Chapter 7 – Public Outreach and Participation

The District of Columbia enjoys an ethnically diverse population of about 561,000 residents living on a land base of sixty-nine square miles. Developed land comprises 80%, forest or parkland is 7%, and surface water is 13%. It is a totally urban landscape with a wealth of opportunities and needs for public service, education, and outreach. Despite being urban a variety of aquatic and wildlife resources abounds in our rivers, creeks, streams and on our minimal land base.

About The Branch

Established in 1986 as an Aquatic Resources Education Program, the program has advanced to a branch with multiple components to reach the local citizens of the District of Columbia.

The Aquatic Resources Education Branch provides a variety of educational and outreach opportunities to schools, community groups, and associations regardless of physical or mental giftedness. Age-appropriate curricula and activities have been designed to reach various target audiences. Additionally, each summer an eight-week hands-on angler education clinic program is provided for youth, teens, and senior citizens. Annual work plans highlight accomplishments and five-year work plans are created to anticipate requests for public services.

The overall mission of the DC Fisheries and Wildlife Division is to provide great customer satisfaction for the public by ensuring aquatic and wildlife education and outreach services are honestly, accurately and informatively represented to prevent environmental health disasters. An underlying principle of all activities will be to collaborate and form partnerships with federal and local governmental agencies, environmental groups, community groups, public schools, and other interested parties to improve the aquatic and wildlife resources status in the District of Columbia. Education and outreach strategies will include involvement with schools to empower urban youth to make better natural resources decisions. The key will be to involve residents and partners not only in education, but also informing and involving them in existing and future recreational aquatic and wildlife opportunities.

Branch Mission

The Branch is dedicated to fostering a better understanding and appreciation of our local aquatic and wildlife resources by providing quality programs through education, conservation and outreach activities.

Existing Programs

The Branch currently offers several educational, outreach, and recreational programs for its residents. They are the following:

School-based Activities

General Fisheries Introduction
- Information on fisheries management, the aquatic environment, and aquatic biota
- Focus on our three major urban waterways
- Provides insight about fish biologists and fish managers

Aquatic Ecology
- Concentrates on the importance of water
- Types of water, aquatic ecosystems
- Aquatic organisms (both flora and fauna)
- Pollution and conservation

Chesapeake Bay
- Chesapeake Bay's relationship to the Anacostia and Potomac Rivers
- Provides a vocabulary builder
- Explains how habitats transition from one area to another

Fish Biology
- Biology and behavior of fish
- Emphasis on local fish species
- Biological terms, fish anatomy, and fish locomotion

Water as an Environment
- Water and humans place in the water cycle
- Fundamentals of water quality
- Pollution
- Facts about water use

Wetlands
- Defines wetlands
- Functions of a wetland
- Identifies local wetlands and wetland areas
- Specialized plants of wetland habitats

Introduction to Urban Wildlife
- Teaches about local wildlife
- Habitats and benefits of wildlife

Birds of DC
- Teaches about birds in the District
- Effects of urban environment on birds

Living with Wildlife
- Effect of urban ecosystem on wildlife

- How people and wildlife co-exist

Staff persons also provide services for

- Career Day Presentations
- Science Fair Judging

Outreach Activities

- Educator Workshops
- Capital Geographic Newsletter
- Tackle Tribute Newsletter
- Kids Fishing Booklet
- Fishing Clinics

Existing Goals

The Aquatic Resources Branch has transformed itself by making use of public involvement opportunities. Educational programs offer a variety of free public services ranging from written literature about the local natural resources, fishing clinics, and in-school programs to Internet access to educational activities to educator workshops. These successes have been some of the primary forces for this transformation. Technological advances coupled with effective and customer-friendly public services will ensure the residents and visitors to our nation's capital continue to enjoy the natural resource treasures that are managed, conserved, protected, and sustained for the benefit of a diverse urban population.

