



Understanding drought in the Coastal Carolinas

NIDIS Coastal Drought Monitoring Knowledge Assessment Workshop

Charleston, SC ~ January 7, 2014

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Carolinas Integrated Sciences & Assessments (CISA)



Presentation Outline



- ▶ Overview of the NIDIS-Carolinas Coastal Ecosystems Drought Early Warning Pilot
 - ▶ Kirstin Dow

- ▶ Challenges in Monitoring Coastal Drought and the Potential for Salinity Indices
 - ▶ Kirsten Lackstrom



Drought and early warning in coastal areas

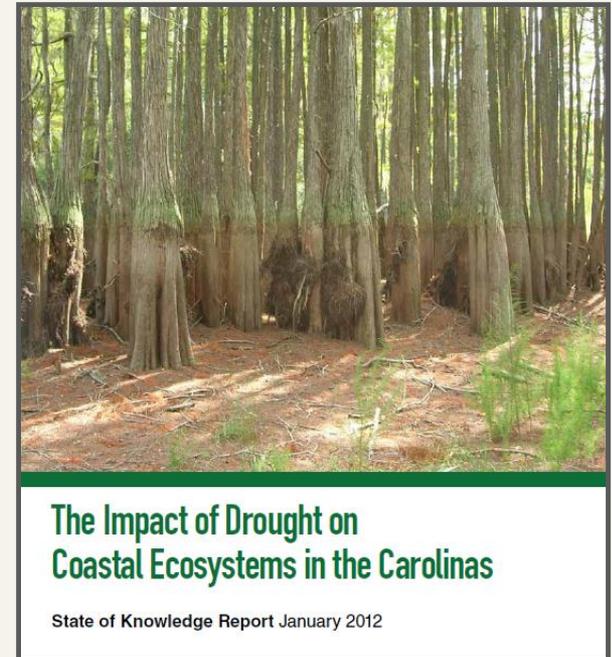


▶ Spring 2010

- ▶ Identifying needs
- ▶ Stakeholder workshops held to identify needs for a DEWS
- ▶ Needs assessment reports available on the [CISA website](#)

▶ State of Knowledge Report

[The Impact of Drought on Coastal Ecosystems in the Carolinas](#)
(Gilbert et al., 2012)



Identifying focus topics



- ▶ **NIDIS Drought Early Warning System Scoping Workshop**
 - ▶ July 31 – August 1, 2012 ~ Wilmington, NC
 - ▶ 4 Pilot Project Topics Identified
 - ▶ Evaluation of Drought Indicators & Indices
 - ▶ Public Health & Water Quality
 - ▶ Drought Forecasts & Communications
 - ▶ Drought Impacts Reporting



[NIDIS Carolinas Drought Early Warning System: Supporting Coastal Ecosystem Management Scoping Workshop Report](#)



Workshop Steering Committee & Participant Organizations



- ▶ Audubon South Carolina
- ▶ Beaufort-Jasper Water & Sewer Authority
- ▶ Clemson University
- ▶ DOI Southeast Climate Science Center*
- ▶ East Carolina University
- ▶ Gullah/Geechee Nation
- ▶ Lumbee Tribe of North Carolina
- ▶ National Drought Mitigation Center*
- ▶ NC Coastal Reserve & National Estuarine Research Reserve
- ▶ NC DENR, Division of Coastal Management
- ▶ NC DENR, Division of Water Resources
- ▶ NC Department of Health & Human Services, Division of Public Health
- ▶ NC Department of Public Safety, Division of Emergency Management
- ▶ NC Sea Grant*
- ▶ NC State Climate Office*
- ▶ NC Water Resources Research Institute
- ▶ NOAA Center for Coastal Environmental Health & Biomolecular Research*
- ▶ NOAA Fisheries, Southeast Regional Office*
- ▶ NOAA National Centers for Coastal Ocean Science, Center for Human Health Risk*
- ▶ NOAA National Climatic Data Center
- ▶ NOAA National Weather Service
- ▶ NOAA Regional Climate Services, Eastern Region*
- ▶ NOAA Southeast and Caribbean Regional Team*
- ▶ North Inlet - Winyah Bay National Estuarine Research Reserve
- ▶ South Atlantic Landscape Conservation Cooperative
- ▶ SC Sea Grant Consortium*
- ▶ SC State Climate Office*
- ▶ Southeast Regional Climate Science Center*
- ▶ The Nature Conservancy, NC & SC*
- ▶ US Army Corps of Engineers
- ▶ US EPA, Region 4*
- ▶ UNC Wilmington, Center for Marine Science
- ▶ USC Public Health Research Center, Dept. of Environmental Health Sciences
- ▶ US FWS, Pocosin Lakes National Wildlife Refuge
- ▶ US FWS, SC Coastal Program*
- ▶ US FWS, SC Lowcountry Refuges Complex*
- ▶ US Marine Corps, Camp Lejeune
- ▶ USGS NC Water Science Center
- ▶ USGS SC Water Science Center*

