*Presentation Notes*

**A Voyage Down the Cape Fear – Kemp Burdette, Cape Fear River Watch**

- 8 days, goal of 25 miles a day
- Jordan lake to Atlantic Ocean
- Difficult to camp without private property permission
- Observed under-use of river (particularly in upper and middle regions)
- Have to carry gear around dams
- Opportunities
    - 2008 State stated that they may accept lock & dams 1,2,3 and adjacent lands as state parks once they've been refurbished and fish passage figured out
    - Create maps of areas along Cape Fear that can be used for camping during a river trip

**A river runs through us – Mike Giles, NC Coastal Federation**

- Oyster restoration
    - Lobbied Department of Commerce on premise that for every $1 million spent on restoration, 15 full time jobs supported
- Fighting hardwood industry
    - They're removing entire trees, which they are not supposed to
- Plans
    - Designate sections along Cape Fear as Aquatic Resource of National Importance
        - Lower cape fear is the priority
        - Elevates permitting from US Army Corps to EPA
        - Some audience questions regarding the necessity of this. What type of designation (eg state) is more useful
        - Response is that it's more for the philosophy/image of it than the permitting
        - Also may open them up to federal funding
- Titan Fight
    - 8 year battle against Titan America's plan to develop a coal-fired cement plant and strip mine along the NE Cape Fear River in Castle Hayne succeeded – plans abandoned in March
- River Corridor economic opportunities
    - Starting at Roan Island
    - Camera trap study to showcase wildlife

**Natural Resource Damage Assessment and Restoration (NRDAR) Update – Sara Ward, US Fish & Wildlife Service case manager for NRDAR and NFWF**

- General NRDAR process
    - It's a legal process

  - Led by trustees
  - First proposal is received
  - Selected based on projects being compatible with EPA clean-up, cost-effective, no impact to public health/safety etc
  - Able to adjust and open to addressing new categories
- Example: Kerr-McGee Site
  - Former creosote wood-treating facility
  - Designated Superfund Site
  - Natural Resource Trustee Council appointed and funds acquired from Kerr-McGee for restoration of natural resources to baseline
  - Also added to National Priorities List for long-term remedial action financed under the federal Superfund program with a focus on addressing risks to human health and the environment from contamination

**National Fish and Wildlife Foundation (NFWF): Federal Penalty for Coal Ash Ponds – Sara Ward, US Fish & Wildlife Service case manager for NRDAR and NFWF**

- NFWF directs public dollars to environmental needs/restoration projects and matches those investments with private contributions
- Can apply for a grant (Request for Proposals (RFP))
- Eligible if your stream network is connected to NC's coal ask networks
- First round nearly $5million allocated
- They act on proposal as it arrives. They don't wait until all proposals have arrived.
- Example of large projects
  - Acquire land around Deep & Rocky River
  - Fish passage at LD2
- Projects must follow what's in the plea agreement set by Department of Justice/not great flexibility unlike NRDAR
- They like partnered projects

**Toxic and nontoxic microcystis in the cape fear river – Madi Polera, UNCW**

  - microcystins (mcy) - biotoxin products of microcystis
  - 1microgram/L standard to protect public health because very toxic (more than snake venom and arsenic
  - drivers
    - temp allows them to make gas pouches (vacuoles) that allow them to float
    - flow and velocity allows the floating to occur
    - has to have forms of nitrogen it can use
    - has to have nitrogen and phosphorus
    - need certain density to cause blooms
    - grazing - low nutritional value, so they don't really get eaten. compared to other blooms, it will be favored because things either don't or can't eat it

- causes low DO and toxins

- 2009 bloom
  - Ppl reported bad ordor
  - measured 73microgram/water
  - was there a change in the river? why did it happen?
- Jordan Lake
  - how upstream do we go? have been found in jordan lake
  - does it serve as an incubator and sending down conditions for microcystis blooms?
- Data
  - EPA's STORET flow and nutrient
  - Temp and Turbidity
  - Jordan Lake Discharge - US Army Corps
- Method
  - sequence genes to find mcy
  - flow
    - looking at flow throughout LD system, and seeing when blooms occurred
      - inconsistent. low flows are necessary for blooms, but are not the cause (alone)
  - velocity
    - slow enough to be laminar (allow for stratification)
    - during all blooms, had stratified water

