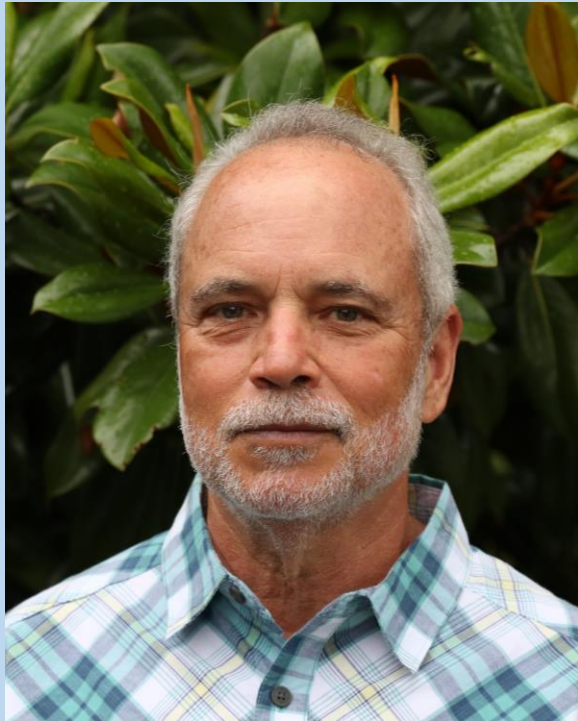


Below the Surface: Striving to Maintain Climate Ready and Productive Estuaries



Todd Miller
North Carolina
Coastal Federation

Todd Miller is the founder and executive director of the North Carolina Coastal Federation. Since the launch of the federation in 1982, Miller has worked tirelessly to raise awareness of the threats to the coast and advocate for access to clean coastal waters. Under Miller's leadership, the federation has succeeded in protecting and restoring tens of thousands of acres of North Carolina coast. A graduate of University of North Carolina at Chapel Hill, from which he holds undergraduate and master's degrees, Miller was selected as a distinguished alumnus by the university in 2013 and honored with a 2015 "Hero of the Seas" award by the Peter Benchley Ocean Awards. Miller is a founding board member of Restore America's Estuaries and serves on the Board of Visitors for the UNC Institute for the Environment and as a board member on the Policy Committee for the Albemarle-Pamlico Estuary Partnership.

Climate Ready Estuaries in N.C.

TODD MILLER, EXECUTIVE DIRECTOR



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EXECUTIVE ORDER #80

ADOPT CLIMATE RISK ASSESSMENT AND RESILIENCY PLAN BY MARCH 2020



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FOCUS

- **PRIORITIZE CLIMATE RISKS**
- **ID PROVEN ADAPTATION STRATEGIES**
- **DETERMINE HELP NEEDED TO IMPLEMENT STRATEGIES**



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1 PRECIPITATION The amount and timing of precipitation are among the great unknowns. Some computer models predict prolonged droughts while others forecast increased rainfall. Either way, it seems likely that more rain will fall during heavy downpours, increasing the risk of flash floods.

2 INCREASED WARMING The average daily temperatures in North Carolina will rise by about 4 degrees by the end of the century, giving the state temperatures that are now normal in central Florida. Some models predict a 10-degree rise.

3 THREATS TO HUMAN HEALTH Adaptation is likely to protect most coastal residents from the wide range of negative health effects – asthma, heat stress, insect- and water-borne diseases.

4 VULNERABLE ECOSYSTEMS Wetlands will disappear as sea level rises rapidly, and the forests of the coastal plain are likely to experience major species shifts or break up into a mosaic of grasslands, woodlands, and forests.

5 GREATER STORM DAMAGE A higher ocean means greater storm surges. Combined with a growing coastal population living closer to the water's edge, coastal storms of the future are likely to create more damage than storms of today.

10 FOOD SUPPLY The region's farmers will likely be able to adapt to the new climate. If there are no seasonal shifts or drastic declines in rainfall and if temperatures don't climb too high, crop production is very likely to increase over the next few decades.

9 TIMBER PRODUCTION Trees should do well with higher carbon dioxide levels if there are no seasonal shifts or drastic declines in precipitation. Forest productivity should increase along the coastal plain, at least in the short term. Fires, insects, droughts and disease could decrease productivity over time, though.

8 WATER QUALITY AND QUANTITY Quick, intense downpours increase stormwater runoff – currently the greatest source of water pollution. Prolonged droughts would have severe effects on aquifers, the drinking water sources for more coastal residents. Rising seas could push saltwater into those aquifers.

