



Managing Western Fish, Wildlife and Plants in an Era of Changing Climate and Increasing Drought

Presentation to RNRF Congress on
Sustaining Western Water

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DROUGHT!



DROUGHT

The United States is no stranger to drought

Dust Bowl of 1930s

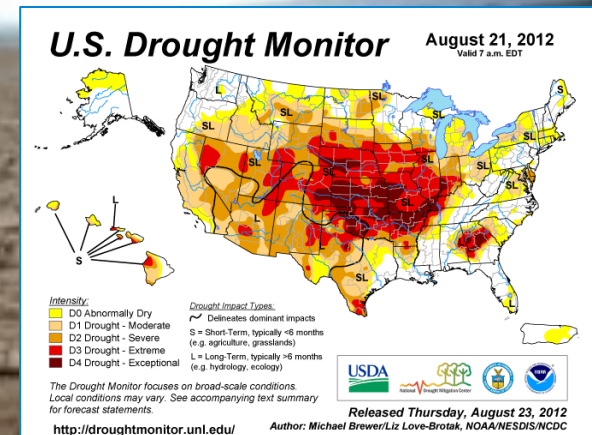
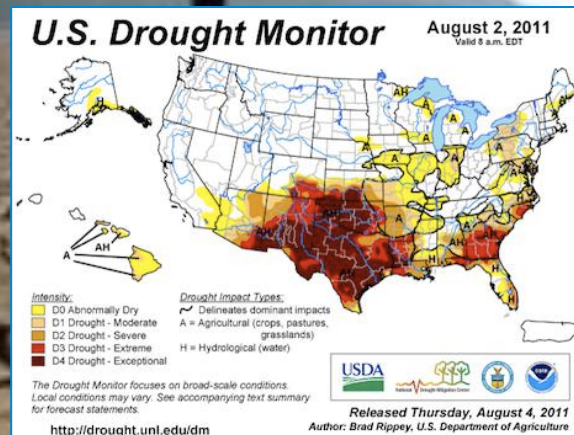
Devastating droughts also occurred in:

- 1950s (Great Plains & SW)
- 1960s (NE)
- 1988-89 (widespread)



DROUGHT

Recent droughts in:
-- Texas
-- Great Plains




Ongoing drought in California



DROUGHT

- ❖ Recent trend toward:
 - ✓ Increasing regional drought (Ficklin et al. 2015)
 - ✓ Possibly increasing drought variability (Rayne and Forest, unpubl)
- ❖ Changes largely due to changing potential evapotranspiration -- PET (Ficklin et al. 2015)



DROUGHT – The Future

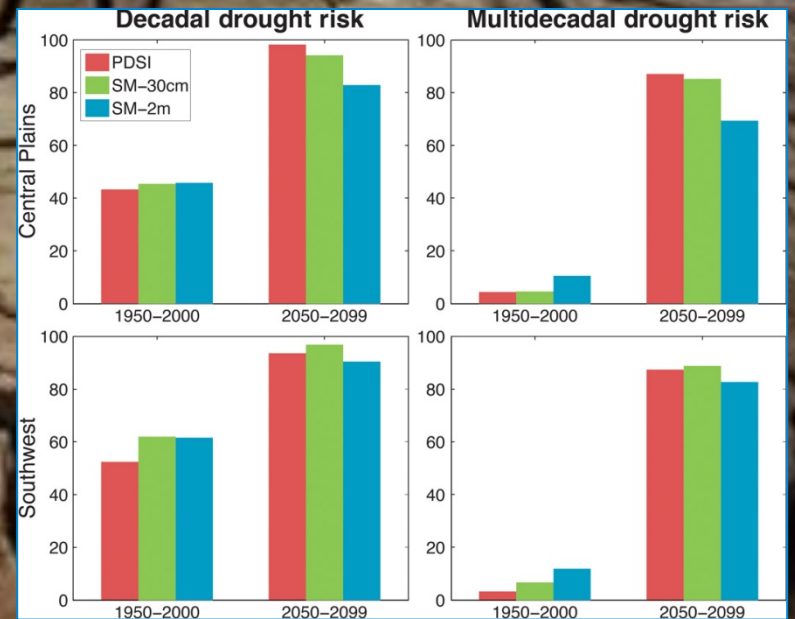
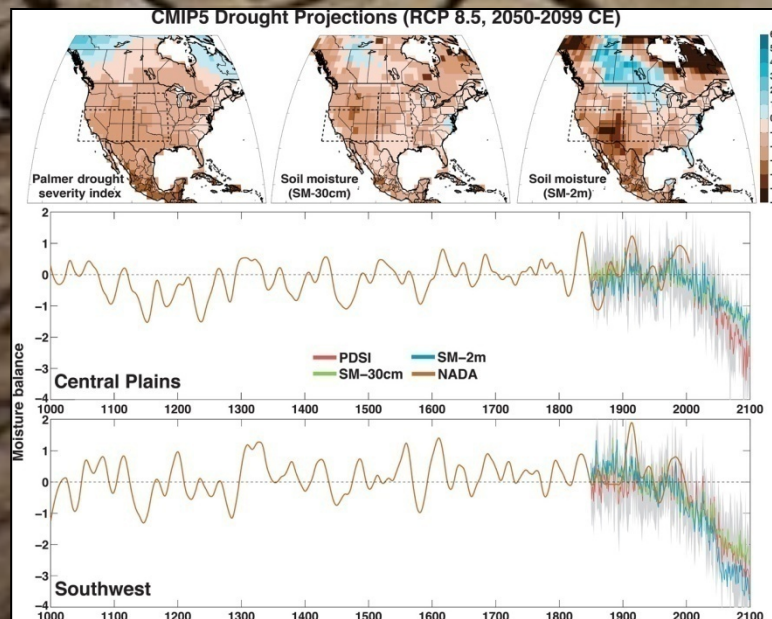
National Climate Assessment (2014):

Short-term (seasonal or shorter) droughts are expected to intensify in most U.S. regions.

Longer-term droughts are expected to intensify in large areas of the Southwest, southern Great Plains, and Southeast.

DROUGHT – The Future

Cook et al. (2015) modeled potential future drought conditions in Southwest and Central Plains of western N.A.



A photograph of two people wading in a river. One person, wearing a dark shirt and waders, is holding a large, light-colored net. The other person, wearing a light shirt and shorts, is standing next to them. They are both looking down at the net, which is partially submerged in the water. The background is a dense forest with tall trees. The water is dark and rippling. The overall mood is somber and contemplative.

LESS WATER

MORE PROBLEMS

For USFWS “Trust Resources”

- *National Wildlife Refuges*
- *ESA-listed Species*
- *Migratory Birds*
- *Certain Migratory Fish*
- *National Fish Hatcheries*



National Wildlife Refuges

- Camas NWR (ID)
- Central Valley of CA (10 NWRs and 6 WMAs)
- Klamath NWRs (N. CA & S. OR)
- Malheur (OR)
- Modoc (CA)
- Ruby Lake (NV)
- