5. **Name:** Classification and Management of Riparian and Wetland Sites in Montana.

Authors: Paul Hansen, Robert Pfister, John Joy, Dan Svoboda, Keith Boggs, Lew Myers, Steve Chadde, and John Pierce.

References: Batchelor, R., M. Erwin, R. Martinka, D. McIntosh, R. Pfister, E. Schneegas, J. Tayor, and K. Walther. 1982. A taxonomic classification system for Montana riparian vegetation types. Montana rural Area Development Committee, Bozeman, Montana. 13 pp.

Boggs K., P. Hansen, R. Pfister, and J. Joy. 1990. Classification and management of riparian and wetland sites in northwestern Montana, draft version 1, Montana Riparian Association, School of Forestry, University of Montana. 217 pp.

Hansen, P., S.W. Chadde, and R. Pfister, 1988. Riparian dominance types of Montana. Montana Forest and Conservation Experiment Station, School of Forestry, University of Montana, Missoula, Montana. Misc. Pub. No. 49. 411 pp.

Hansen, P., K. Boggs, R. Pfister, and J. Joy. 1990. Classification and management of riparian and wetland sites in southwestern Montana, draft version 2a, Montana Riparian Association, School of Forestry, University of Montana. 292 pp.

Hansen, P., K. Boggs, R. Pfister, and J. Joy. 1990. Classification and management of riparian and wetland sites in central and eastern Montana, draft version 2, Montana Riparian Association, School of Forestry, University of Montana. 279 pp.

Objectives: Develop a riparian ecological site classification for Montana to assist in the identification, description, communication, and management of riparian areas by resource managers. Describe the general geographic, topographic, edaphic, functional, and floristic features of riparian ecosystems. Describe successional trends and predict vegetative potential on disturbed riparian sites. Present information on resource values and management opportunities. In addition, the classification can be used for mapping and inventory of the riparian zone.

Designed Users: Managers, biologists, hydrologists, engineers, resource specialists.

Area of Applicability: The approach is both a conceptual framework and an operational taxonomy that is applicable everywhere. The actual "types" described in the work are applicable to southwestern, central, northwestern, and eastern Montana.

Classification Units, Description, and Data:

Supplement to classification units: The ecological concepts and terminology used essentially follow the work of Daubenmire (1959), Daubenmire (1968), Daubenmire and Daubenmire (1968), Daubenmire (1970), Daubenmire (1978), and Kovalchik (1987). The hierarchical system is described by Daubenmire (1978). The following is a brief discussion of the hierarchical system.

Classification Units	Description
Region	Regions have a high degree of physiognomic uniformity among the climatic climaxes, and a gross similarity of climates throughout. However, taxonomic similarity is not a requirement.
Province	Provinces are zones in which the dominants of the climatic climaxes have had much the same geologic history, exhibit a strong thread of taxonomic continuity, and occur in climates of somewhat similar pattern. A finer subdivision of a province is a section.
Zones	Zones are the entire area over which zonal soils support what may be considered the same type of climatic climax. Zones are areas of essentially homogeneous macroclimate as indicated by a common climatic climax. The zones fit together on a map as a mosaic without overlap, although the plant association that is climatic climax in one zone usually occurs as an edaphic or topographic climax in a contiguous zone, where it becomes restricted to an environment which compensates for the relatively unfavorable macroclimate.
Series	A series is a group of habitat types having the same potential climax overstory.
Habitat Types	A habitat type is all the area of land capable of supporting the same climax plant association whether this be climatic, edaphic, or topographic climax. (A plant association is a kind of plant community represented by stands occurring in places where environments are so closely similar that there is a high degree of floristic uniformity in all layers.)
Phase	A phase is a subdivision of a habitat type representing a characteristic variation in climax vegetation and environmental conditions.
	Additional Ecological Terms
Riparian Association	A riparian association is a plant community type representing the latest successional stage attainable on a specific hydrologically influenced surface (equal to potential natural community). Because the riparian association is the end result of plant succession, it reflects the most meaningful integration of environmental factors affecting vegetation. [Because of the difficulties of defining climax in the classical sense for flood plain environments, this system currently follows the lead of Kovalchik (1987) in using the term riparian association to represent the latest successional stage available.]

