Fish Crossing: fish passage software for culvert design and assessment

Six Rivers National Forest - Watershed Interactions Team
Michael A. Love, Susan Firor, Michael J. Furniss,
Thomas Dunklin, Bob Gubernick

Fish passage at road crossing structures has become a global issue. Thousands of culverts are currently installed in fish-bearing streams, many of which are partial or total barriers to upstream fish migration. Since retrofitting or replacing existing stream crossings can be costly, it is imperative to inventory and prioritize existing culverts and properly design new stream crossings to ensure they will function as desired. The design and assessment of culverts for fish passage is complex requiring a broad knowledge of hydraulic engineering, fisheries biology, and hydrology.

> *"...it is imperative to inventory and prioritize existing culverts and properly design new stream crossings..."*

FishXing is an interactive software package that integrates a culvert design and assessment model for fish passage nested in a multimedia educational setting. Culvert hydraulics are well understood and model output closely resembles reality. FishXing successfully models hydraulic conditions throughout the culvert over a wide range of flows for numerous culvert shapes and sizes. Additionally, the model incorporates fisheries inputs including fish species, size, and swimming abilities. The software uses the swimming abilities to determine whether the culvert installation will accommodate fish passage at desired flows and to identify specific locations within the culvert that impede passage. Software output includes water surface profiles and hydraulic variables such as water depths and velocities displayed in both tabular and graphical formats. Video lectures and on-line help are included as both a learning tool and to provide technical assistance.

The FishXing CD will be available in a Windows 95/98/NT format in March 2000. The software and associated help can be down loaded at www.stream.fs.fed.us/fishxing/.

The Wildlife Society Working Group Changes Name

The GIS and Remote Sensing Working Group of The Wildlife Society (TWS) has officially changed its name to "The GIS, Remote Sensing, and Telemetry Working Group". "Telemetry" has also been added as an area of focus within the group's charter. Other areas of focus included GIS, remote sensing, and landscape ecology. Telemetry is a critical tool in many wildlife related studies. The geospatial aspect of telemetry analysis made this subject an obvious extension to the working group's function.

In This Issue......

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Increasing Access to Fish and Wildlife Information through the National Biological Information Infrastructure

by Anne Frondorf

Over the last century, and continuing through today, a vast amount of information on fish and wildlife resources throughout the United States has been collected by government agencies, scientists, and non-government organizations. This information ranges from the biological specimens collected by early explorers and scientists (specimens which still exist in natural history museums today), to environmental data collected daily by satellites.

While we have collectively made substantial progress in computerizing our fish and wildlife information, and in using computerized tools such as GIS to assist in analysis, we are still not able to find and use all of our existing information in a consistent and fully integrated way. In many cases, individuals and agencies that could use certain information to help answer a given question may not even be aware the information they need already exists somewhere. Instead, they often spend money and time re-collecting information that already exists. Also, much useful information, such as information on many museum biological specimens, is only available on paper and not in a computerized format and therefore is not readily accessible to anyone outside that institution. Our ability to correlate and synthesize fish and wildlife information to help answer questions can be limited by the fact that information is often collected and stored in many different forms and formats in many different locations.

With the advent of the Internet and the World Wide Web, it is now possible to link people and information together like never before. The challenge now is to apply this technology to fully utilize the wealth of important biological information that currently exists in hundreds of different government agency databases, and in universities, natural history museums, and other institutions throughout the country.

The National Biological Information Infrastructure (NBII) http://www.nbii.gov program is a broad cooperative effort to establish a distributed Internet-based Afederation@ of biological resources data, information, and analysis tools.   While the NBII program is administered by the U.S. Geological Survey, the effort depends on the active participation of many agencies, organizations, and individuals. NBII partners in government, academia, private industry, and the non-profit community are working together to accomplish several related goals:
•   to make significant biological resources information from many sources more broadly available;
•   to jointly develop new types of tools and standards that make it easier to find information on certain species, topics, or geographic locations;
•   to integrate information that is in different forms and formats;
•   and to better use this great wealth of existing information as a tool in research, for resource management and decision making, in education, and many other applications.

