

## Memorandum

**To:** State Fish and Wildlife Directors  
**From:** Duane L. Shroufe, Chair, IAFWA Teaming with Wildlife Committee  
**Subject:** Ecological Frameworks Sub-workgroup (SWG Workgroup)  
**Date:** September 15, 2003

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Following is a guidance document drafted by the TWW Committee's State Wildlife Grants Work Group. It is intended to provide state agency staff working on Comprehensive Wildlife Conservation Strategies (Plans) with (a) information on habitat/natural community classification systems that are available, (b) insight into what classification systems states are planning to use, and (c) to make a recommendation as to the best ecological platform to use in a national synopsis. With regard to the recommendation, I want to reaffirm that it is a suggestion, and any given state can choose not to follow it. However, clearly there would be tremendous advantages in synthesizing CWCS information at a national scale if many states used the same ecological platform.

In addition, the Work Group was asked to provide any additional guidance to help ensure continued coordination between states as they develop their CWCSs. On this last point, the Work Group recommends that the lines of communication initially established between states at the 2003 regional CWCS workshops be further cultivated, particularly among neighboring states. Several suggestions are made in this document as to how to accomplish this. However, perhaps the best approach to achieving interstate coordination would be for state directors to frequently and persistently encourage their CWCS coordinator and other staff, to network with their peers in other states.

Following is the Ecological Framework Guidance document. If you or your staff have questions about it, I suggest contacting Mr. Mark Humpert (see Contact, above).

## Ecological Framework Options for Comprehensive Wildlife Conservation Strategies (Plans)

**Introduction:** Critical to development of a Comprehensive Wildlife Conservation Strategy (Plan) is a means of classifying habitats and/or vegetations systems. There was no legislative guidance in the State Wildlife Grants appropriate language as to which type, or kind, of criteria that states should use when choosing a classification system. Nor was there guidance regarding what, if any, ecological system should be used to ensure that information contained within each state plan could be compiled into a national summary.

As a result of questions from state wildlife agency staff about these issues, the TWW State Wildlife Grants Work Group was charged with the following tasks: (1) Make a recommendation to the states on what ecological platform should be used in a national synopsis; (2) Develop a list of habitat/vegetation classification systems that could be used by states when developing their CWCS; (3) Survey state agency staff to find out what classification systems states are using or plan to use; and (4) Provide guidance to state agency staff that can be used to help ensure plans are useable and well coordinated.

The guidance provided herein will principally assist state agency staff in addressing required CWCS element number ii, *"the plans must include descriptions of locations and relative condition of key habitats and community types essential to conservation of species identified in (1)."*

Guidance from this document will also indirectly address several other elements, including number vii, *"the plans must include plans for coordinating the development, implementation, review, and revision of the State comprehensive wildlife conservation plan with Federal, State, and local agencies and Indian tribes that manage significant land and water areas within the state or administer programs that significantly affect the conservation of identified species and their habitats."*

**National Synopsis:** A key aspect of this planning effort may be the ability to condense information from each state plan into a national synopsis. The capacity to do this will have tremendous ecological and political consequences. However, this will only be possible if a common currency is used by each state to summarize data in its plan. **The SWG Work Group recommends that the Bailey/USFS Ecological Units be adopted as the ecological platform for a national synopsis and to recommend that states provide a section-level<sup>1</sup> summary of their state plan to IAFWA.** This platform was selected because of its wide acceptance within the ecological community and its close association to The Nature Conservancy's ecoregions and Partners in Flight regional plans. Many states are expected to incorporate many aspects of these two planning efforts into their CWCS.

The common currency for state reporting under this system would be at the Bailey section level. This would make it relatively easy for state information to be rolled-up into a national synopsis. Although most states will develop plans classifying habitat/vegetation at a much finer scale,

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<sup>1</sup> The "section" level in Bailey's hierarchy is one level below ecological province.

including this level of detail at the national level would make it difficult to summarize in an intelligible way for a lay audience.