Riparian Site Type	The riparian site type is the area of land occupied or potentially occupied by a specific riparian association (e.g., a vegetation based ecological site type for riparian areas). Each riparian site type represents a relatively narrow segment of environmental variation having a certain potential for vegetation development. Although any given riparian site type may support a wide variety of disturbance induced or seral vegetation, the ultimate product of vegetational succession anywhere within that riparian site type will be a similar plant community. Therefore, the riparian site type is an ecological site classification that uses the plant community as an indicator of integrated environmental factors as they affect species reproduction and plant community development.
Community Type	A community type is an aggregation of all plant communities distinguished by floristic and structural similarities in both overstory and undergrowth layers. Community types are considered to represent seral stages.
Site Descriptions	
Location and Riparian Landforms	Presents typical elevation range and landforms associated with each type.
Floristic Characteristics of Sampled Stands	Describes the vegetation on the site.
Potential Natural Community	Used for seral stages (community types) and describes the proposed successional pathway(s) to the climax vegetation.
Soils	Follows standard SCS taxonomy and description of moisture regime.
Adjacent Communities	Describes adjacent wetter or drier sites. This information gives the user a mental picture of the "types" position on the landscape.
Management Information	The following management information is presented: livestock, timber, wildlife, fisheries, fire, soil management and rehabilitation opportunities, recreational uses and considerations. In addition, the following information (by species) is presented: 1) forage palatability (cattle, sheep, and horses), 2) energy value, 3) protein value, 4) thermal or feeding cover values (elk, mule deer, whitetail deer, upland game birds, waterfowl, small nongame birds, and small mammals), 5) food value or degree of use (elk, mule deer, whitetail deer, antelope, upland game birds, waterfowl, small

	nongame birds, and small mammals), 6) potential biomass production, 7) erosion control potential, 8) short-term revegetation potential, and 9) long-term revegetation potential.
Other Studies	Summary of similar sites.

Use, Testing, Validation: The approach is both a conceptual framework and an operational taxonomy that is applicable everywhere. The methodology is being used throughout Montana. The document provides managers with site potentials and management information.

Ease of Application: The procedure is straightforward. Its ease of application is dependent on the experience of the field personnel doing the vegetation mapping, identification, and interpretation.

Use in Defining System Response and Potential: The procedure's strength is in its attempt to understand system response and site potential for the purpose of providing management information.

Use in Determining State of System: A goal of the procedure is to identify associations (i.e., site succession). An effort was made to reference other potentials from the association descriptions based on changes in water regime.

Relation to Other Procedures: The procedure uses standard ecological classification principles. The ecological concepts and terminology used essentially follow the work of Daubenmire (1968), Daubenmire and Daubenmire (1968), Daubenmire (1970), Daubenmire (1978), and Kovalchik (1987). It is conceptually similar in part to ecological sites.

Automated Data Processing: The procedure uses the USFS Region 1 Ecodata sampling and automated data processing system. The results of the procedure would not be easily converted to a standard ADP system. However, it would work well in a knowledged based system (expert system).

Limitations and Assumptions: As presented, the authors have done a superb job of getting to the manager's need.

6. **Name:** Classifying Rangeland Riparian Areas: The Nevada Task Force Approach.

Authors: Sherman Swanson, Ray Miles, Steve Leonard, and Kenneth Genz.

Reference: Swanson S., R. Miles, S. Leonard, and K. Genz. 1988. Classifying rangeland riparian areas: the Nevada task force approach. Journal of Soil and Water Conservation, 1988. 43:3.

Objectives: Develop a system that is interdisciplinary, hierarchical, simple yet reliable, useful for management, related to ecological potential, and mappable.

Designed Users: Biologists, soil scientists, hydrologists, managers.