Equally important, the Aquatic Resources Branch must address the communications aspects of the division, to ensure the universal availability of basic resource and administrative services, make communications services accessible internally and externally, and inform consumers about our programs and management activities. The key will be to continue to involve residents and partners not only in education, but also informing and involving them in recreational aquatic and wildlife opportunities available in the District. In support of this mission, the Aquatic Resources Education Branch has four general goals for the next 5 years. They are:

- Enhance the District of Columbia youths' knowledge and understanding of urban aquatic and wildlife resources
- Provide practical angling skills training to District residents
- Provide practical wildlife skills training to District teachers
- Increase public awareness concerning the Aquatic Resources Education Center

WAP Goal

Provide wildlife education and outreach to residents of the District

The DC Fisheries and Wildlife Division is committed to supporting and promoting the highest quality of public education and outreach services for residents and visitors as it pertains to our local aquatic and wildlife resources. It is our mission to provide great customer satisfaction for the public by ensuring aquatic and wildlife education and outreach services are honestly, accurately, and informatively represented to prevent environmental health disasters. An underlying principle of all efforts will be to improve the aquatic and wildlife resources status in the District of Columbia. Education and outreach strategies will include involvement of schools to empower urban youth to make better natural resource decisions. The key to success will be to involve residents and partners not only in education, but also informing and involving them in recreational aquatic and wildlife opportunities.

Key Objectives and Strategies for the WAP Goal:

Objective 1. Enhance District youths' knowledge and understanding of urban aquatic and wildlife resources.

Strategies

1. Administer wildlife educational outreach programs in the District's public and private schools.
2. Teach wildlife resources education principles to supplement and strengthen teachers' needs.
3. Teach wildlife resources education principles specific to the District of Columbia
4. Work with teachers to encourage and develop life skills for students

Measures

- Increase middle school and high school program participation.
- Enhance and create new aquatic and wildlife resources education curricula.
- Increase communications with science and mathematics teachers.
- Provide training and professional development for all aquatic and wildlife education staff persons, such as web page design, building budget skills, effective delivery of aquatic and wildlife education programs, presenting effective workshops, and fishing techniques and skills.

Objective 2. Provide practical wildlife skills training to District teachers.

Strategies

1. Develop annual workshops on wildlife principles for teachers
2. Involve District teachers in outdoor, interactive and hands-on wildlife activities

3. Relate wildlife education activities to critical learning and developmental skills

Measures
- o Acquire educational tools to implement a full wildlife education program.
- o Provide training and professional development for teachers and develop and implement an evaluation tool to measure success of teacher or educator trainings.
- o Increase communications with science and mathematics teachers to determine what critical skills needs to be addressed.

Objective 3. Increase public awareness concerning the WAP efforts within the District of Columbia.

Strategies
1. Provide community-based wildlife educational programs
2. Promote resident and community involvement in wildlife skills and outreach opportunities
3. Work effectively to increase public knowledge of local wildlife resources

Measures
- o Increase outreach efforts to non-school based organizations to attract a larger segment of the public sector.
- o Provide outdoor skills training, workshops and other types of interactive and hands-on activities for individuals of these organizations.
- o Increase communications with religious groups, senior citizens, garden clubs, youth organizations, daycare, and other such similar organizations to inform them of wildlife resources and outdoor wildlife learning opportunities.

Chapter 8 – Monitoring, Review and Revision

The following chapter describes the District's plan for monitoring the species and conservation actions identified in this WAP and subsequently reviewing and revising the WAP, as required by Elements #5 and #6.

The primary goals of the monitoring projects are to:

- Determine the status and trend of species of greatest conservation need
- Measure the success of the conservation actions
- Adapt conservation actions to new information and changing conditions
- Build a central database of wildlife information

Monitoring allows conservation agencies and organizations to measure changes in:

- Species status, trend, distribution, and response to conservation actions
- Habitat locations and condition
- Threats
- Implementation priorities
- Information and conditions

Approach to Monitoring

To assess changes in species populations and habitats, monitoring projects target multiple levels on local, regional and national scales. The levels include:

1. Species of greatest conservation need
2. Priority habitats
3. Conservation actions

The purpose of this multi-level approach is to be able to measure not only the status of the species, but also the status of the habitat and the effectiveness of the conservation actions. The species level is detailed in the first section of this chapter. The second section details the plan for monitoring conservation actions.

Monitoring Species of Greatest Conservation Need

The District's plan involves a three-tiered approach to monitoring species of greatest conservation need:

1. Coordinate existing projects
2. Expand existing projects
3. Develop new projects

The role of coordinating and overseeing the monitoring process during the implementation phase of the WAP belongs to the DC Fisheries and Wildlife Division. However, a major strategy of the monitoring plan is to work in partnership with other monitoring agencies and organizations and to coordinate existing monitoring projects. Currently, many existing monitoring projects are being implemented by national, local and nongovernmental agencies and organizations, as well as by universities and the general public. The WAP will absorb and incorporate existing monitoring projects into one comprehensive and strategic conservation plan.