To help ensure that states are able to cross-walk their classification system to the Bailey system (section level), the Work Group could serve as a liaison to state agency staff to provide a channel for communication and a source of technical expertise. Although it is unknown if all state plans could be summarized in this way, it is still early enough in the planning effort to provide guidance to the states. The importance of being able to put each state's planning results into a national synopsis can not be underscored enough. By putting state information into a national context, it would be the first time in history that Congress and the public at large could see a coordinated, scientifically rigid, account of the nation's "at-risk" wildlife and their habitats.

**Habitat/Vegetation Classification Systems:** Habitat and vegetation classifications are hierarchical systems that describe fine-scale units used for detailed analyses at the local level. In general, the higher levels of the hierarchy (such as Bailey's ecoregional sections) provide the landscape-level ecological framework for the finer-scale vegetation units. To develop plans that adequately address species habitat needs and the condition of those habitats, state agency staff will need to select a habitat/vegetation classification scheme that supports decision making at the local level. Habitat/vegetation conservation is an important complement to species-level conservation, because it can improve efficiency in the management of habitats for multiple species, and serve as a mechanism for conserving more common species that are not treated individually in the CWCS.

Although there would be many benefits to wildlife conservation if there were a national habitat classification system that was adopted and used by all states and territories — ecological, economical, and political obstacles currently prevent the adoption of a universal system. Instead, numerous habitat and vegetation classification systems are used by state fish and wildlife agencies. A recent publication, "A Working Classification of the Terrestrial Ecological Systems of the Conterminous United States," produced by NatureServe was used to summarize the available ecological classification systems. A summary is included in Appendix A.

Although a number of classification systems are available, state agency staff are encouraged to choose a system that is understandable and useable to planners, researchers, and project practitioners within your agency. Some states, e.g. Missouri, have made great strides in developing a detailed ecological classification system. Other states lack the resources to do the same at this time. The relatively short deadline for completing the CWCS will not allow states to undergo the time consuming task of developing and mapping a new system. The information contained in Appendix A is intended for states that have not begun to grapple with the complicated problem of habitat classification.

It is important that state agency staff understand that each state has a unique set of resources available to them. State Natural Heritage Programs may be an important first point of contact early in the planning process. The natural heritage program uses a common classification system nationwide. Those states where natural heritage programs are housed within the agency responsible for the plan, will likely find it easier to make use of this resource. However, states

could use this planning effort as an opportunity to renew or strengthen relationships with natural heritage program staff.

Two limitations in ecological frameworks are: incomplete status of a freshwater aquatic classification system, and absence of a marine classification system. States should strive to overcome these obstacles, but understand that other states are encountering the same problem. Coastal states are strongly encouraged to communicate and collaborate in developing a solution that makes sense for the majority of states.

**State agency staff survey:** While developing this guidance document, it seemed instructive to inform state agency staff about the classification systems that other states are planning to use. An email survey was conducted of state agency staff. Thirty-two states and one territory responded to the questionnaire. A summary of each state's response is included in Appendix B. Each coordinator was asked the following questions:

1. Are you planning on using a habitat classification system in developing your CWCP?
2. If so, do you know which habitat classification system or what combination of them you plan on using? (e.g. State Natural Heritage Program Community Classifications? U.S. National Vegetation Classification? Others?)

The results of the survey show that most states have decided on a classification system. Sharing of these results will give state agency staff insight into what system other states (especially neighboring states) are using.

Habitat Classification System to be Used	Number of States
Natural community classifications (including state natural heritage program classifications)	7
GAP	4
Ecological site classification	3
Ecoregions	1
U.S. national vegetation classification (NVC)	1
State-specific systems	3
Ecotypes based on soils and climate	1
Combination of systems	6
Undetermined	6

**Need for Regional Coordination:** State agency staff should communicate openly and frequently with each other (particularly between neighboring states). Wildlife conservation is made more difficult by adhering to political boundaries. Through communication, opportunities to engage in interstate planning using relevant ecological boundaries will result in improved science. When possible adjacent states should strive to use similar classification systems. However, care should be taken so that the desire for standardization does not trump a state's need to have a useable and understandable plan.

