



Virginia Master Naturalist

Virginia Master Naturalist Program Guidelines for Basic Training



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Virginia Master Naturalist Program Guidelines for Basic Training

Overview

Many participants will be attracted to the Virginia Master Naturalist Program because of the opportunity for continuing education through the basic training course. It is important for chapters to remember that the course is intended to prepare the participants for volunteering as Master Naturalists. The course should be organized to give the volunteers the background knowledge and skills they need to be effective in their service projects.

Core Curriculum and Objectives

The *minimum* basic training course requirements include 40 hours of combined classroom and field experiences, with 25% of that time spent in the field. Because of its geographical diversity, the natural resources of Virginia vary widely. Therefore, each local chapter will customize their training program to focus on their local ecosystems. Over the course of the 40 hour training, the course should include training to achieve the core training objectives for what Virginia Master Naturalist should know and be able to do.

A Virginia Master Naturalist should know...

- All aspects of their role as a Virginia Master Naturalist, the mission and objectives of the program, and the guidelines for participation, including risk management guidelines
- What a naturalist is and does and the significance of naturalists and natural history
- The biogeography of Virginia, including the physiographic regions and the geological and ecological aspects that make them distinct
- Basic concepts of ecology
- Basic concepts of geology
- Basic resource management principles
- Some native flora and fauna in the region
- The general process of science
- The roles of Virginia state agencies in the management and conservation of natural resources

A Virginia Master Naturalist should be able to...

- Use a key to identify organisms
- Use a field guide
- Share knowledge with others (verbally and/or in writing)
- Make and record observations in nature
- Recognize when he or she does not know the answer to a question, but be able to seek out answers from people, books, or other reliable resources



With these objectives in mind, every Virginia Master Naturalist's training should include the following topics:

- Introduction to the Virginia Master Naturalist program
- Risk management guidelines and policies
- American Naturalists
- Basic Ecology
- Biogeography of Virginia
- Geology
- Nature of Naming
- Education and Interpretation Skills
- Citizen Science and Research Skills
- Ecology and Management of the systems occurring in the region
- Overview of vertebrates, invertebrates, trees and other plants (biology, ecology, identification, conservation and management of each)

Complete List of Objectives

To help guide the chapters as they plan their trainings, the Steering Committee developed a comprehensive list of curriculum objectives, organized by topic (Appendix I). Chapters can use these objectives to plan their syllabi and to choose appropriate presenters. It is recommended that chapters provide guest presenters with the list of objectives for their topics and ask the presenters to cover that material in their presentations. There is not sufficient time to cover details for every objective. Volunteers may learn some of the material from background readings; it need not all be presented during class time.

The Training Schedule

Chapters set their own training schedules. As the training classes are put together, remember that the time of day chosen to hold class sessions significantly influences the make up of the class. If training is offered during the daytime, individuals with flexible schedules (which may include self-employed, homemakers, retirees, and some individuals with disabilities), will be able to take the training, but this schedule will possibly exclude those who work full time or part-time. This schedule may also affect the speakers available to teach classes. Training in the evening may widen the participant group, but could open the training to individuals who cannot complete the volunteer service requirements or become active Virginia Master Naturalists. If all or most of the service opportunities require week day participation, make certain during screening that all individuals will be able to fulfill their certification requirements. If training is offered at night to accommodate trainees that are not available during the day, then there must be appropriate volunteer service opportunities available in the evening and weekend hours. Otherwise, offering training in the evening and having all volunteer opportunities during the day



substantially lowers retention rates due to the individual's inability to volunteer during the times available.

Deciding when during the year to conduct the class also requires careful consideration. Spring, fall, and summer all offer more opportunities for outdoor field trips, although winter is often a less busy time for guest presenters. The decision of when to offer the training should also reflect the timing of the need for volunteer service.

The training schedules for the basic training courses may vary from a short period of very intensive training to a less time-intensive training spread over the course of six months or even a year. Some of the possible training schedules include:

- Once a week in classroom for 2 hours for 12 weeks, plus 16 hours of Saturday field trips
- Once a week in both classroom and field for 3 hours for 12 weeks, plus one 4 hour field trip
- Once a week on Saturdays for 5 hours, including both classroom and field time, for 8 weeks
- Two 5 hour Saturday classes during each of the 4 seasons, including both classroom and field time
- One intensive week-long 40 hour training (this option is not practical for most chapters, but may be an option for chapters based at residential facilities such as environmental education centers).

Chapters should consider the pros and cons of each of these schedules, as well as other possible schedules, and choose the schedule that best fits their community and volunteer needs.

Sample Syllabi

There are several possible approaches a chapter may take when matching curriculum topics with the chosen schedule to create a syllabus. One approach is topic-based and teaches each of the “-ologies” independently. Another approach is more system-based and integrates the “-ologies” into classes that focus on the ecology and management of each of the ecosystems that occur in the region. These two approaches may also be combined to form a hybrid approach. The broad outlines for several sample syllabi are presented here as examples, and additional sample syllabi may be found in the appendices.

Subject approach for a Piedmont-based Course

- Class 1: Introduction to the Virginia Master Naturalist program, personal introductions/icebreaker, history and basic skills of naturalists, risk management guidelines
- Class 2: Basic ecology
- Class 3: Virginia biogeography, physiographic regions, geology and soils, weather and climate, typical communities of each region, land use history
- Class 4: Overview of natural resource management (forest, wetland, freshwater aquatic, coastal/estuarine, urban/suburban)
- Class 5: Taxonomy, classification, and identification of species; botany
- Class 6: Dendrology, Forest Ecology and Management



- Class 7: Ornithology
 - Class 8: Herpetology, Wetlands Ecology and Management
 - Class 9: Mammalogy, Urban Ecology and Management
 - Class 10: Ichthyology, Aquatic Ecology and Management
 - Class 11: Invertebrate Biology/Entomology
 - Class 12: Interpretive skills, Citizen Science skills, wrap-up, assessment, discussion of volunteer opportunities
- + 2 field trips of 4-6 hours each

Systems approach for a Piedmont-based Course

- Class 1: Introduction to the Virginia Master Naturalist program, personal introductions/icebreaker, history and basic skills of naturalists
 - Class 2: Basic ecology
 - Class 3: Virginia biogeography, physiographic regions, geology and soils, weather and climate, typical communities of each region, land use history
 - Class 4: Forests: Basic taxonomy, classification, and identification; dendrology, land use history, forest ecology and management
 - Class 5: Forests, continued: Botany, ornithology, mammalogy, invertebrate biology
 - Class 6: Wetlands: Botany, herpetology, invertebrate biology
 - Class 7: Wetlands, continued: Land use history, wetland ecology and management
 - Class 8: Streams, Lakes, and Rivers: Botany, mammalogy, ichthyology
 - Class 9: Streams, Lakes, and Rivers: Land use history, ecology and resource management
 - Class 10: Urban/suburban systems: Land use history, ecology and management, botany, dendrology, ornithology, herpetology, mammalogy, invertebrate biology
 - Class 11: Interpretive skills
 - Class 12: Citizen Science skills, wrap-up, assessment, discussion of volunteer opportunities, risk management guidelines
- + 2 field trips of 4-6 hours each

Hybrid Approach for a Piedmont-based Course

- Class 1: Introduction to Program, personal introductions/icebreaker, history/skills of naturalist, risk management guidelines
- Class 2: Basic Ecology
- Class 3: Virginia geology/physiographic regions/soils/climate and weather
- Class 4: Botany/Taxonomy/Plant Communities
- Class 5: Forest Ecosystems - Characteristics/Ecological Processes/Community Dynamics, Ornithology
- Class 6: Forest Ecosystems – Management, Dendrology, Entomology
- Class 7: Wetlands Ecosystems – Characteristics, Ecological Processes, Community Dynamic, Herpetology
- Class 8: Wetlands Ecosystems – Management, Mammalogy
- Class 9: Stream/River Ecosystems – Characteristics, Ecological Processes, Community Dynamics, Ichthyology



Class 10: Stream/River Ecosystems – Management, Aquatic Inverts

Class 11: Urban Systems – Characteristics, Ecological Processes, Management, Restoration

Class 12: Interpretive skills, Citizen Science skills, wrap-up, assessment, discussion of volunteer opportunities

+4 field trips - one for each of Ecosystems (Forest/Wetlands/Stream/Urban), 4 hours each

Presenters

Guest presenters should be experts in one or more aspects of the Master Naturalist curriculum as well as excellent educators who can engage the trainees in the material at hand. They should have strong knowledge of the local natural resources in your chapter's community. Local staff from the program's sponsoring agencies (such as extension agents or county foresters) are often willing to be instructors. The community is a great source for additional instructors with natural resource knowledge and experience. City and county professionals, local high school and college faculty, nature center staff, and others can be ideal presenters. Please try to use presenters from as local an area to your chapter as possible. If you have speakers traveling from long distances, consider collaborating with a nearby chapter to offer the training jointly. This saves the chapters' time, resources, and effort; saves speakers from making the same presentation numerous times; and also allows for collaboration among Master Naturalist chapters.