For example, much of the land in the District is managed by the National Park Service (NPS), which conducts monitoring projects using established monitoring protocols. Several of their standard monitoring protocols will be useful for other areas in the District that are not managed by NPS. Thus, a strategy of the District's monitoring plan is to implement NPS monitoring efforts District-wide.

It is very important for the District to include these existing projects in its effort to monitor wildlife. There is no current central coordination of the data and often these efforts are conducted too infrequently to be effective due to irregular or insufficient funding. Therefore, a product of this WAP will a central database with meaningful data on species status and trends that will help the District design the best possible conservation actions for those species and their habitats. In cases where the existing projects have restraints or resource gaps, this WAP serves to fill those gaps and ensure that the monitoring projects are efficient and successful.

Where possible, this chapter includes plans to:

- Coordinate existing monitoring projects to prevent redundancy,
- Expand existing monitoring projects to cover the entire District,
- Tailor existing monitoring projects to target the species of greatest conservation need, and
- Implement existing monitoring projects in a timeframe under which the effectiveness of the conservation actions can be measured at appropriate intervals.

For species of greatest conservation need that are not covered under any of the existing projects, new monitoring projects are proposed that target those species. Other projects may target common habitats rather than individual species. Regardless, the projects listed in this monitoring plan are grouped by wildlife taxa and generally follow standard monitoring protocols for each taxon.

The District's monitoring plan will incorporate and centralize the credible data already being produced by existing monitoring projects. Coordinating existing efforts saves limited resources and enhances those important efforts that have already been made. Standardized techniques will be used when they are compatible for local conditions. On a national level, the following monitoring programs provide guidelines and recommendations that this WAP will consider:

- *US Geological Survey Status and Trends Program*—This program coordinates states' monitoring needs, standardizes protocols, and develops mechanisms to monitor the status and trends of biological resources.

- *Coordinated Bird Monitoring Group of the International Association of Fish and Wildlife Agencies*—This is a report used to motivate discussion among North American Bird Conservation Initiative partners on coordinating bird monitoring.

Monitoring Need

Inventory of existing monitoring actions and plans

- What is being monitored?
- Who is monitoring?
- What is not being monitoring?
- What methods can be used to inventory?
- What are the standard monitoring protocols?

Monitoring Projects

The following section details the projects for species-level monitoring. It is organized by taxa: birds, mammals, reptiles, amphibians, fish, and invertebrates.

Birds

There are 35 birds on the District's list of species of greatest conservation need, representing the largest percentage of species on the list after invertebrates. They are also some of the most studied and monitored species in the District. Therefore, there are many standard protocols and efforts already underway that have been established for years. Monitoring projects for other species taxa should be developed using lessons learned from the experience of the bird projects.

National Projects

Threatened and Endangered Species Monitoring (http://www.fws.gov/endangered)

USGS—The Patuxent Wildlife Research Center runs a Monitoring Avian Productivity and Survivorship (MAPS) station near the District (http://www.pwrc.usgs.gov/). The MAPS program was established by the Institute for Bird Populations and monitors the productivity and survivorship of breeding birds (http://www.birdpop.org/). This WAP will facilitate coordination of the surrounding region to integrate data on species of greatest conservation need and their habitats. The District will start a partnership among agencies and organizations, such as the Patuxent Wildlife Research Center, the DC Fisheries and Wildlife Division, and the Smithsonian Institution that are already conducting monitoring programs in the nearby area.

National Park Service (NPS)—There are various bird monitoring efforts occurring on the Parks within the District.

National Capital Parks—East (NACE) conducted a survey of grassland and ground nesting birds in Anacostia, Fort Circle Parks, and Oxon Cove in 2005. This survey collected data regarding species names, GPS mapping of bird species occurrences during the nesting, wintering, and migration seasons, abundance, life cycle information, and management recommendations. The number of visits varied depending on the season.

NACE issued a permit to the Smithsonian Institute to establish a MAPS banding site at Fort Dupont. The District will coordinate with this program and open more MAPS stations across the District that would strategically capture species of greatest conservation need and their habitats.

Rock Creek Park and Glover Archbold Park each have a Breeding Bird Census Area. These areas were established in 1959 by the National Audubon Society and are monitored by volunteers several times per breeding season. Breeding birds are identified by singing males or by observation. Territories are delineated and mapped. The purpose of the survey is to record population levels in homogenous habitat to determine average population numbers in the region. Neotropical migrants are also recorded in these surveys.

Wildlife biologists conducting point counts on the bird survey

Rock Creek Park also conducts annual surveys on the creek and its tributaries of breeding waterfowl and the survivorship of their young. Mostly mallards and wood duck are recorded.

