



Determining Service Areas for In-Lieu Fee Programs

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Service Area Determination

- Rule
- Current Approaches
- Problems and Issues in Service Area Definition

The Problem

- On-site/off-site debate: “Knowing the impact site, where (and what) should the compensation be?”
- ILFs/Banks may invert the problem: “Knowing the compensation site, where can the impacts be?”
- How do we answer this in advance, for a single compensation site (or all future compensation sites)?

Mitigation Rule

Service Area Definition

“...the geographic area within which impacts can be mitigated at a specific mitigation bank or an in-lieu fee program...”

(33 CFR 332.2)

Mitigation Rule

Draft Instrument Requirements

- **Description:**

“The service area is the watershed, ecoregion, physiographic province, and/or other geographic area within which the mitigation bank or in-lieu fee program is authorized to provide compensatory mitigation...”

- **Scale:**

“...must be appropriately sized to ensure that ...will effectively compensate for adverse environmental impacts across the entire service area.”

- **Another Consideration:**

“...Economic viability of the mitigation bank or ILF program may also be considered in determining the size of the service areas.”

(33 CFR 332.8(d)(6)(ii)(A))

More Considerations from the Mitigation Rule

- “Delineation of service area must also consider any locally-developed standards and criteria that may be applicable.”
- ***Examples of Scale:***
 - In urban areas, a U.S. Geological Survey 8-digit hydrologic unit code (HUC) watershed or a smaller watershed may be an appropriate service area.
 - In rural areas, several contiguous 8-digit HUCs or a 6-digit HUC watershed may be an appropriate service area.

(33 CFR 332.8(d)(6)(ii)(A))

And More Considerations in Mitigation Rule

- ***Where no clear watershed boundary?***

“...where watershed boundaries do not exist, such as marine areas...appropriate spatial scale should be used to replace lost functions and services with the same ecological system (e.g., reef complex, littoral drift cell).”

(33 CFR 332.3(c)(2)(v))

- ***Replacement in Coastal Watersheds?***

“Compensation...in coastal watersheds... located in a coastal watershed where practicable”

(33 CFR 332.3(b)(1))

- ***Documentation:***

“The basis for determining the service area must be documented in writing and referenced in the mitigation banking instrument.”

(33 CFR 332.8(d)(6)(ii)(A))

What is not addressed by these definitions?

- “Watershed” & “geographic area” have no set scale.
- HUCs, gov’t boundaries, ecoregion boundaries can be very large or very small, unrelated to aquatic resources.
- Moving Functions
- Economics: viability & spatial monopoly.
- Corps/IRT have discretion in these areas

Approaches

- 1) Watersheds (or Hydrologic Units)
- 2) Ecoregions
- 3) Landforms
- 4) Ecological distribution
- 5) Administrative/Gov't Boundaries
- 6) Combination
- 7) Primary & Secondary

Why Watersheds?

Generally water quantity and quality at a point on a stream reflects the aggregate of conditions up gradient from that point

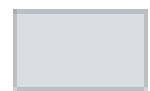
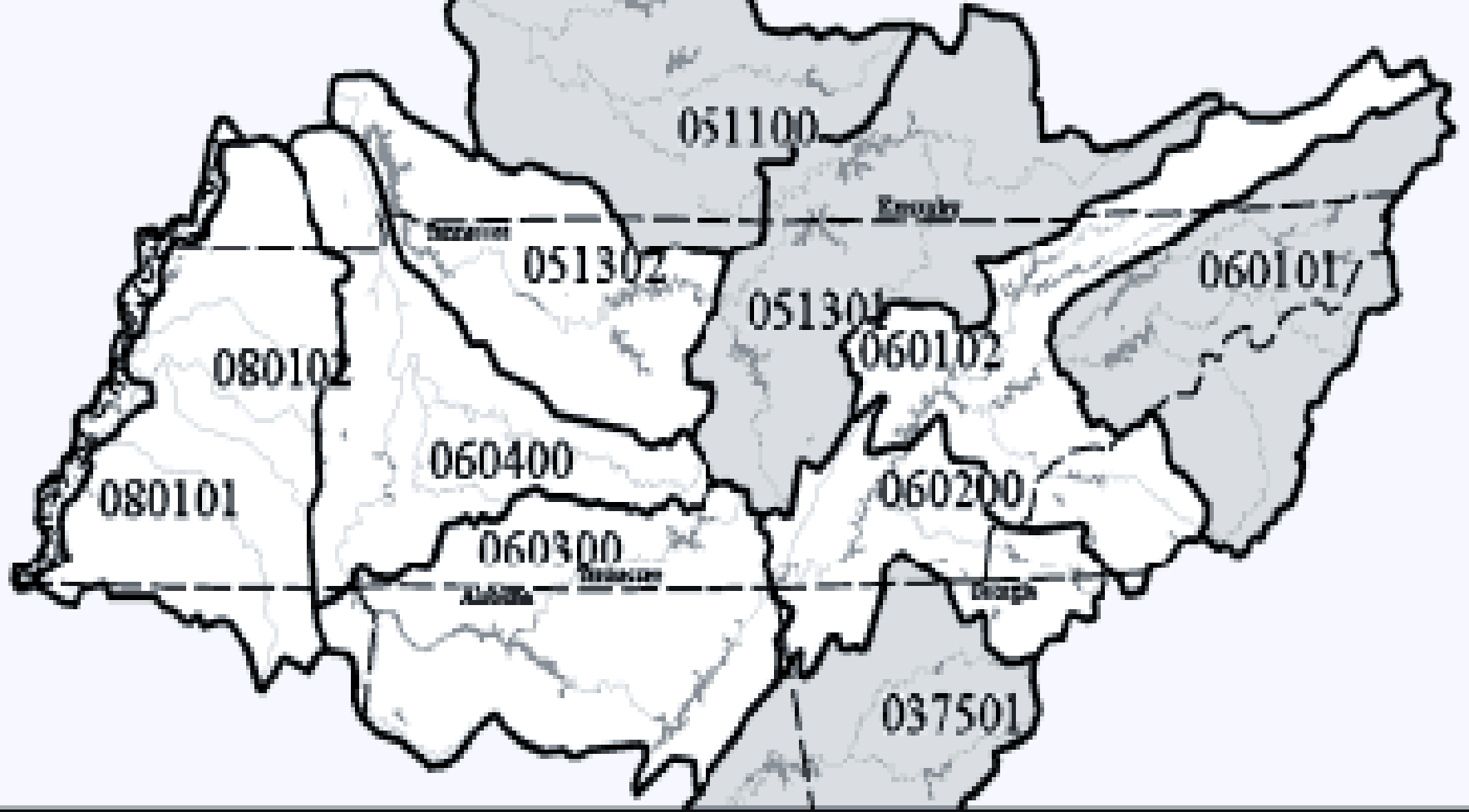
-- thus suitable for spatially organizing ecosystem management or water quality management

[from: <http://www.epa.gov/bioiweb1/html/ecoregions.html>]

Watershed

- "...a land area that drains to a common waterway, such as a stream, lake, estuary, wetland, or ultimately the ocean."

33 CFR 332.2 Definitions



True watershed



Hydrologic units



Major streams

051302 Accounting unit code



(source: Omernik and Bailey, 1997, J. Amer Water Resources Assoc)

HUC Hierarchy

Source: USGS, USDA, NRCS, 2009, Federal guidelines, requirements, and procedures for the national Watershed Boundary Dataset: USGS Techniques and Methods 11-A3, 55 p.

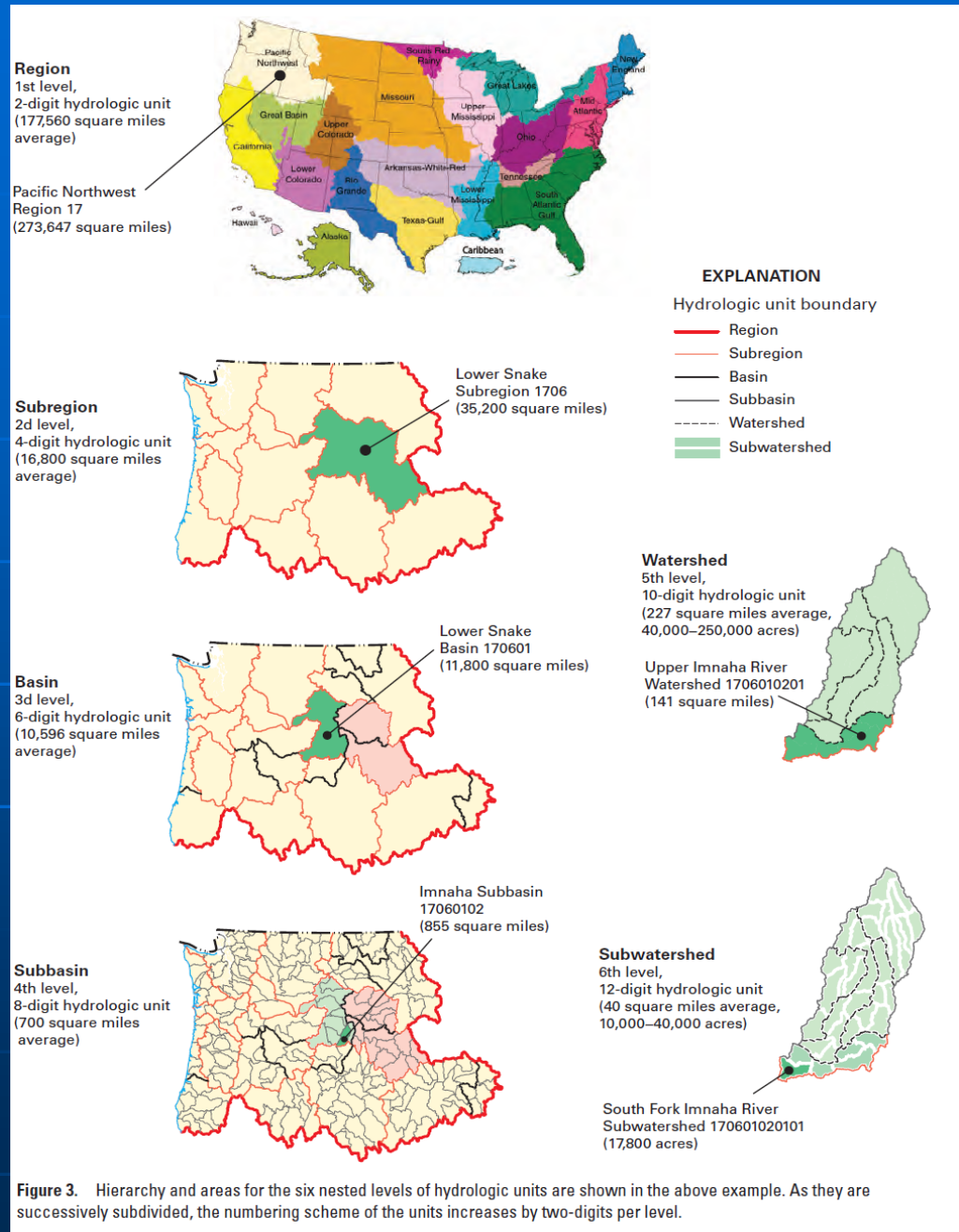
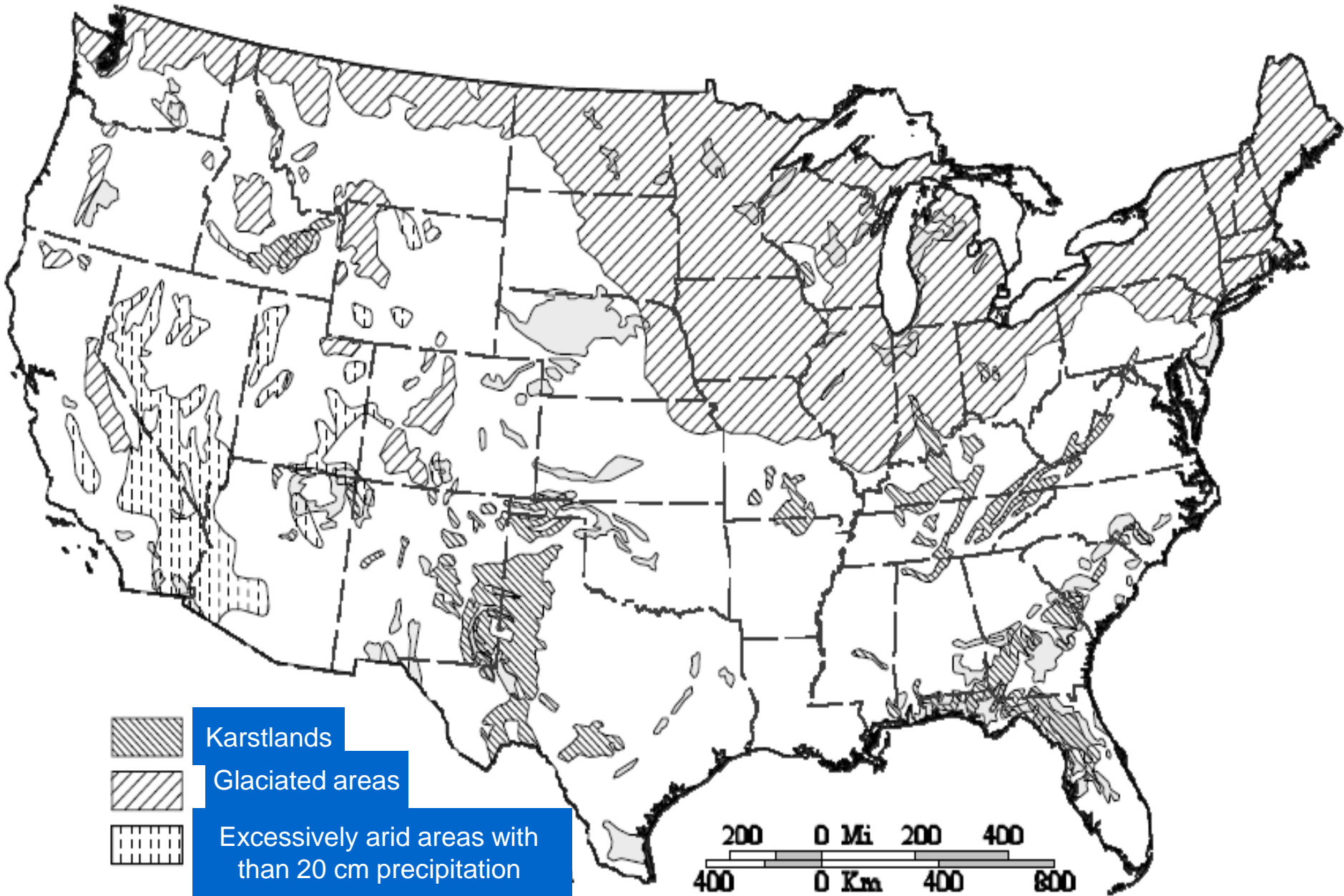


Figure 3. Hierarchy and areas for the six nested levels of hydrologic units are shown in the above example. As they are successively subdivided, the numbering scheme of the units increases by two-digits per level.