Fish and wildlife information managers can currently find much of interest and value in the NBII. This includes access to local, regional and national-level biological data sets (such as long-term data from the North American Breeding Bird Survey, data on distributions of zebra mussel and other invasive species, and data from Gap Analysis projects) and links to existing biodiversity and ecosystem scientific networks (such as the LTER network and the network of State natural heritage programs). The NBII Metadata Clearinghouse http://www.nbii.gov/clearinghouse.html provides a searchable Acard catalog@ of descriptions of many hundreds of different data sets and information products (like technical reports). In addition to data and information, access is provided to a variety of ecological analysis tools (such as models or spatial analysis tools). A new NBII focus area is providing online access to expertise directories for various biological science disciplines—a directory of taxonomic experts, developed in cooperation with the Association of Systematics Collections, is already available http://www.nbii.gov/tred and discussions are underway with the Ecological Society of America to provide a similar NBII-accessible directory of ecologists.

In 1998 the Biodiversity and Ecosystems Panel of the President's Committee of Advisors on Science and Technology reported to the President on its recommendations for strengthening programs for understanding and managing the Nation's biological resources. In its report, *Teaming with Life: Investing in Science to Understand and Use America's Living Capital*, the panel put a major emphasis on the need to advance the development of the NBII to the Anext generation@ANBII-2" would create a network of interconnected regional nodes at major research institutions and/or supercomputer facilities, with powerful, state-of-the-art computing systems to automatically find, analyze, and synthesize vast amounts of diverse environmental data from multiple sources and then present the resulting information in ways specifically tailored to individual users ranging from scientists to resource managers, and to private industry, students and teachers, and others.

Many agencies, organizations, and individuals involved in fish and wildlife management and/or research are actively involved in the NBII. NBII has helped to support projects with individual State fish and wildlife

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agencies and has collaborated at the national level with OFWIM, the Fish and Wildlife Information Exchange, and the Association for Biodiversity Information. NBII also operates an extensive metadata training and support program, offering hands-on metadata training courses at sites across the U.S.

You and your agencies are not only major sources or suppliers of fish and wildlife information that can be shared and communicated with others, but you are also important NBII customers. We encourage your involvement and participation in helping us identify the types and sources of information that would be most valuable to resource managers, scientists, educators, or policy makers. We welcome feedback and collaboration in the development and application of new types of information tools and technologies, specifically tailored to biological resources information and the needs of the fish and wildlife management community. As we start the new century, we invite you to join in making the NBII an important tool for managing and sharing our valuable fish and wildlife information.

American Society of International Law Wildlife Interest Group

The American Society of International Law's Wildlife Interest Group is developing a series of bibliographies on wildlife issues, with citations from both the science and legal disciplines. The first of these bibliographies, with more than 2000 citations, is now available on the site: www.eelink.net/ ~ asilwildlife (under the Resources section). A bibliography on small cetaceans with more than 1500 citations will be posted early next month. Suggestions for additional citations or bibliographies will be greatly appreciated.
Contact: Wil Burns, Co-Chairman, American Society of International Law - Wildlife Interest Group, 1210 Floribunda Ave. #7, Burlingame, CA 94010 USA
Phone: 650.703.3280, Fax: 801.838.4710
ASILwildlife@pacbell.net
www.eelink.net/ ~ asilwildlife

Missouri Watershed Information Network (MoWIN)

by Joe G. Dillard

The need for a watershed information clearinghouse, or network, in Missouri surfaced during a watershed stewardship workshop in 1996. The participants almost unanimously supported the idea of a centralized tracking system for the many and varied ongoing watershed and water quality programs and initiatives in Missouri. University of Missouri Outreach and Extension provided early funding to explore the concept, develop a website and to help develop MoWIN.

Currently, MoWIN is a partnership of 27 agencies and organizations. Our **mission** is to assist you in locating and accessing information relative to Missouri watersheds. Our **goal** is to help citizens increase their knowledge about current watershed conditions and best management practices. Our **vision** is more Missourians taking action to protect and conserve their shared natural resources. And, finally, our **desired outcome** is healthy watersheds with sustainable soil, water, plant, animal, and air resources as indicated by improved water quality.

So what kind of information can you expect from MoWIN? We are compiling information on current watershed events and upcoming meetings, local watershed contacts, information on grants and other funding sources, location of technical assistance, educational resources, and the ever-popular Acronym City (where nearly 700 acronyms are defined, so you will never get buffaloed by another government program or agency again). Soon to come will be information on ongoing watershed projects and sources of natural resource facts, reports and data. Please visit our website *http:// outreach.missouri.edu/mowin/* and let us know how we can improve to help you.