* Steering Committee Member Organization

Drought-Related Impacts & Concerns in Coastal Ecosystems



Drought-Related Impacts & Concerns in Coastal Ecosystems



Source: Ed Christopher



Pocosin Lakes National Wildlife Refuge, NC



National Estuarine Research Reserves



Mission-Aransas, Texas



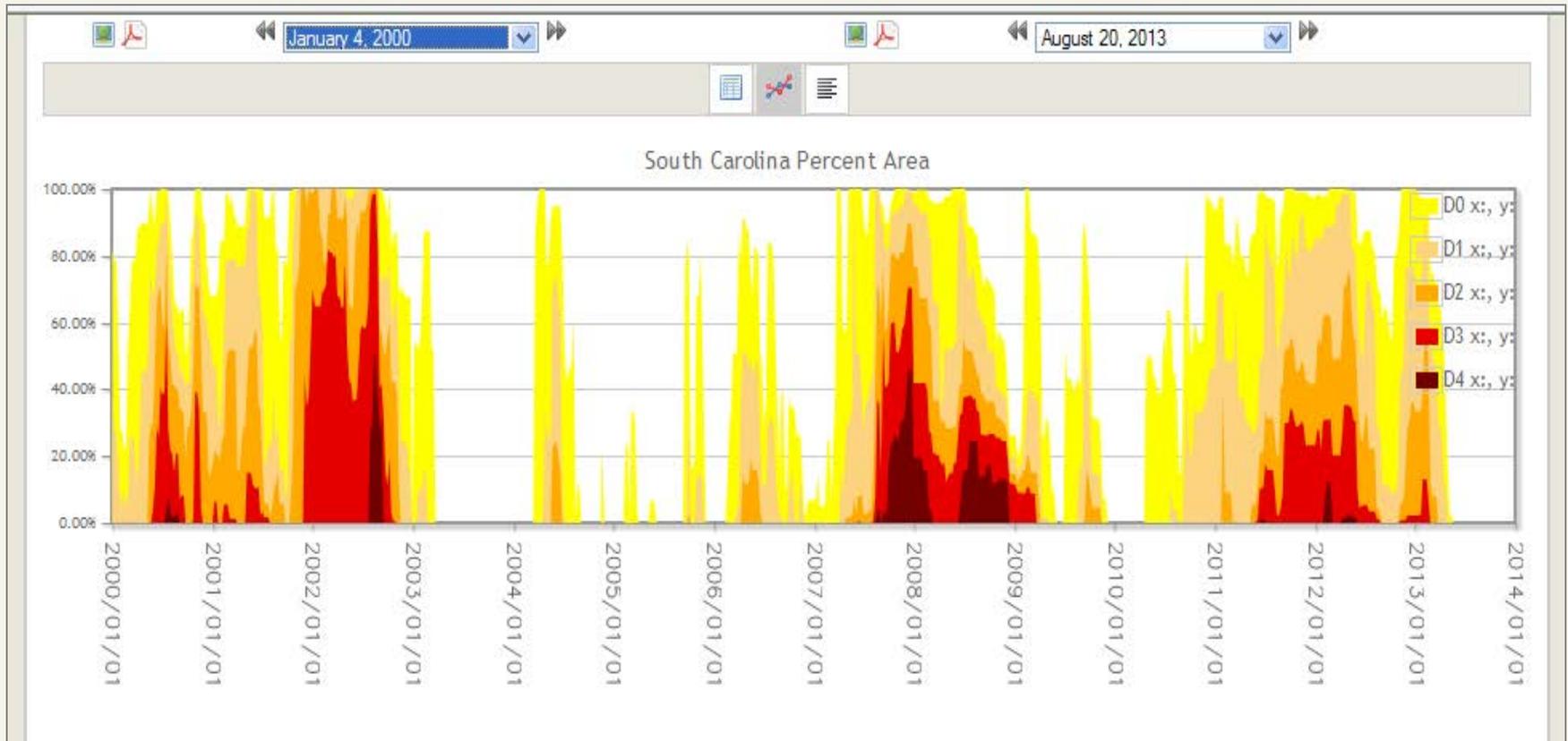
Apalachicola oyster fishers



Challenges and Opportunities



Drought in South Carolina, 2000-2013



<http://droughtmonitor.unl.edu/archive.html>

Downloaded on 22 August 2013 from the Drought Monitor Archives

Challenges

- ▶ **Limited understanding**
 - ▶ Difficult to measure spatially (area affected) and temporally (onset and recovery)
 - ▶ No unified roster or database of drought events, losses
 - ▶ Data about the full range of impacts for many sectors and regions does not exist