Problems with watershed basis - Reasons for Other Approaches?

1. Many geographic areas with aggregate character seldom if ever correspond to patterns in topographic watersheds.
2. Many xeric regions, streams feed groundwater and are not integrators as in mesic/hydric areas.
3. In many areas, watersheds are difficult to define



(source: Omernik & Bailey, 1997, J. Amer Water Resources Assoc)

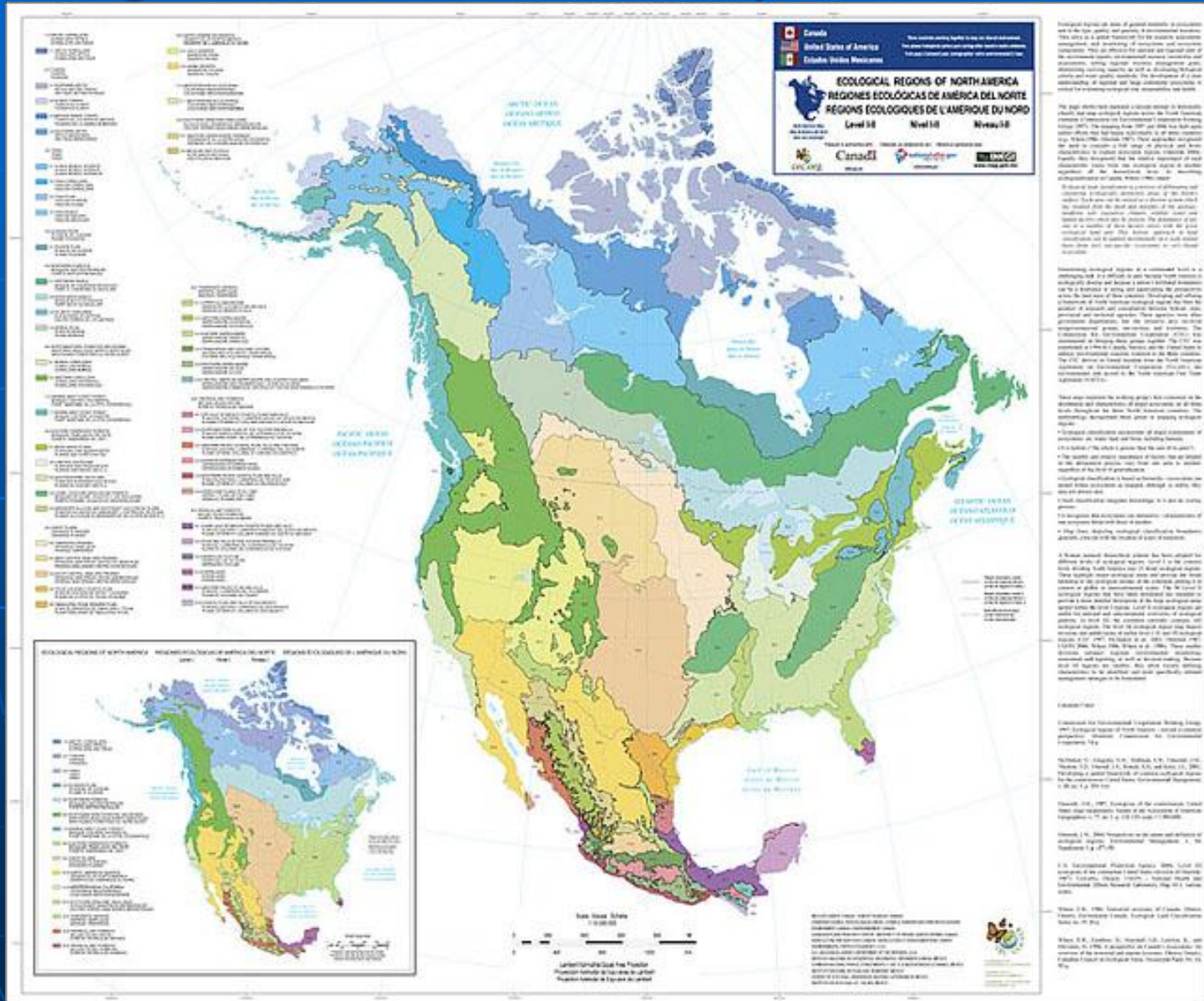
Why Ecoregions?

Intended to provide a spatial framework for ecosystem assessment, research, inventory, monitoring, and management

-- delimit large areas within which local ecosystems reoccur more or less throughout region in predictable patterns

[from: <http://www.epa.gov/bioiweb1/html/ecoregions.html>]

Ecoregions: Omernik (Levels 1 & II)



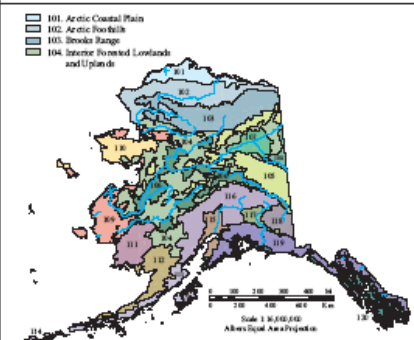
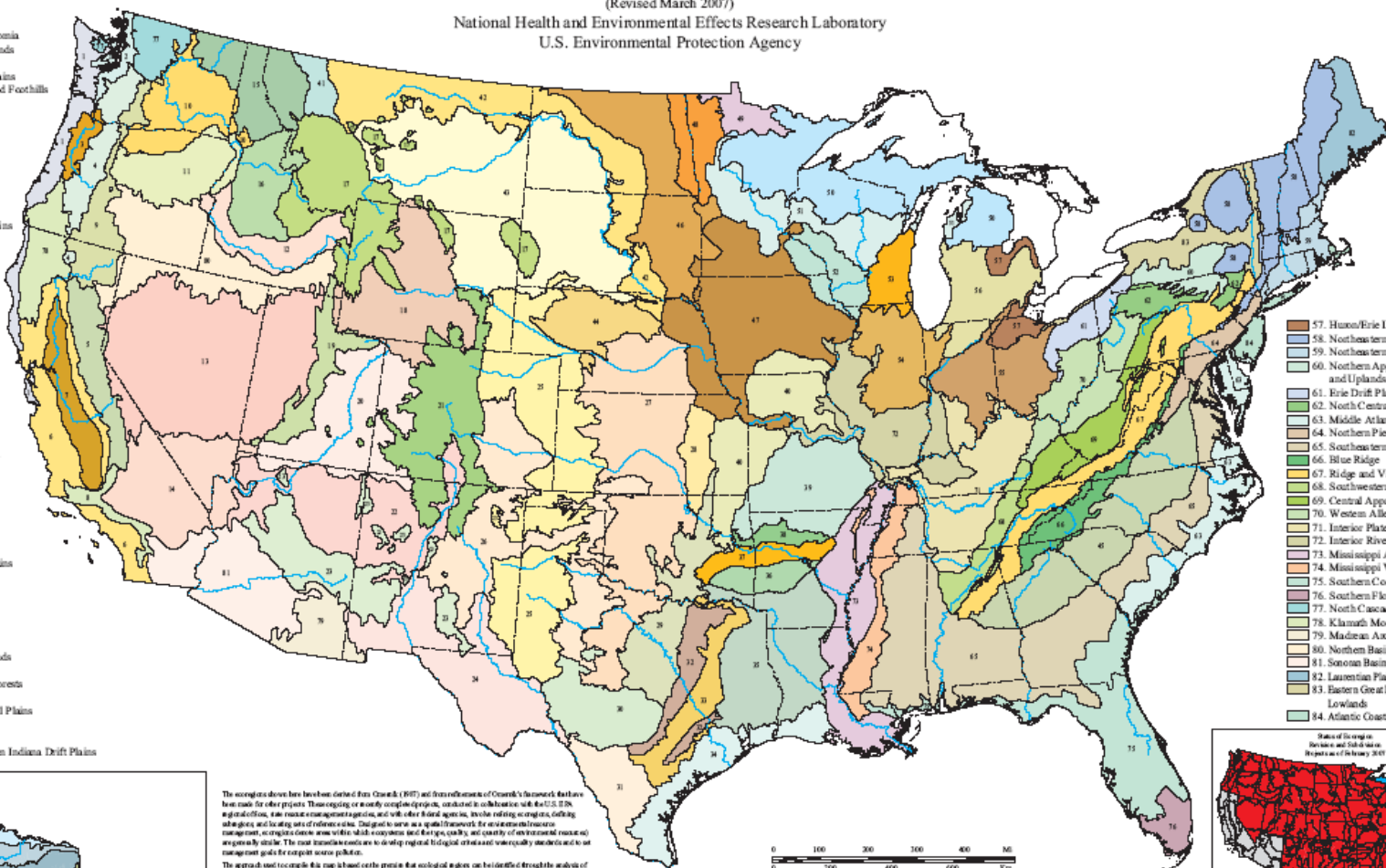
Level III Ecoregions of the Continental United States