Provide instructors with expectations and objectives for their presentations. Provide them with the list of objectives that you would like them to cover. Encourage instructors to focus on the basics of the subject area that people volunteering for education, stewardship, or citizen science projects should know about as a minimum. Also encourage instructors to include a hands-on or interactive component in their presentations, rather than only lecturing (see Appendix IV for suggested guidelines for classroom and field instructors.)

Prepare a tentative schedule of presentations and presenters, then contact each speaker to see if he or she is willing and able to present on the particular topic and date. Once the speakers have agreed to dates and topics, confirmation packages should be sent to the presenters. Each presenter should receive a letter that thanks him/her for agreeing to present and restates the dates, times, topics, and objectives for the presentation. Directions to the training facility and a map should also be included with the letter. It is helpful to include a list of any related readings or reference materials that the trainees will have read ahead of time. Instructors also can be asked to provide ahead of time quiz questions based on the material they will present. These questions assist in evaluating whether or not the trainees understood the lecture topic and if the topic was presented well. Instructors should also be asked what AV equipment they need, and it should be clear who is responsible for providing the equipment.

A follow-up note, phone call, or e-mail one week before the presentation reminds the instructor of the class and avoids potential confusion. Thank-you letters sent after the presentation are also greatly appreciated.

Readings and Course Materials

A reference manual/textbook to be used statewide for Master Naturalist training is in development. Three chapters are currently available on the Virginia Master Naturalist Web site. Chapters should supplement these readings with their own reading lists and reference materials for their trainees. Most chapters organize these readings into a binder, to which additional handouts may be added as the course progresses. These readings may be gathered from a variety of sources. A good option is to ask guest presenters for suggested readings relating to their topics. One chapter chose to use a general field guide to eastern forests as a text for the course, supplemented by handouts and additional readings. Appendix III contains a list of recommended readings compiled by the State Steering Committee for the Virginia Master Naturalist program. It is important that any readings used for the course be unbiased and research-based. Materials provided by Virginia's natural resource agencies and universities are good choices. Please also make sure that you have permission to photocopy any copyrighted materials.

Training Fees and Expenses

Training volunteers to become VMNs is not without its costs; expenses, however, can be minimized and managed. Basic costs include a duplication costs for class handouts, binders, copies of any field guides or texts the chapter wishes to use, equipment for participants such as field journals and hand lenses, mailings, speaker "thank yous," refreshments, nametags for volunteers, and other items. Additional costs can include room rental fees to use a particular facility and transportation for field trips, unless participants will carpool. Depending on the size of a class and expenses covered, the fee could easily exceed \$100 per trainee.

There are several ways for the chapter to reduce the cost per person for the training. Choose teaching space without a rental fee and speakers without honoraria or travel expenses. To reduce costs, have trainees develop their own system to provide class refreshments.

If the training has been planned as prudently as possible and there are still expenses involved, a reasonable fee is suggested. Charging a small fee can help increase commitment to the program. Higher fees may deter or prevent some people from participating. Fees should be set at whatever amount per person will cover the costs of training. Once the cost per person has been determined, it should be included in the advertising materials. Current costs in Virginia Master Naturalist programs across Virginia range from \$60 to \$200 per trainee. Chapters may also raise funds through dues or donations to provide scholarships for potential participants.

Promoting Camaraderie

One reason the VMN basic training course is only offered as an in-person course and not an online course is because it is intended to promote camaraderie and personal connections among chapter members. The intention is that these social bonds will help increase volunteer engagement and retention. Consider ways to promote this type of team atmosphere in your class. Some suggestions include:

- Having a host for each class who is a previous graduate
- Assigning each class member to a mentor who can help connect them with volunteer opportunities
- Building in extra time each class for mixing and mingling

- Having refreshments during class
- Conducting icebreaker activities during the first class, and possibly future classes
- Building in extra time for classmates to share interesting natural history observations or field journal entries
- Ensuring that classmates know how to contact each other to arrange carpools, study sessions, or socials
- Having a class volunteer project or even just a one-day volunteer event built into the course.

Record Keeping

Each trainee and his or her contact information should be entered into the chapter's membership list. Attendance at each training course session and field trip should be tracked to ensure that all trainees complete the training requirements.

Absenteeism

Anticipating the need to set standards for maintaining class attendance, the State Steering Committee has set the following policy: Each chapter may set a local standard for the maximum number of classes that may be missed during a given training cycle without forfeiting the right to earn certification. Chapters are encouraged to set this standard at no more than one or two missed classes. However, regardless of the number of missed classes that a chapter allows, a trainee must make up any missed class(es) by attending the appropriate class(es) within 12 months of the completion of the training. Appropriate means the chapter can allow an advanced training class to count as make-up or the chapter may require that it be the same subject class presented during the next training cycle. If an advanced training class is used as make-up, then for that individual, it does not also count as advanced training. In this case the class must account for only one type of training --initial training OR advanced training. A participant may also attend the same subject class of a neighboring chapter within the same physiographic region, given adequate prior notification and space availability of the neighboring chapter. If a participant must miss more classes than the local standard allows then the respective chapter may consider an exception to their rule in special circumstances, such as medical problems, family illness, accidents, etc. However this should be the exception not the rule. Until these classes are made up, a volunteer cannot become a Certified Virginia Master Naturalist, but may continue to earn volunteer service hours or advanced training hours towards certification. Upon completion of all training coursework, it is recommended that the volunteer be recognized by the State Program as a *Virginia Master Naturalist Member*. Upon completion of all the requirements within the 12 months following the end of training, a Virginia Master Naturalist volunteer is awarded a state certificate and is recognized by the State Program as a Certified Virginia Master Naturalist.

Presenter and Training Evaluations

It is important to evaluate guest speakers and the local training program to determine quality and effectiveness. Trainees should provide feedback after each speaker by means of a class evaluation form. The evaluation forms should be provided before class, completed at the end of class, and collected before the trainees leave. The feedback from these forms will be helpful in determining whether or not speakers were effective in teaching their topics and communicating and can be referred to in planning subsequent training programs.

At the conclusion of the classroom portion, the training should be evaluated. This will help the chapter in making the entire recruitment and training process more effective and efficient for everyone. Questions regarding the recruitment and application process should also be included in the evaluation so that the following year's process can be improved. Sample evaluations are provided on the Coordinators' Area of the Web site.

Volunteer Assessment

Each chapter will do a 3 part assessment of its trainees as part of the basic 40 hours of training and first 40 hours of volunteer service. This assessment includes an open-book, written assessment, a practical component that may include skills such as using a dichotomous key or giving a presentation, and an assessment of the initial 40 hours of volunteer service. To receive the VMN certification, participants must pass each of these parts of the assessment (70% or higher). Sample written assessments are available on the Coordinators' Area of the Web site.

Graduation

At the completion of the training classes and passing of the exams, a graduation should be planned so that the achievements of these volunteers are recognized and each trainee can be promoted to the Virginia Master Naturalist Member level. Local programs should provide each individual who successfully completes the training receives a certificate indicating that he/she is now a "Virginia Master Naturalist Member". A template for the certificate may be found on the Coordinators' Area of the Web site. Some chapters may decide to have a party or potluck luncheon for the graduation event. Town or county officials can be invited to the event in recognition of the achievement. This is often done when the class graduation is coupled with a recognition ceremony for those individuals who have completed their 40-hour volunteer internships and advanced training and are now certified Virginia Master Naturalists. Individuals who have completed their certification would receive certificates reading, "Certified Virginia Master Naturalist" since they have completed the requirements. These certificates will be provided by the state office.



Appendix I: The Virginia Master Naturalist Statewide Curriculum Objectives

Individual Virginia Master Naturalist chapters may assemble the curriculum in an order that best fits their training agenda. Chapter objectives are listed below each chapter heading. These objectives should be shared with guest instructors to communicate expectations and objectives for their presentations. Ideally, the presenters will address these objectives and will customize their presentations to the very specific issues of the local area.

Introduction to the Virginia Master Naturalist Program

- Describe what a Master Naturalist volunteer is
- Identify and communicate the mission and goals of the Master Naturalist program and what makes it unique from other volunteer programs in Virginia
- Identify and communicate the requirements and responsibilities of a Virginia Master Naturalist
- Be familiar with the expected standards of conduct for Master Naturalists and the applicable laws and ethical issues relating to wildlife educators and researchers
- Understand the role of learning as a lifelong pursuit
- Understand the many possible options for volunteer service projects, including citizen science, education/interpretation, and stewardship projects

American Naturalists

- Understand the history and current status of natural history as a discipline
- Identify significant naturalists throughout American history and discuss their accomplishments
- Describe the roles and contributions of early naturalists in Virginia
- Be familiar with local naturalists and their accomplishments
- Describe the basic skills of a naturalist (e.g. observation, field journaling, species identification, sharing knowledge) and how to apply them in field studies

Ecological Concepts

- Describe the levels of organization in ecology: organisms, populations, communities and ecosystems
- Recognize the factors affecting population growth and dynamics
- Describe the major types of interactions between species
- Understand the succession process and the dynamic nature of ecosystems and communities
- Understand how abiotic and biotic factors determine the nature of different ecosystems
- Describe the hydrologic cycle, the nitrogen cycle and the carbon cycle
- Describe energy flow in an ecosystem (food webs, trophic relationships)
- Define biodiversity and its role in community and ecosystem dynamics

- Understand the relationships between ecosystem and landscape dynamics and human activity

Virginia Biogeography

- Trace the geologic history of Virginia
- Identify and differentiate the features of Virginia's physiographic provinces, including the Coastal Plain, Piedmont, Blue Ridge, Valley and Ridge, and Appalachian Plateau
- Identify common and unique ecological communities and species occurring in each province
- Explain the factors creating the great ecological diversity occurring in Virginia
- Describe the paleontology and fossil record of Virginia

Geology and Soil Science

- Understand basic geologic processes such as faulting, folding, volcanism, metamorphism, weathering, erosion, deposition, sedimentation, and plate tectonics
- Understand how to identify major minerals based on physical and chemical properties
- Understand how to identify common rock types based on mineral composition and textures
- Understand the rock cycle as it relates to the origin and transformation of rock types
- Recognize and describe some of the common rock types in Virginia
- Describe the physical and chemical properties and components of soil
- Describe the processes of soil formation and erosion and methods for preventing soil erosion
- Describe the diversity and distribution of soil types in Virginia
- Describe the significance of karst and caves in Virginia

Weather and Climate

- Describe the main factors affecting climate
- Describe how Virginia's climate has changed over time
- Understand human effects on weather, climate, and air quality
- Describe the relationships between climate, weather, and phenology
- Discuss the main processes driving weather
- Understand weather forecasting and the basic weather measurements (temperature, humidity, barometric pressure, wind speed and direction, cloud formations)
- Describe a typical year of weather in Virginia

Nature of Naming

- Understand the basic principles of classification
- Discuss the uses and importance of classification systems
- Identify the main parts of a scientific name
- Understand why the binomial classification system is important
- Discuss the pitfalls of using common names

- Discuss the concept of a species
- Be familiar with types of taxonomic keys, their purposes, and how to use them to classify organisms

Botany

- Describe the diversity and distribution of plants in Virginia
- Describe the role of plants in Virginia ecosystems
- Describe the natural history and basic biology of plants
- Describe the adaptations of plants and how these relate to environmental factors
- Describe the taxonomy of plants
- Describe the key characteristics used to identify plants
- Describe threats and/or issues relating to plants in Virginia, such as invasive species
- Recognize some common plants occurring in the local ecosystems
- Recognize rare or special species that indicate habitat qualities
- Understand appropriate techniques and methods for studying plants

Dendrology

- Describe the diversity and distribution of trees in Virginia
- Describe the role of trees in Virginia ecosystems
- Describe the natural history and basic biology of trees
- Describe the adaptations of trees and how these relate to environmental factors
- Describe the taxonomy of trees
- Describe the key characteristics used to identify trees
- Describe threats and/or issues relating to trees in Virginia, such as invasive species
- Recognize some common trees occurring in the local ecosystems
- Recognize rare or special species that indicate habitat qualities
- Understand appropriate techniques and methods for studying trees

Ornithology

- Describe the diversity and distribution of birds in Virginia
- Describe the role of birds in Virginia ecosystems
- Describe the natural history and basic biology of birds
- Describe the adaptations of birds and how these relate to environmental factors
- Describe the taxonomy of birds
- Describe the key characteristics used to identify birds
- Describe threats and/or issues relating to birds in Virginia, such as habitat fragmentation
- Recognize some common birds occurring in the local ecosystems
- Recognize rare or special species that indicate habitat qualities
- Understand appropriate techniques and methods for studying birds

Entomology

- Describe the diversity and distribution of insects in Virginia
- Describe the role of insects in Virginia ecosystems
- Describe the natural history and basic biology of insects
- Describe the adaptations of insects and how these relate to environmental factors
- Describe the taxonomy of insects
- Describe the key characteristics used to identify insects
- Describe threats and/or issues relating to insects in Virginia, such as invasive species
- Recognize some common insects occurring in the local ecosystems
- Recognize rare or special species that indicate habitat qualities
- Understand appropriate techniques and methods for studying insects

Ichthyology

- Describe the diversity and distribution of fishes in Virginia
- Describe the role of fish in Virginia ecosystems
- Describe the natural history and basic biology of fishes
- Describe the adaptations of fish and how these relate to environmental factors
- Describe the taxonomy of fishes
- Describe the key characteristics used to identify fish
- Describe threats and/or issues relating to fish in Virginia
- Understand the basic principles of fish management
- Recognize some common fish species occurring in the local ecosystems
- Recognize rare or special species that indicate habitat qualities
- Understand appropriate techniques and methods for studying fish

Herpetology

- Describe the diversity and distribution of reptiles and amphibians in Virginia
- Describe the role of reptiles and amphibians in Virginia ecosystems
- Describe the natural history and basic biology of reptiles and amphibians
- Describe the adaptations of reptiles and amphibians and how these relate to environmental factors
- Describe the taxonomy of reptiles and amphibians
- Describe the key characteristics used to identify reptiles and amphibians
- Describe threats and/or issues relating to reptiles and amphibians in Virginia
- Understand the basic principles of reptile and amphibian management
- Recognize some common reptiles and amphibians occurring in the local ecosystems
- Understand appropriate techniques and methods for studying reptiles and amphibians
- Recognize rare or special species that indicate habitat qualities

Mammalogy

- Describe the diversity and distribution of mammals in Virginia

- Describe the role of mammals in Virginia ecosystems
- Describe the natural history and basic biology of mammals
- Describe the adaptations of mammals and how these relate to environmental factors
- Describe the taxonomy of mammals
- Describe the key characteristics used to identify mammals
- Describe threats and/or issues relating to mammals in Virginia
- Recognize some common mammals occurring in the local ecosystems
- Recognize rare or special species that indicate habitat qualities
- Understand appropriate techniques and methods for studying mammals

Land Use in Virginia

- Discuss the major uses of land in Virginia and the prevalence of each
- Understand how land use in Virginia has changed over time and how it has affected the ecological communities in each region
- Describe the geography of agriculture in Virginia

Forest Ecology and Management

- Understand the distribution and diversity of forest communities in Virginia
- Describe the characteristics of the major types of forests in Virginia
- Describe the flora and fauna of forest communities in Virginia
- Understand how forest communities function and the factors affecting this functioning
- Understand threats and/or issues relating to forests in Virginia
- Understand principles, tools, and methods for management of forests in Virginia
- Understand the roles of Virginia state agencies in managing forests
- Understand the roles of citizens in the stewardship of forests in Virginia