Regional Projects

US Shorebird Conservation Plan (Brown et al. 2001)

North American Waterbird Conservation Plan (Kushlan et al. 2002)

North American Waterfowl Management Plan (NAWMP 2004)
Atlantic Coast Joint Venture Strategic Plan (ACJV 2004)

Partners in Flight North American Landbird Conservation Plan (Rich et al. 2001)
Partners in Flight Bird Conservation Plan for the Mid-Atlantic Piedmont (PIF 2003)
Partners in Flight Bird Conservation Plan for the Mid-Atlantic Coastal Plain (PIF 1999)

Local Projects

DC Fisheries and Wildlife Division—The Wildlife Research Branch of the DC Fisheries and Wildlife Division conducts several bird monitoring surveys around the District.

Weekly point counts at Kingman Island. Currently, these population studies provide presence and absence data regarding the status of bird species on Kingman Island. DC Fisheries and Wildlife staff plans to expand the amount of area covered by these counts.

Winter shorebird and waterbird counts. Each winter, the Wildlife Research Branch staff conducts point counts of shorebirds and waterbirds along the Anacostia River. This study monitors the status of birds that migrate to and spend the winter within the District. As part of the WAP, the Division plans to expand these counts to include a larger portion of the river, as well as the Potomac River. Since the start of this study, none of the species of greatest conservation have been seen very often on these counts, but a goal of this WAP to increase the numbers of some of those species in these areas, such as the Sora.

Wildlife biologist removing a white-eyed vireo from a mist nest during training in bird banding, an important research tool for birds.

MAPS bird banding program. The Wildlife Research Branch staff plans to establish a MAPS site in 2006 to begin monitoring the productivity and survivability of resident bird species in selected areas around the District.

Nongovernmental Projects

Natural Heritage Program (NHP)—The state NHPs inventory, catalog and help conserve rare state species.

Breeding Bird Survey (BBS)—The BBS has been coordinated by the USGS since 1966 and is conducted by volunteers from the general public. It is a yearly effort to monitor the status and trends of bird species that breed within the District and across the country. Some of the most threatened species of greatest conservation need are breeders and the BBS is a source for long-term data on these species. BBS routes and data can be used to monitor the District's species of greatest conservation need (http://www.pwrc.usgs.gov/bbs).

C&O Canal Midwinter Count— The C&O Midwinter Count is coordinated by the DC Audubon Society and is conducted by volunteers from the general public.

Anacostia Watershed Society (AWS)—AWS conducts surveys of resident Canada Goose populations at several times throughout the year. The count is conducted by volunteers.

Academic Projects

College of William and Mary—proposed partners for the creation of an historical bird database

Standard monitoring protocol resources

Conway, Courtney J. 2004. *Standardized North American marsh bird monitoring protocols*. USGS, Arizona Cooperative Fish and Wildlife Research Unit.

DeSante, D.F. and K.M. Burton. *MAPS Manual: Instructions for the establishment and operation of stations as part of the Monitoring Avian Productivity and Survivorship program*. The Institute for Bird Populations. Point Reyes Station, CA.

Howe, Marshall, Jon Bart, Stephen Brown, Chris Elphick, Robert Gill, Brian Harrington, Catherine Hickey, Guy Morrison, Susan Skagen, and Nils Warnock, eds. 2000. *A comprehensive monitoring program for North American shorebirds*. Manomet Center for Conservation Sciences. http://www.manomet.org/usscp/files.htm

Bibby, C. J., N. D. Burgess, and D. A. Hill. 1992. *Bird census techniques.* Academic, London.

IAFWA (International Association of Fish and Wildlife Agencies). 2004. *Monitoring avian conservation: Rationale, design, and coordination*. The Coordinated Bird Monitoring Working Group.

Steincamp, M., B. Peterjohn, V. Byrd, H. Carter, and R. Lowe. 2003 (Draft). *Breeding season survey techniques for seabirds and colonial waterbirds throughout North America*. Waterbird Monitoring Partnership of the Waterbird for the Americas Initative, US Geological Survey, Patuxent Wildlife Research Center.

Mammals

National Projects

*Threatened and Endangered Species Monitoring (*http://www.fws.gov/endangered)

National Park Service (NPS)

- Rock Creek Park conducts annual road kill surveys of all animals killed on roads in or adjacent to the park since 1982. The WAP will fund this effort to be conducted on a more regular basis.
- Rock Creek Park conducts annual deer monitoring, including spotlight counts, road kill recording, and vegetation browse impact using exclosures and long-term vegetation plots.