(Revised March 2007)

National Health and Environmental Effects Research Laboratory
U.S. Environmental Protection Agency

- 1. Coast Range
- 2. Puget Lowland
- 3. Willamette Valley
- 4. Cascades
- 5. Sierra Nevada
- 6. Southern and Central California Chaparral and Oak Woodlands
- 7. Central California Valley
- 8. Southern California Mountains
- 9. Eastern Cascades Slopes and Foothills
- 10. Columbia Plateau
- 11. Blue Mountains
- 12. Snake River Plain
- 13. Central Basin and Range
- 14. Mojave Basin and Range
- 15. Northern Rockies
- 16. Idaho Batholith
- 17. Middle Rockies
- 18. Wyoming Basin
- 19. Wausatch and Uinta Mountains
- 20. Colorado Plateau
- 21. Southern Rockies
- 22. Arizona/New Mexico Plateau
- 23. Arizona/New Mexico Mountains
- 24. Chihuahuan Deserts
- 25. High Plains
- 26. Southwestern Tablelands
- 27. Central Great Plains
- 28. Flint Hills
- 29. Cross Timbers
- 30. Edwards Plateau
- 31. Southern Texas Plains
- 32. Texas Hillland Prairies
- 33. East Central Texas Plains
- 34. Western Gulf Coastal Plain
- 35. South Central Plains
- 36. Ouachita Mountains
- 37. Arkansas Valley
- 38. Boston Mountains
- 39. Ozark Highlands
- 40. Central Irregular Plains
- 41. Canadian Rockies
- 42. Northwestern Glaciated Plains
- 43. Northwestern Great Plains
- 44. Nebraska Sand Hills
- 45. Piedmont
- 46. Northern Glaciated Plains
- 47. Western Corn Belt Plains
- 48. Lake Agassiz Plain
- 49. Northern Minnesota Wetlands
- 50. Northern Lakes and Forests
- 51. North Central Hardwood Forests
- 52. Driftless Area
- 53. Southeastern Wisconsin Till Plains
- 54. Central Corn Belt Plains
- 55. Eastern Corn Belt Plains
- 56. Southern Michigan/Northern Indiana Drift Plains

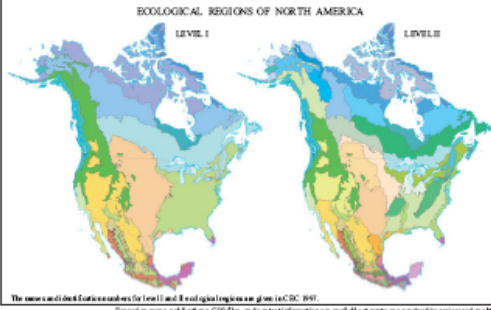
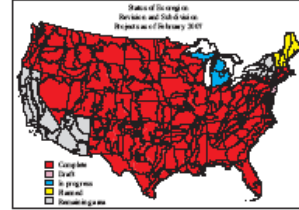
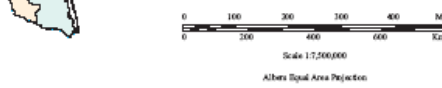
- 57. Huron/Erie Lake Plains
- 58. Northeastern Highlands
- 59. Northeastern Coastal Zone
- 60. Northern Appalachian Plateau and Uplands
- 61. Erie Drift Plain
- 62. North Central Appalachians
- 63. Middle Atlantic Coastal Plain
- 64. Northern Piedmont
- 65. Southeastern Plains
- 66. Blue Ridge
- 67. Ridge and Valley
- 68. Southwestern Appalachians
- 69. Central Appalachians
- 70. Western Allegheny Plateau
- 71. Interior Plateau
- 72. Interior River Valleys and Hills
- 73. Mississippi Alluvial Plain
- 74. Mississippi Valley Loess Plains
- 75. Southern Coastal Plain
- 76. Southern Florida Coastal Plain
- 77. North Cascades
- 78. Klamath Mountains
- 79. Madras Archipelago
- 80. Northern Basin and Range
- 81. Sonoran Basin and Range
- 82. Laurentian Plains and Hills
- 83. Eastern Great Lakes and Hudson Lowlands
- 84. Atlantic Coastal Pine Barrens



- 101. Arctic Coastal Plain
- 102. Arctic Foothills
- 103. Brooks Range
- 104. Interior Forested Lowlands and Uplands
- 105. Interior Highlands
- 106. Interior Borealwoods
- 107. Yukon Flats
- 108. Ogilvie Mountains
- 109. Subarctic Coastal Plains
- 110. Sonoran Pinyons
- 111. Alaskan and Yukon Mountains
- 112. Bristol Bay-Nalaeq-Lowlands
- 113. Aleutian Peninsula Mountains
- 114. Aleutian Islands (Western portion not shown)
- 115. Cook Inlet
- 116. Aleutian Range
- 117. Copper Plateaus
- 118. Wrangell Mountains
- 119. Pacific Coastal Mountains
- 120. Central Western Heterodry-Shika

The ecoregion level has been derived from Omernik (1987) and further refinement of Omernik's framework further has been made for other projects. These ongoing or nearly complete projects, conducted in collaboration with the U.S. EPA regional offices, are resource management agencies, and with other federal agencies, involve defining ecoregions, defining subregions and locating sets of reference sites. Designed to serve as a spatial framework for resource management, resource mapping, resource monitoring, and resource planning, and quality of environmental resources are equally stable. The most immediate uses are to develop regional biological criteria and water quality standards and to management goals for complex watersheds. The approach used to create this map is based on the premise that ecological regions can be identified through the analysis of patterns and the recognition of biotic and abiotic processes that affect a first 4 dimensions: ecosystem quality and integrity (Maret 1986; Omernik 1987, 1995). These phenomena include geology, physiography, vegetation, climate, soil type, and hydrology. The relationships are based on climatic, soil, and hydrological data from one ecological region to another at the hierarchical level. Because of possible confusion with other meanings of terms for different levels of ecological regions, a Roman numeral level has been added to the Level III. Level III is the coarsest level, dividing North America into ecological regions, whereas Level II is the intermediate level, and Level I is the finest level, dividing the hierarchical level down to the map. For portions of the United States, the map level is the same as the hierarchical level. The map level is the same as the hierarchical level. The map level is the same as the hierarchical level. The map level is the same as the hierarchical level.