Wetlands Ecology and Management

- Understand the distribution and diversity of wetlands in Virginia
- Describe the characteristics of the major types of wetlands in Virginia
- Describe the flora and fauna of wetlands in Virginia
- Understand how wetlands function and the factors affecting this functioning
- Understand threats and/or issues relating to wetlands in Virginia
- Understand principles, tools, and methods for management of wetlands in Virginia
- Understand the roles of Virginia state agencies in managing wetlands
- Understand the roles of citizens in the stewardship of wetlands in Virginia

Aquatic Ecology and Management

- Understand the distribution and diversity of aquatic systems in Virginia
- Describe the characteristics of the major types of freshwater aquatic systems (streams, rivers, ponds, lakes and reservoirs) in Virginia
- Describe the flora and fauna of aquatic systems in Virginia

- Understand how aquatic systems function and the factors affecting this functioning
- Understand threats and/or issues relating to aquatic systems in Virginia
- Understand principles, tools, and methods for management of aquatic systems in Virginia
- Understand the roles of Virginia state agencies in managing aquatic systems
- Understanding the roles of citizens in the stewardship of aquatic systems in Virginia

Estuarine and Coastal Ecology and Management

- Understand the distribution and diversity of estuaries and coastal ecosystems in Virginia
- Describe the characteristics of the major types of estuaries and coastal ecosystems in Virginia
- Describe the flora and fauna of estuaries and coastal ecosystems in Virginia
- Understand how estuaries and coastal systems function and the factors affecting this functioning
- Understand threats and/or issues relating to estuaries and coastal systems in Virginia
- Understand principles, tools, and methods for management of estuaries and coastal systems in Virginia
- Understand the roles of Virginia state agencies in managing estuaries and coastal systems
- Understanding the roles of citizens in the stewardship of estuaries and coastal systems in Virginia

Urban and Suburban Systems

- Understand the distribution of urban and suburban systems in Virginia
- Describe the characteristics of urban and suburban systems
- Describe the flora and fauna of urban and suburban systems
- Understand threats and/or issues relating to urbanization in Virginia
- Understand principles, tools, and methods for management of urban and suburban areas in Virginia
- Understand the roles of Virginia state agencies in managing urban and suburban areas
- Understand the roles of citizens in the stewardship of urban and suburban areas in Virginia

Interpretation and Teaching Skills

- Discuss what interpretation is
- Discuss types of interpretation
- Identify and understand components of an interpretive experience
- Demonstrate audience management techniques
- Develop/outline an interpretive program or experience
- Understand the difference between a topic and a theme and the importance/functions each serves
- Understand the difference between education and advocacy and which is appropriate for Master Naturalist-led programs
- Discuss the adult learning cycle and factors that motivate the adult learner



- Understand the learning process from awareness to appreciation to knowledge to skills to actions

Citizen Science and Research Skills

- Describe the types of field studies (inventory, monitoring, and scientific research) that may be used to investigate populations, communities and ecosystems, and understand when and why these types of studies are used
- Understand the process of science and how it informs natural resource management
- Understand the concepts of replication, randomness, and bias
- Demonstrate basic field study skills, including observing, field journaling, following protocols, data recording, and interpreting graphs
- Be familiar with the opportunities for citizen science in the U.S. and in Virginia, such as Wildlife Mapping, Virginia Amphibian Monitoring Program, Christmas Bird Count, etc.)

Appendix IIa: Sample Basic Training Course Syllabus-Rivanna Chapter Spring 2010

Classes met once a week from 6:30-9:30 pm, with some Saturday field trips.

Feb. 16: Introduction, Master Naturalist Policies, Risk Management and Tools (NB, Section 1)

Required Reading:

- *Eastern Forests*, Preface, p vii-ix, How to use this book, p 1-7
- **NB:** List of American Naturalists for Class presentations
- **NB:** VMN, “Chart of Certification Process”
- **NB:** “Virginia Master Naturalist Program Volunteer Injury Incident Report Form”, Appendix II of *VMN Volunteer Policy Handbook*
- **NB:** “Risk Management: Planning for the Best and the Worst”, Appendix I of *VMN Volunteer Policy Handbook*
- **NB:** “Volunteer Project Basics”
- **NB:** “Approved Volunteer Projects: Rivanna Chapter Master Naturalists”
- **NB:** RMN, “Volunteer Project Proposal Form”
- **NB:** Virginia Master Naturalist Program Volunteer Time Sheet

Reference:

- **WEB:** “Volunteer Opportunities for VA Master Naturalists with Sponsoring Agencies” at <http://www.virginiamasternaturalist.org/downloads/VolunteerOpportunitiesWithSponsoringAgencies.pdf>
- **WEB:** *Virginia Master Naturalist Volunteer Policy Handbook and Guidelines* at http://www.virginiamasternaturalist.org/downloads/VMN_Volunteer_Policy_Handbook.pdf
- **WEB:** “The VMN Statewide Curriculum Objectives”, Appendix 1 of VMN Guidelines for Basic Training at: http://www.virginiamasternaturalist.org/downloads/VMN_guidelines_for_basic_training.pdf
- **WEB:** Virginia’s Natural Resource Education Guide: Information, Activities and Resources for Elementary Teachers at <http://www.vanaturally.org/vanaturally/guide/homepage.html>

Feb. 23: Basic Ecology (NB, Section 2)

Required Reading:

- *Eastern Forests*, Ch. 2, Forest Field Marks, especially pp. 8-15 (patterns), 25-26 (factors determining species richness), 31-38 (plant population patterns, forest age, gaps, edges, old fields), pp. 41-44 (forest food chain).
- **NB:** Verner, Lou, "Chapter 1: Ecological Concepts," Prepared for Master Naturalists' Notebook.

Reference:

- **NB:** "Glossary of Ecological Terms," Reprinted from the Ivy Creek Notebook

March 2: Herpetology (Amphibians and Reptiles) (NB, Section 3)

Required Reading:

- **NB:** Introduction to Herpetology – Adapted from Wikipedia
- *Eastern Forests*, pp. 281-294 (Amphibians in Spring), pp. 373-381 (defense adaptations of reptiles)

Suggested Readings:

- **Web:** Bishop, David and Carole Haas, "Salamander Biodiversity and Conservation," Virginia Commonwealth Extension, <http://www.ext.vt.edu/pubs/fisheries/420-528/420-528.pdf>
- **Web:** "Frog Biodiversity and Conservation," Virginia Commonwealth Extension, <http://www.ext.vt.edu/pubs/fisheries/420-527/420-527.pdf>
- **Web:** Mitchell, Joseph C. and Kurt A. Buhlmann, "Turtle Biodiversity and Conservation," VA Co-operative

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Extension, <http://www.ext.vt.edu/pubs/fisheries/420-529/420-529.pdf>

Reference:

- **Web:** Bieker, Dan. "An Annotated Checklist of the Reptiles & Amphibians of Albemarle County, VA."
- **Book:** *A Guide to the Snakes of Virginia*, Special Publication #2.1, VA Dept. of Game and Inland Fisheries
- **Web:** The VA Herpetological Society has an excellent web site at <http://fwie.fw.vt.edu/VHS/>

March 9: Citizen Science, Journaling, Maps, Keys (NB, Section 1)

Required Reading

- **NB:** Prysby, Michelle. "Top 10 Errors on Data Sheets . . . And How to Avoid Them", 2006.
- **NB:** Hayslett, Michael. "Field Journal: Facts and Feelings", 2006.
- **NB:** Swenson, Ida. "Nature of Naming", 2009.