Nongovernmental Projects

Natural Heritage Program (NHP) — see birds.
North American Bat Conservation Partnership (NABCP)— NABCP developed a "Strategic Plan" to remedy the insufficient knowledge of factors influencing North American bat populations and insufficient data on population status and trends, habitat requirements, and ecosystem roles that greatly impede focused and comprehensive recommendations for management. They seek to change the fact that land management practices are being implemented throughout the continent with little or no documentation of their effectiveness in mitigating damage or enhancing habitats for bats. In an effort to fill these knowledge gaps, biologists are now using a wide range of new technologies to investigate species distributions, population trends, and habitat requirements. To ensure the accuracy and utility of this new information, there is an urgent need to verify and standardize technologies and techniques (http://www.batcon.org/nabcp/newsite/).

Standard monitoring protocol resources

Wilson, D.E., F.R. Cole, J.D. Nichols, R. Rudran, M.S. Foster. (eds.) *Measuring and monitoring biological diversity: standard methods for mammals.* 1996. Smithsonian Institution Press, Washington, DC.

Reptiles

National Projects

Threatened and Endangered Species Monitoring (http://www.fws.gov/endangered)


Turtles basking along C&O Canal

Nongovernmental Projects

Natural Heritage Program (NHP) — see birds.

Multi-sector Projects

Partners in Amphibian and Reptile Conservation (Parc) — Parc is a multisector conservation partnership of government agencies, conservation groups, universities, and industry. Their mission is to conserve herpetofauna and their habitats via public/private partnerships. Parc keeps a database of ecology and habitat requirements of herpetofauna so that information is accessible. Parc reviews, synthesizes, and publishes standardized data collection techniques to assure consistency in determining regional population trends, reporting declines or recoveries of species (http://www.parcplace.org/).

Academic Projects

Richmond University—existing reptile and amphibian monitoring program

Standard monitoring protocol resources

Amphibian and Reptile Monitoring Initiative (ARMI). USGS Patuxent Wildlife Research Center. http://armi.usgs.gov/index.asp

Southeast Amphibian and Reptile Monitoring Initiative (SE ARMI). Florida Integrated Science Center. Gainesville, FL. http://cars.er.usgs.gov/armi

ASIH (American Society of Ichthyologists and Herpetologists). 2004. *Guidelines for use of live amphibians and reptiles in field and laboratory research*, 2nd edition. Revised by the Herpetological Animal Care and Use Committee (HACC). Retrieved from http://www.asih.org/ pubs/ASIH_HACC_Final.PDF, April 18, 2005.

Amphibians

National Projects

Threatened and Endangered Species Monitoring (http://www.fws.gov/endangered)

National Park Service (NPS)

- Annual monitoring of vernal pools occurs at Rock Creek Park by USGS personnel with assistance from park staff, as part of the Amphibian Research and Monitoring Initiative (ARMI). Egg mass counts are conducted three times per season and calling surveys are conducted. This type of monitoring is also being done on the lower C&O Canal. ARMI is a national program of amphibian monitoring, research and conservation composed of Interior Department agencies. The USGS coordinates and leads the cooperative effort to study amphibian populations, measure and monitor environmental characteristics, and conduct research into potential causes of decline (http://armi.usgs.gov/).
- As part of ARMI, streamside salamanders in Rock Creek National Park are also monitored annually by USGS.

Nongovernmental Projects

Natural Heritage Program (NHP) — see birds.

Multi-sector Projects

Partners in Amphibian and Reptile Conservation (Parc) — see reptiles.

Academic Projects

Howard University—existing amphibian monitoring program
Richmond University—existing reptile and amphibian monitoring program

Standard monitoring protocol resources

Amphibian and Reptile Monitoring Initiative (ARMI). USGS Patuxent Wildlife Research Center. http://armi.usgs.gov/.

Dodd, C. Kenneth. 2003. *Monitoring amphibians in Great Smoky Mountains National Park*. USGS Circular 1258.

Heyer, W.R., M.A. Donnelly, R.W. McDiarmid, L.C. Hayek, and M.S. Foster (eds.) 1994. *Measuring and monitoring biological diversity: standard methods for amphibians*. Smithsonian Institution Press, Washington, DC.