Area of Applicability: Rangelands, but concepts are applicable everywhere.

Classification Units, Description, and Data:

Classification Units	Description
Physiographic Region	Major land classes as defined by Brown and Kerr (1979).
Major Riparian Areas	Delineates between stream and nonstream types.
Stream Type	Stream types are classified using a geomorphic based system developed by Rosgen (1985).
Nonstream Type	Nonstream types include lake, reservoir, pond, pool, spring, seep, and irrigation conveyance.
Ecosystem - Riparian, Aquatic	Ecosystem is separated into either aquatic or riparian based effectiveness of the open water column. Aquatic ecosystems include nonpersistent emergent, aquatic beds, and areas not vegetated (bars). Cowardin et al. (1979) can be used to describe aquatic ecosystems at this point.
Subsystem	Only the riparian ecosystem is described in the subsystem. This includes moisture regime classes as suggested by Johnson et al. (1984): hydroriparian, mesoriparian, and xeroriparian.
Structure Class, Subclass	Structural class is similar to the Cowardin et al. (1979) class, but is related to perceived potential natural community. Structural classes include: forest, woodland, shrub, herb, nonvegetated. As with class, subclass attributes are based on potential natural community and include: evergreen, deciduous, mixed, tall, low, nonvegetated.

Ecological Site	A distinctive type of land that differs from other kinds of land in its ability to produce a characteristic potential natural community.
Community Type	The existing/dominant plant community distinguished by floristic and structural similarities.
Stream Subtype	Used under the associated stream type to describe in detail the stream reach being classified. The modifiers used by Rosgen (1985) are suggested to describe flow regimen, size, organic debris/channel blockages, depositional features, and meander patterns.
Naming Conventions	The physical site attributes are given in the beginning of the site name and are separated by a forward slash (/). The ecological site attributes are given on the right-hand side of the physical attributes and separated from them with a semicolon (;). Codominants are separated using a hyphen (-).

Use, Testing, Validation: Currently under testing through the University of Nevada, Reno.

Ease of Application: The system appears about as easy as any other procedure to apply. However, since it is more comprehensive than most procedures, there are more data requirements and may require more expertise.

Use in Defining System Response and Potential: The procedure has incorporated the concept of potential natural community, and as such, has recognized one form of system response. It has also incorporated a great deal of geomorphic information, making the tie between major physical systems more possible.

Use in Determining State of System: Procedure has all necessary components to determine site progression.

Relation to Other Procedures: To a large degree, the procedure maintains consistency with Soil Conservation Service standards for soil descriptions and to a lesser degree with the USFWS Cowardin et al. (1979) wetlands procedures. The procedure does deviate in naming conventions at the system, subsystem, and class level, but there are no major deviations in concept.

Automated Data Processing: The procedure is too new to evaluate, but does appear to be suitable to a data base management system.

Limitations and Assumptions: As written, the procedure is limited to inland areas; however, this could be expanded by following Cowardin et al. (1979) more closely. The naming convention may be too complex to allow for easy description and cross-referencing.

7. Name: Classification of Riverine Riparian Habitats for Management of Fisheries Resources.

Authors: William S. Platts, Sherman E. Jensen, Frank Smith.

Reference: Platts, W., S. Jensen, and F. Smith. 1988. Preliminary classification and inventory of riverine riparian habitats livestock/fishery study areas, Nevada. Progress Report I. Nevada Department of Wildlife, Elko, Nevada. 127 pp.

Objectives: Identify the existing state structure and function and their respective physical and biological processes. Identify the natural state under present set of conditions and the variability of this state over time. Estimate achievable state conditions and identify units of similar potential even though present states are not identical. Determine the state direction the system is moving (trends). Determine the time intervals occurring between state changes under known applications of stresses or benefits. Identify Poor and Best Management Practices. Determine limiting factors that determine the biotic carrying capacity for each state. Transfer knowledge and experience over space. Evaluate the influence of natural and artificial geomorphic-physical conditions within the watershed on the fisheries. Determine attainability (as described in the Water Quality Act) of riverine riparian habitats in a regional perspective. Allow valid establishment of control and treatment sites for assessing non-point source impacts to riverine riparian habitats. Display and describe riverine riparian habitats at selected hierarchical levels. Identify those variables that are sensitive for identifying and assessing non-point source impacts (monitoring). Be hierarchical and mappable. Display the regional characteristics of riverine riparian complexes and describe their inherent capabilities and potentials. The process must be amenable to hypothesis or model testing.