March 16: Forest Ecology, Dendrology (NB, Section 4)

Required Reading:

- *Eastern Forests*, pp. 50-51 (Forest Field Mark Questionnaire); 72-75 (Northern hardwood forest community), 81-85 (Maple-basswood, oak-hickory), 97-102 (mixed Appalachian communities), 436-441 (Plants in Fall)
- **NB:** *An Overview of Forest Ecology and Management in Virginia*, Chapter XXV, Virginia Master Naturalist Basic Training Course, <http://pubs.ext.vt.edu/465/465-315/465-315.pdf>
- **NB:** "How a Tree Grows," VA Dept. of Forestry

Reference:

- **Web:** Penn State, "Leaf Identification" <http://cas.psu.edu/docs/CASDEPT/Hort/LeafID/Default.html>
- **Web:** Tony Russell, "Useful Web Sites for the Study of Trees," http://www.vmn-rivanna.org/ed_webtrees.html
- **Book:** Watts, May Theilgaard and Tom Watts. *Winter Tree Finder: for identifying deciduous trees in Winter*, Nature Study Guild, Rochester, NY.
- **Book:** *Common Native Trees of Virginia*, VA Dept. of Forestry

March 20: Field Trip: Reading a Forest

March 23: Geology, Soils (NB, Section 5)

Required:

- **NB:** "Piedmont Province: The Geology of Virginia," Dept. of Geology, William and Mary, <http://web.wm.edu/geology/virginia/provinces/geoterms.html?svr=www>
- **NB:** "Term Definitions: The Geology of Virginia," Dept. of Geology, William and Mary, <http://web.wm.edu/geology/virginia/provinces/geoterms.html?svr=www>
- **NB:** "The Geologic Time Scale and the Geologic History of Virginia," Virginia Division of Mineral Resources, Dept. of Mines, Minerals and Energy (chart)
- **NB:** Fichter, Lynn S., "One Page Geological History of Virginia," (chart)
- **NB:** Tompkins, Dorothy. "Soils—Piedmont"
- *Eastern Forests*, pp. 26-30 (Soil Characteristics), pp. 414-436 (soil litter & decomposers—includes fungi)

References:

- **NB:** "Generalized Geologic Map of Virginia," VA Dept. of Mines, Minerals and Energy.
- **Web:** James Madison University at <http://csmres.jmu.edu/geollab/vageol/vahist/index.html>
- **Web:** Dept. of Geology, William and Mary, <http://web.wm.edu/geology/virginia/provinces/geoterms.html?svr=www>

Recommended geology reference books:

- *Roadside Geology of Virginia (Roadside Geology Series) (Paperback)* by Keith Frye, Mountain Press Publishing Company, 1986.
- *The Field Guide to Geology* by David Lambert, Checkmark Books, 2006.
- *Reading the Rocks: The Autobiography of the Earth* by Marcia Bjornerud Basic Books, 2006.
- *Earth: An Intimate History* by Richard Fortey, Vintage, 2005.
- *Annals of the Former World* by John McPhee, Farrar, Straus and Giroux, 1981.

March 27: Field Trip, Geology

March 30: Botany, Invasive Plants, Keying (NB, Section 6)

Required Reading:

- **Web:** Introduction to Botany at <http://hcs.osu.edu/hcs300/> from OSU Horticulture and Crop Science 300
- *Eastern Forests*, pp. 250-268 (on adaptation), pp. 269-281 (on flower structure and pollination), pp. 320-343 (on habitats and plant growth forms and on patterns of fruiting and seed dispersal)
- **NB:** "The Life of Plants" by Ruth Douglas (2009)
- **Web:** "Basic Botany," Ch. 1 from Arizona Master Gardeners Manual at <http://ag.arizona.edu/pubs/garden/mg/botany/index.html>

References:

- **Web:** "Web Sites for Invasive and Native Plants," Compiled by Ruth Douglas for VA Native Plant Society. (Revised 1/10) <http://www.vmn-rivanna.org/>

Recommended Reference Books:

- Newcomb's Wildflower Guide, Lawrence Newcomb, Little Brown and Company, 1977.
- *Peterson Field Guide Wildflowers Northeastern/Northcentral North America*, Roger Tory Peterson/Margaret McKenney, Houghton Mifflin Co., 1968.
- *How to Identify Plants*, H.D. Harrington, Swallow Press, 1957.
- *Botany for Gardeners, Revised Edition*, Brian Capon, Timber Press, 2005.
- *From Flower to Fruit*, Anne Ophelia Dowden, Ticknor and Fields, 1984.

April 3: Field Trip, Native and Invasive Plants; Pollinators, Practice using a key

April 13: Climate, Weather (NB, Section 7)

Required Reading:

- *Eastern Forests*, pp. 58-61 (What determines a community) pp. 154-159 (Disturbance).
- **NB** VA Dept. of Conservation and Recreation, "Overview of Physiography and Vegetation of Virginia". Also on the web at: http://www.dcr.virginia.gov/natural_heritage/documents/overviewPhysiography_vegetation.pdf
- **Web:** Hayden, Bruce P. and Patrick J. Michaels, "Virginia's Climate," 2000, UVA Climatology Office. <http://climate.virginia.edu/description.htm>

April 17: Wetlands, Interpretation skills (NB, Sections 8 and 1)

Required Readings:

- **NB:** Diagram from USGS: The Water Cycle
- **NB:** Witten, Matthew, "A Wetlands Primer," *Volunteer Monitor*, Spring, 1998, pp. 3,4
- **Web:** Austin, Sam, "Stable stream channel geometry," *Riparian Forest Handbook I*. pp. 11-13 and 19- 20, "Departures from stability and health" on web http://www.dof.virginia.gov/resinfo/resources/Riparian-Forest-Handbook_1.pdf
- **NB:** Walker, Holly, "Interpretation: Background, How-To, and Bibliography",

Virginia Department of Conservation and Recreation, 2006.

Suggested:

- **Web:** VMNH, Virginia Explorer, Winter 2000, "River Basins in VA," p.3 [web p. 5], and "VA Ground Water Resources by Region," p. 7 [web 9] at <http://www.deq.state.va.us/vanaturally/pdf/watermag.pdf>
- **Web:** Overview of Stream ecology at <http://chamisa.freeshell.org/ecology.htm>

April 20: Ornithology (Birds) (NB, Section 9)

Required:

- *Eastern Forests*, pp. 15-24 (descriptions of some common mammals and birds), 210-219 (forest fragmentation and descriptions of some birds of fields, edge, and forest interior), pp. 250-257 (hibernation and migration), pp. 294-309 (bird behavior in spring), pp. 381-391 (bird nesting).
- **NB:** Zimmerman, John. "Ornithology" (Preliminary draft prepared for VA Master Naturalists)
- **NB:** Gaden, Jennifer. "Birds for Master Naturalists"

References:

- **NB:** "Bird Watchers' Checklist: Albemarle County" (Flyer in front pocket of RMN notebook)
- Sibley, David Allen. *The Sibley Field Guide to Birds of Eastern North America*

April 24: Field Trip, Ornithology

April 27: Urban & Suburban Habitats (NB, Section 10)

Required:

- **NB:** Heiser, Carol, brochure "Habitat at Home," Virginia Department of Game and Inland Fisheries
- **Web:** Eaton, Greg. "Backyard Wildlife Habitats," VA Commonwealth Extension, 2005. <http://www.dgif.virginia.gov/habitat/habitat-at-home/extensionbackyardwildlife.pdf>

Suggested:

- *Eastern Forests*, pp. 159-200 (succession)

References:

- **NB:** U.S. Fish and Wildlife Service, *Native Plants for Wildlife Habitat and Conservation Landscaping* [also on the web](http://www.nps.gov/plants/pubs/chesapeake/) at <http://www.nps.gov/plants/pubs/chesapeake/>
- **Web:** Habitat for Wildlife, Virginia DGIF, <http://www.dgif.virginia.gov/habitat/>
- **Book:** *Bringing Nature Home*, Douglas W. Tallamy. Timber Press, 2007. A balancing act of interconnected biodiversity is a process taking place in our back yards — or not, depending on our landscaping choices

May 4: Entomology/Invertebrate Biology (NB Section 11)

Required:

- **NB:** *Getting to Know Virginia's Insects and Spiders*, Arthur V. Evans, D.Sc., Research Associate, Smithsonian Institution and Virginia Museum of Natural History, 2009. with permission.

