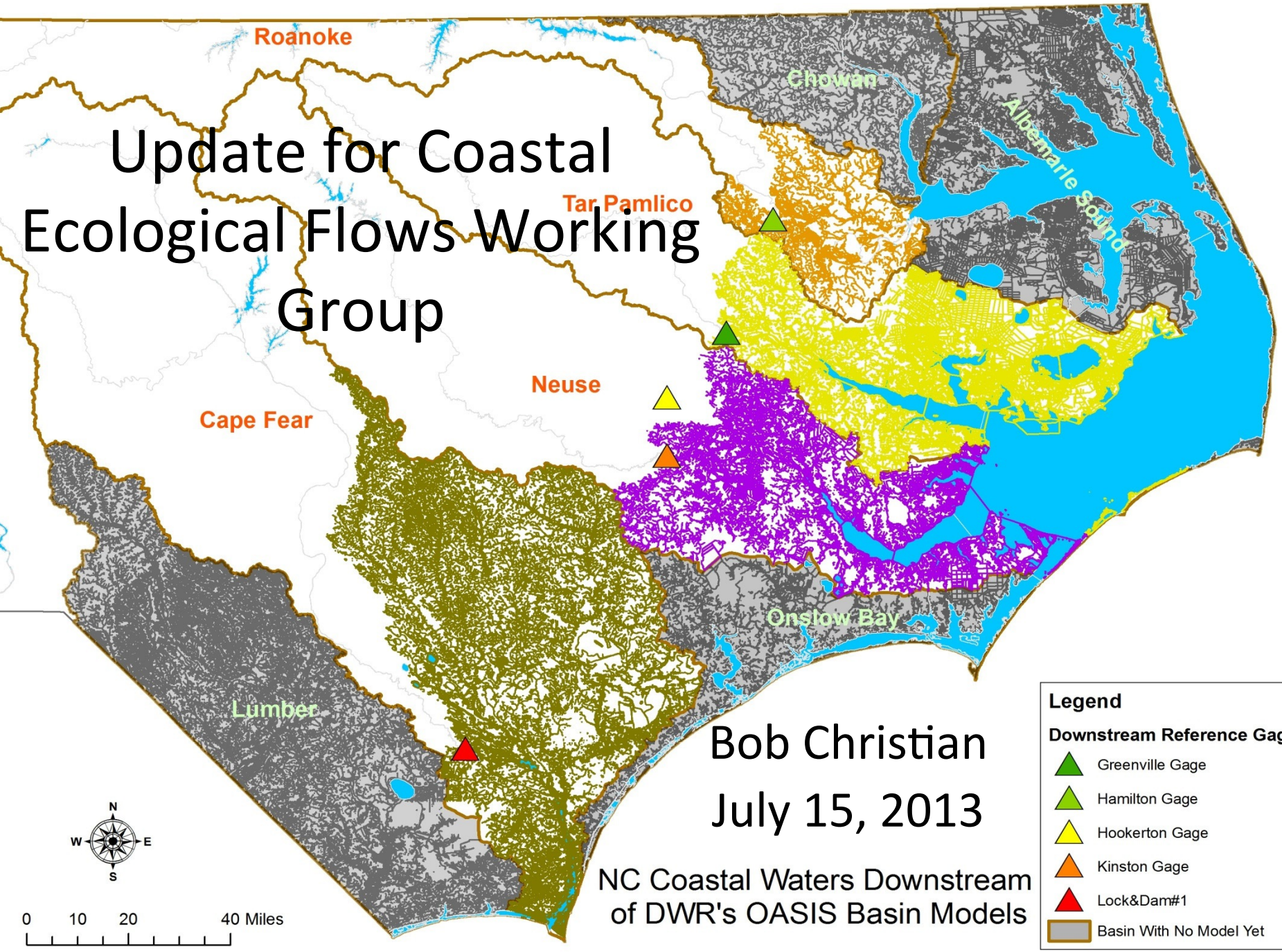
Update for Coastal Ecological Flows Working Group