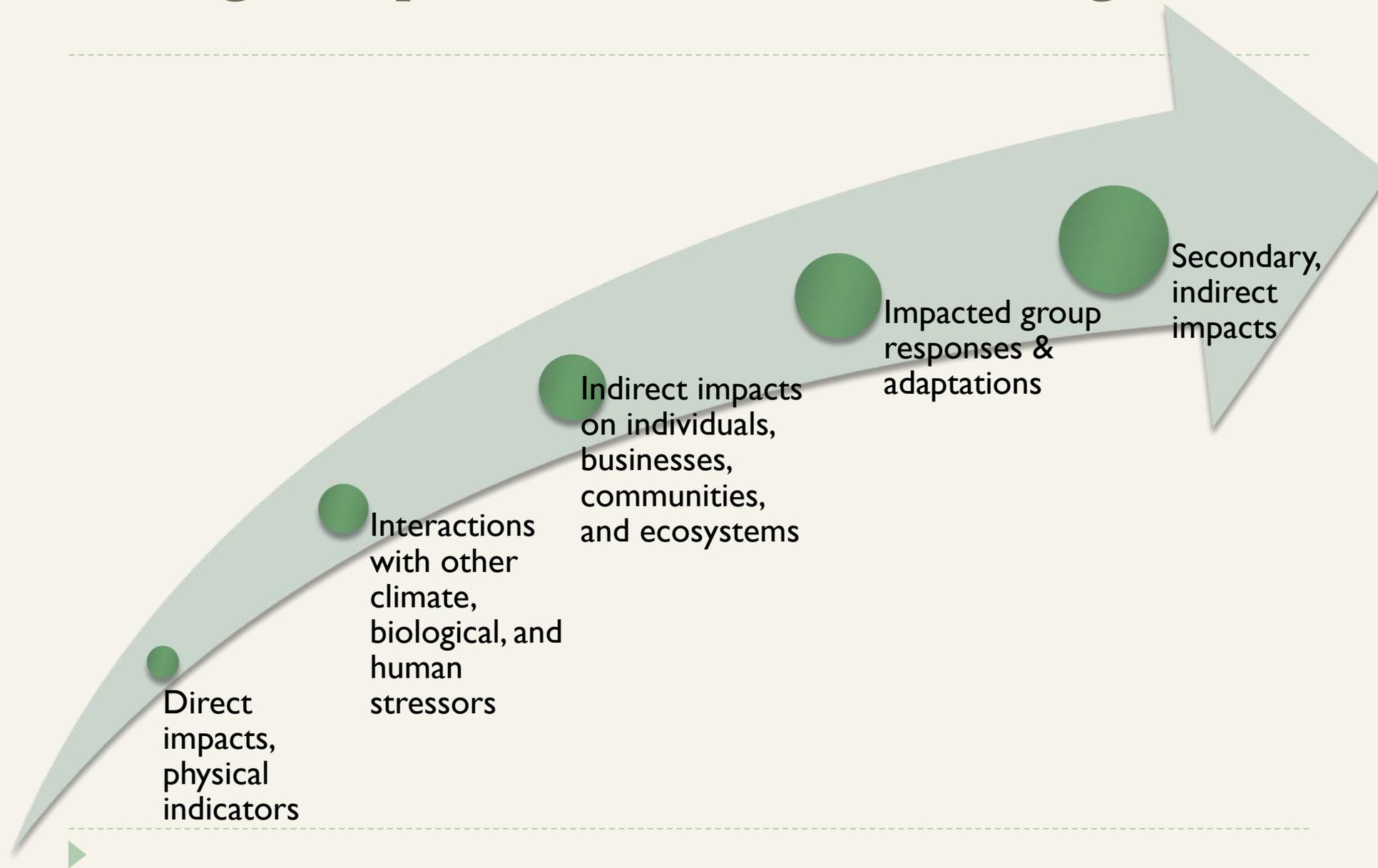
“flash drought” in Arkansas, 2012

A home falls into a large sinkhole in Florida



Sand dune migration onto the rangelands of the Hopi Tribe in northeast Arizona

Drought impacts: what are we looking for?