Our information is available to anyone seeking information related to watersheds in Missouri. In addition to the website, you can contact us by phone, toll-free in Missouri only, at 1/877-H20-SHED (426-7433), fax (573/884-5650), mail (205 Agricultural Engineering Building; University of Missouri-Columbia; Columbia, MO 65211-5200), or e-mail (dillardj@missouri.edu).

President's Message

Lila Borge Wills

Thank you for the opportunity to serve as The Organization of Fish and Wildlife Information Managers (OFWIM) President this year. Appreciation is extended to Doug Beard for the strong leadership and commitment he demonstrated as President last year. I look forward to leading OFWIM in exploring new avenues in training, funding initiatives, and outreach that will assist us foster growth and cooperate in ways to further strengthen the natural resources conservation and management field.

OFWIM co-sponsored the 4th Microcomputer Applications in Fish and Wildlife Conference in the Tahoe area, in late October 1999. The Fish and Wildlife Information Exchange, U.S. Fish and Wildlife Service, The Wildlife Society, the American Fisheries Society Computer Users Section, and the Wisconsin Department of Natural Resources also sponsored this effort. The meeting was a success with 30 States represented and approximately 130 participants. Our web page (address below) has the contact list of attendees available for your reference.

The General Session and four Symposia included Wildlife Habitat Relationships, Microcomputer Applications in Population Modeling and Viability Analysis, Statistical Analysis Software, and Technology in the Wildlife Profession. Another success of the meeting was the Hacker's Ball. This evening event allowed information managers, developers, and other professionals demonstrate new software, fisheries/wildlife technology systems, and exchange valuable tools and resources necessary in our fields.

There was a very positive response from the Conference Follow-up Survey. Results showed that the majority of attendees benefited and learned from the conference. This conference was a great place to foster and build new ideas, renew and encourage new partnerships, and exchange information, which will promote better management and conservation of natural resources.

Some of OFWIM's goals this year include a new electronic Newsletter format, with hard copies mailed upon request. Another is to establish new Regional Directors who can represent the Organization in each of the regions. This representative will contribute with membership outreach, and assist with OFWIM sponsored training efforts and various other co-sponsored initiatives. For more information on assisting at OFWIM's Regional level, contact Don Schrupp at hqwris@lamar.ColoState.EDU.

This year too, we will plan the next Conference in 2001, the Natural Resource Summit, an idea spawned from the highly successful Freshwater Fisheries Database Summit. The place will be announced within this next month. The OFWIM 2000 annual meeting will be held in Denver, CO and will consist of a planning meeting and training workshops. Contact me (lborge@vt.edu) if you would like work with the planning committee for the 2001 Summit meeting.

OFWIM will also be working closely with the newly formed Conservation Management Institute. For more detailed information regarding this new Center housed within the College of Natural Resources at Virginia Tech, see their announcement in this Newsletter.

See our updated website for a Contact List of participants, the Conference Proceedings (also available hardcopy), Minutes of the Annual Business Meeting, Membership, Executive Officers, and general information about OFWIM at: http://fwie.fw.vt.edu/ofwim/index.htm

If you weren't at the 4th Microcomputer Applications Meeting you missed a great time!

Beautiful Emerald Bay in Lake Tahoe!
(Both Lake Tahoe photos by Kathy Quindlen)

This small band of information managers were able to brave the elements of high elevation, cold and wind.....all on granola bar rations and water!

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Wildlife Management Interactive: A New Information Network for Wildlife Professionals

Experience the latest tool for wildlife managers by visiting www.wminteractive.org,. As controversies surrounding management issues continue to emerge in the new millennium, Wildlife Management Interactive will be seeking to help increase an understanding of these situations and the interests involved by delivering the information in a manner consistent with today's technology- at the fingertip of the wildlife professional.