Bob Christian

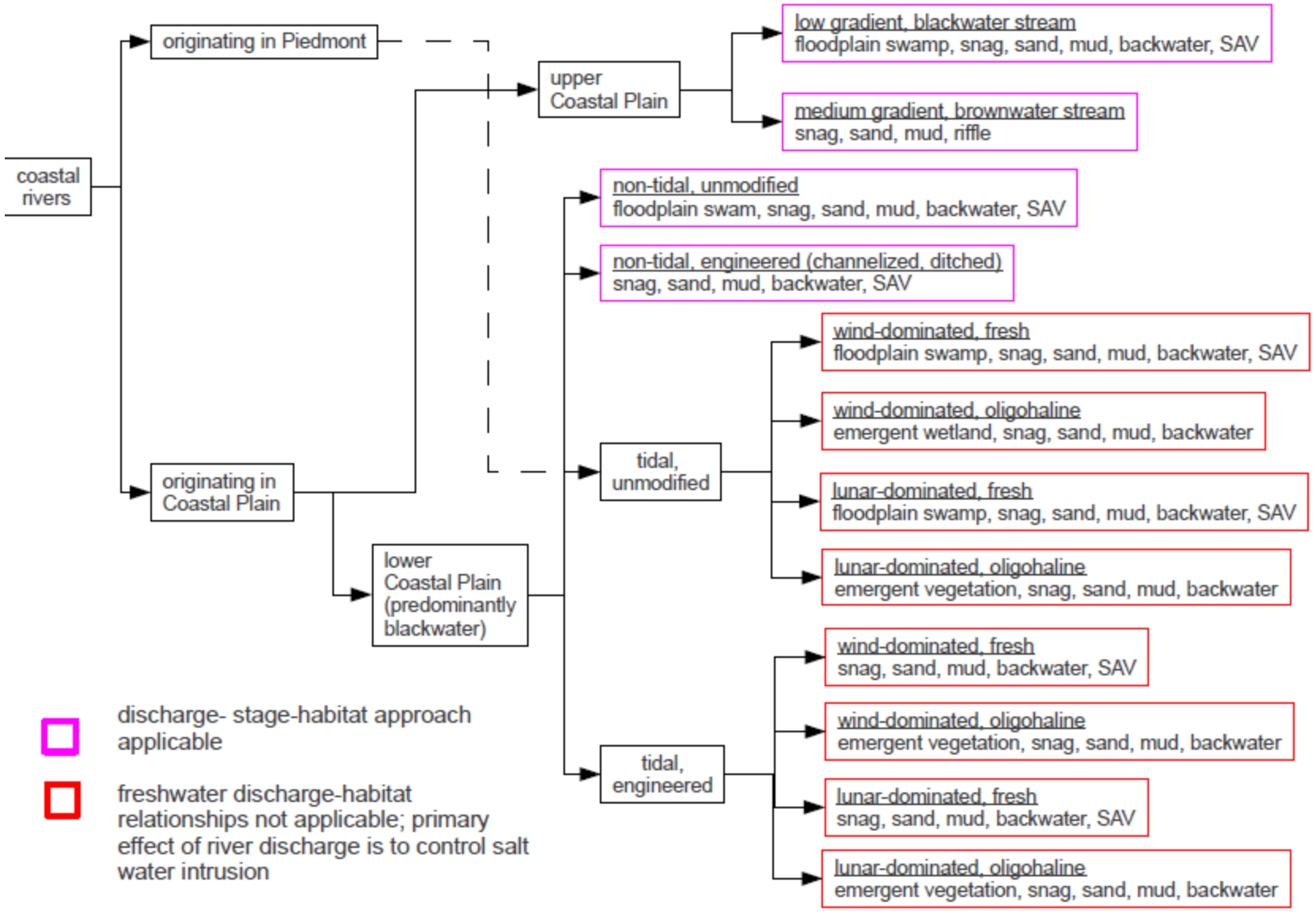
July 15, 2013

NC Coastal Waters Downstream of DWR's OASIS Basin Models

Agenda for Coastal Ecological Flows Working Group June 17, 2013

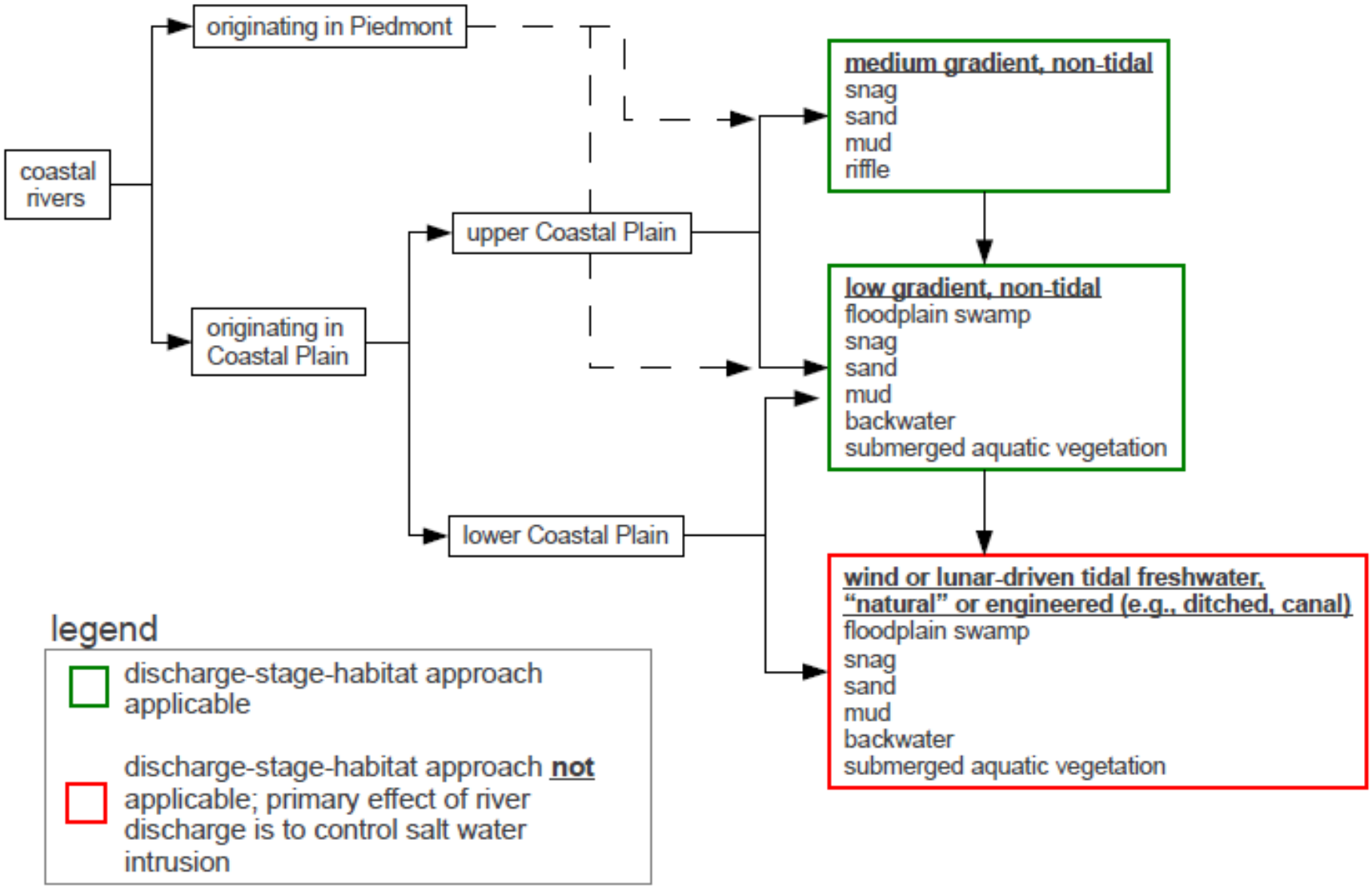
- Objectives:
- Assess applicability of previous coastal work
  - Other states
  - Greenville
- Hone stream classification framework based on Scott's efforts and previous discussions
  - Identify key classes to consider based on importance of environmental factors and potential for flow modification by human activity
- Advance modeling effort
  - Consider maps of potential areas of concern
  - Other?