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Ecoregions

An Issue

What about boundaries??

- Boundaries are not as precise as mapped
- Boundaries are represented as lines
- Some smooth while others are crenulated

“ecoregion boundaries are areas, rather than lines where the predominant characteristics of one region meet the predominant characteristics of another”

Omernik, 2004. Perspectives on the Nature and Definition of Ecological Regions. Environmental Management Vol 34.

Use of Ecoregions

- In 8 cases, ecoregions **may** be used with HUCs as a factor in defining service areas:
 - Charleston
 - Fort Worth
 - Jacksonville
 - Savannah
 - Detroit
 - Galveston
 - Portland
 - Wilmington
- In at least 3 of these cases, ecoregions are used to delineate a secondary & tertiary service area
 - Charleston
 - Fort Worth
 - Galveston
- Other districts are updating their approaches

Source: Greg DeYoung, Westervelt Ecological Services, at National Mitigation and Ecosystem Banking Conference, May 2011

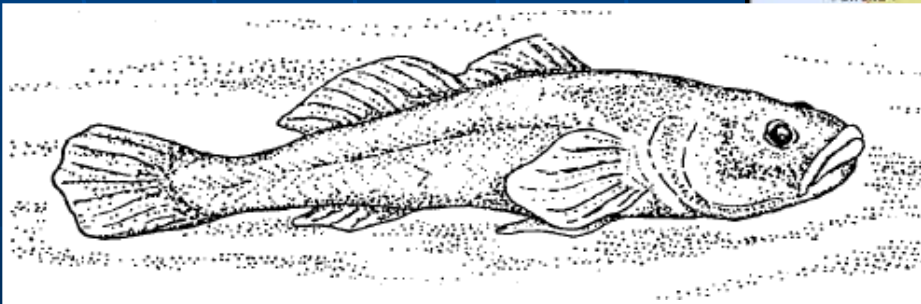
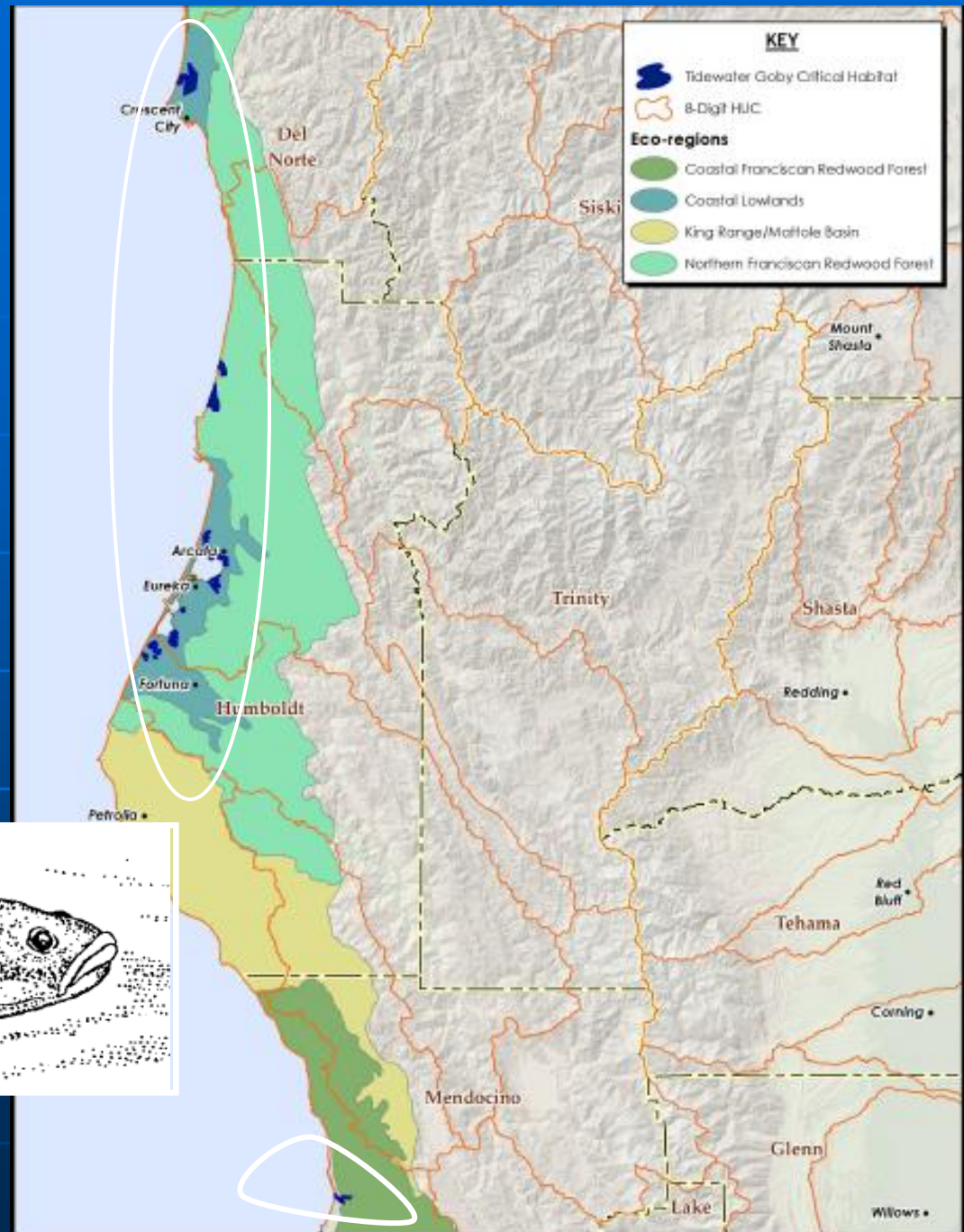
When Districts Use Ecoregions (Thoughts from a Banker*)

- High ecological variation exists within HUC, e.g., mountains and/or coasts
- Endangered Species are a key compensation need
- HUC-8 is small and in a weak market
- Water quality & detention addressed by BMPs

* Source: Greg DeYoung, Westervelt Ecological Services, National Mitigation and Ecosystem Banking Conference, 2011

Other Physical Regions:

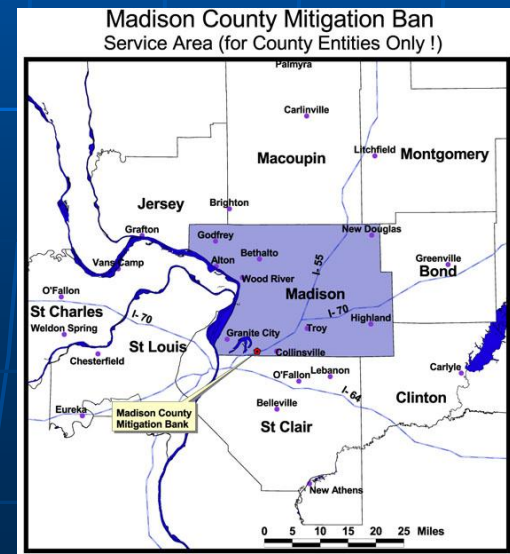
Coastal Example



*Courtesy: Greg DeYoung, 2011,
Westervelt Ecological Services*

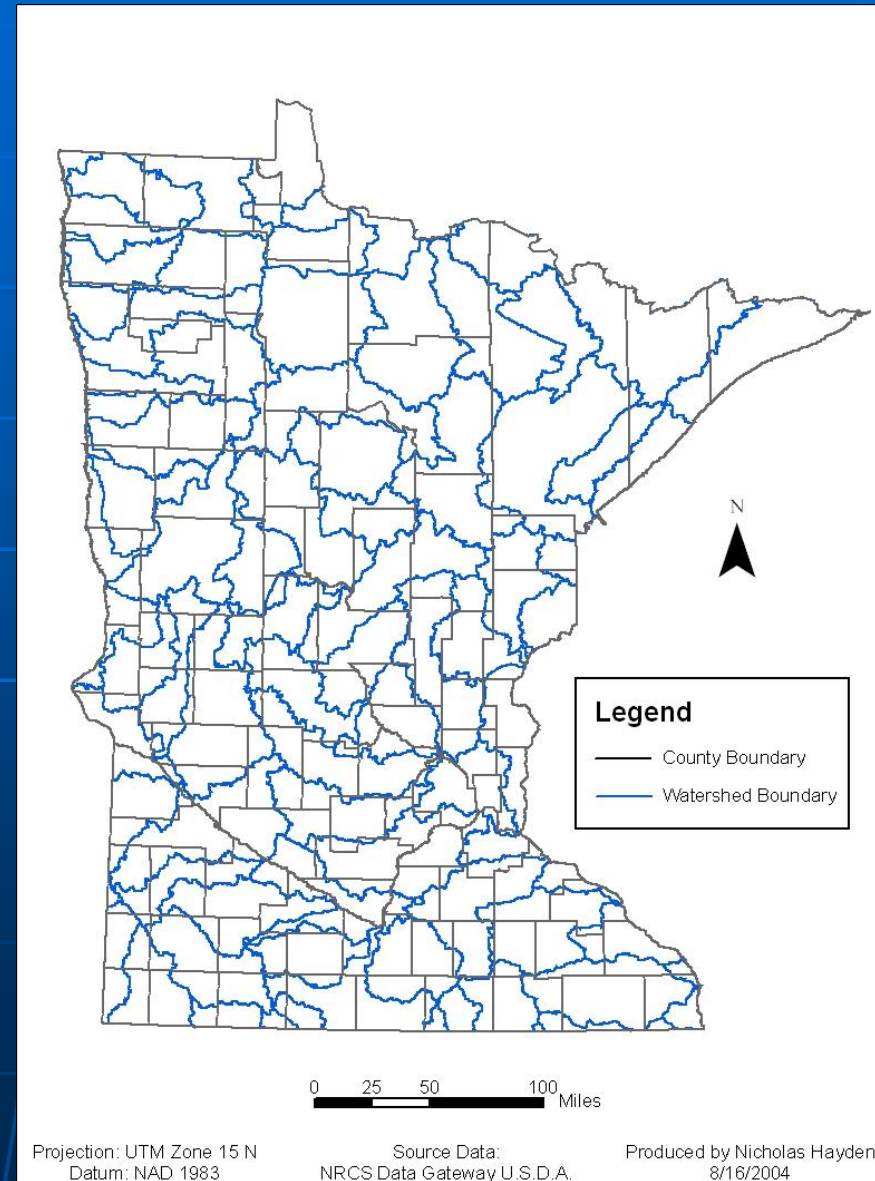
Administrative Boundaries

For IDOT impacts regulated by the Illinois Wetlands Protection Act, the service areas are IDOT Regions.



Combination Service Area

In Minnesota, the Minnesota Wetland Conservation Act requires that impacts be compensated in the same County or Watershed.



ILF Approaches to Service Areas

River Basin & HUCs:

Virginia Aquatic Resources Trust Fund

Arizona Dept of Game & Fish (HUC-4)

North Carolina Ecosystem Enhancement Program

Oregon Department of State Lands (HUC-6 & HUC-8)

New Hampshire ILF (HUC-8)

Vermont ILF (HUC-6)

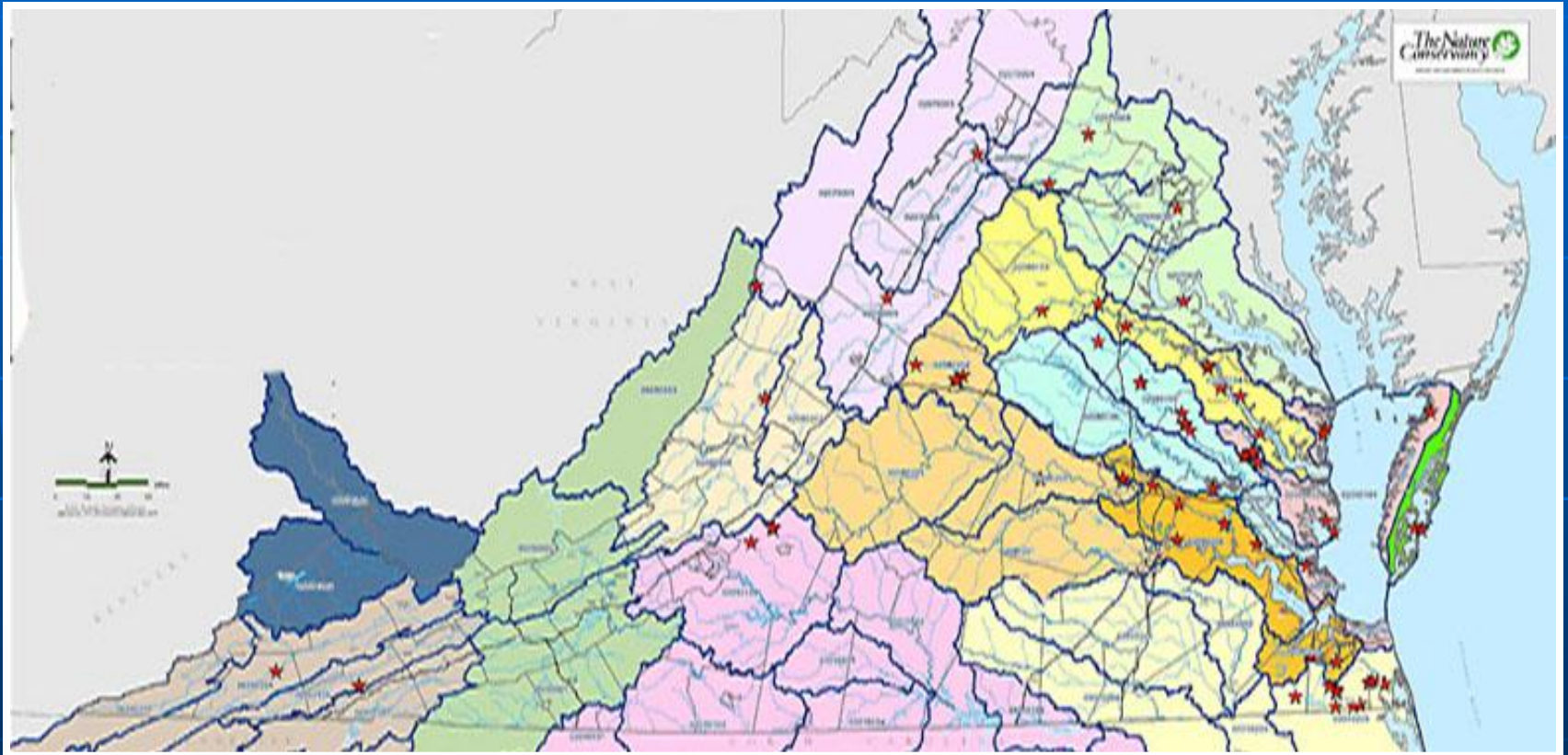
Other:

Florida Keys Environmental Restoration Fund

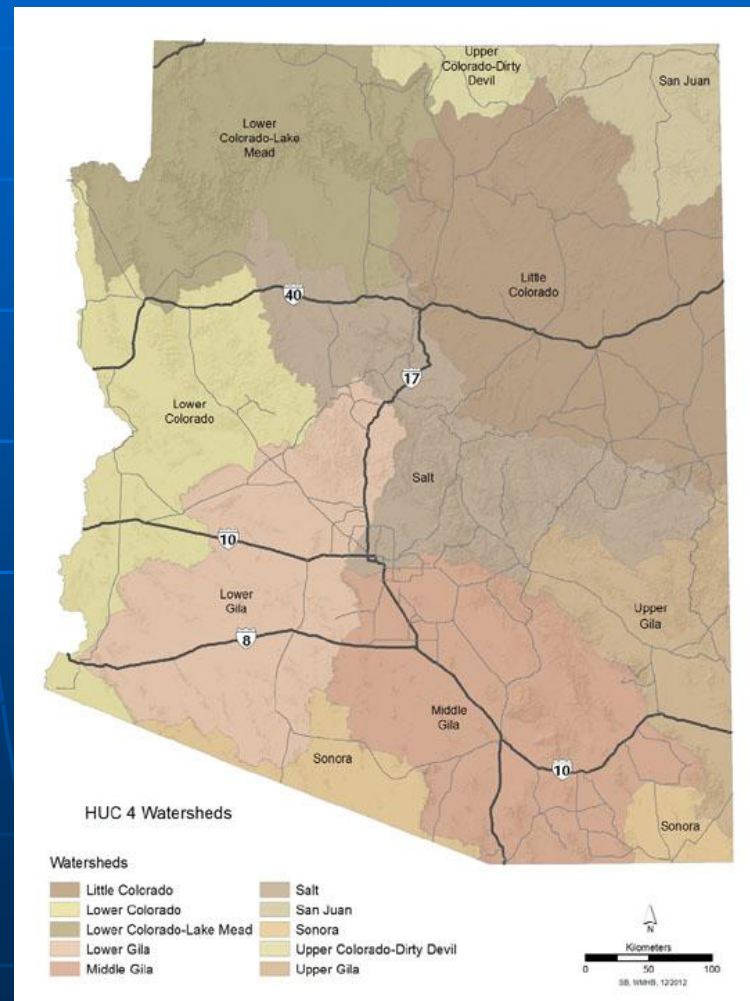
Maine Natural Resources Conservation Program

La Paz Co ILF

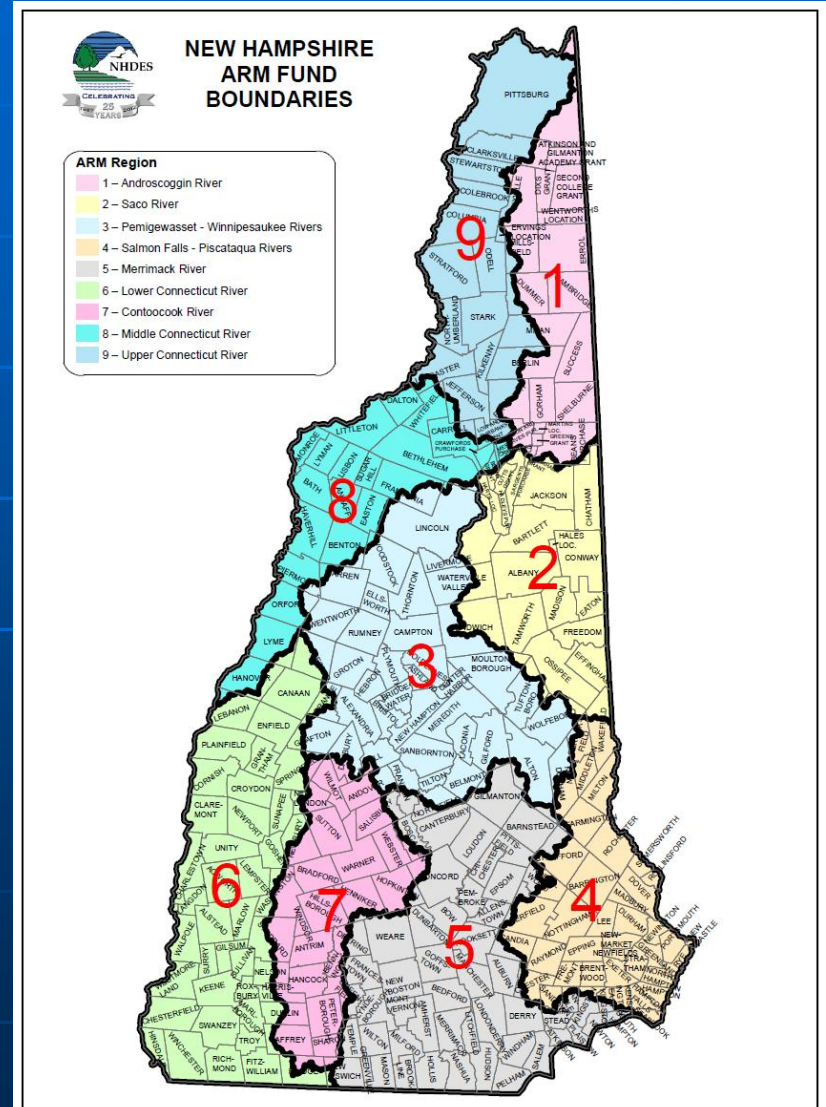
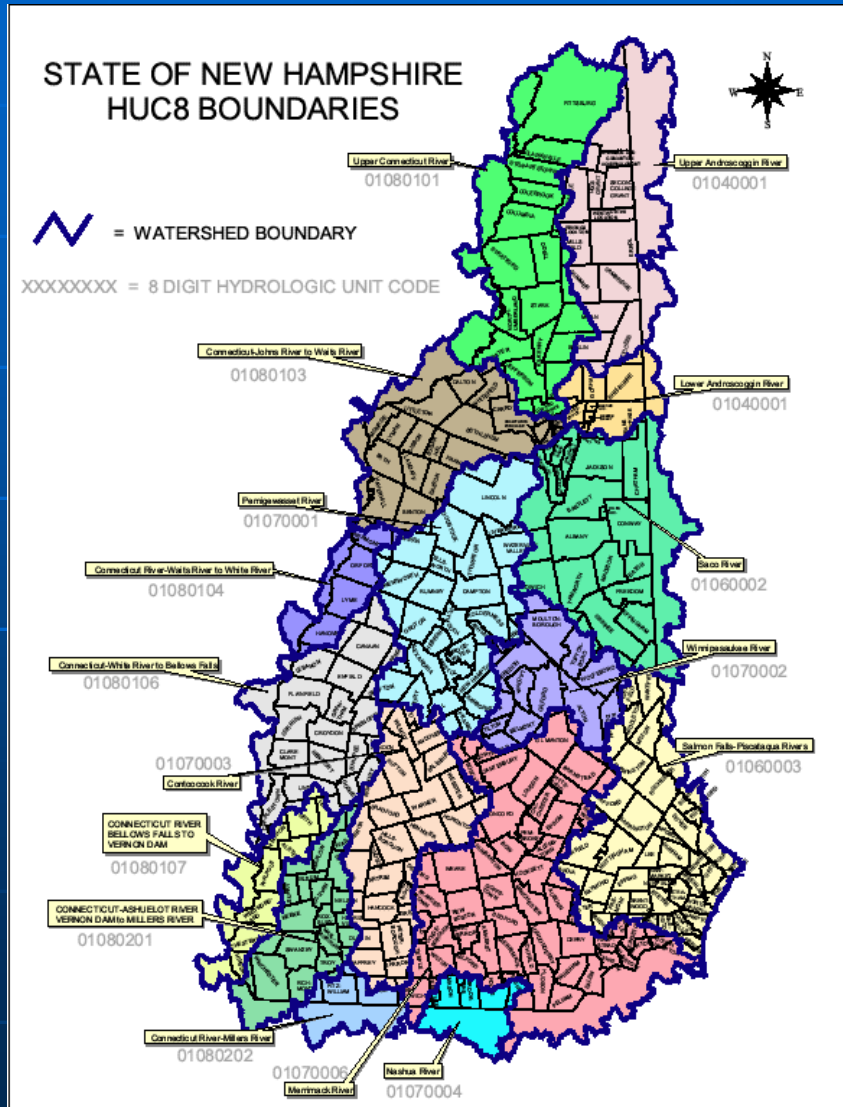
Service Areas: VA Aquatic Resources Trust Fund