The Jack H. Berryman Institute at Utah State University, in cooperation with the International Association of Fish and Wildlife Agencies (IAFWA), is working to develop, implement, and evaluate this rapid communication network designed to assist wildlife professionals in identifying and monitoring the concerns and responses of stakeholders to management actions. The network will provide a single source of information regarding emerging wildlife management issues, and will be functional by March 1, 2000. Incidents in which wildlife management practices have been challenged will be continually reported from across North America. This information will assist managers in planning and implementing proactive programs to address public concerns, as well as to enhance wildlife management's image. The network also will provide a barometer to gauge immediate public responses to wildlife management actions and to monitor any emerging trends. Wildlife managers will also be able to engage in open dialogue, share experiences and philosophies, and receive feedback via interactive message boards. As it is our goal to develop the network into a useful and essential service for wildlife managers, we welcome any suggestions about specific topics that you would like to see addressed, or about information that will be most useful to you as a wildlife professional. Please forward comments to: Courtney Broaden, Jack H. Berryman Institute, Department of Fisheries and Wildlife, 5210 Old Main Hill, Logan, Utah 84322-5210. Phone: 435-797-7163, fax: 435-797-1871, email: courtney@wminteractive.org Additional comments may be directed the project's Principal Investigator, Terry Messmer, at 435-797-3975 or terrym@ext.usu.edu.

New Conservation Management Institute Forming

Virginia Tech has formed the Conservation Management Institute to better address multi-disciplinary research questions that affect conservation management effec- tiveness in Virginia, North America, and the world. Faculty from Virginia Tech and other research institutions will work collaboratively on projects ranging from endangered species propagation to satellite imagery interpretation.

The Conservation Management Institute was founded on the basic belief that informed conservation action is necessary to stem the worldwide loss of biodiversity, and good management must be grounded in good science.

This new center will encompass the former Fish and Wildlife Information Exchange at Virginia Tech as well as new divisions for ecological restoration, international projects, conservation genetics, and others.

For more information about the Institute, contact the Director, Dr. Brian Murphy former Head of the Department of Fisheries and Wildlife Sciences at Virginia Tech (murphybr@vt.edu), or the Assistant Director, Jeff Waldon former Project Leader of the Fish and Wildlife Information Exchange (fwiexchg@vt.edu).

Now Scheduling Committee and Related Meetings for the 90th IAFWA Conference

The 90th International Association of Fish and Wildlife Agencies Annual Conference will be held September 15-20, 2000, at the Hyatt Regency in Indianapolis, Indiana. The confer- ence committee now is scheduling all committee and related meetings. To schedule a meeting, contact conference coordinator, Hannah Kirchner, at 812-723-0088 or via e- mail at hannahk@kiva.net. Meetings will be scheduled until all available space is full, but information must be received by March 15 for inclusion in the conference's advance registration brochure.

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The Committee for the National Institute for the Environment (CNIE) becomes The National Council for Science and the Environment (NCSE)

The Committee for the National Institute for the Environment (CNIE) has been working since 1990 to improve the scientific basis of environmental decisionmaking. To accomplish that goal, CNIE initially set out to establish a federal National Institute for the Environment a concept endorsed by more than 400 academic, scientific, environmental, and business organizations.

In 1997, CNIE determined that its goal could be accomplished if the NIE were organized under the National Science Foundation. On July 28, 1999, the National Science Board approved an interim report recommending that the National Science Foundation implement most of the activities initially proposed for a National Institute for the Environment. In October 1999, CNIE announced its support for the full and effective implementation of this report and suspended its call for the creation of a National Institute for the Environment to work in support of the National Science Foundation initiative.

Because the name Committee for the National Institute for the Environment may lead to confusion, as it implies that we are still committed to advocating the establishment of a separate entity, CNIE is changing its name to the National Council for Science and the Environment. NCSE will:

• Be guided by the needs of stakeholders.

• Educate society about the importance of comprehensive scientific programs that integrate crosscutting research with knowledge
• assessments, education, information dissemination, and training.

• Work towards the full implementation of the National Science Board report Environmental Science and Engineering for the 21st Century: The Role of the National Science Foundation.

• Facilitate stakeholder actions to develop a shared understanding of science, science needs and priorities, and efforts to link science with decisionmaking.

• Develop an online information dissemination system through which users can find understandable, science-based information about the environment.

We invite you to join with us in a permanent collaborative effort to share ideas, disseminate information, build consensus, and help bring about effective programs to improve the scientific basis for environmental decisionmaking.

As always, we thank all of those individuals and organizations who have helped us over the past decade and hope that the new year brings success.

