrics Florida Depart. Environmental Protection						**"NEW" BioRecon Metrics** Florida Department of Environmental Protection							
Eglin Field Number	**Stream Name**	**Locality**	EPT Taxa	FL Index	Total Taxa	Total Indiv	**Quality**	**Date**	Total Taxa	Ephemeropter Taxa	Trichoptera Taxa	Long-Lived Taxa	Clinger Taxa	Sensitive Taxa	**Score**	**Quality**
TAT02-003	Prairie Creek	road crossing at Eglin 678	27	34	48	264	Healthy	10-Feb-02	48	13	10	8	16	16	9	Pass
TAT02-004	Panther Creek	at road crossing at Eglin 255	20	31	42	223	Healthy	10-Feb-02	42	9	8	6	13	14	8	Pass
TAT02-017	Turtle Creek	at road crossing at Eglin 234	21	27	41	342	Healthy	20-Mar-02	41	11	9	5	10	9	7	Pass
TAT02-037	Turtle Creek	at road crossing at Eglin 234	23	26	45	267	Healthy	4-Aug-02	45	11	10	7	10	12	8	Pass
TAT02-049	Prairie Creek	road crossing at Eglin 678	24	29	47	467	Healthy	20-Aug-02	47	12	10	7	15	14	9	Pass
DEP04-05	Long Branch	Eglin Range Road 726	**1**	**6**	**18**	37	**Impaired**	8-Jun-04	37	0	1	0	2	3	2	**Fail**
TAT04-03	Live Oak Creek	at road crossing at Eglin 234	**4**	**8**	31	103	**Impaired**	9-Mar-04	31	3	1	1	1	3	2	**Fail**
TAT04-04	Live Oak Creek	Eglin RR 235/181	**16**	**21**	38	102	**Impaired**	9-Mar-04	38	5	10	3	5	8	5	**Fail**
TAT04-14	Catfish Branch	Eglin 736	**14**	**20**	32	239	**Impaired**	31-Mar-04	32	4	9	6	5	6	5	**Fail**
TAT04-39	Panther Creek	Eglin 722	28	33	60	390	Healthy	15-Aug-04	60	12	14	10	13	17	10	Pass
TAT04-40	Prairie Creek	Eglin 678	24	36	50	424	Healthy	26-Aug-04	50	10	10	8	15	17	9	Pass
TAT04-43	Turtle Creek	Eglin 234	30	29	51	335	Healthy	4-Sep-04	51	15	12	8	13	17	9	Pass
DEP00-020	Bull Creek	road crossing at Eglin 454	22	37	44	191	Healthy	31-Aug-00	44	9	8	8	14	15	8	Pass
JCD00-005	Middle Creek	at road crossing at Eglin 600E	28	31	45	242	Healthy	29-Feb-00	45	11	13	9	17	14	9	Pass
JCD99-017	Turkey Gobbler Crk	Upstream at Eglin 657	20	23	37	254	Healthy	16-Nov-99	37	7	10	9	12	9	7	Pass
JCD99-018	Turkey Gobbler Crk	Upstream at Eglin 600E	**14**	**21**	28	145	**Impaired**	16-Nov-99	28	6	4	7	10	11	6	**Fail**
JCD99-020	Buck Branch	Upstream of road @ Eglin 382	**14**	**20**	26	205	**Impaired**	18-Nov-99	26	6	4	9	10	8	6	**Fail**
JCD99-021	Dry Hollow	10 m up of crossing at Eglin 604W	**14**	23	35	222	**Suspect**	23-Nov-99	35	6	6	6	12	10	6	Pass
JLH01-003	Silver Creek	road crossing at Eglin 211	**12**	**17**	**23**	55	**Impaired**	5-Jul-01	**23**	5	6	3	7	7	4	**Fail**
JLH01-004	Silver Creek	at road crossing at Eglin 454	**12**	**15**	**22**	145	**Impaired**	10-Jul-01	**22**	4	6	5	7	7	4	**Fail**
JLH01-008	Shoal River	trib at road crossing at Eglin 211	**11**	**19**	26	82	**Impaired**	21-Aug-01	26	5	5	2	7	7	4	**Fail**
JLH01-009	Middle Creek	at road crossing at Eglin 211	21	27	37	286	Healthy	23-Aug-01	37	11	7	4	11	14	7	Pass
JLH01-013	West Turkey Hen Crk	at road crossing at Eglin 211	17	22	48	385	Healthy	11-Sep-01	48	10	6	4	4	7	6	Pass
JLH01-014	Turkey Gobbler Crk	at road crossing at Eglin 211	22	24	39	205	Healthy	13-Sep-01	39	11	10	3	10	10	7	Pass
JLH01-016	Metts Creek	at road crossing at Eglin 211	21	26	42	173	Healthy	25-Sep-01	42	5	14	8	6	9	6	Pass
TAT00-002	Boiling Creek	trib at road crossing at Eglin 211	**16**	**11**	25	118	**Impaired**	21-Mar-00	25	6	8	7	7	7	5	**Fail**
TAT00-008	Blue Spring Creek	at road crossing at Eglin 454	19	**19**	36	148	**Suspect**	18-Apr-00	36	8	10	3	9	9	6	Pass

Table 3-4. Aquatic insect stream bioassessment site locations on Eglin AFB, FL separated by drainage (Alaqua, Basin, Rocky, Mill, Turkey, Garnier, East Bay, Yellow and LaGrange) with index scores and resultant site quality determinations using two separate BioRecon Indices from the FL DEP (2004).

			"OLD" BioRecon Metrics Florida Depart. Environmental Protection						**"NEW" BioRecon Metrics** Florida Department of Environmental Protection							
Eglin Field Number	**Stream Name**	**Locality**	EPT Taxa	FL Index	Total Taxa	Total Indiv	**Quality**	**Date**	Total Taxa	Ephemeropter Taxa	Trichoptera Taxa	Long-Lived Taxa	Clinger Taxa	Sensitive Taxa	**Score**	**Quality**
TAT00-012	Carr Springs Branch	road crossing @ Eglin 211	24	39	50	371	Healthy	16-May-00	50	8	11	10	14	16	9	Pass
TAT00-013	Middle Creek	at road crossing at Eglin 211	29	32	45	231	Healthy	16-May-00	45	14	11	7	11	13	8	Pass
TAT00-014	Malone Creek	road crossing @ Eglin 211	**14**	**19**	30	123	**Impaired**	17-May-00	30	8	5	3	8	8	5	**Fail**
TAT00-016	Malone Creek	road crossing @ Eglin 688	21	23	35	160	Healthy	23-May-00	35	9	10	4	10	10	6	Pass
TAT00-025	Boiling Creek	at road crossing at Eglin 211	19	30	41	282	Healthy	8-Jun-00	41	9	8	5	11	11	7	Pass
TAT00-026	Turkey Gobbler Crk	at road crossing at Eglin 211	17	26	43	188	Healthy	9-Jun-00	43	10	6	6	8	8	7	Pass
TAT00-027	Turkey Gobbler Crk	at road crossing at Eglin 215	26	35	46	235	Healthy	9-Jun-00	46	12	9	9	13	13	9	Pass
TAT00-029	Red Deer Creek	at road crossing at Eglin 207	18	23	34	133	Healthy	13-Jun-00	34	7	8	7	10	9	7	Pass
TAT00-030	Wise Creek	at road crossing at Eglin 207	17	24	33	196	Healthy	13-Jun-00	33	6	7	6	11	12	7	Pass
TAT00-031	West Turkey Hen Crk	trib at Eglin 605 and 611	21	23	40	297	Healthy	14-Jun-00	40	9	8	6	11	13	7	Pass
TAT00-032	West Turkey Hen Crk	at road crossing at Eglin 211	20	22	37	190	Healthy	14-Jun-00	37	11	8	4	8	8	6	Pass
TAT00-042	Wolf Creek	road crossing at Eglin 700	22	31	41	230	Healthy	19-Jun-00	41	7	11	7	13	12	8	Pass
TAT00-043	Metts Creek	road crossing at Eglin 688	19	**18**	32	120	**Suspect**	19-Jun-00	32	9	7	6	7	9	6	Pass
TAT00-044	Metts Creek	at road crossing at Eglin 211	22	35	38	220	Healthy	20-Jun-00	38	9	9	8	11	13	8	Pass
TAT00-045	Milligan Creek	at road crossing at Eglin 211	19	27	37	182	Healthy	20-Jun-00	37	9	7	5	10	12	7	Pass
TAT00-046	Honey Creek	at road crossing at Eglin 454	19	25	34	111	Healthy	21-Jun-00	34	7	9	5	10	11	6	Pass
TAT00-047	Honey Creek	at road crossing at Eglin 211	20	25	36	197	Healthy	21-Jun-00	36	8	8	5	12	13	7	Pass
TAT00-055	Blue Spring Creek	at road crossing at Eglin 211	17	23	32	130	Healthy	5-Jul-00	32	7	8	4	9	10	6	Pass
TAT00-056	Yellow River	trib at road crossing at Eglin 211	25	26	39	269	Healthy	6-Jul-00	39	9	12	5	12	14	7	Pass
TAT00-057	Yellow River	no # rd by conflu w Broxon Brnch	**11**	**12**	30	97	**Impaired**	6-Jul-00	30	6	5	2	2	4	4	**Fail**
TAT00-058	Titi Creek	at road crossing at Eglin 207	18	31	34	130	Healthy	7-Jul-00	34	7	7	7	12	12	7	Pass
TAT00-066	Silver Creek	trib at road crossing at Eglin 565	**13**	23	40	163	**Suspect**	25-Jul-00	40	3	8	9	7	4	6	**Fail**
TAT00-067	Pearl Creek	road crossing at Eglin 211	18	25	34	94	Healthy	25-Jul-00	34	5	12	6	10	9	6	Pass
TAT00-068	Cawthan Branch	at road crossing at Eglin 409	20	24	36	108	Healthy	28-Jul-00	36	7	11	8	7	8	6	Pass
TAT00-069	Cowpen Branch	at road crossing at Eglin 409	**10**	**16**	24	58	**Impaired**	28-Jul-00	24	4	5	5	5	4	4	**Fail**
TAT00-080	Bull Creek	road crossing at Eglin 454	29	32	52	344	Healthy	31-Aug-00	52	11	14	9	16	15	9	Pass
TAT01-005	Middle Creek	at road crossing at Eglin 600E	30	37	51	428	Healthy	15-Mar-01	51	12	15	9	15	14	9	Pass

Table 3-4. Aquatic insect stream bioassessment site locations on Eglin AFB, FL separated by drainage (Alaqua, Basin, Rocky, Mill, Turkey, Garnier, East Bay, Yellow and LaGrange) with index scores and resultant site quality determinations using two separate BioRecon Indices from the FL DEP (2004).

			"OLD" BioRecon Metrics Florida Depart. Environmental Protection						**"NEW" BioRecon Metrics** Florida Department of Environmental Protection							
Eglin Field Number	**Stream Name**	**Locality**	EPT Taxa	FL Index	Total Taxa	Total Indiv	**Quality**	**Date**	Total Taxa	Ephemeropter Taxa	Trichoptera Taxa	Long-Lived Taxa	Clinger Taxa	Sensitive Taxa	**Score**	**Quality**
TAT01-006	Honey Creek	at road crossing at Eglin 211	26	30	43	242	Healthy	17-Mar-01	43	11	11	8	15	15	9	Pass
TAT01-007	Moore Creek	Moore Cr. Gauge Station #1	27	35	49	223	Healthy	19-Mar-01	49	10	13	10	17	16	9	Pass
TAT01-030	Turkey Hen Creek	Steephead@Okie Tower = Hwy 85	**7**	**4**	27	218	**Impaired**	1-May-01	27	3	4	5	4	4	4	**Fail**
TAT01-031	Weaver River	road crossing at Eglin 736	18	24	37	327	Healthy	15-May-01	37	7	8	5	10	11	7	Pass
TAT01-037	Little Boiling Creek	at Eglin Road 718	27	28	45	186	Healthy	7-Jun-01	45	11	11	10	12	16	9	Pass
TAT01-039	Bull Creek	at Eglin AFB Range Rd 211	21	23	51	227	Healthy	12-Jun-01	51	12	8	6	8	14	8	Pass
TAT01-040	Ramer Creek	at Eglin AFB Range Rd 211	**16**	22	38	195	**Suspect**	12-Jun-01	38	7	7	9	9	9	7	Pass
TAT02-001	Middle Creek	at road crossing at Eglin 600E	27	33	52	280	Healthy	4-Feb-02	52	11	13	11	15	16	10	Pass
TAT02-012	Moore Creek	Moore Cr. Gauge Station #1	19	**20**	37	132	**Suspect**	17-Feb-02	37	9	6	5	12	14	7	Pass
TAT02-013	West Turkey Hen Crk	at road crossing at Eglin 233	**16**	**16**	28	74	**Impaired**	17-Feb-02	28	10	5	2	5	8	5	**Fail**
TAT02-035	Middle Creek	at road crossing at Eglin 600E	24	33	48	238	Healthy	2-Aug-02	48	10	11	11	12	11	9	Pass
TAT02-045	West Turkey Hen Crk	at road crossing at Eglin 233	22	30	46	301	Healthy	13-Aug-02	46	9	11	9	12	14	8	Pass
TAT02-048	Moore Creek	Moore Cr. Gauge Station #1	22	31	37	177	Healthy	19-Aug-02	37	7	10	6	12	14	7	Pass
TAT04-09	Double Head Branch	Eglin RR 287 - below Buck Pond	**4**	**17**	29	121	**Impaired**	23-Mar-04	29	0	4	0	7	6	3	**Fail**
TAT04-10	Titi Creek	Eglin 220	24	36	52	363	Healthy	24-Mar-04	52	12	9	9	15	20	10	Pass
TAT04-30	Hicks Creek	Eglin 736 east branch	17	**19**	34	291	**Suspect**	19-Jun-04	34	7	8	9	8	10	7	Pass
TAT04-34	Moore Creek	north of Eglin 211	24	29	58	306	Healthy	6-Aug-04	58	8	13	10	14	12	9	Pass
TAT04-41	Middle Creek	Eglin 211	28	32	51	520	Healthy	28-Aug-04	51	12	13	9	15	17	10	Pass
TAT04-42	Gum Creek	Eglin 207	25	29	49	445	Healthy	29-Aug-04	49	10	12	10	15	20	10	Pass

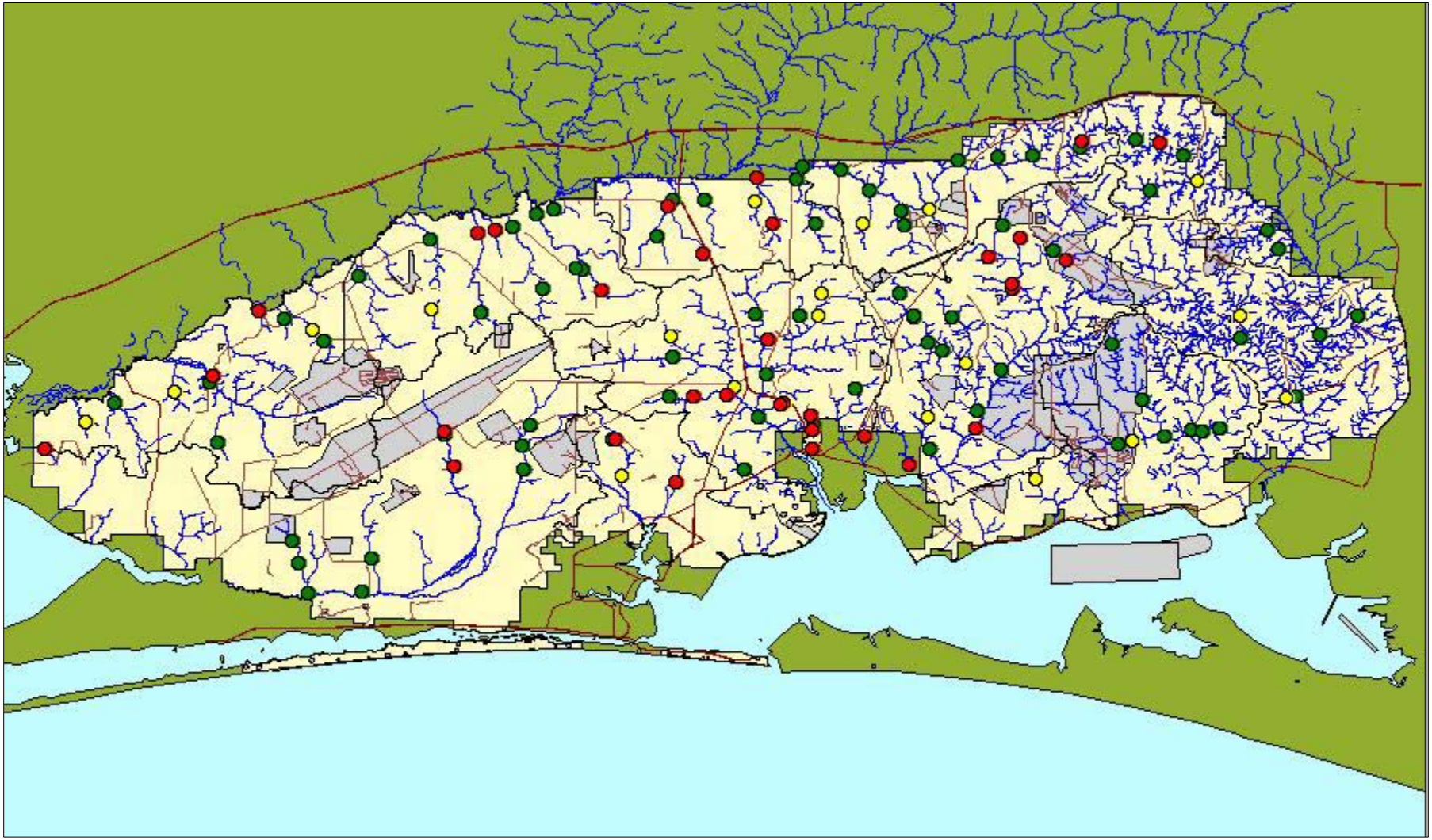

Figure 3-1. Aquatic insect bioassessment site locations sampled from 1999 – 2004 on Eglin AFB, Florida. Healthy sites are designated as ● (green), suspect sites are designated ● (yellow) and impaired sites are designated as ● (red) based on Florida Department of Environmental Protection (FDEP 2004) "Old" BioRecon metrics.

Using the new BioRecon Index metrics ("New BioRecon Index") for the 207 samples collected and analyzed 167 samples evaluated site conditions as "Pass" and 40 samples evaluated site conditions as "Fail" (Table 3-4). Accounting for repeat sampling and multiple samples, 96 sites (76%) were evaluated as "Pass" and 31 sites (24%) were evaluated as "Fail."

When shifting from the "Old BioRecon Index" to "New BioRecon Index", a whole category of evaluation was lost ("Suspect"). The majority of sites originally evaluated as "Suspect" using the old BioRecon Index were evaluated as "Pass" using the new metrics (Table 3-6), although the overall metric score was at the low end of passing (= 6) for most of these sites (see Table 3-4).

Table 3-5. Comparison of site evaluations using two separate BioRecon Index calculation methods as outlined in Fore (2004) and FDEP (2004).

"Old BioRecon Index"		"New BioRecon Index"	
Site Condition	**Number of Sites**	**Site Condition**	**Number of Sites**
Healthy	84	Pass	96
Suspect	14	*	*
Impaired	29	Fail	31
TOTAL SITES	127	**TOTAL SITES**	127

Table 3-6. Summary of how "suspect" sites were ranked using the "New" BioRecon Index calculation methods as outlined in Fore (2004) and FDEP (2004).

"Old BioRecon Index"		"New BioRecon Index"	
Site Condition	**Number of Sites**	**Site Condition**	**Number of Sites**
Suspect	**14**	Pass	11
		Fail	3

From the 207 biomonitoring samples, a total of 44,147 aquatic invertebrates were collected and identified to the lowest possible taxonomic level (typically genus and species). The current bioassessment survey work completed in wadeable streams by the US Fish and Wildlife Service documented 388 taxa representing 28 Orders, 114 families, and 252 genera on Eglin (see results for Thom 2000-2004 in Appendix D). A summary of the major aquatic invertebrate taxa shows the most speciose groups to be Odonata, Trichoptera, Coleoptera, Diptera and Ephemeroptera (Table 3-7). This was supported with summarized invertebrate data (Total Species Summary) including historical invertebrate collections conducted on Eglin property since the 1970's for management supporting the federally endangered

Okaloosa darter (*Etheostoma okaloosae*) and recent taxonomic inventory collaborations (i.e. with the Dragonfly Society of the Americas and with Florida A&M University), as well as with invertebrate data collected from BioRecon benthic kick-net samples (BioRecon Sample Summary) (Table 3-7). Comparing the difference in taxa between the Total Species Summary and BioRecon Sample Summary illustrates the difference in aspects of collection methods and taxonomic resolution. For example, within the Total Species Summary, 135 Diptera species were documented compared to 46 Diptera species in the BioRecon Sample Summary – due to the fact that Chironomidae and Ceratopogonidae were not identified to species level for the BioRecon samples. The difference in both Trichoptera (118 vs. 45 *spp.*) and Odonata (93 vs. 50 *spp*.) illustrates an artifact of taxonomic knowledge – species level identification for Trichoptera and Odonata is currently focused on adult specimens, which were collected in surveys summed within the Total Species Summary. Trichoptera and Odonata taxa collected in BioRecon samples were larval specimens, for which species level identification was not possible for many taxa. Comparing the resultant species totals for the Total Species and BioRecon Species Summaries illustrates the need for specific taxonomic surveys beyond baseline benthic samples to more accurately document species diversity.

Table 3-7. Summary of major taxa for all aquatic invertebrate collections collected on Eglin including adult specimen collections (Total Species Summary), and bioassessment collections based on benthic kick-net samples (BioRecon Sample Summary) using BioRecon survey methods from 2000-2004.

ORDER	Families	Genera	Species	Families	Genera	Species
Acariformes - (Mites)	12	14	14	8	10	10
Amphipoda - (Amphipods)	3	3	3	2	2	2
Coleoptera - (Beetles)	**15**	**44**	**56**	**14**	**38**	**48**
Collembola - (Springtails)	2	3	3	1	1	1
Decapoda - (Crustaceans)	3	4	5	2	2	2
Diptera - (True Flies)	**16**	**104**	**135**	**13**	**45**	**46**
Ephemeroptera - (Mayflies)	**11**	**28**	**43**	**11**	**28**	**40**
Heteroptera - (True Bugs)	13	20	22	13	21	21
Isopoda - (Isopods)	3	3	3	2	2	2
Megaloptera - (Dobsonflies)	2	5	5	2	4	4
Odonata - (Dragon/Damselflies)	**10**	**42**	**93**	**9**	**35**	**50**
Plecoptera - (Stoneflies)	6	14	24	5	13	16
Trichoptera - (Caddisflies)	**17**	**40**	**118**	**15**	**33**	**45**
Unionoida - (Mollusks)	1	1	1	1	1	1
Veneroida - (Mollusks)	1	2	2	1	2	2
	Total Species Summary			**BioRecon Sample Summary**		

Effort and Baseline

We compared sampling effort with Florida Department of Environmental Protection (FDEP) concurrently at 12 sites. This permitted a comparison of data collected from 50-meter and 100-meter overlapping sampling reaches. This comparison allowed examination of differences between statewide biomonitoring and some biomonitoring work completed on Eglin. Site analysis using "Old" BioRecon Index metrics showed a difference in final stream evaluation at only one site, a tributary to Exline Creek in the Rocky Creek drainage. This site was rated "Impaired" based on FDEP 100-meter reach data, and "Healthy" based on 50-meter reach information; two of the three metrics (EPT and FL Index) were marginally above threshold scores and one marginally below – resulting in the difference between final site conditions. Using the "New" BioRecon Index metrics, however, Exline Creek rated as "Pass" for both 50 and 100 meter sample reaches. Assessed quality of the other 11 sites was identical using the different sized sampling reaches. No statistically significant differences were detected between the different reach lengths or site condition determinations using both "Old" and "New" BioRecon Indices. Direct comparisons of diversity indices could not be made due to differences in reporting; FDEP reports relative abundance, while Eglin data was reported as true count data. The original count data from FDEP could not be obtained, as it is not entered into the statewide STORET database. Similarity of invertebrate taxa collected using 50 m and 100 m reach lengths could be compared.

Taxa similarity was compared for the above 12 sample locations using Sorenson Similarity (a measurement of the similarity of taxa richness). Taxa similarity between the two separate reach lengths ranged from 55% to 82% similar. Only one outlier sample location (a tributary to Exline Creek) had relatively high similarity (76%) despite not showing the same site quality, although only for the "old" BioRecon Index. Despite the high similarity, more unique species were collected in the 50-meter reach than in the 100-meter reach.

Using these bioassessment samples collected across Eglin from 2000 – 2004 along with historical aquatic collections from the mid-1970's and early 1980's, we established a baseline species list for aquatic invertebrate species collected (Appendix D; Thom and Herod 2005). The combined species list

documented a total of 518 aquatic macroinvertebrate species in the freshwater systems on Eglin representing 31 Orders, 135 Families and 348 Genera. This maximum species number (518) includes larger river systems, which were excluded from current bioassessments. Current work focused on wadeable streams – mainly 1st through 4th order.

Natural Variability - Spatial, Seasonal and Temporal

Seasonal changes in community structure and composition are due primarily to life histories of taxa (emergence, drift, egg diapause, etc.). Seasonal variability in species richness and abundance in Eglin streams was examined by Scheiring et al. (1981) and Scheiring and Crews (1983). Based on quantitative (ponar) samples, all of the sites sampled for this study in Rocky Creek had the highest number of species in June or July, with a second peak in number of species from January to March (Scheiring at al. 1981). When all samples including black-light and kick-net samples were considered, most sites had the highest richness from March to June. Highest diversity for sites within Bull Creek and Ramer Branch was between December and February, with lowest diversities in April and June based on data from surber and substrate cores, light-traps, and only one kick-sample (Scheiring and Crews 1983).

Differences in taxa assemblages composed mostly of rare and uncommon species can lead to incorrect conclusions about habitat differences. For example, if a rare species is not collected at a site, this might mean that it cannot live there because the habitat is not suitable. It could, however, also mean that the species lives there but sampling methods failed to detect it. The majority of species in Eglin streams are represented by only a few individuals, with very few dominant taxa (Figure 3-2). In spite of the numerous rare taxa, an analysis of similarity among sites based on Eglin biomonitoring data using Sorenson Similarity showed high similarity; species assemblages shared from 71% to 86% of their fauna.

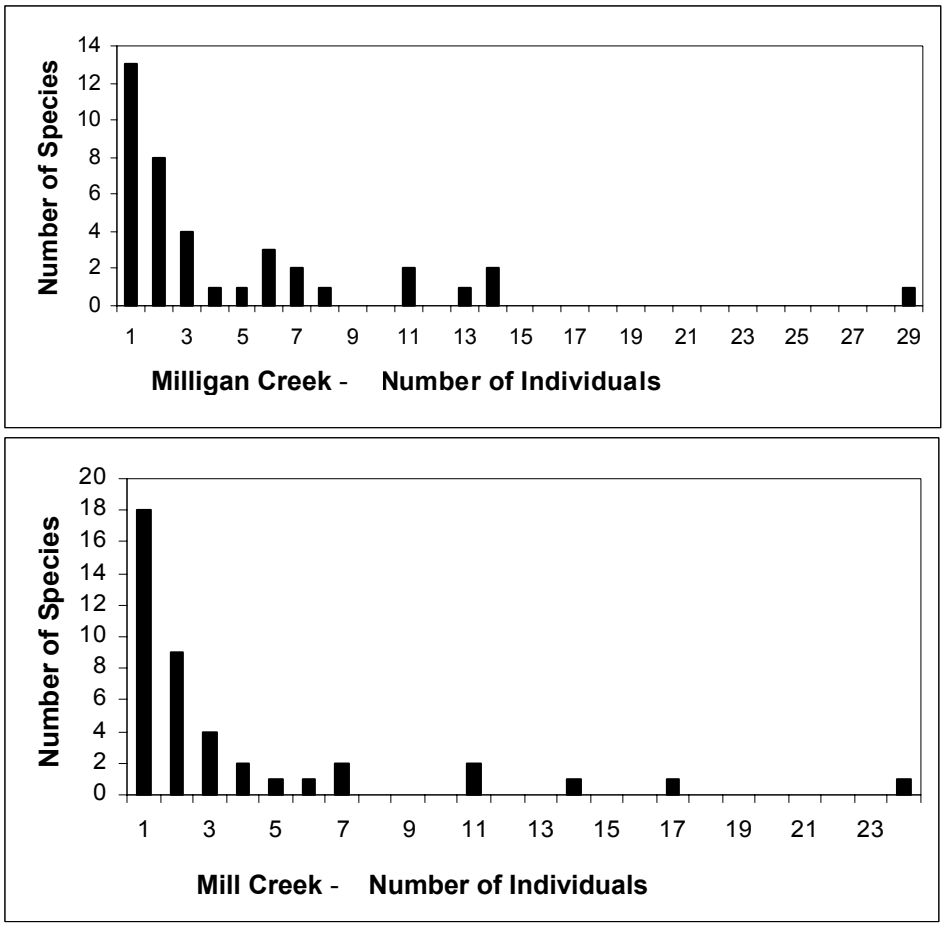

Figure 3-2. Rank abundance graphs for aquatic macroinvertebrate taxa collected from Milligan and Mill Creeks on Eglin AFB, FL.

Repeat visits to the same sites were used to evaluate spatial and temporal variability for BioRecon samples. A total of 49 sites had repeat samples of either two or more biomonitoring samples collected during the study period. Sources of variance examined included site differences, years, visits within years, and season (summer vs. winter). From repeated measures ANOVA, the variance between individual sites was greatest (71%), variance associated with year was relatively small (2%), and variance within year and seasonal interaction were similar (5% and 7%). Figure 3-3 illustrates the variability estimated from repeat visits was higher for moderately disturbed sites (BioRecon scores x to y) than for sites with minimal disturbance (BioRecon scores a to b).

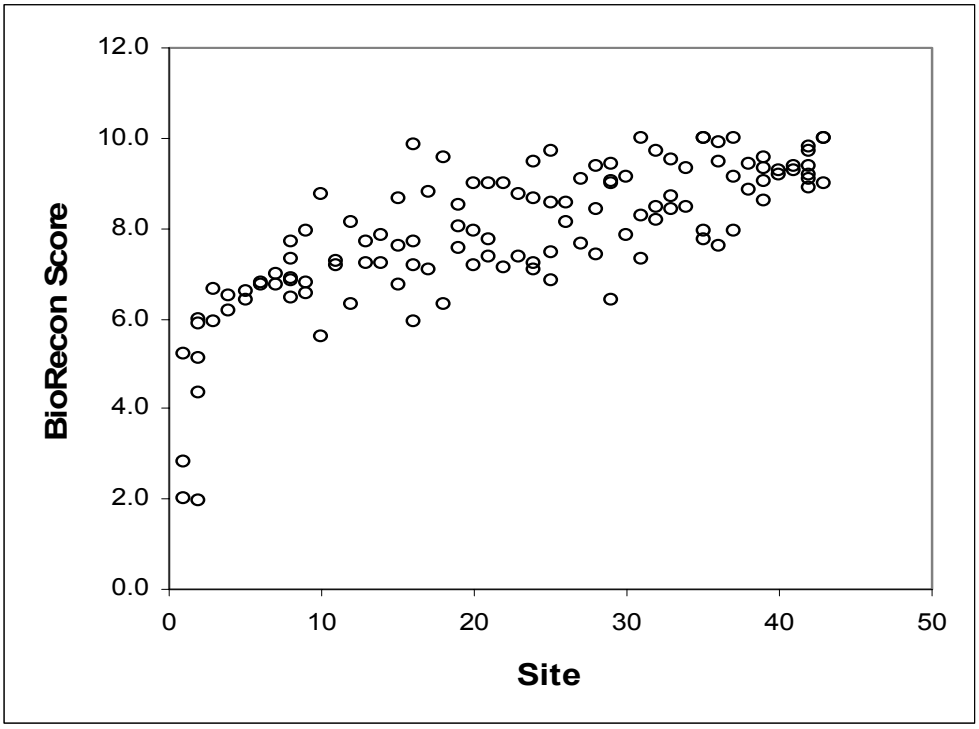

Figure 3-3. BioRecon Index scores for repeat visits to 49 sites are shown. Sites were first sorted according to BioRecon score. Individual site names are not shown, but all BioRecon scores for each site are plotted at a single point on the x-axis. Thus, vertical lines of points represent the range of BioRecon scores at each site.

If BioRecon score variability was estimated using only minimally disturbed reference sites, the error variance would be smaller and the categories corresponding to 'passing' condition would be more restrictive. To determine if human activities were responsible for highest variability observed, I selected the sites with the most variable BioRecon values and noted any change in human activities at the site (Table 3-8). The resultant four sites illustrated the sensitivity of the BioRecon Index to road/stream crossings. Garnier Creek had extensive restoration completed where a powerline crossing was eroding massive amounts of sediment and clogging a section of the stream. Differences in index scores were the result of sampling pre- and post-restoration. For the other three sites (West Turkey Hen Creek, Mill Creek and Open Branch), direct impacts to streams from road crossings (i.e. upstream impoundment, sand smothering downstream) decreased the BioRecon scores and resultant site evaluation. These anecdotal

data suggest that much of the BioRecon variability was associated with real changes in site quality and disturbance rather than natural variability.

Table 3-8. Summary of sites on Eglin having the most variable BioRecon values through time. Variability resulted from restoration work and road crossing structure influence on physical stream characteristics.

Site ID	Date	Sample Direction	New BioRecon Evaluation	Stream Name	Locality
0406S003	19-Jun-01	pre-restoration (down)	Fail	Garnier Creek	powerline X-ing E of Eglin 636
0406S003	1-Mar-04	post-restoration (down)	Pass	Garnier Creek	powerline X-ing E of Eglin 636
0503S002	17-Feb-02	downstream	Fail	West Turkey Hen Creek	at road crossing at Eglin 233
0503S002	13-Aug-02	upstream	Pass	West Turkey Hen Creek	at road crossing at Eglin 233
0604S004	2-Jun-00	downstream	Pass	Mill Creek	first non-culvert part S. of SR 190
0604S004	11-Sep-99	upstream	Fail	Mill Creek	first non-culvert part S. of SR 190
0815S001	13-Jul-00	downstream	Pass	Open Branch	at intersection at Eglin 214/374
0815S001	18-Jul-00	upstream (impounded)	Fail	Open Branch	at intersection at Eglin 214/374

Impaired Sites

For Florida, biological impairment is defined as "the Index for benthic macroinvertebrates shall not be reduced to less than 75% of established background levels" (FAC 62-302.530 (11)). This biological integrity standard was tested against the current bioassessment metrics as summarized by the FDEP, including site specific degradation resulting from localized erosion and reduction in overall site quality based on chemical and physical parameters. Of the 127 sites assessed on Eglin, roughly 70% of the sites were evaluated as "Healthy" or "Pass" and 25% were evaluated as "Impaired" or "Fail" based on BioRecon methods listed for the State. These sites are required to be verified as impaired or failing using the SCI stream assessment method. To date, the six sites listed below have been re-surveyed by FDEP and considered impaired based on a combination of biological, chemical and physical data using the SCI method, although they are not yet listed as impaired under §303(d) of the CWA. Summaries (Eco-Summaries) of this assessment work can be requested from the Northwest District of the Florida Department of Environmental Protection. Despite being impaired based on biological samples, these water bodies are not listed on the 303d list due to insufficient water chemistry information.

- Turkey Creek Tributary downstream of the City of Niceville Landfill

    - Biology impaired 303d; Dissolved Oxygen, Fecal Coliform, Total Coliform, Turbidity, Unionized Ammonia all reported as 3b = insufficient data on the 2004 305b list and are absent from the 303d list

- Shaw Still Branch at Chase Street
    - Biology designated as 3c = on the 2004 305b planning list and absent from the 303d list

- Open Branch at Eglin 214/374 above the road crossing
    - Nutrients (TSI), Dissolved Oxygen, Fecal Coliform, Total Coliform, TSI, Turbidity, Unionized Ammonia are all designated as 3b = insufficient data on the 2004 305b list; it is absent from the 303d list

- Juniper Creek at Eglin B-43 borrow pit
    - Dissolved Oxygen, Fecal Coliform, Total Coliform, Turbidity are all designated as 3b = insufficient data on the 2004 305b list; it is absent from the 303d list

- "Claypit Branch" tributary to Lightwood Knot Creek
    - Biology is on the planning list (3c), Nutrients (chla), Dissolved Oxygen, Turbidity, Unionized Ammonia according are designated 3b = insufficient data on the 2004 305b report; it is absent from the impaired waters list for 2004

- Garnier Creek/ Hwy 85/SR 189
    - Biology is on the planning list (3c), Nutrients (chla), Dissolved Oxygen, Fecal Coliform, Total Coliform, Turbidity, Unionized Ammonia according are designated 3b = insufficient data on the 2004 305b report; it is absent from the impaired waters list for 2004

Other sites sampled reflect conditions predominantly caused by land-use changes, including road crossing structure. For example, several sites were considered to be impaired based on stream assessment indices largely due to upstream impoundments altering stream conditions. These sites are considered to be barriers to fish passage: Live Oak Creek at Eglin Range Road 234, Live Oak Creek at Eglin Range Road 235, Double Head Branch at Eglin Range Road 287 and Long Branch at Eglin Range Road 726.

DISCUSSION

Critique of New BioRecon Index

Florida, along with a handful of other states, leads the nation in the development and implementation of water protection policies for statewide assessment based on biological criteria

(McCarron and Frydenborg 1997; USEPA 2002). The Florida Department of Environmental Protection has invested considerable effort to develop, test, evaluate and re-evaluate the biological criteria as well as data collection, entry and evaluation protocols used for biological assessments of wadeable streams. Bioassessment work on Eglin AFB, FL began with the purpose to assess stream conditions. Based on base-wide bioassessments using aquatic invertebrates, the majority of sites sampled were considered to be relatively healthy. Aquatic insect assemblages are persistent over time at the majority of sites sampled, and the majority of taxa are represented by few individuals at each site. When different assessment methods were compared, high percentages of similar taxa were collected at all sites. Recent metric changes in Florida provided an opportunity to examine these changes for systems on Eglin. Overall, no statistical difference was seen for assessment of impaired sites on Eglin comparing the "Old" and "New" BioRecon Indices. Using the new metrics, only two additional sites were listed as failing.

The main difference between the metrics is in the categories of evaluation. Removing the "Suspect" evaluation from analysis did change the overall picture of stream quality on Eglin. Eliminating the "Suspect" category also eliminates the opportunity to identify if further study is needed, or actions could be taken to improve that site. The shift to evaluation of pass/fail creates a more reactive approach to natural resource management. Since the range between "Pass" and "Fail" is relatively high, when sites finally show impairment (Fail), more effort is required to rehabilitate or potentially restore those areas. This metric change potentially has the most impact on freshwater natural resource management. With only "Pass" and "Fail" there is a reduction in the capability to detect impairment. The whole purpose of using the BioRecon tool is to develop a monitoring program in a long-term effort to document habitat quality changes over time – to target when degradation or restoration is happening and to potentially act proactively in management. Not unlike other agencies, Eglin's main core sampling is completed on a 4-year rotation, thus sampling of a particular site occurs every few years. Within Florida, the BioRecon tools were developed for initial data collection. The metric changes therefore result in a loss of resolution in ambient ecological monitoring.

The “New” BioRecon metrics are richness-based metrics, with no compositional or trophic metrics. The majority of the metrics used by other agencies to assess biotic integrity of streams are measures of diversity; these include Total Taxa Richness, number of EPT taxa, Shannon-Wiener Index and the Simpson Index. Diversity is influenced by both species richness and species evenness (or dominance). The different diversity indices can reflect one or the other of these components. Many of the diversity indices are sensitive to the number of samples collected. For example, species richness typically increases based on the number of species collected, at least to a point. Some indices are harder to calculate than others, and some, although appropriate, may not be widely used and therefore have limited applicability for comparing results with other studies. Since diversity indices are based on numbers of taxa, the level of taxonomic resolution greatly influences the outcomes of the metric scores, as does the proficiency of the taxonomist. The number of taxa per sample is also obviously greatly influenced by subsampling techniques. Typically a total number (100 individuals) of individuals are picked from a sample for identification. For example, Florida SCI metrics use 100 individuals as a fixed count total. Instead of automatically determining that 100 individuals is the appropriate maximum number, this can easily be determined by initially picking total samples, and plotting the number of taxa vs. the total number of individuals collected. Then, depending on what level of taxa diversity you hope to capture (80%, 90%, 95%), an appropriate maximum number of individuals can be determined. This also shows that the total number of individuals identified is not just an arbitrary number and is appropriate for the local level of diversity.

Three metrics involving lists of taxa were created as part of the new BioRecon Index: Long-lived taxa, Clinger taxa and Sensitive taxa. For long-lived taxa criteria, regional differences in voltinism are not addressed for listed species. Consideration of life stage is not specified; long-lived species would have multiple life stages represented within a habitat. Why does life stage matter? For example, the presence of an adult and no early instars might mean that locally there is no recruitment. The presence of only young individuals may mean the species is not reaching maturity due to frequent disturbance previously not part of the system, but the area is maintained as a sink habitat due to downstream migration. Several

Coleoptera (beetle) taxa also require more than a year to complete their life cycles, but were not listed as long-lived species because the FDEP database does not currently distinguish between larvae (which cannot travel to find water) and adults (which can). Several beetle species (primarily Elmidae) are not especially mobile; both larvae and adults are entirely aquatic. Plus, whether or not a species can or cannot leave the water seems to be a moot point for aquatic insects, as the majority of taxa leave the water as adults to complete their life cycles. The long-lived taxa metric includes an invasive species (*Corbicula fluminea*). While it may be a long-lived taxa relative to aquatic insects, the life cycle of *Corbicula fluminea* compared to other mussel species is relatively short and thus should not be included; furthermore it is an invasive species.

The metric "clinger taxa" simply refers to the habit of an organism, which is determined based on body morphology (e.g. the presence of clinging appendages). Compared with other metrics, it does not seem to have significance for stream quality. High nutrient loading could increase macrophyte abundance, which would increase habitat for clinger taxa.

Sensitive taxa lists were determined statistically based on sensitivity to the human disturbance gradient. However, statistical significance is a combination of species abundance as well as species sensitivity. Several rare species (e.g. Mayflies; *Dolania americana*, *Homoeoneuria dolani* and *Pseudiron centralis*) are not included on this list, despite being sensitive. Regional considerations for sensitive species need to be included when developing or amending the sensitive species lists.

The threshold scores for all the metrics were based on the median values of the entire data set. The metric threshold scores were not based on the best stream quality possible, but rather a combination of sites that range from very good to very poor. Thus, threshold scores are overall lower and do not reflect exceptional water quality goals. This same criticism has been raised for development of nutrient criteria standards (Dodds and Welch, 2000). Using quartiles to determine threshold scores from reference conditions in the bioregion is appropriate.

The "New" BioRecon metrics were tested for significance to the human degradation gradient (HDG). Overall, the data from which the HDG is derived is very subjective. In particular, the hydrologic

and habitat indices are not standardized among biologists. Another component of the HDG, the Land Development Intensity (LDI) index, was calculated as the percentage area within the catchment of a particular type of land use multiplied by the coefficient of energy use associated with that land use, summed over all land use types found in the catchment. The sources for the energy use statistics were not provided. The photo resolution and date of survey of aerial photos was also not provided. With current remote-sensing information, GPS, total stations, etc., detailed stream profiles and detailed catchment data should be used for developing the basis for evaluation.

Evaluation of Biological Assessments - Tiered Aquatic Life Use

Under the Clean Water Act (CWA), states are responsible for identifying water quality problems and evaluating the effectiveness of water quality controls. The states have primary responsibility for setting, reviewing, revising, and enforcing water quality standards. Sections 303 and 304 of the Clean Water Act (CWA) require states to protect biological integrity as part of their water quality standards. There has been considerable progress in the development of biological monitoring and assessment techniques since the passage of the Clean Water Act. Major areas of uncertainty such as cumulative impacts, distinguishing between natural variability and effects of stressors on aquatic systems as well as sampling effort, sampling biases, hydrologic connectivity and the appropriate level of protection for individual waterbodies are being explored. Our understanding of how to define and measure the integrity of aquatic systems has advanced to include aspects of structure and function, physical/chemical interactions, genetics, metapopulation dynamics and connectivity.

Many tools and techniques are now available to assess water quality based on biological communities, including multivariate analyses. Standard sampling, monitoring and analysis techniques for other aquatic habitats besides wadeable streams are being developed (i.e. wetlands, non-wadeable rivers) and used in statewide monitoring programs. A main component of biological methodologies nationwide is the Index of Biotic Integrity (IBI) (Karr 1981; Karr 1991). Using multimetric information, IBIs have detected disturbance that resulted in changes in individual, population, and community characteristics.

Multimetric indices have been developed for fish, invertebrates, diatoms, and birds in a variety of ecological contexts in North America, Europe and Asia (Karr et al. 1986; Angermeier and Karr 1986; Thorne and Williams 1997; Hughes et al. 1998; Hughes and Oberdorff 1998; Karr and Chu 1999; Klemm et al. 2003; Fore and Grafe 2002; Bryce et al. 2002). Most states use multimetric indexes for biological assessment, although other techniques have been developed (Hawkins et al. 2000; USEPA 2002). The U.S. Environmental Protection Agency (EPA) has developed numerous guidance documents to support biological assessment (USEPA 1998; Barbour et al.1999; Bowman et al. 2000; Jackson et al. 2000; USEPA 2000; USEPA 2003; Fore 2003). These documents typically emphasize multimetric indexes to measure the biological condition of surface waters (Simon and Lyons 1995; Barbour et al. 1999; Yoder and Rankin 1998).

Several sources also describe essential components for the development and critique of a successful biological monitoring program (USEPA 2003; Whittier et al. 2001; Yoder and Rankin 1995). Barbour et al. (1999) states that an effective and thorough biological monitoring program can help to improve reporting, increase the effectiveness of pollution prevention efforts, and document the progress of mitigation efforts. But are biological monitoring programs really successful? It depends on how success is defined. Benz and Collins (1997) compiled a disheartening collection of chapters focusing on the perilous state of aquatic fauna in the southeast. Native fishes, mussels, amphibians, snails, mayflies, stoneflies, caddisflies and dragonflies have experienced severe population declines (both distribution and abundance). Critical aquatic habitats (i.e. floodplains, headwater streams, wetlands) are being degraded and destroyed, surface water quantity and quality is being reduced, flowing systems are still being dammed, and hydrologic connectivity and seasonal cycles are being disconnected and regulated. Major threats to aquatic systems including degraded water quality, physical alteration of aquatic habitats, introduction of exotic and sometimes invasive species, loss of watershed connectivity and integrity, and cumulative impacts from changing land use and climate seem to be increasing. Every year, more and more of our Nation's waterways are being listed as impaired and requiring management via Total Maximum Daily Loads (TMDLs). Based on this inauspicious data, it seems that in the current system,

biological monitoring programs and bioassessment tools are effective in identifying areas where action (i.e. mitigation, restoration) is needed. But there seem to be major gaps between natural resource management, water quality standards, ecological/biological information and water quality protection and conservation.

NRC (2001) recommended that biological criteria should be used in conjunction with physical and chemical criteria to determine whether a waterbody is meeting its designated uses. NRC (2001) also recommended that "designated uses" of waterbodies need to be more specific and should be tiered as an essential step in setting water quality standards and improving decision making. Biologically-based aquatic life uses could capitalize on monitoring and assessment efforts that address natural variability in aquatic systems and help specify an appropriate level of protection for a waterbody that includes consideration of the system's potential for improvement. The U.S. Environmental Protection Agency has championed biologically based aquatic life uses. While still in draft form, tiered aquatic life use categories are a natural evolution that reflects an improved understanding of surface waters resulting from more than 20 years of biological assessment data (USEPA 2005). Developing more specific, biologically-based definitions for designated water uses can help integrate precise designated aquatic life uses in state water quality standards. This change also provides a direct opportunity for scientists to contribute the best scientific data available to inform this crucial aspect of water policy and natural resource management.

Section 305(b) of the CWA requires that states report to the U.S. Environmental Protection Agency (EPA) on the water quality status of state waters. The resulting 305(b) report provides information to EPA on the physical, chemical, biological, and cultural features of each watershed. The 305(b) report is thereby the science-based tool that allows for assessing water quality and shows both waters that are impaired and those that are at risk of becoming impaired. The information in the 305(b) report is essential for the prioritization of waters for restoration and protection. Section 303(d) of the CWA requires states to submit a list of waters that do not meet applicable water quality standards to the EPA. The state is also required to develop total maximum daily loads (TMDL) for these impaired waters to facilitate their recovery and alleviate the impairment.

Management Implications, Recommendations and Future Research Needs

Based on biological sampling, several sites on Eglin are considered to be impaired. This has important management implications, primarily in terms of compliance-related issues. Reporting violations of the state water quality standards contribute to the listing of those waters as impaired for their respective designated use. Listing these waters as impaired allows for their prioritization for corrective measures through the Total Maximum Daily Load Program (TMDL). The baseline biological assessment work completed through this research has provided managers at Eglin with scientific data for prioritization of restoration work and biological criteria for evaluation of restoration work. These data have supported management actions addressing maintenance of unpaved roads, culvert design, crossing structure replacement and removal, and barriers to fish passage.

Current sampling efforts for aquatic insects and freshwater invertebrates have focused on wadeable streams. Documenting the rare and unique aquatic resources on Eglin with biomonitoring and collaborations with research institutions including Florida A&M University and regional taxonomic experts has been crucial. Further inventories of other invertebrates such as crayfish, mussels and snails are still needed. These species may be useful in assessing aquatic conditions across Eglin and also within the Gulf Coastal Ecosystem Partnership (GCPEP). Due to the relative rarity of many aquatic insects found on Eglin, future invertebrate work targeting specific taxonomic groups (e.g. Diptera) for greater understanding of rare endemic species distribution could be undertaken. Many avenues exist for this work to be completed over time, using multiple sampling techniques and targeting different life stages. This information can better assist managers in prioritization of restoration activities, and documenting high quality areas and hotspots of biodiversity.

Adaptive management requires incorporation of updated scientific information. Continued ambient monitoring efforts are needed to document effective stewardship and restoration activities in watersheds on Eglin. Future aquatic research should include baseline monitoring and taxonomic inventory work in other aquatic habitats including ponds and non-wadeable rivers on Eglin and within GCPEP lands

including Blackwater State Forest and Conecuh National Forest. Finally, a coordinated effort involving local universities, state water resource agencies, federal agencies and non-governmental organizations is needed – especially for a broad watershed approach to conservation in this sensitive coastal area.

LITERATURE CITED

Anderson, W. 1971. Temperatures of Florida streams. Map prepared by U.S. Geological Survey.

Angermeier, P.L. and J.R. Karr. 1986. Applying an index of biotic integrity based on stream-fish communities: considerations in sampling and interpretation. North American Journal of Fisheries Management 6: 418-429.

Bailey, R. G., 1987. Mapping Ecoregions to Manage Land. In: 1987 Yearbook of Agriculture. U.S. Department of Agriculture. Washington, D.C., pp 82-85.

Barbour M.T., J. Gerritsen, G.E. Griffith, R. Frydenborg, E. McCarron, J.S. White, and M.L. Bastian. 1996. A framework for biological criteria for Florida streams using benthic macroinvertebrates. Journal of the North American Benthological Society. 15:185-211.

Barbour, M.T., J. Gerritsen, B.D. Snyder and J.B. Stribling. 1999. Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates, and Fish. Second Edition. EPA 841-B-99-002. US Environmental Protection Agency, Office of Water. Washington, D.C. 339 pp.

Beck, W.M. 1965. The streams of Florida. Bulletin of the Florida State Museum. 10: 81-126.

Benz, G.W. and D.E. Collins. 1997. Aquatic Fauna in Peril: The Southeastern Perspective. Lenz Design and Communications. Decatur, GA. 554 pp.

Berner, L. and M.L. Pescador. 1988. The Mayflies of Florida. University Presses of Florida. Gainesville, FL. 415 pp.

Bowman, M.L., J. Gerritsen, G.R. Gibson, Jr., and B.D. Snyder. 2000. Estuarine and coastal marine waters: Bioassessment and biocriteria technical guidance. Office of Water, U. S. Environmental Protection Agency, Washington, DC. EPA-822-B-00-024.

Brown, M.T. and M.B. Vivas. 2004. A Landscape Development Intensity Index. Environmental Monitoring and Assessment. 101: 289–309

Bryce, S. A., D. P. Larsen, R. M. Hughes, and P. R. Kaufmann. 1999. Assessing relative risks to aquatic ecosystems: A mid-Appalachian case study. Journal of the American Water Resources Association 35 (1): 23-36.

Bryce, S.A., R.M. Hughes and P. R. Kaufmann. 2002. Development of a bird integrity index: using bird assemblages as indicators of riparian condition. Environmental Management. 30:294-310.

Canter, L. 1985. River water quality monitoring. Lewis Publishers, Inc., Chelsea, MI. 170 pp.

Crews, R.C. 1976. Aquatic baseline survey of selected test areas on Eglin Air Force Base Reservation, Florida. Technical report AFTL-TR-76-145 to Air Force Armament Laboratory, Armament Development and Test Center, Eglin Air Force Base, FL. 50 pp.

Cummins, K.W. 1962. An evaluation of some techniques for the collection and analysis of benthic samples with special emphasis on lotic waters. American Midland Naturalist, 67: 477-504.

Cummins, K.W. and R.W. Merritt. 1996. Ecology and distribution of aquatic insects. pp. 74-86 In: An Introduction to the Aquatic Insects of North America. R.W. Merritt and K.W. Cummins (Eds.), Kendall Hunt Publishing Company, Dubuque, Iowa. 862pp.

Davis, W.S. 1995. Biological Assessment and Criteria: Building on the Past, pp. 15-29. *In*: Biological Assessment and Criteria: Tools for Water Resource Planning and Decision Making. W.S. Davis and T.P. Simon (Eds.). Lewis Publishers, CRC Press, Inc., Boca Raton, FL. 415 pp.

Dodds, W. K. and E. B. Welch. 2000. Establishing nutrient criteria in streams. J. N. Am. Benthol. Soc. 19:186-196.

Dunkle, S.W. 2000. Dragonflies Through Binoculars: A Field Guide to Dragonflies of North America. Oxford University Press, Inc., New York, NY. 266 pp.

EPA (Environmental Protection Agency). 2003. Clean Water Act History. February 20th, 2003. http://www.epa.gov/region5/water/cwa.htm

Epler, J.H. 1996. Identification Manual for the Water Beetles of Florida (Coleoptera: Dryopidae, Dytiscidae, Elmidae, Gyrinidae, Haliplidae, Hydraenidae, Hydrophilidae, Noteridae, Psephenidae, Ptilodactylidae, Scirtidae). Bureau of Water Resource Protection, Florida Department of Environmental Protection. Tallahassee, FL. 263 pp.

FDEP (Florida Department of Environmental Protection). 2004. Standard Operation Procedures (SOPs) effective June 8, 2004. DEP-SOP-001/01-FS 7000, General Biological Community Sampling; DEP-SOP-002/01-LT 7000 Determination of Biological Indices; DEP-SOP-002/01-LT 7100 BioRecon Determination. http://www.floridadep.org/labs/qa/sops.htm

Ferrey, S. 2001. Environmental Law: Examples and Explanations. Second Edition. Aspen Law & Business, New York, NY. 615 pp.

Fore, L. S. 2003. Developing Biological Indicators: Lessons Learned from Mid-Atlantic Streams. U.S. Environmental Protections Agency, Office of Environmental Information and Mid-Atlantic Integrated Assessment Program, Region 3, Ft. Meade, MD. EPA 903/R-003/003. www.epa.gov/bioindicators/

Fore, L.S. 2004. Development and Testing of Biomonitoring Tools for Macroinvertebrates in Florida Streams. Final Report to Florida Department of Environmental Protection. February 2004. Statistical Design, Seattle, Washington. 74 pp.

Fore, L. S. and C. Grafe. 2002. Using diatoms to assess the biological condition of large rivers in Idaho (USA). Freshwater Biology 47:2015-2037.

Gallant, A.L., T.R. Whittier, D.P. Larsen, J.M. Omernik, and R.M. Hughes. 1989. Regionalization as a tool for managing environmental resources. EPA/600/3-89/060. U.S. Environmental Protection Agency, Environmental Research Laboratory, Corvallis, OR. 152p.

Griffith, L.M., R.C. Ward, G.B. McBride and J.C. Loftis. 2001. Data Analysis Considerations in Producing Comparable Information for Water Quality Management Purposes. Colorado State University. 45 pp.

Hamilton, S.W. and J.C. Morse. 1990. Southeastern caddisfly fauna: origins and affinities. Florida Entomologist, 73:587-600.

Harris, S. C. 2002. New species of microcaddisflies (Trichoptera: Hydroptilidae) from northern Florida. Annals of the Carnegie Museum, 71:47-57.

Harris, S.C. and B.J. Armitage. 1987. New Hydroptilidae (Trichoptera) from Florida. Entomological News 98(3): 106-110.

Harris, S.C., P.K. Lago and J.F. Scheiring. 1982. An annotated list of Trichoptera of several streams on Eglin Air Force Base, Florida. Entomological News. 93(3) 79-84.

Hawkins, C. P., R. H. Norris, J. N. Hogue, and J. W. Feminella. 2000. Development and evaluation of predictive models for measuring the biological integrity of streams. Ecological Applications:10:1456–1477.

Hellawell, J.M. 1986. Biological Indicators of Freshwater Pollution and Environmental Management. Elsevier, London. 546 pp.

Herod, J.J. and T.A. Thom. 2004. Stream Assessment Program (SAP): Assessment tools targeting multiple scales and ecological parameters to provide decision support for managing Eglin AFB stream systems. Interim Report to Eglin Air Force Base, Jackson Guard, Niceville, Florida. 147 pp.

Hughes, R. M., D. P Larsen, and J. M. Omernik, 1986. Regional Reference Sites: A Method for Assessing Stream Potentials. Environmental Management 10(5):629-635.

Hughes, R. M., P. R. Kaufmann, A. T. Herlihy, T. M. Kincaid, L. Reynolds and D. P. Larsen. 1998. A process for developing and evaluating indices of fish assemblage integrity. Canadian Journal of Fisheries and Aquatic Sciences 55:1618-1631.

Hughes, R. M. and T. Oberdorff. 1998. Application of IBI Concepts and Metrics to Waters Outside the United States (pp. 79-93). *In:* Assessing the Sustainability and Biological Integrity of Water Resources Using Fish Communities. T.P. Simon (Ed) CRC Press, Boca Raton, FL. 671pp.

Jackson, L.E., J.C. Kurtz, and W.S. Fisher. 2000. Evaluation Guidelines for Ecological Indicators. U.S. Environmental Protection Agency, Office of Research and Development, Research Triangle Park, NC. EPA-620-R-99-005. 107 pp.

Johnson, R.K., T. Wiederholm, and D.R. Resh. 1993. Freshwater biomonitoring using individual organisms, populations, and species assemblages of benthic macroinvertebrates, pp. 40-158. *In*: Freshwater biomonitoring and benthic macroinvertebrates. D.M. Rosenberg and V.H. Resh (Eds.). Chapman and Hall, New York. 488 pp.

Karr, J.R. 1981. Assessment of biotic integrity using fish communities. Fisheries 6(6):21-27.

Karr J.R. 1991. Biological integrity: a long-neglected aspect of water resource management. Ecological Applications 1:66-84.

Karr J.R. and E.W. Chu. 1999. Restoring Life in Running Waters: Better Biological Monitoring. Island Press, Washington, DC. 206 pp.

Karr, J.R., J.D. Allan and A.C. Benke. 2000. River Conservation in the United States and Canada, pp. 3-39. *In:* Global Perspectives on River Conservation: Science, Policy, Practice. P. J. Boon, B.R. Davies and G. E. Petts (Eds.). John Wiley & Sons, Inc., Chichester, England. 564 pp.

Karr, J.R., K.D. Fausch, P.L. Angermeier, P.R. Yant and I.J. Schlosser. 1986. Assessment of biological integrity in running water: a method and its rationale. Illinois Natural History Survey, Special Publication Number 5, Champaign, IL. 28 pp.

Kindell, C.E., B.J. Herring, C. Nordman, J. Jensen, A.R. Schotz, and L.G. Chafin. 1997. Natural community survey of Eglin Air Force Base, 1993-1996: Final Report. Florida Natural Areas Inventory, Tallahassee, Florida. 124 pp.

Klemm, D.J., K.A. Blocksom, F.A. Fulk, A.T. Herlihy, R.M. Hughes, P.R. Kaufmann, D.V. Peck, J.L. Stoddard, W.T. Thoeny, M.B. Griffith and W.S. Davis. 2003. Development and evaluation of a macroinvertebrate biotic integrity index (MBII) for regionally assessing Mid-Atlantic Highlands streams. Environmental Management 31(5):656-669.

Lago, P.K. and S.C. Harris. 1983. New Species of Trichoptera from Florida and Alabama. Annals of the Entomological Society of America: 76(4) 664-667.

Lam, E. 2004. Damselflies of the Northeast: A guide to the species of eastern Canada & the northeastern United States. Biodiversity Books, Forest Hills, NY. 96 pp.

Leslie, M., G.K. Meffe, J.L. Hardesty and D.L. Adams. 1996. Conserving Biodiversity on Military Lands: A Handbook for Natural Resource Managers. The Nature Conservancy. Arlington, VA.

McCafferty, W.P. 1981. Aquatic Entomology: The Fisherman's and Ecologists' Illustrated Guide to Insects and Their Relatives. Jones and Bartlett Publishers, Sudbury, MA. 448 pp.

McCarron, E. and R. Frydenborg. 1997. The Florida bioassessment program: an agent for change. Human and Ecological Risk Assessment 3:967-977.

Merritt, R.W. and K.W. Cummins. 1996. An Introduction to the Aquatic Insects of North America. Kendall and Hunt Publishing Company; Dubuque, Iowa. 3rd edition. 862 pp.

Needham, J.G., M.J. Westfall Jr., and M.L. May. 2000. Dragonflies of North America. Scientific Publishers, Inc., Gainesville, FL. 940 pp.

Neill, W.T. 1957. Historical biogeography of present-day Florida. Bulletin of the Florida State Museum, 2:175-221.

Norris, R.H. and A. Georges. 1993. Analysis and interpretation of benthic macroinvertebrate surveys, pp. 234-286. *In:* Freshwater biomonitoring and benthic macroinvertebrates. D.M. Rosenberg and V.H. Resh (Eds.). Chapman and Hall, NY. 488 pp.

NRC (National Research Council). 2001. *Assessing the TMDL Approach to Water Quality Management*. Water Science and Technology Board, Division on Earth and Life Studies. National Academy Press, Washington, DC. 122pp.

Omernik, J.M. 1995. Ecoregions: A spatial framework for environmental management (pp. 49-63). *In:* Biological Assessment and Criteria: Tools for Water Resource Planning and Decision Making. W.S. Davis and T.P. Simon (Eds.) Lewis Publishers, Boca Raton, FL. 415pp.

Patterson, G. and B. Morrison. 1993. Invertebrate animals as indicators of acidity in upland streams. Forestry Commission Field Book 13. HMSO Publications, London, England. 28pp.

Pescador, M.L., A.K. Rasmussen, and B.A. Richard. January 2000. A Guide to the Stoneflies (Plecoptera) of Florida. Division of Water Resources Management. Florida Department of Environmental Protection. Tallahassee, FL. 166pp.

Pescador, M.L., A.K. Rasmussen and S.C. Harris. 2004. Identification Manual for the Caddisfly (Trichoptera) Larvae of Florida – revised edition 2004. State of Florida Department of Environmental Protection, Division of Water Resource Management, Tallahassee, Florida. 136 pp.

Pescador, M.L. and B.A. Richard. 2004. Guide to the Mayfly (Ephemeroptera) Nymphs of Florida. State of Florida Department of Environmental Protection, Division of Water Resource Management, Tallahassee, Florida. 168pp.

Plafkin, J.L., M.T. Barbour, K.D. Porter, S.K. Gross and R.M. Hughes. 1989. Rapid Bioassessment Protocols for use in Streams and Rivers: Benthic Macroinvertebrates and Fish. U.S. Environmental Protection Agency, Office of Water Regulations and Standards, Washington, D.C. EPA 440-4-89-001. 187 pp.

Rasmussen, A.K. 2004. Species diversity and ecology of Trichoptera (Caddisflies) and Plecoptera (Stoneflies) in ravine ecosystems of northern Florida. Dissertation; University of Florida, Gainesville, FL. 139 pp.

Rasmussen, A.K. and M.L. Pescador. 2002. A Guide to the Megaloptera and Aquatic Neuroptera of Florida. Division of Water Resources Management. Florida Department of Environmental Protection. Tallahassee, FL. 75 pp.

Resh, V.H. and D.M. Rosenberg. 1996. Use of aquatic insects in biomonitoring, pp. 87-97. *In:* An introduction to the aquatic insects of North America. R.W. Merritt, and K.W. Cummins (Eds.). Kendall/Hunt Publishing Company, Dubuque, Iowa. 862 pp.

Resh, V.H. and E.P. McElravy. 1993. Contemporary quantitative approaches to biomonitoring using benthic macroinvertebrates, pp. 159-194. *In:* Freshwater biomonitoring and benthic macroinvertebrates. D.M. Rosenberg and V.H. Resh (Eds.). Chapman and Hall, NY. 488 pp.

Resh, V.H. and J.K. Jackson. 1993. Rapid assessment approaches to biomonitoring using benthic macroinvertebrates, pp. 195-233. *In:* Freshwater biomonitoring and benthic macroinvertebrates. D.M. Rosenberg and V.H. Resh (Eds.). Chapman and Hall, NY. 488 pp.

Resh, V.H., M.J. Myers, and M.J. Hannaford. 1996. Macroinvertebrates as biotic indicators of environmental quality, pp. 647-667. *In:* Methods in Stream Ecology. F.R. Hauer and G.A. Lamberti (Eds.). Academic Press, San Diego, CA. 674 pp.

Richardson, J.S. 2003. Identification Manual for the Dragonfly Larvae (Anisoptera) of Florida. Division of Resource Assessment and Management. Florida Department of Environmental Protection. Tallahassee, FL. 122 pp.

Rogers, J.S. 1933. The ecological distribution of the crane-flies of northern Florida. Ecological Monographs, 3:1-74.

Rosenberg, D. M., and V.H. Resh. 1993a. Introduction to freshwater biomonitoring and benthic macroinvertebrates, pp.1-9. *In:* Freshwater biomonitoring and benthic macroinvertebrates. D.M. Rosenberg and V.H. Resh (Eds.). Chapman and Hall, NY. 488 pp.