Designed Users: Biologists, hydrologists, engineers, managers, resource specialists.

Area of Applicability: Anywhere.

Classification Units, Description, and Data:

Classification Units	Description
Domain	Subcontinental area of related climates.
Division	A subset of domain delineating single reference regional climate as defined by Trewartha and Horn (1980).
Ecoregion	A subset of division based on land surface form as defined by Fenneman (1931). A broad vegetation region with the same types of zonal soils. Climatic climax at the level of Kuchler's (1964) potential vegetation types. Four major criteria are landform, potential natural vegetation, land use, and soil.
Geologic District	A subset of ecoregions delineating more homogeneous areas banding together uniform landforms at the level of Hammond's land-surface form regions.

Land Type Association	Groups of closely related types within a geologic district with recurring patterns of landforms, soil, and vegetation.
Land Type	Group of neighboring phases within a land type association with similar soil series or families with similar plant communities at the level of Daubenmire's (1968) habitat types (e.g., valley bottom).
Valley Bottom Class	Group of neighboring sites within land types having similar soil properties with closely related habitat types.
Riverine-Riparian Complexes	Repeating units within valley bottom classes that are made up of distinctive groups of riverine and riparian types.
Riverine and Riparian Community Types[1]	Repeating types within riverine and riparian complexes dictated by the location and combination of soils and water.
Riverine Site	What's at that final point (i.e., pool, riffle).
States	Are used to describe functional position within a number of major site environments for a particular piece of ground fixed in space and the cause/effect relationships that determine its position.

Ecological Considerations: Daubenmire concepts of succession, climax, ecological site are incorporated at the complex and community type level.

Use, Testing, Validation: The method has undergone testing and is now being applied in a regional scale to northern Nevada.

Ease of Application: The upper hierarchical data requirements are fairly easy to obtain though the use of existing resource information. The data requirements at the complex and community type level require field data collection similar to that required in most of the Daubenmire procedures. The site information can be as complex as the user wants to make it. The procedure would require personnel from several areas of expertise.

Use in Defining System Response and Potential: System response is a key element and one of the objectives of the procedure.

Use in Determining State of System: The state of the system is inherent in the procedure.

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[1] Riverine and riparian types are two distinct mappable uses, with riverine ecosystems being that within the channel.

Relation to Other Procedures: Vegetation classification followed is consistent with Youngblood et al. (1985). The procedure uses standard landform description, soil taxonomy, moisture regimes, and has flexibility to incorporate many types of attributes.

Automated Data Processing: Not easily converted to a standard ADP system. Would work well in a knowledge based system (expert system), however.

Limitations and Assumptions: The procedure uses such an integration of various hierarchical attributes that major limitations are unlikely. The procedure integrates both the riverine and riparian system as it is viewed in the upper and middle levels of the hierarchical structure.

8. Name: An Ecological Characterization of Rocky Mountain Montane and Subalpine Wetlands.

Authors: John T. Windell, Beatrice E. Willard, David J. Cooper, Susan Q. Foster, Christopher F. Knud-Hansen, Lauranne P. Rink, George N. Kiladis.

Reference: Windell, J., B. Willard, D. Cooper, S. Foster, C. Knud-Hansen, L. Rink, and G. Kiladis. 1986. An ecological characterization of Rocky Mountain montane and subalpine wetlands. National Ecology Center, Division of Wildlife and Contaminant Research, USDI, Fish and Wildlife Service, Washington, DC, Biological Report 86(11). 298 pp.