Some regional collaboration is already occurring. Discussions by some state agency staff at the regional CWCS workshops and subsequent meetings in the northeast and southeast are

demonstrating how communication can lead to improved coordination. IAFWA's regional associations should be encouraged to facilitate communication among state agency staff. This could be accomplished by coordinating a regional conference call of state agency staff quarterly. In addition, a web forum or listserv could be initiated that could serve to stimulate conversation about ecological frameworks and other discussion points related to the plan.

Most importantly, state agency staff should be encouraged to start the dialogue directly by contacting the coordinator in their neighboring states. This can be facilitated by periodically sending a list of contact information to state agency staff and querying states about their interstate coordination efforts in future progress reports. Agency directors could play a key role in encouraging state agency staff to contact the coordinators in their respective adjacent states.

### **Summary of Habitat Classification Systems (Appendix A)**

#### **U.S. National Vegetation Classification System (NatureServe, TNC):**

<http://www.natureserve.org/library/seeingforest.pdf> This system was started in the 1990s. The classification continues to grow as additional community types are found and analyzed. It is the first consistent classification on a scale fine enough to be useful for conservation of specific sites. It can be used to classify all types of communities, includes more than 4,500 vegetation types, and has been adopted by the Federal Geographic Data Committee for use by all Federal agencies. The system can be easily translated to other classification systems.

#### **Ecological Systems Classification: (NatureServe, TNC)**

<http://www.natureserve.org/library/usEcologicalsystems.pdf> A working classification of terrestrial ecological systems that includes nearly 600 ecological systems, all of which are classified and described. Terrestrial ecological systems are defined as a group of plant community types (associations) that tend to co-occur within landscapes with similar ecological processes, substrates, and/or environmental gradients. Terrestrial ecological system units represent practical, systematically defined groupings of plant associations that provide the basis for mapping terrestrial communities and ecosystems at multiple scales of spatial and thematic resolution. The systems approach complements the U.S. National Vegetation Classification, whose finer-scale units provide a basis for interpreting larger-scale ecological system patterns and concepts.

#### **State Natural Heritage Program Community Classifications (State Natural Heritage Programs):**

<http://www.natureserve.org/visitLocal/index.jsp> Each state uses its own classification system, but has the ability to crosswalk to the National Vegetation Classification System, allowing the same habitat type to be identified across state lines. Units are defined by vegetation physiognomy, current species composition, soil moisture, substrate, soil chemistry, or topographic position, depending on the local situation. This approach has been used with great success for conservation and inventory at the local and state level, but there have been no consistent rules for defining "natural community" concepts for applicability at broader scales.

#### **Ecological Site Classification: (USFS, et.al.)**

Site classifications use physiographic or environmental characteristics along with vegetation. Ecological land classification approaches integrate climate, physiography, landform, soil, and

vegetation to define ecosystem or ecological land units, typically within a spatially nested hierarchy. While data intensive, these classifications have been developed throughout many forested portions of the United States and have often been used to guide forest management.

Only the finest scale ecological land types could practically be said to recur across a given regional landscape. This aspect limits their utility for some conservation applications.

### **Habitat Type Classification (USFS)**

Relies on species occurrence criteria and potential natural vegetation to define site types or habitat types. Potential natural vegetation is often defined as “the vegetation structure that would become established if all successional sequences were completed without interference by man under the present climatic and edaphic conditions.” Because these classifications integrate environmental factors, such as climate and soil characteristics, they may be broadly applied for recurring map units across regional landscapes. However, they share a weakness with ecological site classifications in that they seldom can fully integrate factors of landscape juxtaposition that affect prevailing disturbance regimes and the existing vegetation one would encounter on the ground. Based on potential habitat types. Older version, developed for forest habitats