Rosenberg, D. M., and V.H. Resh (Eds.). 1993b. Freshwater Biomonitoring and Benthic Macroinvertebrates. Chapman and Hall, New York. 488 pp.

Scheiring, J.F. and R.C. Crews. 1983. Benthic Macro-Invertebrates of Bull Creek and Ramer Branch, Eglin AFB Reservation. Final Technical Report: August 1979 – June 1980. Air Force Armament Laboratory, Eglin AFB. AFATL-TR-83-24. 41pp.

Scheiring, J.F., R.C. Crews and S.M. Lefstad. 1981. Benthic Macroinvertebrates of Rocky Creek, Eglin Air Force Base, Florida. Final Technical Report: July 1978 – June 1979. Air Force Armament Laboratory, Eglin AFB. AFATL-TR-81-95. 48 pp.

Simon, T.P and J. Lyons. 1995. Application of the Index of Biotic Integrity to Evaluate Water Resource Integrity in Freshwater Ecosystems. (pp. 242-262). *In:*Biological Assessment and Criteria: Tools for Water Resource Planning and Decision Making. W.S. Davis and T.P. Simon (Eds.) Lewis Publishers, Boca Raton, FL. 415pp.

Strahler, A.N. 1952. Hyposometric (area-altitude) analysis of erosional topography. Bulletin of the Geologic Society of America. 63:117-1142.

Stein, B.A., L.S. Kutner and J.S. Adams. 2000. Precious Heritage: The Status of Biodiversity in the United States. Oxford University Press, Inc., New York, New York. 399 pp.

Thom, T.A. and J.J. Herod. 2002. Stream Monitoring Program: FY2002 Annual Report and Program Summary for Fiscal Years 1999-2002. Summary report for Eglin Air Force Base, Natural Resource Management Branch, Jackson Guard, FL. 25 pp.

Thom, T.A. and J.J. Herod. 2005. Aquatic Inventory of Eglin Air Force Base and Recommendations for Long-Term Aquatic Ecosystem Management. Technical Report to Eglin Air Force Base. 244 pp & appendices. April 2005.

Thorne, Richard J. and W. Peter Williams. 1997. The response of benthic macroinvertebrates to pollution in developing countries: a multimetric system of bioassessment. Freshwater Biology 37: 671-686.

USEPA (U.S. Environmental Protection Agency). 1996. Summary of state biological assessment programs for streams and rivers. U.S. Environmental Protection Agency, Office of Policy, Planning, and Evaluation, Washington, DC. EPA 230-R-96-007.

USEPA (U.S. Environmental Protection Agency). 1998. Lake and Reservoir Bioassessment and Biocriteria: Technical Guidance Document. U.S. Environmental Protection Agency, Washington, DC. EPA 841-B-98-007. www.epa.gov/owow/monitoring/tech/lakes.html

USEPA (U.S. Environmental Protection Agency). 2000. Stressor Identification Guidance Document. U.S. Environmental Protection Agency, Office of Water. Washington, DC. EPA-822-B-00-025.

USEPA (U.S. Environmental Protection Agency). 2002. Summary of Biological Assessment Programs and Biocriteria Development for States, Tribes, Territories, and Interstate Commissions: Streams and Wadeable Rivers. U.S. Environmental Protection Agency. EPA-822-R-02-048.

USEPA (U.S. Environmental Protection Agency). 2003. Elements of a State Water Monitoring and Assessment Program. Assessment and Watershed Protection Division. Office of Wetlands, Oceans and Watershed. EPA 841-B-03-003. March 2003. 25pp.

USEPA (U.S. Environmental Protection Agency). 2005. DRAFT: Use of Biological Information to Better Define Designated Aquatic Life Uses in State and Tribal Water Quality Standards: Tiered Aquatic Life Uses – August 10, 2005. U.S. Environmental Protection Agency. Health and Ecological Criteria Division, Office of Science and Technology. Washington, DC. 208 pp.

Wallace, J.B. and N.H. Anderson. 1996. Habitat, Life History and Behavioral Adaptations of Aquatic Insects. pp. 41-73 In: An Introduction to the Aquatic Insects of North America. Ed. R.W. Merritt and K.W. Cummins. Kendall/Hunt Publishing Company. Dubuque, Iowa. 862 pp.

Ward, J.V. and J.A. Stanford. 1979. The ecology of regulated streams. Plenum, NY. 398 pp.

Westfall, M.J. Jr. and M.L. May. 1996. Damselflies of North America. Scientific Publishers, Inc., Gainesville, FL . 650 pp.

Wiggins, G.B. 1998. Larvae of the North American Caddisfly Genera of North America. University of Toronto Press, Inc., Toronto, Canada. 2nd edition. 457 pp.

Whittier, T.R., R.M. Hughes, and D.V. Peck. 2001. Comment: Test of an index of biotic integrity. Transactions of the American Fisheries Society. 130(1):169-172.

Yoder, C.O. and E.T. Rankin. 1995. Biological Criteria Program Development and Implementation in Ohio (pp. 109-144). *In:*W.S. Davis and T.P. Simon (Eds). Biological Assessment and Criteria: Tools for Water Resource Planning and Decision Making. Lewis Publishers, Boca Raton, FL. 415pp.

Yoder, C.O. and E.T. Rankin. 1998. The role of biological indicators in a state water quality management process. Environmental Monitoring and Assessment 51:61-88.

CHAPTER 4

EFFECTS OF NATIONWIDE POLICIES AND LITIGATION ON BIOMONITORING IN THE SOUTHEASTERN UNITED STATES[1]

[1] Thom, T.A. and L. Huff. To be submitted to *Conservation in Practice*.

ABSTRACT

Since its inception, the United States Environmental Protection Agency (USEPA) has attempted to protect human health and the environment in which we live using a broad, holistic approach. Legislation such as the Clean Water Act directly affects how freshwater resources are protected across multiple spatial scales. This includes long-term monitoring and evaluation, for which USEPA sets specific guidelines and standards. The purpose of this paper was to evaluate the effect litigation surrounding TMDL development and implementation at the federal level has had on state biological monitoring programs for the eight Southeastern states within USEPA Region IV (AL, FL, GA, KY, MS, NC, SC and TN).

We compared biological monitoring programs between 1996 and 2004, specifically addressing what types of freshwater habitats were sampled, what bioassessment tools were used, what programs biological monitoring supported, and the number of biologists performing bioassessments within each state. We found significant differences in biological monitoring programs from 1996 to 2004. The majority of biological assessments were conducted in wadeable streams using macroinvertebrates in both years, with a significant increase in the use of Chlorophyll a for assessing lakes and reservoirs. The majority of biological samples collected in 2004 supported work with 303(d) listing and TMDL development – a major shift from 1996. From 1996 to 2004, there was a significant increase in the number of bioassessments performed. There was also an increase in the number of biologists employed at the state level, although on average, the years of experience for each biologist performing bioassessments declined. This program analysis is critical for adaptive management within state biomonitoring programs, and contributes to the process of more effective water quality assessment and protection mainly at the State level in the Southeast.

INTRODUCTION

The Environmental Protection Agency was created as a consequence of the passage of the National Environmental Policy Act (NEPA). Congress enacted NEPA in 1970, with the stated purposes:

- "To declare a national policy which will encourage productive and enjoyable harmony between man and his environment."
- "To promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man."
- "To enrich our understanding of the ecological systems and natural resources important to the Nation."

NEPA established the Council on Environmental Quality (CEQ), an agency charged with giving general advice on environmental issues (i.e. reviewing Environmental Impact Statements for major federal actions) (Ferrey 2001). As part of the Executive Office of the President, the CEQ's first job was to prepare guidelines for federal agencies as they began to implement NEPA.

One of the first recommendations was to create an independent agency to make a coordinated attack on the pollutants that harm human health and degrade the environment. The main purpose of this was to introduce a "broad systems approach [that]...would give unique direction to our war on pollution" (USEPA 2005). Viewing "the environment as a whole", and treating "air pollution, water pollution and solid wastes as different forms of a single problem" were some of the main objectives for this new independent agency, the Environmental Protection Agency (USEPA 2005).

The U.S. Environmental Protection Agency (USEPA) was established in 1970 by Executive Order of President Richard Nixon to consolidate a variety of federal activities including environmental research, monitoring, standards and policy setting, and enforcement activities into one agency. USEPA's mission is to protect human health and to safeguard the natural environment (i.e. air, water, and land) (USEPA 2005). Functionally, the USEPA is organized into ten regions, with each region consisting of several states and Tribal Nations. Region IV includes eight southeastern states: Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, and Tennessee; with the Regional Office in Atlanta, Georgia.

USEPA develops regulations, policies, and guidance for implementation by the states, and oversees that states' activities are consistent with the Clean Water Act (CWA) and relevant water quality standards regulations (40 CFR Part 131). Under the CWA, states have primary responsibility for

establishing, reviewing, revising, and enforcing water quality standards. To establish water quality standards, states designate the use(s) of each State waterway and adopt water quality criteria necessary to protect those uses (§303(c)). Examples of designated uses include water contact recreation and public water supply, with water quality criteria that can be either narrative or numeric. States are required to protect biological integrity as part of these water quality standards. Specifically in §303(c) subsection 2A, water quality standards must take into account "propagation of fish and wildlife" (33 U.S.C. 1312 et seq.). Subsection 2B (§303(c)) requires that whenever a State reviews, revises or adopts new water quality standards, the State must adopt specific numerical criteria to support the designated use. If numeric criteria are unavailable, criteria for pollutants should be based on biological monitoring or other assessment methods. Within §303(d), Subsections 1A and B, each State is required to identify waters not meeting their designated uses, including "protection and propagation of a balanced indigenous population of shellfish, fish, and wildlife" (33 U.S.C. 1312 et seq.).

The CWA specifically addresses biological integrity in Section 101(a) as a goal of the program. Within Section 303(c), water quality standards can and should include provisions for restoring and maintaining chemical, physical and biological integrity. When uses of waterbodies are determined, they can and should include protection and propagation of fish, shellfish and wildlife. Impaired determined using biological criteria, monitoring uses biological components.

For waterbodies not meeting water quality standards, Section 303(d) of CWA requires states to report these waterbodies as impaired. Total Maximum Daily Loads (TMDLs) are then developed to determine the maximum amount of pollutant load the waterbody can receive and still meet water quality standards (for legal definition see 40 CFR 130.2(i)). Both point and nonpoint source pollutants are included in the analysis at the basin/catchment/watershed scale (Jarrell 1999). Basically, TMDLs are a tool for specifically addressing cumulative impacts to waterbodies at a watershed scale. As stated by USEPA (1998), "The primary mission of the TMDL program is to protect public health and the health of impaired aquatic ecosystems by ensuring attainment of water quality standards, including beneficial uses."

Actual development of TMDLs for listed waterways by states was not effectively pursued until environmental organizations in a number of states sued USEPA (Copeland 1997; Jarrell 1999). Beginning in 1984, multiple lawsuits were filed regarding USEPA's failure to compel states to list impaired waterways and subsequently develop TMDLs. In the first case, Scott v. City of Hammond, 530F.Supp.288(N.D.Ill.1981),741 F.2d 992,(7th Cir. 1984), Illinois, Indiana, Michigan and Wisconsin challenged that EPA had to develop TMDLs for Lake Michigan if they failed to do so (Copeland 1997; USGS 1997). At the time, none of the states had submitted determinations that TMDLs were needed for Lake Michigan, and the case was denied.

In another early case, (Alaska Center for the Environment v. Reilly, 762F. Supp. 1422-29 upheld the appeal 20F.3d 981 (9th Cir. 1994)), all parties involved agreed that no TMDL had been developed, and that the State of Alaska had not started any part of the TMDL process despite data from Alaska's 1988 305(d) report documenting hundreds of impaired waterways. In this case the court ruled that EPA should initiate its own process of establishing TMDLs for impaired waterways (USGS 1997).

Currently EPA is under court order to develop TMDLs in 23 states if the states do not; this includes five out of eight states in EPA Region IV (AL, FL, GA, MS, TN) (USEPA 2004).

High biological diversity within the Southeast is well documented (Hackney et al. 1992; Laerm et al. 1980; Mac et al. 1998; Martin et al. 1993; Stein et al. 2000; Whitney et al. 2004). Conservation of the biological diversity in this region is especially challenging due to increasing human population growth. Based on population growth between 2000 and 2001, five out of the top ten fastest growing counties in the U.S. were within EPA Region IV: Forsyth, Henry and Paulding counties in Georgia, Spencer County in Kentucky and Flagler County in Florida (US Census Bureau 2002). Aquatic habitats are sensitive to the major land use changes associated with population growth. Especially in the Southeast, freshwater habitats are experiencing significant declines in both population distribution and abundance for native aquatic species (Benz and Collins 1997).

In order to provide a forum for exchange of critical information and novel approaches to the most pressing water quality issues facing the Southeast, including biodiversity loss, the Southeastern Water

Pollution Biologist Association (SWPBA) was created in the mid-1970s. The primary goal of SWPBA is to provide an annual forum where EPA Region IV biologists can interact with state biologists (FDEP 2005). Typically held annually, SWPBA meetings now provide a framework for coordination and standardization of current assessment techniques at the state level, as well as region-wide protection and conservation efforts. SWPBA's focus on evaluation of long-term monitoring and assessment protocols brings scientific experts together with field biologists to ensure the best technology and techniques are utilized for natural resource management. This paper summarizes biological assessment evaluation completed through the SWPBA forum. The objectives of this study were to provide an analysis of statewide biological monitoring programs within Region IV. Specifically we wanted to know if litigation surrounding TMDL implementation and development had changed the number of bioassessments being conducted and the different types of programs being supported within statewide biological monitoring programs. This type of program evaluation is critical for adaptive management and contributes to the process of more effective water quality assessment and protection at local, state and federal levels in the Southeast.

METHODS

In an effort to assess the potential effects of the legislation itself on state biological assessment programs, program evaluations were sent to state biologists within Region IV. Evaluations focused on 1996 and 2004. This timeframe corresponds with litigation on development and implementation of TMDLs for impaired waterbodies. The goals of the program evaluation were to determine the types of biological assessments completed in the Southeast, what aquatic habitats were surveyed, how many assessments were completed annually, what types of survey programs were missing, how many biologists were available for program support, what was their experience level, and how these aspects of statewide biological assessment changed since 1996. Survey categories focused on biological assessment programs only. Volunteers, student interns and temporary hires were not included in staffing data. Data were compiled in EXCEL and analyzed using JMP 4.0.

RESULTS

Freshwater Natural Resources

The types of habitats surveyed using various assessment techniques (based on State protocols) within EPA Region IV were summarized for several freshwater habitats: wadeable streams, lakes and reservoirs, springs, non-wadeable streams and rivers, and wetlands (Figure 4-1). Data for 1996 and 2004 were compared. Techniques used for assessment were also compared between habitats and years. In both

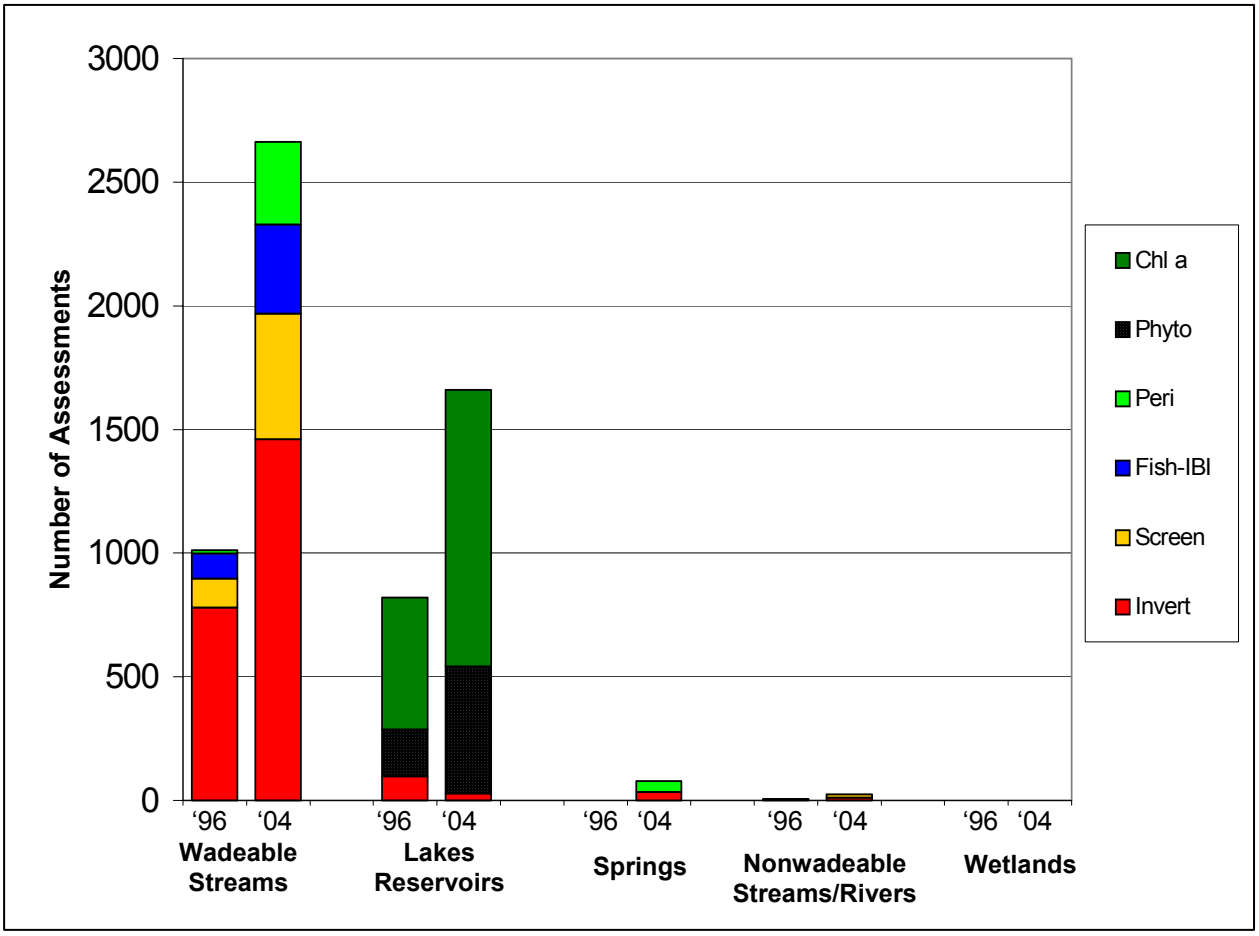

Figure 4-1. Comparison of waterbody types surveyed within EPA Region IV in 1996 and 2004 and the tools used to sample the respective habitats as outlined by State Standard Operating Procedures (Chlorophyll a, Phytoplankton, Periphyton, Fish-IBI, Invertebrate Screen (BioRecon), and Invertebrate Sampling. Data from 1996 are in the first columns for each habitat type.

survey years (1996 and 2004), the majority of bioassessments were conducted in wadeable streams (Figure 4-1). An increase in the use of Chlorophyll a for surveys of lakes and reservoirs occurred. Springs

were evaluated using periphyton and macroinvertebrates; bioassessments of springs were only conducted in Florida where biological assessment techniques for spring-fed systems are being developed. Very few non-wadeable streams were surveyed (6 in 1996 and 24 in 2004). Non-wadeable streams and rivers were only surveyed in South Carolina and Tennessee. Within Region IV, biological assessment tools have not been used to assess wetland habitats.

Specific comparison of the different types of bioassessment tools used within Region IV between 1996 and 2004 (Chlorophyll a, Phytoplankton, Periphyton, Fish-IBI, Invertebrate Screening (BioRecon) and Macroinvertebrate Sampling (SCI)) showed an overall increase in the number of bioassessments performed (2050 performed in 1996; 5542 performed in 2004) within Region IV (Figure 4-2).

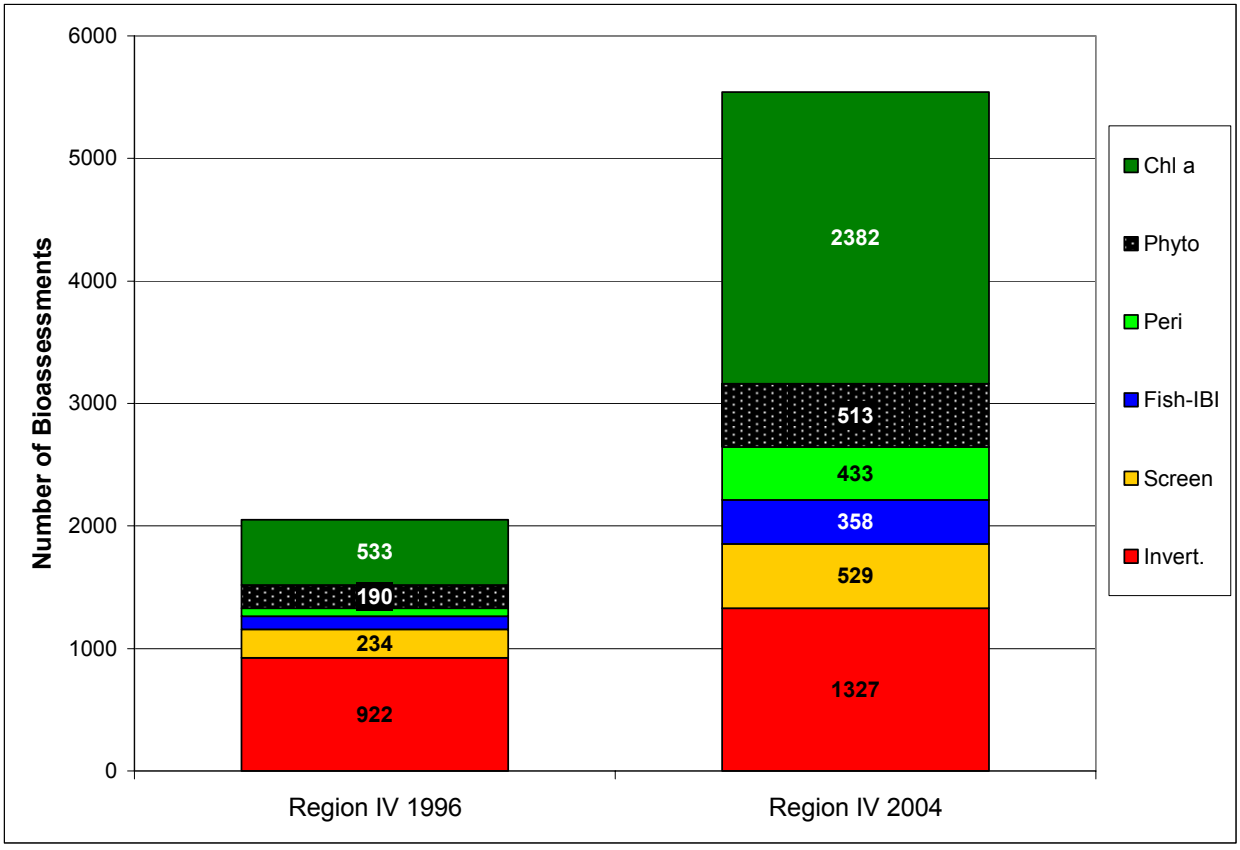

Figure 4-2. Comparison of different types of bioassessment tools used within Region IV (AL, FL, GA, KY, MS, NC, SC, TN) in 1996 and in 2004. Assessment tools included Chlorophyll a, Phytoplankton, Periphyton, Fish-IBI, Invertebrate Screen (BioRecon) and Invertebrate Sampling (SCI).

Invertebrates and Chlorophyll a were the most frequently used biological assessment tools. The increase in use of Chlorophyll a was directly related to increased sampling of lakes and reservoirs (Figure 4-1). Fish-based IBI (Index of Biotic Integrity) techniques to assess freshwater systems were used to support non-point source monitoring in Alabama, Kentucky, Mississippi and North Carolina.

Bioassessment Project Support

We analyzed the number of bioassessments completed in Region IV with the state programs they supported between 1996 and 2004 (Figure 4-3). The majority of assessments completed in 2004 supported aspects of 303(d) work, mainly screening potentially impaired waterways (303(d)/NPS Screen),

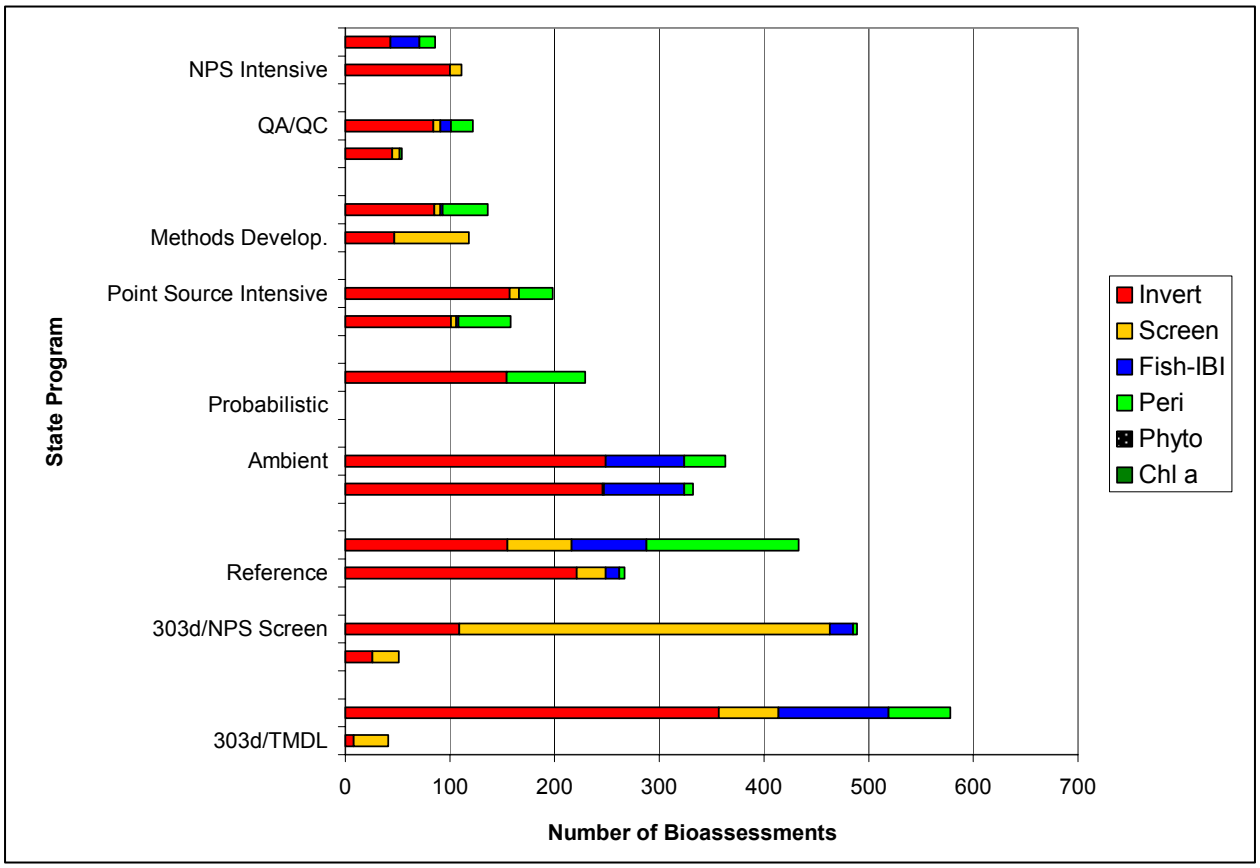

Figure 4-3. Comparison between 2004 (top bar) and 1996 for number of bioassessments performed in Region IV to support various state programs. Biological monitoring tools included invertebrate sampling, invertebrate screening (BioRecon), Fish-IBI work, Periphyton, Phytoplankton, and Chlorophyll a. State programs supported included Non-Point Source intensive surveys, QA/QC, Methods Development, Intensive Point Source Monitoring, Probabilistic, Ambient monitoring, Reference reach monitoring, 303(d) and Non-Point Source screening, and verification of 303(d) sites and TMDL development.

verification of 303(d) planning lists and TMDL work such as nutrient criteria development (303(d)/TMDL). All programs saw an increase in the use of biological sampling from 1996 to 2004 except Intensive Non-Point Source monitoring (NPS Intensive) (Figure 4-3, 4-4). There was a slight increase in the number of bioassessment samples conducted for methods development. This increase in methods development (using periphyton) was the result of several states implementing and testing the applicability of periphyton surveys for use in wadeable streams. Implementation of monitoring designs using probabilistic surveys (stratified random sampling design) in Florida, Kentucky and South Carolina accounted for the increase in support of that program (Probabilistic). Macroinvertebrate surveys were the main tool used to support all programs within Region IV in both 2004 and 1996. The increases in total number of biological samples for the majority of state programs was more dramatically apparent when percent change in total number of biological assessments was graphed (Figure 4-4).

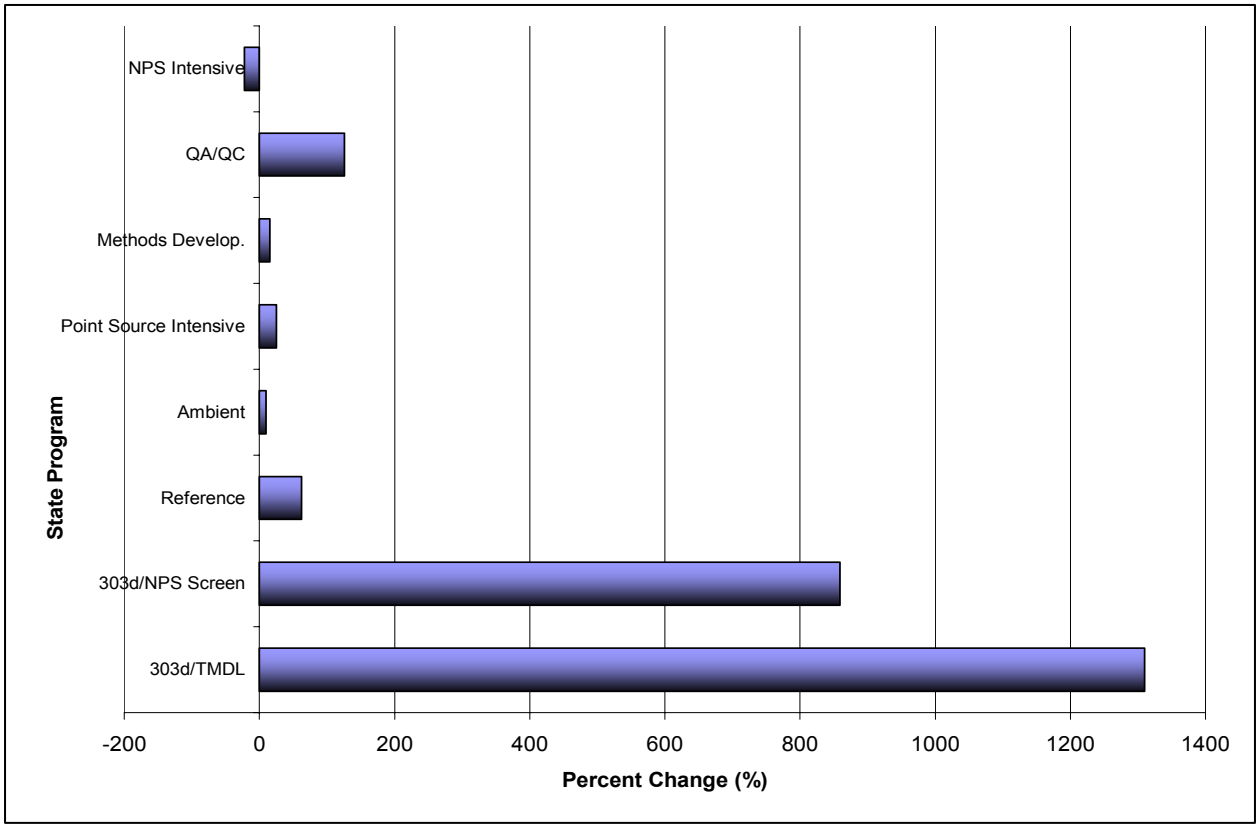

Figure 4-4. Percent change in number of biological samples conducted for each state program from 1996 to 2004 for states within EPA Region IV (AL, FL, GA, KY, MS, NC, SC and TN).

Although most programs showed an increase in use of biological assessment tools, support of TMDL work and 303(d) impaired waters had the most substantial increase (both screening and verification). Slight increases in the number of bioassessments targeting reference conditions were also completed, mainly to test the sensitivity of biological indicators.

State Program Personnel

With the considerable increase in the number of biological assessments being performed within Region IV, it is important to also examine aspects of staffing and personnel. We summarized the number of biologists employed by each state within Region IV (AL, FL, GA, KY, MS, NC, SC and TN) (Figure 4-5). We then compared the average number of biological assessments completed per biologist for each state within Region IV (Figure 4-6).

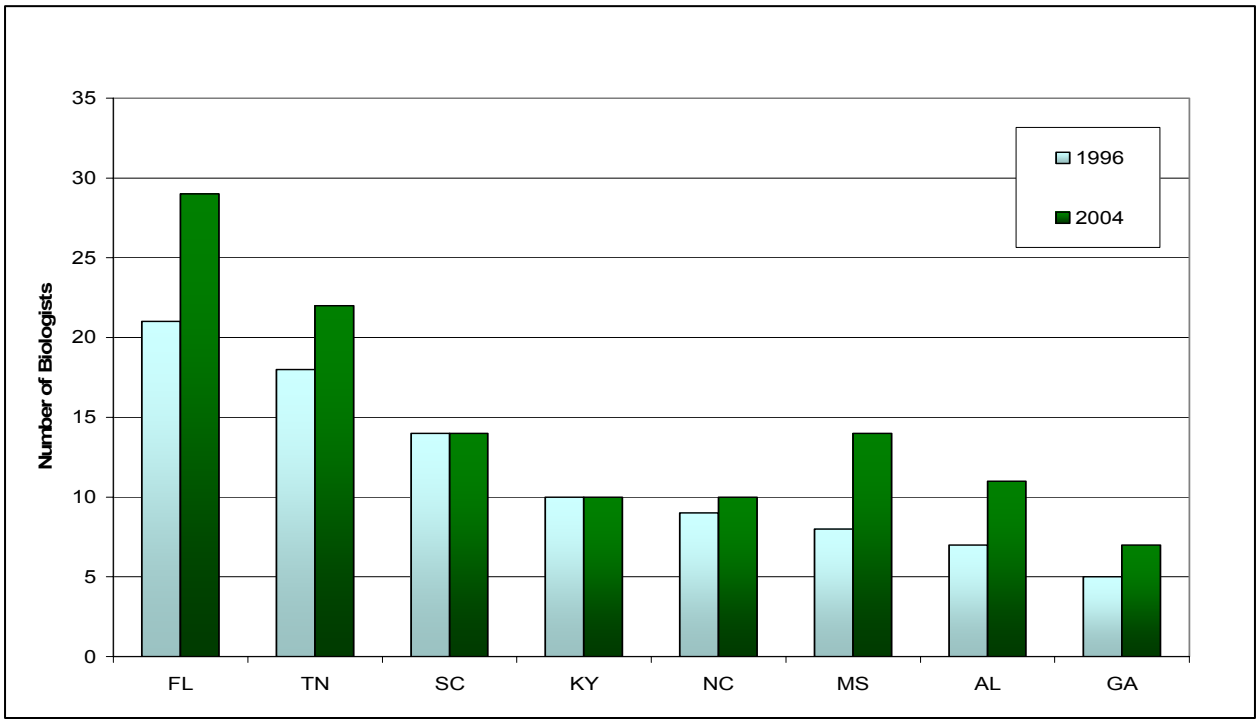

Figure 4-5. Number of biologists in each state within Region IV, compared between 1996 and 2004.

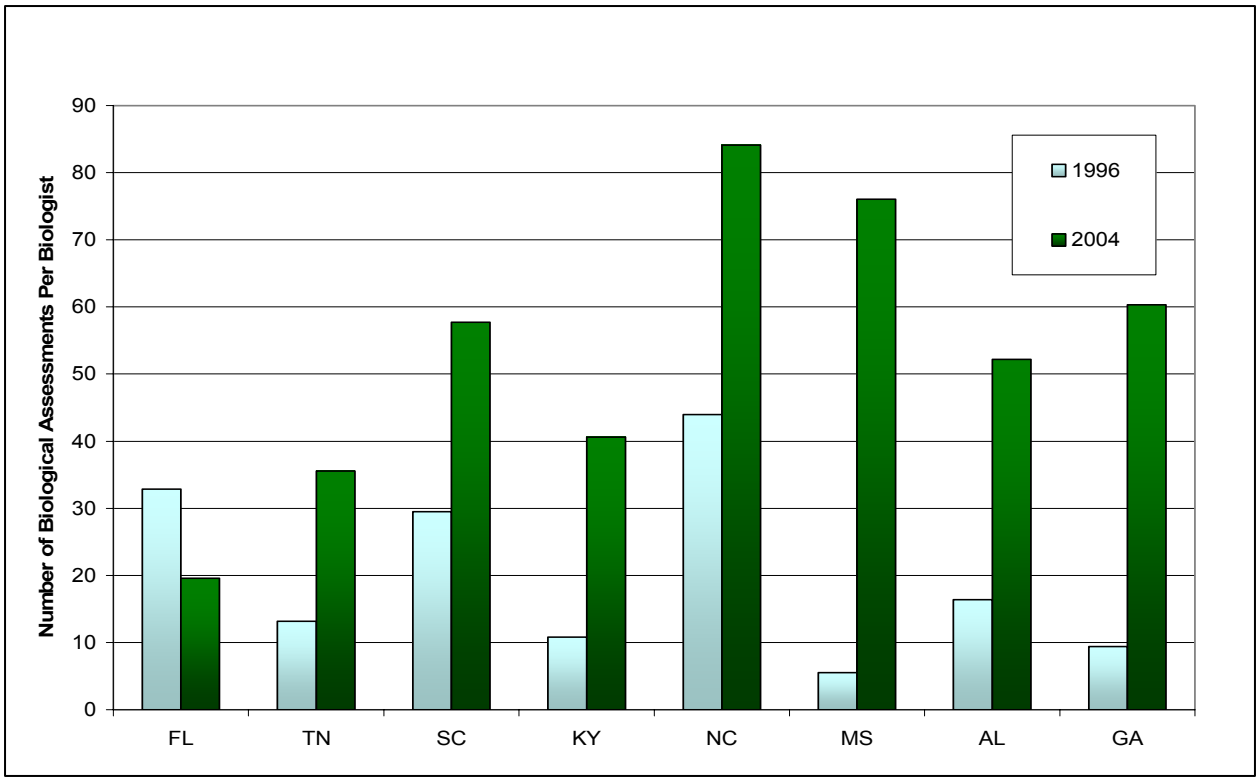

Figure 4-6. Average number of bioassessments completed per biologist in each state within Region IV, compared between 1996 and 2004.

Overall, the number of biologists for each state increased or stayed the same between 1996 and 2004, and the number of assessments each biologist was being asked to accomplish increased. Region wide, 87 biologists conducted bioassessments in 1996, and 121 biologists in 2004. This 39% increase in biologists completed an 88% increase in bioassessments from 1996 to 2004.

Within the realm of biological sampling, expertise and field experience are especially important (Bannister 2004). The majority of quality assurance procedures for biological data outline specific guidelines on training staff and standardization of experience (i.e. requiring participation in specialized certifications, scheduled re-evaluation, field techniques standardization/coordination). We accounted for experience for each state by calculating the number of biologist years – the total number of years conducting biological community assessment work summed for each biologist (Figure 4-7).

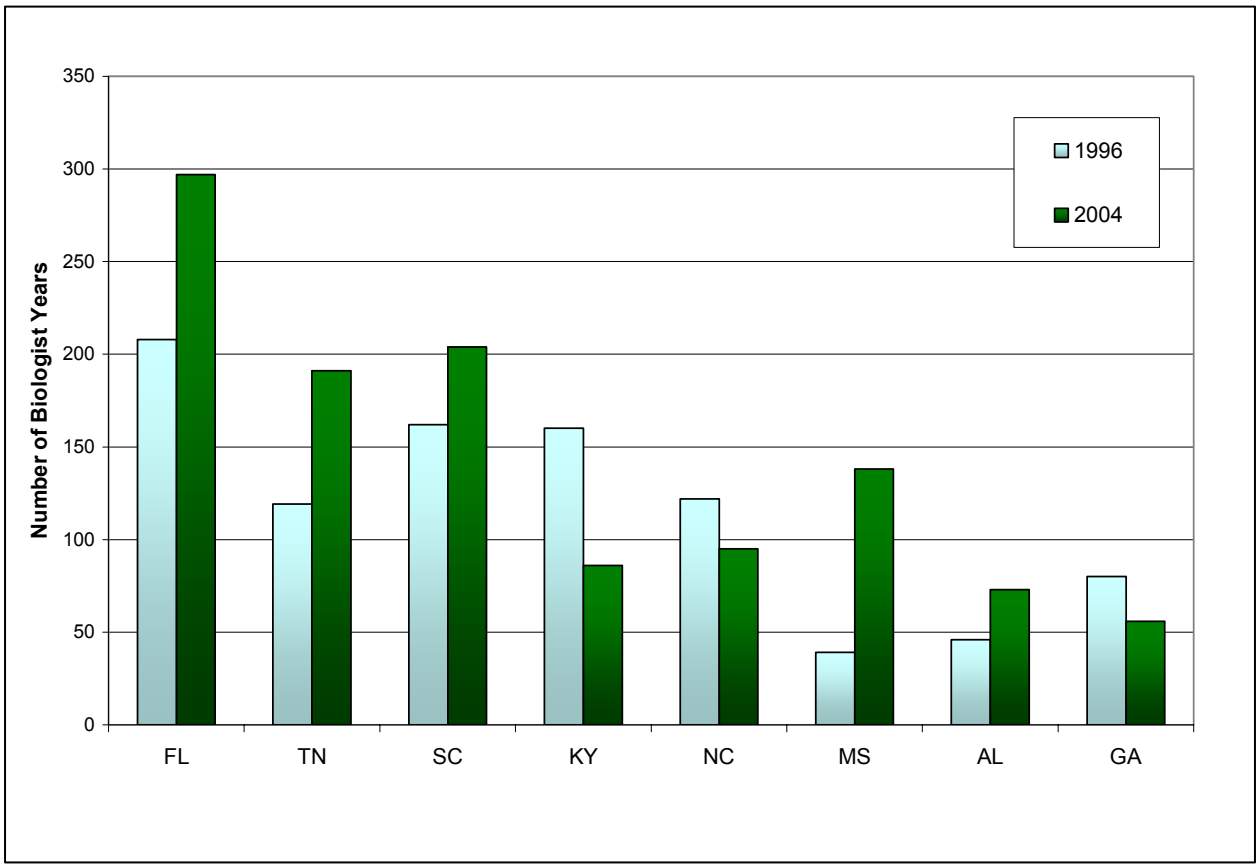

Figure 4-7. Total number of biologist years as calculated for states in Region IV by totaling the number of years conducting community bioassessment work for each biologist.

The majority of states had an increase in experience of biologists between 1996 and 2004. Biologist experience also illustrates staff succession; as biologists (with years of experience, sometimes >20 years) retire, new biologists with comparatively little experience are hired. In 2004, there were a significantly lower number of biologists with more than 20 years of sampling experience compared to 1996. With the current federal and state focus on bioassessments, the goal of a consistent biological assessment program should be to have an increasing number of biologists and an increasing or sustained level of experience. For Region IV, this is generally true, although Kentucky, North Carolina and Georgia all had declines in overall biological experience.

To further explore biologist succession in the workplace, we examined the number of personnel transfers, promotions, retirements and new hires for the workforce in Region IV. We were particularly interested in the number of retirements and the number of new hires (Figure 4-8).

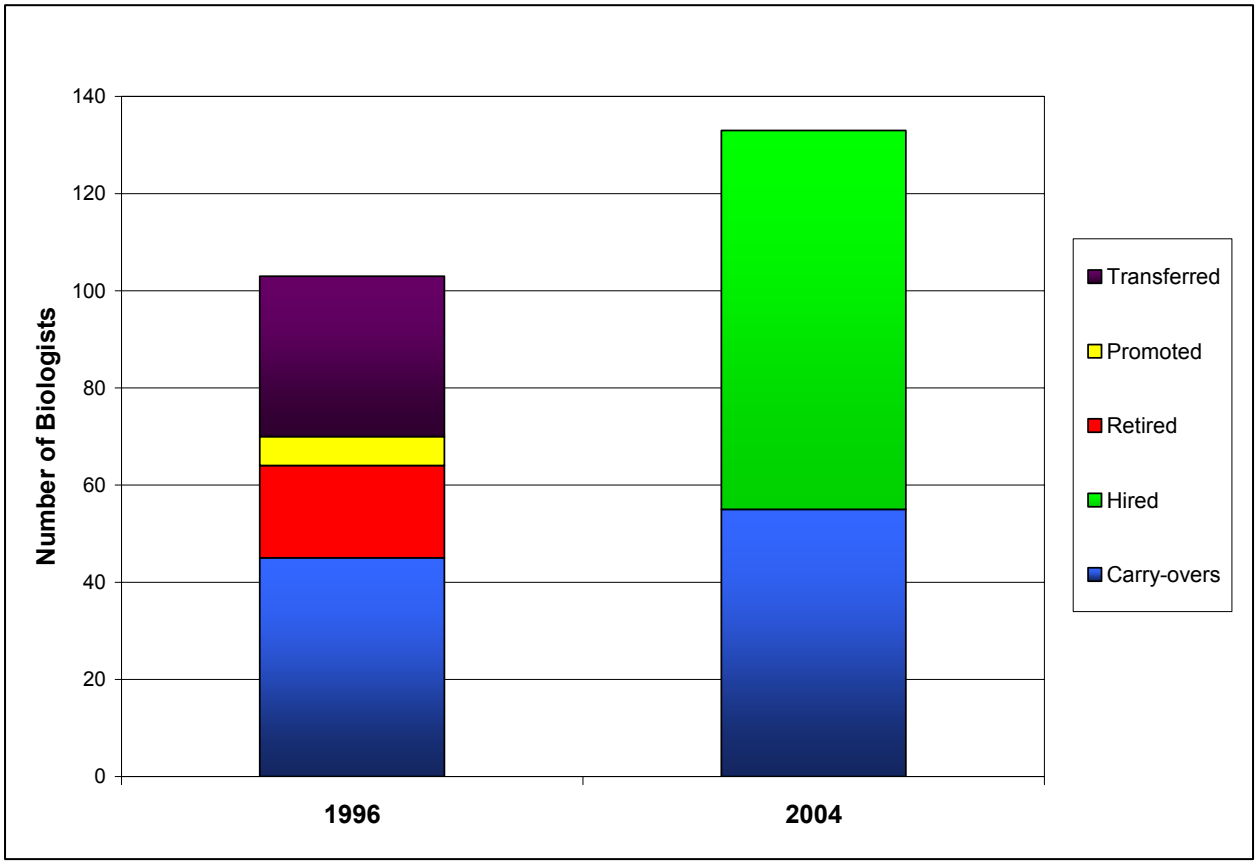

Figure 4-8. Factors influencing workplace succession (retirement, promotion, transfers and new hires) for biologists working in Region IV (AL, FL, GA, KY, MS, NC, SC and TN) for 1996 and 2004.

Biological Assessments and Listed Impaired Waterways

One of the primary goals of monitoring freshwater biological communities as set forth by the USEPA is to protect public health and aquatic ecosystems by ensuring attainment of water quality standards. We felt it was important to examine the percentages of freshwater habitats actually surveyed relative to the freshwater habitats within each state. Since most biological assessments have focused on wadeable freshwater streams (Barbour et al. 1999; Plafkin et al. 1989), we summarized the number of stream miles (total number and number of perennial stream miles) as reported in USEPA (2002) for each

state based on 1:50,000 maps. We then compared that number with the number of stream miles reported as assessed for biology by EPA (USEPA 2002) and the number of stream miles listed as impaired under 303(d) of the Clean Water Act (Figure 4-9).

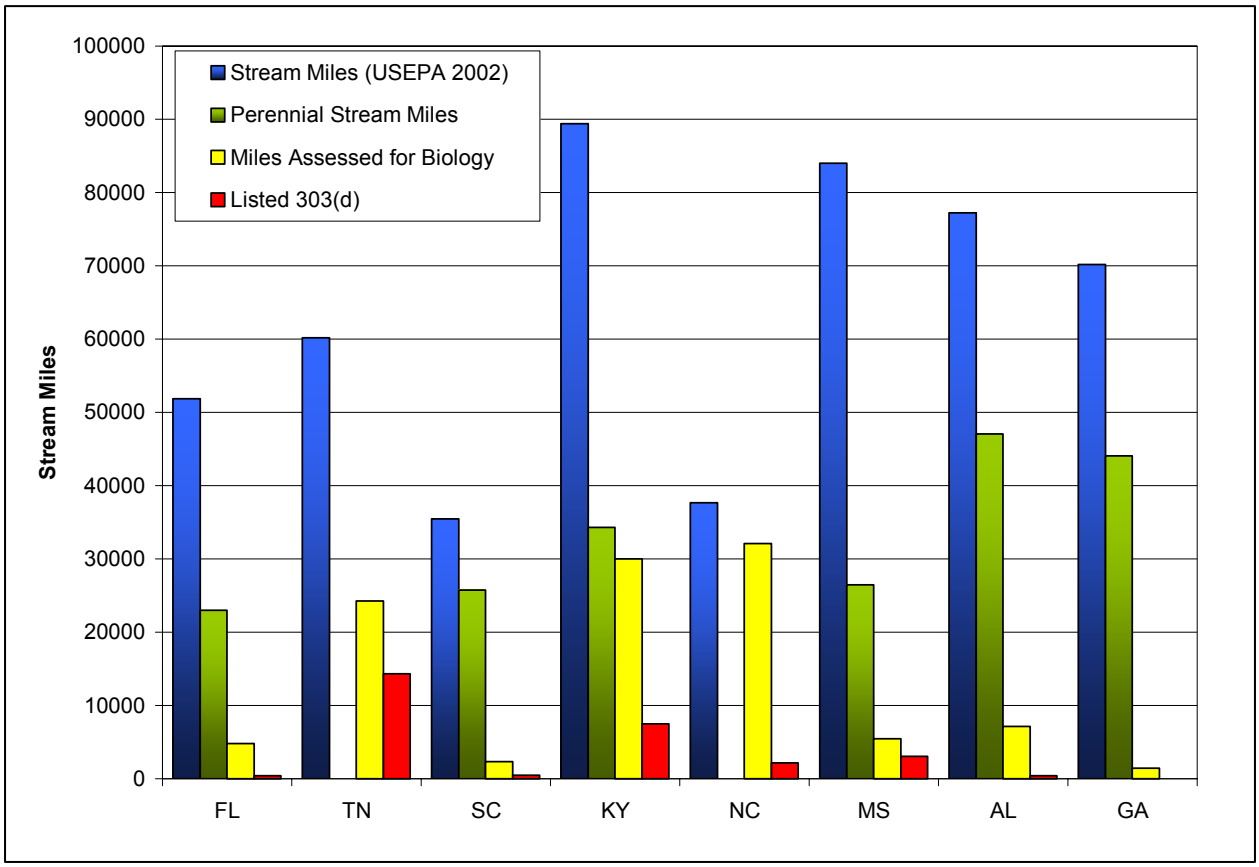

Figure 4-9. Summary of number of stream miles, number of perennial stream miles, number of miles assessed using biological tools, and the number of stream miles listed as impaired on the 303(d) list for each state within Region IV based on USEPA (2002).

Perennial stream miles ranged from 31% (Mississippi) to 72% (South Carolina) of total stream miles reported, although number of perennial stream miles was not determined for Tennessee or North Carolina. A wide range also exists between states for the percentage of stream miles sampled using biological techniques: 2% of total stream miles have been assessed using biological criteria in Georgia, 6% in Mississippi, and 85% in North Carolina. Reported 303(d) listed waterways made up the smallest percentages in Florida and Alabama (0.8% and 0.5% respectively), whereas Tennessee had the highest percentage of listed impaired waters (24%) compared to total stream miles. No listed waterways were

reported by Georgia in 2002 (USEPA 2002). However, according to 2002 Section 303(d) list fact sheet for Georgia, a total number of 446 impaired waters were reported in 2002 (EPA 2002). The discrepancy in reporting based on these two documents suggests potential data gaps within the USEPA 2002 biological monitoring programs summary report.

DISCUSSION

Within Region IV, the most biological sampling occurred in wadeable streams and rivers. A considerable number of lakes and reservoirs were also assessed using biological techniques. Florida was the only state that performed biological sampling in springs. Very few non-wadeable streams were surveyed using biological techniques, and no biological assessments were done on wetlands within Region IV. The reason for this distribution of biological sampling is the sampling protocols that are available, tested and approved for use by state biologists. Standard protocols and peer-reviewed literature detail most aspects of conducting biological surveys in wadeable streams, lakes and reservoirs. Currently, USEPA in Ohio is working on draft surveys for standardized large river sampling protocols. Within Florida, springs are an important biological resource and local community groups like Save Our Springs are working to assess the unique biology and historic value of these sensitive habitats. The state has recognized the need to assess and monitor freshwater springs and is beginning to develop monitoring strategies. Wetlands, while important to overall ecosystem health, water quality and quantity issues, are not currently addressed by state biological assessments. They are difficult to sample, and no one standardized guidance document has been created for biological assessment of wetlands.

The number of biological assessments conducted on an annual basis has greatly increased since 1996. This is the result of a combination of factors, including standardized protocols for surveys, and direct influence from EPA; 1996 was the last year when bioassessment programs were optional. Since 1996, USEPA has been forced to address the development and implementation of TMDLs for impaired waterways due to litigation primarily brought by citizen groups. Since 1996, there has been a dramatic increase in the number of biological assessments performed in support of the TMDL program. Thus, the

increase in biological assessments and work supporting TMDLs since 1996 is evidence for a strong link between administrative policies and field sampling.

Scientists have critiqued the TMDL process, addressing the time constraints and deadlines associated with TMDL sampling and reporting. In many cases, TMDL sampling has not been proactive or coordinated with ambient monitoring, methods testing, and development. When TMDL work is not integrated with other biological work, it takes away from other sampling programs and projects. For instance, in Mississippi, long-term ambient monitoring was suspended in 2000 to address the consent decree over the State's 303(d) list – a direct effect policy had on biological sampling.

The dramatic increase in number of biological samples has required an increase in the overall number of biologists who are trained to perform biological sampling, analysis and reporting. Institutional and resource knowledge are very important. Similar to the problem of shifting baselines in marine fisheries, there is also a shifting baseline in resource management as older generations retire and newer generations step into these roles. This resource knowledge is a non-renewable resource, unless there are archives and historical accounts. Many state biologists working now have been sampling in the area for a long time – some more than 30 years – and are close to retirement. As the workforce ages, states have to make an effort to maintain biologist expertise as well as enough biologists.

In Summary

Legislation such as the Clean Water Act directly affects how freshwater resources are protected across multiple spatial scales. One aspect of protection is long-term monitoring and evaluation, for which USEPA sets specific guidelines and standards. This broad, top-down control influences biological sampling, mainly work completed at the state level. Litigation also has influenced what types of assessments are done, and who completes them.

ACKNOWLEDGEMENTS

This work would not have been possible without the Southeastern Water Pollution Biologists Association and its respective membership. We thank those listed below for clarification of program survey data for each state: EPA-Athens: C. Decker, H. Howard; Florida: E. McCarron, J. Espy, D. Ray, P. Morgan, D. Denson; Georgia: K. Mettier, C. Cutcliff; Kentucky: M. Vogel, P. Akers; Mississippi: M. Beiser, A. Dossett; North Carolina: T. MacPherson; South Carolina: J. Glover; Tennessee: D. Arnwine.

LITERATURE CITED

Bannister, R. 2004. National River Health Program: Quality Assurance and Quality Control Project. Monitoring River Health Report Number 20. Department of the Environment and Heritage. Water ECOscience Report Number 766/2004.

Barbour, M.T., J. Gerritsen, B.D. Snyder and J.B. Stribling. 1999. Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates, and Fish. Second Edition. EPA 841-B-99-002. US Environmental Protection Agency, Office of Water. Washington, D.C. 339 pp.

Benz, G.W. and D.E. Collins. 1997. Aquatic Fauna in Peril: The Southeastern Perspective. Lenz Design and Communications. Decatur, GA. 554 pp.

Copeland, C. 1997. Water Quality Act and TMDLs. Congressional Research Service (CRS) Report to Congress. Environment and Natural Resources Policy Division, Washington, DC. 97-831-ENR. 7 pp.

EPA (Environmental Protection Agency). 2002. 2002 Section 303(d) List Fact Sheet for Georgia. List Status: Waters listed by waterbody type. 30 April 2002. http://oaspub.epa.gov/waters/state_rept.control?p_state=GA

FDEP (Florida Department of Environmental Protection). 2005. About Southeastern Water Pollution Biologist Association. Last updated June 8, 2005. http://www.dep.state.fl.us/water/bioassess/swpba.htm

Ferrey, S. 2001. Environmental Law: Examples and Explanations. Second Edition. Aspen Law & Business, New York, NY. 615 pp.

Hackney, C.T., S.M. Adams and W.H. Martin (Eds.). 1992. Biodiversity of the Southeastern United States: Aquatic Communities. John Wiley & Sons. New York, NY. 800 pp.

Laerm, J., B.J. Freeman and L.J. Vitt. 1980. Vertebrates of the Okefenokee Swamp. Brimleyana 4:47-73.

Mac, M.J., P.A. Opler, C.E. Haecker and P.D. Doran. 1998. Status and Trends of the Nation's Biological Resources. Department of the Interior. Geological Survey, Reston, VA. 964 pp.

Martin, W.H., S.G. Boyce and A.C. Echternacht (Eds.). 1993. Biodiversity of the Southeastern United States: Upland Terrestrial Communities. John Wiley and Sons, New York, NY. 373 pp.

Plafkin, J.L., M.T. Barbour, K.D. Porter, S.K. Gross and R.M. Hughes. 1989. Rapid Bioassessment Protocols for use in Streams and Rivers: Benthic Macroinvertebrates and Fish. U.S. Environmental Protection Agency, Office of Water Regulations and Standards, Washington, D.C. EPA 440-4-89-001. 187 pp.

Stein, B.A., L.S. Kutner and J.S. Adams. 2000. Precious Heritage: The Status of Biodiversity in the United States. Oxford University Press, Inc., New York, NY. 399 pp.

US Census Bureau. 2002. Most of Nation's 10 Fastest-Growing Counties in South. US Census Bureau News. U.S. Department of Commerce, Washington, DC. http://www.census.gov/Press-Release/www/releases/archives/population/000453.html

USEPA (United States Environmental Protection Agency). 1998. Report of the Federal Advisory Committee on the Total Maximum Daily Load (TMDL) Program: The National Advisory Council for Environmental Policy and Technology. EPA 100-R-98-006. 97 pp. +7 appendices.

USEPA (U.S. Environmental Protection Agency). 2002. Summary of Biological Assessment Programs and Biocriteria Development for States, Tribes, Territories, and Interstate Commissions: Streams and Wadeable Rivers. U.S. Environmental Protection Agency. EPA-822-R-02-048.

USEPA (United States Environmental Protection Agency). 2003. Clean Water Act History. February 20th, 2003. http://www.epa.gov/region5/water/cwa.htm

USEPA (United States Environmental Protection Agency). 2004. TMDL Litigation by State. 01 October 2004. http://www.epa.gov/owow/tmdl/lawsuit1.html

USEPA (United States Environmental Protection Agency). 2005. About EPA. Last updated August 24th, 2005. http://www.epa.gov/epahome/aboutepa.htm

USGS (United States Geological Survey) 1997. TMDL Litigation. Office of Water Quality Technical Memorandum 97.05. In: Appendix I: EPA Overview of TMDL Cases. A. Sosin. January 9, 1997. 25pp. http://water.usgs.gov/admin/memo/QW/qw97.05.html

Whitney, E.D., B. Means and A. Rudloe. 2004. Priceless Florida. Pineapple Press, Sarasota, FL. 423 pp.

CHAPTER 5

CONCLUSIONS

The overall objective of this dissertation was to provide scientific information such as species community composition and natural history data to natural resource managers in support of biodiversity conservation, adaptive ecosystem management, and the military mission on Eglin Air Force Base, FL. This dissertation summarizes the baseline biological assessment data for wadeable stream ecosystems within Eglin boundaries. The compiled information supports recommendations for development of a long-term aquatic ecosystem monitoring program on Eglin Air Force Base. This work also provides the framework for a broader inventory and monitoring partnership program between the Department of Defense and the U.S. Fish and Wildlife Service for monitoring and adaptive management of rivers and streams to enhance military mission flexibility and success.

As a whole, this dissertation summarized how species level data can be used for conservation initiatives and natural resource management. It also illustrated how biological community data informs management decisions such as road removal and other restoration efforts. Analysis of biological community data is greatly influenced by state policies and guidance for collecting, calculating and evaluating biological data which changes over time. Federal policies such as the Clean Water Act directly influence the types of biological monitoring conducted, mainly through state agencies. Litigation related to federal legislation also affects the types of stream assessment work conducted at the state level. These are the factors influencing biological monitoring and stream assessments within the Southeast. This blend of biological monitoring data for a previously sparsely sampled area in the Florida Panhandle, combined with state program evaluation in relation to federal polices is my unique contribution to science.

Specifically within Chapter 2 of this work, I summarized natural history data and collection information for 28 rare and sensitive species collected in conjunction with biological assessment work on Eglin. This work documented the occurrence of several species for the first time within the Florida Panhandle, new county records, and substantial range and distribution increases for several species. One

dragonfly species found during the course of this work had not been previously described. This chapter further documents the rich aquatic faunal diversity in the northwestern Florida Panhandle, mainly for invertebrate taxa.

Chapter 3 summarized four years of biomonitoring work on Eglin AFB. Aside from developing an integrated freshwater stream monitoring program, these biological monitoring data provided an evaluation of 127 sites across Eglin, based on aquatic macroinvertebrate surveys. These data provided an opportunity to evaluate recent state-wide assessment metric changes used to evaluate Florida streams. I found that the new BioRecon Index metrics reduce the resolution of site evaluation, potentially inhibiting proactive stream resource management. I illustrated how statewide policies influence public lands management, primarily through aspects of the Clean Water Act.

Chapter 4 examined how litigation surrounding the Clean Water Act has affected statewide biological monitoring within EPA Region IV. Specifically, biological assessment programs within Region IV were compared from 1996 and 2004. There has been a significant increase in the number of bioassessments performed. The number of bioassessments completed for TMDL work and 303(d) listing has significantly increased. The number of biologists employed by each state within Region IV has also increased, but the overall level of biological experience of these personnel has decreased. The combination of increased need for biological sampling, an increase in biological requirements for listing impaired waters, an increased need for experienced personnel and an aging workforce will continue to illustrate the interconnectedness of federal, state and local policies on stream assessment work.