Complexity

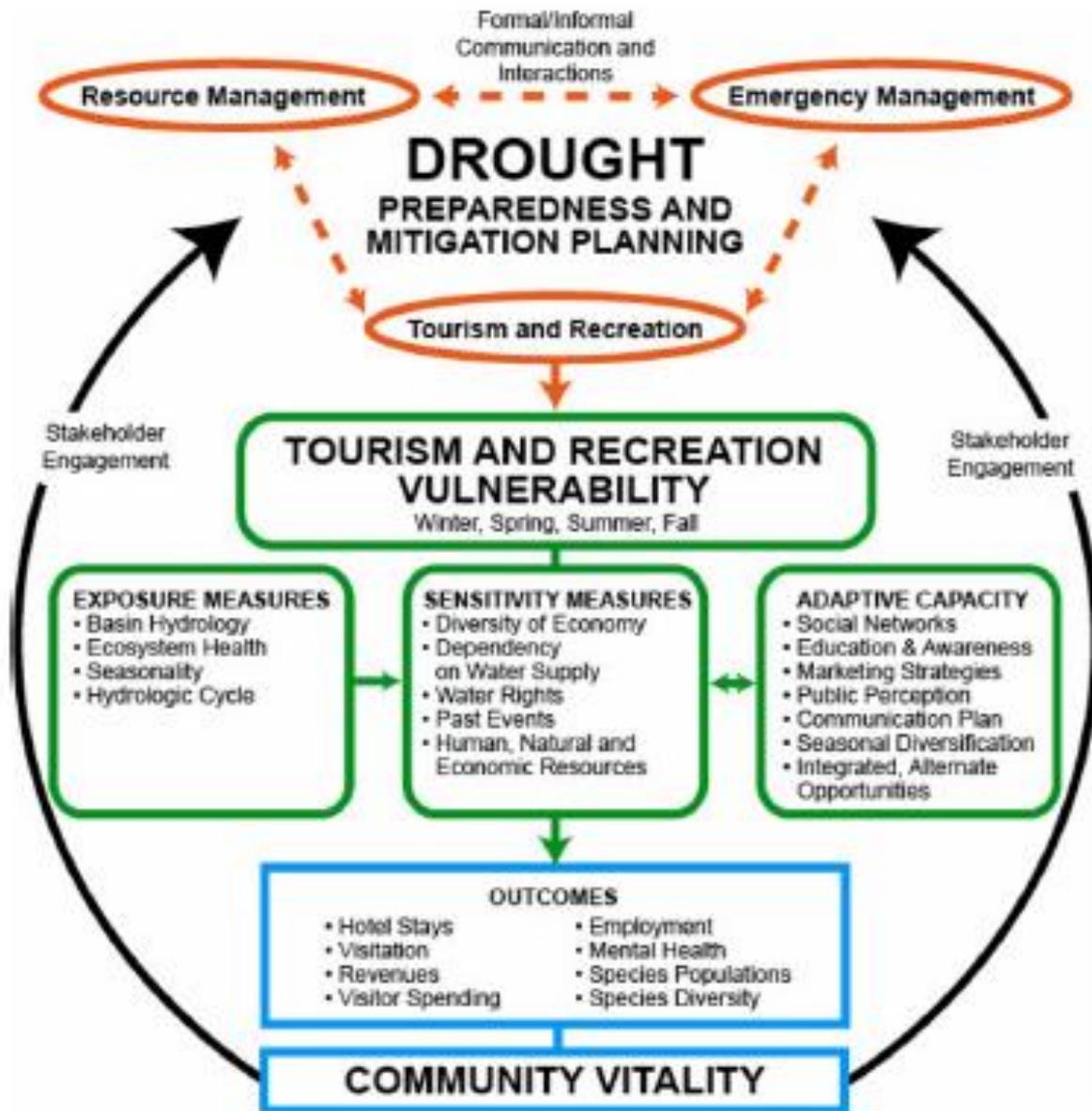


Figure 1. Drought-tourism/recreation conceptual framework.

Source: Thomas, D.S.K, et al. 2013. A comprehensive framework for tourism and recreation drought vulnerability reduction. Environmental Research Letters 8, doi:10.1088/1748-9326/8/4/044004.

Challenges Opportunities



▶ Connecting impacts and indicators

▶ Particular sectors use specific indices

- ▶ Agriculture (PDSI, CMI)
- ▶ Hydrology, water supply (streamflows, SPI, SWSI)
- ▶ Fire (KBDI)

▶ Defining drought for coastal ecosystems

- ▶ Drivers: precipitation, freshwater inflows, sea level, water management
 - Key stressor/indicator: salinity, movement of the saltwater-freshwater interface
 - Opportunity to use data from existing USGS (and other agency) specific conductance/salinity gages



Building blocks



- ▶ **Salinity is a shared concern across many different stakeholders, agencies, organizations**
 - ▶ Management plans and assessments
 - ▶ e.g., NC ecological flows report, APNEP Comprehensive Conservation and Management Plan
 - ▶ Local decision makers, resource users and managers
 - ▶ CISA interviews
 - ▶ Researchers, academic community
- ▶ **Challenges (continued)**
 - ▶ Fostering connections between groups
 - ▶ Integration w/drought management activities



Building blocks



- ▶ **Priorities discussed at previous NIDIS-Carolinas workshops**
 - ▶ Identify which variables, thresholds, and impacts are most important to monitor and assess (e.g. chemical, physical, biological, socio-economic)
 - ▶ Determine appropriate temporal- and spatial scales
- ▶ **Existing monitoring programs – some examples:**
 - ▶ Long Term Ecological Research (LTER) Network
 - ▶ National Estuarine Research Reserve System
 - ▶ National Estuary Program
 - ▶ National Park Service Inventory & Monitoring Program
 - ▶ National Wildlife Refuge System Inventory & Monitoring Initiative
- ▶ **Transferability to other sectors and regions**
 - ▶ Public health, recreation and tourism, water infrastructure



References



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Questions?



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