GEOMORPHIC TYPOLOGY AND ASSOCIATED IN-STREAM HABITATS

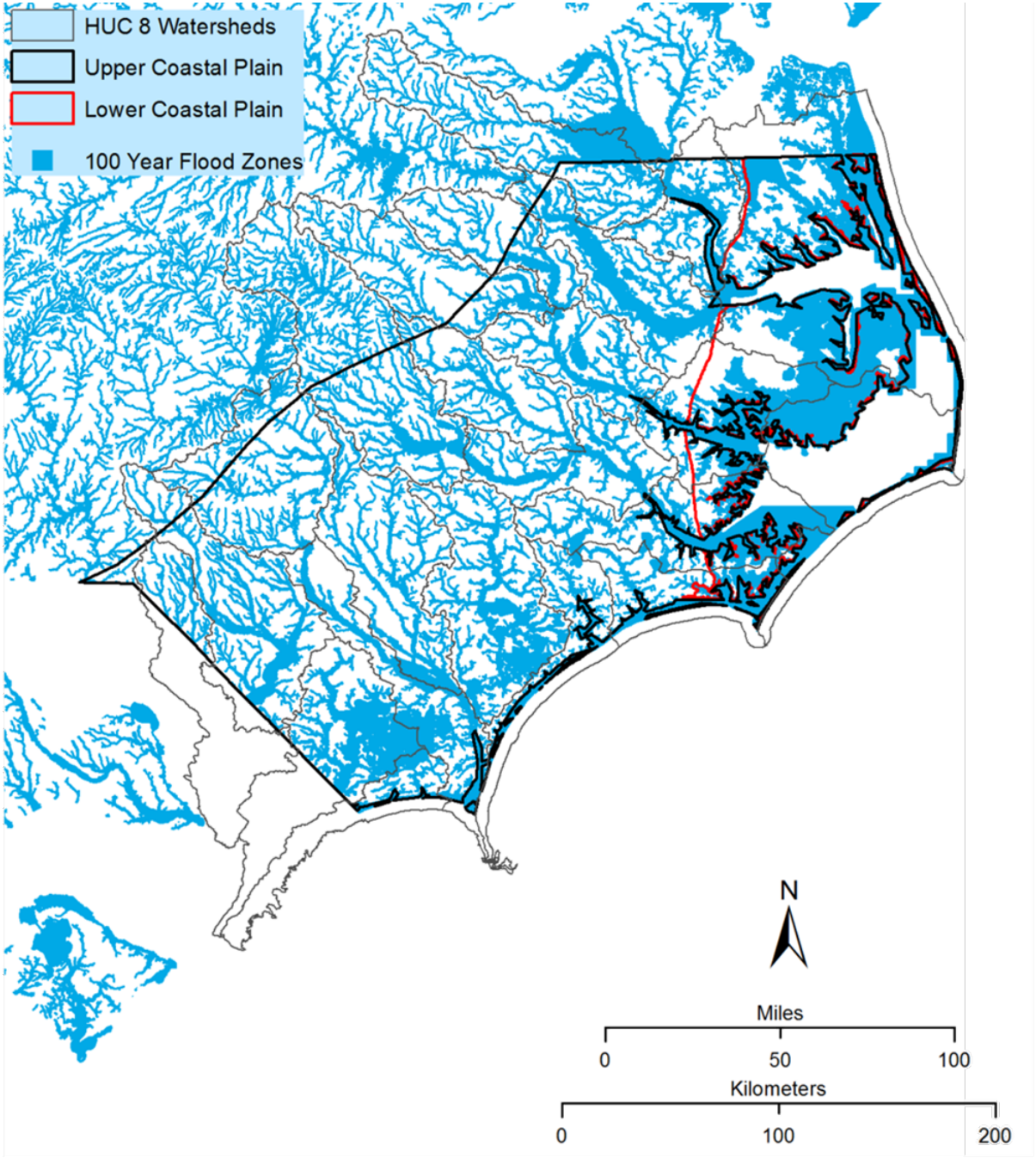