APPENDICES

Appendix A. Rare and Sensitive Aquatic Insect Species within Florida							
Order	***Scientific Name***	**Common Name**	**FNAI Global/State**	**State Status**	**FWS Status**	**FCREPA Status**	**FWC - SGCN**
AMPHIPODA (Amphipods)							
Amphipoda	*Crangonyx grandimanus*	Florida Cave Amphipod	G3/G4 - S2	*	*	SSC	**yes**
Amphipoda	*Crangonyx hobbsi*	Hobbs' Cave Amphipod	G5 - S2/S3	*	*	SSC	**yes**
COLEOPTERA (Beetles)							
Coleoptera	*Ancyronyx variegata*	Riffle Beetle	*	*	*	*	*
Coleoptera	*Gonielmis dietrichi*	Riffle Beetle	*	*	*	*	*
Coleoptera	*Gyretes iricolor*	Whirligig Beetle	*	*	*	*	*
Coleoptera	*Gyrinus marginellus*	Whirligig Beetle	*	*	*	*	*
DIPTERA (Flies, Mosquitoes, Midges)							
Diptera	*Aedes hendersoni*	North American Canopy Treehole Aedes	*	*	*	SU	*
Diptera	*Anopheles albimanus*	Central American Malaria Mosquito	*	*	*	*	**yes**
Diptera	*Asaphomyia floridensis*	Florida Asaphomyian Tabanid Fly	G1/G3 - SNR	*	*	*	*
Diptera	*Culex bahamensis*	Bahamian Culex	*	*	*	T	**yes**
Diptera	*Culex mulrennani*	Mulrennan's Culex	*	*	*	T	**yes**
Diptera	*Merycomyia brunnea*	Brown Merycomyian Tabanid Fly	G1/G3 - SNR	*	*	*	*
Diptera	*Mixogaster delongi*	Delong's Mixogaster Flower Fly	G1/G3 - SNR	*	*	*	*
Diptera	*Nemopalpus nearcticus*	Sugarfoot Moth Fly	GNR - SNR	*	*	*	*
EPHEMEROPTERA (Mayflies)							
Ephemeroptera	*Asioplax dolani*	Little Stout Crawler	G4 - S1	*	*	A	**yes**
Ephemeroptera	*Attenella attenuata*	Spiny Crawler Mayfly	G5 - S1/S2	*	*	A	**yes**
Ephemeroptera	*Baetisca becki*	Armored Mayfly	G2/G3 - S2	*	*	*	**yes**
Ephemeroptera	*Baetisca laurentina*	Armored Mayfly	G5 - S1	*	*	A	*
Ephemeroptera	*Baetisca obesa*	Armored Mayfly	*	*	*	*	*
Ephemeroptera	*Baetisca rogersi*	Armored Mayfly	G4 - S3	*	*	*	**yes**
Ephemeroptera	*Brachycercus nasutus*	Small Squaregills Mayfly	G3/G4 - S1	*	*	A	**yes**
Ephemeroptera	*Dannella simplex*	Spiny Crawler Mayfly	G5 - S1	*	*	A	**yes**
Ephemeroptera	*Dolania americana*	American Sand-burrowing Mayfly	G4 - S1/S2	*	*	T	**yes**
Ephemeroptera	*Habrophlebia vibrans*	A Mayfly	*	*	*	*	*
Ephemeroptera	*Hexagenia bilineata*	Burrowing Mayfly	G5 - S2	*	*	A	**yes**

Appendix A. Rare and Sensitive Aquatic Insect Species within Florida							
Order	***Scientific Name***	**Common Name**	**FNAI Global/State**	**State Status**	**FWS Status**	**FCREPA Status**	**FWC - SGCN**
Ephemeroptera	*Hexagenia limbata*	Common Burrower Mayfly	*	*	*	*	**yes**
Ephemeroptera	*Hexagenia orlando*	Common Burrower Mayfly	*	*	*	*	**yes**
Ephemeroptera	*Homoeoneuria dolani*	Blue Sand-river Mayfly	G3/G4 - S1/S2	*	*	T	**yes**
Ephemeroptera	*Isonychia berneri*	Brushed legged Mayfly	G2/G3 - S1	*	*	A	**yes**
Ephemeroptera	*Isonychia sicca*	Brushed legged Mayfly	G5 - S1	*	*	A	**yes**
Ephemeroptera	*Leptophlebia cupida*	Prong gills Mayfly	*	*	*	A	*
Ephemeroptera	*Maccaffertium modestum*	Flat-headed Mayfly	*	*	*	A	*
Ephemeroptera	*Macdunnoa brunnea*	Flat-headed Mayfly	G3/G4 - S1/S2	*	*	A	**yes**
Ephemeroptera	*Procloeon sp.*	Small Minnow Mayfly	*	*	*	A	*
Ephemeroptera	*Pseudiron centralis*	White Sand-river Mayfly	G5 - S2	*	*	T	**yes**
Ephemeroptera	*Serratella deficiens*	Dark lead-winged Olive	*	*	*	*	*
Ephemeroptera	*Siphoplecton brunneum*	Cleft-footed Minnow Mayfly	G2 - S1	*	*	A	**yes**
Ephemeroptera	*Siphoplecton fuscum*	Cleft-footed Minnow Mayfly	G1/G3Q - S1	*	*	A	**yes**
Ephemeroptera	*Siphoplecton simile*	Cleft-footed Minnow Mayfly	G1/G3Q - S1/S2	*	*	A	**yes**
Ephemeroptera	*Stenacron floridense*	Flat-headed Mayfly	G4 - S3/S4	*	*	A	**yes**
ISOPODA (Soubugs, Scuds)							
Isopoda	*Caecidotea hobbsi*	Florida Cave Isopod	G3/G4 - S2	*	*	*	**yes**
Isopoda	*Caecidotea sp. 1*	Rock Springs Cave Isopod	G1 - S1	*	*	*	**yes**
Isopoda	*Caecidotea sp. 8*	Econfina Springs Cave Isopod	G1 - S1	*	*	*	**yes**
Isopoda	*Remasellus parvus*	Swimming Little Florida Cave Isopod	*	*	*	*	**yes**
ODONATA (Dragonflies and Damselflies)							
Odonata	*Cordulegaster obliqua fasciata*	Arrowhead Spiketail	*	*	*	R	*
Odonata	*Cordulegaster sayi*	Say's Spiketail	G2 - S1/S2	*	*	T	**yes**
Odonata	*Didymops floridensis*	Maidencane Cruiser	G4 - S4	*	*	SSC	*
Odonata	*Dromogomphus armatus*	Southeastern Spinyleg	G4 - S3	*	*	R	**yes**
Odonata	*Enallagma traviatum*	Slender Bluet	G5 - SU	*	*	U	*
Odonata	*Epitheca spinosa*	Robust Baskettail	G4 - S2	*	*	T	**yes**
Odonata	*Erpetogomphus designatus*	Eastern Ringtail	G5 - S1	*	*	T	**yes**
Odonata	*Gomphaeschna antilope*	Taper-tailed Darner	G4 - S4	*	*	R	*

Appendix A. Rare and Sensitive Aquatic Insect Species within Florida							
Order	***Scientific Name***	**Common Name**	**FNAI Global/State**	**State Status**	**FWS Status**	**FCREPA Status**	**FWC - SGCN**
Odonata	*Gomphus cavillaris*	Sandhill Clubtail	G4 - S4	*	*	SSC	*
Odonata	*Gomphus geminatus*	Twin-striped Clubtail	G3 - S3	*	*	R	**yes**
Odonata	*Gomphus hodgesi*	Hodges' Clubtail	G3 - S3	*	*	R	**yes**
Odonata	*Gomphus hybridus*	Cocoa Clubtail	G4 - SH	*	*	T	*
Odonata	*Gomphus modestus*	Gulf Coast Clubtail	G3 - S1	*	*	T	**yes**
Odonata	*Gomphus vastus*	Cobra Clubtail	G5 - S1	*	*	T	**yes**
Odonata	*Gomphus westfalli*	Westfall's Clubtail	G1/G2 - S1	*	*	T	**yes**
Odonata	*Helocordulia selysii*	Selys' Sunfly	G4 - S4	*	*	R	*
Odonata	*Hetaerina americana*	American Rubyspot	G5 - S1	*	*	SSC	**yes**
Odonata	*Lestes inaequalis*	Elegant Spreadwing	G5 - S2/S3	*	*	R	**yes**
Odonata	*Libellula jesseana*	Purple Skimmer	G2 - SNR	*	*	T	**yes**
Odonata	*Macromia alleghaniensis*	Allegheny River Cruiser	G4 - S1	*	*	T	**yes**
Odonata	*Nannothemis bella*	Elfin Skimmer	G4 - S3	*	*	R	**yes**
Odonata	*Nehalennia minuta*	Tropical Sprite	G3 - SNR	*	*	*	*
Odonata	*Nehalennia pallidula*	Everglades Sprite	G3 - SNR	*	*	SSC	*
Odonata	*Neurocordulia clara*	Apalachicola Shadowfly	G1/G3Q - S1	*	*	*	**yes**
Odonata	*Neurocordulia molesta*	Smokey Shadowfly	G4 - S1	*	*	T	**yes**
Odonata	*Neurocordulia obsoleta*	Umber Shadowfly	G5 - S1	*	*	SU	**yes**
Odonata	*Ophiogomphus sp.*	Snaketail	*	*	*	*	*
Odonata	*Progomphus alachuensis*	Tawny Sanddragon	G4 - S4	*	*	SSC	*
Odonata	*Progomphus bellei*	Belle's Sanddragon	G3 - S3	*	*	R	**yes**
Odonata	*Somatochlora calverti*	Calvert's Emerald	G3 - S3	*	*	SU	**yes**
Odonata	*Somatochlora georgiana*	Coppery Emerald	G3/G4 - SNR	*	*	R	*
Odonata	*Somatochlora provocans*	Treetop Emerald	*	*	*	T	**yes**
Odonata	*Stylurus laurae*	Laura's Clubtail	G4 - SNR	*	*	T	**yes**
Odonata	*Stylurus potulentus*	Yellow-sided Clubtail	G2 - S2	*	*	T	**yes**
Odonata	*Stylurus townesi*	Bronze Clubtail	G3 - S1	*	*	T	**yes**
Odonata	*Tachopteryx thoreyi*	Gray Petaltail	G4 - S3	*	*	R	**yes**
PLECOPTERA (Stoneflies)							

Appendix A. Rare and Sensitive Aquatic Insect Species within Florida							
Order	***Scientific Name***	**Common Name**	**FNAI Global/State**	**State Status**	**FWS Status**	**FCREPA Status**	**FWC - SGCN**
Plecoptera	*Eccoptura xanthenes*	Stonefly	*	*	*	*	*
Plecoptera	*Leuctra cottaquilla*	Stonefly	*	*	*	*	*
Plecoptera	*Neoperla carlsoni*	Stonefly	*	*	*	*	*
Plecoptera	*Paragnetina fumosa*	Stonefly	*	*	*	*	*
Plecoptera	*Perlinella drymo*	Stonefly	*	*	*	*	*
Plecoptera	*Pteronarcys dorsata*	Stonefly	*	*	*	*	*
Plecoptera	*Tallaperla cornelia*	Stonefly	*	*	*	*	*
TRICHOPTERA (Caddisflies)							
Trichoptera	*Agarodes libalis*	Spring-loving Psiloneuran Caddisfly	G1/G2 - S1	*	*	Removed	**yes**
Trichoptera	*Agarodes ziczac*	Zigzag Blackwater Caddisfly	G1 - SNR	*	*	T	**yes**
Trichoptera	*Beraea n. sp.*	Caddisfly	*	*	*	*	*
Trichoptera	*Ceraclea floridana*	Florida (Scaly Wing Sedge) Ceraclean Caddisfly	GH - SNR	*	*	SU	**yes**
Trichoptera	*Cernotina truncona*	Florida Cernotinan Caddisfly	G4/G5 - S2	*	*	R	**yes**
Trichoptera	*Cheumatopsyche gordonae*	Gordon's Little Sister Sedge (caddisfly)	*	*	*	T	**yes**
Trichoptera	*Cheumatopsyche petersi*	Peters' Little Sister Sedge (caddisfly)	G2 - S1	*	*	R	**yes**
Trichoptera	*Chimarra argentella*	Silvery Little Black Sedge	*	*	*	SU	*
Trichoptera	*Chimarra florida*	Floridian Finger-net Caddisfly	G1/G2 - S1	*	*	Removed	**yes**
Trichoptera	*Heteroplectron americanum*	Caddisfly	*	*	*	*	*
Trichoptera	*Hydroptila berneri*	Berner's Microcaddisfly	G1 - SNR	*	*	Removed	*
Trichoptera	*Hydroptila bribriae*	Microcaddisfly	*	*	*	*	*
Trichoptera	*Hydroptila eglinensis*	Microcaddisfly	*	*	*	*	*
Trichoptera	*Hydroptila hamiltoni*	Microcaddisfly	*	*	*	*	*
Trichoptera	*Hydroptila latosa*	Broad Varicolored Microcaddisfly	*	*	*	R	*
Trichoptera	*Hydroptila lloganae*	Llogan's Varicolored Microcaddisfly	*	*	*	R	*
Trichoptera	*Hydroptila molsonae*	Molson's Varicolored Microcaddisfly	G2/G3 - S1	*	*	R	**yes**
Trichoptera	*Hydroptila okaloosa*	Microcaddisfly	*	*	*	*	*
Trichoptera	*Hydroptila sarahae*	Microcaddisfly	*	*	*	*	*
Trichoptera	*Hydroptila wakulla*	Wakulla Springs Vari-colored Microcaddisfly	*	*	*	T	**yes**
Trichoptera	*Lepidostoma morsei*	Morse's Little Plain Brown Sedge	*	*	*	T	**yes**

Appendix A. Rare and Sensitive Aquatic Insect Species within Florida							
Order	***Scientific Name***	**Common Name**	**FNAI Global/State**	**State Status**	**FWS Status**	**FCREPA Status**	**FWC - SGCN**
Trichoptera	*Nectopsyche paludicola*	Marsh-Dwelling White Miller (caddisfly)	*	*	*	SU	*
Trichoptera	*Nectopsyche tavara*	Tavares White Miller	*	*	*	R	*
Trichoptera	*Neotrichia armitagei*	Microcaddisfly	*	*	*	*	*
Trichoptera	*Nyctiophylax morsei*	Morse's Dinky Light Summer Sedge (caddisfly)	*	*	*	R	*
Trichoptera	*Ochrotrichia okaloosa*	Okaloosa Somber Microcaddisfly	*	*	*	T	**yes**
Trichoptera	*Ochrotrichia provosti*	Provost's Somber Caddisfly	G1 - SNR	*	*	T	**yes**
Trichoptera	*Oecetis daytona*	Daytona Long-horned (Sedge) Caddisfly	G2 - S1	*	*	R	**yes**
Trichoptera	*Oecetis floridana*	Florida Long-horn Sedge	GH - SNR	*	*	SU	**yes**
Trichoptera	*Oecetis morsei*	Morse's Long-Horn Sedge (caddisfly)	*	*	*	R	*
Trichoptera	*Oecetis parva*	Little Longhorned Caddisfly	*	*	*	SU	**yes**
Trichoptera	*Oecetis porteri*	Porter's Long-horn Sedge	GH - SNR	*	*	T	**yes**
Trichoptera	*Oecetis pratelia*	Little Meadow Long-horned (Sedge) Caddisfly	G1 - SNR	*	*	T	**yes**
Trichoptera	*Orthotrichia curta*	Short Orthotrichian Microcaddisfly	G3/G5 - S1	*	*	R	**yes**
Trichoptera	*Orthotrichia dentata*	Dentate Orthotrichian Microcaddisfly	G1/G2 - S1	*	*	T	**yes**
Trichoptera	*Orthotrichia instabilis*	Changeable Orthotrichian Microcaddisfly	G1/G3 - S1	*	*	T	**yes**
Trichoptera	*Oxyethira elerobi*	Elerob's Cream and Brown Mottled Microcaddisfly	G3? - S1	*	*	R	**yes**
Trichoptera	*Oxyethira florida*	Florida Cream and Brown Microcaddisfly	G1? - S1?	*	*	T	**yes**
Trichoptera	*Oxyethira janella*	Little-entrance Oxyethiran Microcaddisfly	G5 - S1	*	*	Removed	**yes**
Trichoptera	*Oxyethira kelleyi*	Kelley's Cream and Brown Mottled Microcaddisfly	*	*	*	T	**yes**
Trichoptera	*Oxyethira kingi*	King's Cream and Brown Mottled Microcaddisfly	*	*	*	T	**yes**
Trichoptera	*Oxyethira novasota*	Novasota Oxyethiran Microcaddisfly	G2 - S1	*	*	Removed	**yes**
Trichoptera	*Oxyethira setosa*	Setose Cream and Brown Mottled Microcaddisfly	*	*	*	R	*
Trichoptera	*Polycentropus floridensis*	Florida Brown Checkered Summer Sedge -caddisfly	*	*	*	T	**yes**
Trichoptera	*Pycnopsyche antica/indiana*	Caddisfly	*	*	*	*	*
Trichoptera	*Rhyacophila carolina*	Caddisfly	*	*	*	*	*
Trichoptera	*Triaenodes florida*	Floridian Triaenode Caddisfly	G2? - S1	*	*	R	**yes**
Trichoptera	*Triaenodes furcella*	Little-fork Triaenode Caddisfly	G1? - SNR	*	*	T	**yes**
Trichoptera	*Triaenodes helo*	Marsh Triaenode Caddisfly	*	*	*	R	*
Trichoptera	*Triaenodes tridontus*	Three-tooth Triaenodes Caddisfly	G1/G2 - SNR	*	*	*	*

KEY TO ABBREVIATIONS AND NOTATIONS

FNAI Global/State: Global and State conservation ranks as defined by the Florida Natural Area Inventory (FNAI). The global rank is based on the target's worldwide status, and the state rank is based on the status of the target within Florida. Reported ranks are based on most current data available (last updated September 2004). Further information can be obtained from http://fnai.org/data.cfm, under the searchable tracking list which can be searched state-wide or by county.

State Status: Ranking of non-plant species status is summarized by the Florida Fish and Wildlife Conservation Commission (FWC). Further information and electronic data can be found at http://wildflorida.org/imperiled/. The FWC is responsible for Florida's endangered, threatened, and of special concern animals (Rules 39-27.003, 39-27.004, and 39-27.005, respectively, Florida Administrative Code (F.A.S.)), and they maintain a list of species, as well as some educational information on their web site. Data reported here was last updated 29 January 2004 for official state status.

Ranking of state status for plant species is maintained by The Florida Department of Agriculture and Consumer Services (DOACS) Division of Plant Industry in Gainesville, FL. The Endangered Plant Advisory Committee (EPAC) provides information to DOACS for publication of Florida's Regulated Plant Index. This index provides descriptions and other information on the endangered, threatened and commercially exploited plant species in Florida. Amended 14 February 2003, the Regulated Plant Index contains 421 endangered species, 113 threatened species, and eight commercially exploited species. Further information regarding can be found at www.doacs.state.fl.us/pi/ and the updated Regulated Plant Index is available in electronic format at www.doacs.state.fl.us/pi/enpp/botany/images/notes2003.pdf

FWC-SGCN:
Recently, as part of the federal requirements for the Comprehensive Wildlife Conservation Strategy to address the biodiversity in Florida, 974 species of greatest conservation need (SGCN) were identified. The selection criteria for these species were based on several factors, including scientific data and expert opinion. The SGCN include all taxa from sponges and corals to birds and mammals. The main goal of this list's creation was to help the Florida Fish and Wildlife Conservation Commission (FWC) prioritize, identify and provide additional funds for these meeting the conservation needs of these listed species. Species are either included on the list (yes) or not considered (*).

FWS Status: Ranking of species status as summarized by the US Fish and Wildlife Service. Further information including electronic data and recovery plans can be found at http://endangered.fws.gov/

FCREPA Status: Florida Commission for Rare and Endangered Plants and Animals (FCREPA). FCREPA is a consortium of scientists who periodically review the population status of plants and animals in Florida and publish these compilations. The most recent group of publications from were completed in 1999, entitled Rare and Endangered Biota of Florida, in multiple volumes.

STATUS DEFINITIONS

FNAI-Status Rank (Florida Natural Areas Inventory). The Global (G) element rank is based on a species' worldwide status; the State (S) rank is based on the species' status in Florida.

- 1: Critically imperiled. Extremely rare (5 or fewer occurrences or less than 1000 individuals) or extremely vulnerable to extinction.
- 2: Imperiled. Very rare (6 to 20 occurrences or less than 3000 individuals) or vulnerable to extinction.
- 3: Either very rare or local throughout its range (21-100 occurrences or less than 10,000 individuals) or found locally in a restricted range or vulnerable to extinction.
- 4: Apparently secure globally (may be rare in part of its range).
- 5: Demonstrable secure globally.
- H: Occurred historically throughout its range, but has not been observed for many years.
- * denotes no ranking has been given

State Status-Florida Fish and Wildlife Conservation Commission (FWC).
Definitions derived from "Florida's Endangered Species and Species of Special Concern, Official Lists."

- E = Endangered: a species, subspecies, or isolated population which is so rare or depleted in number or so restricted in range of habitat due to any man-made or natural factor that it is in immediate danger of extinction or extirpation from Florida.
- T = Threatened: a species, subspecies, or isolated population which is acutely vulnerable to environmental alteration, declining in number at a rapid rate, or whose range or habitat is decreasing in area at a rapid rate and as a consequence is destined or very likely to become endangered in the forseeable future.
- SSC = Species of Special Concern: a species or population which warrants special protection, recognition, or consideration because it has an inherent significant vulnerability to habitat modification, environmental alteration, human disturbance, or substantial human exploitation which, in the forseeable future, may result in its becoming threatened.
- SU = Status Undetermined.
- * denotes no ranking has been given.

State Status-Florida Department of Agriculture and Consumer Services (DOACS) – Division of Plant Industry.
Definitions derived from Sections 581.011 and 581.185(2), Florida Statutes, and the Preservation of Native Flora of Florida Act, 5B-40.001.

- LE = Endangered: species of plants native to Florida that are in imminent danger of extinction within the state, the survival of which is unlikely if the causes of a decline in the number of plants continue; includes all species determined to be endangered or threatened pursuant to the U.S. Endangered Species Act.
- LT = Threatened: species native to the state that are in rapid decline in the number of plants within the state, but which have not so decreased in number as to cause them to be Endangered.

- PE = Proposed for listing as Endangered.
- PT = Proposed for listing as Threatened.
- N = Not currently listed, nor currently being considered for listing.
- * denotes no ranking has been given.

Federal Status-US Fish and Wildlife Service (FWS)
Definitions derived from U.S. Endangered Species Act of 1973, Section 3.

- E = Endangered: Any species in danger of extinction throughout all or a significant portion of its range.
- T = Threatened: A species which is likely to become endangered in the foreseeable future.
- C = Candidate: A species currently being considered for listing.
- MC = Not currently listed, but of management concern.
- * denotes no ranking has been given.

FCREPA Status- Florida Committee for Rare and Endangered Plants and Animals (FCREPA)

- E = Endangered: Species in danger of extinction or extirpation if the deleterious factors affecting their populations continue to operate. These are forms whose numbers have already declined to such a critically low level or whose habitats have been so seriously reduced or degraded that without active assistance, their survival in Florida is questionable.
- T = Threatened: Species that are likely to become endangered in the state within the foreseeable future if current trends continue. This category includes: (1) species in which most or all populations are decreasing because of overexploitation, habitat loss, or other factors; (2) species whose populations have already been heavily depleted by deleterious conditions and, while not actually endangered, are nevertheless in a critical state; and (3) species that may still be relatively abundant but are being subjected to serious adverse pressures throughout their range.
- R = Rare: Species that, although not presently endangered or threatened as defined above, are potentially at risk because they are found only within a restricted geographic area or habitat in the state or are sparsely distributed over a more extensive range.
- SSC = Species of Special Concern: Species that do not clearly fit into one of the preceding categories yet warrant special attention. Included in this category are: (1) species that, although they are perhaps presently relatively abundant and widespread in the state, are especially vulnerable to certain types of exploitation or environmental changes and have experienced long-term population declines; and (2) species whose status in Florida has a potential impact on endangered or threatened populations of the same or other species outside the state.
- SU = Status Undetermined: Species suspected of falling into one of the above categories for which available data are insufficient to provide an adequate basis for their assignment to a specific category.
- A = Additional Invertebrates of Concern: Invertebrates that are listed in need of recognition – presumably many of these species will appear in other categories in future editions of the FCREPA publications.
- * denotes no ranking has been given.

APPENDIX B. Overall site summary, and sampling collection summary sorted by field number for samples collected within freshwater systems on and near Eglin AFB, FL during FY1997 – FY2005.

Sample Location	LAT	LONG	Quad Sheet	Eglin Management Unit (EMU)	Direction Sampled	Stream Order	Rosgen Stream Type	Fish	Habitat	Geomorphology	Insects	Chemistry
Alaqua Creek 1.5 river mi above SR 20 bridge	30.5272	-86.1749	PORTLAND	1101S002	no record	6		√				
Alaqua Creek 2 river mi above SR 20 bridge	30.5343	-86.1749	PORTLAND	1101S003	no record	6		√				
Alaqua Creek at boat ramp at SR 20	30.5116	-86.1864	PORTLAND	temp19	no record	6		√				
Alaqua Creek at Eglin 200	30.5952	-86.1642	PORTLAND	1103S001	downstrm	5		√	√			√
Alaqua Creek at Eglin 200	30.5952	-86.1642	PORTLAND	1103S001	upstream	5		√	√		√	√
Alaqua Creek at Eglin 205	30.5561	-86.1792	PORTLAND	1103S003	downstrm	6					√	√
Alaqua Creek at Eglin 205	30.5561	-86.1792	PORTLAND	1103S003	upstream	6					√	√
Alaqua Creek at Eglin 210	30.6925	-86.2417	DEFUNIAK SPRINGS W	0901S001	downstrm	4						√
Alaqua Creek at Eglin 210	30.6925	-86.2417	DEFUNIAK SPRINGS W	0901S001	upstream	4		√			√	√
Alaqua Creek at Eglin 213	30.7083	-86.2526	MOSSY HEAD	0901S002	downstrm	3		√				√
Alaqua Creek at Eglin 213	30.7083	-86.2526	MOSSY HEAD	0901S002	upstream	3		√				√
Alaqua Crk 300 m above conflu w/ L. Alaqua	30.5495	-86.1761	PORTLAND	1103S004	no record	6		√				
Unnamed Alaqua Creek tributary at Eglin 213	30.7065	-86.2377	DEFUNIAK SPRINGS W	0904S001	downstrm	3		√	√			√
Unnamed Alaqua Creek tributary at Eglin 213	30.7065	-86.2377	DEFUNIAK SPRINGS W	0904S001	Upstream	3		√	√			√
Alligator Creek @ Range Road 634	30.4778	-86.6700	MARY ESTHER	0204	downstrm	1		√	√			
Alligator Creek @road N Jnct Eglin 655 & 638	30.4779	-86.6644	NAVARRE	0204S007	no record	2		√				
Anderson Branch upstream of Eglin 231	30.5596	86.5147	VALPARAISO	0608P001	upstream	2						√
Basin Creek at Eglin 212	30.5280	-86.2825	NICEVILLE SE	1007S001	downstrm	4						√
Basin Creek at Eglin 212	30.5280	-86.2825	NICEVILLE SE	1007S001	upstream	4					√	√
Basin Creek at Eglin 218	30.5173	-86.2359	PORTLAND	1007S003	downstrm	5		√	√		√	√
Basin Creek at Eglin 218	30.5173	-86.2359	PORTLAND	1007S003	upstream	5		√	√		√	√
Basin Creek at Eglin 433	30.5306	-86.2629	NICEVILLE SE	1007S002	downstrm	4			√			√
Basin Creek at Eglin 433	30.5306	-86.2629	NICEVILLE SE	1007S002	upstream	4			√		√	√
Basin Creek at Eglin Range Rd 427/222	30.5254	-86.2923	NICEVILLE SE	1007S006	no record	3		√				
Basin Creek at Eglin Range Rd 427/222	30.5254	-86.2923	NICEVILLE SE	1007S006	upstream	3					√	√
Basin Creek tributary at Eglin Range Rd 218	30.5156	-86.2463	PORTLAND	1007S007	no record	1		√				
Bay Head Branch at Eglin Range Rd 388	30.5599	-86.3263	NICEVILLE SE	1007S004	no record	2		√				
Bear Bay Branch at Eglin 407	30.6790	-86.2770	MOSSY HEAD	0905	Upstream	2		√				
Bear Bay Branch at Eglin Range Road 381	30.6865	-86.2717	MOSSY HEAD	0905S001	downstrm	3	C5					√
Bear Bay Branch at Eglin Range Road 381	30.6865	-86.2717	MOSSY HEAD	0905S001	no record	3	C5	√				
Bear Bay Branch at Eglin Range Road 381	30.6865	-86.2717	MOSSY HEAD	0905S001	upstream	3	C5			√	√	√
Bear Bay Branch tributary at Eglin 407	30.6773	-86.2788	MOSSY HEAD	0905S002	both	1						√
Bear Branch 400 m S. of the end of Eglin 369	30.5515	-86.2387	PORTLAND	1009S003	no record	4		√				

Sample Location	LAT	LONG	Quad Sheet	Eglin Management Unit (EMU)	Direction Sampled	Stream Order	Rosgen Stream Type	Fish	Habitat	Geomorphology	Insects	Chemistry
Bear Branch at Eglin 359	30.5350	-86.2450	PORTLAND	1009S002	downstrm	4	E5		√			√
Bear Branch at Eglin 359	30.5350	-86.2450	PORTLAND	1009S002	no record	4	E5	√				
Bear Branch at Eglin 359	30.5350	-86.2450	PORTLAND	1009S002	upstream	4	E5		√	√	√	√
Bear Branch tributary at Eglin 361	30.5831	-86.2749	NICEVILLE SE	1009S001	downstrm	2						√
Bear Branch tributary at Eglin 361	30.5831	-86.2749	NICEVILLE SE	1009S001	no record	2		√				
Bear Branch tributary at Eglin 361	30.5831	-86.2749	NICEVILLE SE	1009S001	upstream	2						√
Bear Creek @ Eglin 211	30.5880	-86.8569	HAROLD SE	0102S004	downstrm	2			√			√
Bear Creek @ Eglin 211	30.5880	-86.8569	HAROLD SE	0102S004	no record	2		√				
Bear Creek @ Eglin 211	30.5880	-86.8569	HAROLD SE	0102S004	upstream	2			√			√
Bear Creek at Corbin Gainey Rd, near SR 280	30.6912	-86.2079	DEFUNIAK SPRINGS W	temp14	no record	3		√				
Bear Creek E of SR 280, 2.9 mi W of I-10	30.7070	-86.2107	DEFUNIAK SPRINGS W	temp11	no record	3		√				
Bens Creek at Eglin 619	30.5830	-86.5637	VALPARAISO	0607S004	both	2						√
Bens Creek at old intersection w/ Eglin 604E	30.5939	-86.5765	VALPARAISO	0607S001	downstrm	2			√			
Bens Creek at old intersection w/ Eglin 604E	30.5939	-86.5765	VALPARAISO	0607S001	upstream	2			√		√	√
Big Fork at Eglin 207	30.7064	-86.4408	SPENCER FLATS	0704S001	downstrm	3						√
Big Fork at Eglin 207	30.7064	-86.4408	SPENCER FLATS	0704S001	upstream	3		√				√
Blount Creek at Eglin 201	30.6160	-86.1640	PORTLAND	1103S002	downstrm	3			√			√
Blount Creek at Eglin 201	30.6160	-86.1640	PORTLAND	1103S002	no record	3		√				
Blount Creek at Eglin 201	30.6160	-86.1640	PORTLAND	1103S002	upstream	3			√			√
Blount Mill Creek at Eglin 200/201	30.6075	-86.2146	PORTLAND	1108S001	downstrm	2			√			√
Blount Mill Creek at Eglin 200/201	30.6075	-86.2146	PORTLAND	1108S001	upstream	2			√		√	√
Blount Mill Creek at Eglin 208	30.5986	-86.2113	PORTLAND	1108S002	downstrm	3						√
Blount Mill Creek at Eglin 208	30.5987	-86.2114	PORTLAND	1108S002	upstream	3		√				√
New Home Seepage Slope at Eglin 200/201	30.6078	-86.2249	PORTLAND	1108SS01	both	1						
Blue Spring Creek at Eglin 211	30.6797	-86.4507	SPENCER FLATS	0703S002	downstrm	2		√	√			√
Blue Spring Creek at Eglin 211	30.6797	-86.4507	SPENCER FLATS	0703S002	upstream	2		√	√		√	√
Blue Spring Creek at Eglin 450	30.6797	-86.4508	SPENCER FLATS	0703S003	downstrm	2			√			
Blue Spring Creek at Eglin 450	30.6797	-86.4508	SPENCER FLATS	0703S003	upstream	2			√			
Blue Spring Creek at Eglin 454	30.6658	-86.4541	SPENCER FLATS	0703S001	downstrm	2			√			√
Blue Spring Creek at Eglin 454	30.6658	-86.4541	SPENCER FLATS	0703S001	no record	2		√				
Blue Spring Creek at Eglin 454	30.6658	-86.4541	SPENCER FLATS	0703S001	upstream	2			√		√	√
Boiling Creek @ Eglin 211	30.5650	-86.8691	HAROLD SE	0104S002	downstrm	4			√			√
Boiling Creek @ Eglin 211	30.5650	-86.8691	HAROLD SE	0104S002	no record	4		√				
Boiling Creek @ Eglin 211	30.5650	-86.8691	HAROLD SE	0104S002	upstream	4			√		√	√
Boiling Creek 4 air miles above Eglin 211	30.5507	-86.8479	HAROLD SE	0104S005	no record	4		√				
Boiling Creek trib. @ Eglin 211	30.5686	-86.8675	HAROLD SE	0104S001	downstrm	1			√			√

Sample Location	LAT	LONG	Quad Sheet	Eglin Management Unit (EMU)	Direction Sampled	Stream Order	Rosgen Stream Type	Fish	Habitat	Geomorphology	Insects	Chemistry
Boiling Creek trib. @ Eglin 211	30.5686	-86.8675	HAROLD SE	0104S001	upstream	1			√		√	√
Broxson Branch @ 211	30.6016	-86.8359	HAROLD SE	0102	downstrm	1		√	√			
Broxson Branch @ 211	30.6016	-86.8359	HAROLD SE	0102	upstream	1		√	√			
Buck Branch at Eglin 382	30.7168	-86.2659	MOSSY HEAD	0907S001	upstream	2		√			√	√
Bull Creek at Eglin Range Rd 211	30.6741	-86.4300	SPENCER FLATS	0705S002	downstrm	2						√
Bull Creek at Eglin Range Rd 211	30.6741	-86.4300	SPENCER FLATS	0705S002	no record	2		√				
Bull Creek at Eglin Range Rd 211	30.6741	-86.4300	SPENCER FLATS	0705S002	upstream	2					√	√
Bull Creek at Eglin Road 454	30.6647	-86.4279	SPENCER FLATS	0705S001	upstream	2					√	√
Bullhide Creek at Eglin 213	30.7087	-86.2503	MOSSY HEAD	0906S001	downstrm	3		√	√			√
Bullhide Creek at Eglin 213	30.7087	-86.2504	MOSSY HEAD	0906S001	upstream	3	E5	√	√	√	√	√
Camp Creek at Eglin 211	30.6383	-86.7729	FLORIDALE	0305S001	downstrm	2						√
Camp Creek at Eglin 211	30.6383	-86.7729	FLORIDALE	0305S001	no record	2		√				
Camp Creek at Eglin 211	30.6383	-86.7729	FLORIDALE	0305S001	upstream	2						√
Carr Spring Branch at Eglin 211	30.6748	-86.6507	HOLT	0310S001	downstrm	2	C5					√
Carr Spring Branch at Eglin 211	30.6748	-86.6507	HOLT	0310S001	no record	2	C5	√				
Carr Spring Branch at Eglin 211	30.6748	-86.6507	HOLT	0310S001	upstream	2	C5	√	√	√	√	√
Carroll Creek at Eglin 211	30.6461	-86.7575	FLORIDALE	0301S001	downstrm	2			√			√
Carroll Creek at Eglin 211	30.6461	-86.7575	FLORIDALE	0301S001	no record	2		√				
Carroll Creek at Eglin 211	30.6461	-86.7575	FLORIDALE	0301S001	upstream	2			√			√
Catfish Branch at Eglin 736	30.5294	-86.9793	WARD BASIN	0201S003	downstrm	1		√	√			
Catfish Branch at Eglin 736	30.5227	-86.9741	WARD BASIN	0201S003	upstream	1	C5			√	√	√
Cawthan Branch at Eglin 409	30.7144	-86.3165	MOSSY HEAD	0713S001	downstrm	2		√	√			√
Cawthan Branch at Eglin 409	30.7146	-86.3161	MOSSY HEAD	0713S001	upstream	2		√	√		√	√
Coon Head Branch at Eglin Range Rd 388	30.5620	-86.3185	NICEVILLE SE	1007S005	no record	2		√				
Cosson Mill Crk trib E ofSR 280,1.8 mi W I-10	30.7066	-86.1927	DEFUNIAK SPRINGS W	temp12	no record	1		√				
Cowpen Branch at Eglin 409	30.7178	-86.3150	MOSSY HEAD	0701S001	downstrm	3			√			√
Cowpen Branch at Eglin 409	30.7178	-86.3150	MOSSY HEAD	0701S001	upstream	3			√		√	√
Unnamed trib of Cowpen Branch @ RR 382	30.7332	-86.3124	MOSSY HEAD	0701	downstrm	2		√	√			
Unnamed trib of Cowpen Branch @ RR 382	30.7332	-86.3124	MOSSY HEAD	0701	upstream	2		√	√			
Crane Branch @ Eglin 211	30.6218	-86.8020	FLORIDALE	0102S008	downstrm	1						√
Crane Branch @ Eglin 211	30.6218	-86.8020	FLORIDALE	0102S008	no record	1		√				
Davis Branch at Eglin 201	30.6146	-86.1780	PORTLAND	1106S002	downstrm	2			√			√
Davis Branch at Eglin 201	30.6146	-86.1780	PORTLAND	1106S002	no record	2		√				
Davis Branch at Eglin 201	30.6146	-86.1780	PORTLAND	1106S002	upstream	2			√			√
Davis Branch tributary at Eglin 319	30.6119	-86.1802	PORTLAND	1106S001	downstrm	2			√			√
Davis Branch tributary at Eglin 319	30.6119	-86.1802	PORTLAND	1106S001	upstream	2			√			√

Sample Location	LAT	LONG	Quad Sheet	Eglin Management Unit (EMU)	Direction Sampled	Stream Order	Rosgen Stream Type	Fish	Habitat	Geomorphology	Insects	Chemistry
Old Ford Road above Hwy 87	30.4461	-86.8868	HOLLEY	-	upstream	2					√	√
discharge from Speck Pond below levee	30.6992	-86.3874	SPENCER FLATS	0708	downstrm	1		√				
Dogwood Head Branch at Eglin Road 485	30.6248	-86.3593	MOSSY HEAD	0804S005	upstream	1					√	√
Double Head Branch @ powerline road	30.5501	-86.9162	WARD BASIN	0103S004	downstrm	1			√			
Double Head Branch @ powerline road	30.5501	-86.9162	WARD BASIN	0103S004	upstream	1			√			
Double Head Branch below Buck Pond (287)	30.5511	-86.9104	WARD BASIN	0103S006	downstrm	1					√	√
Dry Hollow @ Eglin 604W	30.5983	-86.8039	HAROLD SE	0102S001	downstrm	1			√			
Dry Hollow @ Eglin 604W	30.5983	-86.8039	HAROLD SE	0102S001	upstream	1			√		√	√
East Bay River 0.75 mi below SR 87 bridge	30.4383	-86.8736	NAVARRE	temp3	downstrm	6		√				
East Bay River 2000 m below Eglin 259	30.4308	-86.7813	NAVARRE	0204S009	downstrm	6		√				
East Bay River 4.5 air mi above SR 87 bridge	30.4309	-86.7815	NAVARRE	0204S008	upstream	6		√				
East Bay River at Eglin 259	30.4315	-86.7725	NAVARRE	0204S003	downstrm	5						√
East Bay River at Eglin 259	30.4315	-86.7725	NAVARRE	0204S003	no record	5		√				
East Bay River at Eglin 259	30.4315	-86.7725	NAVARRE	0204S003	upstream	5					√	√
East Bay River at Florida Hwy 87 bridge	30.4408	-86.8663	NAVARRE	0204S004	both	6						√
East Bay River trib. at Eglin 655	30.4461	-86.6582	MARY ESTHER	0204S010	no record	1		√				
East Turkey Creek @ RR473 (Bortone #22)	30.5159	-86.3691	NICEVILLE	0802	downstrm	1		√				
East Turkey Creek 1.1 mi NE of junct 285&190	30.5418	-86.4420	NICEVILLE	0802S004	both	2		√				
East Turkey Creek 1.5 mi E of junct 285 & 190	30.5125	-86.4251	NICEVILLE	0802S002	downstrm	2		√			√	√
East Turkey Creek at bridge on Roberts Rd.	30.5341	-86.4333	NICEVILLE	0802S003	both	2		√				
East Turkey Creek RR 220 (Bortone #21)	30.5331	-86.4312	NICEVILLE	0802	downstrm	1		√				
East Turkey Crk at bridge xing Ruckle's land	30.5229	-86.4281	NICEVILLE	0802S001	upstream	2		√				
East Turkey Crk S. of headwater (Bortone #1)	30.5497	-86.4411	NICEVILLE	0802	downstrm	1		√				
Ruckel Property (Bortone #8)	30.5150	-86.4388	NICEVILLE	0802	downstrm	1		√				
East Turkey Creek trib near road off Eglin 220	30.5339	-86.4304	NICEVILLE	0802S005	both	1			√			
Exline Creek at Eglin 416	30.6418	-86.3552	MOSSY HEAD	0817S003	downstrm	2					√	
Exline Creek tributary at Eglin 492	30.6563	-86.3543	MOSSY HEAD	0817S004	downstrm	1					√	√
Exline Creek tributary at Eglin 492	30.6563	-86.3543	MOSSY HEAD	0817S004	upstream	1					√	√
Exline Creek tributary at Eglin 503	30.6448	-86.3749	MOSSY HEAD	0817S002	upstream	1					√	√
Fishpond Branch E SR 280, 0.9 mi W of I-10	30.7065	-86.1790	DEFUNIAK SPRINGS W	temp13	no record	1		√				
East Branch of Fourmile Creek near RR 312	30.5467	-86.1284	PORTLAND	1102S006	upstream	2		√	√		√	√
Fourmile Creek at Eglin 205	30.5797	-86.1351	PORTLAND	1102S001	both	1						√
Fourmile Creek at end of Eglin 312, SW fork	30.5426	-86.1349	PORTLAND	1102S005	no record	1		√				
Fourmile Creek at end of Eglin Rd 342	30.5485	-86.1346	PORTLAND	1102S004	no record	2		√				
Fourmile Creek SR 20, 1 mi W of Freeport	30.5015	-86.1458	PORTLAND	temp20	no record	2		√				
Power line (Bortone #5)	30.5489	-86.4718	NICEVILLE	0605	downstrm	1		√				

Sample Location	LAT	LONG	Quad Sheet	Eglin Management Unit (EMU)	Direction Sampled	Stream Order	Rosgen Stream Type	Fish	Habitat	Geomorphology	Insects	Chemistry
Garnier Creek at new powerline rd E. of 636	30.5012	-86.5735	FT WALTON BEACH	0406S003	no record	2		√				
Garnier Creek at new powerline rd E. of 636	30.5012	-86.5735	FT WALTON BEACH	0406S003	upstream	2					√	√
Garnier Creek at SR 189 (Wright Rd)	30.4804	-86.5854	FT WALTON BEACH	0406S001	no record	2		√				
Garnier Creek western trib at powerline road	30.5008	-86.5793	VALPARAISO	0406S002	downstrm	1	D5	√	√	√	√	√
Garnier Creek western trib at powerline road	30.5008	-86.5793	VALPARAISO	0406S002	no record	1	D5	√				
Goodwin Creek 0.5 river mi above conflu w/Alaqua Creek	30.5004	-86.1962	PORTLAND	temp18	upstream	1		√				
Goodwin Creek at confluence with Alaqua Crk	30.4989	-86.1987	FREEPORT	temp17	no record	1		√				
Gopher Creek at Eglin AFB Range Rd 211	30.6817	-86.6061	CRESTVIEW SOUTH	0502S001	downstrm	1						√
Gopher Creek at Eglin AFB Range Rd 211	30.6817	-86.6061	CRESTVIEW SOUTH	0502S001	no record	1		√				
Green Head Branch at Eglin Road 485	30.6272	-86.3595	MOSSY HEAD	0804S006	upstream	1					√	√
Gum Creek at Eglin Range Road 207	30.7065	-86.3936	SPENCER FLATS	0707S001	downstrm	3		√	√			√
Gum Creek at Eglin Range Road 207	30.7065	-86.3934	SPENCER FLATS	0707S001	no record	3	E5	√				
Gum Creek at Eglin Range Road 207	30.7065	-86.3934	SPENCER FLATS	0707S001	upstream	3	E5	√	√	√	√	√
Hicks Creek E. Branch @ Eglin 736	30.5400	-86.9479	WARD BASIN	0101S003	upstream	1	D5	√		√	√	√
Hicks Creek west branch steephead	30.5306	-86.9481	WARD BASIN	0101S002	no record	1		√				
Hog Creek at Eglin Road 207	30.7086	-86.3446	MOSSY HEAD	0710S001	downstrm	3			√			√
Hog Creek at Eglin Road 207	30.7086	-86.3446	MOSSY HEAD	0710S001	no record	3		√				
Hog Creek at Eglin Road 207	30.7086	-86.3446	MOSSY HEAD	0710S001	upstream	3			√			√
Holley Creek at Eglin 735	30.5449	-86.8150	HAROLD SE	0104S004	downstrm	2			√			
Holley Creek at Eglin 735	30.5449	-86.8150	HAROLD SE	0104S004	no record	2		√				
Holley Creek at Eglin 735	30.5449	-86.8150	HAROLD SE	0104S004	upstream	2			√			
Honey Creek at Eglin 207, N of Eglin boundary	30.6988	-86.5004	SPENCER FLATS	0506S006	no record	3		√				
Honey Creek at Eglin 211	30.6939	-86.4962	SPENCER FLATS	0506S001	downstrm	3			√			√
Honey Creek at Eglin 211	30.6939	-86.4962	SPENCER FLATS	0506S001	no record	3		√				
Honey Creek at Eglin 211	30.6939	-86.4962	SPENCER FLATS	0506S001	upstream	3			√		√	√
Honey Creek at Eglin 564	30.6798	-86.4924	SPENCER FLATS	0506S004	both	3			√			
Honey Creek at Eglin AFB Range Rd 454	30.6653	-86.4848	SPENCER FLATS	0506S003	downstrm	2			√			√
Honey Creek at Eglin AFB Range Rd 454	30.6485	-86.4849	SPENCER FLATS	0506S003	no record	2		√				
Honey Creek at Eglin AFB Range Rd 454	30.6653	-86.4848	SPENCER FLATS	0506S003	upstream	2			√		√	√
Honey Creek at Range Road 456	30.6509	-86.4797	SPENCER FLATS	0506	Upstream	2		√	√			
Honey Creek trib. at Eglin 454	30.6653	-86.4882	SPENCER FLATS	0506S002	downstrm	1					√	√
Honey Creek trib. at Eglin 454	30.6653	-86.4882	SPENCER FLATS	0506S002	upstream	1			√			√
Horse Branch at Eglin Range Rd 253	30.4641	-86.7363	MARY ESTHER	0210S006	no record	1		√				
Indigo Creek at Eglin Road 409	30.6964	-86.3105	MOSSY HEAD	0711S001	both	1						√
Indigo Creek at Eglin 213	30.5406	-86.8359	HAROLD SE	0107S001	downstrm	1						√

Sample Location	LAT	LONG	Quad Sheet	Eglin Management Unit (EMU)	Direction Sampled	Stream Order	Rosgen Stream Type	Fish	Habitat	Geomorphology	Insects	Chemistry
Indigo Creek at Eglin 213	30.5406	-86.8359	HAROLD SE	0107S001	upstream	1			√			√
Indigo Pond	30.6975	-86.3313	MOSSY HEAD	0711	Upstream	2		√				
Jr. Walton Pond at Eglin 211 (E. of range gate)	30.6955	-86.4710	SPENCER FLATS	0510P001	upstream	1						√
Juniper Creek at Eglin Road 434	30.6229	-86.5212	VALPARAISO	0609S004	no record	1		√				
Juniper Creek bridge crossing on Eglin 221	30.6078	-86.5228	VALPARAISO	0609S001	downstrm	3			√		√	√
Juniper Creek bridge crossing on Eglin 221	30.6078	-86.5228	VALPARAISO	0609S001	upstream	3		√	√		√	√
Juniper Creek crossing at Hwy 85	30.5578	-86.5197	VALPARAISO	0608S001	both	4						√
Juniper Creek Steephead off Eglin 231	30.6287	-86.5012	CRESTVIEW SOUTH	0609SH01	downstrm	1						
Juniper Crk steephead S Duke Fld, N RR 565	30.6329	-86.5232	CRESTVIEW SOUTH	0609SH02	downstrm	1					√	
Juniper Creek trib. upstream of borrow pit	30.5925	-86.5147	VALPARAISO	0609S002	upstream	1					√	√
Lightwood Knot Creek at Eglin 632	30.5051	-86.6072	VALPARAISO	0405S003	downstrm	2		√	√			√
Lightwood Knot Creek at Eglin 632	30.5051	-86.6072	VALPARAISO	0405S003	no record	2		√				
Lightwood Knot Creek at Eglin 632	30.5051	-86.6072	VALPARAISO	0405S003	Upstream	2		√	√	√	√	√
Lightwood Knot Creek at SR 189 (Wright Rd)	30.4779	-86.5961	FT WALTON BEACH	0405S005	no record	3		√				
Lightwood Knot Crk headwaters (steephead)	30.5291	-86.6132	VALPARAISO	0405S002	upstream	1					√	√
trib. at confluence with Lighterwood Knot Crk	30.5283	-86.6114	VALPARAISO	0405S001	downstrm	2					√	√
Little Alaqua at Eglin 200/201	30.6047	-86.2402	PORTLAND	1104S002	downstrm	3						√
Little Alaqua at Eglin 200/201	30.6047	-86.2402	PORTLAND	1104S002	no record	3		√				
Little Alaqua at Eglin 200/201	30.6047	-86.2402	PORTLAND	1104S002	upstream	3						√
Little Alaqua at Eglin 205	30.5550	-86.1847	PORTLAND	1104S003	downstrm	5						√
Little Alaqua at Eglin 205	30.5550	-86.1847	PORTLAND	1104S003	upstream	5					√	√
Little Alaqua at Eglin 208	30.5928	-86.2142	PORTLAND	1104S004	downstrm	4						√
Little Alaqua at Eglin 208	30.5928	-86.2142	PORTLAND	1104S004	no record	4		√				
Little Alaqua at Eglin 208	30.5928	-86.2142	PORTLAND	1104S004	upstream	4					√	√
Little Alaqua at Eglin 381	30.6386	-86.2585	MOSSY HEAD	1104S006	no record	2		√				
Little Alaqua Crk 100 m above conflu.w/Alaqua	30.5477	-86.1755	PORTLAND	1104S008	no record	5		√				
Little Basin Creek at Eglin 351	30.5356	-86.2277	PORTLAND	1008S002	downstrm	2		√	√			
Little Basin Creek at Eglin 351	30.5356	-86.2277	PORTLAND	1008S002	upstream	2	E5	√	√	√	√	√
Little Basin Creek at Eglin 359	30.5336	-86.2380	PORTLAND	1008S001	downstrm	3			√			√
Little Basin Creek at Eglin 359	30.5336	-86.2380	PORTLAND	1008S001	no record	3		√				
Little Basin Creek at Eglin 359	30.5336	-86.2380	PORTLAND	1008S001	upstream	3		√	√		√	√
Little Boiling Creek at Eglin 213	30.5414	-86.8650	HAROLD SE	0106S001	downstrm	2			√			√
Little Boiling Creek at Eglin 213	30.5414	-86.8650	HAROLD SE	0106S001	upstream	2			√			√
Little Boiling Creek at Eglin Road 718	30.5262	-86.8647	HAROLD SE	0106S002	upstream	1					√	√
Little Rocky Creek at Eglin 200	30.5769	-86.3883	NICEVILLE	0809S003	downstrm	4			√			
Little Rocky Creek at Eglin 200	30.5769	-86.3883	NICEVILLE	0809S003	upstream	4			√		√	√

Sample Location	LAT	LONG	Quad Sheet	Eglin Management Unit (EMU)	Direction Sampled	Stream Order	Rosgen Stream Type	Fish	Habitat	Geomorphology	Insects	Chemistry
Little Rocky Creek at Eglin 434	30.6209	-86.4306	NICEVILLE	0809S005	downstrm	2			√			
Little Rocky Creek at Eglin 434	30.6209	-86.4306	NICEVILLE	0809S005	upstream	2			√		√	√
Little Rocky Creek at Eglin 499	30.5854	-86.4038	NICEVILLE	0809S002	downstrm	3			√		√	√
Little Rocky Creek at Eglin 499	30.5854	-86.4038	NICEVILLE	0809S002	upstream	3			√		√	√
Little Rocky Creek at Eglin 515	30.5901	-86.4128	NICEVILLE	0809S001	downstrm	3	E5			√	√	√
Little Rocky Creek at Eglin 515	30.5901	-86.4128	NICEVILLE	0809S001	upstream	3	E5				√	√
Little Rocky Creek at end of Eglin 477	30.5470	-86.3816	NICEVILLE	0809S007	downstrm	4	C5c-			√	√	√
Little Rocky Creek at end of Eglin 477	30.5470	-86.3816	NICEVILLE	0809S007	upstream	4	C5c-				√	√
Little Rocky Creek at Old Hwy 285	30.6090	-86.4243	NICEVILLE	0809S006	downstrm	3						
Little Rocky Creek at railroad trestle	30.6067	-86.4219	NICEVILLE	0809S008	downstrm	3	E5	√		√	√	√
Little Rocky Creek at railroad trestle	30.6074	-86.4223	NICEVILLE	0809S008	upstream	3	D5c-	√			√	√
Live Oak Branch bridge blowout @ Eglin 382	30.7194	-86.2812	MOSSY HEAD	0908S001	upstream	3		√			√	√
Live Oak Creek @ road below 235 (gate 82C)	30.5316	-86.7203	HOLT SW	0210S005	downstrm	1					√	√
Live Oak Creek at Eglin 234	30.5110	-86.7146	HOLT SW	0210S001	downstrm	2			√			√
Live Oak Creek at Eglin 234	30.5110	-86.7146	HOLT SW	0210S001	no record	2		√				
Live Oak Creek at Eglin 234	30.5110	-86.7146	HOLT SW	0210S001	upstream	2			√		√	√
Live Oak Creek at Eglin 235/181	30.5341	-86.7202	HOLT SW	0210S004	no record	2		√				
Live Oak Creek at Eglin 235/181	30.5341	-86.7202	HOLT SW	0210S004	upstream	2					√	√
Live Oak Creek at Eglin 253	30.4354	-86.7343	MARY ESTHER	0210S002	downstrm	3						√
Live Oak Creek at Eglin 253	30.4354	-86.7343	MARY ESTHER	0210S002	no record	3		√				
Live Oak Creek at Eglin 253	30.4354	-86.7343	MARY ESTHER	0210S002	upstream	3						√
Bog Frog Site at tributary to Live Oak Creek	30.4930	-86.7265	MARY ESTHER	0210	downstrm	1		√				
Long Branch at Eglin 381, N of jnct w/200/201	30.6146	-86.2547	PORTLAND	1104S007	no record	2		√				
Long Branch at Eglin 726	30.4804	-86.9355	HOLLEY	0201S004	downstrm	1		√	√			
Long Branch at Eglin 726	30.4808	-86.9357	HOLLEY	0201S004	upstream	1					√	√
Long Branch at Eglin 815	30.4708	-86.9350	HOLLEY	0201S001	upstream	2					√	√
Long Creek at old 469 - (road removed)	30.5226	-86.4120	NICEVILLE	0803S003	upstream	2					√	√
Long Creek Range Road 220 (Bortone #12)			NICEVILLE	0803	Upstream	1		√				
Long Creek trib 2.5 mi N of conflu w/Rocky Crk	30.5349	-86.4189	NICEVILLE	0803S002	downstrm	1			√			
Long Creek trib 2.5 mi N of conflu w/Rocky Crk	30.5349	-86.4189	NICEVILLE	0803S002	upstream	1		√	√			
Long Creek tributary at Eglin 406	30.5428	-86.4133	NICEVILLE	0803S001	downstrm	2			√			
Long Creek tributary at Eglin 406	30.5428	-86.4133	NICEVILLE	0803S001	upstream	2		√	√		√	√
Magnolia Creek @ wellfields					downstrm	1		√				
Malone Creek at Eglin 211	30.6600	-86.6990	HOLT	0307S001	downstrm	3			√			√
Malone Creek at Eglin 211	30.6600	-86.6990	HOLT	0307S001	no record	3		√				
Malone Creek at Eglin 211	30.6600	-86.6990	HOLT	0307S001	upstream	3			√		√	√

Sample Location	LAT	LONG	Quad Sheet	Eglin Management Unit (EMU)	Direction Sampled	Stream Order	Rosgen Stream Type	Fish	Habitat	Geomorphology	Insects	Chemistry
Malone Creek at Eglin 236	30.6377	-86.7014	HOLT	0307S003	downstrm	2		√	√			
Malone Creek at Eglin 236	30.6377	-86.7014	HOLT	0307S003	no record	2		√				
Malone Creek at Eglin 236	30.6377	-86.7014	HOLT	0307S003	upstream	2		√	√			
Malone Creek at Eglin 688	30.6097	-86.6976	HOLT SW	0307S002	downstrm	2			√			
Malone Creek at Eglin 688	30.6097	-86.6976	HOLT SW	0307S002	no record	2		√				
Malone Creek at Eglin 688	30.6097	-86.6976	HOLT SW	0307S002	upstream	2			√		√	√
Metts Creek at 236, 0.4 mi from jnct w/211	30.6603	-86.7255	HOLT	0302S001	no record	2		√				
Metts Creek at Eglin 211	30.6560	-86.7293	HOLT	0306S001	downstrm	2			√			√
Metts Creek at Eglin 211	30.6560	-86.7293	HOLT	0306S001	no record	2		√				
Metts Creek at Eglin 211	30.6560	-86.7293	HOLT	0306S001	upstream	2			√		√	√
Metts Creek at Eglin 236	30.6511	-86.7257	HOLT	0306S003	downstrm	2		√	√			
Metts Creek at Eglin 236	30.6511	-86.7257	HOLT	0306S003	upstream	2			√			
Metts Creek at Eglin 688	30.6111	-86.7284	HOLT SW	0306S002	downstrm	1			√			
Metts Creek at Eglin 688	30.6111	-86.7284	HOLT SW	0306S002	no record	1		√				
Metts Creek at Eglin 688	30.6111	-86.7284	HOLT SW	0306S002	upstream	1			√		√	√
Middle Creek at Eglin 211	30.6638	-86.6766	HOLT	0308S002	downstrm	3	C5	√	√			√
Middle Creek at Eglin 211	30.6638	-86.6766	HOLT	0308S002	no record	3	C5	√				
Middle Creek at Eglin 211	30.6638	-86.6766	HOLT	0308S002	upstream	3	C5	√	√	√	√	√
Middle Creek at Eglin 427	30.5459	-86.2917	NICEVILLE SE	1011S001	downstrm	2			√			
Middle Creek at Eglin 427	30.5459	-86.2917	NICEVILLE SE	1011S001	no record	2		√				
Middle Creek at Eglin 427	30.5459	-86.2917	NICEVILLE SE	1011S001	upstream	2			√			
Middle Creek at Eglin 600E	30.6244	-86.6578	HOLT SW	0308S003	downstrm	2			√			
Middle Creek at Eglin 600E	30.6244	-86.6578	HOLT SW	0308S003	no record	2		√				
Middle Creek at Eglin 600E	30.6244	-86.6578	HOLT SW	0308S003	upstream	2			√		√	√
Middle Creek at Eglin 610	30.6468	-86.6652	HOLT	0308S001	downstrm	2						√
Middle Creek at Eglin 610	30.6468	-86.6652	HOLT	0308S001	upstream	2						√
Mill Creek at bridge N. of SR.190 by hole 13	30.5372	-86.4856	NICEVILLE	0604S005	downstrm	1		√	√			√
Mill Creek at bridge N. of SR.190 by hole 13	30.5373	-86.4853	NICEVILLE	0604S005	upstream	1		√	√		√	√
Mill Creek at bridge north of SR 190, by hole 9	30.5438	-86.4873	NICEVILLE	0604S006	downstrm	1		√			√	√
Mill Creek at bridge north of SR 190, by hole 9	30.5438	-86.4873	NICEVILLE	0604S006	upstream	1		√				√
Mill Creek at non-culvert section dstm SR. 190	30.5344	-86.4861	NICEVILLE	0604S004	downstrm	2		√			√	√
Mill Creek at non-culvert section dstm SR. 190	30.5344	-86.4861	NICEVILLE	0604S004	upstream	2		√			√	√
Mill Creek below Trout Lake impoundment	30.5230	-86.4865	NICEVILLE	0604S001	downstrm	2					√	√
Mill Creek fairway b/t holes 14 and 16	30.5338	-86.4859	NICEVILLE	0604S003	downstrm	1		√				√
Mill Creek SR 190 (College Blvd)	30.5351	-86.4863	NICEVILLE	0604S002	downstrm	1		√	√		√	
Mill Creek SR 190 (College Blvd)	30.5351	-86.4863	NICEVILLE	0604S002	upstream	1		√			√	√

Sample Location	LAT	LONG	Quad Sheet	Eglin Management Unit (EMU)	Direction Sampled	Stream Order	Rosgen Stream Type	Fish	Habitat	Geomorphology	Insects	Chemistry
Milligan Creek at Eglin 211	30.6320	-86.7749	FLORIDALE	0305S002	downstrm	3			√			√
Milligan Creek at Eglin 211	30.6320	-86.7749	FLORIDALE	0305S002	no record	3		√				
Milligan Creek at Eglin 211	30.6320	-86.7749	FLORIDALE	0305S002	upstream	3			√		√	√
Milligan Creek at Eglin 688	30.6099	-86.7688	HAROLD SE	0305S004	no record	2		√				
Moore Creek @ Gauge Station N. of 211	30.5589	-86.8920	WARD BASIN	0104S003	downstrm	2			√			√
Moore Creek @ Gauge Station N. of 211	30.5589	-86.8920	WARD BASIN	0104S003	upstream	2	C5	√	√	√	√	√
Mt. Sinai Branch at Eglin 412	30.6646	-86.3653	MOSSY HEAD	0818S001	upstream	1					√	√
Mullet Creek at Eglin Road 354	30.5035	-86.3297	NICEVILLE SE	1204S002	downstrm	2		√			√	
Ninemile Creek at Eglin 462	30.5912	-86.4670	NICEVILLE	0615S002	downstrm	2			√			
Ninemile Creek at Eglin 462	30.5912	-86.4670	NICEVILLE	0615S002	upstream	2			√			
Ninemile Creek at Eglin 477	30.5919	-86.4581	NICEVILLE	0615S003	downstrm	2						√
Ninemile Creek tributary at Eglin 551	30.6036	-86.4578	NICEVILLE	0615S001	downstrm	2			√			
Ninemile Creek tributary at Eglin 551	30.6036	-86.4578	NICEVILLE	0615S001	upstream	2			√			
Oakie Creek at Eglin 208	30.6615	-86.1969	DEFUNIAK SPRINGS W	0903S001	downstrm	3						√
Oakie Creek at Eglin 208	30.6615	-86.1969	DEFUNIAK SPRINGS W	0903S001	no record	3		√				
Oakie Creek at Eglin 208	30.6615	-86.1969	DEFUNIAK SPRINGS W	0903S001	upstream	3					√	√
Open Branch at intersection of Eglin 214/374	30.6426	-86.3250	MOSSY HEAD	0815S001	downstrm	2					√	√
Open Branch at intersection of Eglin 214/374	30.6426	-86.3250	MOSSY HEAD	0815S001	upstream	2					√	√
Panther Creek at Eglin 255	30.4310	-86.8067	NAVARRE	0207S001	downstrm	3						√
Panther Creek at Eglin 255	30.4310	-86.8067	NAVARRE	0207S001	upstream	3					√	√
Panther Creek at Eglin 678	30.4642	-86.8168	NAVARRE	0207S002	no record	2		√				
Panther Creek at Eglin 678	30.4642	-86.8168	NAVARRE	0207S002	upstream	2					√	√
Panther Creek at Eglin 722	30.4504	-86.8126	NAVARRE	0207S003	downstrm	2	E5			√	√	√
Panther Creek trib. At Eglin 678	30.4545	-86.7995	NAVARRE	0208S001	no record	1		√				
Parrish Creek at Eglin Range Road 603	30.5824	-86.5416	VALPARAISO	0611S001	downstrm	2			√			√
Parrish Creek at Eglin Range Road 603	30.5824	-86.5416	VALPARAISO	0611S001	upstream	2						√
Pearl Creek at Eglin Range Road 211	30.6805	-86.5553	CRESTVIEW SOUTH	0504S001	downstrm	2						√
Pearl Creek at Eglin Range Road 211	30.6805	-86.5553	CRESTVIEW SOUTH	0504S001	no record	2		√				
Pearl Creek at Eglin Range Road 211	30.6805	-86.5553	CRESTVIEW SOUTH	0504S001	upstream	2		√	√		√	√
Pinelog Creek at Eglin 221	30.6074	-86.4948	NICEVILLE	0616S001	downstrm	2			√			√
Pinelog Creek at Eglin 221	30.6074	-86.4948	NICEVILLE	0616S001	upstream	2			√		√	√
Piney Creek at Eglin Road 354	30.5034	-86.3444	NICEVILLE SE	1204S001	upstream	1		√			√	√
Point Lookout Creek at Eglin 221	30.6070	-86.4824	NICEVILLE	0612S001	downstrm	3		√	√			√
Point Lookout Creek at Eglin 221	30.6070	-86.4824	NICEVILLE	0612S001	no record	3		√				
Point Lookout Creek at Eglin 221	30.6070	-86.4824	NICEVILLE	0612S001	upstream	3	C5	√	√	√	√	√
Point Lookout Creek at Eglin 434	30.6215	-86.4808	NICEVILLE	0612S005	downstrm	2			√			√

Sample Location	LAT	LONG	Quad Sheet	Eglin Management Unit (EMU)	Direction Sampled	Stream Order	Rosgen Stream Type	Fish	Habitat	Geomorphology	Insects	Chemistry
Point Lookout Creek at Eglin 434	30.6215	-86.4808	NICEVILLE	0612S005	upstream	2			√		√	√
Point Lookout Creek near end of Eglin 462	30.5933	-86.4995	NICEVILLE	0612S006	downstrm	3		√	√			
Point Lookout Creek near end of Eglin 462	30.5933	-86.4995	NICEVILLE	0612S006	upstream	3		√	√			
Prairie Creek at Eglin 678	30.4526	-86.7668	NAVARRE	0209S001	no record	3	C5	√				
Prairie Creek at Eglin 678	30.4526	-86.7668	NAVARRE	0209S001	upstream	3	C5			√	√	√
Prairie Creek at powerline E. of 259, S. of 234	30.4835	-86.7734	NAVARRE	0209S002	no record	1		√				
Ramer Creek at Eglin AFB Range Rd 211	30.6749	-86.4123	SPENCER FLATS	0706S001	downstrm	2						√
Ramer Creek at Eglin AFB Range Rd 211	30.6749	-86.4123	SPENCER FLATS	0706S001	no record	2		√				
Ramer Creek at Eglin AFB Range Rd 211	30.6749	-86.4123	SPENCER FLATS	0706S001	upstream	2					√	√
Red Deer Creek at Eglin Road 207	30.7086	-86.3445	MOSSY HEAD	0709S001	downstrm	2		√				√
Red Deer Creek at Eglin Road 207	30.7086	-86.3463	MOSSY HEAD	0709S001	no record	2		√				
Red Deer Creek at Eglin Road 207	30.7086	-86.3463	MOSSY HEAD	0709S001	upstream	2			√		√	√
Rocky Creek at Eglin 213	30.6933	-86.3017	MOSSY HEAD	0804S003	both	1						√
Rocky Creek at Eglin 214/374	30.6483	-86.3334	NICEVILLE	0804S004	downstrm	4					√	√
Rocky Creek at Eglin 214/374	30.6483	-86.3334	NICEVILLE	0804S004	upstream	4					√	√
Rocky Creek at Eglin 219	30.5352	-86.3825	NICEVILLE	0804S002	downstrm	5			√			
Rocky Creek at Eglin 219	30.5352	-86.3825	NICEVILLE	0804S002	upstream	5			√		√	√
Rocky Creek at Eglin Road 200	30.5734	-86.3667	NICEVILLE SE	0804S001	upstream	4					√	√
Rocky Creek near Eglin Road 395 at C-74	30.6769	-86.3219	MOSSY HEAD	0804S007	downstrm	2					√	
Rocky Creek tributary at Egliln 422	30.5934	-86.3872	NICEVILLE	0811S002	both	3						√
Rocky Creek tributary at Eglin 420	30.6062	-86.3977	NICEVILLE	0811S001	downstrm	3			√			√
Rocky Creek tributary at Eglin 420	30.6062	-86.3977	NICEVILLE	0811S001	upstream	3			√		√	√
Rogue Creek at Eglin 233	30.5561	-86.5621	VALPARAISO	0610S001	downstrm	2			√			√
Rogue Creek at Eglin 233	30.5561	-86.5621	VALPARAISO	0610S001	upstream	2			√		√	√
Rogue Creek at Eglin 625	30.5561	-86.5773	VALPARAISO	0610S002	downstrm	2			√		√	
Rogue Creek at Eglin 625	30.5561	-86.5773	VALPARAISO	0610S002	upstream	2			√		√	√
Rogue Creek at Eglin Road 693	30.5564	-86.5405	VALPARAISO	0610S003	downstrm	3					√	√
Sanders Branch Hwy 190 (Bortone #19)	30.5343	-86.4458	NICEVILLE	0801	downstrm	1		√	√			
Sconiers Mill Creek at Senterfitt Rd	30.6797	-86.1632	DEFUNIAK SPRINGS W	temp15	no record	3		√				
Sconiers Mill Creek trib@Coy Burgess Loop Rd.	30.6604	-86.1569	DEFUNIAK SPRINGS W	temp16	no record	2		√				
Alaqua Drainage	N/A	N/A	N/A	N/A	N/A							
Bortone #18	30.5344	-86.4538	NICEVILLE	0803	Upstream	1		√	√			
Howard Chase Drive- neighborhood	30.5302	-86.4528	NICEVILLE	0606S001	downstrm	1		√				
Shaw Still Branch 0.2 mi S of 190(subdivision)	30.5302	-86.4528	NICEVILLE	0606S001	downstrm	1		√			√	√
Shaw Still Branch 0.2 mi S of 190(subdivision)	30.5302	-86.4528	NICEVILLE	0606S001	upstream	1		√			√	√

Sample Location	LAT	LONG	Quad Sheet	Eglin Management Unit (EMU)	Direction Sampled	Stream Order	Rosgen Stream Type	Fish	Habitat	Geomorphology	Insects	Chemistry
Shoal River 0.5 river mi below Titi confluence	30.7003	-86.5359	CRESTVIEW SOUTH	temp8	downstrm	6		√				
Shoal River 1.4 air mi above Yellow Rvr conflu.	30.6936	-86.6266	HOLT	0501S001	no record	6		√				
Shoal River 200 yards upstream of powerlines at an oxbow	30.6978	-86.5563	CRESTVIEW SOUTH	temp5	upstream	5		√				
Shoal River 3.5 river mi upstream from SR 85 bridge	30.6997	-86.5433	CRESTVIEW SOUTH	temp6	no record	5		√				
Shoal River 400 m above SR 85 bridge	30.6966	-86.5711	CRESTVIEW SOUTH	temp4	upstream	6		√				
Shoal River at confluence with Titi Creek	30.7021	-86.5343	CRESTVIEW SOUTH	temp7	no record	6		√				
Shoal River at I-10 bridge	30.7265	-86.5216	CRESTVIEW SOUTH	temp9	no record	5		√				
Shoal River at SR 285, Co. Rte 1087 bridge	30.7963	-86.3072	NEW HARMONY	temp10	upstream	4		√				
Shoal River tributary at Eglin 211	30.6889	-86.5367	CRESTVIEW SOUTH	0507S001	downstrm	1						√
Silver Creek at Eglin 211	30.6946	-86.5214	CRESTVIEW SOUTH	0505S003	downstrm	3						√
Silver Creek at Eglin 211	30.6946	-86.5214	CRESTVIEW SOUTH	0505S003	no record	3		√				
Silver Creek at Eglin 211	30.6946	-86.5214	CRESTVIEW SOUTH	0505S003	upstream	3					√	√
Silver Creek at Eglin 454	30.6653	-86.5112	CRESTVIEW SOUTH	0505S001	downstrm	2						√
Silver Creek at Eglin 454	30.6653	-86.5112	CRESTVIEW SOUTH	0505S001	upstream	2						√
Silver Creek tributary at Eglin 565	30.6800	-86.5225	CRESTVIEW SOUTH	0505S002	downstrm	2						√
Silver Creek tributary at Eglin 565	30.6800	-86.5225	CRESTVIEW SOUTH	0505S002	no record	2		√				
Silver Creek tributary at Eglin 565	30.6800	-86.5225	CRESTVIEW SOUTH	0505S002	upstream	2			√		√	√
Still Branch trib. at Eglin 434	30.6213	-86.4646	NICEVILLE	0612S004	downstrm	1			√			
Still Branch trib. at Eglin 434	30.6213	-86.4646	NICEVILLE	0612S004	upstream	1			√			
Bortone #9A	30.5375	-86.4657	NICEVILLE	0605	downstrm	2		√				
Hwy 20 crossing (Bortone #24)	30.5132	-86.4549	NICEVILLE	0605	Upstream	3		√				
Hwy 285 crossing (Bortone #20)	30.5281	-86.4670	NICEVILLE	0605	downstrm	3		√	√			
Old Rail Road Crossing (Bortone Site #9)	30.5603	-86.4587	NICEVILLE	0605	downstrm	1		√				
Swift Creek 350 m North of Roberts Lake	30.5447	-86.4671	NICEVILLE	0605S001	upstream	3		√				
Swift Creek S. of old railroad crossing culvert	30.5606	-86.4589	NICEVILLE	0605S002	downstrm	3		√	√		√	√
Swift Creek S. of old railroad crossing culvert	30.5606	-86.4589	NICEVILLE	0605S002	upstream	3		√	√		√	√
Swift Crk S. Hwy 190 (effluent of College Pond)	30.5606	-86.4589	NICEVILLE	0604	downstrm	3		√				
Tallaperla Creek at powerline rd. SE of 330	30.6498	-86.1898	DEFUNIAK SPRINGS W	0901S003	upstream	2	E5			√	√	√
Tenmile Creek at Eglin Road 231	30.5701	-86.5159	VALPARAISO	0612S003	downstrm	4					√	√
Tenmile Creek at Eglin Road 231	30.5701	-86.5159	VALPARAISO	0612S003	no record	4		√				
Tenmile Creek at Eglin Road 231	30.5701	-86.5159	VALPARAISO	0612S003	upstream	4					√	√
Titi Creek at Eglin 207	30.7016	-86.4922	SPENCER FLATS	0701S006	no record	5		√				
Titi Creek at Eglin 207	30.7016	-86.4922	SPENCER FLATS	0701S006	upstream	5					√	√
Titi Creek at Eglin 382	30.7334	-86.3127	MOSSY HEAD	0701S005	downstrm	1						√
Titi Creek at Eglin 382	30.7334	-86.3127	MOSSY HEAD	0701S005	upstream	1					√	√

Sample Location	LAT	LONG	Quad Sheet	Eglin Management Unit (EMU)	Direction Sampled	Stream Order	Rosgen Stream Type	Fish	Habitat	Geomorphology	Insects	Chemistry
Titi Creek at Eglin AFB Range Rd 220	30.6996	-86.4690	SPENCER FLATS	0701S007	downstrm	4		√	√			
Titi Creek at Eglin AFB Range Rd 220	30.6999	-86.4685	SPENCER FLATS	0701S007	no record	4		√				
Titi Creek at Eglin AFB Range Rd 220	30.6996	-86.4690	SPENCER FLATS	0701S007	upstream	4		√	√		√	√
Titi Creek tributary at Eglin 207	30.7077	-86.3563	MOSSY HEAD	0701S002	downstrm	1			√			√
Titi Creek tributary at Eglin 207	30.7077	-86.3563	MOSSY HEAD	0701S002	upstream	1						√
unnamed tributary to Titi Creek at Eglin 211	30.6909	-86.4613	SPENCER FLATS	0508S001	downstrm	1						√
New site upstream of (Bortone #28)	30.5093	-86.5304	VALPARAISO	0602	Upstream	2		√				
Toms Creek at Florida S.R. 85 (Bortone #28)	30.5062	-86.5239	VALPARAISO	0602S001	downstrm	2		√				
Toms Creek at powerline road W. 85 near 631	30.5093	-86.5302	VALPARAISO	0602S002	upstream	2					√	√
Trout Creek at Florida S.R. 20	30.4821	-86.2884	CHOCTAW BEACH	1001S001	downstrm	3		√			√	
Turkey Creek at Eglin 232	30.5618	-86.5363	VALPARAISO	0607S005	downstrm	4			√		√	√
Turkey Creek at Eglin 232	30.5618	-86.5363	VALPARAISO	0607S005	upstream	4			√		√	√
Turkey Creek at Eglin 233	30.5814	-86.5749	VALPARAISO	0607S003	downstrm	3					√	√
Turkey Creek at Eglin 233	30.5814	-86.5749	VALPARAISO	0607S003	upstream	3					√	√
Turkey Creek at Eglin 626	30.5428	-86.5206	VALPARAISO	0607S006	downstrm	5						√
Turkey Creek at Eglin 626	30.5428	-86.5206	VALPARAISO	0607S006	upstream	5					√	√
Turkey Creek at Eglin 637	30.5796	-86.6074	VALPARAISO	0607S002	downstrm	1			√		√	√
Turkey Creek at Eglin 637	30.5796	-86.6074	VALPARAISO	0607S002	upstream	1			√		√	√
Turkey Creek steephead trib S. of Eglin 639	30.5895	-86.6001	VALPARAISO	0607SH01	downstrm	1					√	
Turkey Creek trib. North of Eglin 626	30.5520	-86.5047	VALPARAISO	0607L001	upstream	1					√	√
Turkey Gobbler Creek at Eglin 211	30.6713	-86.6620	HOLT	0309S005	downstrm	3		√	√			√
Turkey Gobbler Creek at Eglin 211	30.6713	-86.6620	HOLT	0309S005	no record	3		√				
Turkey Gobbler Creek at Eglin 211	30.6713	-86.6620	HOLT	0309S005	upstream	3		√	√		√	√
Turkey Gobbler Creek at Eglin 215	30.6372	-86.6369	HOLT	0309S003	downstrm	2			√			√
Turkey Gobbler Creek at Eglin 215	30.6372	-86.6369	HOLT	0309S003	no record	2		√				
Turkey Gobbler Creek at Eglin 215	30.6372	-86.6369	HOLT	0309S003	upstream	2			√		√	√
Turkey Gobbler Creek at Eglin 237 (blown out)	30.6206	-86.6108	VALPARAISO	0309S006	downstrm	1			√			
Turkey Gobbler Creek at Eglin 237 (blown out)	30.6206	-86.6108	VALPARAISO	0309S006	no record	1		√				
Turkey Gobbler Creek at Eglin 237 (blown out)	30.6206	-86.6108	VALPARAISO	0309S006	upstream	1			√			
Turkey Gobbler Creek at Eglin 600E	30.6238	-86.6210	VALPARAISO	0309S002	both	1						√
Turkey Gobbler Creek at Eglin 600E	30.6238	-86.6210	VALPARAISO	0309S002	downstrm	1			√			
Turkey Gobbler Creek at Eglin 600E	30.6238	-86.6210	VALPARAISO	0309S002	upstream	1			√		√	√
Turkey Gobbler Creek at Eglin 610	30.6571	-86.6523	HOLT	0309S004	no record	3		√				
Turkey Gobbler Creek at Eglin 610	30.6571	-86.6523	HOLT	0309S004	upstream	3						√
Turkey Gobbler Creek at Eglin 657	30.6360	-86.6326	HOLT	0309S001	downstrm	1			√			√
Turkey Gobbler Creek at Eglin 657	30.6360	-86.6326	HOLT	0309S001	upstream	1			√		√	√

Sample Location	LAT	LONG	Quad Sheet	Eglin Management Unit (EMU)	Direction Sampled	Stream Order	Rosgen Stream Type	Fish	Habitat	Geomorphology	Insects	Chemistry
steephead behind Okie Tower off Hwy 85	30.6463	-86.5558	CRESTVIEW SOUTH	0503SH01	downstrm	1						√
steephead behind Okie Tower off Hwy 85	30.6463	-86.5558	CRESTVIEW SOUTH	0503SH01	upstream	1					√	√
Turkey Hen Creek at Eglin 211	30.6809	-86.5755	CRESTVIEW SOUTH	0503S001	downstrm	3		√	√			√
Turkey Hen Creek at Eglin 211	30.6809	-86.5755	CRESTVIEW SOUTH	0503S001	no record	3		√				
Turkey Hen Creek at Eglin 211	30.6809	-86.5755	CRESTVIEW SOUTH	0503S001	upstream	3			√		√	√
Turkey Hen Creek at Eglin 233	30.6769	-86.5780	CRESTVIEW SOUTH	0503S002	downstrm	2						√
Turkey Hen Creek at Eglin 233	30.6769	-86.5780	CRESTVIEW SOUTH	0503S002	upstream	2					√	√
Turkey Hen Creek at end of Eglin RR 601	30.6575	-86.5688	CRESTVIEW SOUTH	0503S005	downstrm	1						√
Turkey Hen Creek at end of Eglin RR 601	30.6575	-86.5688	CRESTVIEW SOUTH	0503S005	no record	1		√				
Turkey Hen Creek at end of Eglin RR 601	30.6575	-86.5688	CRESTVIEW SOUTH	0503S005	upstream	1						√
Turkey Hen Creek east trib. at Eglin 605 & 611	30.6576	-86.5856	CRESTVIEW SOUTH	0503S003	downstrm	1			√			√
Turkey Hen Creek east trib. at Eglin 605 & 611	30.6576	-86.5856	CRESTVIEW SOUTH	0503S003	upstream	1			√		√	√
Turkey Hen Creek west tributary at Eglin 605	30.6594	-86.5872	CRESTVIEW SOUTH	0503S004	downstrm	1			√			√
Turkey Hen Creek west tributary at Eglin 605	30.6594	-86.5872	CRESTVIEW SOUTH	0503S004	no record	1		√				
Turkey Hen Creek west tributary at Eglin 605	30.6594	-86.5872	CRESTVIEW SOUTH	0503S004	upstream	1						√
Turtle Creek @ powerline road nr Eglin 181	30.5247	-86.6712	HOLT SW	0204S005	downstrm	2					√	√
Turtle Creek @ powerline road nr Eglin 181	30.5247	-86.6712	HOLT SW	0204S005	upstream	2					√	√
Turtle Creek @ road near B165 (B-82)	30.5378	-86.6654	HOLT SW	0204S006	downstrm	2		√			√	√
Turtle Creek @ road near B165 (B-82)	30.5378	-86.6654	HOLT SW	0204S006	upstream	2					√	√
Turtle Creek at Eglin 234	30.5090	-86.6703	HOLT SW	0211S001	downstrm	3	C5c-					√
Turtle Creek at Eglin 234	30.5090	-86.6703	HOLT SW	0211S001	no record	3	C5c-	√				
Turtle Creek at Eglin 234	30.5090	-86.6703	HOLT SW	0211S001	upstream	3	C5c-			√	√	√
Turtle Creek at Eglin 253	30.4297	-86.7389	MARY ESTHER	0204S002	both	4						√
Turtle Creek at Eglin 653	30.4890	-86.6505	MARY ESTHER	0204S001	downstrm	1						√
Turtle Creek at Eglin 653	30.4890	-86.6505	MARY ESTHER	0204S001	no record	1		√				
Turtle Creek at Eglin 653	30.4890	-86.6505	MARY ESTHER	0204S001	upstream	1						√
Watering Creek at Eglin 212	30.5535	-86.2768	NICEVILLE SE	1010S001	downstrm	3			√			√
Watering Creek at Eglin 212	30.5535	-86.2768	NICEVILLE SE	1010S001	no record	3		√				
Watering Creek at Eglin 212	30.5535	-86.2768	NICEVILLE SE	1010S001	upstream	3			√		√	√
Watering Creek at Eglin 356	30.5351	-86.2656	NICEVILLE SE	1010S002	downstrm	3			√			√
Watering Creek at Eglin 356	30.5351	-86.2656	NICEVILLE SE	1010S002	no record	3			√			
Watering Creek at Eglin 356	30.5351	-86.2656	NICEVILLE SE	1010S002	upstream	3			√			√
Watering Creek at Eglin 370	30.5895	-86.2959	NICEVILLE SE	1010S003	upstream	2					√	√
Weaver River @ Eglin RR 736	30.5518	-86.9297	WARD BASIN	0103S001	upstream	3			√		√	√
Weaver River @ road off Eglin 724	30.5337	-86.9171	WARD BASIN	0103S003	downstrm	1			√			
Weaver River @ road off Eglin 724	30.5337	-86.9171	WARD BASIN	0103S003	upstream	1			√			

Sample Location	LAT	LONG	Quad Sheet	Eglin Management Unit (EMU)	Direction Sampled	Stream Order	Rosgen Stream Type	Fish	Habitat	Geomorphology	Insects	Chemistry
Weaver River trib. @ unnumbered road	30.5311	-86.9164	WARD BASIN	0103S005	downstrm	1			√			
Weaver River trib. @ unnumbered road	30.5311	-86.9164	WARD BASIN	0103S005	upstream	1			√			
West Branch at Eglin 635 (nearly unpassable)	30.4969	-86.6119	FT WALTON BEACH	0405S004	no record	2		√				
West Branch at Eglin 635 (nearly unpassable)	30.4969	-86.6119	FT WALTON BEACH	0405S004	upstream	2						√
West Head @ 720	30.4714	-86.9052	HOLLEY	0202	downstrm	2		√	√			
West Long @restored site RR469 (Bortone #7)	30.5226	-86.4116	NICEVILLE	0803	Upstream	2		√				
West Long Crk at Eglin 406 (Bortone #2)	30.5427	-86.4131	NICEVILLE	0803	Upstream	2		√				
White Branch at Eglin 200	30.6074	-86.1394	PORTLAND	1105S001	downstrm	2			√			√
White Branch at Eglin 200	30.6074	-86.1394	PORTLAND	1105S001	no record	2	E5	√				
White Branch at Eglin 200	30.6074	-86.1394	PORTLAND	1105S001	upstream	2	E5		√	√	√	√
Whitehead Spring Branch @ 382	30.7191	-86.2820	MOSSY HEAD	0908	Upstream	3		√				
Wildcat Branch at Eglin 211	30.7022	-86.3750	MOSSY HEAD	0701S008	no record	1		√				
Wise Creek at Eglin 207	30.7082	-86.3681	MOSSY HEAD	0701S003	downstrm	2			√			√
Wise Creek at Eglin 207	30.7082	-86.3681	MOSSY HEAD	0701S003	upstream	2			√		√	√
Wise Creek tributary at Eglin 207	30.7081	-86.3714	MOSSY HEAD	0701S004	both	1						√
Wolf Creek @ Eglin 211	30.6075	-86.8165	HAROLD SE	0102S002	downstrm	2		√	√			√
Wolf Creek @ Eglin 211	30.6075	-86.8165	HAROLD SE	0102S002	no record	2		√				
Wolf Creek @ Eglin 211	30.6075	-86.8165	HAROLD SE	0102S002	upstream	2		√				√
Wolf Creek @ Eglin 700	30.5908	-86.7973	HAROLD SE	0102S007	downstrm	2			√			
Wolf Creek @ Eglin 700	30.5908	-86.7973	HAROLD SE	0102S007	upstream	2			√		√	√
mouth of Yellow River south fork (Skim Lake)	30.5459	-86.9974	WARD BASIN	temp1	no record	7		√				
Yellow River @ confluence of Milligan Creek	30.6448	-86.7811	FLORIDALE	0102S010	no record	7		√				
Yellow River 1.0 air mi below SR 87 Bridge	30.5710	-86.9283	WARD BASIN	0101S002	downstrm	7		√				
Yellow River 1.5 river mi above SR 87 Bridge	30.5828	-86.9127	WARD BASIN	0101S003	upstream	7		√				
Yellow River 2 air mi above SR 87 bridge	30.5835	-86.8961	WARD BASIN	0102S011	upstream	7		√				
Yellow River at first midpoint of DEP deadhead permit range	30.6735	-86.7077	HOLT	DEP002	no record	7		√				
Yellow river mouth Blackwater Bay (middle fork)	30.5543	-86.9929	WARD BASIN	temp2	no record	7		√				
Yellow River upstream of Broxon Branch	30.6098	-86.8380	HAROLD SE	0102S006	downstrm	7			√			
Yellow River upstream of Broxon Branch	30.6098	-86.8380	HAROLD SE	0102S006	upstream	7		√	√		√	√
Yellow River trib. @ 211, W of jnct w/253	30.6275	-86.7908	FLORIDALE	0102S009	downstrm	1						√
Yellow River trib. @ 211, W of jnct w/253	30.6275	-86.7908	FLORIDALE	0102S009	no record	1		√				
Yellow River trib. @ Eglin 211	30.6017	-86.8359	HAROLD SE	0102S003	downstrm	1			√			√
Yellow River trib. @ Eglin 211	30.6017	-86.8359	HAROLD SE	0102S003	no record	1		√				
Yellow River trib. @ Eglin 211	30.6017	-86.8359	HAROLD SE	0102S003	upstream	1					√	√
Yellow River trib. at Eglin 211	30.6616	-86.6884	HOLT	0303S001	downstrm	1			√			√

Sample Location	LAT	LONG	Quad Sheet	Eglin Management Unit (EMU)	Direction Sampled	Stream Order	Rosgen Stream Type	Fish	Habitat	Geomorphology	Insects	Chemistry
Yellow River trib. at Eglin 211	30.6616	-86.6884	HOLT	0303S001	no record	1		√				
Yellow River trib. at Eglin 211	30.6616	-86.6884	HOLT	0303S001	upstream	1			√		√	√

Eglin Management Unit (EMU)	Field Number	LAT	LONG	Quad Sheet	Date	Water Body	Sample Location	Projects	Direction Sampled	Stream Order
-	-	30.4461	-86.8868	HOLLEY	03-Aug-04	Dean Creek	Old Ford Road above Hwy 87	Biomonitoring	upstream	2
0201S001	-	30.4708	-86.9350	HOLLEY	8-Jun-04	Long Branch	Long Branch at Eglin 815	TMDL/SCI/DEP	upstream	2
0201S004	-	30.4808	-86.9357	HOLLEY	8-Jun-04	Long Branch	Long Branch at Eglin 726	Biomonitoring	upstream	1
0707S001	-	30.7065	-86.3934	SPENCER FLATS	11-May-04	Gum Creek	Gum Creek at Eglin Range Road 207	Geomorphology	upstream	3
0809S001	-	30.5901	-86.4128	NICEVILLE	12-May-04	Little Rocky Creek	Little Rocky Creek at Eglin 515	Geomorphology	downstream	3
0809S007	-	30.5470	-86.3816	NICEVILLE	12-May-04	Little Rocky Creek	Little Rocky Creek at end of Eglin 477	Geomorphology	downstream	4
0609S002	DEP00-001	30.5925	-86.5147	VALPARAISO	18-Jan-00	Juniper Creek trib.	Juniper Creek trib. upstream of borrow pit	Biomonitoring	upstream	1
0605S002	DEP00-002	30.5606	-86.4589	NICEVILLE	11-Jul-00	Swift Creek	Swift Creek S. of old railroad crossing culvert	Biomonitoring	downstream	3
0815S001	DEP00-003	30.6426	-86.3250	MOSSY HEAD	13-Jul-00	Open Branch	Open Branch at intersection of Eglin 214/374	Biomonitoring	upstream	2
0815S001	DEP00-004	30.6426	-86.3250	MOSSY HEAD	18-Jul-00	Open Branch	Open Branch at intersection of Eglin 214/374	Biomonitoring	downstream	2
0804S004	DEP00-005	30.6483	-86.3334	NICEVILLE	18-Jul-00	Rocky Creek	Rocky Creek at Eglin 214/374	Biomonitoring	upstream	4
0804S004	DEP00-006	30.6483	-86.3334	NICEVILLE	20-Jul-00	Rocky Creek	Rocky Creek at Eglin 214/374	Biomonitoring	downstream	4
0604S005	DEP00-007	30.5373	-86.4853	NICEVILLE	25-Jul-00	Mill Creek	Mill Creek at bridge N. of SR.190 by hole 13	Biomonitoring	upstream	1
0604S006	DEP00-008	30.5438	-86.4873	NICEVILLE	25-Jul-00	Mill Creek	Mill Creek at bridge north of SR 190, by hole 9	Biomonitoring	downstream	1
0606S001	DEP00-009	30.5302	-86.4528	NICEVILLE	27-Jul-00	Shaw Still Branch	Shaw Still Branch 0.2 mi S of 190(subdivision)	Biomonitoring	both	1
0802S002	DEP00-010	30.5125	-86.4251	NICEVILLE	27-Jul-00	East Turkey Creek	East Turkey Creek 1.5 mi E of junct 285 & 190	Biomonitoring	downstream	2
0204S005	DEP00-011	30.5247	-86.6712	HOLT SW	01-Aug-00	Turtle Creek	Turtle Creek @ powerline road nr Eglin 181	Biomonitoring	downstream	2
0817S002	DEP00-012	30.6448	-86.3749	MOSSY HEAD	03-Aug-00	Exline Creek trib.	Exline Creek tributary at Eglin 503	Biomonitoring	upstream	1
0204S006	DEP00-013	30.5378	-86.6654	HOLT SW	08-Aug-00	Turtle Creek	Turtle Creek @ road near B165 (B-82)	Biomonitoring	downstream	2
0818S001	DEP00-014	30.6646	-86.3653	MOSSY HEAD	10-Aug-00	Mt. Sinai Branch	Mt. Sinai Branch at Eglin 412	Biomonitoring	upstream	1
0210S001	DEP00-015	30.5110	-86.7146	HOLT SW	15-Aug-00	Live Oak Creek	Live Oak Creek at Eglin 234	Biomonitoring	upstream	2
0210S004	DEP00-016	30.5341	-86.7202	HOLT SW	17-Aug-00	Live Oak Creek	Live Oak Creek at Eglin 235	Biomonitoring	upstream	2
0210S005	DEP00-017	30.5316	-86.7203	HOLT SW	22-Aug-00	Live Oak Creek	Live Oak Creek @ road below 235 (gate 82C)	Biomonitoring	downstream	1

Eglin Management Unit (EMU)	Field Number	LAT	LONG	Quad Sheet	Date	Water Body	Sample Location	Projects	Direction Sampled	Stream Order
0207S002	DEP00-018	30.4642	-86.8168	NAVARRE	24-Aug-00	Panther Creek	Panther Creek at Eglin 678	Biomonitoring	upstream	2
0209S001	DEP00-019	30.4526	-86.7668	NAVARRE	29-Aug-00	Prairie Creek	Prairie Creek at Eglin 678	Biomonitoring	upstream	3
0705S001	DEP00-020	30.6647	-86.4279	SPENCER FLATS	31-Aug-00	Bull Creek	Bull Creek at Eglin Road 454	Biomonitoring	upstream	2
0204S003	DEP01-001	30.4315	-86.7725	NAVARRE	08-Mar-01	East Bay River	East Bay River at Eglin 259	Biomonitoring	upstream	5
0405S001	DEP98-001	30.5283	-86.6114	VALPARAISO	06-Aug-98	Lightwood Knot Creek	trib. at confluence with Lighterwood Knot Crk	Biomonitoring	downstream	2
0405S002	DEP98-002	30.5291	-86.6132	VALPARAISO	06-Aug-98	Lightwood Knot Creek	Lightwood Knot Crk headwaters (steephead)	Biomonitoring	upstream	1
0604S005	DEP98-003	30.5373	-86.4853	NICEVILLE	13-Aug-98	Mill Creek	Mill Creek at bridge N. of SR.190 by hole 13	Biomonitoring	upstream	1
0604S001	DEP98-004	30.5230	-86.4865	NICEVILLE	13-Aug-98	Mill Creek	Mill Creek below Trout Lake impoundment	Biomonitoring	downstream	2
0901S001	DEP98-005	30.6925	-86.2417	DEFUNIAK SPRINGS W	21-May-98	Alaqua Creek	Alaqua Creek at Eglin 210	Biomonitoring	upstream	4
0604S006	DEP99-001	30.5438	-86.4873	NICEVILLE	29-Jul-99	Mill Creek	Mill Creek at bridge north of SR 190, by hole 9	Biomonitoring	downstream	1
temp10	HLJ00-03	30.7963	-86.3072	NEW HARMONY	13-Mar-00	Shoal River	Shoal River at SR 285, Co. Rte 1087 bridge	Fish Survey	upstream	4
1108S001	HLJ01-02b	30.6075	-86.2146	PORTLAND	09-Apr-01	Blount Mill Creek	Blount Mill Creek at Eglin 200/201	Survey	upstream	2
0607S005	HLJ01-03b	30.5618	-86.5363	VALPARAISO	10-Apr-01	Turkey Creek	Turkey Creek at Eglin 232	Survey	upstream	4
0607S001	HLJ01-04b	30.5939	-86.5765	VALPARAISO	10-Apr-01	Bens Creek	Bens Creek at old intersection w/ Eglin 604E	Survey	upstream	2
0609S001	HLJ01-05b	30.6078	-86.5228	VALPARAISO	10-Apr-01	Juniper Creek	Juniper Creek bridge crossing on Eglin 221	Survey	upstream	3
0104S003	HLJ01-06b	30.5589	-86.8920	WARD BASIN	11-Apr-01	Moore Creek	Moore Creek @ Gauge Station N. of 211	Survey	upstream	2
0308S003	HLJ01-07b	30.6244	-86.6578	HOLT SW	11-Apr-01	Middle Creek	Middle Creek at Eglin 600E	Survey	upstream	2
0809S002	HLJ01-08b	30.5854	-86.4038	NICEVILLE	11-Apr-01	Little Rocky Creek	Little Rocky Creek at Eglin 499	Survey	upstream	3
0809S001	HLJ01-09b	30.5901	-86.4128	NICEVILLE	11-Apr-01	Little Rocky Creek	Little Rocky Creek at Eglin 515	Survey	upstream	3
0607L002	HLJ01-10b	30.5511	-86.5064	VALPARAISO	11-Apr-01	Turkey Creek trib.	Turkey Creek trib. North of Eglin 626	Survey	(near 2nd monitoring well)	1
1010S003	HLJ01-11b	30.5895	-86.2959	NICEVILLE SE	12-Apr-01	Watering Creek	Watering Creek at Eglin 370	Survey	upstream	2
1007S006	HLJ01-12b	30.5254	-86.2923	NICEVILLE SE	12-Apr-01	Basin Creek	Basin Creek at Eglin Range Rd 427/222	Survey	upstream	3

Eglin Management Unit (EMU)	Field Number	LAT	LONG	Quad Sheet	Date	Water Body	Sample Location	Projects	Direction Sampled	Stream Order
0506S001	HLJ01-14b	30.6939	-86.4962	SPENCER FLATS	13-Apr-01	Honey Creek	Honey Creek at Eglin 211	Survey	upstream	3
1007S003	HLJ01-15b	30.5173	-86.2359	PORTLAND	24-Apr-01	Basin Creek	Basin Creek at Eglin 218	Survey	both	5
0803S001	HLJ01-16b	30.5428	-86.4133	NICEVILLE	25-Apr-01	Long Creek trib.	Long Creek tributary at Eglin 406	Survey	upstream	2
1104S004	HLJ01-17b	30.5928	-86.2142	PORTLAND	25-Apr-01	Little Alaqua Creek	Little Alaqua at Eglin 208	Survey	upstream	4
0204S003	HLJ01-18b	30.4315	-86.7725	NAVARRE	26-Apr-01	East Bay River	East Bay River at Eglin 259	Survey	upstream	5
0209S001	HLJ01-19b	30.4526	-86.7668	NAVARRE	26-Apr-01	Prairie Creek	Prairie Creek at Eglin 678	Survey	upstream	3
0207S001	HLJ01-20b	30.4310	-86.8067	NAVARRE	26-Apr-01	Panther Creek	Panther Creek at Eglin 255	Survey	upstream	3
0612S003	HLJ01-21b	30.5701	-86.5159	VALPARAISO	27-Apr-01	Tenmile Creek	Tenmile Creek at Eglin Road 231	Survey	upstream	4
1103S003	HLJ01-22b	30.5561	-86.1792	PORTLAND	27-Apr-01	Alaqua Creek	Alaqua Creek at Eglin 205	Survey	both	6
0607S003	JCD00-001	30.5814	-86.5749	VALPARAISO	14-Feb-00	Turkey Creek	Turkey Creek at Eglin 233	Survey	both	3
1007S001	JCD00-002	30.5280	-86.2825	NICEVILLE SE	17-Feb-00	Basin Creek	Basin Creek at Eglin 212	Biomonitoring	upstream	4
0612S001	JCD00-003	30.6070	-86.4824	NICEVILLE	24-Feb-00	Point Lookout Creek	Point Lookout Creek at Eglin 221	Habitat Survey	upstream	3
0308S003	JCD00-004	30.6244	-86.6578	HOLT SW	28-Feb-00	Middle Creek	Middle Creek at Eglin 600E	Fire and Water	upstream	2
0308S003	JCD00-004A	30.6244	-86.6578	HOLT SW	28-Feb-00	Middle Creek	Middle Creek at Eglin 600E	Fire and Water	upstream	2
0308S003	JCD00-004B	30.6244	-86.6578	HOLT SW	28-Feb-00	Middle Creek	Middle Creek at Eglin 600E	Fire and Water	upstream	2
0308S003	JCD00-004C	30.6244	-86.6578	HOLT SW	28-Feb-00	Middle Creek	Middle Creek at Eglin 600E	Fire and Water	upstream	2
0308S003	JCD00-004D	30.6244	-86.6578	HOLT SW	28-Feb-00	Middle Creek	Middle Creek at Eglin 600E	Fire and Water	upstream	2
0308S003	JCD00-004E	30.6244	-86.6578	HOLT SW	28-Feb-00	Middle Creek	Middle Creek at Eglin 600E	Fire and Water	upstream	2
0308S003	JCD00-004F	30.6244	-86.6578	HOLT SW	28-Feb-00	Middle Creek	Middle Creek at Eglin 600E	Fire and Water	upstream	2
0308S003	JCD00-004G	30.6244	-86.6578	HOLT SW	28-Feb-00	Middle Creek	Middle Creek at Eglin 600E	Fire and Water	upstream	2
0308S003	JCD00-004H	30.6244	-86.6578	HOLT SW	28-Feb-00	Middle Creek	Middle Creek at Eglin 600E	Fire and Water	upstream	2
0308S003	JCD00-004I	30.6244	-86.6578	HOLT SW	28-Feb-00	Middle Creek	Middle Creek at Eglin 600E	Fire and Water	upstream	2
0308S003	JCD00-004J	30.6244	-86.6578	HOLT SW	28-Feb-00	Middle Creek	Middle Creek at Eglin 600E	Fire and Water	upstream	2
0308S003	JCD00-004K	30.6244	-86.6578	HOLT SW	28-Feb-00	Middle Creek	Middle Creek at Eglin 600E	Fire and Water	upstream	2
0308S003	JCD00-004L	30.6244	-86.6578	HOLT SW	28-Feb-00	Middle Creek	Middle Creek at Eglin 600E	Fire and Water	upstream	2

Eglin Management Unit (EMU)	Field Number	LAT	LONG	Quad Sheet	Date	Water Body	Sample Location	Projects	Direction Sampled	Stream Order
0308S003	JCD00-004M	30.6244	-86.6578	HOLT SW	29-Feb-00	Middle Creek	Middle Creek at Eglin 600E	Fire and Water	upstream	2
0308S003	JCD00-004N	30.6244	-86.6578	HOLT SW	29-Feb-00	Middle Creek	Middle Creek at Eglin 600E	Fire and Water	upstream	2
0308S003	JCD00-004O	30.6244	-86.6578	HOLT SW	29-Feb-00	Middle Creek	Middle Creek at Eglin 600E	Fire and Water	upstream	2
0308S003	JCD00-004P	30.6244	-86.6578	HOLT SW	29-Feb-00	Middle Creek	Middle Creek at Eglin 600E	Fire and Water	upstream	2
0308S003	JCD00-004Q	30.6244	-86.6578	HOLT SW	29-Feb-00	Middle Creek	Middle Creek at Eglin 600E	Fire and Water	upstream	2
0308S003	JCD00-005	30.6244	-86.6578	HOLT SW	29-Feb-00	Middle Creek	Middle Creek at Eglin 600E	Biomonitoring	upstream	2
0308S003	JCD00-005A	30.6244	-86.6578	HOLT SW	05-Mar-00	Middle Creek	Middle Creek at Eglin 600E	Habitat Survey	upstream	2
1007S003	JCD00-006	30.5173	-86.2359	PORTLAND	29-Mar-00	Basin Creek	Basin Creek at Eglin 218	Fish Survey	both	5
0611S001	JCD00-007	30.5824	-86.5416	VALPARAISO	13-Apr-00	Parrish Creek	Parrish Creek at Eglin Range Road 603	Habitat Survey	downstream	2
0802S003	JCD00-008	30.5341	-86.4333	NICEVILLE	24-Apr-00	East Turkey Creek	East Turkey Creek at bridge on Roberts Rd.	Darter Monitoring	both	2
0802S004	JCD00-009	30.5418	-86.4420	NICEVILLE	24-Apr-00	East Turkey Creek	East Turkey Creek 1.1 mi NE of junct 285&190	Darter Monitoring	both	2
0803S001	JCD00-010	30.5428	-86.4133	NICEVILLE	24-Apr-00	Long Creek trib.	Long Creek tributary at Eglin 406	Darter Monitoring	upstream	2
0803S002	JCD00-011	30.5349	-86.4189	NICEVILLE	24-Apr-00	Long Creek trib.	Long Creek trib 2.5 mi N of conflu w/Rocky Crk	Darter Monitoring	upstream	1
0605S002	JCD00-012	30.5606	-86.4589	NICEVILLE	25-Apr-00	Swift Creek	Swift Creek S. of old railroad crossing culvert	Darter Monitoring	both	3
0605S001	JCD00-013	30.5447	-86.4671	NICEVILLE	25-Apr-00	Swift Creek	Swift Creek 350 m North of Roberts Lake	Darter Monitoring	upstream	3
0606S001	JCD00-014	30.5302	-86.4528	NICEVILLE	25-Apr-00	Shaw Still Branch	Shaw Still Branch 0.2 mi S of 190(subdivision)	Darter Monitoring	both	1
0602S001	JCD00-015	30.5062	-86.5239	VALPARAISO	25-Apr-00	Toms Creek	Toms Creek at Florida S.R. 85 (Bortone #28)	Darter Monitoring	downstream	2
0802S002	JCD00-016	30.5125	-86.4251	NICEVILLE	26-Apr-00	East Turkey Creek	East Turkey Creek 1.5 mi E of junct 285 & 190	Darter Monitoring	downstream	2
0802S001	JCD00-017	30.5229	-86.4281	NICEVILLE	26-Apr-00	East Turkey Creek	East Turkey Crk at bridge xing Ruckle's land	Darter Monitoring	upstream	2
0309S006	JCD00-018	30.6206	-86.6108	VALPARAISO	05-May-00	Turkey Gobbler Creek	Turkey Gobbler Creek at Eglin 237 (blown out)	Habitat Survey	downstream	1
0309S006	JCD00-019	30.6206	-86.6108	VALPARAISO	05-May-00	Turkey Gobbler Creek	Turkey Gobbler Creek at Eglin 237 (blown out)	Habitat Survey	upstream	1

Eglin Management Unit (EMU)	Field Number	LAT	LONG	Quad Sheet	Date	Water Body	Sample Location	Projects	Direction Sampled	Stream Order
0309S002	JCD00-020	30.6238	-86.6210	VALPARAISO	05-May-00	Turkey Gobbler Creek	Turkey Gobbler Creek at Eglin 600E	Habitat Survey	downstream	1
0309S002	JCD00-021	30.6238	-86.6210	VALPARAISO	05-May-00	Turkey Gobbler Creek	Turkey Gobbler Creek at Eglin 600E	Habitat Survey	upstream	1
0309S001	JCD00-022	30.6360	-86.6326	HOLT	05-May-00	Turkey Gobbler Creek	Turkey Gobbler Creek at Eglin 657	Habitat Survey	downstream	1
0309S001	JCD00-023	30.6360	-86.6326	HOLT	05-May-00	Turkey Gobbler Creek	Turkey Gobbler Creek at Eglin 657	Habitat Survey	upstream	1
0309S003	JCD00-024	30.6372	-86.6369	HOLT	05-May-00	Turkey Gobbler Creek	Turkey Gobbler Creek at Eglin 215	Habitat Survey	downstream	2
0309S003	JCD00-025	30.6372	-86.6369	HOLT	05-May-00	Turkey Gobbler Creek	Turkey Gobbler Creek at Eglin 215	Habitat Survey	upstream	2
0612S004	JCD00-030	30.6213	-86.4646	NICEVILLE	22-May-00	Still Branch trib.	Still Branch trib. at Eglin 434	Habitat Survey	downstream	1
0612S004	JCD00-031	30.6213	-86.4646	NICEVILLE	22-May-00	Still Branch trib.	Still Branch trib. at Eglin 434	Habitat Survey	upstream	1
0612S001	JCD00-032	30.6070	-86.4824	NICEVILLE	22-May-00	Point Lookout Creek	Point Lookout Creek at Eglin 221	Habitat Survey	downstream	3
0612S001	JCD00-033	30.6070	-86.4824	NICEVILLE	22-May-00	Point Lookout Creek	Point Lookout Creek at Eglin 221	Habitat Survey	upstream	3
0612S005	JCD00-034	30.6215	-86.4808	NICEVILLE	22-May-00	Point Lookout Creek	Point Lookout Creek at Eglin 434	Habitat Survey	downstream	2
0612S005	JCD00-035	30.6215	-86.4808	NICEVILLE	22-May-00	Point Lookout Creek	Point Lookout Creek at Eglin 434	Habitat Survey	upstream	2
0616S001	JCD00-036	30.6074	-86.4948	NICEVILLE	22-May-00	Pinelog Creek	Pinelog Creek at Eglin 221	Habitat Survey	downstream	2
0616S001	JCD00-037	30.6074	-86.4948	NICEVILLE	22-May-00	Pinelog Creek	Pinelog Creek at Eglin 221	Habitat Survey	upstream	2
0609S001	JCD00-038	30.6078	-86.5228	VALPARAISO	22-May-00	Juniper Creek	Juniper Creek bridge crossing on Eglin 221	Habitat Survey	upstream	3
0609S001	JCD00-039	30.6078	-86.5228	VALPARAISO	22-May-00	Juniper Creek	Juniper Creek bridge crossing on Eglin 221	Habitat Survey	downstream	3
0615S001	JCD00-040	30.6036	-86.4578	NICEVILLE	22-May-00	Ninemile Creek trib.	Ninemile Creek tributary at Eglin 551	Habitat Survey	downstream	2
0615S001	JCD00-041	30.6036	-86.4578	NICEVILLE	22-May-00	Ninemile Creek trib.	Ninemile Creek tributary at Eglin 551	Habitat Survey	upstream	2
0615S002	JCD00-042	30.5912	-86.4670	NICEVILLE	22-May-00	Ninemile Creek	Ninemile Creek at Eglin 462	Habitat Survey	downstream	2
0615S002	JCD00-043	30.5912	-86.4670	NICEVILLE	22-May-00	Ninemile Creek	Ninemile Creek at Eglin 462	Habitat Survey	upstream	2
0612S006	JCD00-044	30.5933	-86.4995	NICEVILLE	22-May-00	Point Lookout Creek	Point Lookout Creek near end of Eglin 462	Habitat Survey	both	3
0609S001	JCD00-045	30.6078	-86.5228	VALPARAISO	31-May-00	Juniper Creek	Juniper Creek bridge crossing on Eglin 221	Darter Monitoring	upstream	3

Eglin Management Unit (EMU)	Field Number	LAT	LONG	Quad Sheet	Date	Water Body	Sample Location	Projects	Direction Sampled	Stream Order
0612S001	JCD00-046	30.6070	-86.4824	NICEVILLE	31-May-00	Point Lookout Creek	Point Lookout Creek at Eglin 221	Darter Monitoring	downstream	3
0612S006	JCD00-047	30.5933	-86.4995	NICEVILLE	31-May-00	Point Lookout Creek	Point Lookout Creek near end of Eglin 462	Darter Monitoring	both	3
0307S001	JCD00-048	30.6600	-86.6990	HOLT	02-Jun-00	Malone Creek	Malone Creek at Eglin 211	Habitat Survey	upstream	3
0307S001	JCD00-049	30.6600	-86.6990	HOLT	02-Jun-00	Malone Creek	Malone Creek at Eglin 211	Habitat Survey	downstream	3
0308S003	JCD00-050	30.6244	-86.6578	HOLT SW	07-Jun-00	Middle Creek	Middle Creek at Eglin 600E	Habitat Survey	upstream	2
0308S003	JCD00-051	30.6244	-86.6578	HOLT SW	07-Jun-00	Middle Creek	Middle Creek at Eglin 600E	Habitat Survey	downstream	2
0303S001	JCD00-052	30.6616	-86.6884	HOLT	07-Jun-00	Yellow River trib.	Yellow River trib. at Eglin 211	Habitat Survey	upstream	1
0303S001	JCD00-053	30.6616	-86.6884	HOLT	07-Jun-00	Yellow River trib.	Yellow River trib. at Eglin 211	Habitat Survey	downstream	1
0308S002	JCD00-054	30.6638	-86.6766	HOLT	07-Jun-00	Middle Creek	Middle Creek at Eglin 211	Habitat Survey	upstream	3
0308S002	JCD00-055	30.6638	-86.6766	HOLT	07-Jun-00	Middle Creek	Middle Creek at Eglin 211	Habitat Survey	downstream	3
0309S005	JCD00-056	30.6713	-86.6620	HOLT	07-Jun-00	Turkey Gobbler Creek	Turkey Gobbler Creek at Eglin 211	Habitat Survey	upstream	3
0309S005	JCD00-057	30.6713	-86.6620	HOLT	07-Jun-00	Turkey Gobbler Creek	Turkey Gobbler Creek at Eglin 211	Habitat Survey	downstream	3
1105S001	JCD00-058	30.6074	-86.1394	PORTLAND	12-Jun-00	White Branch	White Branch at Eglin 200	Habitat Survey	upstream	2
1105S001	JCD00-059	30.6074	-86.1394	PORTLAND	12-Jun-00	White Branch	White Branch at Eglin 200	Habitat Survey	downstream	2
1103S001	JCD00-060	30.5952	-86.1642	PORTLAND	12-Jun-00	Alaqua Creek	Alaqua Creek at Eglin 200	Habitat Survey	upstream	5
1103S001	JCD00-061	30.5952	-86.1642	PORTLAND	12-Jun-00	Alaqua Creek	Alaqua Creek at Eglin 200	Habitat Survey	downstream	5
1103S002	JCD00-062	30.6160	-86.1640	PORTLAND	12-Jun-00	Blount Creek	Blount Creek at Eglin 201	Habitat Survey	upstream	3
1103S002	JCD00-063	30.6160	-86.1640	PORTLAND	12-Jun-00	Blount Creek	Blount Creek at Eglin 201	Habitat Survey	downstream	3
1106S002	JCD00-064	30.6146	-86.1780	PORTLAND	12-Jun-00	Davis Branch	Davis Branch at Eglin 201	Habitat Survey	upstream	2
1106S002	JCD00-065	30.6146	-86.1780	PORTLAND	12-Jun-00	Davis Branch	Davis Branch at Eglin 201	Habitat Survey	downstream	2
1106S001	JCD00-066	30.6119	-86.1802	PORTLAND	12-Jun-00	Davis Branch trib.	Davis Branch tributary at Eglin 319	Habitat Survey	upstream	2
1106S001	JCD00-067	30.6119	-86.1802	PORTLAND	12-Jun-00	Davis Branch trib.	Davis Branch tributary at Eglin 319	Habitat Survey	downstream	2
1108S001	JCD00-068	30.6075	-86.2146	PORTLAND	12-Jun-00	Blount Mill Creek	Blount Mill Creek at Eglin 200/201	Habitat Survey	upstream	2
1108S001	JCD00-069	30.6075	-86.2146	PORTLAND	12-Jun-00	Blount Mill Creek	Blount Mill Creek at Eglin 200/201	Habitat Survey	downstream	2
0607S005	JCD00-070	30.5618	-86.5363	VALPARAISO	15-Jun-00	Turkey Creek	Turkey Creek at Eglin 232	Storm Sampling	downstream	4
0607S005	JCD00-071	30.5618	-86.5363	VALPARAISO	15-Jun-00	Turkey Creek	Turkey Creek at Eglin 232	Storm Sampling	downstream	4
0612S003	JCD00-072	30.5701	-86.5159	VALPARAISO	15-Jun-00	Tenmile Creek	Tenmile Creek at Eglin Road 231	Storm Sampling	downstream	4

Eglin Management Unit (EMU)	Field Number	LAT	LONG	Quad Sheet	Date	Water Body	Sample Location	Projects	Direction Sampled	Stream Order
0612S001	JCD00-073	30.6070	-86.4824	NICEVILLE	15-Jun-00	Point Lookout Creek	Point Lookout Creek at Eglin 221	Storm Sampling	downstream	3
0612S001	JCD00-074	30.6070	-86.4824	NICEVILLE	15-Jun-00	Point Lookout Creek	Point Lookout Creek at Eglin 221	Storm Sampling	downstream	3
0612S001	JCD00-075	30.6070	-86.4824	NICEVILLE	15-Jun-00	Point Lookout Creek	Point Lookout Creek at Eglin 221	Storm Sampling	downstream	3
0210S001	JCD00-076	30.5110	-86.7146	HOLT SW	15-Jun-00	Live Oak Creek	Live Oak Creek at Eglin 234	Storm Sampling	downstream	2
0211S001	JCD00-077	30.5090	-86.6703	HOLT SW	15-Jun-00	Turtle Creek	Turtle Creek at Eglin 234	Storm Sampling	downstream	3
0710S001	JCD00-078	30.7086	-86.3446	MOSSY HEAD	19-Jun-00	Hog Creek	Hog Creek at Eglin Road 207	Habitat Survey	upstream	3
0710S001	JCD00-079	30.7086	-86.3446	MOSSY HEAD	19-Jun-00	Hog Creek	Hog Creek at Eglin Road 207	Habitat Survey	downstream	3
0709S001	JCD00-080	30.7086	-86.3463	MOSSY HEAD	19-Jun-00	Red Deer Creek	Red Deer Creek at Eglin Road 207	Habitat Survey	upstream	2
0701S002	JCD00-081	30.7077	-86.3563	MOSSY HEAD	19-Jun-00	Titi Creek trib.	Titi Creek tributary at Eglin 207	Habitat Survey	downstream	1
0701S003	JCD00-082	30.7082	-86.3681	MOSSY HEAD	19-Jun-00	Wise Creek	Wise Creek at Eglin 207	Habitat Survey	upstream	2
0701S003	JCD00-083	30.7082	-86.3681	MOSSY HEAD	19-Jun-00	Wise Creek	Wise Creek at Eglin 207	Habitat Survey	downstream	2
0701S001	JCD00-084	30.7178	-86.3150	MOSSY HEAD	19-Jun-00	Cowpen Branch	Cowpen Branch at Eglin 409	Habitat Survey	upstream	3
0701S001	JCD00-085	30.7178	-86.3150	MOSSY HEAD	19-Jun-00	Cowpen Branch	Cowpen Branch at Eglin 409	Habitat Survey	downstream	3
0610S002	JCD00-086	30.5561	-86.5773	VALPARAISO	20-Jun-00	Rogue Creek	Rogue Creek at Eglin 625	Habitat Survey	upstream	2
0610S002	JCD00-087	30.5561	-86.5773	VALPARAISO	20-Jun-00	Rogue Creek	Rogue Creek at Eglin 625	Habitat Survey	downstream	2
0607S002	JCD00-088	30.5796	-86.6074	VALPARAISO	20-Jun-00	Turkey Creek	Turkey Creek at Eglin 637	Habitat Survey	upstream	1
0607S002	JCD00-089	30.5796	-86.6074	VALPARAISO	20-Jun-00	Turkey Creek	Turkey Creek at Eglin 637	Habitat Survey	downstream	1
0607S001	JCD00-090	30.5939	-86.5765	VALPARAISO	20-Jun-00	Bens Creek	Bens Creek at old intersection w/ Eglin 604E	Habitat Survey	upstream	2
0607S001	JCD00-091	30.5939	-86.5765	VALPARAISO	20-Jun-00	Bens Creek	Bens Creek at old intersection w/ Eglin 604E	Habitat Survey	downstream	2
0610S001	JCD00-092	30.5561	-86.5621	VALPARAISO	20-Jun-00	Rogue Creek	Rogue Creek at Eglin 233	Habitat Survey	upstream	2
0610S001	JCD00-093	30.5561	-86.5621	VALPARAISO	20-Jun-00	Rogue Creek	Rogue Creek at Eglin 233	Habitat Survey	downstream	2
0607S005	JCD00-094	30.5618	-86.5363	VALPARAISO	20-Jun-00	Turkey Creek	Turkey Creek at Eglin 232	Habitat Survey	upstream	4
0607S005	JCD00-095	30.5618	-86.5363	VALPARAISO	20-Jun-00	Turkey Creek	Turkey Creek at Eglin 232	Habitat Survey	downstream	4
0307S003	JCD00-096	30.6377	-86.7014	HOLT	21-Jun-00	Malone Creek	Malone Creek at Eglin 236	Habitat Survey	upstream	2
0307S003	JCD00-097	30.6377	-86.7014	HOLT	21-Jun-00	Malone Creek	Malone Creek at Eglin 236	Habitat Survey	downstream	2
0307S002	JCD00-098	30.6097	-86.6976	HOLT SW	21-Jun-00	Malone Creek	Malone Creek at Eglin 688	Habitat Survey	upstream	2
0307S002	JCD00-099	30.6097	-86.6976	HOLT SW	21-Jun-00	Malone Creek	Malone Creek at Eglin 688	Habitat Survey	downstream	2
0306S002	JCD00-100	30.6111	-86.7284	HOLT SW	21-Jun-00	Metts Creek	Metts Creek at Eglin 688	Habitat Survey	upstream	1
0306S002	JCD00-101	30.6111	-86.7284	HOLT SW	21-Jun-00	Metts Creek	Metts Creek at Eglin 688	Habitat Survey	downstream	1
0306S001	JCD00-102	30.6560	-86.7293	HOLT	21-Jun-00	Metts Creek	Metts Creek at Eglin 211	Habitat Survey	upstream	2
0306S001	JCD00-103	30.6560	-86.7293	HOLT	21-Jun-00	Metts Creek	Metts Creek at Eglin 211	Habitat Survey	downstream	2

Eglin Management Unit (EMU)	Field Number	LAT	LONG	Quad Sheet	Date	Water Body	Sample Location	Projects	Direction Sampled	Stream Order
0306S003	JCD00-104	30.6511	-86.7257	HOLT	21-Jun-00	Metts Creek	Metts Creek at Eglin 236	Habitat Survey	upstream	2
0306S003	JCD00-105	30.6511	-86.7257	HOLT	21-Jun-00	Metts Creek	Metts Creek at Eglin 236	Habitat Survey	downstream	2
0301S001	JCD00-106	30.6461	-86.7575	FLORIDALE	21-Jun-00	Carroll Creek	Carroll Creek at Eglin 211	Habitat Survey	upstream	2
0301S001	JCD00-107	30.6461	-86.7575	FLORIDALE	21-Jun-00	Carroll Creek	Carroll Creek at Eglin 211	Habitat Survey	downstream	2
0305S002	JCD00-108	30.6320	-86.7749	FLORIDALE	21-Jun-00	Milligan Creek	Milligan Creek at Eglin 211	Habitat Survey	upstream	3
0305S002	JCD00-109	30.6320	-86.7749	FLORIDALE	21-Jun-00	Milligan Creek	Milligan Creek at Eglin 211	Habitat Survey	downstream	3
0605S002	JCD00-110	30.5606	-86.4589	NICEVILLE	22-May-00	Swift Creek	Swift Creek S. of old railroad crossing culvert	Habitat Survey	upstream	3
0605S002	JCD00-111	30.5606	-86.4589	NICEVILLE	22-Jun-00	Swift Creek	Swift Creek S. of old railroad crossing culvert	Habitat Survey	downstream	3
0803S001	JCD00-112	30.5428	-86.4133	NICEVILLE	22-Jun-00	Long Creek trib.	Long Creek tributary at Eglin 406	Habitat Survey	upstream	2
0803S001	JCD00-113	30.5428	-86.4133	NICEVILLE	22-Jun-00	Long Creek trib.	Long Creek tributary at Eglin 406	Habitat Survey	downstream	2
0802S005	JCD00-114	30.5339	-86.4304	NICEVILLE	22-Jun-00	East Turkey Creek trib.	East Turkey Creek trib near road off Eglin 220	Habitat Survey	both	1
0803S002	JCD00-115	30.5349	-86.4189	NICEVILLE	22-Jun-00	Long Creek trib.	Long Creek trib 2.5 mi N of conflu w/Rocky Crk	Habitat Survey	both	1
0604S005	JCD00-116	30.5373	-86.4853	NICEVILLE	22-Jun-00	Mill Creek	Mill Creek at bridge N. of SR.190 by hole 13	Habitat Survey	both	1
0604S002	JCD00-117	30.5351	-86.4863	NICEVILLE	22-Jun-00	Mill Creek	Mill Creek SR 190 (College Blvd)	Habitat Survey	downstream	1
0210S001	JCD00-118	30.5110	-86.7146	HOLT SW	22-Jun-00	Live Oak Creek	Live Oak Creek at Eglin 234	Habitat Survey	upstream	2
0210S001	JCD00-119	30.5110	-86.7146	HOLT SW	22-Jun-00	Live Oak Creek	Live Oak Creek at Eglin 234	Habitat Survey	downstream	2
1007S003	JCD00-120	30.5173	-86.2359	PORTLAND	26-Jun-00	Basin Creek	Basin Creek at Eglin 218	Habitat Survey	upstream	5
1007S003	JCD00-121	30.5173	-86.2359	PORTLAND	26-Jun-00	Basin Creek	Basin Creek at Eglin 218	Habitat Survey	downstream	5
1008S001	JCD00-122	30.5336	-86.2380	PORTLAND	26-Jun-00	Little Basin Creek	Little Basin Creek at Eglin 359	Habitat Survey	upstream	3
1008S001	JCD00-123	30.5336	-86.2380	PORTLAND	26-Jun-00	Little Basin Creek	Little Basin Creek at Eglin 359	Habitat Survey	downstream	3
1009S002	JCD00-124	30.5350	-86.2450	PORTLAND	26-Jun-00	Bear Branch	Bear Branch at Eglin 359	Habitat Survey	upstream	4
1009S002	JCD00-125	30.5350	-86.2450	PORTLAND	26-Jun-00	Bear Branch	Bear Branch at Eglin 359	Habitat Survey	downstream	4
1010S002	JCD00-126	30.5351	-86.2656	NICEVILLE SE	26-Jun-00	Watering Creek	Watering Creek at Eglin 356	Habitat Survey	upstream	3
1010S002	JCD00-127	30.5351	-86.2656	NICEVILLE SE	26-Jun-00	Watering Creek	Watering Creek at Eglin 356	Habitat Survey	downstream	3
1007S002	JCD00-128	30.5306	-86.2629	NICEVILLE SE	26-Jun-00	Basin Creek	Basin Creek at Eglin 433	Habitat Survey	upstream	4
1007S002	JCD00-129	30.5306	-86.2629	NICEVILLE SE	26-Jun-00	Basin Creek	Basin Creek at Eglin 433	Habitat Survey	downstream	4
1010S001	JCD00-130	30.5535	-86.2768	NICEVILLE SE	26-Jun-00	Watering Creek	Watering Creek at Eglin 212	Habitat Survey	upstream	3
1010S001	JCD00-131	30.5535	-86.2768	NICEVILLE SE	26-Jun-00	Watering Creek	Watering Creek at Eglin 212	Habitat Survey	downstream	3
1011S001	JCD00-132	30.5459	-86.2917	NICEVILLE SE	26-Jun-00	Middle Creek	Middle Creek at Eglin 427	Habitat Survey	upstream	2

Eglin Management Unit (EMU)	Field Number	LAT	LONG	Quad Sheet	Date	Water Body	Sample Location	Projects	Direction Sampled	Stream Order
1011S001	JCD00-133	30.5459	-86.2917	NICEVILLE SE	26-Jun-00	Middle Creek	Middle Creek at Eglin 427	Habitat Survey	downstream	2
0703S001	JCD00-134	30.6658	-86.4541	SPENCER FLATS	27-Jun-00	Blue Spring Creek	Blue Spring Creek at Eglin 454	Habitat Survey	upstream	2
0703S001	JCD00-135	30.6658	-86.4541	SPENCER FLATS	27-Jun-00	Blue Spring Creek	Blue Spring Creek at Eglin 454	Habitat Survey	downstream	2
0703S003	JCD00-136	30.6797	-86.4508	SPENCER FLATS	27-Jun-00	Blue Spring Creek	Blue Spring Creek at Eglin 450	Habitat Survey	upstream	2
0703S003	JCD00-137	30.6797	-86.4508	SPENCER FLATS	27-Jun-00	Blue Spring Creek	Blue Spring Creek at Eglin 450	Habitat Survey	downstream	2
0703S002	JCD00-138	30.6866	-86.4501	SPENCER FLATS	27-Jun-00	Blue Spring Creek	Blue Spring Creek at Eglin 211	Habitat Survey	upstream	2
0703S002	JCD00-139	30.6866	-86.4501	SPENCER FLATS	27-Jun-00	Blue Spring Creek	Blue Spring Creek at Eglin 211	Habitat Survey	downstream	2
0506S003	JCD00-140	30.6653	-86.4848	SPENCER FLATS	27-Jun-00	Honey Creek	Honey Creek at Eglin AFB Range Rd 454	Habitat Survey	upstream	2
0506S003	JCD00-141	30.6653	-86.4848	SPENCER FLATS	27-Jun-00	Honey Creek	Honey Creek at Eglin AFB Range Rd 454	Habitat Survey	downstream	2
0506S002	JCD00-142	30.6653	-86.4882	SPENCER FLATS	27-Jun-00	Honey Creek trib.	Honey Creek trib. at Eglin 454	Habitat Survey	upstream	1
0506S002	JCD00-143	30.6653	-86.4882	SPENCER FLATS	27-Jun-00	Honey Creek trib.	Honey Creek trib. at Eglin 454	Survey	downstream	1
0506S001	JCD00-144	30.6939	-86.4962	SPENCER FLATS	27-Jun-00	Honey Creek	Honey Creek at Eglin 211	Habitat Survey	upstream	3
0506S001	JCD00-145	30.6939	-86.4962	SPENCER FLATS	27-Jun-00	Honey Creek	Honey Creek at Eglin 211	Habitat Survey	downstream	3
0506S004	JCD00-146	30.6798	-86.4924	SPENCER FLATS	27-Jun-00	Honey Creek	Honey Creek at Eglin 564	Habitat Survey	both	3
0104S002	JCD00-147	30.5650	-86.8691	HAROLD SE	28-Jun-00	Boiling Creek	Boiling Creek @ Eglin 211	Habitat Survey	upstream	4
0104S002	JCD00-148	30.5650	-86.8691	HAROLD SE	28-Jun-00	Boiling Creek	Boiling Creek @ Eglin 211	Habitat Survey	downstream	4
0104S001	JCD00-149	30.5686	-86.8675	HAROLD SE	28-Jun-00	Boiling Creek trib.	Boiling Creek trib. @ Eglin 211	Habitat Survey	upstream	1
0104S001	JCD00-150	30.5686	-86.8675	HAROLD SE	28-Jun-00	Boiling Creek trib.	Boiling Creek trib. @ Eglin 211	Habitat Survey	downstream	1
0102S004	JCD00-151	30.5880	-86.8569	HAROLD SE	28-Jun-00	Bear Creek	Bear Creek @ Eglin 211	Habitat Survey	upstream	2
0102S004	JCD00-152	30.5880	-86.8569	HAROLD SE	28-Jun-00	Bear Creek	Bear Creek @ Eglin 211	Habitat Survey	downstream	2
0102S006	JCD00-153	30.6098	-86.8380	HAROLD SE	28-Jun-00	Yellow River	Yellow River upstream of Broxon Branch	Habitat Survey	both	7
0102S003	JCD00-154	30.6017	-86.8359	HAROLD SE	28-Jun-00	Yellow River trib.	Yellow River trib. @ Eglin 211	Habitat Survey	downstream	1
0102S007	JCD00-155	30.5908	-86.7973	HAROLD SE	28-Jun-00	Wolf Creek	Wolf Creek @ Eglin 700	Habitat Survey	upstream	2
0102S007	JCD00-156	30.5908	-86.7973	HAROLD SE	28-Jun-00	Wolf Creek	Wolf Creek @ Eglin 700	Habitat Survey	downstream	2

Eglin Management Unit (EMU)	Field Number	LAT	LONG	Quad Sheet	Date	Water Body	Sample Location	Projects	Direction Sampled	Stream Order
0102S001	JCD00-157	30.5983	-86.8039	HAROLD SE	28-Jun-00	Dry Hollow	Dry Hollow @ Eglin 604W	Habitat Survey	upstream	1
0102S001	JCD00-158	30.5983	-86.8039	HAROLD SE	28-Jun-00	Dry Hollow	Dry Hollow @ Eglin 604W	Habitat Survey	downstream	1
0102S002	JCD00-159	30.6075	-86.8165	HAROLD SE	28-Jun-00	Wolf Creek	Wolf Creek @ Eglin 211	Habitat Survey	upstream	2
0102S002	JCD00-160	30.6075	-86.8165	HAROLD SE	28-Jun-00	Wolf Creek	Wolf Creek @ Eglin 211	Habitat Survey	downstream	2
0503S003	JCD00-161	30.6576	-86.5856	CRESTVIEW SOUTH	29-Jun-00	Turkey Hen Creek trib.	Turkey Hen Creek east trib. at Eglin 605 & 611	Habitat Survey	upstream	1
0503S003	JCD00-162	30.6576	-86.5856	CRESTVIEW SOUTH	29-Jun-00	Turkey Hen Creek trib.	Turkey Hen Creek east trib. at Eglin 605 & 611	Habitat Survey	downstream	1
0503S004	JCD00-163	30.6594	-86.5872	CRESTVIEW SOUTH	29-Jun-00	Turkey Hen Creek trib.	Turkey Hen Creek west tributary at Eglin 605	Habitat Survey	downstream	1
0503S001	JCD00-164	30.6809	-86.5755	CRESTVIEW SOUTH	29-Jun-00	Turkey Hen Creek	Turkey Hen Creek at Eglin 211	Storm Sampling	downstream	3
0503S001	JCD00-165	30.6809	-86.5755	CRESTVIEW SOUTH	29-Jun-00	Turkey Hen Creek	Turkey Hen Creek at Eglin 211	Storm Sampling	upstream	3
0104S004	JCD00-166	30.5449	-86.8150	HAROLD SE	11-Jul-00	Holley Creek	Holley Creek at Eglin 735	Habitat Survey	upstream	2
0104S004	JCD00-167	30.5449	-86.8150	HAROLD SE	11-Jul-00	Holley Creek	Holley Creek at Eglin 735	Habitat Survey	downstream	2
0107S001	JCD00-168	30.5406	-86.8359	HAROLD SE	11-Jul-00	Indigo Creek	Indigo Creek at Eglin 213	Habitat Survey	upstream	1
0106S001	JCD00-169	30.5414	-86.8650	HAROLD SE	11-Jul-00	Little Boiling Creek	Little Boiling Creek at Eglin 213	Habitat Survey	upstream	2
0106S001	JCD00-170	30.5414	-86.8650	HAROLD SE	11-Jul-00	Little Boiling Creek	Little Boiling Creek at Eglin 213	Habitat Survey	downstream	2
0104S003	JCD00-171	30.5589	-86.8920	WARD BASIN	11-Jul-00	Moore Creek	Moore Creek @ Gauge Station N. of 211	Habitat Survey	upstream	2
0104S003	JCD00-172	30.5589	-86.8920	WARD BASIN	11-Jul-00	Moore Creek	Moore Creek @ Gauge Station N. of 211	Habitat Survey	downstream	2
0103S004	JCD00-173	30.5501	-86.9162	WARD BASIN	11-Jul-00	Double Head Branch	Double Head Branch @ powerline road	Habitat Survey	upstream	1
0103S004	JCD00-174	30.5501	-86.9162	WARD BASIN	11-Jul-00	Double Head Branch	Double Head Branch @ powerline road	Habitat Survey	downstream	1
0103S005	JCD00-175	30.5311	-86.9164	WARD BASIN	11-Jul-00	Weaver River trib.	Weaver River trib. @ unnumbered road	Habitat Survey	upstream	1
0103S005	JCD00-176	30.5311	-86.9164	WARD BASIN	11-Jul-00	Weaver River trib.	Weaver River trib. @ unnumbered road	Habitat Survey	downstream	1
0103S003	JCD00-177	30.5337	-86.9171	WARD BASIN	11-Jul-00	Weaver River	Weaver River @ road off Eglin 724	Habitat Survey	upstream	1
0103S003	JCD00-178	30.5337	-86.9171	WARD BASIN	11-Jul-00	Weaver River	Weaver River @ road off Eglin 724	Habitat Survey	downstream	1
0103S001	JCD00-179	30.5518	-86.9297	WARD BASIN	11-Jul-00	Weaver River	Weaver River @ Eglin RR 736	Habitat Survey	upstream	3

Eglin Management Unit (EMU)	Field Number	LAT	LONG	Quad Sheet	Date	Water Body	Sample Location	Projects	Direction Sampled	Stream Order
0103S003	JCD00-180	30.5337	-86.9171	WARD BASIN	11-Jul-00	Weaver River	Weaver River @ road off Eglin 724	Habitat Survey	downstream	1
0503S001	JCD00-181	30.6809	-86.5755	CRESTVIEW SOUTH	18-Jul-00	Turkey Hen Creek	Turkey Hen Creek at Eglin 211	Habitat Survey	upstream	3
0503S001	JCD00-182	30.6809	-86.5755	CRESTVIEW SOUTH	18-Jul-00	Turkey Hen Creek	Turkey Hen Creek at Eglin 211	Habitat Survey	downstream	3
0804S002	JCD00-183	30.5352	-86.3825	NICEVILLE	18-Jul-00	Rocky Creek	Rocky Creek at Eglin 219	Habitat Survey	upstream	5
0804S002	JCD00-184	30.5352	-86.3825	NICEVILLE	18-Jul-00	Rocky Creek	Rocky Creek at Eglin 219	Habitat Survey	downstream	5
0809S003	JCD00-185	30.5769	-86.3883	NICEVILLE	18-Jul-00	Little Rocky Creek	Little Rocky Creek at Eglin 200	Habitat Survey	upstream	4
0809S003	JCD00-186	30.5769	-86.3883	NICEVILLE	18-Jul-00	Little Rocky Creek	Little Rocky Creek at Eglin 200	Habitat Survey	downstream	4
0811S001	JCD00-187	30.6062	-86.3977	NICEVILLE	18-Jul-00	Rocky Creek trib.	Rocky Creek tributary at Eglin 420	Habitat Survey	upstream	3
0811S001	JCD00-188	30.6062	-86.3977	NICEVILLE	18-Jul-00	Rocky Creek trib.	Rocky Creek tributary at Eglin 420	Habitat Survey	downstream	3
0809S002	JCD00-189	30.5854	-86.4038	NICEVILLE	18-Jul-00	Little Rocky Creek	Little Rocky Creek at Eglin 499	Habitat Survey	upstream	3
0809S002	JCD00-190	30.5854	-86.4038	NICEVILLE	18-Jul-00	Little Rocky Creek	Little Rocky Creek at Eglin 499	Habitat Survey	downstream	3
0809S005	JCD00-191	30.6209	-86.4306	NICEVILLE	18-Jul-00	Little Rocky Creek	Little Rocky Creek at Eglin 434	Habitat Survey	upstream	2
0809S005	JCD00-192	30.6209	-86.4306	NICEVILLE	18-Jul-00	Little Rocky Creek	Little Rocky Creek at Eglin 434	Habitat Survey	downstream	2
0505S002	JCD00-193	30.6800	-86.5225	CRESTVIEW SOUTH	25-Jul-00	Silver Creek trib.	Silver Creek tributary at Eglin 565	Habitat Survey	upstream	2
0604S002	JCD99-003	30.5351	-86.4863	NICEVILLE	01-Sep-99	Mill Creek	Mill Creek SR 190 (College Blvd)	Golf Course	both	1
0604S003	JCD99-004	30.5338	-86.4859	NICEVILLE	01-Sep-99	Mill Creek	Mill Creek fairway b/t holes 14 and 16	Golf Course	downstream	1
0604S004	JCD99-005	30.5344	-86.4861	NICEVILLE	01-Sep-99	Mill Creek	Mill Creek at non-culvert section dstm SR. 190	Golf Course	both	2
0604S006	JCD99-006	30.5438	-86.4873	NICEVILLE	01-Sep-99	Mill Creek	Mill Creek at bridge north of SR 190, by hole 9	Golf Course	both	1
0604S006	JCD99-007	30.5438	-86.4873	NICEVILLE	01-Sep-99	Mill Creek	Mill Creek at bridge north of SR 190, by hole 9	Golf Course	both	1
0604S005	JCD99-008	30.5373	-86.4853	NICEVILLE	01-Sep-99	Mill Creek	Mill Creek at bridge N. of SR.190 by hole 13	Golf Course	both	1
0610S001	JCD99-009	30.5561	-86.5621	VALPARAISO	13-Sep-99	Rogue Creek	Rogue Creek at Eglin 233	Biomonitoring	upstream	2
0609S001	JCD99-010	30.6078	-86.5228	VALPARAISO	21-Sep-99	Juniper Creek	Juniper Creek bridge crossing on Eglin 221	Survey	upstream	3
0612S001	JCD99-011	30.6070	-86.4824	NICEVILLE	13-Oct-99	Point Lookout Creek	Point Lookout Creek at Eglin 221	Veg. Survey	upstream	3

Eglin Management Unit (EMU)	Field Number	LAT	LONG	Quad Sheet	Date	Water Body	Sample Location	Projects	Direction Sampled	Stream Order
0612S002	JCD99-012	30.6066	-86.4826	NICEVILLE	13-Oct-99	Point Lookout Creek	Point Lookout Creek 50m below Eglin 221	Veg. Survey	downstream	3
0612S001	JCD99-014	30.6070	-86.4824	NICEVILLE	28-Oct-99	Point Lookout Creek	Point Lookout Creek at Eglin 221	Biomonitoring	upstream	3
0607S001	JCD99-015	30.5939	-86.5765	VALPARAISO	04-Nov-99	Bens Creek	Bens Creek at old intersection w/ Eglin 604E	Biomonitoring	upstream	2
0604S004	JCD99-016	30.5344	-86.4861	NICEVILLE	09-Nov-99	Mill Creek	Mill Creek at non-culvert section dstm SR. 190	Biomonitoring	downstream	2
0309S001	JCD99-017	30.6360	-86.6326	HOLT	16-Nov-99	Turkey Gobbler Creek	Turkey Gobbler Creek at Eglin 657	Biomonitoring	upstream	1
0309S002	JCD99-018	30.6238	-86.6210	VALPARAISO	16-Nov-99	Turkey Gobbler Creek	Turkey Gobbler Creek at Eglin 600E	Biomonitoring	upstream	1
0908S001	JCD99-019	30.7194	-86.2812	MOSSY HEAD	18-Nov-99	Live Oak Branch	Live Oak Branch bridge blowout @ Eglin 382	Survey	upstream	3
0907S001	JCD99-020	30.7168	-86.2659	MOSSY HEAD	18-Nov-99	Buck Branch	Buck Branch at Eglin 382	Biomonitoring	upstream	2
0102S001	JCD99-021	30.5983	-86.8039	HAROLD SE	23-Nov-99	Dry Hollow	Dry Hollow @ Eglin 604W	Biomonitoring	upstream	1
0612S001	JCD99-022	30.6070	-86.4824	NICEVILLE	30-Nov-99	Point Lookout Creek	Point Lookout Creek at Eglin 221	Golf Course	upstream	3
0612S002	JCD99-023	30.6066	-86.4826	NICEVILLE	30-Nov-99	Point Lookout Creek	Point Lookout Creek 50m below Eglin 221	Golf Course	downstream	3
0609S001	JCD99-024	30.6078	-86.5228	VALPARAISO	30-Nov-99	Juniper Creek	Juniper Creek bridge crossing on Eglin 221	Golf Course	upstream	3
0604S004	JCD99-025	30.5344	-86.4861	NICEVILLE	30-Nov-99	Mill Creek	Mill Creek at non-culvert section dstm SR. 190	Golf Course	downstream	2
0604S005	JCD99-026	30.5373	-86.4853	NICEVILLE	30-Nov-99	Mill Creek	Mill Creek at bridge N. of SR.190 by hole 13	Golf Course	upstream	1
0612S003	JCD99-101	30.5701	-86.5159	VALPARAISO	09-Dec-99	Tenmile Creek	Tenmile Creek at Eglin Road 231	Recon	both	4
0616S001	JCD99-102	30.6074	-86.4948	NICEVILLE	09-Dec-99	Pinelog Creek	Pinelog Creek at Eglin 221	Recon	both	2
0612S001	JCD99-103	30.6070	-86.4824	NICEVILLE	09-Dec-99	Point Lookout Creek	Point Lookout Creek at Eglin 221	Recon	both	3
0703S001	JCD99-104	30.6658	-86.4541	SPENCER FLATS	09-Dec-99	Blue Spring Creek	Blue Spring Creek at Eglin 454	Recon	both	2
0506S001	JCD99-105	30.6939	-86.4962	SPENCER FLATS	09-Dec-99	Honey Creek	Honey Creek at Eglin 211	Recon	both	3
0506S002	JCD99-106	30.6653	-86.4882	SPENCER FLATS	09-Dec-99	Honey Creek trib.	Honey Creek trib. at Eglin 454	Recon	both	1
0506S003	JCD99-107	30.6653	-86.4848	SPENCER FLATS	09-Dec-99	Honey Creek	Honey Creek at Eglin AFB Range Rd 454	Recon	both	2

Eglin Management Unit (EMU)	Field Number	LAT	LONG	Quad Sheet	Date	Water Body	Sample Location	Projects	Direction Sampled	Stream Order
0505S001	JCD99-108	30.6653	-86.5112	CRESTVIEW SOUTH	09-Dec-99	Silver Creek	Silver Creek at Eglin 454	Recon	both	2
0505S002	JCD99-109	30.6800	-86.5225	CRESTVIEW SOUTH	09-Dec-99	Silver Creek trib.	Silver Creek tributary at Eglin 565	Recon	both	2
0504S001	JCD99-110	30.6805	-86.5553	CRESTVIEW SOUTH	09-Dec-99	Pearl Creek	Pearl Creek at Eglin Range Road 211	Recon	both	2
0612S001	JCD99-111	30.6070	-86.4824	NICEVILLE	13-Dec-99	Point Lookout Creek	Point Lookout Creek at Eglin 221	Storm Sampling	downstream	3
0609S001	JCD99-112	30.6078	-86.5228	VALPARAISO	13-Dec-99	Juniper Creek	Juniper Creek bridge crossing on Eglin 221	Storm Sampling	downstream	3
0616S001	JCD99-113	30.6074	-86.4948	NICEVILLE	13-Dec-99	Pinelog Creek	Pinelog Creek at Eglin 221	Storm Sampling	downstream	2
0612S003	JCD99-114	30.5701	-86.5159	VALPARAISO	13-Dec-99	Tenmile Creek	Tenmile Creek at Eglin Road 231	Storm Sampling	downstream	4
0607S002	JCD99-115	30.5796	-86.6074	VALPARAISO	14-Dec-99	Turkey Creek	Turkey Creek at Eglin 637	Recon	both	1
0607S003	JCD99-116	30.5814	-86.5749	VALPARAISO	14-Dec-99	Turkey Creek	Turkey Creek at Eglin 233	Recon	both	3
0607S004	JCD99-117	30.5830	-86.5637	VALPARAISO	14-Dec-99	Bens Creek	Bens Creek at Eglin 619	Recon	both	2
0611S001	JCD99-118	30.5824	-86.5416	VALPARAISO	14-Dec-99	Parrish Creek	Parrish Creek at Eglin Range Road 603	Recon	both	2
0607S005	JCD99-119	30.5618	-86.5363	VALPARAISO	14-Dec-99	Turkey Creek	Turkey Creek at Eglin 232	Recon	both	4
0610S001	JCD99-120	30.5561	-86.5621	VALPARAISO	14-Dec-99	Rogue Creek	Rogue Creek at Eglin 233	Recon	both	2
0608S001	JCD99-121	30.5578	-86.5197	VALPARAISO	14-Dec-99	Juniper Creek	Juniper Creek crossing at Hwy 85	Recon	both	4
0607S006	JCD99-122	30.5428	-86.5206	VALPARAISO	14-Dec-99	Turkey Creek	Turkey Creek at Eglin 626	Recon	both	5
0503S001	JCD99-123	30.6809	-86.5755	CRESTVIEW SOUTH	15-Dec-99	Turkey Hen Creek	Turkey Hen Creek at Eglin 211	Recon	both	3
0503S002	JCD99-124	30.6769	-86.5780	CRESTVIEW SOUTH	15-Dec-99	Turkey Hen Creek	Turkey Hen Creek at Eglin 233	Recon	both	2
0503S003	JCD99-125	30.6576	-86.5856	CRESTVIEW SOUTH	15-Dec-99	Turkey Hen Creek trib.	Turkey Hen Creek east trib. at Eglin 605 & 611	Recon	both	1
0503S004	JCD99-126	30.6594	-86.5872	CRESTVIEW SOUTH	15-Dec-99	Turkey Hen Creek trib.	Turkey Hen Creek west tributary at Eglin 605	Recon	both	1
0309S002	JCD99-127	30.6238	-86.6210	VALPARAISO	15-Dec-99	Turkey Gobbler Creek	Turkey Gobbler Creek at Eglin 600E	Recon	both	1
0309S003	JCD99-128	30.6372	-86.6369	HOLT	15-Dec-99	Turkey Gobbler Creek	Turkey Gobbler Creek at Eglin 215	Recon	both	2
0309S001	JCD99-129	30.6360	-86.6326	HOLT	15-Dec-99	Turkey Gobbler Creek	Turkey Gobbler Creek at Eglin 657	Recon	both	1
0308S001	JCD99-130	30.6468	-86.6652	HOLT	15-Dec-99	Middle Creek	Middle Creek at Eglin 610	Recon	both	2

Eglin Management Unit (EMU)	Field Number	LAT	LONG	Quad Sheet	Date	Water Body	Sample Location	Projects	Direction Sampled	Stream Order
0309S004	JCD99-131	30.6571	-86.6523	HOLT	15-Dec-99	Turkey Gobbler Creek	Turkey Gobbler Creek at Eglin 610	Recon	both	3
0308S002	JCD99-132	30.6638	-86.6766	HOLT	15-Dec-99	Middle Creek	Middle Creek at Eglin 211	Recon	both	3
0309S005	JCD99-133	30.6713	-86.6620	HOLT	15-Dec-99	Turkey Gobbler Creek	Turkey Gobbler Creek at Eglin 211	Recon	both	3
0811S001	JCD99-134	30.6062	-86.3977	NICEVILLE	06-Jan-00	Rocky Creek trib.	Rocky Creek tributary at Eglin 420	Recon	both	3
0811S002	JCD99-135	30.5934	-86.3872	NICEVILLE	06-Jan-00	Rocky Creek trib.	Rocky Creek tributary at Egliln 422	Recon	both	3
0903S001	JCD99-136	30.6615	-86.1969	DEFUNIAK SPRINGS W	25-Jan-00	Oakie Creek	Oakie Creek at Eglin 208	Recon	both	3
0901S002	JCD99-137	30.7083	-86.2526	MOSSY HEAD	25-Jan-00	Alaqua Creek	Alaqua Creek at Eglin 213	Recon	both	3
0906S001	JCD99-138	30.7087	-86.2504	MOSSY HEAD	25-Jan-00	Bullhide Creek	Bullhide Creek at Eglin 213	Recon	both	3
0904S001	JCD99-139	30.7066	-86.2380	DEFUNIAK SPRINGS W	25-Jan-00	Alaqua Creek trib.	Unnamed Alaqua Creek tributary at Eglin 213	Recon	both	2
0901S001	JCD99-140	30.6925	-86.2417	DEFUNIAK SPRINGS W	25-Jan-00	Alaqua Creek	Alaqua Creek at Eglin 210	Recon	both	4
1103S002	JCD99-141	30.6160	-86.1640	PORTLAND	25-Jan-00	Blount Creek	Blount Creek at Eglin 201	Recon	both	3
1106S002	JCD99-142	30.6146	-86.1780	PORTLAND	25-Jan-00	Davis Branch	Davis Branch at Eglin 201	Recon	both	2
1104S002	JCD99-143	30.6047	-86.2402	PORTLAND	25-Jan-00	Little Alaqua Creek	Little Alaqua at Eglin 200/201	Recon	both	3
1105S001	JCD99-144	30.6074	-86.1394	PORTLAND	25-Jan-00	White Branch	White Branch at Eglin 200	Recon	both	2
1103S001	JCD99-145	30.5952	-86.1642	PORTLAND	25-Jan-00	Alaqua Creek	Alaqua Creek at Eglin 200	Recon	both	5
1106S001	JCD99-146	30.6119	-86.1802	PORTLAND	25-Jan-00	Davis Branch trib.	Davis Branch tributary at Eglin 319	Recon	both	2
1108S001	JCD99-147	30.6075	-86.2146	PORTLAND	25-Jan-00	Blount Mill Creek	Blount Mill Creek at Eglin 200/201	Recon	both	2
1102S001	JCD99-148	30.5797	-86.1351	PORTLAND	27-Jan-00	Fourmile Creek	Fourmile Creek at Eglin 205	Recon	both	1
1103S003	JCD99-149	30.5561	-86.1792	PORTLAND	27-Jan-00	Alaqua Creek	Alaqua Creek at Eglin 205	Recon	both	6
1104S003	JCD99-150	30.5550	-86.1847	PORTLAND	27-Jan-00	Little Alaqua Creek	Little Alaqua at Eglin 205	Recon	both	5
1104S004	JCD99-151	30.5928	-86.2142	PORTLAND	27-Jan-00	Little Alaqua Creek	Little Alaqua at Eglin 208	Recon	both	4
1108S002	JCD99-152	30.5986	-86.2113	PORTLAND	27-Jan-00	Blount Mill Creek	Blount Mill Creek at Eglin 208	Recon	both	3
1009S001	JCD99-153	30.5831	-86.2749	NICEVILLE SE	27-Jan-00	Bear Branch trib.	Bear Branch tributary at Eglin 361	Recon	both	2
1010S001	JCD99-154	30.5535	-86.2768	NICEVILLE SE	27-Jan-00	Watering Creek	Watering Creek at Eglin 212	Recon	both	3
1007S001	JCD99-155	30.5280	-86.2825	NICEVILLE SE	27-Jan-00	Basin Creek	Basin Creek at Eglin 212	Recon	both	4
1010S002	JCD99-156	30.5351	-86.2656	NICEVILLE SE	27-Jan-00	Watering Creek	Watering Creek at Eglin 356	Recon	both	3
1007S002	JCD99-157	30.5306	-86.2629	NICEVILLE SE	27-Jan-00	Basin Creek	Basin Creek at Eglin 433	Recon	both	4

Eglin Management Unit (EMU)	Field Number	LAT	LONG	Quad Sheet	Date	Water Body	Sample Location	Projects	Direction Sampled	Stream Order
1009S002	JCD99-158	30.5350	-86.2450	PORTLAND	27-Jan-00	Bear Branch	Bear Branch at Eglin 359	Recon	both	4
1008S001	JCD99-159	30.5336	-86.2380	PORTLAND	27-Jan-00	Little Basin Creek	Little Basin Creek at Eglin 359	Recon	both	3
1007S003	JCD99-160	30.5173	-86.2359	PORTLAND	27-Jan-00	Basin Creek	Basin Creek at Eglin 218	Recon	both	5
0905S002	JCD99-161	30.6773	-86.2788	MOSSY HEAD	01-Feb-00	Bear Bay Branch trib.	Bear Bay Branch tributary at Eglin 407	Recon	both	1
0905S001	JCD99-162	30.6865	-86.2717	MOSSY HEAD	01-Feb-00	Bear Bay Branch	Bear Bay Branch at Eglin Range Road 381	Recon	both	3
0907S001	JCD99-163	30.7168	-86.2659	MOSSY HEAD	01-Feb-00	Buck Branch	Buck Branch at Eglin 382	Recon	upstream	2
0908S001	JCD99-164	30.7194	-86.2812	MOSSY HEAD	01-Feb-00	Live Oak Branch	Live Oak Branch bridge blowout @ Eglin 382	Recon	upstream	3
0701S001	JCD99-165	30.7178	-86.3150	MOSSY HEAD	01-Feb-00	Cowpen Branch	Cowpen Branch at Eglin 409	Recon	both	3
0713S001	JCD99-166	30.7146	-86.3161	MOSSY HEAD	01-Feb-00	Cawthan Branch	Cawthan Branch at Eglin 409	Recon	both	2
0701S005	JCD99-167	30.7334	-86.3127	MOSSY HEAD	01-Feb-00	Titi Creek	Titi Creek at Eglin 382	Recon	both	1
0804S003	JCD99-168	30.6933	-86.3017	MOSSY HEAD	01-Feb-00	Rocky Creek	Rocky Creek at Eglin 213	Recon	both	1
0711S001	JCD99-169	30.6964	-86.3105	MOSSY HEAD	01-Feb-00	Indigo Branch	Indigo Creek at Eglin Road 409	Recon	both	1
0710S001	JCD99-170	30.7086	-86.3446	MOSSY HEAD	01-Feb-00	Hog Creek	Hog Creek at Eglin Road 207	Recon	both	3
0709S001	JCD99-171	30.7086	-86.3463	MOSSY HEAD	01-Feb-00	Red Deer Creek	Red Deer Creek at Eglin Road 207	Recon	both	2
0701S002	JCD99-172	30.7077	-86.3563	MOSSY HEAD	01-Feb-00	Titi Creek trib.	Titi Creek tributary at Eglin 207	Recon	both	1
0701S003	JCD99-173	30.7082	-86.3681	MOSSY HEAD	01-Feb-00	Wise Creek	Wise Creek at Eglin 207	Recon	both	2
0701S004	JCD99-174	30.7081	-86.3714	MOSSY HEAD	01-Feb-00	Wise Creek trib.	Wise Creek tributary at Eglin 207	Recon	both	1
0707S001	JCD99-175	30.7065	-86.3934	SPENCER FLATS	01-Feb-00	Gum Creek	Gum Creek at Eglin Range Road 207	Recon	both	3
0704S001	JCD99-176	30.7064	-86.4408	SPENCER FLATS	01-Feb-00	Big Fork	Big Fork at Eglin 207	Recon	both	3
0503S001	JCD99-177	30.6809	-86.5755	CRESTVIEW SOUTH	09-Feb-00	Turkey Hen Creek	Turkey Hen Creek at Eglin 211	Recon	both	3
0309S001	JCD99-178	30.6360	-86.6326	HOLT	09-Feb-00	Turkey Gobbler Creek	Turkey Gobbler Creek at Eglin 657	Recon	both	1
0303S001	JCD99-179	30.6616	-86.6884	HOLT	09-Feb-00	Yellow River trib.	Yellow River trib. at Eglin 211	Recon	both	1
0306S001	JCD99-180	30.6560	-86.7293	HOLT	09-Feb-00	Metts Creek	Metts Creek at Eglin 211	Recon	both	2
0301S001	JCD99-181	30.6461	-86.7575	FLORIDALE	09-Feb-00	Carroll Creek	Carroll Creek at Eglin 211	Recon	both	2
0305S001	JCD99-182	30.6383	-86.7729	FLORIDALE	09-Feb-00	Camp Creek	Camp Creek at Eglin 211	Recon	both	2
0305S002	JCD99-183	30.6320	-86.7749	FLORIDALE	09-Feb-00	Milligan Creek	Milligan Creek at Eglin 211	Recon	both	3
0102S002	JCD99-184	30.6075	-86.8165	HAROLD SE	09-Feb-00	Wolf Creek	Wolf Creek @ Eglin 211	Recon	both	2

Eglin Management Unit (EMU)	Field Number	LAT	LONG	Quad Sheet	Date	Water Body	Sample Location	Projects	Direction Sampled	Stream Order
0102S003	JCD99-185	30.6017	-86.8359	HAROLD SE	09-Feb-00	Yellow River trib.	Yellow River trib. @ Eglin 211	Recon	both	1
0102S004	JCD99-186	30.5880	-86.8569	HAROLD SE	09-Feb-00	Bear Creek	Bear Creek @ Eglin 211	Recon	both	2
0104S001	JCD99-187	30.5686	-86.8675	HAROLD SE	09-Feb-00	Boiling Creek trib.	Boiling Creek trib. @ Eglin 211	Recon	both	1
0104S002	JCD99-188	30.5650	-86.8691	HAROLD SE	09-Feb-00	Boiling Creek	Boiling Creek @ Eglin 211	Recon	both	4
0104S003	JCD99-189	30.5589	-86.8920	WARD BASIN	09-Feb-00	Moore Creek	Moore Creek @ Gauge Station N. of 211	Recon	both	2
0106S001	JCD99-190	30.5414	-86.8650	HAROLD SE	09-Feb-00	Little Boiling Creek	Little Boiling Creek at Eglin 213	Recon	both	2
0107S001	JCD99-191	30.5406	-86.8359	HAROLD SE	09-Feb-00	Indigo Creek	Indigo Creek at Eglin 213	Recon	both	1
0405S003	JCD99-192	30.5051	-86.6072	VALPARAISO	10-Feb-00	Lightwood Knot Creek	Lightwood Knot Creek at Eglin 632	Recon	both	2
0405S004	JCD99-193	30.4969	-86.6119	FT WALTON BEACH	10-Feb-00	West Branch	West Branch at Eglin 635 (nearly unpassable)	Recon	both	2
0211S001	JCD99-194	30.5090	-86.6703	HOLT SW	10-Feb-00	Turtle Creek	Turtle Creek at Eglin 234	Recon	both	3
0204S001	JCD99-195	30.4890	-86.6505	MARY ESTHER	10-Feb-00	Turtle Creek	Turtle Creek at Eglin 653	Recon	both	1
0210S001	JCD99-196	30.5110	-86.7146	HOLT SW	10-Feb-00	Live Oak Creek	Live Oak Creek at Eglin 234	Recon	both	2
0210S002	JCD99-197	30.4354	-86.7343	MARY ESTHER	10-Feb-00	Live Oak Creek	Live Oak Creek at Eglin 253	Recon	both	3
0204S002	JCD99-198	30.4297	-86.7389	MARY ESTHER	10-Feb-00	Turtle Creek	Turtle Creek at Eglin 253	Recon	both	4
0204S003	JCD99-199	30.4315	-86.7725	NAVARRE	10-Feb-00	East Bay River	East Bay River at Eglin 259	Recon	both	5
0207S001	JCD99-200	30.4310	-86.8067	NAVARRE	10-Feb-00	Panther Creek	Panther Creek at Eglin 255	Recon	both	3
0204S004	JCD99-201	30.4408	-86.8663	NAVARRE	10-Feb-00	East Bay River	East Bay River at Florida Hwy 87 bridge	Recon	both	6
0708	JJH02-14	30.6992	-86.3874	SPENCER FLATS	29-Jul-02	Deserter Creek	discharge from Speck Pond below levee	IBI	Downstream	1
0709S001	JJH02-15	30.7086	-86.3445	MOSSY HEAD	30-Jul-02	Red Deer Creek	Red Deer Creek at Eglin Road 207	IBI	Downstream	3
0701	JJH02-16	30.7332	-86.3124	MOSSY HEAD	31-Jul-02	Cowpen Branch	Unnamed trib of Cowpen Branch @ RR 382	IBI	Downstream	2
0713S001	JJH02-17	30.7144	-86.3165	MOSSY HEAD	1-Aug-02	Cawthan Branch	Cawthan Branch at Eglin 409	IBI	Downstream	2
0707S001	JJH02-18	30.7065	-86.3936	SPENCER FLATS	13-Aug-02	Gum Creek	Gum Creek at Eglin Range Road 207	IBI	Upstream	3
0506	JJH02-19	30.6509	-86.4797	SPENCER FLATS	14-Aug-02	Honey Creek	Honey Creek at Range Road 456	IBI	Upstream	2
0701S007	JJH02-20	30.6996	-86.4690	SPENCER FLATS	15-Aug-02	Titi Creek	Titi Creek at Eglin AFB Range Rd 220	IBI	Upstream	4

Eglin Management Unit (EMU)	Field Number	LAT	LONG	Quad Sheet	Date	Water Body	Sample Location	Projects	Direction Sampled	Stream Order
0703S002	JJH02-21	30.6797	-86.4507	SPENCER FLATS	16-Aug-02	Blue Spring Creek	Blue Spring Creek at Eglin 211	IBI	Upstream	2
0604S002	JJH02-22	30.5351	-86.4863	NICEVILLE	14-Oct-02	Mill Creek	Mill Creek SR 190 (College Blvd)	Darter Monitoring	Downstream	1
0604	JJH02-23	30.5606	-86.4589	NICEVILLE	14-Oct-02	Swift Creek	Swift Crk S. Hwy 190 (effluent of College Pond)	Darter Monitoring	Downstream	3
0606S001	JJH02-24	30.5302	-86.4528	NICEVILLE	14-Oct-02	Shaw Still Branch	Howard Chase Drive-neighborhood	Darter Monitoring	Downstream	1
0503S001	JJH02-25	30.6806	-86.5760	CRESTVIEW SOUTH	29-Oct-02	Turkey Hen Creek	Turkey Hen Creek at Eglin 211	IBI	Downstream	2
0308S002	JJH02-26	30.6639	-86.6761	HOLT	30-Oct-02	Middle Creek	Middle Creek at Eglin 211	IBI	Upstream	3
0306S003	JJH02-27	30.6511	-86.7255	HOLT	30-Oct-02	Metts Creek	Metts Creek at Eglin 236	IBI	Downstream	2
0307S003	JJH02-28	30.6377	-86.7012	HOLT	31-Oct-02	Malone Creek	Malone Creek at Eglin 236	IBI	Downstream	3
0309S005	JJH02-29	30.6712	-86.6614	HOLT	31-Oct-02	Turkey Gobbler Creek	Turkey Gobbler Creek at Eglin 211	IBI	Upstream	3
0605	JJH02-32	30.5603	-86.4587	NICEVILLE	4-Nov-02	Swift Creek	Old Rail Road Crossing (Bortone Site #9)	Darter Monitoring	Downstream	1
0605	JJH02-33	30.5375	-86.4657	NICEVILLE	4-Nov-02	Swift Creek	Bortone #9A	Darter Monitoring	Downstream	2
0803	JJH02-34	30.5344	-86.4538	NICEVILLE	4-Nov-02	Shaw Still Branch	Bortone #18	Darter Monitoring	Upstream	1
0803	JJH02-35	30.5226	-86.4116	NICEVILLE	5-Nov-02	West Long Creek	West Long @restored site RR469 (Bortone #7)	Darter Monitoring	Upstream	2
0803	JJH02-36	30.5427	-86.4131	NICEVILLE	5-Nov-02	West Long Creek	West Long Crk at Eglin 406 (Bortone #2)	Darter Monitoring	Upstream	2
0803	JJH02-37	30.5343	-86.4185	NICEVILLE	5-Nov-02	West Long Creek trib.	West Long Creek trib. Eglin RR 220 (Bortone #12)	Darter Monitoring	Upstream	1
0802	JJH02-38	30.5331	-86.4312	NICEVILLE	5-Nov-02	East Turkey Creek	East Turkey Creek RR 220 (Bortone #21)	Darter Monitoring	Downstream	1
0801	JJH02-39	30.5343	-86.4458	NICEVILLE	6-Nov-02	Sanders Branch	Sanders Branch Hwy 190 (Bortone #19)	Darter Monitoring	Downstream	1
0802	JJH02-40	30.5159	-86.3691	NICEVILLE	6-Nov-02	East Turkey Creek	East Turkey Creek @ RR473 (Bortone #22)	Darter Monitoring	Downstream	1
0802	JJH02-41	30.5497	-86.4411	NICEVILLE	6-Nov-02	East Turkey Creek	East Turkey Crk S of headwater (Bortone #1)	Darter Monitoring	Downstream	1
0605	JJH02-42	30.5281	-86.4670	NICEVILLE	7-Nov-02	Swift Creek	Hwy 285 crossing (Bortone #20)	Darter Monitoring	Downstream	3

Eglin Management Unit (EMU)	Field Number	LAT	LONG	Quad Sheet	Date	Water Body	Sample Location	Projects	Direction Sampled	Stream Order
0602S001	JJH02-43	30.5062	-86.5239	NICEVILLE	7-Nov-02	Toms Creek	Toms Creek at Florida S.R. 85 (Bortone #28)	Darter Monitoring	Downstream	2
0605	JJH02-44	30.5132	-86.4549	NICEVILLE	12-Dec-02	Swift Creek	Hwy 20 crossing (Bortone #24)	Darter Monitoring	Upstream	3
0605	JJH02-45	30.5489	-86.4718	NICEVILLE	12-Dec-02	Fox Head Branch	Power line (Bortone #5)	Darter Monitoring	Downstream	1
0602	JJH02-46	30.5093	-86.5304	VALPARAISO	12-Dec-02	Toms Creek	New site upstream of (Bortone #28)	Darter Monitoring	Upstream	2
0802	JJH02-47	30.5150	-86.4388	NICEVILLE	13-Dec-02	East Turkey Creek	Ruckel Property (Bortone #8)	Darter Monitoring	Downstream	1
0802	JJH02-48	30.5331	-86.4312	NICEVILLE	13-Dec-02	East Turkey Creek	East Turkey Creek RR 220 (Bortone #21)	Darter Monitoring	Downstream	1
0204	JJH03-01	30.4778	-86.6700	MARY ESTHER	10-Feb-03	Alligator Creek	Alligator Creek @ Range Road 634	IBI	Downstream	1
0406S002	JJH03-02	30.5010	-86.5794	VALPARAISO	24-Feb-03	Garnier Creek	Garnier Creek western trib at powerline road	IBI	Downstream	1
0405S003	JJH03-03	30.5051	-86.6072	VALPARAISO	24-Feb-03	Lightwood Knot Creek	Lightwood Knot Creek at Eglin 632	IBI	Upstream	2
0504S001	JJH03-04	30.6805	-86.5552	CRESTVIEW SOUTH	27-Feb-03	Pearl Creek	Pearl Creek at Eglin Range Road 211	IBI	Upstream	1
	JJH03-05				6/7 Mar-03	Magnolia Creek	Magnolia Creek @ wellfields	IBI	Downstream	1
0102	JJH03-06	30.6016	-86.8359	HAROLD SE	19-Mar-03	Broxson Branch	Broxson Branch @ 211	IBI	Upstream	1
0310S001	JJH03-07	30.6747	-86.6508	HOLT	20-Mar-03	Carr Spring Branch	Carr Spring Branch at Eglin 211	IBI	Upstream	2
0102S002	JJH03-08	30.6075	-86.8165	HAROLD SE	21-Mar-03	Wolf Creek	Wolf Creek @ Eglin 211	IBI	Downstream	3
1102S006	JJH03-09	30.5464	-86.1282	PORTLAND		Fourmile Creek	East Branch of Fourmile Creek near RR 312	IBI	Upstream	2
0906S001	JJH03-10	30.7087	-86.2503	MOSSY HEAD	28-May-03	Bullhide Creek	Bullhide Creek at Eglin 213	IBI	Upstream	3
0904S001	JJH03-11	30.7065	-86.2377	DEFUNIAK SPRINGS W	28-May-03	Alaqua Creek trib.	Unnamed Alaqua Creek tributary at Eglin 213	IBI	Downstream	3
1008S001	JJH03-12	30.5336	-86.2380	PORTLAND	4-Jun-03	Little Basin Creek	Little Basin Creek at Eglin 359	IBI	Upstream	3
0901S001	JJH03-13	30.6925	-86.2417	DEFUNIAK SPRINGS W	22-Jul-03	Alaqua Creek	Alaqua Creek at Eglin 210	IBI	Upstream	4
0102	JJH03-14	30.6016	-86.8359	HAROLD SE	29-Jul-03	Broxson Branch	Broxson Branch @ 211	IBI	Upstream	1
1008S002	JJH03-15	30.5438	-86.2199	PORTLAND	20-Oct-03	Little Basin Creek	Little Basin Creek at Eglin 351	IBI	Downstream	2
0905	JJH03-16	30.6790	-86.2770	MOSSY HEAD	21-Oct-03	Bear Bay Branch	Bear Bay Branch at Eglin 407	IBI	Upstream	2

Eglin Management Unit (EMU)	Field Number	LAT	LONG	Quad Sheet	Date	Water Body	Sample Location	Projects	Direction Sampled	Stream Order
0908	JJH03-17	30.7191	-86.2820	MOSSY HEAD	22-Oct-03	Whitehead Spring Branch	Whitehead Spring Branch @ 382	IBI	Upstream	3
0101S003	JJH03-18	30.5399	-86.9478	WARD BASIN	23-Oct-03	Hicks Creek	Hicks Creek E. Branch @ Eglin 736	IBI	Upstream	1
0202	JJH03-19	30.4714	-86.9052	HOLLEY	27-Oct-03	West Head	West Head @ 720	IBI	Downstream	2
1108S002	JJH03-20	30.5987	-86.2114	PORTLAND	28-Oct-03	Blount Mill Creek	Blount Mill Creek at Eglin 208	IBI	Upstream	4
0201S004	JJH03-21	30.4804	-86.9355	HOLLEY	29-Oct-03	Long Branch	Long Branch at Eglin 726	IBI	Downstream	1
0201S003	JJH03-22	30.5294	-86.9793	WARD BASIN	30-Oct-03	Catfish Branch	Catfish Branch at Eglin 736	IBI	Downstream	1
0104	JJH03-23	30.5600	-86.8921	WARD BASIN	31-Oct-03	Moore Creek	Moore Creek @ Gauge Station N. of 211Moore Creek @ 787	IBI	Upstream	2
0406S002	JJH04-03	30.5010	-86.5794	VALPARAISO	20-Feb-04	Garnier Creek	Garnier Creek western trib at powerline road	IBI	Downstream	1
0711	JJH04-04	30.6975	-86.3313	MOSSY HEAD	10-Mar-04	Indigo Pond	Indigo Pond	Pond Assesment	Upstream	2
0210	JJH04-06	30.4930	-86.7265	MARY ESTHER	30-Mar-04	Live Oak Creek trib.	Bog Frog Site at tributary to Live Oak Creek	IBI	Downstream	1
0809S008	JJH04-07	30.6072	-86.4221	NICEVILLE	31-Mar-04	Little Rocky Creek	Little Rocky Creek at railroad trestle	Darter Monitoring	Downstream	2
0809S008	JJH04-08	30.6072	-86.4221	NICEVILLE	2-Apr-04	Little Rocky Creek	Little Rocky Creek at railroad trestle	Darter Monitoring	Upstream	2
0713S001	JJH04-09	30.7144	-86.3165	MOSSY HEAD	5-Apr-04	Cawthan Branch	Cawthan Branch at Eglin 409	IBI	Downstream	2
0713S001	JJH04-10	30.7144	-86.3165	MOSSY HEAD	6-Apr-04	Cawthan Branch	Cawthan Branch at Eglin 409	IBI	Upstream	2
0701	JJH04-11	30.7332	-86.3124	MOSSY HEAD	6-Apr-04	Cowpen Branch	Unnamed trib of Cowpen Branch @ RR 382	IBI	Downstream	2
0701	JJH04-12	30.7332	-86.3124	MOSSY HEAD	7-Apr-04	Cowpen Branch	Unnamed trib of Cowpen Branch @ RR 382	IBI	Upstream	2
0707S001	JJH04-13	30.7065	-86.3936	SPENCER FLATS	8-Apr-04	Gum Creek	Gum Creek at Eglin Range Road 207	IBI	Downstream	3
0707S001	JJH04-14	30.7065	-86.3936	SPENCER FLATS	9-Apr-04	Gum Creek	Gum Creek at Eglin Range Road 207	IBI	Upstream	3
0703S002	JJH04-15	30.6797	-86.4507	SPENCER FLATS	12-Apr-04	Blue Spring Creek	Blue Spring Creek at Eglin 211	IBI	Downstream	2
0703S002	JJH04-16	30.6797	-86.4507	SPENCER FLATS	13-Apr-04	Blue Spring Creek	Blue Spring Creek at Eglin 211	IBI	Upstream	2
0701S007	JJH04-17	30.6996	-86.4690	SPENCER FLATS	14-Apr-04	Titi Creek	Titi Creek at Eglin AFB Range Rd 220	IBI	Downstream	4

Eglin Management Unit (EMU)	Field Number	LAT	LONG	Quad Sheet	Date	Water Body	Sample Location	Projects	Direction Sampled	Stream Order
0701S007	JJH04-18	30.6996	-86.4690	SPENCER FLATS	15-Apr-04	Titi Creek	Titi Creek at Eglin AFB Range Rd 220	IBI	Upstream	4
0604S005	JJH04-19	30.5372	-86.4856	NICEVILLE	30-Jun-04	Mill Creek	Mill Creek at bridge N. of SR.190 by hole 13	Darter Monitoring	Downstream	2
0604S005	JJH04-20	30.5372	-86.4856	NICEVILLE	30-Jun-04	Mill Creek	Mill Creek at bridge N. of SR.190 by hole 13	Darter Monitoring	Downstream	2
0604S005	JJH04-21	30.5372	-86.4856	NICEVILLE	1-Jul-04	Mill Creek	Mill Creek at bridge N. of SR.190 by hole 13	Darter Monitoring	Upstream	2
0604S005	JJH04-22	30.5372	-86.4856	NICEVILLE	1-Jul-04	Mill Creek	Mill Creek at bridge N. of SR.190 by hole 13	Darter Monitoring	Upstream	2
0604S006	JJH04-23	30.5424	-86.4868	NICEVILLE	1-Jul-04	Mill Creek	Mill Creek at bridge north of SR 190, by hole 9	Darter Monitoring	Downstream	1
0604S002	JJH04-24	30.5350	86.4863	NICEVILLE	2-Jul-04	Mill Creek	Mill Creek SR 190 (College Blvd)	Darter Monitoring	Downstream	2
0604S006	JJH04-25	30.5424	-86.4868	NICEVILLE	13-Jul-04	Mill Creek	Mill Creek at bridge north of SR 190, by hole 9	Darter Monitoring	Downstream	1
0604S006	JJH04-26	30.5424	-86.4868	NICEVILLE	14-Jul-04	Mill Creek	Mill Creek at bridge north of SR 190, by hole 9	Darter Monitoring	Upstream	1
0307S003	JJH04-27	30.6377	-86.7012	HOLT	19-Jul-04	Malone Creek	Malone Creek at Eglin 236	IBI	Downstream	3
0307S003	JJH04-28	30.6377	-86.7012	HOLT	20-Jul-04	Malone Creek	Malone Creek at Eglin 236	IBI	Upstream	3
0308S002	JJH04-29	30.6639	-86.6761	HOLT	21-Jul-04	Middle Creek	Middle Creek at Eglin 211	IBI	Downstream	3
0308S002	JJH04-30	30.6639	-86.6761	HOLT	22-Jul-04	Middle Creek	Middle Creek at Eglin 211	IBI	Upstream	3
0309S005	JJH04-31	30.6712	-86.6614	HOLT	24-Jul-04	Turkey Gobbler Creek	Turkey Gobbler Creek at Eglin 211	IBI	Downstream	3
0309S005	JJH04-32	30.6712	-86.6614	HOLT	25-Jul-04	Turkey Gobbler Creek	Turkey Gobbler Creek at Eglin 211	IBI	Upstream	3
0102	JJH04-33	30.6016	-86.8359	HAROLD SE	26-Jul-04	Broxson Branch	Broxson Branch @ 211	IBI	Downstream	1
0102	JJH04-34	30.6016	-86.8359	HAROLD SE	27-Jul-04	Broxson Branch	Broxson Branch @ 211	IBI	Upstream	1
0405S003	JJH04-35	30.5051	-86.6072	VALPARAISO	28-Jul-04	Lightwood Knot Creek	Lightwood Knot Creek at Eglin 632	IBI	Downstream	2
0405S003	JJH04-36	30.5051	-86.6072	VALPARAISO	29-Jul-04	Lightwood Knot Creek	Lightwood Knot Creek at Eglin 632	IBI	Upstream	2
1008S002	JJH04-37	30.5356	-86.2277	PORTLAND	25-Aug-04	Little Basin Creek	Little Basin Creek at Eglin 351	IBI	Downstream	2
1008S002	JJH04-38	30.5356	-86.2277	PORTLAND	26-Aug-04	Little Basin Creek	Little Basin Creek at Eglin 351	IBI	Upstream	2
0906S001	JJH04-39	30.7087	-86.2503	MOSSY HEAD	27-Aug-04	Bullhide Creek	Bullhide Creek at Eglin 213	IBI	Downstream	3

Eglin Management Unit (EMU)	Field Number	LAT	LONG	Quad Sheet	Date	Water Body	Sample Location	Projects	Direction Sampled	Stream Order
0906S001	JJH04-40	30.7087	-86.2503	MOSSY HEAD	28-Aug-04	Bullhide Creek	Bullhide Creek at Eglin 213	IBI	Upstream	3
0904S001	JJH04-41	30.7065	-86.2377	DEFUNIAK SPRINGS W	30-Aug-04	Alaqua Creek trib.	Unnamed Alaqua Creek tributary at Eglin 213	IBI	Downstream	3
0904S001	JJH04-42	30.7065	-86.2377	DEFUNIAK SPRINGS W	31-Aug-04	Alaqua Creek trib.	Unnamed Alaqua Creek tributary at Eglin 213	IBI	Upstream	3
0406S003	JLH01-001	30.5012	-86.5735	FT WALTON BEACH	19-Jun-01	Garnier Creek	Garnier Creek at new powerline rd E. of 636	Biomonitoring	upstream	2
0405S003	JLH01-002	30.5051	-86.6072	VALPARAISO	21-Jun-01	Lightwood Knot Creek	Lightwood Knot Creek at Eglin 632	Biomonitoring	upstream	2
0505S003	JLH01-003	30.6946	-86.5214	CRESTVIEW SOUTH	05-Jul-01	Silver Creek	Silver Creek at Eglin 211	Biomonitoring	upstream	3
0505S001	JLH01-004	30.6653	-86.5112	CRESTVIEW SOUTH	10-Jul-01	Silver Creek	Silver Creek at Eglin 454	Biomonitoring	upstream	2
0610S001	JLH01-005	30.5561	-86.5621	VALPARAISO	12-Jul-01	Rogue Creek	Rogue Creek at Eglin 233	Biomonitoring	upstream	2
0612S003	JLH01-006	30.5701	-86.5159	VALPARAISO	17-Jul-01	Tenmile Creek	Tenmile Creek at Eglin Road 231	Biomonitoring	upstream	4
0817S003	JLH01-007	30.6418	-86.3552	MOSSY HEAD	14-Aug-01	Exline Creek	Exline Creek at Eglin 416	Survey	downstream	2
0303S001	JLH01-008	30.6616	-86.6884	HOLT	21-Aug-01	Yellow River trib.	Yellow River trib. at Eglin 211	Biomonitoring	upstream	1
0308S002	JLH01-009	30.6638	-86.6766	HOLT	23-Aug-01	Middle Creek	Middle Creek at Eglin 211	Biomonitoring	upstream	3
0309S005	JLH01-010a	30.6713	-86.6620	HOLT	28-Aug-01	Turkey Gobbler Creek	Turkey Gobbler Creek at Eglin 211	Storm Sampling	downstream	3
0308S002	JLH01-010b	30.6638	-86.6766	HOLT	28-Aug-01	Middle Creek	Middle Creek at Eglin 211	Storm Sampling	downstream	3
0303S001	JLH01-010c	30.6616	-86.6884	HOLT	28-Aug-01	Yellow River trib.	Yellow River trib. at Eglin 211	Storm Sampling	downstream	1
0307S001	JLH01-010d	30.6600	-86.6990	HOLT	28-Aug-01	Malone Creek	Malone Creek at Eglin 211	Storm Sampling	downstream	3
0306S001	JLH01-010e	30.6560	-86.7293	HOLT	28-Aug-01	Metts Creek	Metts Creek at Eglin 211	Storm Sampling	downstream	2
0301S001	JLH01-010f	30.6461	-86.7575	FLORIDALE	28-Aug-01	Carroll Creek	Carroll Creek at Eglin 211	Storm Sampling	downstream	2
0305S001	JLH01-010g	30.6383	-86.7729	FLORIDALE	28-Aug-01	Camp Creek	Camp Creek at Eglin 211	Storm Sampling	downstream	2
0305S002	JLH01-010h	30.6320	-86.7749	FLORIDALE	28-Aug-01	Milligan Creek	Milligan Creek at Eglin 211	Storm Sampling	downstream	3
0102S009	JLH01-010i	30.6275	-86.7908	FLORIDALE	28-Aug-01	Yellow River trib.	Yellow River trib. @ 211, W of jnct w/253	Storm Sampling	downstream	1
0102S008	JLH01-010j	30.6218	-86.8020	FLORIDALE	28-Aug-01	Crane Branch	Crane Branch @ Eglin 211	Storm Sampling	downstream	1
0102S002	JLH01-010k	30.6075	-86.8165	HAROLD SE	28-Aug-01	Wolf Creek	Wolf Creek @ Eglin 211	Storm Sampling	downstream	2
0102S004	JLH01-010L	30.5880	-86.8569	HAROLD SE	28-Aug-01	Bear Creek	Bear Creek @ Eglin 211	Storm Sampling	downstream	2
0104S002	JLH01-010m	30.5650	-86.8691	HAROLD SE	28-Aug-01	Boiling Creek	Boiling Creek @ Eglin 211	Storm Sampling	downstream	4
0502S001	JLH01-010n	30.6817	-86.6061	CRESTVIEW SOUTH	28-Aug-01	Gopher Creek	Gopher Creek at Eglin AFB Range Rd 211	Storm Sampling	downstream	1

Eglin Management Unit (EMU)	Field Number	LAT	LONG	Quad Sheet	Date	Water Body	Sample Location	Projects	Direction Sampled	Stream Order
0503S001	JLH01-010o	30.6809	-86.5755	CRESTVIEW SOUTH	28-Aug-01	Turkey Hen Creek	Turkey Hen Creek at Eglin 211	Storm Sampling	downstream	3
0504S001	JLH01-011a	30.6805	-86.5553	CRESTVIEW SOUTH	30-Aug-01	Pearl Creek	Pearl Creek at Eglin Range Road 211	Storm Sampling	downstream	2
0505S003	JLH01-011b	30.6946	-86.5214	CRESTVIEW SOUTH	30-Aug-01	Silver Creek	Silver Creek at Eglin 211	Storm Sampling	downstream	3
0506S001	JLH01-011c	30.6939	-86.4962	SPENCER FLATS	30-Aug-01	Honey Creek	Honey Creek at Eglin 211	Storm Sampling	downstream	3
0703S002	JLH01-011d	30.6866	-86.4501	SPENCER FLATS	30-Aug-01	Blue Spring Creek	Blue Spring Creek at Eglin 211	Storm Sampling	downstream	2
0505S002	JLH01-012a	30.6800	-86.5225	CRESTVIEW SOUTH	05-Sep-01	Silver Creek trib.	Silver Creek tributary at Eglin 565	Storm Sampling	downstream	2
0505S001	JLH01-012b	30.6653	-86.5112	CRESTVIEW SOUTH	05-Sep-01	Silver Creek	Silver Creek at Eglin 454	Storm Sampling	downstream	2
0609S001	JLH01-012c	30.6078	-86.5228	VALPARAISO	05-Sep-01	Juniper Creek	Juniper Creek bridge crossing on Eglin 221	Biomonitoring	downstream	3
0612S001	JLH01-012d	30.6070	-86.4824	NICEVILLE	05-Sep-01	Point Lookout Creek	Point Lookout Creek at Eglin 221	Storm Sampling	downstream	3
0612S003	JLH01-012e	30.5701	-86.5159	VALPARAISO	05-Sep-01	Tenmile Creek	Tenmile Creek at Eglin Road 231	Storm Sampling	downstream	4
0506S001	JLH01-012f	30.6939	-86.4962	SPENCER FLATS	05-Sep-01	Honey Creek	Honey Creek at Eglin 211	Storm Sampling	downstream	3
0505S003	JLH01-012g	30.6946	-86.5214	CRESTVIEW SOUTH	05-Sep-01	Silver Creek	Silver Creek at Eglin 211	Storm Sampling	downstream	3
0504S001	JLH01-012h	30.6805	-86.5553	CRESTVIEW SOUTH	05-Sep-01	Pearl Creek	Pearl Creek at Eglin Range Road 211	Storm Sampling	downstream	2
0503S001	JLH01-012i	30.6809	-86.5755	CRESTVIEW SOUTH	05-Sep-01	Turkey Hen Creek	Turkey Hen Creek at Eglin 211	Storm Sampling	downstream	3
0502S001	JLH01-012j	30.6817	-86.6061	CRESTVIEW SOUTH	05-Sep-01	Gopher Creek	Gopher Creek at Eglin AFB Range Rd 211	Storm Sampling	downstream	1
0616S001	JLH01-012k	30.6074	-86.4948	NICEVILLE	05-Sep-01	Pinelog Creek	Pinelog Creek at Eglin 221	Storm Sampling	downstream	2
0503S001	JLH01-013	30.6809	-86.5755	CRESTVIEW SOUTH	11-Sep-01	Turkey Hen Creek	Turkey Hen Creek at Eglin 211	Biomonitoring	upstream	3
0309S005	JLH01-014	30.6713	-86.6620	HOLT	13-Sep-01	Turkey Gobbler Creek	Turkey Gobbler Creek at Eglin 211	Biomonitoring	upstream	3
0609S001	JLH01-015a	30.6078	-86.5228	VALPARAISO	20-Sep-01	Juniper Creek	Juniper Creek bridge crossing on Eglin 221	Storm Sampling	downstream	3
0616S001	JLH01-015b	30.6074	-86.4948	NICEVILLE	20-Sep-01	Pinelog Creek	Pinelog Creek at Eglin 221	Storm Sampling	downstream	2

Eglin Management Unit (EMU)	Field Number	LAT	LONG	Quad Sheet	Date	Water Body	Sample Location	Projects	Direction Sampled	Stream Order
0612S002	JLH01-015c	30.6066	-86.4826	NICEVILLE	20-Sep-01	Point Lookout Creek	Point Lookout Creek 50m below Eglin 221	Storm Sampling	downstream	3
0615S003	JLH01-015d	30.5919	-86.4581	NICEVILLE	20-Sep-01	Ninemile Creek	Ninemile Creek at Eglin 477	Storm Sampling	downstream	2
0612S005	JLH01-015e	30.6215	-86.4808	NICEVILLE	20-Sep-01	Point Lookout Creek	Point Lookout Creek at Eglin 434	Storm Sampling	downstream	2
0506S003	JLH01-015f	30.6653	-86.4848	SPENCER FLATS	20-Sep-01	Honey Creek	Honey Creek at Eglin AFB Range Rd 454	Storm Sampling	downstream	2
0506S003	JLH01-015g	30.6653	-86.4848	SPENCER FLATS	20-Sep-01	Honey Creek	Honey Creek at Eglin AFB Range Rd 454	Storm Sampling	downstream	2
0506S002	JLH01-015h	30.6653	-86.4882	SPENCER FLATS	20-Sep-01	Honey Creek trib.	Honey Creek trib. at Eglin 454	Storm Sampling	downstream	1
0306S001	JLH01-016	30.6560	-86.7293	HOLT	25-Sep-01	Metts Creek	Metts Creek at Eglin 211	Biomonitoring	upstream	2
temp4	RJL00-01	30.6966	-86.5711	CRESTVIEW SOUTH	14-Mar-00	Shoal River	Shoal River 400 m above SR 85 bridge	Fish Survey	upstream	6
temp8	RJL00-02	30.7003	-86.5359	CRESTVIEW SOUTH	15-Mar-00	Shoal River	Shoal River 0.5 river mi below Titi confluence	Fish Survey	downstream	6
1204S001	RJL00-06	30.5034	-86.3444	NICEVILLE SE	28-Mar-00	Piney Creek	Piney Creek at Eglin Road 354	Fish Survey	upstream	1
1204S002	RJL00-07	30.5035	-86.3297	NICEVILLE SE	28-Mar-00	Mullet Creek	Mullet Creek at Eglin Road 354	Fish Survey	downstream	2
1001S001	RJL00-08	30.4821	-86.2884	CHOCTAW BEACH	28-Mar-00	Trout Creek	Trout Creek at Florida S.R. 20	Fish Survey	downstream	3
1007S003	RJL00-09	30.5173	-86.2359	PORTLAND	29-Mar-00	Basin Creek	Basin Creek at Eglin 218	Fish Survey	no record	5
0204S003	RJL00-10	30.4315	-86.7725	NAVARRE	30-Mar-00	East Bay River	East Bay River at Eglin 259	Fish Survey	no record	5
0204S009	RJL00-11	30.4308	-86.7813	NAVARRE	30-Mar-00	East Bay River	East Bay River 2000 m below Eglin 259	Fish Survey	downstream	6
temp20	RJL00-12	30.5015	-86.1458	PORTLAND	31-Mar-00	Fourmile Creek	Fourmile Creek SR 20, 1 mi W of Freeport	Fish Survey	no record	2
0503S001	RJL97-01	30.6809	-86.5755	CRESTVIEW SOUTH	23-Jun-97	Turkey Hen Creek	Turkey Hen Creek at Eglin 211	Fish Survey	no record	3
0502S001	RJL97-02	30.6817	-86.6061	CRESTVIEW SOUTH	23-Jun-97	Gopher Creek	Gopher Creek at Eglin AFB Range Rd 211	Fish Survey	no record	1
0309S005	RJL97-03	30.6713	-86.6620	HOLT	23-Jun-97	Turkey Gobbler Creek	Turkey Gobbler Creek at Eglin 211	Fish Survey	no record	3
0308S002	RJL97-04	30.6638	-86.6766	HOLT	24-Jun-97	Middle Creek	Middle Creek at Eglin 211	Fish Survey	no record	3
0303S001	RJL97-05	30.6616	-86.6884	HOLT	24-Jun-97	Yellow River trib.	Yellow River trib. at Eglin 211	Fish Survey	no record	1
0307S001	RJL97-06	30.6600	-86.6990	HOLT	24-Jun-97	Malone Creek	Malone Creek at Eglin 211	Fish Survey	no record	3
0306S001	RJL97-07	30.6560	-86.7293	HOLT	24-Jun-97	Metts Creek	Metts Creek at Eglin 211	Fish Survey	no record	2
0302S001	RJL97-08	30.6603	-86.7255	HOLT	24-Jun-97	Metts Creek	Metts Creek at 236, 0.4 mi from jnct w/211	Fish Survey	no record	2

Eglin Management Unit (EMU)	Field Number	LAT	LONG	Quad Sheet	Date	Water Body	Sample Location	Projects	Direction Sampled	Stream Order
0102S008	RJL97-09	30.6218	-86.8020	FLORIDALE	25-Jun-97	Crane Branch	Crane Branch @ Eglin 211	Fish Survey	no record	1
0102S009	RJL97-10	30.6275	-86.7908	FLORIDALE	25-Jun-97	Yellow River trib.	Yellow River trib. @ 211, W of jnct w/253	Fish Survey	no record	1
0305S002	RJL97-11	30.6320	-86.7749	FLORIDALE	25-Jun-97	Milligan Creek	Milligan Creek at Eglin 211	Fish Survey	no record	3
0305S001	RJL97-12	30.6383	-86.7729	FLORIDALE	25-Jun-97	Camp Creek	Camp Creek at Eglin 211	Fish Survey	no record	2
0301S001	RJL97-13	30.6461	-86.7575	FLORIDALE	25-Jun-97	Carroll Creek	Carroll Creek at Eglin 211	Fish Survey	no record	2
0102S002	RJL97-14	30.6075	-86.8165	HAROLD SE	26-Jun-97	Wolf Creek	Wolf Creek @ Eglin 211	Fish Survey	no record	2
0102S003	RJL97-15	30.6017	-86.8359	HAROLD SE	26-Jun-97	Yellow River trib.	Yellow River trib. @ Eglin 211	Fish Survey	no record	1
0102S004	RJL97-16	30.5880	-86.8569	HAROLD SE	26-Jun-97	Bear Creek	Bear Creek @ Eglin 211	Fish Survey	no record	2
0309S004	RJL97-18	30.6571	-86.6523	HOLT	26-Jun-97	Turkey Gobbler Creek	Turkey Gobbler Creek at Eglin 610	Fish Survey	no record	3
0505S002	RJL97-19	30.6800	-86.5225	CRESTVIEW SOUTH	07-Jul-97	Silver Creek trib.	Silver Creek tributary at Eglin 565	Fish Survey	no record	2
0504S001	RJL97-20	30.6805	-86.5553	CRESTVIEW SOUTH	07-Jul-97	Pearl Creek	Pearl Creek at Eglin Range Road 211	Fish Survey	no record	2
0310S001	RJL97-21	30.6748	-86.6507	HOLT	07-Aug-97	Carr Spring Branch	Carr Spring Branch at Eglin 211	Fish Survey	no record	2
0505S003	RJL97-22	30.6946	-86.5214	CRESTVIEW SOUTH	07-Aug-97	Silver Creek	Silver Creek at Eglin 211	Fish Survey	no record	3
0506S001	RJL97-23	30.6939	-86.4962	SPENCER FLATS	07-Aug-97	Honey Creek	Honey Creek at Eglin 211	Fish Survey	no record	3
0703S001	RJL97-26	30.6658	-86.4541	SPENCER FLATS	07-Aug-97	Blue Spring Creek	Blue Spring Creek at Eglin 454	Fish Survey	no record	2
0609S001	RJL97-28	30.6078	-86.5228	VALPARAISO	07-Sep-97	Juniper Creek	Juniper Creek bridge crossing on Eglin 221	Fish Survey	upstream	3
0612S001	RJL97-29	30.6070	-86.4824	NICEVILLE	07-Sep-97	Point Lookout Creek	Point Lookout Creek at Eglin 221	Fish Survey	no record	3
0609S004	RJL97-31	30.6229	-86.5212	VALPARAISO	07-Sep-97	Juniper Creek	Juniper Creek at Eglin Road 434	Fish Survey	no record	1
0612S003	RJL97-33	30.5701	-86.5159	VALPARAISO	07-Sep-97	Tenmile Creek	Tenmile Creek at Eglin Road 231	Fish Survey	no record	4
0701S006	RJL97-34	30.7016	-86.4922	SPENCER FLATS	07-Oct-97	Titi Creek	Titi Creek at Eglin 207	Fish Survey	no record	5
0701S007	RJL97-35	30.6999	-86.4685	SPENCER FLATS	07-Oct-97	Titi Creek	Titi Creek at Eglin AFB Range Rd 220	Fish Survey	no record	4
0506S003	RJL97-38	30.6485	-86.4849	SPENCER FLATS	28-Jul-97	Honey Creek	Honey Creek at Eglin AFB Range Rd 454	Fish Survey	no record	2

Eglin Management Unit (EMU)	Field Number	LAT	LONG	Quad Sheet	Date	Water Body	Sample Location	Projects	Direction Sampled	Stream Order
0506S006	RJL97-39	30.6988	-86.5004	SPENCER FLATS	29-Jul-97	Honey Creek	Honey Creek at Eglin 207, N of Eglin	Fish Survey	no record	3
0704S001	RJL97-42	30.7064	-86.4408	SPENCER FLATS	29-Jul-97	Big Fork	Big Fork at Eglin 207	Fish Survey	no record	3
0707S001	RJL97-44	30.7065	-86.3934	SPENCER FLATS	29-Jul-97	Gum Creek	Gum Creek at Eglin Range Road 207	Fish Survey	no record	3
0701S008	RJL97-47	30.7022	-86.3750	MOSSY HEAD	29-Jul-97	Wildcat Branch	Wildcat Branch at Eglin 211	Fish Survey	no record	1
0706S001	RJL97-48	30.6749	-86.4123	SPENCER FLATS	30-Jul-97	Ramer Creek	Ramer Creek at Eglin AFB Range Rd 211	Fish Survey	no record	2
0705S002	RJL97-49	30.6741	-86.4300	SPENCER FLATS	30-Jul-97	Bull Creek	Bull Creek at Eglin Range Rd 211	Fish Survey	no record	2
0710S001	RJL97-51	30.7086	-86.3446	MOSSY HEAD	30-Jul-97	Hog Creek	Hog Creek at Eglin Road 207	Fish Survey	no record	3
0709S001	RJL97-52	30.7086	-86.3463	MOSSY HEAD	30-Jul-97	Red Deer Creek	Red Deer Creek at Eglin Road 207	Fish Survey	no record	2
0307S002	RJL97-54	30.6097	-86.6976	HOLT SW	31-Jul-97	Malone Creek	Malone Creek at Eglin 688	Fish Survey	no record	2
0307S003	RJL97-55	30.6377	-86.7014	HOLT	31-Jul-97	Malone Creek	Malone Creek at Eglin 236	Fish Survey	no record	2
0308S003	RJL97-56	30.6244	-86.6578	HOLT SW	31-Jul-97	Middle Creek	Middle Creek at Eglin 600E	Fish Survey	no record	2
0309S003	RJL97-58	30.6372	-86.6369	HOLT	31-Jul-97	Turkey Gobbler Creek	Turkey Gobbler Creek at Eglin 215	Fish Survey	no record	2
0309S006	RJL97-59	30.6206	-86.6108	VALPARAISO	31-Jul-97	Turkey Gobbler Creek	Turkey Gobbler Creek at Eglin 237 (blown out)	Fish Survey	no record	1
0503S004	RJL97-61	30.6594	-86.5872	CRESTVIEW SOUTH	08-Nov-97	Turkey Hen Creek trib.	Turkey Hen Creek west tributary at Eglin 605	Fish Survey	no record	1
0503S005	RJL97-62	30.6575	-86.5688	CRESTVIEW SOUTH	08-Nov-97	Turkey Hen Creek	Turkey Hen Creek at end of Eglin RR 601	Fish Survey	no record	1
0906S001	RJL97-63	30.7087	-86.2504	MOSSY HEAD	08-Dec-97	Bullhide Creek	Bullhide Creek at Eglin 213	Fish Survey	upstream	3
0901S002	RJL97-64	30.7083	-86.2526	MOSSY HEAD	08-Dec-97	Alaqua Creek	Alaqua Creek at Eglin 213	Fish Survey	no record	3
0907S001	RJL97-65	30.7168	-86.2659	MOSSY HEAD	08-Dec-97	Buck Branch	Buck Branch at Eglin 382	Fish Survey	upstream	2
0908S001	RJL97-66	30.7194	-86.2812	MOSSY HEAD	08-Dec-97	Live Oak Branch	Live Oak Branch bridge blowout @ Eglin 382	Fish Survey	upstream	3
temp13	RJL97-68	30.7065	-86.1790	DEFUNIAK SPRINGS W	13-Aug-97	Fishpond Branch	Fishpond Branch E SR 280, 0.9 mi W of I-10	Fish Survey	no record	1
temp12	RJL97-69	30.7066	-86.1927	DEFUNIAK SPRINGS W	13-Aug-97	Cosson Mill Creek trib.	Cosson Mill Crk trib E ofSR 280,1.8 mi W I-10	Fish Survey	no record	1
temp11	RJL97-70	30.7070	-86.2107	DEFUNIAK SPRINGS W	13-Aug-97	Bear Creek	Bear Creek E of SR 280, 2.9 mi W of I-10	Fish Survey	no record	3
temp14	RJL97-71	30.6912	-86.2079	DEFUNIAK SPRINGS W	13-Aug-97	Bear Creek	Bear Creek at Corbin Gainey Rd, near SR 280	Fish Survey	no record	3