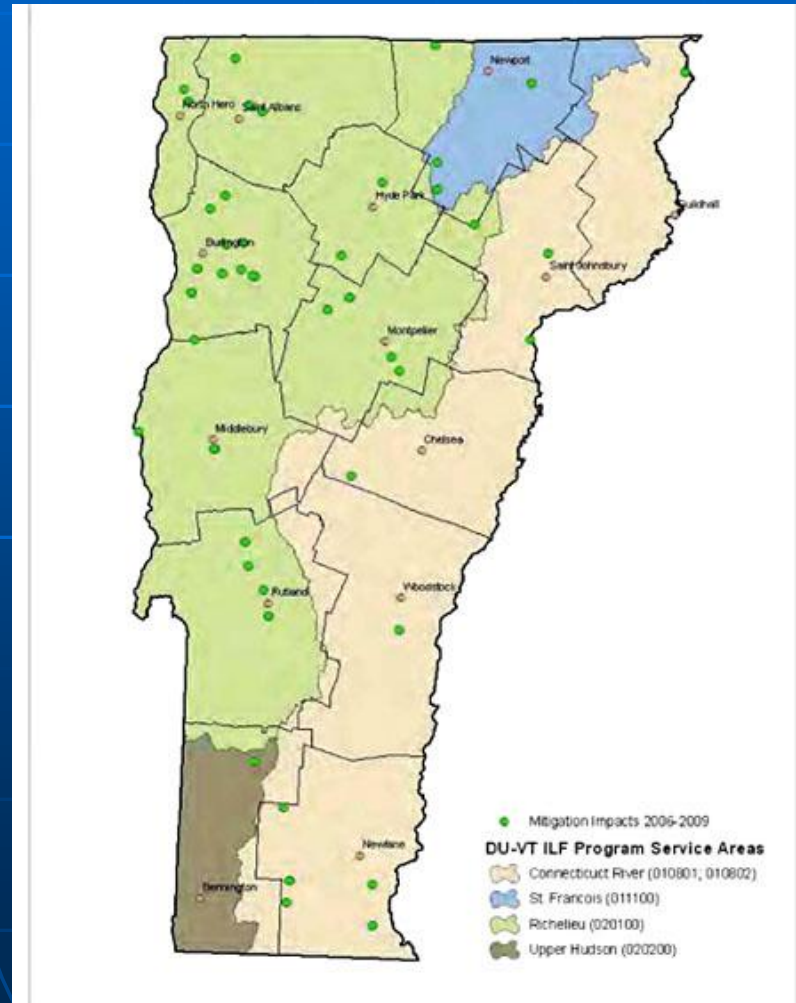
Service Areas: Arizona Department of Fish and Game



Service Areas: New Hampshire In-Lieu Fee Program



Service Areas: Vermont In-Lieu Fee Program



Service Areas: Florida Keys Restoration Fund

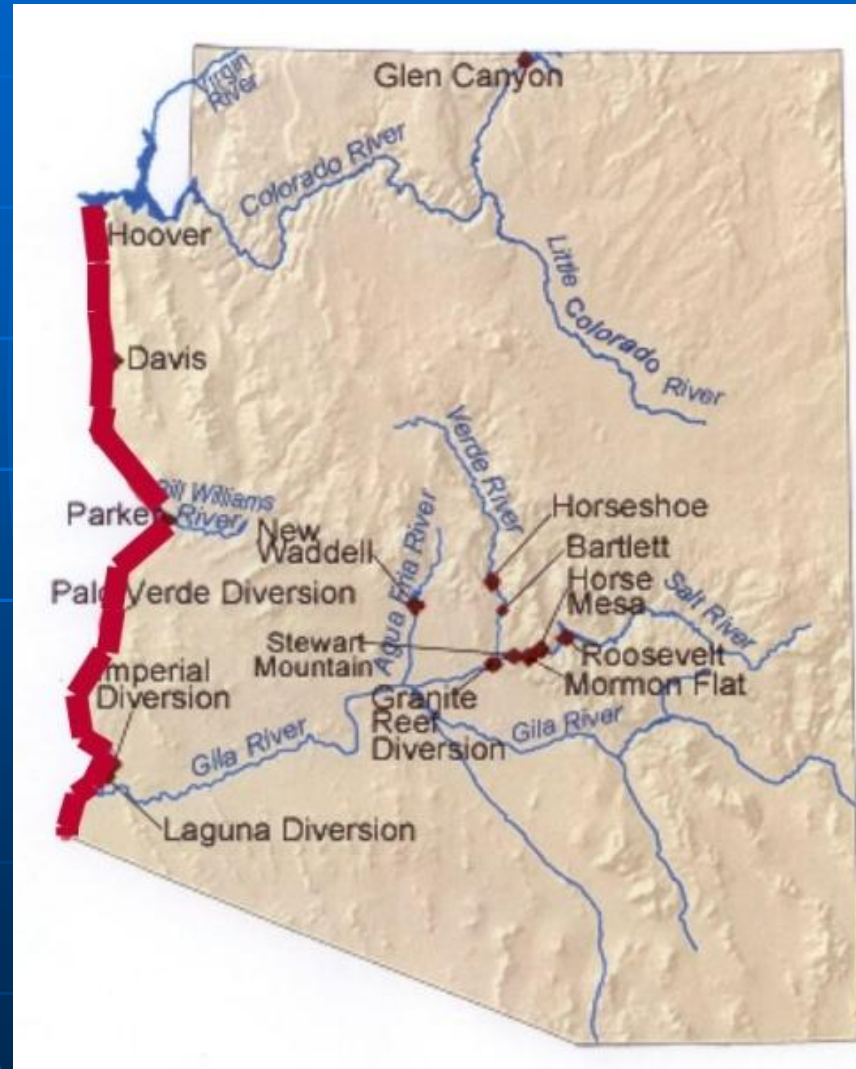


Service Areas: Maine Natural Resource Conservation Program

Ecoregions



Service Areas: La Paz County ILF



Is there a most typical service area??

25 of 38 Corps Districts -
HUC-8s or HUC-8s in
combination with other...

(source: Womble & Doyle, 2010)

Questions?