Scott Ensign

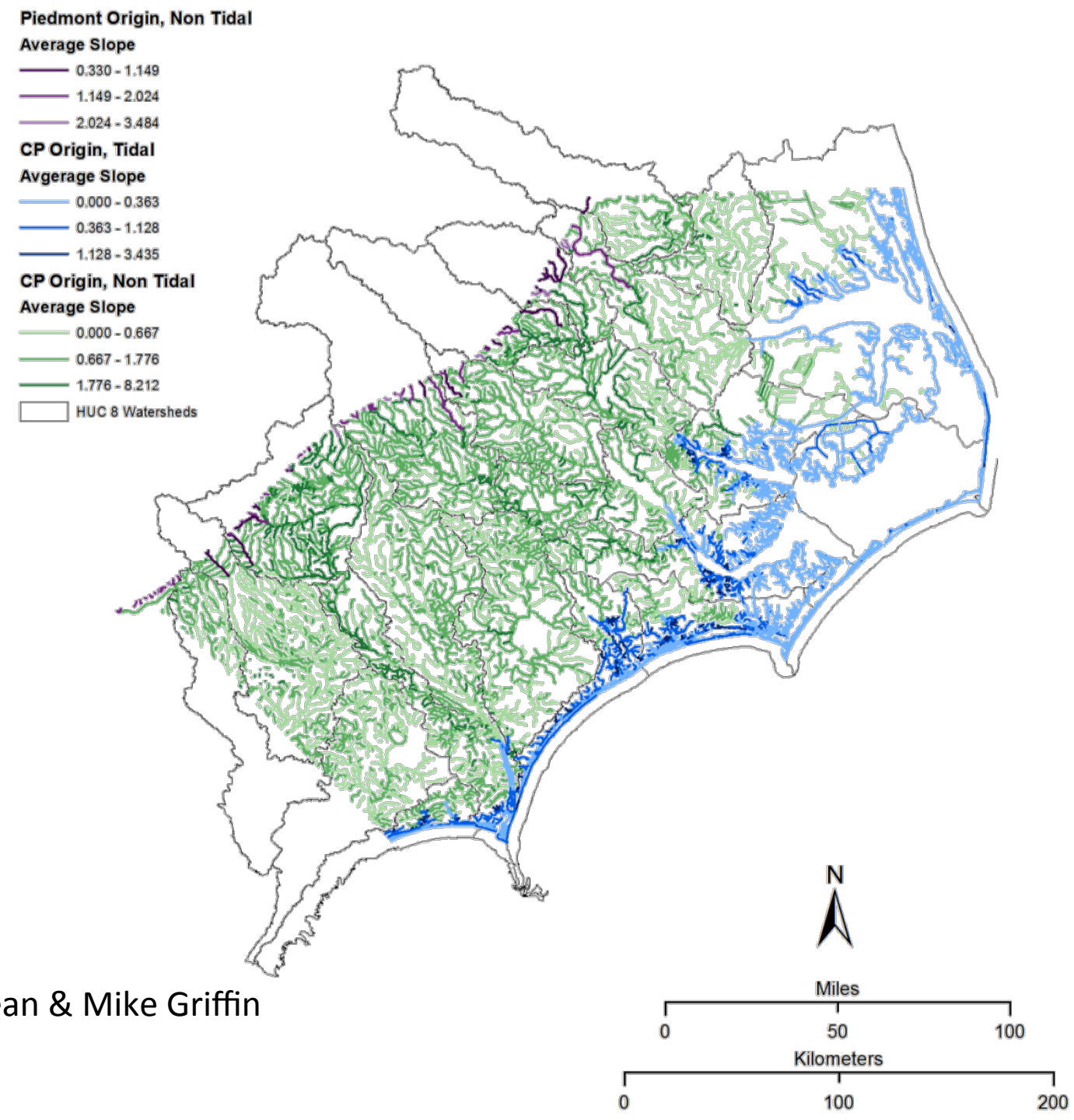
GEOMORPHIC TYPOLOGY AND ASSOCIATED IN-STREAM HABITATS



