Drought & Water Update for the AA Climate Goal Board
July 24th meeting

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OAR/Climate Program Office
Existing Activities
Cross-NOAA Examples

Monitoring and Forecasting

- **Applied research**: Evaluation of Long-Term Retrospective Forecasts with NCEP Climate Forecast System: Predictability of ENSO and Drought
- **Transition**: Improved water supply forecasts in support of the CO and SE NIDIS pilots
- **Delivery**: RCCs: Monitor and verify state climate extremes, Collect and distribute climate network information etc.

Impacts and Risk Assessment

- **Applied research**: Reconciling future streamflow projections in the Upper Colorado River Basin
- **Transition**: RCCs and State Climatologists as transition endpoints; Building partnerships with extension agencies to transition decision-support tools
- **Delivery**: Provide information regarding impacts and risks associated with water resource reliability

Informing Adaptation

- **Decision support research**: Evaluation of Paleoclimatic Data in Drought Planning for California
- **Transition**: Drought-Ready Communities
- **Delivery**: Regional climate outlook forums
Multi-Line Execution Model for Drought & Water

Proposed NOAA Executive Working Group members*
- Physical Sciences Division
- Coastal Services Center
- Office of Hydrology/RFCs
- NCDC
- CPC

Advisors: Executive Council-Exists for NIDIS

LO Sponsor = OAR
Project Lead = Roger Pulwarty
Drought - A continuum and a deficit

Heat Waves
Storm Track Variations
Madden-Julian Oscillation

El Niño-Southern Oscillation
Decadal Variability
Solar Variability
Deep Ocean Circulation
Greenhouse Gases

SHORT-TERM
INTERANNUAL
DECADE-TO-CENTURY

The future (2041-2060):
where do the projections agree and why?

Drought of 1931-1940
Drought of 1950-1957

1930s 1950s
The NIDIS governance structure promotes cross-NOAA and multi-agency development and implementation of information systems to support adaptation decisions across climate timescales (weather extremes, variability and change).

- Identify and characterize impacts, observations and forecasts of climate across timescales
  (Identifying and Assessing Risks and Impacts)

- Assess & Improve the accessibility and utility of information to meet user needs
  (Informing Decisions- Products, Prototyping, and Delivery)

- Engage federal and non-federal partners to align research and practice to inform decision making
  (Building Coordination & Capacity)
Regional Drought Early Warning Information Systems

NIDIS Implementation
Over 50 Federal, state, tribal and private sector representatives nationally

Integrated Monitoring and Forecasting
NRCS, USGS
River Forecast Center, BoR
Climate Prediction Center
USDA

Interdisciplinary Needs Assess., Research, Applications
Regional Integrated Sciences and Assessments
Regional Climate Centers
NCAR

U.S. Drought Portal
NCDC
NDMC-NOAA, USGS, USDA, USBoR

Public Awareness And Education
State Climatologists, NWS-CSD
USDA Extension

Engaging Preparedness Communities
NDMC
State and Tribal Offices, RISAs
US BoR, USACE, Counties
NIDIS-Developing Regional Early Warning Systems

Hydrologic Unit Boundaries

- Pacific Northwest
- Upper Missouri Basin
- Great Lakes
- Colorado River Basin
- Chesapeake Bay
- Tennessee Valley
- Southeast ACF Carolinas
- TX, OK, NM
- California

Timeframes:
- SHORT-TERM: Seasonal (30 days to 1-4 seasons)
- DECADE-TO-CENTURY: 10 years to 100 years
Regional Integrated Sciences and Assessments Program

Support cross-regional efforts to assess user needs, test drought-focused decision support tools

Coping with Drought Research

Sectoral Applications Research Program

Identify socio-economic effects of drought and data and info needs of resource managers and policy/decision makers

Evaluate and transition drought information products to operations

Regional Climate Centers
State Climatologists
RCSDs
Ensemble evaporation estimates