    =flow and velocity are similar in bloom and nonbloom years
  - nutrients over time
    - see increases in certain cities over long period of time (from 1990s), but no change if you only look at 2000s (so increase in nutrients isn't explanation)
  - Temperature
    - no big change in trend
  - Chlorophyll a
    - Jordan lake amount is large, NC 42 (bridge in Chatham County) it's big, DROPS at lillington, and goes back up again by elizabeth town - why?
    - overall just more consistent in upper basin, and more sporadic in lower basin
  - Jordon Lake
    - 3 factors: quanitity of water, nutrients, phytoplankton
    - 140 miles btwn jordan lake and LD1, at abs slowest, take 28 days to get from one point to another
    - tracked back the discharge graph 28 days from bloom hoping to see big flow at that point

        - saw nothing (no big slug)
        - and saw big pulses with no blooms following them within the timescale =so it's not sending any populations of mcy
    - what else to explore?
        - herbicides
        - cyanophages
        - floodplain interaction
    - Also question remains of why there's a change in LD2

**Evidence of Nutrient Factors in Cape Fear Algal Blooms – Bradley Saul, UNC Biostatistics**

- focusing on LD1
- focuing on chlorophyll-a (as a proxy for blooms)
- causal inference statistics
- Defined at LD 1: high cholorphyll-a is >25micrograms/L, med is <25 >10, low is <10
- across the board nutrients at all levels increase after Lock 3 (and start to rise before it)
    - particularly ammonia?
    - This is not adjusting for space and time
- as you move down the river, more nitrate is associated with less chlorophyll
- statistically significant positively correlation of nutrients with chlorophyll-a at LD1
    - every mg/L increase in NO3 at Smithfield/tarheel sees a 3.5 times increase in chlorophyl A at LD1
    - adjusted for space and time
- correlation becomes negative after Lock 1 but based on very little data
- major issue - monthly sampling on first of the month, so could entirely miss event

**Water Resources Availability in the Cape Fear River basin - Fred Tarver, DWR and DEQ**

- New legislation: An act to require the review commission to conduct a study of water resources availability in the Cape Fear River Basin
    - study aggregate uses of groundwater and surface water (public, industrial, and ag)
    - 50 yr projection
    - Long-term needs for all water demands
    - identification of potential conflicts among the various users
    - Brunswisk, New Hanover, and Pender counties enhanced review for demands of groundwater basin modeling (because these counties are below LD1 point and have been neglected)
    - cape fear basin hydrologic model 2008 - OASIS
        - lines and dots show water demand and where the water is traveling from
        - includes:
            - surface water withdrawals

        - wastewater discharges
        - reservoir management protocols and flow targets
        - water shortage/drought response protocols
        - water connections and transfers between cape fear and adjoining basins
    - remaining tasks
        - lower cape
            - Oasis model doesn't extend below LD1 because can't model tidal movements (this includes brunswick, pender, and new hanover)
            - black and northeast cape fear river also not included
        - basinwide
            - identification of potential conflicts
            - need to incorporate groundwater

**Cape Fear River and Southeast Atlantic Coast Fish and Wildlife Habitat Assessment - Keith Walls, Dial Cordy and Associates Inc.**

- 2015 Dial Cordy Associates Inc. contracted by NFWF to completely 3 components
    - 1st part with NEMAC out of western carolina - prioritizing coastal areas based on resilience
    - 2nd part to identify critical areas for fish, wildlife and ecosystem health
    - 3rd part is development of a list and map of resiliency projects
- GIS methodology
    - stakeholder meetings to identify datasets
    - developed subset of data to be used
    - layers
        - 4 layers used to extract G ranking for species (from natureserve supported by natural heritage program) and Federally designated Threatened and Endangered (T and E) species
        - Significant biodiveristy where those species occurred
        - Included additional data for the known special species not captured by the 4 layers
        - aggregated and tiered into priority groupings (1 = highest, 2, 3)
    - Priority Groups
        - for Priority 1, included just G1 and G2 (77% of identified areas)
        - for Priority 2, included G3 in addition to G1 and G2 (16% of identified areas)
            - NFWS asked to filter for only vertebrates and freshwater inverts
        - for Priority 3, also included fish spawning areas. they should be captured in 1 and 2, but because it's modeled data not raw, had to deprioritize it (7% of identified areas)
- Not asked to do post-model analysis. Just passed on to NFWF.