Suggested:

- *Eastern Forests*, pp. 341-373 (milkweed ecology; insect camouflage, mimicry, and other defenses; dragonfly mating patterns)

References:

- **NB:** *Insect Orders*, Arthur V. Evans, D.Sc., Research Associate, Smithsonian Institution and Virginia Museum of Natural History, 2009 with permission.
- **Web:** "Key to Insect Orders", American Museum of Natural History.

http://www.amnh.org/learn/biodiversity_counts/ident_help/Text_Keys/arthropod_keyA.htm

May 8: Field Trip, Aquatic Ecology (NB, Section 8)

- **NB:** *What is Aquatic Biodiversity; Why Is It Important?*, Virginia Cooperative Extension, Publication 420-520

References:

- **NB:** "Glossary of Aquatic Terms", (From Ivy Creek Notebook)
- **NB:** "StreamWatch Key to Virginia SOS Taxa Groups"
- **NB:** "Stream Insects and Crustaceans ID Card," Save Our Streams.
- **Web:** 2008 Stream Conditions Report - summary version - "Biological Health of Rivanna Basin Streams - 2005-2007" (4pp) <http://streamwatch.org/reports>
- **Web:** Living in Our Watershed—Population density, water quality, and stream health in the Rivanna River Basin. A summary of the StreamWatch 2006 report. (7 pp) <http://streamwatch.org/reports>

May 11: Mammalogy and Ichthyology (NB Section 12)

Required:

- **NB:** "Mammalogy," John F. Pagels, Chapter XIV: Virginia Master Naturalist Basic Training Course also available on the web.
- **NB:** "Ichthyology," Editors: Paul E. Bugas Jr., John R. Copeland, Brian Murphy, Chapter XII: Virginia Master Naturalist Basic Training Course also available on the web.

References:

- **NB:** "Common Mammals of the Ivy Creek Natural Area--A Profile" (from Ivy Creek Notebook)
- **Booklet:** Track Finder by Dorcas Miller, 1981.
- **Web:** Eastern Brook Trout Joint Venture www.easternbrooktrout.org
- **Web:** Bieker, Dan. "Annotated Checklist of the Mammals of Albemarle County, VA"
- **Booklet:** VA Dept. of Game and Inland Fisheries, *Identification Guide to Virginia Freshwater Sportfish*.

Recommended Reference Books:

- Linzey, Donald W., *The Mammals of Virginia*. The McDonald and Woodward Publishing Co., Blacksburg. VA, 1998.
- Rezendes, Paul, *Tracking & the Art of Seeing, How to Read Animal Tracks & Sign*. Camden House, Charlotte, VT, 1992.

May 15: Field Trip,-Arthropods

May 18: Practical exam, return and discuss written exam

May 22: Field Trip-Tracking, Reading Animal Signs

May 25: Graduation and Volunteer Fair

Appendix IIb: Sample Basic Training Course Syllabus-Tidewater Chapter Spring 2007

CLASSROOM SECTION: 7 classes with 1 make-up (17.5 hours)

Location: Norfolk Botanical Gardens, Baker Hall

Day and time: Thursday, 6:30- 9:00 p.m.

Dates: 3/8, 3/15, 3/22, 3/29, 4/5, 4/12, 4/19, 4/26 (make-up)

1. INTRODUCTION TO VIRGINIA MASTER NATURALISTS, 3/8
 - a. Greetings, pass out binders: LCC member (10 min)
 - b. Personal introductions: all (20-30 min)
 - c. What is a Master Naturalist? Michelle Prysby (45 min)
 - d. BREAK (10 min)
 - e. American Naturalist presentation: LCC members (10 min)
 - f. Internet: Matt Lighthart (30 min)
 - g. QUIZ: (10 min)

2. ECOLOGICAL CONCEPTS, 3/15
 - a. Announcements, discuss field trip details (10 min)
 - b. American Naturalists presentations by students(10 min)
 - c. General introduction to ecological concepts: Jay Bolin (50 min)
 - d. BREAK (10 min)
 - e. Green infrastructure: Eric Walberg (50 min)
 - f. QUIZ (10 min)

3. VERTEBRATES: taxonomy, biology, ecology, identification, conservation, management, 3/22
 - a. Announcements (5 min)
 - b. American Naturalists presentations by students (10 min)
 - c. General Introduction: Fred Stemple (45-60 min)
 - d. BREAK (10 min)
 - e. Avian Ecology: Dorie Stolley (45-60 min) or Herpetiles: Al Savitsky
 - f. QUIZ (10 min)

4. BIOGEOGRAPHY, PHYSIOGRAPHY, GEOLOGY (AND THE CHESAPEAKE BAY GIANT METEOR), SOILS, 3/29
 - a. Announcements, discuss GDS field trip details (10 min)
 - b. American Naturalists presentations by students (10 min)
 - c. Overview of all topics: Suzanne Foxworth and Rebecca Gehring (60 min)
 - d. BREAK (10 min)
 - e. All topics continued (50 min)
 - f. QUIZ (10 min)

5. TREES AND OTHER PLANTS: taxonomy, biology, ecology, identification, conservation, management, 4/5
 - a. Announcements (5 min)
 - b. American Naturalist Presentations (10 min)
 - c. General Introduction, plant families: Darren Loomis (60 min)
 - d. BREAK (10 min)
 - e. Landscape practices to improve water quality: Susan French (50 min)
 - f. QUIZ (10 min)

6. INVERTEBRATES: taxonomy, biology, ecology, identification, conservation, management, aquatic ecology, 4/12
 - a. Announcements, discuss upcoming field trip details (10 min)
 - b. American Naturalist Presentations by students (10 min)
 - c. General Introduction to Invertebrate Ecology and Benthic Ecology: Sharon Tatem (60 min)
 - d. BREAK (10 min)
 - e. Butterflies and dragonflies: TBD (40 min)
 - f. QUIZ (10 min)

7. INTERPRETIVE SKILLS (4/19)
 - a. Announcements, discuss overnight field trip details (10 min)
 - b. Interpretive skills: TBD (60 min)
 - c. BREAK (10 min)
 - d. Review (i.e., plants and animals to know): LCC (30 min)
 - e. Final Exam (30 min)
 - f. Evaluations (10 min)

MAKE-UP: Topics to be determined (4/26)

BACK UP CLASSES:

Avian Ecology (Dorie Stolley, unless done on 3/22)

Rare Plants and Animals of Southeast Virginia (Darren Loomis)

Sea Turtle and Marine Mammal Strandings and Conservation in Virginia (Christina Trapani)

FIELD TRIP SECTION: 4 trips with one make-up (24 hours)

1. Virginia Aquarium and Ocean Lakes High School Wetland (3/17; 4 hr)
 - a. Marine mammals and Sea Turtles: Christina Trapani
 - b. Freshwater and Saltwater Fish: Jeff Thompson
 - c. Tour of Aviary: Dorie Stolley
 - d. History and Ecology of Constructed Wetland: Autumn Amici
2. Great Dismal Swamp (3/31; 4 hr)
 - a. Introduction to GDSNWR: Deloras Freeman and Cindy Lane
 - b. Visit to Lake Drummond and Water Quality/Citizen Science exercises: Robert Ake and DEQ Employee
 - c. Fire management: Tim Craig
 - d. Tour of Savannah restoration area: Tim Craig
 - e. Volunteer opportunities at GDSNWR: Cindy Lane
3. Norfolk Botanical Garden (4/14; 4 hr)
 - a. Local flora: Theresa Augustin and Ed Bradley
 - b. Using a dichotomous key to identify trees: Ed Bradley
 - c. GPS and mapping: Coco Amici
4. *Back Bay NWR/False Cape SP overnight from Saturday morning to Sunday mid-day (4/21 and 4/22; 12 hours of training) NOT SURE OF EXACT ORDER YET, SOME ACTIVITIES DONE WITH HALF OF THE GROUP AT A TIME
 - a. Introduction to Back Bay NWR and False Cape State Park: Jared Brandwein, Kyle Barbour
 - b. Wetland Management: Dorie Stolley
 - c. History and ecology of Back Bay: Michelle Baker
 - d. Weather and climate: Eric Walberg
 - e. Barrier Island Ecology: Darren Loomis
 - f. Edible Wild Plants: Vickie Shufer



- g. Nonnative plant and animal management: Dorie Stolley
 - h. Nesting loggerhead sea turtles: Michelle Baker
 - i. Astronomy: Michelle Bailey Hennesey
 - j. Using field guides to identify beach finds: Elizabeth Lighthart
 - k. Human history and its effects on the natural history: Cameron Barnes
 - l. Volunteer opportunities at FCSP and BBNWR: Cameron Barnes, Walter Tegge
 - m. Seining activity: Christina Trapani and Matt Lighthart
 - n. Endangered, rare and threatened species: Darren Loomis
5. Make-up Field Trip TBD (4 hr)

*Note: All students MUST attend overnight!

