Key to Aquatic Ecological Systems

Northwestern Great Plains Ecoregion
   2) Stream 1st-2nd order or <30 miles long **3**
   2) Stream 3rd-5th order or >30 and <100 miles long .... **NWGP Prairie Stream**
   2) River >5th order or >100 miles long .... **NWGP Medium Prairie River**
   2) River >5th order and >200 miles long and a direct tributary to the Yellowstone or Missouri River (Little Missouri, Tongue, Bighorn and Powder Rivers) .... **NWGP Large Prairie River**
   2) Yellowstone River downstream from Billings or Missouri River downstream from Great Falls ....
   .... **NWGP Large Valley River**

   3) Perennial 1st or 2nd order stream above 1000 meters elevation in the Wolf Mountains, Powder River Basin or Missouri Breaks .... **NWGP Perennial Spring**
   3) Small (<100 m^2 in area), low gradient intermittent pools separated by long breaks of dry stream bed, typically lacks downstream connectivity to a large mainstem river .... **NWGP Intermittent Stream**

Northern Glaciated Plains Ecoregion
   4) Stream 1st-2nd order or <30 miles long .... **NGP Intermittent Stream**
   4) Stream 3rd-5th order or >30 and <100 miles long .... **NGP Prairie Stream**
   4) River >5th order or >100 miles long .... **NGP Medium Prairie River**
   4) River >5th order and >200 miles long and a direct tributary to the Missouri River (Milk or Marias Rivers) ....
   .... **NGP Large Prairie River**
   4) The Missouri River downstream from Great Falls .... **NGP Large Valley River**

Foothills & Valleys Ecoregion
   5) 1st order, origin from Valley Foor groundwater output .... **Spring Creek**
   5) 1st-2nd order or <30 miles long .... **Headwaters Foothills River**
   5) 3rd-4th order or >30 and <60 miles long **6**
   5) 4th-5th order, >60 miles long and a direct tributary to the Yellowstone or Missouri River ....
   .... **Intermountain Transitional River**
   5) The Yellowstone River from Gardiner downstream to Billings or the Missouri River downstream from Three Forks to Great Falls .... **Mainstem Intermountain Transitional River**

   6) Tributaries to transitional streams that become too warm for coldwater fisheries ....
   .... **Small Transitional Foothills River**
   6) Tributaries to intermountain transitional rivers that maintain coldwater fisheries .... **Small Foothills River**

Middle Rockies and Isolated Mountain Ranges Ecoregion
   7) 1st-2nd order or <15 miles long **8**
   7) 3rd-4th order or >15 and <60 mileslong .... **Mountain Stream**
   7) 5th order or >60 miles long and a direct tributary of the *Intermountain Transitional River* ....
   .... **Small Transitional Foothills River**

   8) 1st or 2nd order, elevation >2400 meters, hydrology driven by alpine snowmelt .... **Alpine Stream**
   8) 1st order, elevation from 1500 to 2400 meters, hydrology driven by ground water discharge ....
   .... **Mountain Spring Stream**

Key to Detailed Aquatic Classification Levels

Northwestern Great Plains (NWGP) and Northern Glaciated Plains (NGP) Ecoregions

Any large, medium prairie river or smaller prairie stream that are within 10, 5 or 1 river miles respectively, from a confluence with a larger river (at least 2 stream orders) contain a biological community that is significantly effected by this large river connectivity and should be coded with a "c" after the code, denoting a confluence ecosystem.

Key to Large Valley and Large Prairie Rivers

1) A reach with most macrohabitats present, especially riffles/gravel runs (other macrohabitats typically present include side channels, pools, woody debris / undercut banks):
- Missouri River .... **Large Valley River – Optimal Habitat (A001a)**
- Yellowstone River .... **Large Valley River – Optimal Habitat (A002a)**
- Little Missouri River, Powder River, Lower Bighorn or Tongue River .... **NWGP Large Prairie River – Optimal Habitat (A003a)**
- Marias or Milk River .... **NGP LargePrairie River – Optimal Habitat (A004a)**

1) A reach without riffles and/or gravel, may contain the other macrohabitats:
- Missouri River .... **Large Valley River – Sub-Optimal Habitat (A001b)**
- Yellowstone River .... **Large Valley River – Sub-Optimal Habitat (A002b)**
- Little Missouri River, Powder River, Lower Bighorn or Tongue River .... **NWGP Large Prairie River – Sub-Optimal Habitat (A003b)**
- Marias or Milk River .... **NGP Large Prairie River – Sub-Optimal Habitat (A004b)**

1) A reach with few macrohabitats, typically anthropogenically degraded:
- Missouri River .... **Large Valley River – Degraded Habitat (A001d)**
- Yellowstone River .... **Large Valley River – Degraded Habitat (A002d)**
- Little Missouri River, Powder River, Lower Bighorn or Tongue River .... **Large NWGP Prairie River – Degraded Habitat (A003d)**
- Marias or Milk River .... **Large NGP Prairie River – Degraded Habitat (A004d)**

Key to Medium Prairie Rivers

1) A reach with most macrohabitats present, especially riffles/gravel runs (other macrohabitats typically present include pools, woody debris/undercut banks):
- Northwestern Great Plains Ecoregion .... **NWGP Medium Prairie River – Optimal Habitat (B005a)**
- Northern Glaciated Plains Ecoregion .... **NGP Medium Prairie River – Optimal Habitat (B006a)**

1) A reach without riffles and/or gravel, may contain the other macrohabitats:
- Northwestern Great Plains Ecoregion ....**NWGP Medium Prairie River – Sub-Optimal Habitat (B005b)**
- Northern Glaciated Plains Ecoregion ....**NGP Medium Prairie River – Sub-Optimal Habitat (B006b)**