7 HURRICANE FREQUENCY Another of the unknowns. The physical dynamics of hurricanes would seem to suggest that warmer ocean temperatures should spawn more, intense hurricanes and lengthen the hurricane season, but the computer models can't agree.

6 RISING SEAS Higher sea level is a natural consequence of warmer air temperatures as the ocean warms and glaciers melt. Along the NC coast sea level is forecast to rise from 12 to 36 inches by the end of the century, with as much as a 10-inch rise by 2010. About 200 feet of shoreline is lost to erosion for every foot of sea-level rise.



CLIMATE RISKS CONSEQUENCES FOR N.C.'S ESTUARIES

***DECLINES IN WATER QUALITY
AND FISH HABITATS***

MORE MARINE DEBRIS

***INCREASING THREATS TO PUBLIC
HEALTH AND SAFETY***

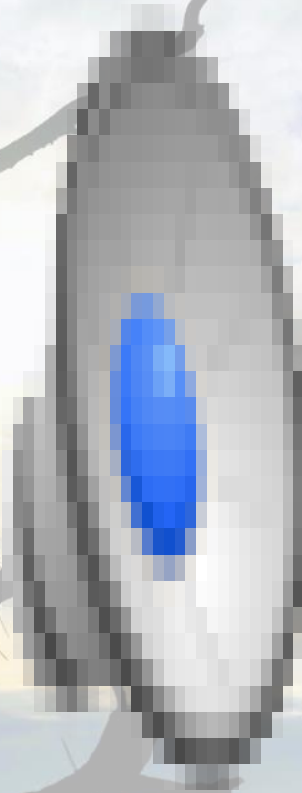


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CLIMATE RISKS:

RISING SEAS

***EXTREME
WEATHER***



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PROVEN NATURE BASED CLIMATE RISK REDUCTION STRATEGIES

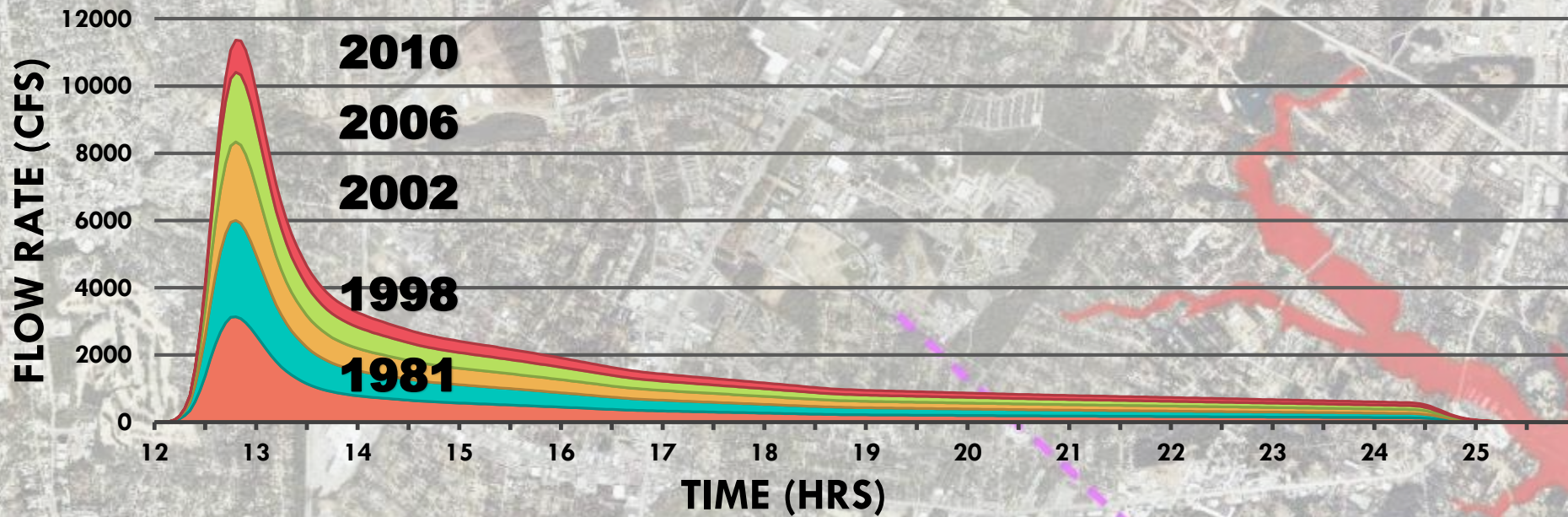
#1: WATERSHED HYDROLOGY - MATTERS MORE THAN ANYTHING ELSE!