North American Amphibian Monitoring Program (NAAMP). USGS Patuxent Wildlife Research Center. http://www.pwrc.usgs.gov/NAAMP/protocol

Southeast Amphibian and Reptile Monitoring Initiative (SE ARMI). Florida Integrated Science Center. Gainesville, FL. http://cars.er.usgs.gov/armi

ASIH (American Society of Ichthyologists and Herpetologists). 2004. *Guidelines for use of live amphibians and reptiles in field and laboratory research*, 2nd edition. Revised by the Herpetological Animal Care and Use Committee (HACC). Retrieved from http://www.asih.org/ pubs/ASIH_HACC_Final.PDF, April 18, 2005.

Mitchell, J. C. 1997. *Amphibian monitoring protocols for Virginia*. Virginia Department of Game and Inland Fisheries, Richmond, Virginia.

Jung, R. E. 2002a. *Streamside salamander inventory and monitoring, Northeast Refuges and Parks.* Patuxent Wildlife Research Center, U.S. Geological Survey, Laurel, Maryland.

Jung, R. E. 2002b. *Wood frog and spotted salamander egg mass counts and percent vernal pools occupied by amphibian species on DOI lands in the northeastern United States*. Patuxent Wildlife Research Center, U.S. Geological Survey, Laurel, Maryland.

Fish

National Projects

Threatened and Endangered Species Monitoring (http://www.fws.gov/endangered)

Nongovernmental Projects

Natural Heritage Program (NHP) — see birds.

Local Projects

DC Fisheries and Wildlife Division— The Fisheries Research Branch staff is conducting several monitoring programs for the District's fish species in greatest conservation need. The Branch monitors migratory and resident fish and assessing water quality conditions and the state of aquatic habitats. Current monitoring projects include:

- Anadromous and resident fish surveys
- Ichthyoplankton studies to determine the spawning success of both anadromous and resident fish species
- Research to determine age and growth rate of fish
- Monitoring and evaluation to assess and improve fish habitat
- Monitoring to assess the yearly trends of the extent, density, and species composition of submerged aquatic vegetation

This data is used to determine and project growth trends and identify the conservation needs of the District's fish species. The data guides the Division in determining the most effective conservation actions for the 12 fish species of greatest conservation need for the District's WAP.

Standard monitoring protocol resources

AFS (American Fisheries Society), AIFRB (American Institute of Fishery Research Biologists), and ASIH (American Society of Ichthyologists and Herpetologists). 2004. Guidelines for the use of fishes in research. Revised by the Use of Fishes in Research Committee. Retrieved from http://www.fisheries.org/html/Public_Affairs/Sound_Science/Guidelines2004.shtml, April 18, 2005.

Nielsen, L.A. and D.L. Johnson (eds.). 1983. *Fisheries Techniques.* American Fisheries Society, Bethesda, Maryland.

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

Karr, J.R., K.D. Fausch, P.L. Angermeier, P.R. Yant, and I.J. Schlosser. 1986. *Assessing biotic integrity in running waters: a method and its rationale*. Illinois Natural History Survey, Champaign, IL.

Atkinson, J. 2002. *Shenandoah National Park fisheries monitoring protocol*. Natural Resources Branch, Division of Natural and Cultural Resources, Shenandoah National Park.

Invertebrates

The number of invertebrate species of greatest conservation need represented in this WAP is probably lower than it would actually be. Due to gaps in invertebrate monitoring within the District, the status of many invertebrate populations is unknown. The number given in this WAP represents the number of species of greatest conservation need given current knowledge. One of the first steps in conserving invertebrate species of greatest conservation need within the District is to do a comprehensive inventory of all invertebrates to determine which species are in need. Invertebrate surveys and research is a strategy of the District's WAP. Still, given current knowledge, there are 51 invertebrate species of greatest conservation need, giving invertebrates the highest percentage of species of greatest conservation need than any other wildlife taxa.

National Projects

Threatened and Endangered Species Monitoring (http://www.fws.gov/endangered)

National Park Service (NPS)—There are various invertebrate monitoring efforts occurring on the Parks within the District.