1) A reach with few macrohabitats, typically anthropogenically degraded:
- Northwestern Great Plains Ecoregion .... **NWGP Medium Prairie River – Degraded Habitat (B005d)**
- Northern Glaciated Plains Ecoregion .... **NGP Medium Prairie River – Degraded Habitat (B006d)**

Key to Prairie Stream Ecosystems

1) A reach with most macrohabitats present, especially riffle/gravel runs (other macrohabitats typically present include vegetated pools & undercut banks):
- Northwestern Great Plains Ecoregion .... **NWGP Prairie Stream – Optimal Habitat (C005a)**
- Northern Glaciated Plains Ecoregion .... **NGP Prairie Stream – Optimal Habitat (C006a)**

1) A reach without riffles and/or gravel, may contain the other macrohabitats:
- Northwestern Great Plains Ecoregion .... **NWGP Prairie Stream – Sub-Optimal Habitat (C005b)**
- Northern Glaciated Plains Ecoregion .... **NGP Prairie Stream – Sub-Optimal Habitat (C006b)**

1) A reach with few macrohabitats, typically anthropogenically degraded:
- Northwestern Great Plains Ecoregion .... **NWGP Prairie Stream – Degraded Habitat (C005d)**
- Northern Glaciated Plains Ecoregion .... **NGP Prairie Stream – Degraded Habitat (C006d)**

Key to Intermittent Stream Ecosystem

1) Vegetated pools, typically non-incised channel, clear to turbid with shallow silt over a mineral substrate:
- Fish Present:
    - Northwestern Great Plains Ecoregion .... **NWGP Intermittent Prairie Stream – Optimal Habitat (D005a)**
    - Northern Glaciated Plains Ecoregion .... **NGP Intermittent Prairie Stream – Optimal Habitat (D006a)**
- Fish absent:
    - Northwestern Great Plains Ecoregion .... **NWGP Intermittent Prairie Stream – Optimal Habitat (E005a)**
    - Northern Glaciated Plains Ecoregion .... **NGP Intermittent Prairie Stream – Optimal Habitat (E006a)**

1) Non-vegetated pools, typically with an incised channel, deep silt substrate and turbid water:
- Fish Present:
    - Northwestern Great Plains Ecoregion .... **NWGP Intermittent Prairie Stream – Sub-Optimal Habitat (D005d)**
    - Northern Glaciated Plains Ecoregion .... **NGP Intermittent Prairie Stream – Sub-Optimal Habitat (D006d)**
- Fish absent:
    - Northwestern Great Plains Ecoregion .... **NWGP Intermittent Prairie Stream – Sub-Optimal Habitat (E005d)**
    - Northern Glaciated Plains Ecoregion .... **NGP Intermittent Prairie Stream – Sub-Optimal Habitat (E006d)**

Foothills & Valleys Ecoregion

Any small or transitional foothills river reach that is within 5 river miles of the confluence with a larger river (at least 2 stream orders) contains a biological community that is significantly effected by this large river connectivity and should be coded with a "c" after the code, denoting a confluence ecosystem.

1) A reach with most macrohabitats present, especially cobble riffles/gravel runs (other macrohabitats typically present include pools, woody debris/undercut banks):
- **Headwaters Foothills River —Optimal Habitat (D001a)**
- **Small Transitional Foothills River-Optimal Habitat (C001a)**
- **Small Foothills River Ecosystem-Optimal Habitat (C002a)**
- **Intermountain Transitional River-Optimal Habitat (B001a)**

1) A reach without cobble riffles and/or gravel, may contain the other macrohabitats:
- **Headwaters Foothills River-Sub-Optimal Habitat (D001b)**
- **Small Transitional Foothills River—Sub-Optimal Habitat (C001b)**
- **Small Foothills River-Sub-Optimal Habitat (C002b)**
- **Intermountain Transitional River Ecosystem-Sub-Optimal Habitat (B001b)**

1) A reach with degraded macrohabitats, typically anthropogenically altered:
- **Headwaters Foothills River-Degraded Habitat (D001d)**
- **Small Transitional Foothills-Degraded Habitat (C001d)**
- **Small Foothills River Ecosystem-Degraded Habitat (C002d)**
- **Intermountain Transitional River-Degraded Habitat (B001d)**

Middle Rockies and Isolated Mountain Ranges Ecoregion

1) Alpine Stream
- A reach with most macro-habitats present (boulder step pools/cobble riffles/runs) .... **Alpine Stream Optimal Habitat (E001a)**
- A reach without boulder step pools, other macro-habitats present .... **Alpine Stream Sub-Optimal Habitat (E001b)**
- A reach lacking course mineral substrate, with degraded macrohabitats .... **Alpine Stream Degraded Habitat (E001d)**

1) Mountain Spring Ecosystem
- A reach with most macro-habitats present (boulder step pools/cobble riffles/runs) .... **Mountain Spring Optimal Habitat (S001a)**
- A reach without boulder step pools, other macro-habitats present .... **Mountain Spring Sub-Optimal Habitat (S001b)**
- A reach lacking course mineral substrate, with degraded macrohabitats .... **Mountain Spring Degraded Habitat (S001d)**

1) Mountain Stream Ecosystem
- A reach with most macro-habitats present (boulder step pools/cobble riffles/runs/woody debris) .... **Mountain Stream Optimal Habitat (D002a)**
- A reach without boulder step pools, other macro-habitats present .... **Mountain Stream Sub-Optimal Habitat (D002b)**
- A reach lacking course mineral substrate, or with degraded macrohabitats .... **Mountain Stream Degraded Habitat (D002d)**