Kevin Hutton, Webmaster
National Council for Science & the Environment
1725 K St. NW Suite 212
Washington, DC 20006
http://www.cnie.org

The Wildlife Society's GIS, Remote Sensing, and Telemetry Working Group to host an Interactive GIS Poster Session

"GIS Software Applications for Wildlife" will be held on the afternoon of Wednesday, September 13 2000. This interactive poster session will be part of TWS's 7th Annual Conference taking place in Nashville, Tennessee. This special event is co-sponsored by Environmental Systems Research Institute (ESRI).

Over 20 presenters will demonstrate the latest spatial applications for the natural resource profession. Several GIS companies along with individual programmers will be on hand to display their software and answer questions. Different from traditional "pin-up" poster sessions, most of the presentations within "GIS Software Applications for Wildlife" will use live projected computer demonstrations. The authors can tailor their display to specific attendee questions and concerns, allowing greater audience interaction.

Also featured within this session will be a geospatial help desk. The GIS, Remote Sensing, and Telemetry Working Group will have experts in the fields of GIS, remote sensing, GPS, landscape ecology, and telemetry on-hand to answer questions. Further information about the help desk, including schedules of experts and chances to submit questions prior to the conference will be available soon. The GIS, Remote Sensing, and Telemetry Working Group's annual business meeting will be held in the evening following the poster session. Members of the Working Group and non-members are encouraged to attend. For more information about this business meeting, our Working Group, or the special poster session see our website at: http://fwie.fw.vt.edu/tws-gis/index.htm

See you in Nashville!

2000 Training Workshop Schedule

The U.S. Geological Survey of the Department of the Interior is presenting a series of topical workshops pertaining to mapping, vegetation, photo-interpretation, remote sensing and Geographical Information Systems. The workshops are part of an effort to exchange information and provide access to spatial technologies developed at the center for natural resource survey. The workshops are available to the general public, educators, and state and federal agencies. Workshop participation by the international community is also greatly encouraged.

Most of the workshops are 3 days long, creating compact presentation of materials. No previous experience in any of the topical workshops is assumed, except for advanced workshops. Appropriate handouts, photos, maps and other forms of distributed materials are provided to the workshop participants. Some workshops will have scheduled field exercises. Hands-on exercises are utilized to involve workshop participation. Specialized workshop topics and transient workshops can be arranged based upon consultation and number of workshop participants. Scheduled workshops are subject to change; please contact the workshop coordinator at the listed phone number for workshop information.

February 15-17	Vegetation Survey Using Air Video Technology
February 24-25	Introduction to Dendroecology
March 7-9	Introduction to GIS (Arc/Info) for Natural Resources
April 18-20	Introduction to National Wetlands Classification System
June 22-23	Introduction to the Identification of Wetland Forest Trees
June 28-30	Hydric Soils and Wetland Delineations
August 8-10	Introduction to Desktop GIS (ArcView) for Natural Resources
October 25-27	Introduction to Wetland Remote Sensing and Mapping
October 30-November 1	Advanced Wetland Photo-Interpretation
December 5-7	Introduction to GPS for Natural Resource Assessment & Survey

For more information please call Pat O'Neil at 318-266-8699 or e-mail Holly Nelson at holly_nelson@usgs.gov or go to the USGS National Wetlands Research Center's home page (www.nwrc.usgs.gov and click on training and then 2000 Training Workshop Schedule or go directly to http://www.nwrc.usgs.gov/training/2ktrain.html

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Accessible Access

Tips to enhance your MS Access applications and database management activities.

Compact databases to optimize disk space:
Compacting a database rearranges how the database is stored. Thus it will utilize disk space more efficiently and improve database performance.

1. **Open your database.**
2. **From the** Tools **menu, select** Database Utilities, **and then choose** Compact Database.

Note: If you deleted records from the end of a table that has an Auto Number field, Access will reset the Auto Number value for the next record to a value of one more than the last undeleted Auto Number value when compacted.

Data Entry Tips:

Pressing CTRL + ; (semicolon) will automatically insert today's date into the current field.

Pressing CTRL + ' (apostrophe) will repeat the contents from the field above.