### **Natural Resource Conservation Service Ecological Sites (NRCS)**

(<http://plants.usda.gov/esis>). Soil is used as the basis for determining, correlating, and differentiating one ecological site from another. Soils with like properties that produce and support a characteristic native plant community, and that respond similarly to management, are grouped into the same ecological site. Criteria used differentiate one ecological site from another include a) significant differences in the species or species groups that are in the characteristic plant community, b) significant differences in the relative proportion of species or species groups in the characteristic plant community, c) soil factors that determine plant production and composition, the hydrology of the site, and the functioning of the ecological processes of the water cycle, mineral cycles, and energy flow, and d) differences in the kind, proportion, and production of the overstory and understory plants due to differences in soil, topography, climate, and environment factors, or the response of vegetation to management. In practice, ecological sites may define units at or near the scale of plant associations of the National Vegetation Classification or small groups of associations. This system may still be under development?

### **National Wetland Classification System (USFWS)**

<http://www.nwi.fws.gov> The hierarchical levels are defined by water body types (marine, riverine, palustrine), substrate materials, flooding regimes, and vegetation life forms. The lowest unit is the dominance type, named for the dominant plant and animal forms, and is developed by the user, so it varies with each application. This system can be mapped, but some features, such as flooding regimes, are very dynamic and multi-temporal observation is often required. About 90 percent of the lower 48 states have been mapped. This is a widely accepted system.

### **Hydrogeomorphic Approach (ACOE, EPA, FHA, FWS, NRCS, FWS):**

<http://www.wes.army.mil/el/wetlands/hgmhp.html> This approach is intended to support methods for assessing the physical, chemical, and biological functions of wetlands. It is based on wetland hydrogeomorphic properties of geomorphic setting, water source, and hydrodynamics. A suite of indicators is used to describe each of these properties, then develop “profiles” that describe the

functions the wetland is likely to perform. While of great utility for its intended purpose, the HGM approach is not designed to be sensitive to species composition of vegetation.

**North American Biotic Communities:**

Communities are described using a biogeographic approach that considers the limiting effects of moisture and temperature minima on the structure and composition of vegetation, as well as the specific plant and animal adaptations to regional environments. A six-level hierarchy is used to describe these types, which results in some 150 Biotic Community units across the contiguous United States. This approach provides many useful insights for biogeographic regionalization, and the application of biogeographic criteria to make practical inferences for the likely biotic composition of communities in a given regional landscape. However, not unlike the National Vegetation Classification (see below), there is a considerable break in the number of classification units between, for example, the Biotic Community scale and the Series scale, the latter of which likely includes more than 1000 units in the contiguous United States, if fully developed.

**Summary of State Survey, August 2003 (Appendix B)**

State	Habitat Classification System?	Which One?
Alabama		
		This has been discussed with many of our potential partners. There is only one statewide ecosystem map available from USGS. It uses 30 vegetation classes, is very coarse, and doesn't even remotely resemble a habitat classification system relevant to wildlife. We also lack a statewide classification of lake, river, stream and marine habitats. An infusion of funds from the USFWS GAP project will help, but that effort is not expected to begin until 2005. We might have something for the next iteration of our CWCP, but we are going into this round of planning with a decided handicap. TNC ecoregional planning in Alaska has been hampered by this also.
Alaska	We don't know yet.	
Arizona		
Arkansas	Yes	Ecoregions
California		
Colorado		
Connecticut	Yes, but within the context of the overall plan--as a piece of the overall picture.	We will be looking at our state natural community classifications, forestry stand/type classifications, and physiographic provinces (eg. PIF), and probably more. A single system may not be sufficient based on the diversity of available data at this stage of the planning process. We are looking closely at classifications used by NJ in development of their landscape level plans and their "BIG" map initiative. We will also be making use of land-use/land-cover data obtained via landsat and similar sources data.