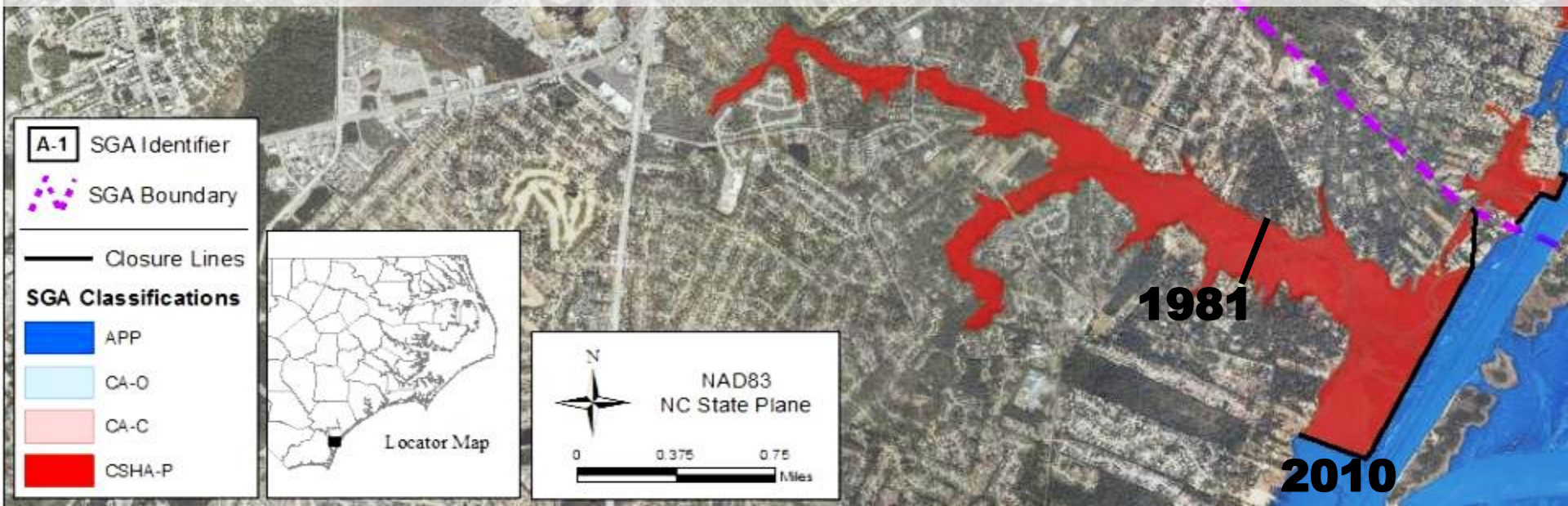
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HEWLETT'S CREEK WATERSHED 1-YR STORM HYDROGRAPHS