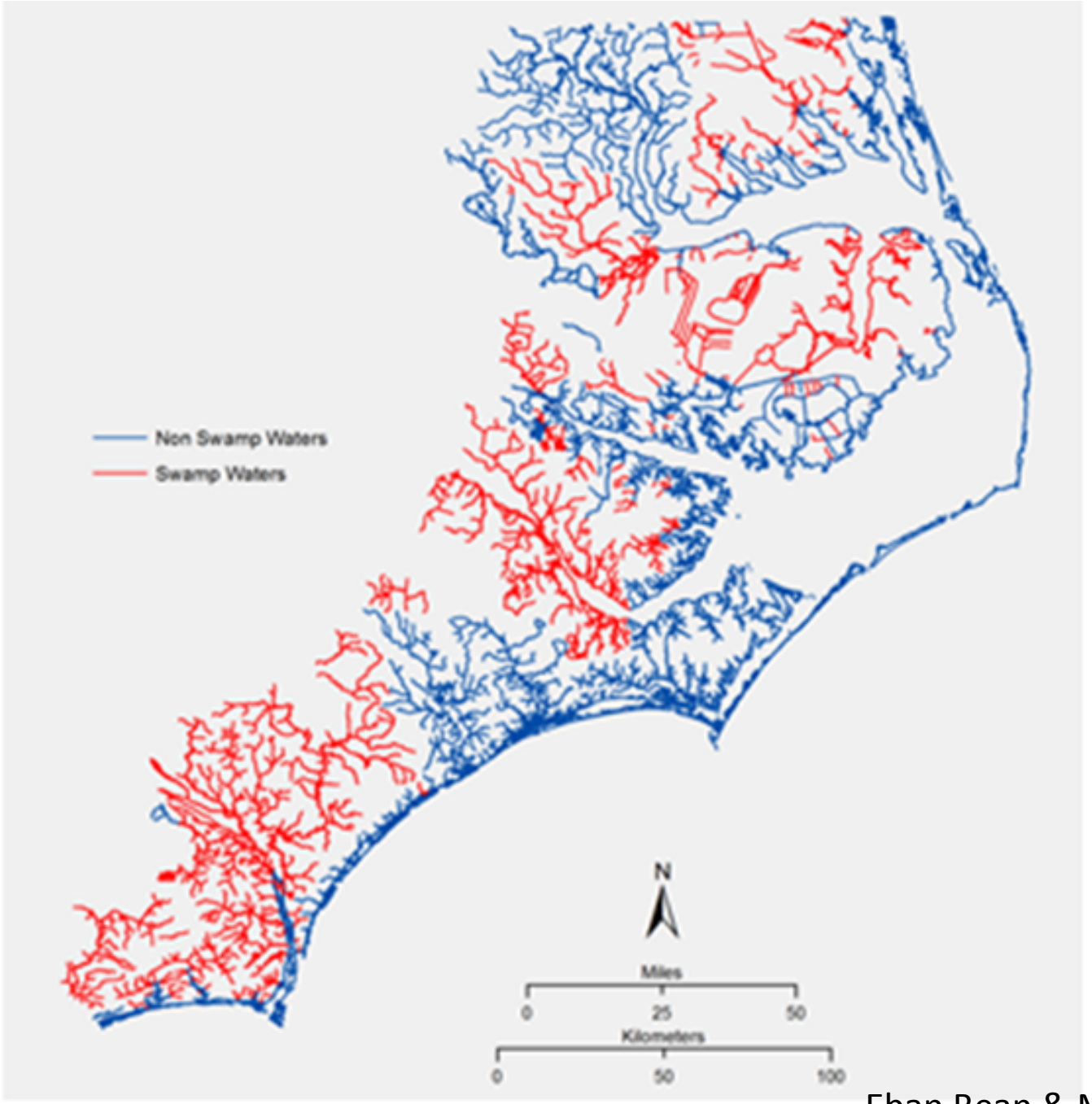
Scott Ensign



Eban Bean &
Mike Griffin



Eban Bean & Mike Griffin



Eban Bean & Mike Griffin

Link of Stream Typology & Potential EF Determination

Origin	Slope	EF determinant		
		Discharge & Habitat	Downstream Salinity	Overbank Flow
Piedmont	Medium gradient	X	X	
Upper Coastal Plain	Medium gradient	X	X	
Upper Coastal Plain	Low gradient	X	X	X
Lower Coastal Plain	Low gradient	X	X	X
Lower Coastal Plain	Wind or tidal driven flow		X	X

Ecology

- Species are often different than those found in inland waters or having different ecology from that inland.
  - Examples (Some require Fisheries Management Plans involving flows)
    - Anadromous fish (upstream spawning)
      - Blueback herring and alewife (under consideration for endangered status)
      - American shad
      - Atlantic sturgeon (endangered)
      - Shortnose sturgeon (endangered)
      - Striped bass (stock status – concern)
    - Catadromous fish (marine spawning)- eel – (stock status - depleted)
    - Estuarine species – some of the common low-salinity species that occur in river systems: southern flounder, Atlantic croaker, spot, menhaden, bay anchovy, blue crab, white shrimp, striped mullet

Physical factors and flow influence select species and life history stages

Table 2.4. Physical spawning (adult) and egg development requirements for resident freshwater and anadromous fishes inhabiting coastal North Carolina.