Objectives: Provide a comprehensive review of Rocky Mountain wetlands. Identify gaps existing in the scientific literature. Provide information for the assessment, planning, and permitting of activities affecting wetlands. Provide an educational source for anyone interested in the ecological functioning and value of high-elevation wetlands. The report also classifies Rocky Mountain wetlands within a system hierarchy that recognizes international wetland terminology, considers duration, depth, velocity of water and frequency of flooding, and variety and concentration of mineral nutrients as the two dominant factors determining pattern of species and communities.

Designed Users: Biologists, ecologists, planners, managers.

Area of Applicability: Rocky Mountains.

Classification Units, Description, and Data:

Classification Units	Description
Water Regime	Highest level of the classification and includes: permanent shallow, standing water; communities with seasonal or permanent high water tables, but without permanent standing waters; communities adjacent to running waters; communities in running water.
Subcategory	Permanent shallow, standing includes: floating, rooted submerged, rooted floating leaved, rooted emergent. Seasonal water regime: herb wetlands, shrub wetlands, forested wetlands, unvegetated. Running water regime: moss, herbaceous, shrub, forested, unvegetated.
Substrate	Mineral or organic.
Water Type	Fresh, saline, minerotrophic, ombrotrophic.
Ecosystem Type	Types listed to conform to international nomenclature: fen, bog, marsh-meadow, saline marsh-meadow, carr, shrub bog, shrub wetland, saline shrub wetland, deciduous angiosperm forest, moss wetlands, herbaceous wetland, shrub wetland, coniferous forest.

Fen	Sedge, grass, or reed-dominated minerotrophic peatlands. The water table is at, or close to, the surface most of the time. Minerotrophic means that the water source has been in contact with mineral soils and provides a much greater supply of nutrients.
Bog	A generalized term for a wetland that develops in a depres sion, such as a lake with poor drainage. Generally character ized by extensive peat deposits, acidic water, floating sedge, heath shrubs, and often the presence of coniferous trees. The water table is usually close to the surface without standing water (except where there are open ponds).
Marsh	A wetland on mineral soils dominated by herbaceous (nonwoody) plants, often developing in shallow ponds or depressions, river margins, tidal areas, and estuaries. Waters are not acid.
Meadow	Refers to herbaceous wetlands on mineral soil and may be synonymous with wet meadow. Generally occur in season ally flooded basins and flats, and soils usually are not wet during the entire growing season.
Carr	Wetlands that occur on organic soil composed of minerotrophic peat, having greater than 25 percent shrubs that may form very dense cover creating thicket, or the overstory may be open. Usually there is abundant water that retards peat decomposition. Willow is common dominant in Rocky Mountain carrs.
Shrub Wetland	Wetlands dominated with shrubs found on either organic or mineral substrate. When on organic substrate with an ombotrophic water source (water source from precipitation which is also the major source of nutrients), they are called a shrub bog. When on organic substrate with a minerotrophic water source, they are considered a carr. When on mineral substrate with a fresh water source, they are called a shrub wetland, with a saline water source, a saline shrub wetland.

Levels below the subcategories are not formally defined, but are assumed to be similar to that of the USFWS (Cowardin et al. 1979) procedure.

Use, Testing, Validation: This procedure was intended to present a broad description of the wetland systems in the Rocky Mountains along with an abundance of supportive information on geology, climate, hydrology, and management. The document provides information into wetland ecology that is considered necessary reading to anyone attempting to describe or manage wetlands.

Ease of Application: The classification system appears fairly easy to apply; however, the entire report format is quite lengthy. The document as a whole is a tremendous characterization effort and would serve as a model for other ecoregions. A document similar to this would provide very helpful assistance to a more detailed classification.

Use in Defining System Response and Potential: The text of the document has a good discussion on system response at some levels but is inconsistent from type to type. The information provided would be useful in defining system response.

Use in Determining State of System: The chapter dealing with ecological process discusses theory and gives practical examples of system state change. The applications are broad, however.