Appendix IIc: Sample Basic Training Course Syllabus-Riverine Chapter Spring 2007

Class 1 (1/10/07): Introduction to the Virginia Master Naturalist Program

Instructor: Michelle Prysby, Virginia Master Naturalist Program Coordinator and agency representatives

- Describe what a Master Naturalist volunteer is and does (i.e., requirements and responsibilities of a VMN)
 1. Explain expected standards of conduct for VMNs and the applicable laws & ethical issues relating to wildlife educators and researchers (including info on collection permits)
- Identify and communicate the mission and goals of the VMN program; describe what makes it unique from other volunteer programs in Virginia
- Discuss the history and current status of natural history as a discipline
 1. Identify significant naturalists throughout American history and discuss contributions and/or accomplishments
 2. Be familiar with local naturalists and their accomplishments
- Describe the basic skills of a naturalist (e.g. observation, field journaling, species identification, sharing knowledge) and how to apply them in field studies
- Describe options for volunteer service projects, including citizen science, education/interpretation, and stewardship projects
- Virginia State Agency roles in management & conservation of natural resources
- Public policy: state and regional
- Web resources (examples: GIS, FOF, Google, City Green)
- Five sponsoring agencies: projects, what they do, public policy and environmental aspects, priorities, environmental condition of our region and state

Class 2 (1/17/07): Ecological Concepts

Instructor: Lou Verner, Department of Game and Inland Fisheries

- Introduction to scientific nomenclature and classification systems
- Define basic ecology (communities, population, distribution, abundance, diversity, interaction, etc. of organisms)
- Balance of ecosystems, predation & competition, key species
- Hydrogen, Nitrogen and Carbon cycles
- Food web
- Human impact (pollution of air and water; loss of habitat)
- What is biodiversity and why/how do we manage for it
- Rare, threatened and endangered species (Virginia focus)
 - 1) Discuss factors that cause species to fall into these categories
- Habitat quality (using species present as a gauge of ecosystem health)
- Biogeography
- Succession & climax (stable) community
- Native vs. exotic species

Class 3 (1/24/07): Virginia Physiographic Regions and Geography

Instructors:

- Virginia's physiographic regions
- Climate, geology and soils (focus on Piedmont and Coastal Plain)
 - 1) Physical & chemical properties of soil
 - 2) Hydrologic Cycle
 - 3) Erosion & sedimentation – natural v. human impacted
- Virginia's natural resources
- Environmental impacts of trends: water pollution, air pollution, loss of habitat, loss of open land, loss of forested land

Class 4 (1/31/07): Watersheds & Water Quality

Instructor: Amber Foster, James River Association

- Define watershed
 1. Chesapeake Bay, York, James, Chickahominy River, etc.
- Water Quality
 1. Human Impacts
 - a. Land use & land cover
 - b. Impervious surfaces – storm water runoff
 - c. Nutrients (fertilizer, livestock in streams, pet waste, etc.)
 - d. Pesticides
 2. Improving water quality
- Conservation
 1. Protecting water sources
 2. Bio-retention swales, rain gardens
 3. Riparian buffers
- TMDLs (total maximum daily load)
- Review/how to apply/brainstorming

Class 5 (2/7/07): Forests (1st session)

Instructors: Dennis Gaston and Kathleen Ogilvy, Department of Forestry

- Characteristics: geology, soils, climate
- Types of forests in VA
- Introduction to classification (its importance; scientific name – genus and species)
- Introduction to using field guide and dichotomous key
- Flora
- Exotic species
- Succession process in forests

Class 6 (2/14/07): Forests (2nd session)

Instructors: Peter Smallwood, University of Richmond; Dennis Gaston and Kathleen Ogilvy (Department of Forestry)

- Fauna
 - Characteristic species in each type of forest in region
 - More detailed description/biology of reptiles & amphibians, birds, mammals
- Using field guides and dichotomous keys (continued)
- Management methods & principles
- Threats
- Protection
- Review and discussion on how to use information/ brainstorming

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Class 7 (2/21/06): Wetlands (1st session)

Instructor: Doug DeParry

- Characteristics
 - Ecology
- Flora: typical species
- Flora: alien species
- Fauna: birds, reptiles and amphibians, mammals
- Threats
- Review/ how to apply/ brainstorming

Class 8 (2/28/07): Wetlands (2nd session) and Estuaries & Coastal Systems

Instructor:

- A. Wetlands
 - Management methods & principles
 - Protection
- B. Estuaries and Coastal Systems
 - Characteristics
 - Flora & fauna
 - Management methods & principles
 - Threats
 - Protection
- Review/ how to apply/ brainstorming

Class 9 (3/7/07): Aquatic Systems (Rivers and Streams)

Instructor: Bill Shanabruch, Department of Environmental Quality

- Characteristics
- Flora & fauna
- Review riparian buffers
- Management methods & principles
- Threats
- Protection
- Review/ how to apply/ brainstorming

Class 10 (3/14/07): Urban & Suburban Systems

Instructor: Carol Heiser, Department of Game and Inland Fisheries

- Characteristics
- Land use issues
 1. Loss of habitat
 2. Habitat fragmentation
 3. Threats to native species
- Backyard ecology
 1. Flora and fauna
 2. Restoring impacted habitat (habitat improvement)
 3. Bayscaping: using native plants
- Human/wildlife interface

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1. Human/wildlife interaction around the home
 2. Handling "nuisance" wildlife
 3. Wildlife laws
- Protection of native flora and fauna
 - Methods of habitat improvement
 - Review/ how to apply/ brainstorming: habitat improvement projects

Class 11 (3/21/07): Research and Interpretive Skills

Instructor: Holly Walker (Department of Conservation and Recreation)

- Written & visual interpretation
- Classroom discussions
- Teaching skills/techniques to others
- Citizen science
- Research skills
- Review and how to apply

Class 12 (3/28/07): Wrap-Up & Assessment

Instructor:

- Make-up class
- Review of MN program and obligations of participants
- Safety issues and risk management
- Class assessment
- Individual assessment
- Project proposals and presentations

Class 13 (4/11/07): Make-up Class for Weather or Other Cancellations

Fieldtrips: To be held on Saturdays in Spring 2007

Guides:

For each field trip include:

- Using a Dichotomous key
 - 1) Plants, Trees native to region / Virginia
 - 2) Birds, Herps, Mammals native to region / Virginia
 - 3) Invertebrates – terrestrial & aquatic native to region / Virginia
- Using a Field Guide
- Recording observations in nature
- Possible projects and skills needed

Possible sites:

- Chickahominy Wildlife Refuge
- Crawford Forest in New Kent
- James River City Park
- Presquile
- Pocahontas State Park
- Amelia Wildlife Area
- Various county parks

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Appendix III: Reference Materials for Chapter Trainings

How To Use These Materials

The Virginia Master Naturalist program's statewide Steering Committee compiled resources that are produced by our sponsoring agencies and a few other partners, that match well with the curriculum objectives, and that are written at an appropriate level. This list is by no means a comprehensive collection of all the natural resource materials that exist. It also does not cover all of the VMN curriculum objectives. It does, however, provide a good starting point for chapters in developing their first trainings. Looking through the materials will provide a sense of the type and quality of information Virginia Master Naturalists should learn.

Chapters may wish to use the printed materials as handouts or background readings (in place of a textbook) for their training courses. Most of the materials may be copied for educational purposes. Some are available as downloads from the Web. Others are subject to normal copyright restrictions and additional copies must be ordered for a fee.

The list also includes some interactive CD-ROMs and PowerPoint presentations. The PowerPoint presentations are all posted in the Coordinators' Area of the Web site. These presentations may be provided to guest instructors as a starting point for developing their own presentations. They generally do not have scripts attached, and so cannot substitute for a qualified instructor on a topic.