- National Capital Parks—East (NACE) conducted a survey of dragonflies and damselflies of the Aquatic Gardens, Kenilworth Marsh, Kingman Lake/ Marsh, National Arboretum, an the Anacostia River from New York Avenue south to Benning Bridge in 2000. The survey was a baseline study by which future improvements in aquatic habitat may be measured or monitored and provides insights as to what invertebrate changes can be expected within the wetland habitats of the survey area if water quality is returned to a more healthy condition.
- NACE keeps a list of pollinators of native plant species in an effort to address the issue of invasive/ alien plant species.
- NACE conducted a reptile and amphibian survey at Kenilworth Aquatic Gardens in 2002.
- NACE has a survey of butterflies of the north-eastern sites of NACE (Fort Circle sites, Suitland Parkway, Greenbelt Park, and the Baltimore-Washington Parkway) planned for 2006 and 2007. The surveys will look at modern-day occurrence and status of butterflies in these areas and include a species list, notes on distribution, relative abundance, flight periods, habitat and host plant notation, GPS mapping, and management recommendations. Visits will occur at periods timed to maximize species diversity.

*Hay's Spring Amphipod (*Sygobromus hayi*) Project*

The Hay's Spring amphipod is a federally endangered species that is endemic to the springs of Rock Creek Park. There is little known about the biology, population dynamics, or ecological community of this amphipod. Indeed, subterranean species are difficult to monitor since they appear seasonally and sporadically in seeps and springs or may not appear even during high water flows. It spends its life in a shallow groundwater zone, moving in water that percolates among sand grains and gravel until it is flushed out by large volumes of water into a spring. Therefore, universities, the US Fish and Wildlife

Service, and the MD Department of Natural Resources (MD DNR) provide assistance to Rock Creek Park in terms of developing monitoring question and gathering and analyzing data for the Hay's Spring Amphipod (Pavek 2002).

*Kenk's Amphipod (*Stygobromus kenki*) Project*

Kenk's amphipod is a species of greatest conservation need that is endemic to the springs of Rock Creek. One of the highest conservation priorities for this species is to learn more about it. A two-year study by an American University professor will be conducted in Rock Creek Park to determine the status of Kenk's Amphipod. The study will also monitor other groundwater invertebrates as well as spring outflows, which is a priority habitat of this WAP. The method is a direct sampling of the fauna that should reduce sampling error. MD DNR, with funds from the US Fish and Wildlife Service, will monitor the status of Kenk's Amphipod by conducting surveys outside of national parks (Pavek 2002).

Nongovernmental Project

Natural Heritage Program (NHP) — see birds.

Academic Projects

American University—see Kenk's Amphipod monitoring project

Standard monitoring protocol resources

NABA (North American Butterfly Association). 2005. 31st Annual NABA Butterfly Count – 2005 instructions (USA). North American Butterfly Association. Posted at: http://www.naba.org/counts.html.

New, T. R. 1998. *Invertebrate surveys for conservation*. Oxford University, New York, New York.

Strayer, D. L. and D. R. Smith. 2003. *A guide to sampling freshwater mussel populations*. American Fisheries Society Monograph 8, Bethesda, Maryland.

Voshell, J. R. and S.W. Hiner. 1990. *Shenandoah National Park long-term ecological monitoring system, section III, aquatic component user manual, NPS/NRSHEN/NRTR-90/02*. Department of Forestry, Virginia Polytechnic Institute and State University, Blacksburg, Virginia.

Monitoring Conservation Actions

The second level to the District's approach to monitoring is to monitor conservation actions. In order to facilitate Required Element # 6, the review and revision of the WAP,

there must be a protocol and procedure for monitoring the conservation actions proposed in this WAP. This section:

- Sets project level performance indicators and criteria to measure the success of the conservation actions, and
- Develops corresponding adaptive management techniques.

Performance Indicators and Criteria

- Did the action occur?
  - Reporting of projects to supervisors
- Was the action cost-effective?
  - Time/money guidelines from the International Association of Fish and Wildlife Agencies
  - Develop a cost accounting system
- Was the action effective?
  - Use of indicator species
  - Use of project tracking database
  - Survey of biologists and resource managers
- Were the targets met?
  - Assign measurable goals to conservation actions
  - Evaluation of projects by supervisors
- Were all interested stakeholders involved?
  - Federal, state, local, private, nongovernmental
- Was the public invited to participate?
- Were their any consequences?
- What was public opinion of the action?

Multi-level Monitoring

The District followed the multi-level approach to monitoring conservation actions as developed by the US Forest Service (USFS). The USFS makes distinctions among the levels of monitoring that guides the questions asked during the monitoring process and guides the development of goals for the monitoring program. The levels include:

Implementation Monitoring—This is a simple record of progress toward a specific goal, and whether they were implemented as planned (http://www.for.gov.bc.ca/hfp/frep/about/types.htm). For example, did a park spray for invasive species?