Relation to Other Procedures: The document presents a table that cross-references other classification procedures. The procedure uses internationally recognized terms for wetland. As stated above, this document should be considered necessary reading to anyone attempting to describe or manage wetlands.

Automated Data Processing: The procedure as presented is not well-suited for ADP other than in a knowledge-based system.

Limitations and Assumptions: Classification nomenclature on an international level could be easily incorporated into many other procedures. Many of the concepts are presented throughout the document. The lack of an index makes rapid retrieval of such information difficult. The document does contain a great deal of information that should be reviewed by wetland classifiers and managers in understanding a broad overview of the landscape.

9. Name: Ecosystem Classification Handbook.

Authors: Wendel J. Hann and Mark E. Jensen.

Reference: Hann, W.J., and M.E. Jensen. 1987. Ecosystem classification handbook, Chapter 4 - Ecodata sampling methods. Region I, USDA, Forest Service. Missoula, Montana.

Objectives: The classification handbook is a total effort to integrate data inventory and analysis of terrestrial and riparian habitats and to combine this information into classification. The procedure is a means for the collection, management, and interpretation of data. Just about any taxonomical classification would be served by the ECODATA system.

Designed Users: Land managers and biologists.

Area of Applicability: United States (although system could be used anywhere).

Classification Units, Description, and Data:

The procedure reviewed did not include any typically hierarchical format, although the attributes collected during the inventory, the inventory design and mapping procedures, and the nomenclature all point to a very complete but flexible hierarchical structure. The units below are given in order of typically structured hierarchical procedures. Mapping terms are:

Classification Units	Description
Polygon	A contiguous unit of land which is delineated on a map or aerial photo within a closed boundary. Can contain similar or dissimilar strata.
Stand	A type of polygon which is designed to describe one dominant stratum type within a uniform environmental setting.
Stratum	A vegetation classification category defined at any level of resolution dependent upon classification needs. A vegetation type stratum contains all the land within a defined vegetation type. A community type stratum contains all the land within one particular seral or climax community type.
Complex	Where two or more dissimilar vegetation stratum are in the same stand (polygon) and each makes up greater than 20 percent of the stand area.
Inclusion	Where a dissimilar vegetation stratum comprises less than 10 percent of the stand or polygon area (vegetation).
Range Type	Delineation of major form type riparian and nonriparian (grassland, meadow, perennial forb, sagebrush, browse-mountain shrub, conifer, rock, broadleaf trees, badlands).

Ecosystem	All the land that has potential to produce similar structural life forms and has similar broad environmental characteristics (nonvegetated, conifer, juniper, shrub dominated wetland, grassland/grass-steppe/mountain grass).
Habitat Type	All the land capable of producing similar plant communities at climax. A habitat type name incorporates those plant species which best define the environment (typically two species). Habitat types sometimes are estimated since existing vegetation types may be seral because of disturbance.
Vegetation Type	All the plant communities that are similar with respect to both species type and abundance within all layers. Characterized by minimal variability in plant species composition.
Community Type	All the plant communities in which the dominant and/or indicator species of corresponding layers are similar.
Habitat Phase	A refinement of a habitat type in which additional indicator plant species are used to define a more narrow range of environmental conditions.

Physical Terms

Site Type	All sites possessing similar soil, parent material, slope position, shape, aspect, elevation, and climate.
Parent Material	Specific rock type.
Hydrologic Unit Code	USGS code for basin, sub-basin.
Stream Order	Standard Horton stream order.
Valley Bottom Type	Valley gradient.
Valley Bottom Subtype	Valley form and sideslope.
Stream Classification	Class as defined by Rosgen (1985) A1, B2, etc., including debris, stream size, flow regimen, depositional feature, meander pattern, sinuosity, form, bankfull gradient.

Other miscellaneous measurements include streambank canopy, overhang, streambank cover, bank slope, and undercut.

Use, Testing, Validation: Riparian portion of method is in draft.