- Also provided NFWF with a threats overlay including NPDES sites, coal ash ponds, CAFOs, pulic boat ramps, dams
  - Quick assessment: 61 CAFOs located within 1/4mile of priority 1 area
- Also came up with Regional South Atlantic Coast Priority HUCs
  - Adjusted criteria slightly from the Cape Fear River Basin scale
- Resiliency Projects
  - 67 identified and evaluated
  - NFWF selected 3 projects to be showcased. more about testing the creation of resiliency plans/pilot studies. did not come with funding.
  - this is the excel spreadsheet we were given
- The hope is NFWF uses these maps to help them decide on projects for funding

*Breakout Session Summaries*

**Socioeconomic Session**

- determine target audience
- find value of ecotourism
- need master plan between cities
- conservation fund - economic valuation of state parks

**Habitat**

- Identifying significant habitat areas
- finding money
- creating maps
- specifically
  - smith creek restoration
  - Division of water resources - project wet (education)
  - Wildlife Resources Commission (Green Growth toolbox)
- Making a unified vision
  - goal of the resiliency/restoration (keith wall's presentation)
  - parcel-level in order to apply for a lot of sources of funding

**Water Quality**

- Priority for reducing blooms: river flow
  - Can river flow be managed? Will they adjust? Particularly unlikely in drought months, when it is important to maintain flows to move out algae
- Monitoring
  - Above Lock and Dam 1 - fish and wildlife service has been tasked with that
  - DEQ, Division of Water Resources (DWR) to restart basin-wide plan

- Outreach/publications
  - Dealing with nutrients
    - DWR - looking at northeast cape fear - a lot of it non point source
    - Stocking Head Creek - Mike Mallin's lab doing research. It is rich in CAFOs, nitrate exceeded 10 mg per liter (blue baby syndrome levels)
    - USGS Final Report on Surface-Water Quality and Swine CAFOs by Steven Harden, released June 2015
      - http://pubs.usgs.gov/sir/2015/5080/
- Soil and Water Conservation
  - 2015 - 1.5 million worth of projects (N & P loading reductions)
  - but their underfunded, under control of NC General Assembly
  - working on a program looking at creation of river buffers (eg on agricultural land)
    - good amount of money available from the feds that should be tapped

**Fish Passage**

- Barrier (dam) prioritization tool (BPT)
  - identified Dodds Millpond in Bladen County
  - Halls lake, Sampson County
  - Culverts to open up
  - Some dams on Fort bragg and little river
- Michael Fisk - WRC
  - doing 3rd year of telemetry at LD1,2,3
  - as in previous years, shad seems to go up ramp readily (75%), striped bass not so much (25%), and flatheads are inconsistent btwn years
  - Fishing below all dams have shown like last year that there are higher numbers at LD2 than LD1 (so fish are going upstream), Buckhorn Dam blocking them to LD3
  - WRC and River watch have been trying to replicate NC State study. Seen shad eggs below LD2 as with the NC state study, but more striped bass below LD3 than in the study
- NC Division of Marine Fisheries (DMF)
  - tagging of striped bass to look at movement
  - sturgeon tags are disappearing/need to be replaced
- Talking about LD1 functionality/what can be learned
  - Guidance document coming out by USGS and NOAA Restoration Center
- Scour hole LD2
  - The US Army Corp Plan for filling the scour hole should be done by september
  - Funding is unclear, just have money for plans and specs
  - Has to be filled for dam safety reasons, but hopefully also eventually for construction of fish passage

- So might make sense to focus on LD3 fish passage first and wait for them to fill scour hole to reduce costs
- loss of life is a metric in the rating, and it's pretty low for LD2, which plays into its prioritization
- loss of property also considered
- Does it consider loss of water supply?

o LD3

- they want it to stay intact...rock ramp may be a solution
- need to be able to demonstrate that value to the people that make those decisions