6 Western River Forecast Centers (RFC)

Water Supply Forecasts

Ensemble Streamflow Forecasts

Historical Streamflow

Metadata

Central Database

RFC Website

NIDIS Web Services

NIDIS (RFC/CPC, BoR)
Next Steps

• Understand the role of precipitation events in reducing the severity or ending drought conditions and the influence of temperature in exacerbating (or reducing) drought severity and duration

• Develop new regions for early warning systems: Pacific Northwest, Chesapeake Bay, Great Plains (transferring approaches from earlier pilots)

• Initiate a network of Regional Drought Information Coordinators for existing EWS
Next Steps-Help needed
Drought-Water EWG

• Developing partnerships with extramural groups- state, tribal, private, and local agencies, organizations, and other stakeholders on developing and implementing early warning information that include impacts assessments

• Improving the understanding of climate variability and forecast reliability across a variety of timescales (influence of decadal scale forcings and land surface feedbacks on seasonal forecast reliability);

• Assessing current understanding of climate processes, model and observational capabilities for accurately representing watershed scales and budgets

• Characterizing and communicate relevant uncertainties

• Developing and delivering skillful drought and flood outlooks that integrate antecedent, existing and predicted conditions

• Work across the Climate Goal Societal Challenges team on cross-scale water-related issues e.g. coastal/nearshore impacts
Backup Slides
• **Public Law (109-430, 2006) better informed and more timely drought-related decisions leading to reduced impacts and costs**

• **Specific Tasks**
  - Provide an effective drought early warning system:
    - collect and integrate key indicators of drought severity and impacts; and (b) produce timely information that reflect local, regional, and State differences;
  - Coordinate and integrate as practicable Federal research in support of a drought early warning system
  - Build upon existing forecasting and assessment programs and partnerships
Regional Water (NIDIS) | Coastal Inundation | Weather and Climate Extremes
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Defined Centralized Funding | Unidentified or Decentralized Funding
Specific Legislative Mandate | Broad NOAA Mission Mandate
Clearly Defined Project Management Structure | No Defined Project Management Structure
Clearly Defined Project Requirements | Project Requirements Are Not Fully Defined
What does the NIDIS prototype allow—

• **Developing an Information Pedigree**—Relevant, authoritative, accessible, compatible/usable
  • Downscaling is valuable but not a substitute for monitoring and understanding local climates

• **Overcoming impediments to information flow**
  • **Existing barriers** to cross-agency collaboration to be addressed or least be made explicit
  • **Innovations** and new information to be **introduced and tested**, and
  • **The benefits of participation** in design, implementation and maintenance to be **clarified**

Mature prototypes become the regional early warning system and are more likely to be viewed as transferable
Coping with Drought: Examples

Drought decision support portal for the Republican River Basin (NE,KS)

Reconciling projections of CO Basin streamflow (multiple)

Develop climate training workshops targeting Extension Agents/Farm Bureaus (OK,TX)

Paleoclimatic Information for Drought Planning and Decision Making (AZ,CA)

Link NOAA climate forecasts to dynamic vegetation models to produce seasonal predictions for fire management (NV)
Identify user requirements
Conduct research

Develop/test applications
Integrate knowledge and products

Deliver products
Disseminate information
Data quality control

RESEARCH & DEVELOPMENT & PROTOTYPING & DELIVERY
Measures

• The number of states and institutions with improved capacity to inform risk management and reduce exposure to drought and flood risks

• The number of staff in or working with those institutions trained to develop and communicate local drought information and help reduce impacts

• The number of research projects that conduct and update drought impacts and user needs assessments in drought-sensitive parts of the US and

• The percentage of the U.S. population covered by adequate drought risk and early warning information systems
NOAA is constructing the IWRSS National Water Center (NWC) at the University of Alabama, Tuscaloosa.

- 60,000 SF facility (full occupancy = 200)
- groundbreaking was February 21, 2012
- completion in Summer 2013

**Key Components & Capabilities**

- operations center for water analysis, forecasting and decision support
- applied water resources research and development center
- geo-intelligence laboratory
- distance-learning center
- Joint agency coordination and collaboration; common operating picture
- multi-agency interoperability