Sheryl K. Soborowski
MS Access Developer
Fish and Wildlife Information Exchange

Accessing multiple state wildlife databases online through the WAPITI project

by Nancy Brauer

The prototype Wild Animal and Plant Information Transfer Infrastructure (WAPITI) allows Internet users to search the state fish and wildlife databases of Maryland, Pennsylvania, Virginia, and West Virginia. A Jasmine Object Database coordinates the multistate data. Jasmine's object-oriented design is well suited for the multidimensional relationships of wildlife data. WAPITI currently serves taxonomy, distribution, status, and habitat distribution data of vertebrates. Users search for species by common name, scientific name, ITIS TSN*, or by other types of species data, such as status or land use types. The search results are presented in a table. Each row contains the species' common and scientific names and links to available state data and its ITIS account. The links to state data present the state or ITIS data in a new browser window, leaving the search results in the original browser window.

One of WAPITI's goals is to provide dynamic species occurrence maps. A custom ArcView Internet Map Server (IMS) application was developed to create these maps "on the fly". Currently maps are available for West Virginia data. A combination of Active Server Pages, JavaScript, and a Java applet allow users to view online species occurrence maps based on data retrieved from the WV Microsoft Access 97 database.

WAPITI currently being tested and will be accessible to the public in March. For more information please contact Nancy Brauer, Conservation Management Institute, Fish and Wildlife Information Exchange, Virginia Tech, at 540-231-7348 or nbrauer@vt.edu.

* ITIS = **I**ntegrated **T**axonomic **I**nformation **S**ystem, TSN = **T**axon **S**erial **N**umber. Learn more about ITIS at their website: www.itis.usda.gov

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U.S.G.S. National Wetlands Research Center

The U.S. Geological Survey National Wetlands Research Center is a partner in a research project with the University of Louisiana at Lafayette and is building a library of materials on coastal Louisiana. Materials are cataloged using Dublin Core metadata. Geospatial data in the FGDC Content Standard for Digital Geospatial Metadata format is converted to MARC format with access through the online library catalog. This catalog access is redundant to the NSDI Clearinghouse and assures patrons will find the data with other textual materials using geographic and subject search strategies. The FGDC to MARC converter is available for anyone to use from http://cuadra.nwrc.gov. The library catalog to locate materials in any format is available at http://cuadra.nwrc.gov/star.

To organize the Graphics Department slide collection at the U.S. Geological Survey National Wetlands Research Center, the systems librarian made a database in Microsoft Access. Slides are scanned in a TIF format and pasted into a metadata form. Data fields include scientific name, keywords, persons in the slide, copyright status of the slide, and geographic location. All of the fields use a controlled vocabulary to eliminate typographic errors and maintain consistency. The database is a slide locator system for the Center. Slides are stored in the databases at 72 DPI, and if a better resolution is needed, the patron requests a copy of the archived slide. There are currently 7638 slides in the database, and the system can potentially manage the many small collections held by researchers.

Duckdata is a bibliographic database for North American waterfowl and their wetland habitats. The database is constantly updated and reviewed by Dean Demarest and Ken Reinecke at the USGS Patuxent Wildlife Research Center in Vicksburg, Mississippi. Most of the citations are verified and data is very reliable. The National Wetlands Research Center Library makes the data available through a searchable database at http:// eeirc.nwrc.gov/ris/risweb.isa and by offering the entire database in Procite version 3.04 format or as delimited text.

Other bibliographic databases offered by the library at http://eeirc.nwrc.gov/ris/risweb.isa include the NWRC publications list and the Wetlands Values Database. The publications database contains all publications by Center staff. The Wetlands Values Database is a bibliographic database on the values and functions of wetlands for water quality, as habitat, hydrologic value, and uses to the economy, recreation, and regional culture.

The U.S. Geological Survey's National Wetlands Research Center has made geospatial data (which may be of biological importance to studies being conducted within the Gulf of Mexico region) accessible through a website, located at http://sdms.nwrc.gov. The Spatial Data and Metadata Server houses ecological data, as well as data sets for developing base maps and providing ancillary information

About the OFWIM

The Organization of Fish and Wildlife Information Managers is nonprofit organization whose goals are to promote the management and conservation of natural resources by facilitating technology and information exchange among fish and wildlife information managers. To submit an article for the OFWIM Newsletter or obtain a subscription, contact Karen Reay, Virginia Department of Game and Inland FIsheries, 4010 W. Broad St., Richmond VA 23230-1104, email kreay@dgif.state.va.us, or call (804) 367-2733. Visit our web site at http://fwie.fw.vt.edu/ofwim/index.html and associated link at www.fwie.fw.vt.edu/tws-gis

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