Ease of Application: The system is easy to apply and particularly useful with aerial photographs. The system becomes more time consuming as additional field attributes are added. Its ease of application would be dependent on the approach used to interpret the data.

Use in Defining System Response and Potential: The procedure as described does not address system response other than vegetation ecology, although there are many attributes, such as stream type, that could be used in the interpretation of system response. Site potential is inherent in the data storage and analysis system. The attributes collected will allow a more complete estimate of system response.

Use in Determining State of System: The USFS procedure can be used to describe the state of a riparian system, but the inventory would have to be designed to deal with cause and effect relationships that would be useful in determining potential state changes in a riparian system.

Relation to Other Procedures: The USFS procedure does a good job of keeping open to detailed attributes, such as soils information, landforms, and attributes. Standard soil taxonomic classification can be placed into the procedure at the modifier level. The procedure appears to fit into other vegetation classification schemes, such as those done on a regional or provincial level. The ECODATA system appears to be a good data manager that would benefit the analysis of any type of wetland/riparian classification effort.

Automated Data Processing: ADP is inherent in the procedure and includes automated analysis for determining a number of characteristics including community type.

Limitations and Assumptions: The full application of all data attributes in the procedure recognizes nearly all important vegetation, hydrologic, and geomorphic characteristics. Thus it requires a diversified and experienced team to conduct the full application of the data collection described in the document. The procedure appears flexible as it does not tie the user down to any particular taxonomic system, but retains data integrity (with the exception of stream morphology). This allows the user to move into many types of classification systems easily and to provide important additional descriptions.

10. Name: Classification of Wetlands and Deepwater Habitats of the United States.

Authors: Lewis M. Cowardin, Virginia Carter, Francis Golet, and Edward LaRoe.

Reference: Cowardin L.M., V. Carter, F. Golet, and E. LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States, 1979. U.S. Department of the Interior, Fish and Wildlife Service, FWS/OBS-79/31, Washington, DC. 103 pp.

Objectives: The classification is designed for use in a new inventory of wetlands and deepwater habitats and is intended to describe ecological taxa, arrange them in a system useful to resource managers, furnish units for mapping, and provide uniformity of concepts and terms. The system provides hierarchical levels from the broadest (marine, estuarine, riverine, lacustrine, palustrine) to the lowest level, dominance type, which is named for the dominant plant or animal form of the area.

Designed Users: Land managers and biologists.

Area of Applicability: United States (although system could be used anywhere).

Classification Units, Description, and Data:

Classification Units	Description
System	Basic water source/feature (marine, estuarine, riverine, etc.).
Subsystem	Basic water persistence attributes (subtidal, intertidal, lower perennial, upper perennial, etc.).
Class	Gross substrate/vegetation form (rock bottom, aquatic bed, emergent wetland, rocky shore, forested, etc.).
Subclass	Specific substrate/vegetation type (bedrock, sand, mud, needle-leaved evergreen, broad-leaved deciduous, etc.).
Dominance	Dominant plant/animal species (horsetail, black cottonwood, willow, caddisfly, crayfish).
Modifiers	Site specific attributes of soil, regime, water chemistry, and land alteration (salinity, pH, flooding condition, mineral or organic, farmed, diked, etc.).

Use, Testing, Validation: This system is currently in use by many agencies for the general inventory and classification of habitats. It has been used in small and large applications. Products from the classification can give the manager a good overview of the resource.

Ease of Application: The system is easy to apply and particularly useful with aerial photographs. The system becomes more complex as modifiers are added to the description, as with specific hydrology and water chemistry.

Use in Defining System Response and Potential: The USFWS procedure does not consider responsiveness or functional processes.

Use in Determining State of System: The USFWS procedure can be used to describe the state of a riparian system, but is not designed to deal with cause and effect relationships that would be useful in determining potential state changes in a riparian system.