Eglin Management Unit (EMU)	Field Number	LAT	LONG	Quad Sheet	Date	Water Body	Sample Location	Projects	Direction Sampled	Stream Order
0901S001	RJL97-73	30.6925	-86.2417	DEFUNIAK SPRINGS W	13-Aug-97	Alaqua Creek	Alaqua Creek at Eglin 210	Fish Survey	no record	4
0905S001	RJL97-74	30.6865	-86.2717	MOSSY HEAD	13-Aug-97	Bear Bay Branch	Bear Bay Branch at Eglin Range Road 381	Fish Survey	no record	3
temp15	RJL97-76	30.6797	-86.1632	DEFUNIAK SPRINGS W	14-Aug-97	Sconiers Mill Creek	Sconiers Mill Creek at Senterfitt Rd	Fish Survey	no record	3
temp16	RJL97-79	30.6604	-86.1569	DEFUNIAK SPRINGS W	14-Aug-97	Sconiers Mill Creek trib.	Sconiers Mill Creek trib@Coy Burgess Loop Rd.	Fish Survey	no record	2
temp6	RJL98-09	30.6997	-86.5433	CRESTVIEW SOUTH	24-Mar-98	Shoal River	Shoal River 3.5 river mi upstream from SR 85 bridge	Fish Survey	no record	5
temp5	RJL98-10	30.6978	-86.5563	CRESTVIEW SOUTH	24-Mar-98	Shoal River	Shoal River 200 yards upstream of powerlines at an oxbow	Fish Survey	upstream	5
temp1	RJL98-11	30.5459	-86.9974	WARD BASIN	25-Mar-98	Yellow River	mouth of Yellow River south fork (Skim Lake)	Fish Survey	no record	7
temp2	RJL98-12	30.5543	-86.9929	WARD BASIN	25-Mar-98	Yellow River	Yellow river mouth Blackwater Bay (middle fork)	Fish Survey	no record	7
0101S003	RJL98-14	30.5828	-86.9127	WARD BASIN	26-Mar-98	Yellow River	Yellow River 1.5 river mi above SR 87 Bridge	Fish Survey	upstream	7
0102S006	RJL98-15	30.6098	-86.8380	HAROLD SE	26-Mar-98	Yellow River	Yellow River upstream of Broxon Branch	Fish Survey	upstream	7
0104S002	RJL98-16	30.5650	-86.8691	HAROLD SE	22-Jun-98	Boiling Creek	Boiling Creek @ Eglin 211	Fish Survey	no record	4
0102S011	RJL98-17	30.5835	-86.8961	WARD BASIN	23-Jun-98	Yellow River	Yellow River 2 air mi above SR 87 bridge	Fish Survey	upstream	7
0101S002	RJL98-18	30.5306	-86.9481	WARD BASIN	23-Jun-98	Hicks Creek Steephead	Hicks Creek west branch steephead	Fish Survey	no record	1
0101S002	RJL98-18	30.5710	-86.9283	WARD BASIN	23-Jun-98	Yellow River	Yellow River 1.0 air mi below SR 87 Bridge	Fish Survey	downstream	7
DEP002	RJL98-19	30.6735	-86.7077	HOLT	24-Jun-98	Yellow River	Yellow River at first midpoint of DEP deadhead permit range	Fish Survey	no record	7
0102S010	RJL98-20	30.6448	-86.7811	FLORIDALE	24-Jun-98	Yellow River	Yellow River @ confluence of Milligan Creek	Fish Survey	no record	7
temp7	RJL98-21	30.7021	-86.5343	CRESTVIEW SOUTH	25-Jun-98	Shoal River	Shoal River at confluence with Titi Creek	Fish Survey	no record	6
0501S001	RJL98-22	30.6936	-86.6266	HOLT	25-Jun-98	Shoal River	Shoal River 1.4 air mi above Yellow Rvr conflu.	Fish Survey	no record	6
0405S003	RJL98-23	30.5051	-86.6072	VALPARAISO	07-Jul-98	Lightwood Knot Creek	Lightwood Knot Creek at Eglin 632	Fish Survey	no record	2

Eglin Management Unit (EMU)	Field Number	LAT	LONG	Quad Sheet	Date	Water Body	Sample Location	Projects	Direction Sampled	Stream Order
0405S004	RJL98-24	30.4969	-86.6119	FT WALTON BEACH	07-Aug-98	West Branch	West Branch at Eglin 635 (nearly unpassable)	Fish Survey	no record	2
0406S002	RJL98-25	30.5008	-86.5793	VALPARAISO	07-Aug-98	Garnier Creek	Garnier Creek western trib at powerline road	Fish Survey	no record	1
0406S003	RJL98-26	30.5012	-86.5735	FT WALTON BEACH	07-Aug-98	Garnier Creek	Garnier Creek at new powerline rd E. of 636	Fish Survey	no record	2
0406S001	RJL98-27	30.4804	-86.5854	FT WALTON BEACH	07-Sep-98	Garnier Creek	Garnier Creek at SR 189 (Wright Rd)	Fish Survey	no record	2
0405S005	RJL98-28	30.4779	-86.5961	FT WALTON BEACH	07-Sep-98	Lightwood Knot Creek	Lightwood Knot Creek at SR 189 (Wright Rd)	Fish Survey	no record	3
1105S001	RJL98-29	30.6074	-86.1394	PORTLAND	07-Oct-98	White Branch	White Branch at Eglin 200	Fish Survey	no record	2
1104S006	RJL98-30	30.6386	-86.2585	MOSSY HEAD	21-Jul-98	Little Alaqua Creek	Little Alaqua at Eglin 381	Fish Survey	no record	2
1104S007	RJL98-31	30.6146	-86.2547	PORTLAND	21-Jul-98	Long Branch	Long Branch at Eglin 381, N of jnct w/200/201	Fish Survey	no record	2
1104S002	RJL98-32	30.6047	-86.2402	PORTLAND	21-Jul-98	Little Alaqua Creek	Little Alaqua at Eglin 200/201	Fish Survey	no record	3
1108S002	RJL98-33	30.5986	-86.2113	PORTLAND	22-Jul-98	Blount Mill Creek	Blount Mill Creek at Eglin 208	Fish Survey	no record	3
1104S004	RJL98-34	30.5928	-86.2142	PORTLAND	22-Jul-98	Little Alaqua Creek	Little Alaqua at Eglin 208	Fish Survey	no record	4
0903S001	RJL98-35	30.6615	-86.1969	DEFUNIAK SPRINGS W	22-Jul-98	Oakie Creek	Oakie Creek at Eglin 208	Fish Survey	no record	3
1103S002	RJL98-36	30.6160	-86.1640	PORTLAND	23-Jul-98	Blount Creek	Blount Creek at Eglin 201	Fish Survey	no record	3
1106S002	RJL98-37	30.6146	-86.1780	PORTLAND	23-Jul-98	Davis Branch	Davis Branch at Eglin 201	Fish Survey	no record	2
1103S001	RJL98-38	30.5952	-86.1642	PORTLAND	23-Jul-98	Alaqua Creek	Alaqua Creek at Eglin 200	Fish Survey	no record	5
1103S001	RJL98-39	30.5952	-86.1642	PORTLAND	23-Jul-98	Alaqua Creek	Alaqua Creek at Eglin 200	Fish Survey	no record	5
1103S004	RJL98-40	30.5495	-86.1761	PORTLAND	20-Oct-98	Alaqua Creek	Alaqua Crk 300 m above conflu w/ L. Alaqua	Fish Survey	no record	6
1104S008	RJL98-41	30.5477	-86.1755	PORTLAND	20-Oct-98	Little Alaqua Creek	Little Alaqua Crk 100 m above conflu.w/Alaqua	Fish Survey	no record	5
1101S003	RJL98-42	30.5343	-86.1749	PORTLAND	21-Oct-98	Alaqua Creek	Alaqua Creek 2 river mi above SR 20 bridge	Fish Survey	no record	6
1101S002	RJL98-43	30.5272	-86.1749	PORTLAND	21-Oct-98	Alaqua Creek	Alaqua Creek 1.5 river mi above SR 20 bridge	Fish Survey	no record	6
temp19	RJL98-44	30.5116	-86.1864	PORTLAND	22-Oct-98	Alaqua Creek	Alaqua Creek at boat ramp at SR 20	Fish Survey	no record	6
temp18	RJL98-45	30.5004	-86.1962	PORTLAND	22-Oct-98	Goodwin Creek	Goodwin Creek 0.5 river mi above conflu w/Alaqua Creek	Fish Survey	upstream	1
temp17	RJL98-46	30.4989	-86.1987	FREEPORT	22-Oct-98	Goodwin Creek	Goodwin Creek at confluence with Alaqua Crk	Fish Survey	no record	1

Eglin Management Unit (EMU)	Field Number	LAT	LONG	Quad Sheet	Date	Water Body	Sample Location	Projects	Direction Sampled	Stream Order
temp4	RJL99-01	30.6966	-86.5711	CRESTVIEW SOUTH	03-Jan-99	Shoal River	Shoal River 400 m above SR 85 bridge	Fish Survey	upstream	6
0104S005	RJL99-02	30.5507	-86.8479	HAROLD SE	03-Feb-99	Boiling Creek	Boiling Creek 4 air miles above Eglin 211	Fish Survey	no record	4
temp9	RJL99-03	30.7265	-86.5216	CRESTVIEW SOUTH	03-Mar-99	Shoal River	Shoal River at I-10 bridge	Fish Survey	no record	5
temp7	RJL99-04	30.7021	-86.5343	CRESTVIEW SOUTH	03-Mar-99	Shoal River	Shoal River at confluence with Titi Creek	Fish Survey	no record	6
0204S008	RJL99-05	30.4309	-86.7815	NAVARRE	03-Apr-99	East Bay River	East Bay River 4.5 air mi above SR 87 bridge	Fish Survey	upstream	6
temp3	RJL99-06	30.4383	-86.8736	NAVARRE	03-Apr-99	East Bay River	East Bay River 0.75 mi below SR 87 bridge	Fish Survey	downstream	6
0305S004	RJL99-07	30.6099	-86.7688	HAROLD SE	03-May-99	Milligan Creek	Milligan Creek at Eglin 688	Fish Survey	no record	2
0204S010	RJL99-08	30.4461	-86.6582	MARY ESTHER	23-Mar-99	East Bay River trib.	East Bay River trib. at Eglin 655	Fish Survey	no record	1
0204S007	RJL99-09	30.4779	-86.6644	NAVARRE	23-Mar-99	Alligator Creek	Alligator Creek @road N Jnct Eglin 655 & 638	Fish Survey	no record	2
0204S001	RJL99-10	30.4890	-86.6505	MARY ESTHER	23-Mar-99	Turtle Creek	Turtle Creek at Eglin 653	Fish Survey	no record	1
0210S004	RJL99-11	30.5341	-86.7202	HOLT SW	24-Mar-99	Live Oak Creek	Live Oak Creek at Eglin 235	Fish Survey	no record	2
0210S001	RJL99-12	30.5110	-86.7146	HOLT SW	24-Mar-99	Live Oak Creek	Live Oak Creek at Eglin 234	Fish Survey	no record	2
0211S001	RJL99-13	30.5090	-86.6703	HOLT SW	24-Mar-99	Turtle Creek	Turtle Creek at Eglin 234	Fish Survey	no record	3
0210S006	RJL99-14	30.4641	-86.7363	MARY ESTHER	24-Mar-99	Horse Branch	Horse Branch at Eglin Range Rd 253	Fish Survey	no record	1
0204S006	RJL99-15	30.5378	-86.6654	HOLT SW	25-Mar-99	Turtle Creek	Turtle Creek @ road near B165 (B-82)	Fish Survey	downstream	2
0210S002	RJL99-17	30.4354	-86.7343	MARY ESTHER	25-Mar-99	Live Oak Creek	Live Oak Creek at Eglin 253	Fish Survey	no record	3
0209S001	RJL99-18	30.4526	-86.7668	NAVARRE	26-Mar-99	Prairie Creek	Prairie Creek at Eglin 678	Fish Survey	no record	3
0306S002	RJL99-19	30.6111	-86.7284	HOLT SW	29-Mar-99	Metts Creek	Metts Creek at Eglin 688	Fish Survey	no record	1
0104S004	RJL99-21	30.5449	-86.8150	HAROLD SE	29-Mar-99	Holley Creek	Holley Creek at Eglin 735	Fish Survey	no record	2
0209S002	RJL99-22	30.4835	-86.7734	NAVARRE	30-Mar-99	Prairie Creek	Prairie Creek at powerline E. of 259, S. of 234	Fish Survey	no record	1
0207S002	RJL99-23	30.4642	-86.8168	NAVARRE	30-Mar-99	Panther Creek	Panther Creek at Eglin 678	Fish Survey	no record	2
0208S001	RJL99-24	30.4545	-86.7995	NAVARRE	30-Mar-99	Panther Creek trib.	Panther Creek trib. At Eglin 678	Fish Survey	no record	1
1102S004	RJL99-25	30.5485	-86.1346	PORTLAND	28-Jun-99	Fourmile Creek	Fourmile Creek at end of Eglin Rd 342	Fish Survey	no record	2

Eglin Management Unit (EMU)	Field Number	LAT	LONG	Quad Sheet	Date	Water Body	Sample Location	Projects	Direction Sampled	Stream Order
1007S005	RJL99-26	30.5620	-86.3185	NICEVILLE SE	29-Jun-99	Coon Head Branch	Coon Head Branch at Eglin Range Rd 388	Fish Survey	no record	2
1007S004	RJL99-27	30.5599	-86.3263	NICEVILLE SE	29-Jun-99	Bay Head Branch	Bay Head Branch at Eglin Range Rd 388	Fish Survey	no record	2
1007S007	RJL99-28	30.5156	-86.2463	PORTLAND	29-Jun-99	Basin Creek trib.	Basin Creek tributary at Eglin Range Rd 218	Fish Survey	no record	1
1008S001	RJL99-29	30.5336	-86.2380	PORTLAND	29-Jun-99	Little Basin Creek	Little Basin Creek at Eglin 359	Fish Survey	no record	3
1010S002	RJL99-30	30.5351	-86.2656	NICEVILLE SE	30-Jun-99	Watering Creek	Watering Creek at Eglin 356	Fish Survey	no record	3
1009S001	RJL99-31	30.5831	-86.2749	NICEVILLE SE	30-Jun-99	Bear Branch trib.	Bear Branch tributary at Eglin 361	Fish Survey	no record	2
1010S001	RJL99-32	30.5535	-86.2768	NICEVILLE SE	30-Jun-99	Watering Creek	Watering Creek at Eglin 212	Fish Survey	no record	3
1011S001	RJL99-33	30.5459	-86.2917	NICEVILLE SE	30-Jun-99	Middle Creek	Middle Creek at Eglin 427	Fish Survey	no record	2
1009S003	RJL99-34	30.5515	-86.2387	PORTLAND	07-Jan-99	Bear Branch	Bear Branch 400 m S. of the end of Eglin 369	Fish Survey	no record	4
1009S002	RJL99-35	30.5350	-86.2450	PORTLAND	07-Jan-99	Bear Branch	Bear Branch at Eglin 359	Fish Survey	no record	4
1007S006	RJL99-36	30.5254	-86.2923	NICEVILLE SE	07-Jan-99	Basin Creek	Basin Creek at Eglin Range Rd 427/222	Fish Survey	no record	3
1102S005	RJL99-37	30.5426	-86.1349	PORTLAND	07-Feb-99	Fourmile Creek	Fourmile Creek at end of Eglin 312, SW fork	Fish Survey	no record	1
0609S001	TAT00-001	30.6078	-86.5228	VALPARAISO	09-Mar-00	Juniper Creek	Juniper Creek bridge crossing on Eglin 221	Biomonitoring	upstream	3
0104S001	TAT00-002	30.5686	-86.8675	HAROLD SE	21-Mar-00	Boiling Creek trib.	Boiling Creek trib. @ Eglin 211	Biomonitoring	upstream	1
1010S001	TAT00-003	30.5535	-86.2768	NICEVILLE SE	27-Mar-00	Watering Creek	Watering Creek at Eglin 212	Biomonitoring	upstream	3
1204S001	TAT00-004	30.5034	-86.3444	NICEVILLE SE	28-Mar-00	Piney Creek	Piney Creek at Eglin Road 354	Biomonitoring	upstream	1
1204S002	TAT00-005	30.5035	-86.3297	NICEVILLE SE	28-Mar-00	Mullet Creek	Mullet Creek at Eglin Road 354	Survey	downstream	2
1001S001	TAT00-006	30.4821	-86.2884	CHOCTAW BEACH	28-Mar-00	Trout Creek	Trout Creek at Florida S.R. 20	Survey	downstream	3
0607S005	TAT00-007	30.5618	-86.5363	VALPARAISO	13-Apr-00	Turkey Creek	Turkey Creek at Eglin 232	Survey	downstream	4
0703S001	TAT00-008	30.6658	-86.4541	SPENCER FLATS	18-Apr-00	Blue Spring Creek	Blue Spring Creek at Eglin 454	Biomonitoring	upstream	2
0102S001	TAT00-008a	30.5983	-86.8039	HAROLD SE	02-May-00	Dry Hollow	Dry Hollow @ Eglin 604W	Survey	at bridge	1
0701S005	TAT00-008b	30.7334	-86.3127	MOSSY HEAD	02-May-00	Titi Creek	Titi Creek at Eglin 382	Survey	at bridge	1
1108S001	TAT00-009	30.6075	-86.2146	PORTLAND	09-May-00	Blount Mill Creek	Blount Mill Creek at Eglin 200/201	Biomonitoring	upstream	2
1103S001	TAT00-010	30.5952	-86.1642	PORTLAND	10-May-00	Alaqua Creek	Alaqua Creek at Eglin 200	Biomonitoring	upstream	5
1008S001	TAT00-011	30.5336	-86.2380	PORTLAND	15-May-00	Little Basin Creek	Little Basin Creek at Eglin 359	Biomonitoring	upstream	3

Eglin Management Unit (EMU)	Field Number	LAT	LONG	Quad Sheet	Date	Water Body	Sample Location	Projects	Direction Sampled	Stream Order
0310S001	TAT00-012	30.6748	-86.6507	HOLT	16-May-00	Carr Spring Branch	Carr Spring Branch at Eglin 211	Biomonitoring	upstream	2
0308S002	TAT00-013	30.6638	-86.6766	HOLT	16-May-00	Middle Creek	Middle Creek at Eglin 211	Biomonitoring	upstream	3
0307S001	TAT00-014	30.6600	-86.6990	HOLT	17-May-00	Malone Creek	Malone Creek at Eglin 211	Biomonitoring	upstream	3
0602S002	TAT00-015	30.5093	-86.5302	VALPARAISO	20-May-00	Toms Creek	Toms Creek at powerline road W. 85 near 631	Biomonitoring	upstream	2
0307S002	TAT00-016	30.6097	-86.6976	HOLT SW	23-May-00	Malone Creek	Malone Creek at Eglin 688	Biomonitoring	upstream	2
1007S002	TAT00-017	30.5306	-86.2629	NICEVILLE SE	26-May-00	Basin Creek	Basin Creek at Eglin 433	Biomonitoring	upstream	4
0604S004	TAT00-018	30.5344	-86.4861	NICEVILLE	02-Jun-00	Mill Creek	Mill Creek at non-culvert section dstm SR. 190	Biomonitoring	upstream	2
0604S004	TAT00-018a	30.5344	-86.4861	NICEVILLE	02-Jun-00	Mill Creek	Mill Creek at non-culvert section dstm SR. 190	Hester-Dendy	upstream	2
0605S002	TAT00-019	30.5606	-86.4589	NICEVILLE	03-Jun-00	Swift Creek	Swift Creek S. of old railroad crossing culvert	Biomonitoring	upstream	3
0616S001	TAT00-020	30.6074	-86.4948	NICEVILLE	05-Jun-00	Pinelog Creek	Pinelog Creek at Eglin 221	Biomonitoring	upstream	2
0616S001	TAT00-020a	30.6074	-86.4948	NICEVILLE	05-Jun-00	Pinelog Creek	Pinelog Creek at Eglin 221	Hester-Dendy	upstream	2
0612S005	TAT00-021	30.6215	-86.4808	NICEVILLE	06-Jun-00	Point Lookout Creek	Point Lookout Creek at Eglin 434	Biomonitoring	upstream	2
0607S005	TAT00-022	30.5618	-86.5363	VALPARAISO	06-Jun-00	Turkey Creek	Turkey Creek at Eglin 232	Biomonitoring	upstream	4
0901S001	TAT00-023	30.6925	-86.2417	DEFUNIAK SPRINGS W	07-Jun-00	Alaqua Creek	Alaqua Creek at Eglin 210	Biomonitoring	upstream	4
0901S001	TAT00-023a	30.6925	-86.2417	DEFUNIAK SPRINGS W	07-Jun-00	Alaqua Creek	Alaqua Creek at Eglin 210	Hester-Dendy	upstream	4
0104S001	TAT00-024	30.5686	-86.8675	HAROLD SE	08-Jun-00	Boiling Creek trib.	Boiling Creek trib. @ Eglin 211	Hester-Dendy	upstream	1
0104S002	TAT00-025	30.5650	-86.8691	HAROLD SE	08-Jun-00	Boiling Creek	Boiling Creek @ Eglin 211	Biomonitoring	upstream	4
0104S002	TAT00-025a	30.5650	-86.8691	HAROLD SE	08-Jun-00	Boiling Creek	Boiling Creek @ Eglin 211	Hester-Dendy	upstream	4
0309S005	TAT00-026	30.6713	-86.6620	HOLT	09-Jun-00	Turkey Gobbler Creek	Turkey Gobbler Creek at Eglin 211	Biomonitoring	upstream	3
0309S005	TAT00-026a	30.6713	-86.6620	HOLT	09-Jun-00	Turkey Gobbler Creek	Turkey Gobbler Creek at Eglin 211	Hester-Dendy	upstream	3
0309S003	TAT00-027	30.6372	-86.6369	HOLT	09-Jun-00	Turkey Gobbler Creek	Turkey Gobbler Creek at Eglin 215	Biomonitoring	upstream	2
0309S003	TAT00-027a	30.6372	-86.6369	HOLT	09-Jun-00	Turkey Gobbler Creek	Turkey Gobbler Creek at Eglin 215	Hester-Dendy	upstream	2
0811S001	TAT00-028	30.6062	-86.3977	NICEVILLE	12-Jun-00	Rocky Creek trib.	Rocky Creek tributary at Eglin 420	Biomonitoring	upstream	3

Eglin Management Unit (EMU)	Field Number	LAT	LONG	Quad Sheet	Date	Water Body	Sample Location	Projects	Direction Sampled	Stream Order
0811S001	TAT00-028a	30.6062	-86.3977	NICEVILLE	12-Jun-00	Rocky Creek trib.	Rocky Creek tributary at Eglin 420	Hester-Dendy	upstream	3
0709S001	TAT00-029	30.7086	-86.3463	MOSSY HEAD	13-Jun-00	Red Deer Creek	Red Deer Creek at Eglin Road 207	Biomonitoring	upstream	2
0709S001	TAT00-029a	30.7086	-86.3463	MOSSY HEAD	13-Jun-00	Red Deer Creek	Red Deer Creek at Eglin Road 207	Hester-Dendy	upstream	2
0701S003	TAT00-030	30.7082	-86.3681	MOSSY HEAD	13-Jun-00	Wise Creek	Wise Creek at Eglin 207	Biomonitoring	upstream	2
0503S003	TAT00-031	30.6576	-86.5856	CRESTVIEW SOUTH	14-Jun-00	Turkey Hen Creek trib.	Turkey Hen Creek east trib. at Eglin 605 & 611	Biomonitoring	upstream	1
0503S001	TAT00-032	30.6809	-86.5755	CRESTVIEW SOUTH	14-Jun-00	Turkey Hen Creek	Turkey Hen Creek at Eglin 211	Biomonitoring	upstream	3
0309S005	TAT00-033	30.6713	-86.6620	HOLT	15-Jun-00	Turkey Gobbler Creek	Turkey Gobbler Creek at Eglin 211	Storm Sampling	downstream	3
0308S002	TAT00-034	30.6638	-86.6766	HOLT	15-Jun-00	Middle Creek	Middle Creek at Eglin 211	Storm Sampling	downstream	3
0307S001	TAT00-035	30.6600	-86.6990	HOLT	15-Jun-00	Malone Creek	Malone Creek at Eglin 211	Storm Sampling	downstream	3
0309S005	TAT00-036	30.6713	-86.6620	HOLT	15-Jun-00	Turkey Gobbler Creek	Turkey Gobbler Creek at Eglin 211	Storm Sampling	downstream	3
0308S002	TAT00-037	30.6638	-86.6766	HOLT	15-Jun-00	Middle Creek	Middle Creek at Eglin 211	Storm Sampling	downstream	3
0307S001	TAT00-038	30.6600	-86.6990	HOLT	15-Jun-00	Malone Creek	Malone Creek at Eglin 211	Storm Sampling	downstream	3
0307S001	TAT00-039	30.6600	-86.6990	HOLT	15-Jun-00	Malone Creek	Malone Creek at Eglin 211	Storm Sampling	downstream	3
0308S002	TAT00-040	30.6638	-86.6766	HOLT	15-Jun-00	Middle Creek	Middle Creek at Eglin 211	Storm Sampling	downstream	3
0309S005	TAT00-041	30.6713	-86.6620	HOLT	15-Jun-00	Turkey Gobbler Creek	Turkey Gobbler Creek at Eglin 211	Storm Sampling	downstream	3
0102S007	TAT00-042	30.5908	-86.7973	HAROLD SE	19-Jun-00	Wolf Creek	Wolf Creek @ Eglin 700	Biomonitoring	upstream	2
0306S002	TAT00-043	30.6111	-86.7284	HOLT SW	19-Jun-00	Metts Creek	Metts Creek at Eglin 688	Biomonitoring	upstream	1
0306S001	TAT00-044	30.6560	-86.7293	HOLT	20-Jun-00	Metts Creek	Metts Creek at Eglin 211	Biomonitoring	upstream	2
0305S002	TAT00-045	30.6320	-86.7749	FLORIDALE	20-Jun-00	Milligan Creek	Milligan Creek at Eglin 211	Biomonitoring	upstream	3
0506S003	TAT00-046	30.6653	-86.4848	SPENCER FLATS	21-Jun-00	Honey Creek	Honey Creek at Eglin AFB Range Rd 454	Biomonitoring	upstream	2
0506S001	TAT00-047	30.6939	-86.4962	SPENCER FLATS	21-Jun-00	Honey Creek	Honey Creek at Eglin 211	Biomonitoring	upstream	3
0809S005	TAT00-048	30.6209	-86.4306	NICEVILLE	26-Jun-00	Little Rocky Creek	Little Rocky Creek at Eglin 434	Biomonitoring	upstream	2
0809S005	TAT00-048a	30.6209	-86.4306	NICEVILLE	26-Jun-00	Little Rocky Creek	Little Rocky Creek at Eglin 434	Hester-Dendy	upstream	2
0809S001	TAT00-049	30.5901	-86.4128	NICEVILLE	26-Jun-00	Little Rocky Creek	Little Rocky Creek at Eglin 515	Biomonitoring	upstream	3
0809S001	TAT00-049b	30.5901	-86.4128	NICEVILLE	26-Jun-00	Little Rocky Creek	Little Rocky Creek at Eglin 515	Storm Sampling	downstream	3
0809S001	TAT00-	30.5901	-86.4128	NICEVILLE	26-Jun-00	Little Rocky Creek	Little Rocky Creek at Eglin 515	Storm Sampling	downstream	3

Eglin Management Unit (EMU)	Field Number	LAT	LONG	Quad Sheet	Date	Water Body	Sample Location	Projects	Direction Sampled	Stream Order
	049c									
0809S001	TAT00-049d	30.5901	-86.4128	NICEVILLE	26-Jun-00	Little Rocky Creek	Little Rocky Creek at Eglin 515	Storm Sampling	downstream	3
0809S001	TAT00-050	30.5901	-86.4128	NICEVILLE	26-Jun-00	Little Rocky Creek	Little Rocky Creek at Eglin 515	Storm Sampling	downstream	3
0809S001	TAT00-051	30.5901	-86.4128	NICEVILLE	26-Jun-00	Little Rocky Creek	Little Rocky Creek at Eglin 515	Storm Sampling	downstream	3
0809S001	TAT00-052	30.5901	-86.4128	NICEVILLE	26-Jun-00	Little Rocky Creek	Little Rocky Creek at Eglin 515	Storm Sampling	downstream	3
0809S003	TAT00-053	30.5769	-86.3883	NICEVILLE	27-Jun-00	Little Rocky Creek	Little Rocky Creek at Eglin 200	Biomonitoring	upstream	4
0809S003	TAT00-053a	30.5769	-86.3883	NICEVILLE	27-Jun-00	Little Rocky Creek	Little Rocky Creek at Eglin 200	Hester-Dendy	upstream	4
0804S002	TAT00-054	30.5352	-86.3825	NICEVILLE	29-Jun-00	Rocky Creek	Rocky Creek at Eglin 219	Biomonitoring	upstream	5
0804S002	TAT00-054a	30.5352	-86.3825	NICEVILLE	29-Jun-00	Rocky Creek	Rocky Creek at Eglin 219	Hester-Dendy	upstream	5
0703S002	TAT00-055	30.6866	-86.4501	SPENCER FLATS	05-Jul-00	Blue Spring Creek	Blue Spring Creek at Eglin 211	Biomonitoring	upstream	2
0703S002	TAT00-055a	30.6866	-86.4501	SPENCER FLATS	05-Jul-00	Blue Spring Creek	Blue Spring Creek at Eglin 211	Hester-Dendy	upstream	2
0102S005	TAT00-056	30.6050	-86.8225	HAROLD SE	06-Jul-00	Yellow River trib.	Yellow River trib. @ Eglin 211	Biomonitoring	upstream	1
0102S005	TAT00-056a	30.6050	-86.8225	HAROLD SE	06-Jul-00	Yellow River trib.	Yellow River trib. @ Eglin 211	Hester-Dendy	upstream	1
0102S006	TAT00-057	30.6098	-86.8380	HAROLD SE	06-Jul-00	Yellow River	Yellow River upstream of Broxon Branch	Biomonitoring	upstream	7
0701S006	TAT00-058	30.7016	-86.4922	SPENCER FLATS	07-Jul-00	Titi Creek	Titi Creek at Eglin 207	Biomonitoring	upstream	5
0701S006	TAT00-058a	30.7016	-86.4922	SPENCER FLATS	07-Jul-00	Titi Creek	Titi Creek at Eglin 207	Hester-Dendy	upstream	5
0607S006	TAT00-059	30.5428	-86.5206	VALPARAISO	10-Jul-00	Turkey Creek	Turkey Creek at Eglin 626	Biomonitoring	upstream	5
0607S006	TAT00-059a	30.5428	-86.5206	VALPARAISO	10-Jul-00	Turkey Creek	Turkey Creek at Eglin 626	Hester-Dendy	upstream	5
0607S003	TAT00-060	30.5814	-86.5749	VALPARAISO	10-Jul-00	Turkey Creek	Turkey Creek at Eglin 233	Biomonitoring	upstream	3
0607S003	TAT00-060a	30.5814	-86.5749	VALPARAISO	10-Jul-00	Turkey Creek	Turkey Creek at Eglin 233	Hester-Dendy	upstream	3
1103S003	TAT00-061	30.5561	-86.1792	PORTLAND	11-Jul-00	Alaqua Creek	Alaqua Creek at Eglin 205	Hester-Dendy	upstream	6
1104S003	TAT00-062	30.5550	-86.1847	PORTLAND	12-Jul-00	Little Alaqua Creek	Little Alaqua at Eglin 205	Biomonitoring	upstream	5
0908S001	TAT00-063	30.7194	-86.2812	MOSSY HEAD	14-Jul-00	Live Oak Branch	Live Oak Branch bridge blowout @ Eglin 382	Biomonitoring	upstream	3
0908S001	TAT00-063a	30.7194	-86.2812	MOSSY HEAD	14-Jul-00	Live Oak Branch	Live Oak Branch bridge blowout @ Eglin 382	Hester-Dendy	upstream	3
0607S001	TAT00-064	30.5939	-86.5765	VALPARAISO	17-Jul-00	Bens Creek	Bens Creek at old intersection w/ Eglin 604E	Biomonitoring	upstream	2

Eglin Management Unit (EMU)	Field Number	LAT	LONG	Quad Sheet	Date	Water Body	Sample Location	Projects	Direction Sampled	Stream Order
0610S002	TAT00-065	30.5561	-86.5773	VALPARAISO	17-Jul-00	Rogue Creek	Rogue Creek at Eglin 625	Biomonitoring	upstream	2
0505S002	TAT00-066	30.6800	-86.5225	CRESTVIEW SOUTH	25-Jul-00	Silver Creek trib.	Silver Creek tributary at Eglin 565	Biomonitoring	upstream	2
0504S001	TAT00-067	30.6805	-86.5553	CRESTVIEW SOUTH	25-Jul-00	Pearl Creek	Pearl Creek at Eglin Range Road 211	Biomonitoring	upstream	2
0713S001	TAT00-068	30.7146	-86.3161	MOSSY HEAD	28-Jul-00	Cawthan Branch	Cawthan Branch at Eglin 409	Biomonitoring	upstream	2
0701S001	TAT00-069	30.7178	-86.3150	MOSSY HEAD	28-Jul-00	Cowpen Branch	Cowpen Branch at Eglin 409	Biomonitoring	upstream	3
0204S005	TAT00-070	30.5247	-86.6712	HOLT SW	01-Aug-00	Turtle Creek	Turtle Creek @ powerline road nr Eglin 181	Biomonitoring	upstream	2
0817S002	TAT00-071	30.6448	-86.3749	MOSSY HEAD	03-Aug-00	Exline Creek trib.	Exline Creek tributary at Eglin 503	Biomonitoring	upstream	1
0204S006	TAT00-072	30.5378	-86.6654	HOLT SW	08-Aug-00	Turtle Creek	Turtle Creek @ road near B165 (B-82)	Biomonitoring	upstream	2
0818S001	TAT00-073	30.6646	-86.3653	MOSSY HEAD	10-Aug-00	Mt. Sinai Branch	Mt. Sinai Branch at Eglin 412	Biomonitoring	upstream	1
0210S001	TAT00-074	30.5110	-86.7146	HOLT SW	15-Aug-00	Live Oak Creek	Live Oak Creek at Eglin 234	Biomonitoring	upstream	2
0210S004	TAT00-075	30.5341	-86.7202	HOLT SW	17-Aug-00	Live Oak Creek	Live Oak Creek at Eglin 235	Biomonitoring	upstream	2
0210S005	TAT00-076	30.5316	-86.7203	HOLT SW	22-Aug-00	Live Oak Creek	Live Oak Creek @ road below 235 (gate 82C)	Biomonitoring	downstream	1
0207S002	TAT00-077	30.4642	-86.8168	NAVARRE	24-Aug-00	Panther Creek	Panther Creek at Eglin 678	Biomonitoring	upstream	2
0209S001	TAT00-078	30.4526	-86.7668	NAVARRE	29-Aug-00	Prairie Creek	Prairie Creek at Eglin 678	Biomonitoring	upstream	3
0612S001	TAT00-079	30.6070	-86.4824	NICEVILLE	30-Aug-00	Point Lookout Creek	Point Lookout Creek at Eglin 221	Biomonitoring	upstream	3
0705S001	TAT00-080	30.6647	-86.4279	SPENCER FLATS	31-Aug-00	Bull Creek	Bull Creek at Eglin Road 454	Biomonitoring	upstream	2
0612S003	TAT01-001	30.5701	-86.5159	VALPARAISO	29-Jan-01	Tenmile Creek	Tenmile Creek at Eglin Road 231	Survey	downstream	4
0804S004	TAT01-002	30.6483	-86.3334	NICEVILLE	02-Feb-01	Rocky Creek	Rocky Creek at Eglin 214/374	Site Assessment	upstream	4
0804S004	TAT01-003	30.6483	-86.3334	NICEVILLE	02-Feb-01	Rocky Creek	Rocky Creek at Eglin 214/374	Biomonitoring	downstream	4
0817S004	TAT01-004	30.6563	-86.3543	MOSSY HEAD	09-Feb-01	Exline Creek trib.	Exline Creek tributary at Eglin 492	Survey	both	1
0308S003	TAT01-005	30.6244	-86.6578	HOLT SW	15-Mar-01	Middle Creek	Middle Creek at Eglin 600E	Biomonitoring	upstream	2
0306S001	TAT01-005a	30.6560	-86.7293	HOLT	15-Mar-01	Metts Creek	Metts Creek at Eglin 211	Survey	at bridge	2
0306S003	TAT01-005b	30.6511	-86.7257	HOLT	15-Mar-01	Metts Creek	Metts Creek at Eglin 236	Survey	at bridge	2
0506S001	TAT01-006	30.6939	-86.4962	SPENCER FLATS	17-Mar-01	Honey Creek	Honey Creek at Eglin 211	Biomonitoring	upstream	3

Eglin Management Unit (EMU)	Field Number	LAT	LONG	Quad Sheet	Date	Water Body	Sample Location	Projects	Direction Sampled	Stream Order
0104S003	TAT01-007	30.5589	-86.8920	WARD BASIN	19-Mar-01	Moore Creek	Moore Creek @ Gauge Station N. of 211	Biomonitoring	upstream	2
0102S002	TAT01-007a	30.6075	-86.8165	HAROLD SE	19-Mar-01	Wolf Creek	Wolf Creek @ Eglin 211	Storm Sampling	downstream	2
0102S008	TAT01-007b	30.6218	-86.8020	FLORIDALE	19-Mar-01	Crane Branch	Crane Branch @ Eglin 211	Storm Sampling	downstream	1
0102S009	TAT01-007c	30.6275	-86.7908	FLORIDALE	19-Mar-01	Yellow River trib.	Yellow River trib. @ 211, W of jnct w/253	Storm Sampling	downstream	1
0306S001	TAT01-007d	30.6560	-86.7293	HOLT	19-Mar-01	Metts Creek	Metts Creek at Eglin 211	Storm Sampling	downstream	2
0308S002	TAT01-007e	30.6638	-86.6766	HOLT	19-Mar-01	Middle Creek	Middle Creek at Eglin 211	Storm Sampling	downstream	3
0309S005	TAT01-007f	30.6713	-86.6620	HOLT	19-Mar-01	Turkey Gobbler Creek	Turkey Gobbler Creek at Eglin 211	Storm Sampling	downstream	3
0503S001	TAT01-007g	30.6809	-86.5755	CRESTVIEW SOUTH	19-Mar-01	Turkey Hen Creek	Turkey Hen Creek at Eglin 211	Storm Sampling	downstream	3
1108S001	TAT01-008a	30.6075	-86.2146	PORTLAND	20-Mar-01	Blount Mill Creek	Blount Mill Creek at Eglin 200/201	Storm Sampling	downstream	2
1108S002	TAT01-008b	30.5986	-86.2113	PORTLAND	20-Mar-01	Blount Mill Creek	Blount Mill Creek at Eglin 208	Storm Sampling	downstream	3
1104S004	TAT01-008c	30.5928	-86.2142	PORTLAND	20-Mar-01	Little Alaqua Creek	Little Alaqua at Eglin 208	Storm Sampling	downstream	4
0609S001	TAT01-009	30.6078	-86.5228	VALPARAISO	21-Mar-01	Juniper Creek	Juniper Creek bridge crossing on Eglin 221	Biomonitoring	upstream	3
0607L002	TAT01-010	30.5511	-86.5064	VALPARAISO	22-Mar-01	Turkey Creek trib.	Turkey Creek trib. North of Eglin 626	Biomonitoring	upstream (near 2nd monitoring well)	1
0607S005	TAT01-011	30.5618	-86.5363	VALPARAISO	23-Mar-01	Turkey Creek	Turkey Creek at Eglin 232	Biomonitoring	upstream	4
0607L001	TAT01-012	30.5520	-86.5047	VALPARAISO	27-Mar-01	Turkey Creek trib.	Turkey Creek trib. North of Eglin 626	Biomonitoring	upstream of visual landfill mpact)	1
0503S001	TAT01-013a	30.6809	-86.5755	CRESTVIEW SOUTH	29-Mar-01	Turkey Hen Creek	Turkey Hen Creek at Eglin 211	Storm Sampling	downstream	3
0503S001	TAT01-013b	30.6809	-86.5755	CRESTVIEW SOUTH	29-Mar-01	Turkey Hen Creek	Turkey Hen Creek at Eglin 211	Storm Sampling	upstream	3
0310S001	TAT01-013c	30.6748	-86.6507	HOLT	29-Mar-01	Carr Spring Branch	Carr Spring Branch at Eglin 211	Storm Sampling	downstream	2
0309S005	TAT01-013d	30.6713	-86.6620	HOLT	29-Mar-01	Turkey Gobbler Creek	Turkey Gobbler Creek at Eglin 211	Storm Sampling	downstream	3

Eglin Management Unit (EMU)	Field Number	LAT	LONG	Quad Sheet	Date	Water Body	Sample Location	Projects	Direction Sampled	Stream Order
0308S002	TAT01-013e	30.6638	-86.6766	HOLT	29-Mar-01	Middle Creek	Middle Creek at Eglin 211	Storm Sampling	downstream	3
0307S001	TAT01-013f	30.6600	-86.6990	HOLT	29-Mar-01	Malone Creek	Malone Creek at Eglin 211	Storm Sampling	downstream	3
0306S001	TAT01-013g	30.6560	-86.7293	HOLT	29-Mar-01	Metts Creek	Metts Creek at Eglin 211	Storm Sampling	downstream	2
0307S001	TAT01-013h	30.6600	-86.6990	HOLT	29-Mar-01	Malone Creek	Malone Creek at Eglin 211	Storm Sampling	downstream	3
0308S002	TAT01-013i	30.6638	-86.6766	HOLT	29-Mar-01	Middle Creek	Middle Creek at Eglin 211	Storm Sampling	downstream	3
0309S005	TAT01-013j	30.6713	-86.6620	HOLT	29-Mar-01	Turkey Gobbler Creek	Turkey Gobbler Creek at Eglin 211	Storm Sampling	downstream	3
0310S001	TAT01-013k	30.6748	-86.6507	HOLT	29-Mar-01	Carr Spring Branch	Carr Spring Branch at Eglin 211	Storm Sampling	downstream	2
0503S001	TAT01-013l	30.6809	-86.5755	CRESTVIEW SOUTH	29-Mar-01	Turkey Hen Creek	Turkey Hen Creek at Eglin 211	Storm Sampling	downstream	3
0504S001	TAT01-013m	30.6805	-86.5553	CRESTVIEW SOUTH	29-Mar-01	Pearl Creek	Pearl Creek at Eglin Range Road 211	Storm Sampling	downstream	2
0507S001	TAT01-013n	30.6889	-86.5367	CRESTVIEW SOUTH	29-Mar-01	Shoal River trib.	Shoal River tributary at Eglin 211	Storm Sampling	downstream	1
0505S003	TAT01-013o	30.6946	-86.5214	CRESTVIEW SOUTH	29-Mar-01	Silver Creek	Silver Creek at Eglin 211	Storm Sampling	downstream	3
0506S001	TAT01-013p	30.6939	-86.4962	SPENCER FLATS	29-Mar-01	Honey Creek	Honey Creek at Eglin 211	Storm Sampling	downstream	3
0510P001	TAT01-013q	30.6955	-86.4710	SPENCER FLATS	29-Mar-01	Jr. Walton Pond	Jr. Walton Pond at Eglin 211 (E. of range gate)	Storm Sampling	upstream	1
0508S001	TAT01-013r	30.6909	-86.4613	SPENCER FLATS	29-Mar-01	Titi Creek trib.	unnamed tributary to Titi Creek at Eglin 211	Storm Sampling	downstream	1
0703S002	TAT01-013s	30.6866	-86.4501	SPENCER FLATS	29-Mar-01	Blue Spring Creek	Blue Spring Creek at Eglin 211	Storm Sampling	downstream	2
0703S002	TAT01-013t	30.6866	-86.4501	SPENCER FLATS	29-Mar-01	Blue Spring Creek	Blue Spring Creek at Eglin 211	Storm Sampling	downstream	2
0508S001	TAT01-013u	30.6909	-86.4613	SPENCER FLATS	29-Mar-01	Titi Creek trib.	unnamed tributary to Titi Creek at Eglin 211	Storm Sampling	downstream	1
0506S001	TAT01-013v	30.6939	-86.4962	SPENCER FLATS	29-Mar-01	Honey Creek	Honey Creek at Eglin 211	Storm Sampling	downstream	3
0507S001	TAT01-013w	30.6889	-86.5367	CRESTVIEW SOUTH	29-Mar-01	Shoal River trib.	Shoal River tributary at Eglin 211	Storm Sampling	downstream	1
0507S001	TAT01-013x	30.6889	-86.5367	CRESTVIEW SOUTH	29-Mar-01	Shoal River trib.	Shoal River tributary at Eglin 211	Storm Sampling	downstream	1

Eglin Management Unit (EMU)	Field Number	LAT	LONG	Quad Sheet	Date	Water Body	Sample Location	Projects	Direction Sampled	Stream Order
0504S001	TAT01-013y	30.6805	-86.5553	CRESTVIEW SOUTH	29-Mar-01	Pearl Creek	Pearl Creek at Eglin Range Road 211	Storm Sampling	downstream	2
0607S001	TAT01-014	30.5939	-86.5765	VALPARAISO	30-Mar-01	Bens Creek	Bens Creek at old intersection w/ Eglin 604E	Biomonitoring	upstream	2
0503S001	TAT01-015a	30.6809	-86.5755	CRESTVIEW SOUTH	04-Apr-01	Turkey Hen Creek	Turkey Hen Creek at Eglin 211	Storm Sampling	downstream	3
0310S001	TAT01-015b	30.6748	-86.6507	HOLT	04-Apr-01	Carr Spring Branch	Carr Spring Branch at Eglin 211	Storm Sampling	downstream	2
0309S005	TAT01-015c	30.6713	-86.6620	HOLT	04-Apr-01	Turkey Gobbler Creek	Turkey Gobbler Creek at Eglin 211	Storm Sampling	downstream	3
0308S002	TAT01-015d	30.6638	-86.6766	HOLT	04-Apr-01	Middle Creek	Middle Creek at Eglin 211	Storm Sampling	downstream	3
0307S001	TAT01-015e	30.6600	-86.6990	HOLT	04-Apr-01	Malone Creek	Malone Creek at Eglin 211	Storm Sampling	downstream	3
0306S001	TAT01-015f	30.6560	-86.7293	HOLT	04-Apr-01	Metts Creek	Metts Creek at Eglin 211	Storm Sampling	downstream	2
0102S009	TAT01-015g	30.6275	-86.7908	FLORIDALE	04-Apr-01	Yellow River trib.	Yellow River trib. @ 211, W of jnct w/253	Storm Sampling	downstream	1
1108S001	TAT01-017	30.6075	-86.2146	PORTLAND	09-Apr-01	Blount Mill Creek	Blount Mill Creek at Eglin 200/201	Biomonitoring	upstream	2
0809S001	TAT01-018	30.5901	-86.4128	NICEVILLE	11-Apr-01	Little Rocky Creek	Little Rocky Creek at Eglin 515	Biomonitoring	upstream	3
0809S002	TAT01-019	30.5854	-86.4038	NICEVILLE	11-Apr-01	Little Rocky Creek	Little Rocky Creek at Eglin 499	Biomonitoring	upstream	3
1010S003	TAT01-020	30.5895	-86.2959	NICEVILLE SE	12-Apr-01	Watering Creek	Watering Creek at Eglin 370	Biomonitoring	upstream	2
1007S006	TAT01-021	30.5254	-86.2923	NICEVILLE SE	12-Apr-01	Basin Creek	Basin Creek at Eglin Range Rd 427/222	Biomonitoring	upstream	3
0604S002	TAT01-022	30.5351	-86.4863	NICEVILLE	12-Apr-01	Mill Creek	Mill Creek SR 190 (College Blvd)	Survey	both	1
0506S001	TAT01-023	30.6939	-86.4962	SPENCER FLATS	13-Apr-01	Honey Creek	Honey Creek at Eglin 211	Biomonitoring	upstream	3
0803S001	TAT01-024	30.5428	-86.4133	NICEVILLE	13-Apr-01	Long Creek trib.	Long Creek tributary at Eglin 406	Biomonitoring	upstream	2
1104S004	TAT01-025	30.5928	-86.2142	PORTLAND	23-Apr-01	Little Alaqua Creek	Little Alaqua at Eglin 208	Biomonitoring	upstream	4
1007S003	TAT01-026	30.5173	-86.2359	PORTLAND	24-Apr-01	Basin Creek	Basin Creek at Eglin 218	Survey	downstream	5
0209S001	TAT01-027	30.4526	-86.7668	NAVARRE	26-Apr-01	Prairie Creek	Prairie Creek at Eglin 678	Biomonitoring	upstream	3
0207S001	TAT01-028	30.4310	-86.8067	NAVARRE	26-Apr-01	Panther Creek	Panther Creek at Eglin 255	Biomonitoring	upstream	3
1103S003	TAT01-029	30.5561	-86.1792	PORTLAND	27-Apr-01	Alaqua Creek	Alaqua Creek at Eglin 205	Survey	upstream	6
0503SH01	TAT01-030	30.6463	-86.5558	CRESTVIEW SOUTH	01-May-01	Turkey Hen Creek	steephead behind Okie Tower off Hwy 85	Biomonitoring	upstream	1
0103S001	TAT01-031	30.5518	-86.9297	WARD BASIN	15-May-01	Weaver River	Weaver River @ Eglin RR 736	Biomonitoring	upstream	3

Eglin Management Unit (EMU)	Field Number	LAT	LONG	Quad Sheet	Date	Water Body	Sample Location	Projects	Direction Sampled	Stream Order
0903S001	TAT01-032	30.6615	-86.1969	DEFUNIAK SPRINGS W	29-May-01	Oakie Creek	Oakie Creek at Eglin 208	Biomonitoring	upstream	3
0905S001	TAT01-033	30.6865	-86.2717	MOSSY HEAD	29-May-01	Bear Bay Branch	Bear Bay Branch at Eglin Range Road 381	Biomonitoring	upstream	3
0804S005	TAT01-034	30.6248	-86.3593	MOSSY HEAD	31-May-01	Dogwood Head Branch	Dogwood Head Branch at Eglin Road 485	Biomonitoring	upstream	1
0804S006	TAT01-035	30.6272	-86.3595	MOSSY HEAD	31-May-01	Green Head Branch	Green Head Branch at Eglin Road 485	Biomonitoring	upstream	1
0607S006	TAT01-036a	30.5428	-86.5206	VALPARAISO	01-Jun-01	Turkey Creek	Turkey Creek at Eglin 626	Storm Sampling	downstream	5
0607S005	TAT01-036b	30.5618	-86.5363	VALPARAISO	01-Jun-01	Turkey Creek	Turkey Creek at Eglin 232	Storm Sampling	downstream	4
0612S003	TAT01-036c	30.5701	-86.5159	VALPARAISO	01-Jun-01	Tenmile Creek	Tenmile Creek at Eglin Road 231	Storm Sampling	downstream	4
0609S001	TAT01-036d	30.6078	-86.5228	VALPARAISO	01-Jun-01	Juniper Creek	Juniper Creek bridge crossing on Eglin 221	Storm Sampling	downstream	3
0612S001	TAT01-036e	30.6070	-86.4824	NICEVILLE	01-Jun-01	Point Lookout Creek	Point Lookout Creek at Eglin 221	Storm Sampling	downstream	3
0506S001	TAT01-036f	30.6939	-86.4962	SPENCER FLATS	01-Jun-01	Honey Creek	Honey Creek at Eglin 211	Storm Sampling	downstream	3
0703S002	TAT01-036g	30.6866	-86.4501	SPENCER FLATS	01-Jun-01	Blue Spring Creek	Blue Spring Creek at Eglin 211	Storm Sampling	downstream	2
0703S001	TAT01-036h	30.6658	-86.4541	SPENCER FLATS	01-Jun-01	Blue Spring Creek	Blue Spring Creek at Eglin 454	Storm Sampling	downstream	2
0506S003	TAT01-036i	30.6653	-86.4848	SPENCER FLATS	01-Jun-01	Honey Creek	Honey Creek at Eglin AFB Range Rd 454	Storm Sampling	downstream	2
0505S001	TAT01-036j	30.6653	-86.5112	CRESTVIEW SOUTH	01-Jun-01	Silver Creek	Silver Creek at Eglin 454	Storm Sampling	downstream	2
0106S002	TAT01-037	30.5262	-86.8647	HAROLD SE	07-Jun-01	Little Boiling Creek	Little Boiling Creek at Eglin Road 718	Biomonitoring	upstream	1
0503S001	TAT01-038a	30.6809	-86.5755	CRESTVIEW SOUTH	11-Jun-01	Turkey Hen Creek	Turkey Hen Creek at Eglin 211	Storm Sampling	downstream	3
0310S001	TAT01-038b	30.6748	-86.6507	HOLT	11-Jun-01	Carr Spring Branch	Carr Spring Branch at Eglin 211	Storm Sampling	downstream	2
0309S005	TAT01-038c	30.6713	-86.6620	HOLT	11-Jun-01	Turkey Gobbler Creek	Turkey Gobbler Creek at Eglin 211	Storm Sampling	downstream	3
0308S002	TAT01-038d	30.6638	-86.6766	HOLT	11-Jun-01	Middle Creek	Middle Creek at Eglin 211	Storm Sampling	downstream	3
0307S001	TAT01-038e	30.6600	-86.6990	HOLT	11-Jun-01	Malone Creek	Malone Creek at Eglin 211	Storm Sampling	downstream	3

Eglin Management Unit (EMU)	Field Number	LAT	LONG	Quad Sheet	Date	Water Body	Sample Location	Projects	Direction Sampled	Stream Order
0306S001	TAT01-038f	30.6560	-86.7293	HOLT	11-Jun-01	Metts Creek	Metts Creek at Eglin 211	Storm Sampling	downstream	2
0301S001	TAT01-038g	30.6461	-86.7575	FLORIDALE	11-Jun-01	Carroll Creek	Carroll Creek at Eglin 211	Storm Sampling	downstream	2
0102S009	TAT01-038h	30.6275	-86.7908	FLORIDALE	11-Jun-01	Yellow River trib.	Yellow River trib. @ 211, W of jnct w/253	Storm Sampling	downstream	1
0102S002	TAT01-038i	30.6075	-86.8165	HAROLD SE	11-Jun-01	Wolf Creek	Wolf Creek @ Eglin 211	Storm Sampling	downstream	2
0102S009	TAT01-038j	30.6275	-86.7908	FLORIDALE	11-Jun-01	Yellow River trib.	Yellow River trib. @ 211, W of jnct w/253	Storm Sampling	downstream	1
0301S001	TAT01-038k	30.6461	-86.7575	FLORIDALE	11-Jun-01	Carroll Creek	Carroll Creek at Eglin 211	Storm Sampling	downstream	2
0306S001	TAT01-038l	30.6560	-86.7293	HOLT	11-Jun-01	Metts Creek	Metts Creek at Eglin 211	Storm Sampling	downstream	2
0307S001	TAT01-038m	30.6600	-86.6990	HOLT	11-Jun-01	Malone Creek	Malone Creek at Eglin 211	Storm Sampling	downstream	3
0308S002	TAT01-038n	30.6638	-86.6766	HOLT	11-Jun-01	Middle Creek	Middle Creek at Eglin 211	Storm Sampling	downstream	3
0309S005	TAT01-038o	30.6713	-86.6620	HOLT	11-Jun-01	Turkey Gobbler Creek	Turkey Gobbler Creek at Eglin 211	Storm Sampling	downstream	3
0503S001	TAT01-038p	30.6809	-86.5755	CRESTVIEW SOUTH	11-Jun-01	Turkey Hen Creek	Turkey Hen Creek at Eglin 211	Storm Sampling	downstream	3
0506S001	TAT01-038q	30.6939	-86.4962	SPENCER FLATS	11-Jun-01	Honey Creek	Honey Creek at Eglin 211	Storm Sampling	downstream	3
0703S002	TAT01-038r	30.6866	-86.4501	SPENCER FLATS	11-Jun-01	Blue Spring Creek	Blue Spring Creek at Eglin 211	Storm Sampling	downstream	2
0705S002	TAT01-038s	30.6741	-86.4300	SPENCER FLATS	11-Jun-01	Bull Creek	Bull Creek at Eglin Range Rd 211	Storm Sampling	downstream	2
0706S001	TAT01-038t	30.6749	-86.4123	SPENCER FLATS	11-Jun-01	Ramer Creek	Ramer Creek at Eglin AFB Range Rd 211	Storm Sampling	downstream	2
0607S005	TAT01-038u	30.5618	-86.5363	VALPARAISO	11-Jun-01	Turkey Creek	Turkey Creek at Eglin 232	Storm Sampling	downstream	4
0607S003	TAT01-038v	30.5814	-86.5749	VALPARAISO	11-Jun-01	Turkey Creek	Turkey Creek at Eglin 233	Storm Sampling	downstream	3
0607S002	TAT01-038w	30.5796	-86.6074	VALPARAISO	11-Jun-01	Turkey Creek	Turkey Creek at Eglin 637	Storm Sampling	downstream	1
0607S003	TAT01-038x	30.5814	-86.5749	VALPARAISO	11-Jun-01	Turkey Creek	Turkey Creek at Eglin 233	Storm Sampling	downstream	3
0607S005	TAT01-038y	30.5618	-86.5363	VALPARAISO	11-Jun-01	Turkey Creek	Turkey Creek at Eglin 232	Storm Sampling	downstream	4
0612S003	TAT01-038z1	30.5701	-86.5159	VALPARAISO	11-Jun-01	Tenmile Creek	Tenmile Creek at Eglin Road 231	Storm Sampling	downstream	4
1104S004	TAT01-038z10	30.5928	-86.2142	PORTLAND	11-Jun-01	Little Alaqua Creek	Little Alaqua at Eglin 208	Storm Sampling	downstream	4

Eglin Management Unit (EMU)	Field Number	LAT	LONG	Quad Sheet	Date	Water Body	Sample Location	Projects	Direction Sampled	Stream Order
1007S001	TAT01-038z2	30.5280	-86.2825	NICEVILLE SE	11-Jun-01	Basin Creek	Basin Creek at Eglin 212	Storm Sampling	downstream	4
1010S001	TAT01-038z3	30.5535	-86.2768	NICEVILLE SE	11-Jun-01	Watering Creek	Watering Creek at Eglin 212	Storm Sampling	downstream	3
1009S001	TAT01-038z4	30.5831	-86.2749	NICEVILLE SE	11-Jun-01	Bear Branch trib.	Bear Branch tributary at Eglin 361	Storm Sampling	downstream	2
1009S001	TAT01-038z5	30.5831	-86.2749	NICEVILLE SE	11-Jun-01	Bear Branch trib.	Bear Branch tributary at Eglin 361	Storm Sampling	upstream	2
1104S002	TAT01-038z6	30.6047	-86.2402	PORTLAND	11-Jun-01	Little Alaqua Creek	Little Alaqua at Eglin 200/201	Storm Sampling	downstream	3
1108S001	TAT01-038z7	30.6075	-86.2146	PORTLAND	11-Jun-01	Blount Mill Creek	Blount Mill Creek at Eglin 200/201	Storm Sampling	downstream	2
1108S001	TAT01-038z8	30.6075	-86.2146	PORTLAND	11-Jun-01	Blount Mill Creek	Blount Mill Creek at Eglin 200/201	Storm Sampling	upstream	2
1108S002	TAT01-038z9	30.5986	-86.2113	PORTLAND	11-Jun-01	Blount Mill Creek	Blount Mill Creek at Eglin 208	Storm Sampling	downstream	3
0705S002	TAT01-039	30.6741	-86.4300	SPENCER FLATS	12-Jun-01	Bull Creek	Bull Creek at Eglin Range Rd 211	Biomonitoring	upstream	2
0706S001	TAT01-040	30.6749	-86.4123	SPENCER FLATS	12-Jun-01	Ramer Creek	Ramer Creek at Eglin AFB Range Rd 211	Biomonitoring	upstream	2
0604S005	TAT01-041	30.5373	-86.4853	NICEVILLE	26-Jun-01	Mill Creek	Mill Creek at bridge N. of SR.190 by hole 13	Biomonitoring	upstream	1
0817S004	TAT01-042	30.6563	-86.3543	MOSSY HEAD	29-Jun-01	Exline Creek trib.	Exline Creek tributary at Eglin 492	Biomonitoring	upstream	1
0612S003	TAT01-043a	30.5701	-86.5159	VALPARAISO	31-Jul-01	Tenmile Creek	Tenmile Creek at Eglin Road 231	Storm Sampling	downstream	4
0609S001	TAT01-043b	30.6078	-86.5228	VALPARAISO	31-Jul-01	Juniper Creek	Juniper Creek bridge crossing on Eglin 221	Storm Sampling	downstream	3
0503S001	TAT01-043c	30.6809	-86.5755	CRESTVIEW SOUTH	31-Jul-01	Turkey Hen Creek	Turkey Hen Creek at Eglin 211	Storm Sampling	downstream	3
0503S001	TAT01-043d	30.6809	-86.5755	CRESTVIEW SOUTH	31-Jul-01	Turkey Hen Creek	Turkey Hen Creek at Eglin 211	Storm Sampling	upstream	3
0309S005	TAT01-043e	30.6713	-86.6620	HOLT	31-Jul-01	Turkey Gobbler Creek	Turkey Gobbler Creek at Eglin 211	Storm Sampling	downstream	3
0308S002	TAT01-043f	30.6638	-86.6766	HOLT	31-Jul-01	Middle Creek	Middle Creek at Eglin 211	Storm Sampling	downstream	3
0308S002	TAT01-043g	30.6638	-86.6766	HOLT	31-Jul-01	Middle Creek	Middle Creek at Eglin 211	Storm Sampling	downstream	3
0307S001	TAT01-043h	30.6600	-86.6990	HOLT	31-Jul-01	Malone Creek	Malone Creek at Eglin 211	Storm Sampling	downstream	3
0306S001	TAT01-043i	30.6560	-86.7293	HOLT	31-Jul-01	Metts Creek	Metts Creek at Eglin 211	Storm Sampling	downstream	2

Eglin Management Unit (EMU)	Field Number	LAT	LONG	Quad Sheet	Date	Water Body	Sample Location	Projects	Direction Sampled	Stream Order
0102S009	TAT01-043j	30.6275	-86.7908	FLORIDALE	31-Jul-01	Yellow River trib.	Yellow River trib. @ 211, W of jnct w/253	Storm Sampling	downstream	1
0309S005	TAT01-043k	30.6713	-86.6620	HOLT	31-Jul-01	Turkey Gobbler Creek	Turkey Gobbler Creek at Eglin 211	Storm Sampling	downstream	3
0607S005	TAT01-043l	30.5618	-86.5363	VALPARAISO	31-Jul-01	Turkey Creek	Turkey Creek at Eglin 232	Storm Sampling	downstream	4
0607S005	TAT01-043m	30.5618	-86.5363	VALPARAISO	31-Jul-01	Turkey Creek	Turkey Creek at Eglin 232	Storm Sampling	downstream	4
0607S005	TAT01-043n	30.5618	-86.5363	VALPARAISO	31-Jul-01	Turkey Creek	Turkey Creek at Eglin 232	Storm Sampling	downstream	4
0607S005	TAT01-043o	30.5618	-86.5363	VALPARAISO	31-Jul-01	Turkey Creek	Turkey Creek at Eglin 232	Storm Sampling	downstream	4
0607S005	TAT01-043p	30.5618	-86.5363	VALPARAISO	31-Jul-01	Turkey Creek	Turkey Creek at Eglin 232	Storm Sampling	downstream	4
0607S005	TAT01-043q	30.5618	-86.5363	VALPARAISO	31-Jul-01	Turkey Creek	Turkey Creek at Eglin 232	Storm Sampling	downstream	4
0610S003	TAT01-044	30.5564	-86.5405	VALPARAISO	07-Aug-01	Rogue Creek	Rogue Creek at Eglin Road 693	Biomonitoring	downstream	3
0804S007	TAT01-045	30.6769	-86.3219	MOSSY HEAD	07-Aug-01	Rocky Creek	Rocky Creek near Eglin Road 395 at C-74	Survey	downstream	2
0308S003	TAT02-001	30.6244	-86.6578	HOLT SW	04-Feb-02	Middle Creek	Middle Creek at Eglin 600E	Biomonitoring	upstream	2
0607S005	TAT02-002	30.5618	-86.5363	VALPARAISO	05-Feb-02	Turkey Creek	Turkey Creek at Eglin 232	Biomonitoring	upstream	4
0209S001	TAT02-003	30.4526	-86.7668	NAVARRE	10-Feb-02	Prairie Creek	Prairie Creek at Eglin 678	Biomonitoring	upstream	3
0207S001	TAT02-004	30.4310	-86.8067	NAVARRE	10-Feb-02	Panther Creek	Panther Creek at Eglin 255	Biomonitoring	upstream	3
1104S004	TAT02-005	30.5928	-86.2142	PORTLAND	13-Feb-02	Little Alaqua Creek	Little Alaqua at Eglin 208	Biomonitoring	upstream	4
1103S003	TAT02-006	30.5561	-86.1792	PORTLAND	13-Feb-02	Alaqua Creek	Alaqua Creek at Eglin 205	Biomonitoring	upstream	6
0612S001	TAT02-007	30.6070	-86.4824	NICEVILLE	15-Feb-02	Point Lookout Creek	Point Lookout Creek at Eglin 221	Biomonitoring	upstream	3
0609S001	TAT02-008	30.6078	-86.5228	VALPARAISO	15-Feb-02	Juniper Creek	Juniper Creek bridge crossing on Eglin 221	Biomonitoring	upstream	3
0809S003	TAT02-009	30.5769	-86.3883	NICEVILLE	16-Feb-02	Little Rocky Creek	Little Rocky Creek at Eglin 200	Biomonitoring	upstream	4
0809S002	TAT02-010	30.5854	-86.4038	NICEVILLE	16-Feb-02	Little Rocky Creek	Little Rocky Creek at Eglin 499	Biomonitoring	downstream	3
0803S001	TAT02-011	30.5428	-86.4133	NICEVILLE	16-Feb-02	Long Creek trib.	Long Creek tributary at Eglin 406	Biomonitoring	upstream	2
0104S003	TAT02-012	30.5589	-86.8920	WARD BASIN	17-Feb-02	Moore Creek	Moore Creek @ Gauge Station N. of 211	Biomonitoring	upstream	2
0503S002	TAT02-013	30.6769	-86.5780	CRESTVIEW SOUTH	17-Feb-02	Turkey Hen Creek	Turkey Hen Creek at Eglin 233	Biomonitoring	upstream	2
1007S006	TAT02-014	30.5254	-86.2923	NICEVILLE SE	26-Feb-02	Basin Creek	Basin Creek at Eglin Range Rd 427/222	Biomonitoring	upstream	3