List of Materials

General References

- Guide to Threatened and Endangered Species of Virginia
 - Normal copyright restrictions apply
 - Copies may be purchased on Amazon.com. DGIF contacts may also be able to provide some additional copies.
- Virginia's Natural Resource Education Guide
 - Copies may be made for educational purposes
 - Additional copies may be printed from <http://www.vanaturally.com/guide/homepage.html>

Introduction to the Virginia Master Naturalist Program

- Powerpoint presentation: An Introduction to the Virginia Master Naturalist Program
 - Available at Coordinators' Area of VMN Web site
- Powerpoint presentation and handouts: Risk Management for Virginia Master Naturalists
 - Available at Coordinators' Area of VMN Web site
- Educators and Virginia's Wildlife Laws by Carol A. Heiser (DGIF publication)
 - PDF version available at <http://www.dgif.virginia.gov/education/wildlife-laws-educators.pdf>

Ecological Concepts

- Ecological Concepts chapter by Lou Verner (VMN manual)
 - Coming this fall to <http://www.virginiamasternaturalist.org/training.html>

Virginia Biogeography

- The Biotic Regions of Virginia by Richard Hoffman (VMNH publication)
 - The author and the VMNH have given permission for copies to be made for educational purposes within the VA Master Naturalist Program
 - Original copies may be purchased from <http://www.vmnh.net/> for \$6.00 each
- Overview of the Physiographic Regions of Virginia (DCR publication)
 - Available at http://www.dcr.virginia.gov/natural_heritage/documents/overviewPhysiography_vegetation.pdf
 - The Natural Heritage Program site also has links to descriptions of the natural communities of Virginia at http://www.dcr.virginia.gov/natural_heritage/ncintro.shtml

Geology and Soil Science

- Geology of Virginia-Introduction CD-ROM (DMME publication)
 - Normal copyright restrictions apply
 - Copies can be ordered for \$6 from <https://www.dmme.virginia.gov/commerce/>
- Geology of Virginia-Web site (Dept. of Geology, The College of William and Mary)
 - Copies may be printed from <http://www.wm.edu/geology/virginia/>
- Introduction to Virginia's Karst Powerpoint/PDF (DCR publication)
 - Powerpoint and additional Karst information at http://www.dcr.virginia.gov/natural_heritage/karsthme.shtml

Dendrology

- Common Native Trees of Virginia (DOF publication)
 - Copies available for \$2 each at <http://www.dof.virginia.gov/>

Entomology and Invertebrate Biology

- Aquatic Insect Biodiversity and Conservation (VCE publication)
 - PDF version available at <http://www.ext.vt.edu/resources/anrpublications.html>

Ichthyology

- Ichthyology for Virginia Master Naturalists (VMN manual)
 - PDF version available at <http://www.virginiamasternaturalist.org/training.html>
- Freshwater Fish Biodiversity and Conservation (VCE publication)
 - PDF version available at <http://www.virginiamasternaturalist.org/training.html>
- Freshwater Fish ID poster (DGIF publication)
 - Additional copies may be requested from DGIF for a small fee; see <http://www.dgif.virginia.gov/education/fishing/caep-materials.html>
- Know Your Fish (Chesapeake Bay Foundation publication)

- PDF available at <http://www.cbf.org/>
- Selected Freshwater Fish Families (VCE publication)
 - PDF version available at <http://www.ext.vt.edu/resources/anrpublications.html>

Herpetology

- A Guide to the Snakes of Virginia (DGIF publication)
 - Normal copyright restrictions apply
 - Copies may be ordered for \$5 each (with a discount for larger quantities) from http://www.dgif.state.va.us/wildlife/snake_guide.html
- Salamander Biodiversity and Conservation (VCE publication)
 - PDF version available at <http://www.ext.vt.edu/resources/anrpublications.html>
- Frog Biodiversity and Conservation (VCE publication)
 - PDF version available at <http://www.ext.vt.edu/resources/anrpublications.html>
- Turtle Biodiversity and Conservation (VCE publication)
 - PDF version available at <http://www.ext.vt.edu/resources/anrpublications.html>

Mammalogy

- Mammalogy for Virginia Master Naturalists (VMN manual)
 - PDF version available at <http://www.virginiamasternaturalist.org/training.html>
- Animal Tracks and How To Know Them (DGIF publication)
- Animal Tracks (DGIF publication)
 - Copies may be ordered through DGIF

Forest Ecology and Management

- Forest Ecology and Management for Virginia Master Naturalists (VMN manual)
 - PDF version available at <http://www.virginiamasternaturalist.org/training.html>
- Come Walk With Me CD-ROM (DOF publication)
 - Normal copyright restrictions apply
 - Additional copies available for \$5 each from <http://www.dof.virginia.gov/>
- Sustainable Forestry: A Guide for Virginia Forest Landowners (VCE publication)
 - PDF version available at <http://www.ext.vt.edu/resources/anrpublications.html#DEPT116>
- Principles of Regeneration Silviculture in Virginia (VCE publication)
 - PDF version available at <http://www.ext.vt.edu/resources/anrpublications.html>

Aquatic Ecology and Management

- Aquatic Habitats: Homes for Aquatic Animals (VCE publication)
 - PDF version available at <http://www.virginiamasternaturalist.org/training.html>
- Freshwater Mussel Biodiversity and Conservation (VCE publication)
 - PDF version available at <http://www.virginiamasternaturalist.org/training.html>
- A Guide to Virginia's Ground Water (VA Water Resources Research Center publication)
 - PDF version available at <http://www.vwrrc.vt.edu/publications/educatio.htm>

- Landowner's Guide to Managing Streams in the Eastern United States (VCE publication)
 - PDF version available at <http://www.ext.vt.edu/resources/anrpublications.html>

Urban and Suburban Systems

- Habitat at Home (DGIF publication)
 - Copies may be reproduced for educational purposes
 - Available at <http://www.dgif.virginia.gov/habitat/wild-in-the-woods/habitat-at-home.pdf>
- Backyard Wildlife (DGIF publications)
 - Available at <http://www.dgif.virginia.gov/wildlifewatching/backyard.asp>
- Human-Wildlife Interactions (DGIF publications)
 - Available at <http://www.dgif.virginia.gov/wildlifewatching/human-wildlife.asp>

Interpretation and Teaching Skills

- Interpretation: Background, How-To, and Bibliography (by Holly Walker, DCR)
 - Copies may be reproduced for educational purposes
- Environmental Education Curriculum Materials—Contact Listing
- Virginia Naturally informational materials
 - Available at <http://www.vanaturally.com>

Appendix IV: Sample Guidelines for Instructors

Basic Background

The Virginia Master Naturalist program is a corps of well-trained volunteers providing education and service to benefit natural resources in their communities. Volunteers start the program by completing a 40+ hour basic training course. The course is intended to (1) give volunteers some fundamental knowledge and skills relating to natural history and natural resources that they can use in their volunteer service, (2) familiarize volunteers with the resources in their community, including the natural resources and the expert resources who can provide them with additional information, (3) pique volunteers' interest in one or more areas of natural history or natural resource management to inspire them to learn more and volunteer in that area, (4) promote camaraderie and connections among classmates to develop a team-oriented atmosphere. Upon completing the course, the volunteers may achieve Virginia Master Naturalist certification by conducting 40 hours of volunteer service and 8 hours of advanced training. They remain part of a local chapter, participating in chapter activities and learning opportunities.

Classroom Instructors

- Communicate with the chapter training coordinator ahead of time about the objectives for the class.
- Be sure to plan your presentation to fit in the allotted time, allowing for questions.
- Make your presentation as interactive and hands-on as possible. Rather than giving a 1 hour Powerpoint lecture, consider limiting the lecture to 45 minutes and including a 15 minute hands-on activity to illustrate the concepts.
- Do not focus only on your specific area of research interest, but rather on the topic as a whole.
- Aim your presentation at an advanced high school or undergraduate non-major level.
- Design your presentation to focus on knowledge and skills volunteers might be able to use in their education, citizen science, and stewardship service projects. Communicate with the chapter training coordinator about examples of active service projects related to the topic so that example can be part of the lesson.

Field Instructors

- The field trips are intended to be opportunities for the volunteers to have a hands-on and interactive experience.
- Communicate with the chapter training coordinator ahead of time about the objectives for the field trip.
- The majority of the field trip time should be spent having the volunteers experience the natural resources and practice skills such as observation, identification, sampling, and other naturalist and citizen science skills.
- Only a small amount of time (if any) should be spent with the volunteers just standing and listening to a presenter. Avoid having field trips become simply outdoor lectures.



- Communicate with the chapter training coordinator ahead of time about what conditions volunteers should expect on the field trip so they know what to wear and bring.
- Safety is of utmost importance. Communicate with the chapter training coordinator ahead of time about a risk management plan.