Effectiveness Monitoring—This determines whether the conservation action was effective (http://www.for.gov.bc.ca/hfp/frep/about/types.htm). For example, did spraying a specific amount of invasive species remove or significantly reduce the threat of invasive species in the park or the District?

Validation Monitoring—This monitors the link between cause and effect to validate the development of the management decision (http://www.for.gov.bc.ca/hfp/frep/about/types.htm). For example, is spraying invasive species an effective strategy for targeting the threat of invasive species? Is there a better way to reduce invasive species? Is there a more cost effective way to reduce invasive species?

Specific Examples from the District's WAP

Example #1: Using a land exchange to prevent habitat loss
Possible performance indicator for the action—

- How much land was saved due to a land exchange? (*implementation monitoring*)
- Did the land exchange prevent habitat loss of grasslands and managed meadows? (*effectiveness monitoring*)
- Are land exchanges an effective action for habitat loss, or is there a more cost-effective strategy? (*validation monitoring*)

Example #2: Increasing enforcement to stop dumping
Possible performance indicator for the action—

- Did increased enforcement decrease dumping? (*implementation monitoring*)
- Did it protect early successional/ shrub-scrub/ edge habitats from dumping? (*effectiveness monitoring*)
- Is there a more effective way to prevent dumping? (*validation monitoring*)

More examples:

- What is the status of the District stormwater control plan? How has it impacted rivers and streams?
- Did surveys help fill research and prioritization gaps for invertebrate species?
- Did involvement in the planning process result in smart growth?
- Did implementation of best management practices reduce stormwater erosion in hardwood forests?
- Did preserving groundwater recharge areas reduce changes to hydrologic regimes in tidal mudflats?
- Did stream bank restoration help reduce erosion in ponds and pools?
- Did designating areas as "critical" limit the impact of the change in land use of forested wetlands/ riparian woodlands/ floodplains?

- Did educational outreach reduce poaching from vernal pools?
- Was a goose management plan approved to address the threat of overbrowsing of emergent tidal wetlands?
- Was the Exotic Plants Management Team implemented District-wide?
- Is pollution still a threat to emergent non-tidal wetlands?
- What are the results of the monitoring project for parasites and pathogens in urban landscapes?
- Was the introduction of submerged aquatic vegetation to new sites successful? What are the sites?

Another tool for monitoring conservation actions is receiving feedback from conservation planning organizations. The Nature Conservancy and Defenders of Wildlife were participants in the development phase of the WAP and will be very active in the implementation phase as well. Both groups have a great deal of experience in conservation planning and have very valuable expertise to bring to this monitoring program.

Coordination among the neighboring states of Maryland and Virginia will also be a strategy of this monitoring program. Since the District shares many species of greatest conservation need, priority habitats, and threats with the surrounding region, strategic conservation planning includes being consistent with and communicating with the region. Exchanging monitoring data and success stories, as well as methods is a strategy of the District's WAP.

Adaptive Management of Conservation Actions

- Based on performance indicators and criteria, how should conservation actions be changed?
- Based on the monitoring of status and trends of species, habitats and threats, how should conservation actions be changed?
- Are the conservation actions meeting the goals of the District's WAP?
- Communication among Working Group partners; data exchange regarding project success, recommendations, needs, priorities
- Establishment of a database that assesses success data, needs, priorities

Review and Revision

The DC Fisheries and Wildlife Division, with the continued help of the Working Group, will review and revise the WAP, as required by Element #6. The Working Group will establish a very detailed schedule, which will include annual, biannual, as well as third, fourth and fifth year reviews and evaluations of the strategy. A comprehensive revision

of the WAP will occur every five years. The review and revision process will occur using the following timeline:

- Within the first year of the implementation phase of the WAP—the Working Group will set short and long term measurable goals and timetables for each conservation action that allow for adaptive management and application of performance indicators.

- Biannually after goals and timetables have been set—goals will be reviewed to evaluate whether the goals have been achieved based on the timetable and determine if any new goals or adjustment need to be made based on new information.

- Years three and six after implementation—conservation actions will be reviewed and evaluated to determine if that conservation action is still needed and to establish new conservation actions based on new data and information.

- Years four and eight after implementation—the current top five threats and strategies will be reviewed and evaluated to determine if any changes or reprioritizations are needed based on new information and conditions.

- Years five and ten after implementation—the entire WAP will undergo a comprehensive review and evaluation. In addition to the reviews in the other years of the goals, conservation actions, strategies and threats, the comprehensive review will reevaluate and update the District's list of species of greatest conservation need, priority habitats and maps, threats, and tables based on the most current information available.

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