Eglin Management Unit (EMU)	Field Number	LAT	LONG	Quad Sheet	Date	Water Body	Sample Location	Projects	Direction Sampled	Stream Order
1009S002	TAT02-015	30.5350	-86.2450	PORTLAND	19-Mar-02	Bear Branch	Bear Branch at Eglin 359	Biomonitoring	upstream	4
0908S001	TAT02-016	30.7194	-86.2812	MOSSY HEAD	19-Mar-02	Live Oak Branch	Live Oak Branch bridge blowout @ Eglin 382	Biomonitoring	upstream	3
0211S001	TAT02-017	30.5090	-86.6703	HOLT SW	20-Mar-02	Turtle Creek	Turtle Creek at Eglin 234	Biomonitoring	upstream	3
1010S003	TAT02-018	30.5895	-86.2959	NICEVILLE SE	20-Mar-02	Watering Creek	Watering Creek at Eglin 370	Biomonitoring	upstream	2
0905S001	TAT02-019	30.6865	-86.2717	MOSSY HEAD	30-Mar-02	Bear Bay Branch	Bear Bay Branch at Eglin Range Road 381	Survey	upstream	3
0612S003	TAT02-020	30.5701	-86.5159	VALPARAISO	23-Apr-02	Tenmile Creek	Tenmile Creek at Eglin Road 231	Survey	downstream	4
0809S006	TAT02-021	30.6090	-86.4243	NICEVILLE	20-May-02	Little Rocky Creek	Little Rocky Creek at Old Hwy 285	Survey	downstream	3
1108SS01	TAT02-022	30.6078	-86.2249	PORTLAND	20-May-02	Blount Mill Creek	New Home Seepage Slope at Eglin 200/201	Survey	both	1
0607S005	TAT02-023	30.5618	-86.5363	VALPARAISO	22-May-02	Turkey Creek	Turkey Creek at Eglin 232	Survey	downstream	4
0610S002	TAT02-024	30.5561	-86.5773	VALPARAISO	22-May-02	Rogue Creek	Rogue Creek at Eglin 625	Survey	both	2
0607S002	TAT02-025	30.5796	-86.6074	VALPARAISO	22-May-02	Turkey Creek	Turkey Creek at Eglin 637	Survey	both	1
0609S001	TAT02-026	30.6078	-86.5228	VALPARAISO	23-May-02	Juniper Creek	Juniper Creek bridge crossing on Eglin 221	Survey	downstream	3
0609SH01	TAT02-027	30.6287	-86.5012	CRESTVIEW SOUTH	23-May-02	Juniper Creek	Juniper Creek Steephead off Eglin 231	Survey	downstream	1
0503S005	TAT02-028	30.6575	-86.5688	CRESTVIEW SOUTH	23-May-02	Turkey Hen Creek	Turkey Hen Creek at end of Eglin RR 601	Survey	both	1
0503SH01	TAT02-029	30.6463	-86.5558	CRESTVIEW SOUTH	23-May-02	Turkey Hen Creek	steephead behind Okie Tower off Hwy 85	Survey	downstream	1
0607SH01	TAT02-030	30.5895	-86.6001	VALPARAISO	24-May-02	Turkey Creek trib.	Turkey Creek steephead trib S. of Eglin 639	Survey	downstream	1
0612S003	TAT02-031	30.5701	-86.5159	VALPARAISO	10-Jun-02	Tenmile Creek	Tenmile Creek at Eglin Road 231	Survey	both	4
0609SH01	TAT02-032	30.6287	-86.5012	CRESTVIEW SOUTH	20-Jun-02	Juniper Creek	Juniper Creek Steephead off Eglin 231	Survey	downstream	1
0609SH02	TAT02-033	30.6329	-86.5232	CRESTVIEW SOUTH	20-Jun-02	Juniper Creek	Juniper Crk steephead S Duke Fld, N RR 565	Survey	downstream	1
0804S001	TAT02-034	30.5734	-86.3667	NICEVILLE SE	29-Jul-02	Rocky Creek	Rocky Creek at Eglin Road 200	Biomonitoring	upstream	4
0308S003	TAT02-035	30.6244	-86.6578	HOLT SW	02-Aug-02	Middle Creek	Middle Creek at Eglin 600E	Biomonitoring	upstream	2
1007S006	TAT02-036	30.5254	-86.2923	NICEVILLE SE	03-Aug-02	Basin Creek	Basin Creek at Eglin Range Rd 427/222	Biomonitoring	upstream	3
0211S001	TAT02-037	30.5090	-86.6703	HOLT SW	04-Aug-02	Turtle Creek	Turtle Creek at Eglin 234	Biomonitoring	upstream	3

Eglin Management Unit (EMU)	Field Number	LAT	LONG	Quad Sheet	Date	Water Body	Sample Location	Projects	Direction Sampled	Stream Order
0612S001	TAT02-038	30.6070	-86.4824	NICEVILLE	05-Aug-02	Point Lookout Creek	Point Lookout Creek at Eglin 221	Biomonitoring	upstream	3
0609S001	TAT02-039	30.6078	-86.5228	VALPARAISO	06-Aug-02	Juniper Creek	Juniper Creek bridge crossing on Eglin 221	Biomonitoring	upstream	3
0612S001	TAT02-039a	30.6070	-86.4824	NICEVILLE	05-Aug-02	Point Lookout Creek	Point Lookout Creek at Eglin 221	Storm Sampling	downstream	3
0616S001	TAT02-039b	30.6074	-86.4948	NICEVILLE	05-Aug-02	Pinelog Creek	Pinelog Creek at Eglin 221	Storm Sampling	downstream	2
0612S003	TAT02-039c	30.5701	-86.5159	VALPARAISO	05-Aug-02	Tenmile Creek	Tenmile Creek at Eglin Road 231	Storm Sampling	downstream	4
0612S003	TAT02-039d	30.5701	-86.5159	VALPARAISO	05-Aug-02	Tenmile Creek	Tenmile Creek at Eglin Road 231	Storm Sampling	downstream	4
0608P001	TAT02-039e	30.5596	86.5147	VALPARAISO	05-Aug-02	Anderson Branch	Anderson Branch upstream of Eglin 231	Storm Sampling	upstream	2
0503S001	TAT02-039f	30.6809	-86.5755	CRESTVIEW SOUTH	05-Aug-02	Turkey Hen Creek	Turkey Hen Creek at Eglin 211	Storm Sampling	downstream	3
0503S001	TAT02-039g	30.6809	-86.5755	CRESTVIEW SOUTH	05-Aug-02	Turkey Hen Creek	Turkey Hen Creek at Eglin 211	Storm Sampling	downstream	3
0309S003	TAT02-039h	30.6372	-86.6369	HOLT	05-Aug-02	Turkey Gobbler Creek	Turkey Gobbler Creek at Eglin 215	Storm Sampling	downstream	2
0607S005	TAT02-040	30.5618	-86.5363	VALPARAISO	06-Aug-02	Turkey Creek	Turkey Creek at Eglin 232	Biomonitoring	upstream	4
0809S002	TAT02-041	30.5854	-86.4038	NICEVILLE	08-Aug-02	Little Rocky Creek	Little Rocky Creek at Eglin 499	Biomonitoring	downstream	3
0803S001	TAT02-042	30.5428	-86.4133	NICEVILLE	09-Aug-02	Long Creek trib.	Long Creek tributary at Eglin 406	Biomonitoring	upstream	2
1010S003	TAT02-043	30.5895	-86.2959	NICEVILLE SE	10-Aug-02	Watering Creek	Watering Creek at Eglin 370	Biomonitoring	upstream	2
1103S003	TAT02-044	30.5561	-86.1792	PORTLAND	12-Aug-02	Alaqua Creek	Alaqua Creek at Eglin 205	Biomonitoring	downstream	6
0503S002	TAT02-045	30.6769	-86.5780	CRESTVIEW SOUTH	13-Aug-02	Turkey Hen Creek	Turkey Hen Creek at Eglin 233	Biomonitoring	upstream	2
0908S001	TAT02-046	30.7194	-86.2812	MOSSY HEAD	14-Aug-02	Live Oak Branch	Live Oak Branch bridge blowout @ Eglin 382	Biomonitoring	upstream	3
1104S004	TAT02-047	30.5928	-86.2142	PORTLAND	15-Aug-02	Little Alaqua Creek	Little Alaqua at Eglin 208	Biomonitoring	upstream	4
0104S003	TAT02-048	30.5589	-86.8920	WARD BASIN	19-Aug-02	Moore Creek	Moore Creek @ Gauge Station N. of 211	Biomonitoring	upstream	2
0209S001	TAT02-049	30.4526	-86.7668	NAVARRE	20-Aug-02	Prairie Creek	Prairie Creek at Eglin 678	Biomonitoring	upstream	3
0809S007	TAT02-050	30.5470	-86.3816	NICEVILLE	5-Sep-02	Little Rocky Creek	Little Rocky Creek at end of Eglin 477	Biomonitoring	upstream	4
0406S002	TAT04-01	30.5008	-86.5793	VALPARAISO	1-Mar-04	Garnier Creek	Garnier Creek western trib at powerline road	Biomonitoring	downstream	1

Eglin Management Unit (EMU)	Field Number	LAT	LONG	Quad Sheet	Date	Water Body	Sample Location	Projects	Direction Sampled	Stream Order
0809S008	TAT04-02	30.6067	-86.4219	NICEVILLE	3-Mar-04	Little Rocky Creek	Little Rocky Creek at railroad trestle	Geomorphology	downstream	3
0210S001	TAT04-03	30.5110	-86.7146	HOLT SW	9-Mar-04	Live Oak Creek	Live Oak Creek at Eglin 234	TMDL/SCI/DEP	upstream	2
0210S004	TAT04-04	30.5341	-86.7202	HOLT SW	9-Mar-04	Live Oak Creek	Live Oak Creek at Eglin 235/181	TMDL/SCI/DEP	upstream	2
0809S008	TAT04-05	30.6067	-86.4219	NICEVILLE	11-Mar-04	Little Rocky Creek	Little Rocky Creek at railroad trestle	Biomonitoring	downstream	3
0809S008	TAT04-06	30.6074	-86.4223	NICEVILLE	11-Mar-04	Little Rocky Creek	Little Rocky Creek at railroad trestle	Biomonitoring	upstream	3
0101S003	TAT04-07	30.5400	-86.9479	WARD BASIN	17-Mar-04	Hicks Creek	Hicks Creek E. Branch @ Eglin 736	Geomorphology	upstream	1
0905S001	TAT04-08	30.6865	-86.2717	MOSSY HEAD	19-Mar-04	Bear Bay Branch	Bear Bay Branch at Eglin Range Road 381	Geomorphology	upstream	3
0103S006	TAT04-09	30.5511	-86.9104	WARD BASIN	23-Mar-04	Double Head Branch	Double Head Branch below Buck Pond (287)	TMDL/SCI/DEP	downstream	1
0701S007	TAT04-10	30.6999	-86.4685	SPENCER FLATS	24-Mar-04	Titi Creek	Titi Creek at Eglin AFB Range Rd 220	Biomonitoring	upstream	4
1102S006	TAT04-11	30.5467	-86.1284	PORTLAND	25-Mar-04	Fourmile Creek	East Branch of Fourmile Creek near RR 312	Biomonitoring	upstream	2
N/A	TAT04-12	N/A	N/A	N/A	29-Mar-04	several sites	Alaqua Drainage	Site Photos	N/A	N/A
0901S003	TAT04-13	30.6498	-86.1898	DEFUNIAK SPRINGS W	30-Mar-04	Tallaperla Creek	Tallaperla Creek at powerline rd. SE of 330	Biomonitoring	upstream	2
0201S003	TAT04-14	30.5227	-86.9741	WARD BASIN	31-Mar-04	Catfish Branch	Catfish Branch at Eglin 736	Biomonitoring	upstream	1
0201S003	TAT04-15	30.5227	-86.9741	WARD BASIN	2-Apr-04	Catfish Branch	Catfish Branch at Eglin 736	Geomorphology	upstream	1
1009S002	TAT04-16	30.5350	-86.2450	PORTLAND	3-Apr-04	Bear Branch	Bear Branch at Eglin 359	Biomonitoring	upstream	4
1009S002	TAT04-17	30.5350	-86.2450	PORTLAND	6-Apr-04	Bear Branch	Bear Branch at Eglin 359	Geomorphology	upstream	4
0803S003	TAT04-18	30.5226	-86.4120	NICEVILLE	12-Apr-04	Long Creek	Long Creek at old 469 - (road removed)	Biomonitoring	upstream	2
1008S001	TAT04-19	30.5336	-86.2380	PORTLAND	16-Apr-04	Little Basin Creek	Little Basin Creek at Eglin 359	Biomonitoring	upstream	3
0310S001	TAT04-20	30.6748	-86.6507	HOLT	20-May-04	Carr Spring Branch	Carr Spring Branch at Eglin 211	Geomorphology	upstream	2
1008S002	TAT04-21	30.5356	-86.2277	PORTLAND	20-May-04	Little Basin Creek	Little Basin Creek at Eglin 351	Geomorphology	upstream	2
0901S003	TAT04-22	30.6498	-86.1898	DEFUNIAK SPRINGS W	26-May-04	Tallaperla Creek	Tallaperla Creek at powerline rd. SE of 330	Geomorphology	upstream	2
0906S001	TAT04-23	30.7087	-86.2504	MOSSY HEAD	2-Jun-04	Bullhide Creek	Bullhide Creek at Eglin 213	Geomorphology	upstream	3
0405S003	TAT04-24	30.5051	-86.6072	VALPARAISO	3-Jun-04	Lightwood Knot Creek	Lightwood Knot Creek at Eglin 632	Geomorphology	upstream	2

Eglin Management Unit (EMU)	Field Number	LAT	LONG	Quad Sheet	Date	Water Body	Sample Location	Projects	Direction Sampled	Stream Order
0104S003	TAT04-25	30.5589	-86.8920	WARD BASIN	3-Jun-04	Moore Creek	Moore Creek @ Gauge Station N. of 211	Geomorphology	upstream	2
0406S002	TAT04-26	30.5008	-86.5793	VALPARAISO	4-Jun-04	Garnier Creek	Garnier Creek western trib at powerline road	Geomorphology	downstream	1
0209S001	TAT04-27	30.4526	-86.7668	NAVARRE	8-Jun-04	Prairie Creek	Prairie Creek at Eglin 678	Geomorphology	upstream	3
1105S001	TAT04-28	30.6074	-86.1394	PORTLAND	9-Jun-04	White Branch	White Branch at Eglin 200	Geomorphology	upstream	2
0211S001	TAT04-29	30.5090	-86.6703	HOLT SW	23-Jul-04	Turtle Creek	Turtle Creek at Eglin 234	Geomorphology	upstream	3
0101S003	TAT04-30	30.5400	-86.9479	WARD BASIN	19-Jun-04	Hicks Creek	Hicks Creek E. Branch @ Eglin 736	Biomonitoring	upstream	1
0612S001	TAT04-31	30.6070	-86.4824	NICEVILLE	19-Jul-04	Point Lookout Creek	Point Lookout Creek at Eglin 221	Geomorphology	upstream	3
0207S003	TAT04-32	30.4504	-86.8126	NAVARRE	21-Jul-04	Panther Creek	Panther Creek at Eglin 722	Geomorphology	downstream	2
0308S002	TAT04-33	30.6638	-86.6766	HOLT	26-Jul-04	Middle Creek	Middle Creek at Eglin 211	Geomorphology	upstream	3
0104S003	TAT04-34	30.5589	-86.8920	WARD BASIN	06-Aug-04	Moore Creek	Moore Creek @ Gauge Station N. of 211	Biomonitoring	upstream	2
0906S001	TAT04-35	30.7087	-86.2504	MOSSY HEAD	07-Aug-04	Bullhide Creek	Bullhide Creek at Eglin 213	Biomonitoring	upstream	3
0905S001	TAT04-36	30.6865	-86.2717	MOSSY HEAD	07-Aug-04	Bear Bay Branch	Bear Bay Branch at Eglin Range Road 381	Biomonitoring	upstream	3
1105S001	TAT04-37	30.6074	-86.1394	PORTLAND	08-Aug-04	White Branch	White Branch at Eglin 200	Biomonitoring	upstream	2
1008S002	TAT04-38	30.5356	-86.2277	PORTLAND	14-Aug-04	Little Basin Creek	Little Basin Creek at Eglin 351	Biomonitoring	upstream	2
0207S003	TAT04-39	30.4504	-86.8126	NAVARRE	15-Aug-04	Panther Creek	Panther Creek at Eglin 722	Biomonitoring	downstream	2
0209S001	TAT04-40	30.4526	-86.7668	NAVARRE	26-Aug-04	Prairie Creek	Prairie Creek at Eglin 678	Biomonitoring	upstream	3
0308S002	TAT04-41	30.6638	-86.6766	HOLT	28-Aug-04	Middle Creek	Middle Creek at Eglin 211	Biomonitoring	upstream	3
0707S001	TAT04-42	30.7065	-86.3934	SPENCER FLATS	29-Aug-04	Gum Creek	Gum Creek at Eglin Range Road 207	Biomonitoring	upstream	3
0211S001	TAT04-43	30.5090	-86.6703	HOLT SW	4-Sep-04	Turtle Creek	Turtle Creek at Eglin 234	Biomonitoring	upstream	3
0809S007	TAT04-44	30.5470	-86.3816	NICEVILLE	5-Sep-04	Little Rocky Creek	Little Rocky Creek at end of Eglin 477	Biomonitoring	downstream	4
0809S001	TAT04-45	30.5901	-86.4128	NICEVILLE	6-Sep-04	Little Rocky Creek	Little Rocky Creek at Eglin 515	Biomonitoring	downstream	3

Appendix C. Stream bioassessment data collected on Eglin AFB, FL and analyzed using two separate BioRecon Indices from the FL Department of Environmental Protection as described in Fore (2004).							"OLD" BioRecon Metrics Florida Depart. Environmental Protection					
Site ID	**Field Number**	**Stream Name**	**Locality**	**LAT**	**LONG**	**Drainage**	EPT	FL Index	Total Taxa	Total Indiv	**QUALITY**	**Date**
0901S001	DEP98-005	Alaqua Creek	at road crossing at Eglin 210	30.6925	-86.2417	Alaqua Creek	21	34	41	156	Healthy	21-May-98
1108S001	TAT00-009	Blount Mill Creek	at road crossing at Eglin 200/201	30.6075	-86.2146	Alaqua Creek	**14**	22	38	234	**Suspect**	09-May-00
1103S001	TAT00-010	Alaqua Creek	at road crossing at Eglin 200	30.5952	-86.1642	Alaqua Creek	18	24	37	158	Healthy	10-May-00
0901S001	TAT00-023	Alaqua Creek	at road crossing at Eglin 210	30.6925	-86.2417	Alaqua Creek	**15**	22	33	174	**Suspect**	07-Jun-00
1104S003	TAT00-062	Little Alaqua Creek	at road crossing at Eglin 205	30.5550	-86.1847	Alaqua Creek	**14**	25	31	70	**Suspect**	12-Jul-00
0908S001	TAT00-063	Live Oak Branch	Up of bridge blowout @ Eglin 382	30.7194	-86.2812	Alaqua Creek	20	30	39	159	Healthy	14-Jul-00
1108S001	TAT01-017	Blount Mill Creek	at road crossing at Eglin 200/201	30.6075	-86.2146	Alaqua Creek	19	29	37	287	Healthy	09-Apr-01
1104S004	TAT01-025	Little Alaqua Creek	at road crossing at Eglin 208	30.5928	-86.2142	Alaqua Creek	23	31	43	197	Healthy	23-Apr-01
0903S001	TAT01-032	Oakie Creek	at road crossing at Eglin 208	30.6615	-86.1969	Alaqua Creek	20	28	45	179	Healthy	29-May-01
0905S001	TAT01-033	Bear Bay Branch	Eglin Range Road 381	30.6865	-86.2717	Alaqua Creek	21	29	41	315	Healthy	29-May-01
1104S004	TAT02-005	Little Alaqua Creek	at road crossing at Eglin 208	30.5928	-86.2142	Alaqua Creek	22	27	42	211	Healthy	13-Feb-02
1103S003	TAT02-006	Alaqua Creek	at road crossing at Eglin 205	30.5561	-86.1792	Alaqua Creek	20	24	35	119	Healthy	13-Feb-02
0908S001	TAT02-016	Live Oak Branch	Up of bridge blowout @ Eglin 382	30.7194	-86.2812	Alaqua Creek	27	28	49	243	Healthy	19-Mar-02
1103S003	TAT02-044	Alaqua Creek	at road crossing at Eglin 205	30.5561	-86.1792	Alaqua Creek	17	28	44	149	Healthy	12-Aug-02
0908S001	TAT02-046	Live Oak Branch	Up of bridge blowout @ Eglin 382	30.7194	-86.2812	Alaqua Creek	31	42	65	321	Healthy	14-Aug-02
1104S004	TAT02-047	Little Alaqua Creek	at road crossing at Eglin 208	30.5928	-86.2142	Alaqua Creek	24	34	47	296	Healthy	15-Aug-02
0901S003	DEP04-03	Tallaperla Creek	powerline cut SE of Eglin 330	30.6498	-86.1898	Alaqua Creek	20	28	40	141	Healthy	30-Mar-04
0901S003	TAT04-13	Tallaperla Creek	powerline cut SE of Eglin 330	30.6498	-86.1898	Alaqua Creek	22	28	43	284	Healthy	30-Mar-04
0906S001	TAT04-35	Bullhide Creek	Eglin 213	30.7087	-86.2504	Alaqua Creek	19	26	43	314	Healthy	07-Aug-04
0905S001	TAT04-36	Bear Bay Branch	Eglin 381	30.6865	-86.2717	Alaqua Creek	25	33	50	324	Healthy	07-Aug-04
1105S001	TAT04-37	White Branch	Eglin 200	30.6074	-86.1394	Alaqua Creek	25	30	52	343	Healthy	08-Aug-04
1007S001	JCD00-002	Basin Creek	at road crossing at Eglin 212	30.5280	-86.2825	Basin Creek	**16**	22	35	146	**Suspect**	17-Feb-00
1010S001	TAT00-003	Watering Creek	at road crossing at Eglin 212	30.5535	-86.2768	Basin Creek	20	24	42	210	Healthy	27-Mar-00
1008S001	TAT00-011	Little Basin Creek	at road crossing at Eglin 359	30.5336	-86.2380	Basin Creek	19	25	42	161	Healthy	15-May-00
1007S002	TAT00-017	Basin Creek	at road crossing at Eglin 433	30.5306	-86.2629	Basin Creek	23	30	50	175	Healthy	26-May-00
1010S003	TAT01-020	Pochanee Branch	road crossing at Eglin 370	30.5895	-86.2959	Basin Creek	19	23	44	217	Healthy	12-Apr-02
1007S006	TAT01-021	Basin Creek	at Eglin AFB Range Rd 427/222	30.5254	-86.2923	Basin Creek	28	28	51	236	Healthy	12-Apr-02
1007S006	TAT02-014	Basin Creek	at Eglin AFB Range Rd 427/222	30.5254	-86.2923	Basin Creek	22	26	40	282	Healthy	26-Feb-02
1009S002	TAT02-015	Bear Branch	at road crossing at Eglin 359	30.5350	-86.2450	Basin Creek	28	36	54	319	Healthy	19-Mar-02
1010S003	TAT02-018	Pochanee Branch	road crossing at Eglin 370	30.5895	-86.2959	Basin Creek	22	28	48	193	Healthy	20-Mar-02
1007S006	TAT02-036	Basin Creek	at Eglin AFB Range Rd 427/222	30.5254	-86.2923	Basin Creek	29	37	60	280	Healthy	3-Aug-02
1010S003	TAT02-043	Pochanee Branch	road crossing at Eglin 370	30.5895	-86.2959	Basin Creek	30	37	58	508	Healthy	10-Aug-02
1009S002	TAT04-16	Bear Branch	at road crossing at Eglin 359	30.5350	-86.2450	Basin Creek	27	40	63	658	Healthy	3-Apr-04

Appendix C. Stream bioassessment data collected on Eglin AFB, FL and analyzed using two separate BioRecon Indices from the FL Department of Environmental Protection as described in Fore (2004).							"OLD" BioRecon Metrics Florida Depart. Environmental Protection					
Site ID	**Field Number**	**Stream Name**	**Locality**	**LAT**	**LONG**	**Drainage**	EPT	FL Index	Total Taxa	Total Indiv	**QUALITY**	**Date**
1008S001	TAT04-19	Little Basin Creek	at road crossing at Eglin 359	30.5336	-86.2380	Basin Creek	25	31	54	449	Healthy	16-Apr-04
1008S002	TAT04-38	Little Basin Creek	Eglin 351	30.5356	-86.2277	Basin Creek	25	30	53	312	Healthy	14-Aug-04
0605S002	DEP00-002	Swift Creek	S. of old railroad crossing culvert	30.5606	-86.4589	Choctawhatchee	19	26	35	142	Healthy	11-Jul-00
0815S001	DEP00-003	Open Branch	at intersection at Eglin 214/374	30.6426	-86.3250	Rocky Creek	17	30	43	120	Healthy	13-Jul-00
0815S001	DEP00-004	Open Branch	at intersection at Eglin 214/374	30.6426	-86.3250	Rocky Creek	**4**	**5**	**20**	62	**Impaired**	18-Jul-00
0804S004	DEP00-005	Rocky Creek	at Eglin Range Road 214/374	30.6483	-86.3334	Rocky Creek	20	26	31	79	Healthy	18-Jul-00
0804S004	DEP00-006	Rocky Creek	at Eglin Range Road 214/374	30.6483	-86.3334	Rocky Creek	18	24	37	130	Healthy	20-Jul-00
0606S001	DEP00-009	Shaw Still Branch	0.2 miles S of 190: In subdivision	30.5302	-86.4528	Choctawhatchee	**7**	**8**	**17**	46	**Impaired**	27-Jul-00
0802S002	DEP00-010	East Turkey Creek	1.5 miles E of routes 285 and 190	30.5125	-86.4251	Choctawhatchee	**16**	**21**	32	122	**Impaired**	27-Jul-00
0817S002	DEP00-012	Exline Creek	trib of Exline @ Eglin 503	30.6448	-86.3749	Rocky Creek	**16**	**20**	35	146	**Impaired**	03-Aug-00
0818S001	DEP00-014	Mt. Sinai Branch	road crossing at Eglin 412	30.6646	-86.3653	Rocky Creek	19	25	33	110	Healthy	10-Aug-00
0605S002	TAT00-019	Swift Creek	S. of old railroad crossing culvert	30.5606	-86.4589	Choctawhatchee	17	25	34	121	Healthy	03-Jun-00
0811S001	TAT00-028	Rocky Creek	trib at Eglin 420	30.6062	-86.3977	Rocky Creek	20	23	40	382	Healthy	12-Jun-00
0809S005	TAT00-048	Little Rocky Creek	road crossing @ Eglin 434	30.6209	-86.4306	Rocky Creek	20	26	37	222	Healthy	26-Jun-00
0809S001	TAT00-049	Little Rocky Creek	at road crossing at Eglin 515	30.5901	-86.4128	Rocky Creek	22	30	35	97	Healthy	26-Jun-00
0809S003	TAT00-053	Little Rocky Creek	at road crossing at Eglin 200	30.5769	-86.3883	Rocky Creek	**16**	25	34	104	**Suspect**	27-Jun-00
0804S002	TAT00-054	Rocky Creek	at road crossing at Eglin 219	30.5352	-86.3825	Rocky Creek	**5**	**8**	**12**	**27**	**Impaired**	29-Jun-00
0817S002	TAT00-071	Exline Creek	tributary of Exline @ Eglin 503	30.6448	-86.3749	Rocky Creek	19	24	33	262	Healthy	03-Aug-00
0818S001	TAT00-073	Mt. Sinai Branch	road crossing at Eglin 412	30.6646	-86.3653	Rocky Creek	23	22	40	278	Healthy	10-Aug-00
0804S004	TAT01-003	Rocky Creek	at Eglin Range Road 214/374	30.6483	-86.3334	Rocky Creek	19	33	41	405	Healthy	2-Feb-01
0809S001	TAT01-018	Little Rocky Creek	at road crossing at Eglin 515	30.5901	-86.4128	Rocky Creek	20	23	36	221	Healthy	11-Apr-01
0809S002	TAT01-019	Little Rocky Creek	at road crossing at Eglin 499	30.5854	-86.4038	Rocky Creek	19	25	35	110	Healthy	11-Apr-01
0803S001	TAT01-024	Long Creek	trib at road crossing at Eglin 406	30.5428	-86.4133	Rocky Creek	23	**20**	41	183	**Suspect**	13-Apr-01
0804S005	TAT01-034	Dogwood Head Brch	at Eglin Road 485	30.6248	-86.3593	Rocky Creek	**12**	**21**	34	149	**Impaired**	31-May-01
0804S006	TAT01-035	Green Head Branch	at Eglin Road 485	30.6272	-86.3595	Rocky Creek	**15**	**18**	29	107	**Impaired**	31-May-01
0817S004	TAT01-042	Exline Creek	trib to Exline Creek at Eglin 492	30.6563	-86.3543	Rocky Creek	**10**	**16**	27	193	**Impaired**	29-Jun-01
0809S003	TAT02-009	Little Rocky Creek	at road crossing at Eglin 200	30.5769	-86.3883	Rocky Creek	29	34	48	235	Healthy	16-Feb-02
0809S002	TAT02-010	Little Rocky Creek	at road crossing at Eglin 499	30.5854	-86.4038	Rocky Creek	30	30	54	217	Healthy	16-Feb-02
0803S001	TAT02-011	Long Creek	trib at road crossing at Eglin 406	30.5428	-86.4133	Rocky Creek	22	**20**	31	169	**Suspect**	16-Feb-02
0804S001	TAT02-034	Rocky Creek	at road crossing at Eglin 200	30.5734	-86.3667	Rocky Creek	23	31	45	223	Healthy	29-Jul-02
0809S002	TAT02-041	Little Rocky Creek	at road crossing at Eglin 499	30.5854	-86.4038	Rocky Creek	23	34	46	352	Healthy	8-Aug-02
0803S001	TAT02-042	Long Creek	trib at road crossing at Eglin 406	30.5428	-86.4133	Rocky Creek	25	27	46	265	Healthy	9-Aug-02
0809S007	TAT02-050	Little Rocky Creek	at end of Eglin 477	30.5470	-86.3816	Rocky Creek	32	39	55	241	Healthy	5-Sep-02

Appendix C. Stream bioassessment data collected on Eglin AFB, FL and analyzed using two separate BioRecon Indices from the FL Department of Environmental Protection as described in Fore (2004).							"OLD" BioRecon Metrics Florida Depart. Environmental Protection					
Site ID	**Field Number**	**Stream Name**	**Locality**	**LAT**	**LONG**	**Drainage**	EPT	FL Index	Total Taxa	Total Indiv	**QUALITY**	**Date**
0809S007	DEP02-050	Little Rocky Creek	at end of Eglin 477	30.5470	-86.3816	Rocky Creek	34	50	64	202	Healthy	5-Sep-02
0809S008	DEP04-01	Little Rocky Creek	above railroad trestle - pre-restore	30.6074	-86.4223	Rocky Creek	21	25	50	132	Healthy	11-Mar-04
0809S008	DEP04-02	Little Rocky Creek	below railroad trestle - pre-restore	30.6067	-86.4219	Rocky Creek	35	38	58	255	Healthy	11-Mar-04
0809S008	TAT04-05	Little Rocky Creek	below railroad trestle - pre-restore	30.6067	-86.4219	Rocky Creek	35	38	58	249	Healthy	11-Mar-04
0809S008	TAT04-06	Little Rocky Creek	above railroad trestle - pre-restore	30.6074	-86.4223	Rocky Creek	21	25	50	132	Healthy	11-Mar-04
0803S003	TAT04-18	Long Creek	Eglin 469 – restoration - road gone	30.5226	-86.4120	Rocky Creek	28	37	60	469	Healthy	12-Apr-04
0809S007	TAT04-44	Little Rocky Creek	at end of Eglin 477	30.5470	-86.3816	Rocky Creek	25	43	52	212	Healthy	5-Sep-04
0809S001	TAT04-45	Little Rocky Creek	at road crossing at Eglin 515	30.5901	-86.4128	Rocky Creek	27	37	44	269	Healthy	5-Sep-04
0604S005	DEP00-007	Mill Creek	N. S.R. 190 btw teebox & 13	30.5373	-86.4853	Choctawhatchee	21	32	44	174	Healthy	25-Jul-00
0604S006	DEP00-008	Mill Creek	north of SR 190, near hole 9	30.5438	-86.4873	Choctawhatchee	**15**	**14**	30	97	**Impaired**	25-Jul-00
0604S005	DEP98-003	Mill Creek	N. S.R. 190 btw teebox & 13	30.5373	-86.4853	Choctawhatchee	22	30	47	120	Healthy	13-Aug-98
0604S001	DEP98-004	Mill Creek	Blw Eglin Golf Course Trout Lake	30.5230	-86.4865	Choctawhatchee	**4**	**4**	**14**	162	**Impaired**	13-Aug-98
0604S006	DEP99-001	Mill Creek	north of SR 190, near hole 9	30.5438	-86.4873	Choctawhatchee	**15**	**19**	30	110	**Impaired**	29-Jul-99
0604S004	JCD99-016	Mill Creek	first non-culverted section S.R. 190	30.5344	-86.4861	Choctawhatchee	**4**	**11**	**20**	75	**Impaired**	11-Sep-99
0604S004	TAT00-018	Mill Creek	first non-culverted section S.R. 190	30.5344	-86.4861	Choctawhatchee	23	24	41	157	Healthy	2-Jun-00
0604S005	TAT01-041	Mill Creek	N. S.R. 190 btw teebox & 13	30.5373	-86.4853	Choctawhatchee	31	35	58	548	Healthy	26-Jun-01
0609S002	DEP00-001	Juniper Creek	trib upstream of borrow pit runoff	30.5925	-86.5147	Turkey Creek	**14**	**17**	33	145	**Impaired**	18-Jan-00
0610S001	JCD99-009	Rogue Creek	Upstream of culvert at 233	30.5561	-86.5621	Turkey Creek	17	**15**	31	94	**Suspect**	13-Sep-99
0612S001	JCD99-014	Point Lookout Creek	Upstream of Culvert @ Eglin 221	30.6070	-86.4824	Turkey Creek	**16**	22	34	189	**Suspect**	28-Oct-99
0607S001	JCD99-015	Bens Creek	old intersection with Eglin 604E	30.5939	-86.5765	Turkey Creek	17	**20**	36	327	**Suspect**	4-Nov-99
0610S001	JLH01-005	Rogue Creek	Upstream of culvert at 233	30.5561	-86.5621	Turkey Creek	**16**	**19**	26	77	**Impaired**	12-Jul-01
0612S003	JLH01-006	Tenmile Creek	at road crossing at Eglin 231	30.5701	-86.5159	Turkey Creek	23	33	49	340	Healthy	17-Jul-01
0609S001	TAT00-001	Juniper Creek	upstream of bridge X-ing on 221	30.6078	-86.5228	Turkey Creek	19	28	36	123	Healthy	9-Mar-00
0602S002	TAT00-015	Toms Creek	no # powerline rd W 85 by RR 631	30.5093	-86.5302	Choctawhatchee	26	28	43	162	Healthy	20-May-00
0616S001	TAT00-020	Pinelog Creek	at road crossing at Eglin 221	30.6074	-86.4948	Turkey Creek	19	24	35	180	Healthy	5-Jun-00
0612S005	TAT00-021	Point Lookout Creek	at road crossing at Eglin 434	30.6215	-86.4808	Turkey Creek	17	**21**	36	197	**Suspect**	6-Jun-00
0607S005	TAT00-022	Turkey Creek	at stream crossing at Eglin 232	30.5618	-86.5363	Turkey Creek	18	**20**	35	109	**Suspect**	6-Jun-00
0607S006	TAT00-059	Turkey Creek	at stream crossing at Eglin 626	30.5428	-86.5206	Turkey Creek	17	35	31	306	Healthy	10-Jul-00
0607S003	TAT00-060	Turkey Creek	at stream crossing at Eglin 233	30.5814	-86.5749	Turkey Creek	22	27	40	263	Healthy	10-Jul-00
0607S001	TAT00-064	Bens Creek	old intersection with Eglin 604E	30.5939	-86.5765	Turkey Creek	17	**21**	38	281	**Suspect**	17-Jul-00
0610S002	TAT00-065	Rogue Creek	at road crossing at Eglin 625	30.5561	-86.5773	Turkey Creek	28	28	43	284	Healthy	17-Jul-00
0612S001	TAT00-079	Point Lookout Creek	Upstream of Culvert @ Eglin 221	30.6070	-86.4824	Turkey Creek	29	31	49	329	Healthy	30-Aug-00
0609S001	TAT01-009	Juniper Creek	upstream of bridge Xing on 221	30.6078	-86.5228	Turkey Creek	29	32	49	391	Healthy	21-Mar-01

Appendix C. Stream bioassessment data collected on Eglin AFB, FL and analyzed using two separate BioRecon Indices from the FL Department of Environmental Protection as described in Fore (2004).							"OLD" BioRecon Metrics Florida Depart. Environmental Protection					
Site ID	**Field Number**	**Stream Name**	**Locality**	**LAT**	**LONG**	**Drainage**	EPT	FL Index	Total Taxa	Total Indiv	**QUALITY**	**Date**
0607L002	TAT01-010	Turkey Creek	LANDFILL trib to Turkey (2nd well)	30.5511	-86.5064	Turkey Creek	**4**	**6**	**23**	153	**Impaired**	22-Mar-01
0607S005	TAT01-011	Turkey Creek	at stream crossing at Eglin 232	30.5618	-86.5363	Turkey Creek	20	31	41	193	Healthy	23-Mar-01
0607L001	TAT01-012	Turkey Creek	LANDFILL trib to Turkey (ref)	30.5520	-86.5047	Turkey Creek	17	**17**	34	193	**Suspect**	27-Mar-01
0607S001	TAT01-014	Bens Creek	old intersection with Eglin 604E	30.5939	-86.5765	Turkey Creek	17	**20**	34	115	**Suspect**	30-Mar-01
0610S003	TAT01-044	Rogue Creek	at Eglin Road 693	30.5564	-86.5405	Turkey Creek	**8**	**20**	25	154	**Impaired**	7-Aug-01
0607S005	TAT02-002	Turkey Creek	at stream crossing at Eglin 232	30.5618	-86.5363	Turkey Creek	19	28	42	166	Healthy	5-Feb-02
0612S001	TAT02-007	Point Lookout Creek	Upstream of Culvert @ Eglin 221	30.6070	-86.4824	Turkey Creek	30	27	49	302	Healthy	15-Feb-02
0609S001	TAT02-008	Juniper Creek	upstream of bridge Xing on 221	30.6078	-86.5228	Turkey Creek	18	24	36	162	Healthy	15-Feb-02
0612S001	TAT02-038	Point Lookout Creek	Upstream of Culvert @ Eglin 221	30.6070	-86.4824	Turkey Creek	29	32	55	330	Healthy	5-Aug-02
0609S001	TAT02-039	Juniper Creek	upstream of bridge Xing on 221	30.6078	-86.5228	Turkey Creek	29	50	54	377	Healthy	6-Aug-02
0607S005	TAT02-040	Turkey Creek	at stream crossing at Eglin 232	30.5618	-86.5363	Turkey Creek	29	41	54	285	Healthy	6-Aug-02
0405S001	DEP98-001	Lightwood Knot Crk	at main Lightwood Knot Crk	30.5283	-86.6114	Choctawhatchee	**1**	**2**	**8**	8	**Impaired**	6-Aug-98
0405S002	DEP98-002	Lightwood Knot Crk	Headwaters above claypit	30.5291	-86.6132	Choctawhatchee	20	24	43	113	Healthy	6-Aug-98
0406S003	JLH01-001	Garnier Creek	new powerline Xing E. of RR 636	30.5012	-86.5735	Choctawhatchee	**1**	**0**	**7**	107	**Impaired**	19-Jun-01
0405S003	JLH01-002	Lightwood Knot Crk	at road crossing at Eglin 632	30.5051	-86.6072	Choctawhatchee	17	**19**	34	172	**Suspect**	21-Jun-01
0406S003	TAT04-01	Garnier Creek	powerline crossing E of Eglin 636	30.5012	-86.5735	Choctawhatchee	17	**17**	**22**	77	**Impaired**	1-Mar-04
1204S001	TAT00-004	Piney Creek	Eglin Road 354	30.5034	-86.3444	Choctawhatchee	**12**	**13**	25	144	**Suspect**	28-Mar-00
1102S006	TAT04-11	Fourmile Creek	north of Eglin 312	30.5467	-86.1284	LaGrange Bayou	23	29	48	332	Healthy	25-Mar-04
0204S005	DEP00-011	Turtle Creek	at powerline road near Eglin 181	30.5247	-86.6712	East Bay River	24	35	48	243	Healthy	01-Aug-00
0204S006	DEP00-013	Turtle Creek	no # road, near B165 (B-82)	30.5378	-86.6654	East Bay River	19	30	38	160	Healthy	08-Aug-00
0210S001	DEP00-015	Live Oak Creek	at road crossing at Eglin 234	30.5110	-86.7146	East Bay River	**16**	**17**	31	110	**Impaired**	15-Aug-00
0210S004	DEP00-016	Live Oak Creek	road crossing at Eglin 235	30.5341	-86.7202	East Bay River	**8**	**9**	**22**	193	**Impaired**	17-Aug-00
0210S005	DEP00-017	Live Oak Creek	no # crossing Eglin road 235	30.5316	-86.7203	East Bay River	30	39	51	197	Healthy	22-Aug-00
0207S002	DEP00-018	Panther Creek	road crossing at Eglin 678	30.4642	-86.8168	East Bay River	24	33	45	153	Healthy	24-Aug-00
0209S001	DEP00-019	Prairie Creek	road crossing at Eglin 678	30.4526	-86.7668	East Bay River	26	46	56	197	Healthy	29-Aug-00
0204S003	DEP01-001	East Bay River	at road crossing at Eglin 259	30.4315	-86.7725	East Bay River	20	41	44	156	Healthy	8-Mar-01
0204S005	TAT00-070	Turtle Creek	powerline road near Eglin 181	30.5247	-86.6712	East Bay River	25	42	55	435	Healthy	01-Aug-00
0204S006	TAT00-072	Turtle Creek	no # road, near B165 (B-82)	30.5378	-86.6654	East Bay River	19	32	37	300	Healthy	08-Aug-00
0210S001	TAT00-074	Live Oak Creek	at road crossing at Eglin 234	30.5110	-86.7146	East Bay River	**13**	**18**	32	208	**Impaired**	15-Aug-00
0210S004	TAT00-075	Live Oak Creek	road crossing at Eglin 235	30.5341	-86.7202	East Bay River	**8**	**6**	24	108	**Impaired**	17-Aug-00
0210S005	TAT00-076	Live Oak Creek	no # road by Eglin 235 (gate 82C)	30.5316	-86.7203	East Bay River	23	38	49	509	Healthy	22-Aug-00
0207S002	TAT00-077	Panther Creek	road crossing at Eglin 678	30.4642	-86.8168	East Bay River	22	33	46	317	Healthy	24-Aug-00
0209S001	TAT00-078	Prairie Creek	road crossing at Eglin 678	30.4526	-86.7668	East Bay River	26	43	55	507	Healthy	29-Aug-00

Appendix C. Stream bioassessment data collected on Eglin AFB, FL and analyzed using two separate BioRecon Indices from the FL Department of Environmental Protection as described in Fore (2004).							"OLD" BioRecon Metrics Florida Depart. Environmental Protection					
Site ID	**Field Number**	**Stream Name**	**Locality**	**LAT**	**LONG**	**Drainage**	EPT	FL Index	Total Taxa	Total Indiv	**QUALITY**	**Date**
0209S001	TAT01-027	Prairie Creek	road crossing at Eglin 678	30.4526	-86.7668	East Bay River	27	37	57	247	Healthy	26-Apr-01
0207S001	TAT01-028	Panther Creek	at road crossing at Eglin 255	30.4310	-86.8067	East Bay River	22	33	46	245	Healthy	26-Apr-01
0209S001	TAT02-003	Prairie Creek	road crossing at Eglin 678	30.4526	-86.7668	East Bay River	27	34	48	264	Healthy	10-Feb-02
0207S001	TAT02-004	Panther Creek	at road crossing at Eglin 255	30.4310	-86.8067	East Bay River	20	31	42	223	Healthy	10-Feb-02
0211S001	TAT02-017	Turtle Creek	at road crossing at Eglin 234	30.5090	-86.6703	East Bay River	21	27	41	342	Healthy	20-Mar-02
0211S001	TAT02-037	Turtle Creek	at road crossing at Eglin 234	30.5090	-86.6703	East Bay River	23	26	45	267	Healthy	4-Aug-02
0209S001	TAT02-049	Prairie Creek	road crossing at Eglin 678	30.4526	-86.7668	East Bay River	24	29	47	467	Healthy	20-Aug-02
0201S004	DEP04-05	Long Branch	Eglin Range Road 726	30.4804	-86.9355	East Bay	**1**	**6**	**18**	37	**Impaired**	8-Jun-04
0210S001	TAT04-03	Live Oak Creek	at road crossing at Eglin 234	30.5110	-86.7146	East Bay River	**4**	**8**	31	103	**Impaired**	9-Mar-04
0210S004	TAT04-04	Live Oak Creek	Eglin RR 235/181	30.5341	-86.7202	East Bay River	**16**	**21**	38	102	**Impaired**	9-Mar-04
0201S003	TAT04-14	Catfish Branch	Eglin 736	30.5227	-86.9741	East Bay River	**14**	**20**	32	239	**Impaired**	31-Mar-04
0207S003	TAT04-39	Panther Creek	Eglin 722	30.4504	-86.8126	East Bay River	28	33	60	390	Healthy	15-Aug-04
0209S001	TAT04-40	Prairie Creek	Eglin 678	30.4526	-86.7668	East Bay River	24	36	50	424	Healthy	26-Aug-04
0211S001	TAT04-43	Turtle Creek	Eglin 234	30.5090	-86.6703	East Bay River	30	29	51	335	Healthy	4-Sep-04
0705S001	DEP00-020	Bull Creek	road crossing at Eglin 454	30.6647	-86.4279	Yellow River	22	37	44	191	Healthy	31-Aug-00
0308S003	JCD00-005	Middle Creek	at road crossing at Eglin 600E	30.6244	-86.6578	Yellow River	28	31	45	242	Healthy	29-Feb-00
0309S001	JCD99-017	Turkey Gobbler Crk	Upstream at Eglin 657	30.6360	-86.6326	Yellow River	20	23	37	254	Healthy	16-Nov-99
0309S002	JCD99-018	Turkey Gobbler Crk	Upstream at Eglin 600E	30.6238	-86.6210	Yellow River	**14**	**21**	28	145	**Impaired**	16-Nov-99
0907S001	JCD99-020	Buck Branch	Upstream of road @ Eglin 382	30.7168	-86.2659	Yellow River	**14**	**20**	26	205	**Impaired**	18-Nov-99
0102S001	JCD99-021	Dry Hollow	10 m up of crossing at Eglin 604W	30.5983	-86.8039	Yellow River	**14**	23	35	222	**Suspect**	23-Nov-99
0505S003	JLH01-003	Silver Creek	road crossing at Eglin 211	30.6946	-86.5214	Yellow River	**12**	**17**	**23**	55	**Impaired**	5-Jul-01
0505S001	JLH01-004	Silver Creek	at road crossing at Eglin 454	30.6653	-86.5112	Yellow River	**12**	**15**	**22**	145	**Impaired**	10-Jul-01
0303S001	JLH01-008	Shoal River	trib at road crossing at Eglin 211	30.6616	-86.6884	Yellow River	**11**	**19**	26	82	**Impaired**	21-Aug-01
0308S002	JLH01-009	Middle Creek	at road crossing at Eglin 211	30.6638	-86.6766	Yellow River	21	27	37	286	Healthy	23-Aug-01
0503S001	JLH01-013	West Turkey Hen Crk	at road crossing at Eglin 211	30.6809	-86.5755	Yellow River	17	22	48	385	Healthy	11-Sep-01
0309S005	JLH01-014	Turkey Gobbler Crk	at road crossing at Eglin 211	30.6713	-86.6620	Yellow River	22	24	39	205	Healthy	13-Sep-01
0306S001	JLH01-016	Metts Creek	at road crossing at Eglin 211	30.6560	-86.7293	Yellow River	21	26	42	173	Healthy	25-Sep-01
0104S001	TAT00-002	Boiling Creek	trib at road crossing at Eglin 211	30.5686	-86.8675	Yellow River	**16**	**11**	25	118	**Impaired**	21-Mar-00
0703S001	TAT00-008	Blue Spring Creek	at road crossing at Eglin 454	30.6658	-86.4541	Yellow River	19	**19**	36	148	**Suspect**	18-Apr-00
0310S001	TAT00-012	Carr Springs Branch	road crossing @ Eglin 211	30.6748	-86.6507	Yellow River	24	39	50	371	Healthy	16-May-00
0308S002	TAT00-013	Middle Creek	at road crossing at Eglin 211	30.6638	-86.6766	Yellow River	29	32	45	231	Healthy	16-May-00
0307S001	TAT00-014	Malone Creek	road crossing @ Eglin 211	30.6600	-86.6990	Yellow River	**14**	**19**	30	123	**Impaired**	17-May-00
0307S002	TAT00-016	Malone Creek	road crossing @ Eglin 688	30.6097	-86.6976	Yellow River	21	23	35	160	Healthy	23-May-00

Appendix C. Stream bioassessment data collected on Eglin AFB, FL and analyzed using two separate BioRecon Indices from the FL Department of Environmental Protection as described in Fore (2004).							"OLD" BioRecon Metrics Florida Depart. Environmental Protection					
Site ID	**Field Number**	**Stream Name**	**Locality**	**LAT**	**LONG**	**Drainage**	EPT	FL Index	Total Taxa	Total Indiv	**QUALITY**	**Date**
0104S002	TAT00-025	Boiling Creek	at road crossing at Eglin 211	30.5650	-86.8691	Yellow River	19	30	41	282	Healthy	8-Jun-00
0309S005	TAT00-026	Turkey Gobbler Crk	at road crossing at Eglin 211	30.6713	-86.6620	Yellow River	17	26	43	188	Healthy	9-Jun-00
0309S003	TAT00-027	Turkey Gobbler Crk	at road crossing at Eglin 215	30.6372	-86.6369	Yellow River	26	35	46	235	Healthy	9-Jun-00
0709S001	TAT00-029	Red Deer Creek	at road crossing at Eglin 207	30.7086	-86.3463	Yellow River	18	23	34	133	Healthy	13-Jun-00
0701S003	TAT00-030	Wise Creek	at road crossing at Eglin 207	30.7082	-86.3681	Yellow River	17	24	33	196	Healthy	13-Jun-00
0503S003	TAT00-031	West Turkey Hen Crk	trib at Eglin 605 and 611	30.6576	-86.5856	Yellow River	21	23	40	297	Healthy	14-Jun-00
0503S001	TAT00-032	West Turkey Hen Crk	at road crossing at Eglin 211	30.6809	-86.5755	Yellow River	20	22	37	190	Healthy	14-Jun-00
0102S007	TAT00-042	Wolf Creek	road crossing at Eglin 700	30.5908	-86.7973	Yellow River	22	31	41	230	Healthy	19-Jun-00
0306S002	TAT00-043	Metts Creek	road crossing at Eglin 688	30.6111	-86.7284	Yellow River	19	**18**	32	120	**Suspect**	19-Jun-00
0306S001	TAT00-044	Metts Creek	at road crossing at Eglin 211	30.6560	-86.7293	Yellow River	22	35	38	220	Healthy	20-Jun-00
0305S002	TAT00-045	Milligan Creek	at road crossing at Eglin 211	30.6320	-86.7749	Yellow River	19	27	37	182	Healthy	20-Jun-00
0506S003	TAT00-046	Honey Creek	at road crossing at Eglin 454	30.6653	-86.4848	Yellow River	19	25	34	111	Healthy	21-Jun-00
0506S001	TAT00-047	Honey Creek	at road crossing at Eglin 211	30.6939	-86.4962	Yellow River	20	25	36	197	Healthy	21-Jun-00
0703S002	TAT00-055	Blue Spring Creek	at road crossing at Eglin 211	30.6866	-86.4501	Yellow River	17	23	32	130	Healthy	5-Jul-00
0102S005	TAT00-056	Yellow River	trib at road crossing at Eglin 211	30.6050	-86.8225	Yellow River	25	26	39	269	Healthy	6-Jul-00
0102S006	TAT00-057	Yellow River	no # rd by conflu w Broxon Brnch	30.6098	-86.8380	Yellow River	**11**	**12**	30	97	**Impaired**	6-Jul-00
0701S006	TAT00-058	Titi Creek	at road crossing at Eglin 207	30.7016	-86.4922	Yellow River	18	31	34	130	Healthy	7-Jul-00
0505S002	TAT00-066	Silver Creek	trib at road crossing at Eglin 565	30.6800	-86.5225	Yellow River	**13**	23	40	163	**Suspect**	25-Jul-00
0504S001	TAT00-067	Pearl Creek	road crossing at Eglin 211	30.6805	-86.5553	Yellow River	18	25	34	94	Healthy	25-Jul-00
0713S001	TAT00-068	Cawthan Branch	at road crossing at Eglin 409	30.7146	-86.3161	Yellow River	20	24	36	108	Healthy	28-Jul-00
0701S001	TAT00-069	Cowpen Branch	at road crossing at Eglin 409	30.7178	-86.3150	Yellow River	**10**	**16**	24	58	**Impaired**	28-Jul-00
0705S001	TAT00-080	Bull Creek	road crossing at Eglin 454	30.6647	-86.4279	Yellow River	29	32	52	344	Healthy	31-Aug-00
0308S003	TAT01-005	Middle Creek	at road crossing at Eglin 600E	30.6244	-86.6578	Yellow River	30	37	51	428	Healthy	15-Mar-01
0506S001	TAT01-006	Honey Creek	at road crossing at Eglin 211	30.6939	-86.4962	Yellow River	26	30	43	242	Healthy	17-Mar-01
0104S003	TAT01-007	Moore Creek	Moore Cr. Gauge Station #1	30.5589	-86.8920	Yellow River	27	35	49	223	Healthy	19-Mar-01
0503SH01	TAT01-030	Turkey Hen Creek	Steephead@Okie Tower = Hwy 85	30.6463	-86.5558	Yellow River	**7**	**4**	27	218	**Impaired**	1-May-01
0103S001	TAT01-031	Weaver River	road crossing at Eglin 736	30.5518	-86.9297	Yellow River	18	24	37	327	Healthy	15-May-01
0106S002	TAT01-037	Little Boiling Creek	at Eglin Road 718	30.5262	-86.8647	Yellow River	27	28	45	186	Healthy	7-Jun-01
0705S002	TAT01-039	Bull Creek	at Eglin AFB Range Rd 211	30.6741	-86.4300	Yellow River	21	23	51	227	Healthy	12-Jun-01
0706S001	TAT01-040	Ramer Creek	at Eglin AFB Range Rd 211	30.6749	-86.4123	Yellow River	**16**	22	38	195	**Suspect**	12-Jun-01
0308S003	TAT02-001	Middle Creek	at road crossing at Eglin 600E	30.6244	-86.6578	Yellow River	27	33	52	280	Healthy	4-Feb-02
0104S003	TAT02-012	Moore Creek	Moore Cr. Gauge Station #1	30.5589	-86.8920	Yellow River	19	**20**	37	132	**Suspect**	17-Feb-02
0503S002	TAT02-013	West Turkey Hen Crk	at road crossing at Eglin 233	30.6769	-86.5780	Yellow River	**16**	**16**	28	74	**Impaired**	17-Feb-02

Appendix C. Stream bioassessment data collected on Eglin AFB, FL and analyzed using two separate BioRecon Indices from the FL Department of Environmental Protection as described in Fore (2004).							"OLD" BioRecon Metrics Florida Depart. Environmental Protection					
Site ID	**Field Number**	**Stream Name**	**Locality**	**LAT**	**LONG**	**Drainage**	EPT	FL Index	Total Taxa	Total Indiv	**QUALITY**	**Date**
0308S003	TAT02-035	Middle Creek	at road crossing at Eglin 600E	30.6244	-86.6578	Yellow River	24	33	48	238	Healthy	2-Aug-02
0503S002	TAT02-045	West Turkey Hen Crk	at road crossing at Eglin 233	30.6769	-86.5780	Yellow River	22	30	46	301	Healthy	13-Aug-02
0104S003	TAT02-048	Moore Creek	Moore Cr. Gauge Station #1	30.5589	-86.8920	Yellow River	22	31	37	177	Healthy	19-Aug-02
0103S006	TAT04-09	Double Head Branch	Eglin RR 287 - below Buck Pond	30.5511	-86.9104	Yellow River	**4**	**17**	29	121	**Impaired**	23-Mar-04
0701S007	TAT04-10	Titi Creek	Eglin 220	30.6999	-86.4685	Yellow River	24	36	52	363	Healthy	24-Mar-04
0101S003	TAT04-30	Hicks Creek	Eglin 736 east branch	30.5400	-86.9479	Yellow River	17	**19**	34	291	**Suspect**	19-Jun-04
0104S003	TAT04-34	Moore Creek	north of Eglin 211	30.5589	-86.8920	Yellow River	24	29	58	306	Healthy	6-Aug-04
0308S002	TAT04-41	Middle Creek	Eglin 211	30.6638	-86.6766	Yellow River	28	32	51	520	Healthy	28-Aug-04
0707S001	TAT04-42	Gum Creek	Eglin 207	30.7065	-86.3934	Yellow River	25	29	49	445	Healthy	29-Aug-04

Appendix C. Stream bioassessment data collected on Eglin AFB, FL and analyzed using two separate BioRecon Indices from Florida DEP as described in Fore (2004).						"NEW" BioRecon Metrics Florida Department of Environmental Protection							
Site ID	**Field Number**	**Stream Name**	**Locality**	**LAT**	**LONG**	Total Taxa	Ephem Taxa	Trichop Taxa	Long-Lived Taxa	Clinger Taxa	Sensitive Taxa	**Score**	**Quality**
0901S001	DEP98-005	Alaqua Creek	at road crossing at Eglin 210	30.6925	-86.2417	41	9	6	10	17	17	9	Pass
1108S001	TAT00-009	Blount Mill Creek	at road crossing at Eglin 200/201	30.6075	-86.2146	38	7	4	8	10	10	6	Pass
1103S001	TAT00-010	Alaqua Creek	at road crossing at Eglin 200	30.5952	-86.1642	37	8	5	6	9	11	6	Pass
0901S001	TAT00-023	Alaqua Creek	at road crossing at Eglin 210	30.6925	-86.2417	33	8	4	5	9	10	6	**Fail**
1104S003	TAT00-062	Little Alaqua Creek	at road crossing at Eglin 205	30.5550	-86.1847	31	3	7	8	8	10	6	**Fail**
0908S001	TAT00-063	Live Oak Branch	Up of bridge blowout @ Eglin 382	30.7194	-86.2812	39	8	8	7	12	14	8	Pass
1108S001	TAT01-017	Blount Mill Creek	at road crossing at Eglin 200/201	30.6075	-86.2146	37	9	6	10	14	14	8	Pass
1104S004	TAT01-025	Little Alaqua Creek	at road crossing at Eglin 208	30.5928	-86.2142	43	14	2	8	14	20	8	Pass
0903S001	TAT01-032	Oakie Creek	at road crossing at Eglin 208	30.6615	-86.1969	45	8	9	10	10	15	8	Pass
0905S001	TAT01-033	Bear Bay Branch	Eglin Range Road 381	30.6865	-86.2717	41	5	13	11	13	11	8	Pass
1104S004	TAT02-005	Little Alaqua Creek	at road crossing at Eglin 208	30.5928	-86.2142	42	10	10	4	11	15	8	Pass
1103S003	TAT02-006	Alaqua Creek	at road crossing at Eglin 205	30.5561	-86.1792	35	7	11	9	11	10	7	Pass
0908S001	TAT02-016	Live Oak Branch	Up of bridge blowout @ Eglin 382	30.7194	-86.2812	49	13	10	13	13	16	9	Pass
1103S003	TAT02-044	Alaqua Creek	at road crossing at Eglin 205	30.5561	-86.1792	44	8	7	8	9	9	7	Pass
0908S001	TAT02-046	Live Oak Branch	Up of bridge blowout @ Eglin 382	30.7194	-86.2812	65	12	13	15	17	18	10	Pass
1104S004	TAT02-047	Little Alaqua Creek	at road crossing at Eglin 208	30.5928	-86.2142	47	11	9	7	12	15	9	Pass
0901S003	DEP04-03	Tallaperla Creek	powerline cut SE of Eglin 330	30.6498	-86.1898	40	7	7	11	13	14	8	Pass
0901S003	TAT04-13	Tallaperla Creek	powerline cut SE of Eglin 330	30.6498	-86.1898	43	7	9	12	14	16	9	Pass
0906S001	TAT04-35	Bullhide Creek	Eglin 213	30.7087	-86.2504	43	7	8	13	13	13	8	Pass
0905S001	TAT04-36	Bear Bay Branch	Eglin 381	30.6865	-86.2717	50	9	12	14	15	14	9	Pass
1105S001	TAT04-37	White Branch	Eglin 200	30.6074	-86.1394	52	9	12	13	15	18	9	Pass
1007S001	JCD00-002	Basin Creek	at road crossing at Eglin 212	30.5280	-86.2825	35	6	4	8	18	17	7	Pass
1010S001	TAT00-003	Watering Creek	at road crossing at Eglin 212	30.5535	-86.2768	42	9	7	8	9	13	8	Pass
1008S001	TAT00-011	Little Basin Creek	at road crossing at Eglin 359	30.5336	-86.2380	42	7	8	7	8	13	7	Pass
1007S002	TAT00-017	Basin Creek	at road crossing at Eglin 433	30.5306	-86.2629	50	11	8	9	11	15	9	Pass
1010S003	TAT01-020	Pochanee Branch	road crossing at Eglin 370	30.5895	-86.2959	44	10	7	6	10	10	7	Pass
1007S006	TAT01-021	Basin Creek	at Eglin AFB Range Rd 427/222	30.5254	-86.2923	51	15	10	4	11	15	8	Pass
1007S006	TAT02-014	Basin Creek	at Eglin AFB Range Rd 427/222	30.5254	-86.2923	40	9	9	8	14	17	8	Pass
1009S002	TAT02-015	Bear Branch	at road crossing at Eglin 359	30.5350	-86.2450	54	10	13	8	17	21	9	Pass
1010S003	TAT02-018	Pochanee Branch	road crossing at Eglin 370	30.5895	-86.2959	48	11	8	8	12	11	8	Pass
1007S006	TAT02-036	Basin Creek	at Eglin AFB Range Rd 427/222	30.5254	-86.2923	60	13	12	9	15	18	10	Pass