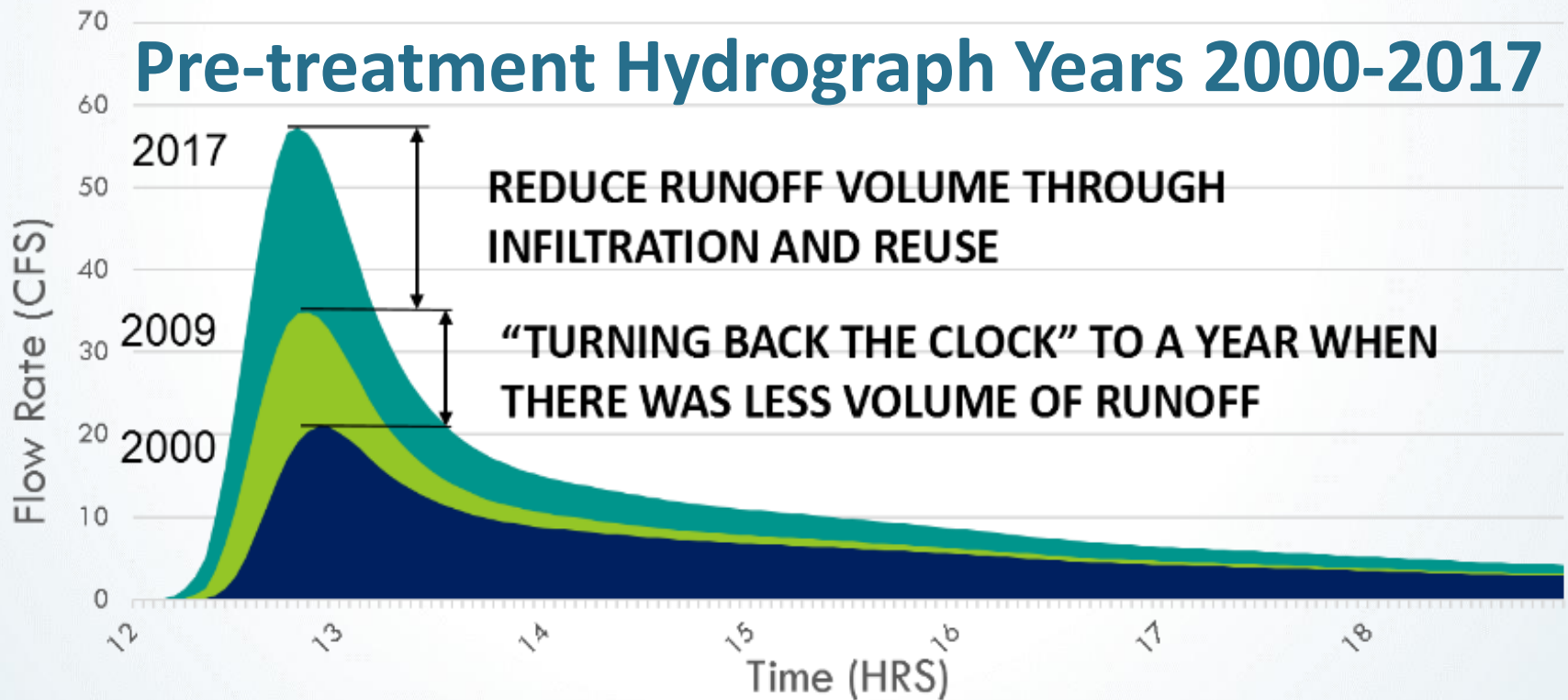


CHANGES IN SHELLFISH CLOSURE BOUNDARIES



STRATEGY

Try to replicate natural hydrology by focusing on the watershed as a whole



ACTION STRATEGIES

Strategy Must:

- Control new sources
- Retrofit existing land uses (urban and rural)







OPEN
Visitors Welcome





During Development





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**NORTH RIVER FARMS
RESTORATION SITE**



Help Wanted - Hydrology

Assist with watershed plans

More funding for retrofits

Make government a role model

**Devise model stormwater programs
for local governments (Based on “hydrologic matching”)**

**Expand and enhance wetland
restoration near estuaries**



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PROVEN NATURE BASED CLIMATE RISK REDUCTION STRATEGIES

#2: LIVING SHORELINES



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Living shoreline at Camp Albemarle in 2017



Living shoreline at Camp Albemarle after Hurricane Florence



Bulkhead at Camp Albemarle after Hurricane Florence



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Help Wanted – Living Shorelines

Create consumer demand

Provide incentives

Train contractors

Serve as role model

Continue to assist permitting



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PROVEN NATURE BASED CLIMATE RISK REDUCTION STRATEGIES

#3: CLEAN UP AND PREVENT MARINE DEBRIS



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Lost Fishing Gear Recovery Project

2019 Update

In 2018, for the third year, the North Carolina General Assembly allocated \$100,000 to clean up lost crab pots statewide in January 2019.



"Being on the water nearly every day as a full time commercial fisherman, it's important to remove the lost pots and keep our waters clean and safe."

-Chad Hemilright, D1 waterman

14

16

48

78 watermen and women removed 3,112 crab pots.

Figure: Number of fishers hired per marine patrol district.



In January, 122 volunteers removed an estimated 6.5 tons of marine debris during three shoreline cleanups.



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Questions? Contact Sara Hallas at 252-473-1607 or sarajh@nc coast.org.
Learn more at nc coast.org/crabpotproject.

Lost Fishing Gear Annual Cleanup



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MANY DOCKS WERE DESTROYED BY FLORENCE



Same Dock: During and After Florence

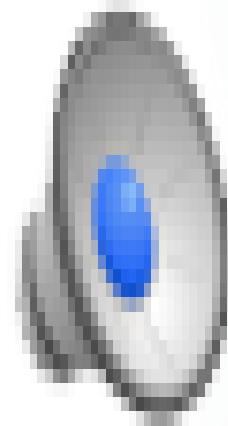


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Help Wanted - Marine Debris

- **Keep public trust areas
clean**
- **Address abandoned
boats**
- **Improve construction
standards**



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IN SUMMARY

**PROTECT AND RESTORE THE COAST
AND IT WILL HELP PROTECT YOU**



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