Species	Salinity (ppt)		Temperature (C)		Dissolved oxygen (mg/l)		Flow (cm/s)	Other parameters
	Adult	Spawn/ Egg	Adult	Spawn/ Egg	Adult	Spawn/ Egg	Spawning	Spawn/ Egg
Alewife	[S] 0-5	[S] 0-5 [O] 0-2		[S] 11-28 [O] 17-21	[S] >3.6	[S] >4	**[O] slow current**	[S] Suspended solids <1000 mg/l
American shad	[S] 0-18	[S] 0-18	[S] 10-30	[S] 13.0-26.0	[S] >5		**[S] 30-90**	
Blueback herring	[S] 0-5	[S] 0-22 [O] 0-2		[S] 14-26 [O] 20-24	[S] >5		**[O] strong current**	[S] Suspended solids <1000 mg/l
Striped bass	[S] 0-5	[S] 0.5-10	[S] 20-22	[S] 12-24, [O] ~18-22	[S] >5		**[S] 30.5-500, [O] 100-200**	
Yellow perch	[S] 0-13	[S] 0-2	[S] 6-30		[S] >5			[S] Suspended solids <1000 mg/l
White perch	[S] 5-18	[S] 0-2	[S] 10-30	[S] 12-20	[S] >5			[S] Suspended solids <100 mg/l
Sturgeon, Atlantic	[S] 0 to >30	[S] 0-5	[S] 0 to >30	[S] 11-20				
Sturgeon, Shortnose	[S] 0 to >30	[S] 0-5	[S] 0 to >30	[S] 5-15				

[S] = Suitable, and [O] = Optimum

Organizing principle? (something to think about)

- Thus far, the EF SAB has approached ecological integrity from a community point of view in which “all species are equal.”
- Given that some of the key species of interest within coastal waters are upper level predators, is it possible to develop a protocol focused on key species that are both economically and ecologically important?
  - Keystone species
  - Foundation species