Appendix C. Stream bioassessment data collected on Eglin AFB, FL and analyzed using two separate BioRecon Indices from Florida DEP as described in Fore (2004).						"NEW" BioRecon Metrics Florida Department of Environmental Protection							
Site ID	**Field Number**	**Stream Name**	**Locality**	**LAT**	**LONG**	Total Taxa	Ephem Taxa	Trichop Taxa	Long-Lived Taxa	Clinger Taxa	Sensitive Taxa	**Score**	**Quality**
1010S003	TAT02-043	Pochanee Branch	road crossing at Eglin 370	30.5895	-86.2959	58	12	15	13	13	15	9	Pass
1009S002	TAT04-16	Bear Branch	at road crossing at Eglin 359	30.5350	-86.2450	63	8	14	13	17	17	9	Pass
1008S001	TAT04-19	Little Basin Creek	at road crossing at Eglin 359	30.5336	-86.2380	54	8	13	10	12	18	9	Pass
1008S002	TAT04-38	Little Basin Creek	Eglin 351	30.5356	-86.2277	53	9	12	13	13	20	9	Pass
0605S002	DEP00-002	Swift Creek	S. of old railroad crossing culvert	30.5606	-86.4589	35	8	7	6	14	14	7	Pass
0815S001	DEP00-003	Open Branch	at intersection at Eglin 214/374	30.6426	-86.3250	43	8	7	9	11	12	8	Pass
0815S001	DEP00-004	Open Branch	at intersection at Eglin 214/374	30.6426	-86.3250	20	2	2	3	1	1	2	**Fail**
0804S004	DEP00-005	Rocky Creek	at Eglin Range Road 214/374	30.6483	-86.3334	31	10	8	4	11	10	7	Pass
0804S004	DEP00-006	Rocky Creek	at Eglin Range Road 214/374	30.6483	-86.3334	37	9	7	4	10	12	7	Pass
0606S001	DEP00-009	Shaw Still Branch	0.2 miles S of 190: In subdivision	30.5302	-86.4528	**17**	2	5	0	4	3	2	**Fail**
0802S002	DEP00-010	East Turkey Creek	1.5 miles E of routes 285 and 190	30.5125	-86.4251	32	8	8	1	7	9	5	**Fail**
0817S002	DEP00-012	Exline Creek	trib of Exline @ Eglin 503	30.6448	-86.3749	35	6	7	9	8	9	7	Pass
0818S001	DEP00-014	Mt. Sinai Branch	road crossing at Eglin 412	30.6646	-86.3653	33	8	8	8	12	11	7	Pass
0605S002	TAT00-019	Swift Creek	S. of old railroad crossing culvert	30.5606	-86.4589	34	7	7	8	10	9	7	Pass
0811S001	TAT00-028	Rocky Creek	trib at Eglin 420	30.6062	-86.3977	40	7	10	6	13	11	7	Pass
0809S005	TAT00-048	Little Rocky Creek	road crossing @ Eglin 434	30.6209	-86.4306	37	7	9	9	12	12	8	Pass
0809S001	TAT00-049	Little Rocky Creek	at road crossing at Eglin 515	30.5901	-86.4128	35	9	8	7	12	12	7	Pass
0809S003	TAT00-053	Little Rocky Creek	at road crossing at Eglin 200	30.5769	-86.3883	34	5	9	6	11	10	6	Pass
0804S002	TAT00-054	Rocky Creek	at road crossing at Eglin 219	30.5352	-86.3825	**12**	2	3	0	4	2	2	**Fail**
0817S002	TAT00-071	Exline Creek	tributary of Exline @ Eglin 503	30.6448	-86.3749	33	6	10	7	10	9	6	Pass
0818S001	TAT00-073	Mt. Sinai Branch	road crossing at Eglin 412	30.6646	-86.3653	40	9	11	9	11	12	8	Pass
0804S004	TAT01-003	Rocky Creek	at Eglin Range Road 214/374	30.6483	-86.3334	41	7	9	8	13	15	8	Pass
0809S001	TAT01-018	Little Rocky Creek	at road crossing at Eglin 515	30.5901	-86.4128	36	11	5	10	12	12	8	Pass
0809S002	TAT01-019	Little Rocky Creek	at road crossing at Eglin 499	30.5854	-86.4038	35	9	6	8	18	15	8	Pass
0803S001	TAT01-024	Long Creek	trib at road crossing at Eglin 406	30.5428	-86.4133	41	7	12	10	10	11	8	Pass
0804S005	TAT01-034	Dogwood Head Brch	at Eglin Road 485	30.6248	-86.3593	34	6	3	8	7	8	5	**Fail**
0804S006	TAT01-035	Green Head Branch	at Eglin Road 485	30.6272	-86.3595	29	8	4	6	8	11	6	**Fail**
0817S004	TAT01-042	Exline Creek	trib to Exline Creek at Eglin 492	30.6563	-86.3543	27	3	7	2	5	6	4	**Fail**
0809S003	TAT02-009	Little Rocky Creek	at road crossing at Eglin 200	30.5769	-86.3883	48	14	9	9	15	17	10	Pass
0809S002	TAT02-010	Little Rocky Creek	at road crossing at Eglin 499	30.5854	-86.4038	54	14	10	10	20	20	10	Pass
0803S001	TAT02-011	Long Creek	trib at road crossing at Eglin 406	30.5428	-86.4133	31	8	10	7	9	12	7	Pass
0804S001	TAT02-034	Rocky Creek	at road crossing at Eglin 200	30.5734	-86.3667	45	11	8	9	15	16	9	Pass

Appendix C. Stream bioassessment data collected on Eglin AFB, FL and analyzed using two separate BioRecon Indices from Florida DEP as described in Fore (2004).						"NEW" BioRecon Metrics Florida Department of Environmental Protection							
Site ID	**Field Number**	**Stream Name**	**Locality**	**LAT**	**LONG**	Total Taxa	Ephem Taxa	Trichop Taxa	Long-Lived Taxa	Clinger Taxa	Sensitive Taxa	**Score**	**Quality**
0809S002	TAT02-041	Little Rocky Creek	at road crossing at Eglin 499	30.5854	-86.4038	46	11	5	14	17	18	9	Pass
0803S001	TAT02-042	Long Creek	trib at road crossing at Eglin 406	30.5428	-86.4133	46	10	11	17	11	14	9	Pass
0809S007	TAT02-050	Little Rocky Creek	at end of Eglin 477	30.5470	-86.3816	55	14	12	12	16	19	10	Pass
0809S007	DEP02-050	Little Rocky Creek	at end of Eglin 477	30.5470	-86.3816	64	13	13	17	19	21	10	Pass
0809S008	DEP04-01	Little Rocky Creek	above railroad trestle - pre-restore	30.6074	-86.4223	50	9	9	8	9	10	8	Pass
0809S008	DEP04-02	Little Rocky Creek	below railroad trestle - pre-restore	30.6067	-86.4219	58	14	17	14	20	19	10	Pass
0809S008	TAT04-05	Little Rocky Creek	below railroad trestle - pre-restore	30.6067	-86.4219	58	14	17	14	20	19	10	Pass
0809S008	TAT04-06	Little Rocky Creek	above railroad trestle - pre-restore	30.6074	-86.4223	50	9	9	8	10	11	8	Pass
0803S003	TAT04-18	Long Creek	Eglin 469 – restoration - road gone	30.5226	-86.4120	60	13	14	7	11	18	9	Pass
0809S007	TAT04-44	Little Rocky Creek	at end of Eglin 477	30.5470	-86.3816	52	10	10	14	12	17	9	Pass
0809S001	TAT04-45	Little Rocky Creek	at road crossing at Eglin 515	30.5901	-86.4128	44	14	9	8	15	18	9	Pass
0604S005	DEP00-007	Mill Creek	N. S.R. 190 btw teebox & 13	30.5373	-86.4853	44	9	8	9	12	15	8	Pass
0604S006	DEP00-008	Mill Creek	north of SR 190, near hole 9	30.5438	-86.4873	30	8	5	9	6	9	6	**Fail**
0604S005	DEP98-003	Mill Creek	N. S.R. 190 btw teebox & 13	30.5373	-86.4853	47	7	11	13	14	15	9	Pass
0604S001	DEP98-004	Mill Creek	Blw Eglin Golf Course Trout Lake	30.5230	-86.4865	**14**	2	2	1	1	0	1	**Fail**
0604S006	DEP99-001	Mill Creek	north of SR 190, near hole 9	30.5438	-86.4873	30	4	8	10	10	11	7	Pass
0604S004	JCD99-016	Mill Creek	first non-culverted section S.R. 190	30.5344	-86.4861	**20**	2	2	3	4	3	2	**Fail**
0604S004	TAT00-018	Mill Creek	first non-culverted section S.R. 190	30.5344	-86.4861	41	10	9	8	10	13	8	Pass
0604S005	TAT01-041	Mill Creek	N. S.R. 190 btw teebox & 13	30.5373	-86.4853	58	11	15	13	14	17	10	Pass
0609S002	DEP00-001	Juniper Creek	trib upstream of borrow pit runoff	30.5925	-86.5147	33	5	7	9	12	9	7	Pass
0610S001	JCD99-009	Rogue Creek	Upstream of culvert at 233	30.5561	-86.5621	31	9	6	5	7	10	6	**Fail**
0612S001	JCD99-014	Point Lookout Creek	Upstream of Culvert @ Eglin 221	30.6070	-86.4824	34	7	7	7	9	8	6	Pass
0607S001	JCD99-015	Bens Creek	old intersection with Eglin 604E	30.5939	-86.5765	36	5	8	5	15	12	7	Pass
0610S001	JLH01-005	Rogue Creek	Upstream of culvert at 233	30.5561	-86.5621	26	6	8	5	8	11	6	Pass
0612S003	JLH01-006	Tenmile Creek	at road crossing at Eglin 231	30.5701	-86.5159	49	8	12	9	11	14	8	Pass
0609S001	TAT00-001	Juniper Creek	upstream of bridge X-ing on 221	30.6078	-86.5228	36	8	8	7	10	9	7	Pass
0602S002	TAT00-015	Toms Creek	no # powerline rd W 85 by RR 631	30.5093	-86.5302	43	14	10	6	8	15	8	Pass
0616S001	TAT00-020	Pinelog Creek	at road crossing at Eglin 221	30.6074	-86.4948	35	7	9	6	12	10	7	Pass
0612S005	TAT00-021	Point Lookout Creek	at road crossing at Eglin 434	30.6215	-86.4808	36	8	5	8	8	10	6	Pass
0607S005	TAT00-022	Turkey Creek	at stream crossing at Eglin 232	30.5618	-86.5363	35	11	6	1	9	10	6	**Fail**
0607S006	TAT00-059	Turkey Creek	at stream crossing at Eglin 626	30.5428	-86.5206	31	3	9	7	12	11	6	Pass
0607S003	TAT00-060	Turkey Creek	at stream crossing at Eglin 233	30.5814	-86.5749	40	11	7	5	11	14	8	Pass

Appendix C. Stream bioassessment data collected on Eglin AFB, FL and analyzed using two separate BioRecon Indices from Florida DEP as described in Fore (2004).						"NEW" BioRecon Metrics Florida Department of Environmental Protection							
Site ID	**Field Number**	**Stream Name**	**Locality**	**LAT**	**LONG**	Total Taxa	Ephem Taxa	Trichop Taxa	Long-Lived Taxa	Clinger Taxa	Sensitive Taxa	**Score**	**Quality**
0607S001	TAT00-064	Bens Creek	old intersection with Eglin 604E	30.5939	-86.5765	38	5	9	6	13	11	7	Pass
0610S002	TAT00-065	Rogue Creek	at road crossing at Eglin 625	30.5561	-86.5773	43	9	15	6	15	14	8	Pass
0612S001	TAT00-079	Point Lookout Creek	Upstream of Culvert @ Eglin 221	30.6070	-86.4824	49	12	13	6	14	17	9	Pass
0609S001	TAT01-009	Juniper Creek	upstream of bridge Xing on 221	30.6078	-86.5228	49	12	13	5	13	15	9	Pass
0607L002	TAT01-010	Turkey Creek	LANDFILL trib to Turkey (2nd well)	30.5511	-86.5064	**23**	2	2	3	1	3	2	**Fail**
0607S005	TAT01-011	Turkey Creek	at stream crossing at Eglin 232	30.5618	-86.5363	41	10	8	3	12	12	7	Pass
0607L001	TAT01-012	Turkey Creek	LANDFILL trib to Turkey (ref)	30.5520	-86.5047	34	7	10	9	5	9	6	Pass
0607S001	TAT01-014	Bens Creek	old intersection with Eglin 604E	30.5939	-86.5765	34	6	7	10	11	12	7	Pass
0610S003	TAT01-044	Rogue Creek	at Eglin Road 693	30.5564	-86.5405	25	2	6	3	4	3	3	**Fail**
0607S005	TAT02-002	Turkey Creek	at stream crossing at Eglin 232	30.5618	-86.5363	42	9	8	8	11	11	8	Pass
0612S001	TAT02-007	Point Lookout Creek	Upstream of Culvert @ Eglin 221	30.6070	-86.4824	49	15	13	6	15	16	9	Pass
0609S001	TAT02-008	Juniper Creek	upstream of bridge Xing on 221	30.6078	-86.5228	36	9	5	7	15	14	7	Pass
0612S001	TAT02-038	Point Lookout Creek	Upstream of Culvert @ Eglin 221	30.6070	-86.4824	55	17	8	10	11	18	9	Pass
0609S001	TAT02-039	Juniper Creek	upstream of bridge Xing on 221	30.6078	-86.5228	54	10	10	16	18	20	10	Pass
0607S005	TAT02-040	Turkey Creek	at stream crossing at Eglin 232	30.5618	-86.5363	54	16	9	10	15	18	10	Pass
0405S001	DEP98-001	Lightwood Knot Crk	at main Lightwood Knot Crk	30.5283	-86.6114	**8**	0	1	1	1	1	1	**Fail**
0405S002	DEP98-002	Lightwood Knot Crk	Headwaters above claypit	30.5291	-86.6132	43	9	8	10	11	11	8	Pass
0406S003	JLH01-001	Garnier Creek	new powerline Xing E. of RR 636	30.5012	-86.5735	**7**	1	0	0	0	0	0	**Fail**
0405S003	JLH01-002	Lightwood Knot Crk	at road crossing at Eglin 632	30.5051	-86.6072	34	8	8	6	10	8	6	Pass
0406S003	TAT04-01	Garnier Creek	powerline crossing E of Eglin 636	30.5012	-86.5735	22	6	7	9	9	10	6	Pass
1204S001	TAT00-004	Piney Creek	Eglin Road 354	30.5034	-86.3444	25	5	4	2	4	6	3	**Fail**
1102S006	TAT04-11	Fourmile Creek	north of Eglin 312	30.5467	-86.1284	48	8	10	11	15	16	9	Pass
0204S005	DEP00-011	Turtle Creek	at powerline road near Eglin 181	30.5247	-86.6712	48	10	9	9	15	16	9	Pass
0204S006	DEP00-013	Turtle Creek	no # road, near B165 (B-82)	30.5378	-86.6654	38	9	6	9	12	13	8	Pass
0210S001	DEP00-015	Live Oak Creek	at road crossing at Eglin 234	30.5110	-86.7146	31	7	8	4	5	6	5	**Fail**
0210S004	DEP00-016	Live Oak Creek	road crossing at Eglin 235	30.5341	-86.7202	**22**	4	3	4	3	3	3	**Fail**
0210S005	DEP00-017	Live Oak Creek	no # crossing Eglin road 235	30.5316	-86.7203	51	16	10	8	18	16	9	Pass
0207S002	DEP00-018	Panther Creek	road crossing at Eglin 678	30.4642	-86.8168	45	10	12	9	14	14	9	Pass
0209S001	DEP00-019	Prairie Creek	road crossing at Eglin 678	30.4526	-86.7668	56	10	11	11	18	19	10	Pass
0204S003	DEP01-001	East Bay River	at road crossing at Eglin 259	30.4315	-86.7725	44	7	8	12	17	14	9	Pass
0204S005	TAT00-070	Turtle Creek	powerline road near Eglin 181	30.5247	-86.6712	55	10	11	10	14	16	9	Pass
0204S006	TAT00-072	Turtle Creek	no # road, near B165 (B-82)	30.5378	-86.6654	37	9	7	6	11	12	7	Pass

Appendix C. Stream bioassessment data collected on Eglin AFB, FL and analyzed using two separate BioRecon Indices from Florida DEP as described in Fore (2004).						"NEW" BioRecon Metrics Florida Department of Environmental Protection							
Site ID	**Field Number**	**Stream Name**	**Locality**	**LAT**	**LONG**	Total Taxa	Ephem Taxa	Trichop Taxa	Long-Lived Taxa	Clinger Taxa	Sensitive Taxa	**Score**	**Quality**
0210S001	TAT00-074	Live Oak Creek	at road crossing at Eglin 234	30.5110	-86.7146	32	5	6	5	3	3	4	**Fail**
0210S004	TAT00-075	Live Oak Creek	road crossing at Eglin 235	30.5341	-86.7202	24	4	4	0	1	0	2	**Fail**
0210S005	TAT00-076	Live Oak Creek	no # road by Eglin 235 (gate 82C)	30.5316	-86.7203	49	11	8	10	11	13	9	Pass
0207S002	TAT00-077	Panther Creek	road crossing at Eglin 678	30.4642	-86.8168	46	8	10	8	8	10	7	Pass
0209S001	TAT00-078	Prairie Creek	road crossing at Eglin 678	30.4526	-86.7668	55	8	13	10	17	15	9	Pass
0209S001	TAT01-027	Prairie Creek	road crossing at Eglin 678	30.4526	-86.7668	57	13	9	12	17	17	10	Pass
0207S001	TAT01-028	Panther Creek	at road crossing at Eglin 255	30.4310	-86.8067	46	11	9	9	15	15	9	Pass
0209S001	TAT02-003	Prairie Creek	road crossing at Eglin 678	30.4526	-86.7668	48	13	10	8	16	16	9	Pass
0207S001	TAT02-004	Panther Creek	at road crossing at Eglin 255	30.4310	-86.8067	42	9	8	6	13	14	8	Pass
0211S001	TAT02-017	Turtle Creek	at road crossing at Eglin 234	30.5090	-86.6703	41	11	9	5	10	9	7	Pass
0211S001	TAT02-037	Turtle Creek	at road crossing at Eglin 234	30.5090	-86.6703	45	11	10	7	10	12	8	Pass
0209S001	TAT02-049	Prairie Creek	road crossing at Eglin 678	30.4526	-86.7668	47	12	10	7	15	14	9	Pass
0201S004	DEP04-05	Long Branch	Eglin Range Road 726	30.4804	-86.9355	37	0	1	0	2	3	2	**Fail**
0210S001	TAT04-03	Live Oak Creek	at road crossing at Eglin 234	30.5110	-86.7146	31	3	1	1	1	3	2	**Fail**
0210S004	TAT04-04	Live Oak Creek	Eglin RR 235/181	30.5341	-86.7202	38	5	10	3	5	8	5	**Fail**
0201S003	TAT04-14	Catfish Branch	Eglin 736	30.5227	-86.9741	32	4	9	6	5	6	5	**Fail**
0207S003	TAT04-39	Panther Creek	Eglin 722	30.4504	-86.8126	60	12	14	10	13	17	10	Pass
0209S001	TAT04-40	Prairie Creek	Eglin 678	30.4526	-86.7668	50	10	10	8	15	17	9	Pass
0211S001	TAT04-43	Turtle Creek	Eglin 234	30.5090	-86.6703	51	15	12	8	13	17	9	Pass
0705S001	DEP00-020	Bull Creek	road crossing at Eglin 454	30.6647	-86.4279	44	9	8	8	14	15	8	Pass
0308S003	JCD00-005	Middle Creek	at road crossing at Eglin 600E	30.6244	-86.6578	45	11	13	9	17	14	9	Pass
0309S001	JCD99-017	Turkey Gobbler Crk	Upstream at Eglin 657	30.6360	-86.6326	37	7	10	9	12	9	7	Pass
0309S002	JCD99-018	Turkey Gobbler Crk	Upstream at Eglin 600E	30.6238	-86.6210	28	6	4	7	10	11	6	**Fail**
0907S001	JCD99-020	Buck Branch	Upstream of road @ Eglin 382	30.7168	-86.2659	26	6	4	9	10	8	6	**Fail**
0102S001	JCD99-021	Dry Hollow	10 m up of crossing at Eglin 604W	30.5983	-86.8039	35	6	6	6	12	10	6	Pass
0505S003	JLH01-003	Silver Creek	road crossing at Eglin 211	30.6946	-86.5214	**23**	5	6	3	7	7	4	**Fail**
0505S001	JLH01-004	Silver Creek	at road crossing at Eglin 454	30.6653	-86.5112	**22**	4	6	5	7	7	4	**Fail**
0303S001	JLH01-008	Shoal River	trib at road crossing at Eglin 211	30.6616	-86.6884	26	5	5	2	7	7	4	**Fail**
0308S002	JLH01-009	Middle Creek	at road crossing at Eglin 211	30.6638	-86.6766	37	11	7	4	11	14	7	Pass
0503S001	JLH01-013	West Turkey Hen Crk	at road crossing at Eglin 211	30.6809	-86.5755	48	10	6	4	4	7	6	Pass
0309S005	JLH01-014	Turkey Gobbler Crk	at road crossing at Eglin 211	30.6713	-86.6620	39	11	10	3	10	10	7	Pass
0306S001	JLH01-016	Metts Creek	at road crossing at Eglin 211	30.6560	-86.7293	42	5	14	8	6	9	6	Pass

Appendix C. Stream bioassessment data collected on Eglin AFB, FL and analyzed using two separate BioRecon Indices from Florida DEP as described in Fore (2004).						"NEW" BioRecon Metrics Florida Department of Environmental Protection							
Site ID	**Field Number**	**Stream Name**	**Locality**	**LAT**	**LONG**	Total Taxa	Ephem Taxa	Trichop Taxa	Long-Lived Taxa	Clinger Taxa	Sensitive Taxa	**Score**	**Quality**
0104S001	TAT00-002	Boiling Creek	trib at road crossing at Eglin 211	30.5686	-86.8675	25	6	8	7	7	7	5	**Fail**
0703S001	TAT00-008	Blue Spring Creek	at road crossing at Eglin 454	30.6658	-86.4541	36	8	10	3	9	9	6	Pass
0310S001	TAT00-012	Carr Springs Branch	road crossing @ Eglin 211	30.6748	-86.6507	50	8	11	10	14	16	9	Pass
0308S002	TAT00-013	Middle Creek	at road crossing at Eglin 211	30.6638	-86.6766	45	14	11	7	11	13	8	Pass
0307S001	TAT00-014	Malone Creek	road crossing @ Eglin 211	30.6600	-86.6990	30	8	5	3	8	8	5	**Fail**
0307S002	TAT00-016	Malone Creek	road crossing @ Eglin 688	30.6097	-86.6976	35	9	10	4	10	10	6	Pass
0104S002	TAT00-025	Boiling Creek	at road crossing at Eglin 211	30.5650	-86.8691	41	9	8	5	11	11	7	Pass
0309S005	TAT00-026	Turkey Gobbler Crk	at road crossing at Eglin 211	30.6713	-86.6620	43	10	6	6	8	8	7	Pass
0309S003	TAT00-027	Turkey Gobbler Crk	at road crossing at Eglin 215	30.6372	-86.6369	46	12	9	9	13	13	9	Pass
0709S001	TAT00-029	Red Deer Creek	at road crossing at Eglin 207	30.7086	-86.3463	34	7	8	7	10	9	7	Pass
0701S003	TAT00-030	Wise Creek	at road crossing at Eglin 207	30.7082	-86.3681	33	6	7	6	11	12	7	Pass
0503S003	TAT00-031	West Turkey Hen Crk	trib at Eglin 605 and 611	30.6576	-86.5856	40	9	8	6	11	13	7	Pass
0503S001	TAT00-032	West Turkey Hen Crk	at road crossing at Eglin 211	30.6809	-86.5755	37	11	8	4	8	8	6	Pass
0102S007	TAT00-042	Wolf Creek	road crossing at Eglin 700	30.5908	-86.7973	41	7	11	7	13	12	8	Pass
0306S002	TAT00-043	Metts Creek	road crossing at Eglin 688	30.6111	-86.7284	32	9	7	6	7	9	6	Pass
0306S001	TAT00-044	Metts Creek	at road crossing at Eglin 211	30.6560	-86.7293	38	9	9	8	11	13	8	Pass
0305S002	TAT00-045	Milligan Creek	at road crossing at Eglin 211	30.6320	-86.7749	37	9	7	5	10	12	7	Pass
0506S003	TAT00-046	Honey Creek	at road crossing at Eglin 454	30.6653	-86.4848	34	7	9	5	10	11	6	Pass
0506S001	TAT00-047	Honey Creek	at road crossing at Eglin 211	30.6939	-86.4962	36	8	8	5	12	13	7	Pass
0703S002	TAT00-055	Blue Spring Creek	at road crossing at Eglin 211	30.6866	-86.4501	32	7	8	4	9	10	6	Pass
0102S005	TAT00-056	Yellow River	trib at road crossing at Eglin 211	30.6050	-86.8225	39	9	12	5	12	14	7	Pass
0102S006	TAT00-057	Yellow River	no # rd by conflu w Broxon Brnch	30.6098	-86.8380	30	6	5	2	2	4	4	**Fail**
0701S006	TAT00-058	Titi Creek	at road crossing at Eglin 207	30.7016	-86.4922	34	7	7	7	12	12	7	Pass
0505S002	TAT00-066	Silver Creek	trib at road crossing at Eglin 565	30.6800	-86.5225	40	3	8	9	7	4	6	**Fail**
0504S001	TAT00-067	Pearl Creek	road crossing at Eglin 211	30.6805	-86.5553	34	5	12	6	10	9	6	Pass
0713S001	TAT00-068	Cawthan Branch	at road crossing at Eglin 409	30.7146	-86.3161	36	7	11	8	7	8	6	Pass
0701S001	TAT00-069	Cowpen Branch	at road crossing at Eglin 409	30.7178	-86.3150	24	4	5	5	5	4	4	**Fail**
0705S001	TAT00-080	Bull Creek	road crossing at Eglin 454	30.6647	-86.4279	52	11	14	9	16	15	9	Pass
0308S003	TAT01-005	Middle Creek	at road crossing at Eglin 600E	30.6244	-86.6578	51	12	15	9	15	14	9	Pass
0506S001	TAT01-006	Honey Creek	at road crossing at Eglin 211	30.6939	-86.4962	43	11	11	8	15	15	9	Pass
0104S003	TAT01-007	Moore Creek	Moore Cr. Gauge Station #1	30.5589	-86.8920	49	10	13	10	17	16	9	Pass
0503SH01	TAT01-030	Turkey Hen Creek	Steephead@Okie Tower = Hwy 85	30.6463	-86.5558	27	3	4	5	4	4	4	**Fail**

Appendix C. Stream bioassessment data collected on Eglin AFB, FL and analyzed using two separate BioRecon Indices from Florida DEP as described in Fore (2004).						"NEW" BioRecon Metrics Florida Department of Environmental Protection							
Site ID	**Field Number**	**Stream Name**	**Locality**	**LAT**	**LONG**	Total Taxa	Ephem Taxa	Trichop Taxa	Long-Lived Taxa	Clinger Taxa	Sensitive Taxa	**Score**	**Quality**
0103S001	TAT01-031	Weaver River	road crossing at Eglin 736	30.5518	-86.9297	37	7	8	5	10	11	7	Pass
0106S002	TAT01-037	Little Boiling Creek	at Eglin Road 718	30.5262	-86.8647	45	11	11	10	12	16	9	Pass
0705S002	TAT01-039	Bull Creek	at Eglin AFB Range Rd 211	30.6741	-86.4300	51	12	8	6	8	14	8	Pass
0706S001	TAT01-040	Ramer Creek	at Eglin AFB Range Rd 211	30.6749	-86.4123	38	7	7	9	9	9	7	Pass
0308S003	TAT02-001	Middle Creek	at road crossing at Eglin 600E	30.6244	-86.6578	52	11	13	11	15	16	10	Pass
0104S003	TAT02-012	Moore Creek	Moore Cr. Gauge Station #1	30.5589	-86.8920	37	9	6	5	12	14	7	Pass
0503S002	TAT02-013	West Turkey Hen Crk	at road crossing at Eglin 233	30.6769	-86.5780	28	10	5	2	5	8	5	**Fail**
0308S003	TAT02-035	Middle Creek	at road crossing at Eglin 600E	30.6244	-86.6578	48	10	11	11	12	11	9	Pass
0503S002	TAT02-045	West Turkey Hen Crk	at road crossing at Eglin 233	30.6769	-86.5780	46	9	11	9	12	14	8	Pass
0104S003	TAT02-048	Moore Creek	Moore Cr. Gauge Station #1	30.5589	-86.8920	37	7	10	6	12	14	7	Pass
0103S006	TAT04-09	Double Head Branch	Eglin RR 287 - below Buck Pond	30.5511	-86.9104	29	0	4	0	7	6	3	**Fail**
0701S007	TAT04-10	Titi Creek	Eglin 220	30.6999	-86.4685	52	12	9	9	15	20	10	Pass
0101S003	TAT04-30	Hicks Creek	Eglin 736 east branch	30.5400	-86.9479	34	7	8	9	8	10	7	Pass
0104S003	TAT04-34	Moore Creek	north of Eglin 211	30.5589	-86.8920	58	8	13	10	14	12	9	Pass
0308S002	TAT04-41	Middle Creek	Eglin 211	30.6638	-86.6766	51	12	13	9	15	17	10	Pass
0707S001	TAT04-42	Gum Creek	Eglin 207	30.7065	-86.3934	49	10	12	10	15	20	10	Pass

APPENDIX D. Inventory taxa list for freshwater macroinvertebrates collected on Eglin AFB, Florida.

Scientific	T.A. Thom 2000-2004	A.K. Rasmussen 2004	DEP SCI	DEP BIO-RECON	Scheiring & Crews 1983	Harris et al. 1982	Scheiring et al. 1981	Taxa
Acariformes - Water Mites								
Arrenurus sp. Duges	X							1
Atractides sp. Koch	X		X					1
Hydrachna sp. Fabricius			X					1
Hydrodroma sp. Koch	X							1
Hygrobates sp. Koch	X		X					1
Krendowskia sp. Piersig			X					1
Lebertia sp. Neuman	X		X					1
Limnochares sp. Latreille			X					1
Mideopsis sp. Neuman	X		X					1
Neumania sp. Trouessart	X							1
Oxus sp. Kramer			X					1
Sperchon sp. Kramer	X		X					1
Sperchonopsis sp. Piersig	X		X					1
Torrenticola sp. Oiersig	X		X					1
Amphipoda - Scuds								
Crangonyx sp. Bate	X		X	X				1
Gammarus sp. Fabricius	X		X	X	X		X	1
Hyalella azteca Saussure	X		X	X				1
Araneae - Spiders								
Pirata sp. Sundevall	X							1
Architaenioglossa - Snails								
Campeloma sp. Rafinesque	X		X					
Viviparus sp. Montfort				X				
Basommatophora - Snails								
Ancylidae	X		X	X				
Ferrissia sp. Walker	X							1
Menetus (Micromenetus) sp. Baker			X	X				1
Physella sp. Haldeman				X				1
Planorbella sp. Haldeman			X					1
Pseudosuccinea columella (Say)				X				1
Branchiobdellida - Worms								
Branchiobdella sp. (Odier)	X							1
Coleoptera - Beetles								
Agabus sp. Leach	X						X	1
Anchytarsus bicolor Melsheimer	X						X	1
Ancyronyx variegata (Germar)	X		X	X				1
Berosus sp. Leach	X			X				1
Carabidae	X							
Celina sp. Aube	X							1
Chrysomelidae	X							
Coptotomus sp. Erichson	X						X	1
Curculionidae	X							
Cyphon sp. Paykull	X							1
Dineutus ciliatus Forsburg	X							1
Dineutus discolor Aube	X			X				1
Dineutus emarginatus Say	X							1

APPENDIX D. Inventory taxa list for freshwater macroinvertebrates collected on Eglin AFB, Florida.

Scientific	T.A. Thom 2000-2004	A.K. Rasmussen 2004	DEP SCI	DEP BIO-RECON	Scheiring & Crews 1983	Harris et al. 1982	Scheiring et al. 1981	Taxa
Dineutus sp. Macleay	X		X	X	X		X	
Dryopidae	X							
Dubiraphia vittata (Melsheimer)	X		X	X	X			*1*
Dytiscidae	X		X	X				
Ectopria thoracica (Ziegler)	X		X	X				*1*
Enochrus ochraceus Melsheimer	X							*1*
Gonielmis dietrichi (Musgrave)	X		X	X				*1*
Gyretes iricolor Young	X		X	X				*1*
Gyrinus analis Say	X							*1*
Gyrinus marginellus Fall	X							*1*
Gyrinus sp. Geoffroy	X			X			X	
Gyrinus woodruffi Fall	X							*1*
Haliplus sp. Latreille	X							*1*
Helichus fastigiatus (Say)			X					*1*
Helichus lithophilus (German)	X							*1*
Helichus sp. Erichson					X			
Helophorus sp. Fabricius	X						X	*1*
Hoperius sp. Fall	X							*1*
Hydrobiidae	X							
Hydrocanthus sp. Say				X				*1*
Hydrochara sp. Berthold	X						X	*1*
Hydrochus sp. Leach	X		X					*1*
Hydrocolus sp. Larson & Roughley	X			X				*1*
Hydrophilidae			X	X				
Hydroporus sp. Clairville	X		X		X			*1*
Hydrovatus sp. Motschulsky	X							*1*
Hygrotus sp. Stephens			X					*1*
Laccophilus sp. Leach	X							*1*
Lioporeus pilatei (Fall)	X							*1*
Macronychus glabratus Say	X		X	X				*1*
Matus leechi Young	X							*1*
Microcylloepus pusillus (LeConte)	X		X	X				*1*
Microsporus sp. Kolenati	X							*1*
Neoporus asidytus (Young)	X							*1*
Neoporus dilatatus (Fall)	X							*1*
Neoporus lynceus complex (Sharp)	X							*1*
Neoporus sp. Guignot	X			X				
Optioservus sp. Sanderson	X							*1*
Oulimnius sp. Gozis			X					*1*
Paracymus nanus (Fall)	X							*1*
Peltodytes sp. Regimbart				X				*1*
Promoresia sp. Sanderson	X		X					*1*
Psephenus sp. Haldeman	X				X			*1*
Rhantus sp. Lacordaire	X						X	*1*
Scirtes sp. Illiger			X					*1*
Sperchopsis tessellata (Ziegler)	X			X				*1*
Stenelmis antennalis Sanderson	X		X	X				*1*

APPENDIX D. Inventory taxa list for freshwater macroinvertebrates collected on Eglin AFB, Florida.

Scientific	T.A. Thom 2000-2004	A.K. Rasmussen 2004	DEP SCI	DEP BIO-RECON	Scheiring & Crews 1983	Harris et al. 1982	Scheiring et al. 1981	Taxa
Stenelmis convexula Sanderson	X		X					*1*
Stenelmis hungerfordi Sanderson			X					*1*
Stenelmis lignicola Schmude & Brown	X							*1*
Stenelmis sinuata LeConte	X							*1*
Stenelmis sp. Dufour	X		X	X	X		X	
Stenelmis xylonastis Schmude & Brown	X		X					*1*
Suphisellus sp. Crotch				X				*1*
Thermonectus basillaris (Harris)	X							*1*
Collembola - Springtails								
Bourletiella spinata (Macgillivray)			X					*1*
Podura aquatica Linnaeus			X					*1*
Sminthurus sp. Latreille	X		X					*1*
Decapoda - Crustaceans					X		X	
Astacidae			X					
Brachycarpus sp. Bate				X				*1*
Cambaridae	X		X	X				
Macrobrachium sp. Bate				X				*1*
Palaemonetes kadiakensis Rathbun	X							*1*
Palaemonetes paludosus (Gibbes)			X	X				*1*
Palaemonetes sp. Heller	X		X	X	X		X	
Procambarus sp. Ortmann	X		X	X	X		X	*1*
Diptera - True Flies								
Ablabesmyia aspera (Roback)			X					*1*
Ablabesmyia hauberi Beck and Beck			X					*1*
Ablabesmyia mallochi (Walley)			X					*1*
Ablabesmyia sp. Johannsen	X		X		X			
Aedes sp. Meigen	X							*1*
Antocha sp. Osten Sacken	X			X				*1*
Apedilum sp. Townes			X					*1*
Atherix lantha Webb	X		X					*1*
Atherix sp. Meigen	X		X	X				
Atherix variegata Walker			X	X				*1*
Atrichopogon sp. Kieffer	X		X					*1*
Bezzia sp. Kieffer	X		X					*1*
Bittacomorpha clavipes (Fabricius)	X							*1*
Brachypremna sp. Osten Sacken	X				X		X	*1*
Brillia flavifrons (Johannsen)			X					*1*
Brundiniella eumorpha (Sublette)			X					*1*
Cardiocladius sp. Keiffer	X		X		X			*1*
Cecidomyiidae			X					
Ceratopogonidae	X		X	X	X		X	
Chelifera sp. Macquart	X		X					*1*
Chironomidae	X		X	X	X		X	
Chironomini gen. 3 Epler			X					*1*
Chironomus sp. Meigen			X		X			*1*
Chlorotabanus sp. Lutz				X				*1*
Chrysops sp. Meigen	X				X		X	*1*

APPENDIX D. Inventory taxa list for freshwater macroinvertebrates collected on Eglin AFB, Florida.

Scientific	T.A. Thom 2000-2004	A.K. Rasmussen 2004	DEP SCI	DEP BIO-RECON	Scheiring & Crews 1983	Harris et al. 1982	Scheiring et al. 1981	Taxa
Cladopelma sp. Kieffer			X					1
Cladotanytarsus sp. Kieffer			X					1
Clinocera sp. Meigen			X					1
Clinotanypus pinguis Loew			X					1
Clinotanypus sp. Keiffer	X		X		X			
Conchapelopia sp. Fittkau			X					1
Corethrella sp. Coquillett	X							1
*Corynoneura sp.*Winnertz			X	X				
Corynoneura taris Roback			X					1
Cricotopus bicinctus grp. (Meigen)			X					1
Cryptochironomus sp. Kieffer	X		X		X			1
Culicoides sp. Latreille	X		X					1
Dicranota sp. Zetterstedt	X							1
Dicrotendipes simpsoni Epler			X					1
Dicrotendipes thanatogratus Epler			X					1
Dixa sp. Meigen	X			X				1
Dixella sp. Dyar & Shannon	X			X				1
Djalmabatista pulcher (Johannsen)			X					1
Dolichopodidae			X					
Empididae	X			X				
Ephydridae	X							
Eukiefferiella sp. Thienemann	X		X		X			1
Forcipomyia sp. Meigen			X					1
Glyptotendipes sp. Kieffer			X					1
Hayesomyia sp. Murray & Fittkau			X					1
Helius sp. Lepeltier & Serville	X							1
Helopelopia sp. Roeback			X					1
Hemerodromia sp. Meigen	X		X				X	1
Heterotrissocladius sp. Sparck			X					1
Hexatoma sp. Latreille	X		X	X	X		X	1
Hudsonimyia sp. Roback			X					1
Hyporhygma quadripunctatus Malloch			X					1
Labrundinia pilosella (Loew)			X					1
Larsia berneri Beck & Beck			X					1
Larsia decolorata (Malloch)			X					1
Larsia sp. a Epler			X					1
Limnophila sp. Macquart	X				X		X	1
Limnophyes sp. Eaton			X					1
Lopescladius sp. Oliveira			X					1
Meropelopia sp. (Roeback)			X					1
Micropsectra sp. Kieffer			X					1
Microtendipes pedellus grp. (Degeer)			X					1
Microtendipes rydalensis grp. (Edwards)			X					1
Microtendipes sp. Kieffer	X				X			
Molophilus sp. Curtis	X						X	1
Nanocladius sp. Kieffer			X					1
Nilotanypus sp. Kieffer			X					1

APPENDIX D. Inventory taxa list for freshwater macroinvertebrates collected on Eglin AFB, Florida.

Scientific	T.A. Thom 2000-2004	A.K. Rasmussen 2004	DEP SCI	DEP BIO-RECON	Scheiring & Crews 1983	Harris et al. 1982	Scheiring et al. 1981	Taxa
Nilothauma sp. Kieffer			X					1
Notiphila sp. Fallen	X						X	1
Ormosia sp. Rondani	X							1
Orthocladiinae			X	X				
Orthocladius annectens Saether			X					1
Pagastiella sp. Brundin			X					1
Palpomyia tibialis (Meigen)			X					1
Palpomyia/Bezzia grp.	X		X	X				
Parachaetocladius sp. Wülker			X					1
Parachironomus pectinatellae (Dendy & Sublette)			X					1
Parachironomus sp. Lenz	X				X			
Paracladopelma sp. Harnish			X					1
Parakiefferiella sp. a Epler			X					1
Parakiefferiella sp. b Epler			X					1
Parakiefferiella sp. f Epler			X					1
Paralauterborniella sp. Lenz	X				X			1
Paramerina sp. Fittkau			X					1
Parametriocnemus sp. Goetghebuer			X					1
Paratanytarsus sp. Bause			X					1
Paratendipes sp. Kieffer	X				X			
Paratendipes subaequalis (Malloch)			X					1
Pentaneura inconspicua (Malloch)			X					1
Phaenopsectra obediens grp. (Johannsen)			X					1
Phaenopsectra punctipes grp. (Wiedemann)			X					1
Phaenopsectra sp. Kieffer	X		X		X			
Polypedilum aviceps Townes			X					1
Polypedilum convictum grp. (Walker)			X					1
Polypedilum fallax (Johannsen)			X					1
Polypedilum halterale grp. (Coquillett)			X					1
Polypedilum illinoense grp. (Malloch)			X					1
Polypedilum scalaenum grp. (Schrank)			X					1
Polypedilum sp. Kieffer	X			X	X			
Polypedilum tritum (Walker)			X					1
Potthastia sp. Kieffer			X					1
Procladius sp. Skuse	X		X		X			1
Psectrocladius elatus Roback			X					1
Pseudochironomus sp. Malloch	X		X		X			1
Pseudolimnophila sp. Alexander	X							1
Pseudorthocladius sp. Goetghebuer			X					1
Ptychoptera sp. Meigen	X							1
Ptychopteridae	X			X				
Rhabdomastix sp. Skuse	X							1
Rheocricotopus robacki (Beck & Beck)			X					1
Rheocricotopus tuberculatus (Caldwell)			X					1
Rheopelopia sp. Fittkau			X					1
Rheosmittia sp. Brundin			X					1
Rheotanytarsus distinctissimus grp.			X					1

APPENDIX D. Inventory taxa list for freshwater macroinvertebrates collected on Eglin AFB, Florida.

Scientific	T.A. Thom 2000-2004	A.K. Rasmussen 2004	DEP SCI	DEP BIO-RECON	Scheiring & Crews 1983	Harris et al. 1982	Scheiring et al. 1981	Taxa
Rheotanytarsus exiguus grp. (Johannsen)			X					*1*
Rheotanytarsus sp. Bause & Thienemann	X				X			
Robackia sp. Saether			X					*1*
Simulium sp. Latreille	X		X	X	X		X	*1*
Smittia sp. Holmgren			X					*1*
Stelechomyia perpulchra (Mitchell)			X					*1*
Stempellina sp. c Epler			X					*1*
Stempellinella sp. a Epler			X					*1*
Stenochironomus sp. Kieffer	X		X	X	X			*1*
Stictochironomus sp. Kieffer	X				X			*1*
Stilobezzia sp. Kieffer			X					*1*
Stratiomyidae	X							
Tabanidae	X		X	X				
Tabanus sp. Linnaeus	X				X		X	*1*
Tanypus sp. Meigen	X				X			*1*
Tanytarsus sp. a Epler			X					*1*
Tanytarsus sp. c Epler			X					*1*
Tanytarsus sp. d Epler			X					*1*
Tanytarsus sp. e Epler			X					*1*
Tanytarsus sp. l Epler			X					*1*
Tanytarsus sp. m Epler			X					*1*
Tanytarsus sp. o Epler			X					*1*
Tanytarsus sp. s Epler			X					*1*
Tanytarsus sp. t Epler			X					*1*
Tanytarsus sp. v Epler			X					*1*
Thienemanniella lobapodema Hestenes & Saether			X					*1*
Thienemanniella similis Malloch			X					*1*
Thienemannimyia sp. (Edwards)	X		X		X			*1*
Tipula sp. Linnaeus	X		X	X	X		X	*1*
Tipulidae	X		X	X				
Tribelos fuscicornis (Malloch)			X					*1*
Tribelos jucundum (Walker)			X					*1*
Tvetenia discoloripes grp.			X					*1*
Tvetenia vitracies (Saether)			X					*1*
Unniella multivirga Saether			X					*1*
Xenochironomus xenolabis (Kieffer)			X					*1*
Xestochironomus sp. Sublette & Wirth			X					*1*
Xylotopus par (Coquiletti)			X	X				*1*
Xylotopus sp. Oliver	X		X	X				
Ephemeroptera - Mayflies								
Acentrella alachua (Berner)	X			X				*1*
Acentrella parvula (McDunnough)	X			X				*1*
Acerpenna pygmaea (Hagen)	X		X	X				*1*
Attenella attenuata (McDunnough)	X		X					*1*
Baetis intercalaris McDunnough			X	X				*1*
Baetis sp. Leach	X		X	X	X			
Baetisca becki Schneider & Berner			X	X				*1*

APPENDIX D. Inventory taxa list for freshwater macroinvertebrates collected on Eglin AFB, Florida.

Scientific	T.A. Thom 2000-2004	A.K. Rasmussen 2004	DEP SCI	DEP BIO-RECON	Scheiring & Crews 1983	Harris et al. 1982	Scheiring et al. 1981	Taxa
Baetisca obesa (Say)	X		X	X				*1*
Baetisca rogersi Berner	X		X	X				*1*
Baetisca sp. Walsh	X		X	X	X		X	
Brachycercus sp. Curtis	X		X					*1*
Caenis diminuta Walker	X		X					*1*
Caenis hilaris (Say)	X							*1*
Caenis sp. Stephens	X		X	X				
Callibaetis floridanus Banks			X	X				*1*
Callibaetis pretiosus Banks			X					*1*
Callibaetis sp. Eaton	X			X				
Choroterpes basalis (Banks)	X			X				*1*
Dannella simplex (McDunnough)			X	X				*1*
Dannella sp. Edmunds	X				X			
Dolania americana Edmunds & Traver	X		X	X				*1*
Ephemerella invania (Berner)	X		X	X				*1*
Ephemerella sp. Walsh	X						X	
Ephemerellidae	X			X				
Ephemeridae			X					
Eurylophella doris (Traver)	X		X	X				*1*
Eurylophella sp. Tiensuu	X			X				
Habrophlebia vibrans Needham	X		X	X				*1*
Habrophlebiodes brunneipennis Berner	X			X				*1*
Heptagenia flavescens (Walsh)	X							*1*
Heptagenia sp. Walsh				X				
Heptageniidae			X					
Hexagenia bilineata (Say)	X							*1*
Hexagenia limbata (Serville)	X		X	X				*1*
Isonychia sayi Burks	X		X					*1*
Isonychia sicca (Walsh)	X							*1*
Isonychia sp. Eaton	X		X	X				
Leptophlebia bradleyi Needham	X							*1*
Leptophlebia intermedia (Traver)	X		X	X				*1*
Leptophlebia sp. Westwood			X	X				
Leptophlebiidae	X		X					
Maccaffertium exiguum(Traver)	X		X	X				*1*
Maccaffertium mexicanum integrum (McDunnough)	X		X	X				*1*
Maccaffertium smithae (Traver)	X		X	X				*1*
Maccaffertium sp. (Traver)	X		X	X	X		X	
Neoephemera compressa Berner				X				*1*
Neoephemera sp. McDunnough	X			X				
Neoephemera youngi Berner	X							*1*
Paraleptophlebia volitans (McDunnough)	X			X				*1*
Plauditus bimaculatus (Berner)	X		X	X				*1*
Plauditus punctiventris (McDunnough)	X		X	X				*1*
Plauditus sp. (Lugo-Ortiz & McCafferty)	X			X				
Procloeon sp. Bengtsson	X		X	X				
Procloeon viridoculare (Berner)				X				*1*

APPENDIX D. Inventory taxa list for freshwater macroinvertebrates collected on Eglin AFB, Florida.

Scientific	T.A. Thom 2000-2004	A.K. Rasmussen 2004	DEP SCI	DEP BIO-RECON	Scheiring & Crews 1983	Harris et al. 1982	Scheiring et al. 1981	Taxa
Pseudocloeon ephippiatum (Traver)	X			X				*1*
Pseudocloeon frondale (McDunnough)	X			X				*1*
Pseudocloeon propinquum (Walsh)	X		X	X				*1*
Serratella deficiens (Morgan)	X		X	X				*1*
Stenacron floridense (Lewis)	X		X	X				*1*
Stenacron interpunctatum (Say)	X		X	X				*1*
Tricorythodes albilineatus Berner	X		X	X				*1*
Gordioidea - Horsehair Worms	X						X	
Haplosclerina - Freshwater Sponges								
Spongillidae	X		X	X				
Haplotaxida - Annelid Worms								
Aulodrilus pigueti Knowalewski			X					*1*
Dero digitata complex (Mueller)			X					*1*
Dero sp. Okem	X		X					
Enchytraeidae			X					
Haber speciosus (Hrabe)			X					*1*
Limnodrilus hoffmeisteri Claparede			X					*1*
Limnodrilus sp. Claparede			X					
Megascolecidae			X					
Nais behningi Michaelsen			X					*1*
Nais communis Piquet	X		X					*1*
Nais simplex Piquet			X					*1*
Paranais litoralis (Mueller)			X					*1*
Pristina sp. Ehrenberg			X					*1*
Pristinella jenkinae (Stephenson)			X					*1*
Pristinella longisoma Harman			X					*1*
Pristinella osborni (Walton)			X					*1*
Pristinella sp. Brinkhurst			X					
Spirosperma sp. Eisen	X							*1*
Tubificidae	X							
Heteroptera - True Bugs								
Aquarius conformis Schellenberg	X							*1*
Belostoma sp. Latreille	X			X				
Belostoma testaceum (Leidy)	X							*1*
Corixidae	X		X	X			X	
Gelastocoris sp. Champion	X							*1*
Gerridae	X			X				
Gerris sp. Fabricius	X							*1*
Hydrometra sp. Latreille	X			X				*1*
Lethocerus griseus (Say)	X							*1*
Limnocoris sp. Stal	X							*1*
Limnoporus canaliculatus (Say)	X							*1*
Lipogomphus sp. Berg	X							*1*
Mesovelia amoena Uhler	X							*1*
Mesovelia sp. Mulsant & Rey	X			X				
Metrobates anomalus Hussey	X							*1*
Metrobates sp. Uhler	X							

APPENDIX D. Inventory taxa list for freshwater macroinvertebrates collected on Eglin AFB, Florida.

Scientific	T.A. Thom 2000-2004	A.K. Rasmussen 2004	DEP SCI	DEP BIO-RECON	Scheiring & Crews 1983	Harris et al. 1982	Scheiring et al. 1981	Taxa
Microvelia americana (Uhler)	X							*1*
Microvelia sp. Westwood	X							*1*
Notonecta sp. Linnaeus	X							*1*
Ochterus sp. Latreille	X							*1*
Pelocoris sp. Stal	X							*1*
Pleidae	X							
Ranatra sp. Fabricius	X			X				*1*
Rhagovelia obesa Uhler	X							*1*
Rhagovelia sp. Mayr	X			X	X		X	
Rhagovelia torreyana Drake & Hussey	X							*1*
Rheumatobates sp. Bergroth	X							
Rheumatobates tenuipes Meinert			X					*1*
Sigara sp. Fabricius	X							*1*
Trepobates sp. Uhler	X							*1*
Veliidae	X			X				
Hirudinea - Leeches			X	X				
Gloiobdella elongata (Castle)	X							*1*
Placobdella multilineata Moore	X							*1*
Placobdella sp. Blanchard	X							
Hoplonemertea - Nemerteans								
Prostoma sp. Duges			X					*1*
Isopoda - Sowbugs	X		X				X	
Caecidotea sp. Packard	X		X	X	X		X	*1*
Probopyrus floridensis Richardson	X							*1*
Sphaeroma sp. Bosc							X	*1*
Lepidoptera - Butterflies	X						X	
Archanara sp. Walker	X						X	*1*
Nepticulidae	X							
Parapoynx sp. Hüber	X			X				*1*
Petrophila sp. Guilding	X			X			X	*1*
Pyralidae	X		X					
Lumbriculida - Worms								
Eclipidrilus palustris (Smith)			X					*1*
Eclipidrilus sp. Eisen	X		X					
Lumbriculidae			X					
Lumbriculus variegatus (Mueller)			X					*1*
Megaloptera - Dobsonflies/Alderflies								
Chauliodes sp. Latreille							X	*1*
Corydalus cornutus (Linnaeus)	X		X	X				*1*
Corydalus sp. Latreille	X		X				X	
Neohermes sp. Banks	X						X	*1*
Nigronia serricornis (Say)	X		X	X				*1*
Sialis sp. Latreille	X			X				*1*
Nemertea - Nemertea			X					
Neotaenioglossa - Snails								
Elimia sp. Adams & Adams			X					*1*
Neuroptera - Lacewings								

APPENDIX D. Inventory taxa list for freshwater macroinvertebrates collected on Eglin AFB, Florida.

Scientific	T.A. Thom 2000-2004	A.K. Rasmussen 2004	DEP SCI	DEP BIO-RECON	Scheiring & Crews 1983	Harris et al. 1982	Scheiring et al. 1981	Taxa
Climacia areolaris Hagen	X		X					*1*
Odonata : Anisoptera - Dragonflies								
Aeshnidae			X					
Anax junias (Drury)	X							*1*
Aphylla williamsoni (Gloyd)	X							*1*
Arigomphus pallidus (Rambur)	X							*1*
Boyeria vinosa (Say)	X		X	X				*1*
Celithemis amanda (Hagen)	X			X				*1*
Celithemis sp. Hagen				X				
Cordulegaster maculata Selys	X							*1*
Cordulegaster sayi Selys	X							*1*
Cordulegaster sp. Leach	X			X	X		X	
Corduliidae			X					
Coryphaeschna ingens (Rambur)	X			X				*1*
Coryphaeschna sp. Williamson	X			X				
Didymops transversa	X							*1*
Dromogomphus armatus	X		X	X				*1*
Dromogomphus sp.	X		X	X				
Dromogomphus spinosus	X							*1*
Epicordulia princeps (Hagen)	X			X				*1*
Epitheca cynosura (Say)	X		X	X				*1*
Erythemis simplicicollis (Say)	X			X				*1*
Gomphus (Hylogomphus) geminatus Carle	X			X				*1*
Gomphus minutus Rambur			X					*1*
Gomphus sp. Leach	X		X	X	X		X	
Hagenius brevistylus Selys	X			X				*1*
Ladona deplanata (Rambur)	X		X					*1*
Libellula incesta Hagen	X							*1*
Libellula semifasciata Burmeister	X							*1*
Libellula sp. Linnaeus	X			X				
Libellula vibrans Fabricius	X							*1*
Libellulidae			X	X				
Macromia alleghaniensis Williamson	X							*1*
Macromia illinoiensis Walsh	X			X				*1*
Macromia sp. Rambur	X		X	X	X		X	
Macromia taeniolata Rambur	X							*1*
Macromiidae	X		X					
Nannothemis bella (Uhler)	X			X				*1*
Neurocordulia alabamensis Hodges	X		X	X				*1*
Ophiogomphus sp. Selys	X							*1*
Orthemis ferruginea (Fabricius)	X							*1*
Pachydiplax longipennis (Burmeister)	X			X				*1*
Pantala sp. Hagen	X						X	*1*
Perithemis sp. Hagen	X		X					*1*
Progomphus alachuensis Byers				X				*1*
Progomphus bellei Knopf & Tennessen	X							*1*
Progomphus obscurus Rambur	X		X					*1*

APPENDIX D. Inventory taxa list for freshwater macroinvertebrates collected on Eglin AFB, Florida.

Scientific	T.A. Thom 2000-2004	A.K. Rasmussen 2004	DEP SCI	DEP BIO-RECON	Scheiring & Crews 1983	Harris et al. 1982	Scheiring et al. 1981	Taxa
Progomphus sp. Selys	X		X	X	X		X	
Somatochlora sp. Selys	X							1
Stylurus ivae Williamson	X		X	X				1
Stylurus laurae Williamson	X							1
Stylurus plagiatus Selys	X							1
Stylurus townesi Gloyd	X							1
Odonata : Zygoptera - Damselflies								
Argia bipunctulata (Hagen)	X							1
Argia fumipennis (Burmeister)	X		X					1
Argia moesta (Hagen)	X			X				1
Argia sedula (Hagen)	X							1
Argia sp. Rambur	X		X	X				
Argia tibialis (Rambur)	X			X				1
Calopterygidae			X					
Calopteryx dimidiata Burmeister	X		X	X				1
Calopteryx maculata (Beauvois)	X		X	X				1
Coenagrionidae			X					
Enallagma basidens Calvert				X				1
Enallagma daeckii (Calvert)	X							1
Enallagma sp. Charpentier	X		X	X	X		X	
Hetaerina americana (Fabricius)	X			X				1
Hetaerina titia (Drury)	X			X				1
Ischnura posita (Hagen)	X							1
Ischnura sp. Charpentier	X		X	X				
Lestes disjunctus australis Walker	X							1
Oligochaeta - Worms	X		X	X	X		X	
Plecoptera - Stoneflies								
Acroneuria abnormis (Newman)	X	X	X	X				1
Acroneuria arenosa (Pictet)	X	X						1
Acroneuria evoluta Klapálek	X		X	X				1
Acroneuria lycorias (Newman)	X	X	X	X				1
Acroneuria sp. Pictet	X		X	X	X		X	
Agnetina annulipes (Hagen)	X		X					1
Attaneuria sp. Ricker	X							1
Haploperla sp. Navás			X	X				1
Helopicus bogaloosa Stark & Ray	X			X				1
Helopicus subvarians (Banks)			X					1
Isoperla sp. Banks	X		X	X				1
Leuctra cottaquilla James		X						1
Leuctra rickeri James		X						1
Leuctra sp. Stephens	X		X	X	X		X	
Neoperla carlsoni Stark & Baumann	X		X	X				1
Neoperla clymene (Newman)		X						1
Neoperla sp. Needham	X		X	X				
Paragnetina fumosa (Banks)	X	X	X	X				1
Peltoperla sp. Needham	X						X	1
Perlesta placida complex	X	X	X	X				1

APPENDIX D. Inventory taxa list for freshwater macroinvertebrates collected on Eglin AFB, Florida.

Scientific	T.A. Thom 2000-2004	A.K. Rasmussen 2004	DEP SCI	DEP BIO-RECON	Scheiring & Crews 1983	Harris et al. 1982	Scheiring et al. 1981	Taxa
Perlesta sp. Banks					X		X	
Perlesta sp. A		X						1
Perlesta sp. B		X						1
Perlidae			X					
Perlinella drymo (Newman)	X	X		X				1
Perlinella ephyre (Newman)			X	X				1
Perlinella sp. Banks	X		X	X				
Perlinella zwicki Kondratieff et al.		X						1
Pteronarcys dorsata (Say)	X	X	X	X				1
Tallaperla cornelia (Needham & Smith)	X		X	X				1
Trichoptera - Caddisflies								
Agarodes crassicornis (Walker)		X				X		1
Agarodes libalis Ross & Scott	X			X				1
Agarodes sp. Banks	X		X	X	X		X	
Agarodes ziczac Ross & Scott		X				X		1
Agrypnia sp. Curtis							X	1
Anisocentropus pyraloides (Walker)	X	X	X	X	X	X	X	1
Banksiola concatenata (Walker)	X	X				X	X	1
Beraea n. sp.		X						1
Beraea sp. Stephens			X				X	1
Brachycentrus chelatus Ross	X	X	X	X				1
Brachycentrus numerosus (Say)						X		1
Brachycentrus sp. Curtis	X		X	X	X		X	
Ceraclea diluta (Hagen)		X						1
Ceraclea maculata (Banks)		X				X		1
Ceraclea nepha (Ross)						X		1
Ceraclea protonepha Morse & Ross		X				X		1
Ceraclea resurgens (Walker)		X						1
Ceraclea sp. Stephens	X			X	X		X	
Ceraclea tarsipunctata (Vorhies)						X		1
Cernotina calcea Ross		X						1
Cernotina sp. Ross	X		X	X				
Cheumatopsyche burksi Ross		X						1
Cheumatopsyche edista Gordon		X						1
Cheumatopsyche gordonae Lago & Harris		X						1
Cheumatopsyche n. sp.						X		1
Cheumatopsyche pasella Ross						X		1
Cheumatopsyche petersi Ross et al.		X				X		1
Cheumatopsyche pettiti (Banks)		X				X		1
Cheumatopsyche sp. Wallengren	X		X	X	X		X	
Cheumatopsyche virginica Denning		X				X		1
Chimarra aterrima (Hagen)		X				X		1
Chimarra falculata Lago & Harris	X	X						1
Chimarra florida Ross		X				X		1
Chimarra moselyi Denning		X						1
Chimarra n. sp.						X		1
Chimarra sp. Stephens	X		X	X	X		X	

APPENDIX D. Inventory taxa list for freshwater macroinvertebrates collected on Eglin AFB, Florida.

Scientific	T.A. Thom 2000-2004	A.K. Rasmussen 2004	DEP SCI	DEP BIO-RECON	Scheiring & Crews 1983	Harris et al. 1982	Scheiring et al. 1981	Taxa
Cyrnellus sp. Banks	X				X			*1*
Diplectrona modesta Banks	X	X	X	X	X	X	X	*1*
Heteroplectron americanum (Walker)	X	X		X				*1*
Hydropsyche decalda Ross			X			X		*1*
Hydropsyche elissoma Ross	X	X	X			X		*1*
Hydropsyche incommoda Hagen		X				X		*1*
Hydropsyche rossi Flint et al.		X						*1*
Hydropsyche sp. Pictet	X		X	X	X		X	
Hydropsychidae	X		X					
Hydroptila bribriae Harris		X						*1*
Hydroptila circangula Harris		X						*1*
Hydroptila disgalera Holzenthal & Kelley		X						*1*
Hydroptila eglinensis Harris		X						*1*
Hydroptila hamata Morton						X		*1*
Hydroptila hamiltoni Harris		X						*1*
Hydroptila latosa Ross		X				X		*1*
Hydroptila lloganae Blickle		X						*1*
Hydroptila molsonae Blickle		X						*1*
Hydroptila okaloosa Harris		X						*1*
Hydroptila parastrepha Kelley & Harris		X						*1*
Hydroptila quinola Ross		X				X		*1*
Hydroptila remita Blickle & Morse		X				X		*1*
Hydroptila sarahae Harris		X						*1*
Hydroptila sp. Dalman	X		X	X	X		X	
Lepidostoma serratum Flint & Wiggins		X						*1*
Lepidostoma sp. Rambur	X		X	X		X	X	
Lype diversa (Banks)	X	X	X	X		X		*1*
Lype sp. McLachlan	X		X				X	
Macrostemum carolina (Banks)	X	X	X	X	X	X	X	*1*
Mayatrichia ayama Mosely		X	X	X		X		*1*
Mayatrichia sp. Mosely	X		X				X	
Micrasema n. sp.	X	X		X	X	X	X	*1*
Micrasema sp. McLachlan	X		X	X				
Micrasema wataga Ross	X		X					*1*
Molanna blenda Sibley	X	X						*1*
Molanna sp. Curtis	X		X	X	X		X	
Molanna tryphena Betten	X	X				X		*1*
Molanna ulmerina Navás	X	X				X		*1*
Nectopsyche candida (Hagen)	X	X				X		*1*
Nectopsyche exquisita (Walker)	X	X	X			X		*1*
Nectopsyche paludicola Harris	X	X		X				*1*
Nectopsyche pavida (Hagen)	X	X		X				*1*
Nectopsyche sp. Mueller	X		X	X	X		X	
Nectopsyche spiloma (Ross)				X				*1*
Neotrichia armitagei Harris		X						*1*
Neotrichia sp. Morton	X		X	X				
Neureclipsis crepuscularis (Walker)	X	X		X				*1*

APPENDIX D. Inventory taxa list for freshwater macroinvertebrates collected on Eglin AFB, Florida.

Scientific	T.A. Thom 2000-2004	A.K. Rasmussen 2004	DEP SCI	DEP BIO-RECON	Scheiring & Crews 1983	Harris et al. 1982	Scheiring et al. 1981	Taxa
Neureclipsis melco Ross		X				X		1
Neureclipsis sp. McLachlan	X			X	X		X	
Nyctiophylax affinis (Banks)						X		1
Nyctiophylax morsei Lago & Harris		X						1
Nyctiophylax n. sp.						X		1
Nyctiophylax serratus Lago & Harris		X						1
Nyctiophylax sp. Brauer	X		X	X	X		X	
Ochrotrichia apalachicola Harris et al.		X						1
Oecetis avara (Banks)	X							1
Oecetis cinerascens (Hagen)	X	X	X	X		X		1
Oecetis daytona Ross		X						1
Oecetis ditissa Ross		X						1
Oecetis georgia Ross	X	X	X	X		X		1
Oecetis inconspicua complex (Walker)	X	X	X	X				1
Oecetis morsei Bueno-Soria	X		X	X				1
Oecetis n. sp.						X		1
Oecetis nocturna Ross		X						1
Oecetis osteni Milne		X				X		1
Oecetis persimilis (Banks)	X	X						1
Oecetis sp. McLachlan	X		X	X	X		X	
Oecetis sp. e Floyd			X					1
Oecetis sphyra Ross		X				X		1
Orthotrichia aegerfasciella (Chambers)		X						1
Orthotrichia cristata Morton		X						1
Orthotrichia sp. Eaton			X				X	
Oxyethira abacatia Denning		X						1
Oxyethira elerobi (Blickle)		X				X		1
Oxyethira florida Denning		X						1
Oxyethira glasa (Ross)		X				X		1
Oxyethira janella Denning		X				X		1
Oxyethira kelleyi Harris		X						1
Oxyethira lumosa Ross		X						1
Oxyethira maya Denning		X						1
Oxyethira novasota Ross		X				X		1
Oxyethira pescadori Harris & Keth		X						1
Oxyethira savanniensis Kelley & Harris		X						1
Oxyethira setosa Denning						X		1
Oxyethira sp. Eaton	X		X	X			X	
Oxyethira zeronia Ross		X				X		1
Paranyctiophylax moestus Banks	X							1
Paranyctiophylax sp. Tsuda	X		X	X				
Phylocentropus carolinus Carpenter		X						1
Phylocentropus placidus (Banks)		X						1
Phylocentropus sp. Banks	X			X				
Polycentropodidae	X		X	X				
Polycentropus cinereus Hagen	X	X				X		1
Polycentropus floridensis Lago & Harris		X						1

APPENDIX D. Inventory taxa list for freshwater macroinvertebrates collected on Eglin AFB, Florida.

Scientific	T.A. Thom 2000-2004	A.K. Rasmussen 2004	DEP SCI	DEP BIO-RECON	Scheiring & Crews 1983	Harris et al. 1982	Scheiring et al. 1981	Taxa
Polycentropus n. sp.						X		*1*
Polycentropus sp. Curtis	X		X	X	X		X	
Potamyia flava (Hagen)	X			X				*1*
Potamyia sp. Banks	X			X			X	
Psilotreta frontalis Banks		X						*1*
Psilotreta sp. Banks				X				
Ptilostomis ocellifera (Walker)		X						*1*
Ptilostomis sp. Kolenati	X				X		X	
Pycnopsyche antica (Walker)		X				X		*1*
Pycnopsyche indiana (Ross)		X						*1*
Pycnopsyche sp. Banks	X			X			X	
Rhyacophila carolina Banks	X	X		X	X	X		*1*
Setodes sp. Rambur			X					*1*
Triaenodes helo Milne	X		X			X		*1*
Triaenodes ignitus (Walker)	X	X	X			X		*1*
Triaenodes n. sp.		X				X		*1*
Triaenodes perna Ross		X	X					*1*
Triaenodes sp. McLachlan	X		X	X	X		X	
Wormaldia moesta (Banks)						X		*1*
Wormaldia sp. McLachlan			X				X	
Tricladida - Flatworms/Planarians								
Planariidae	X		X	X				
Unionoida - Mollusks								
Elliptio sp. Rafinesque			X					*1*
Veneroida - Mollusks								
Musculium lacustre (Muller)	X							*1*
Pisidiidae	X		X	X				
Pisidium dubium (Say)	X							*1*
Pisidium sp. Pfeiffer	X						X	*1*
TOTAL TAXA	**388**	**106**	**339**	**216**	**74**	**56**	**82**	**518**
TOTAL SITES	127	12	15	41	4	9	5	
TOTAL SAMPLES	207	not stated	43	53	120	324	326	