		We will be using a Habitat Classification System, and it will be our current natural community classification, which is based upon, and crosswalked with, the NVC as it is currently managed by NatureServe.
Delaware	Yes	
Florida	Yes	Florida's Closing the Gaps map of important habitat areas
Georgia	Yes	We will be using a system derived from the USNVC, focusing on the ecological systems classification being developed by NatureServe, with correspondence to alliances and associations as appropriate.
Hawaii		
Idaho	Yes	We are planning on using the Ecological Systems of the United States: a working classification of U.S. terrestrial systems which is a mid-scale system based upon the U.S. National Vegetation Classification system (the document can be found on the NatureServe web site).
Illinois	Yes	State Natural Heritage System
Indiana		
Iowa	Yes	Iowa DNR expects that we will be using what our GIS/GAP system uses, as our CWCP will rely heavily upon those tools. That classification is a system of vegetative alliances that originated with TNC and the Natural Heritage Database.
Kansas	Hasn't decided.	
Kentucky	Yes	Kentucky plans to use an ecological classification system but we have not made a final decision which we will use. We will probably use components of different system depending on scale.
Louisiana	Unknown at this time.	
Maine	No	
Maryland	Not determined yet.	If so, both of the above will probably be used to some degree.
Massachusetts		
Michigan	Yes, we intend to approach the CWCP starting at a system level.	This has not yet been determined, but we have recently been briefly introduced to a scheme used by Boise-Cascade in Idaho to define available habitats and associated uses by species of concern. The scheme is basically a 2- (or more?) dimensional matrix with axes that represent different variables along a continuum, that allow different habitat types, and use by species, to be plotted spatially. This allowed them to define their systems and easily find associated species. The key, apparently was to find the correct variables to use on the axes.
Minnesota	Yes, we are planning to use a habitat classification system to frame our CWCP.	We are not sure which one. Probably some form of our ecological classification system, which was initially developed jointly among MN, WI, MI, and the USFS. For the lower levels, we might use our new plan community classification system.

Mississippi	Yes	Mississippi is planning to use Natural Heritage Program habitat classifications when developing our CWCP.
Missouri	Yes. Missouri will build the CWCP on an ecological platform. To understand that fully you need to refer to a copy of the "Atlas of Missouri Ecoregions" by Tim Nigh and Walter Schroeder.	Missouri uses the Terrestrial Natural Community Classification system by Paul Nelson for "every day language" and to track natural communities in Heritage. (Example - Osage Prairie is a dry-mesic sandstone shale prairie). These records are cross-walked with the TNC Vegetations Classification Association - 2001 (Ex. Osage Prairie is Midwest sandstone /shale prairie). We will not build the CWCP plan at this level, but rather these natural communities are elements that will help us identify conservation opportunity areas. We will build our plan at the Subsection level, based on the USFS Sections and Subsections. During the assessment phase we will use Land Type Associations = subsets of the Subsection (ex - Grand River Alluvial Plain). LTAs are basically collections of habitat suites. This is the ecological framework behind the assessment, but we will likely not compile/report our plan at this level. Tentative plans are to compile/report the conservation landscapes at the Ecological Section level. (Ex- Ozark Highlands). That means our conservation landscape targets will be grouped into 5 sections. These ecological entities are recognized across state lines and used by many of our conservation partners. This is the ecological framework, but I am not certain it is a habitat classification systems. It could be that we need to come to agreement on common habitat terminology. I am currently searching for the most recent Central Hardwoods BCA plan because it lays out habitat suites for bird conservation. Could be this is a good approach to discussing "habitats".
Montana	Yes	We will ultimately use many different habitat classifications so that we have course and fine filter ability, but initially we will use the following type map: Ecotypes based on Ross, R.L. and H.E. Hunter 1976. Based on soils and climate. Interpreted by Hank Jorgensen, Bozeman Research Bureau, FWP. 1994.
Nebraska	Yes	A combination of the National Vegetation Classification System and the Ecological Systems of the US classification system
Nevada		
New Hampshire		
New Jersey		
New Mexico		
New York	Expects that they will.	My guess would be that we will use the NHP classification system for NY