Relation to Other Procedures: The USFWS procedure does a good job of keeping open to more detailed modifiers, such as soils information. Standard soil taxonomic classification can be placed into the procedure at the modifier level. The dominance level is fairly standard as vegetation description goes. Some differences between other procedures can be expected in the delineation between overstory, dominance density, etc. The procedure appears to fit into other vegetation classification schemes, such as those done on a regional or provincial level. Overall, the procedure recognizes the difference between fluvial surfaces and major vegetation forms at a level that makes it reasonably easy to merge with classification procedures for other considerations, such as geology, climate, landforms, etc.

Automated Data Processing: ADP was not discussed in the procedure. Since all but the lower hierarchy are defined (5 system names, 8 subsystem names, 11 class names, and 28 subclass names), most of a classification could be standardized and used in ADP very easily. When more detail is demanded from the dominance and modifier description, ADP applications will be more complex.

Limitations and Assumptions: The procedure is not designed to reflect potential natural communities or community ecology. However, a detailed classification using some of the other procedures discussed above could provide information fitting the protocol of this procedure.

11. Name: Riparian Community Type Classification of Eastern Idaho-Western Wyoming.

Authors: Andrew P. Youngblood, Wayne G. Padgett, and Alma H. Winward.

Reference: Youngblood, A.P., W.G. Padgett, and A.H. Winward. 1985. Riparian community type classification of eastern Idaho-western Wyoming. USDA Forest Service, Intermountain Region, R4-Ecol-85-01. 78 pp.

Objectives: To contribute to the broad regional classification program of the USDA Forest Service by developing a riparian community type classification for eastern Idaho and western Wyoming. To describe the general geographic, topographic, edaphic, and floristic features of each community type. To describe the successional trends for each community type, where possible. To present information on resource values and management opportunities for each community type.

Designed Users: Land managers and biologists.

Area of Applicability: Eastern Idaho, western Wyoming (although system could be used anywhere).

Classification Units, Description, and Data:

Classification Units	Description
Canopy Cover	The area covered by the generalized outline of an individual plant's foliage, or collectively covered by all individuals of a species within a stand or sample area. Canopy cover percentages are a determining factor in distinguishing community types, the basic unit of this taxonomical system as described in Daubenmire (1968).
Soils	Soils were classified to the family level using standard pedon description methods (USDA-SCS 1975). Available water capacity (inches of water/inches of soil) was estimated for the top 50 cm (20 inches) using guidelines developed by the U.S. Department of Agriculture, Soil Conservation Service (1983). A general characterization of geologic materials was determined from geologic maps.
Community Type	An aggregation of all plant communities distinguished by floristic and structural similarities in both overstory and undergrowth layers.

Use, Testing, Validation: Document serves as a test and validation. The procedure, or a similar representation, is used by a number of U.S. Forest Service offices.

Ease of Application: The field data requires a number of statistical procedures to analyze canopy data. However, the application is straightforward and should not be difficult for experienced biologists. Developing relationships among adjacent riparian community types and upland vegetation requires experience.

Use in Defining System Response and Potential: The document recognizes the utility of classification to wildlife, livestock, and fire effects and the aid such a classification provides to many areas of management. The procedure or document does not identify potential natural communities; however, reference is made to a stable community. Stable refers to the condition of little or no perceived change in plant communities that are in relative equilibrium with existing environmental conditions. Stability describes persistent, but not necessarily culminating, stages (climax) of plant community succession.

Use in Determining State of System: The description provided by the procedure included a discussion of succession and management. A general discussion of possible successional pathways are given. The physical information on soils and geology would be helpful in determining the state of the system, but more information on geomorphology would be needed for a complete discussion.

Relation to Other Procedures: This procedure relates well to other taxonomical procedures reviewed and uses standard soil taxonomy and Daubenmire community ecological principles. This document provides one of the first efforts in describing riparian community ecology and the interrelationship with soil and water. Many of the community types described in this document have been recognized elsewhere. This document should be reviewed by anyone new to riparian classification.

Automated Data Processing: ADP is inherent in carrying out the procedure.

Limitations and Assumptions: The procedure recognizes that there are stable communities and provides estimates of successional pathways. This approach would need to be continued to derive the largest benefit to management.