North Carolina	Yes, we plan to use a habitat classification system to ID habitats associated with our priority species.	No, we haven't settled on one--- our GAP habitat data seems a possibility, and we've talked to others (VA, for example) about the National Land Cover database---in fact, we're supposed to start up some sort of email discussion among our neighboring states soon about that very topic. We think it would be beneficial to use a system that is popular among others in our region and we're open to suggestions!
North Dakota	Yes	We are awaiting Northern Prairie's (local USGS research center) effort to develop a GAP analysis which includes a vegetative component for terrestrial species. It should be completed by the end of September (maybe!). It appears to be based on basic land cover types (i.e., grasslands, woodlands, wetlands, etc.). The GAP effort will be on a large scale and we are concerned about its level of precision. Ducks Unlimited and the U.S Fish and Wildlife Service HAPET office here in Bismarck have developed a land cover GIS layer as well (done in 1997). This may have some applicability as well. Bottom line is that we are still undecided on what to use, but we intend to use something.
Ohio	Yes	We are using our own "other" system.
Oklahoma	Yes	We envision starting with the BCR's applicable to Oklahoma, then step down to a modification of Omernick's Ecoregion system reflected in our Biodiversity Plan (modified to include a Big Rivers category that Omernick did not have), then step down to the Oklahoma Natural Heritage Inventory Vegetation Classification System (which is stepped down from the U.S. National Vegetation Classification System).
Oregon		
Pennsylvania		
Rhode Island		
South Carolina	Yes	As I see it, we need a system that is mapped, and the only one we have that is mapped state-wide is the SC- GAP vegetation layer.
South Dakota	Yes	No, we are not far enough along in the process to have chosen a system.
Tennessee	Yes	We are using the land cover classification system employed for the Tennessee Terrestrial GAP Analysis. That classification system is a combination or integration of Anderson level 2 classifications and species alliances based on the Southeastern Forest Classification System created by The Nature Conservancy.

Texas	Yes. Preliminary intent is to use vegetation units as habitat units for the plan.	Don't know yet. We're just starting. We have a state plant community classification system - I think it marries closely with the 2 mentioned below.
Utah	Yes	Utah is using a slightly modified version of the Utah GAP habitat classification system for our CWCP.
Vermont		
Virginia	Yes	We are still evaluating classification options, especially as it relates to our ability to map and determine the extent of those habitats. The level of detail available in many habitat classification schemes presents unrealistic expectations of our mapping abilities, since most of the digital data available is not and likely cannot be classified to that same level of detail. We will probably use a modification of the U.S. National Vegetation Classification or Anderson land use/land cover. We are also evaluating some different options for describing and evaluating aquatic habitats (working in concert with our ongoing aquatic Gap Analysis efforts) that provide more detail than some of the traditional habitat classification strategies. Systems we are currently evaluating include: National Land Cover Dataset (NLCD) - based loosely on Anderson et al 1976 Land Use/Land Cover, Virginia Gap Analysis - habitat types, Mid-Atlantic Gap Region - Ecological Systems - NatureServe 2003 - these are groups of Associations from the National Vegetation Classification System, National Wetland Inventory - Cowardin et al. Wetland and Deepwater Habitat Types, Virginia Aquatic Gap - Aquatic Habitat Classification System currently in development within VDGIF.
Washington	Washington is using the Ecoregion classification developed by The Nature Conservancy, modified from Bailey, USFS	Washington is using the habitat classification from "Wildlife Habitat Relationships of Oregon and Washington", Johnson, D.H. and T.A. O'Neill, 2001, Oregon State University Press, Corvallis, OR. This classification is summarized below. The experts started with the National vegetation classification system (Grossman et al. 1998 and Anderson et al.1998). There were 287 plant alliances found in OR & WA. These were grouped into 85 vegetative groups. Then 5 agricultural and 1 urban land cover types and 28 marine types were added for a total of 119 types. Next they associated 541 native breeding wildlife species with the the 119 vegetation/cover types using information from the GAP Analysis and Interior Columbia Basin Ecosystem Management Projects. Then multivariate statistics and cluster analysis were used to delineate 32 major wildlife habitat types in OR & WA.
West Virginia		

Wisconsin		
Wyoming		
Dist. of Columbia		
Puerto Rico		
Guam		
Virgin Islands	Yes	Natural Heritage Program Community Classifications
Samoa		
Marianas		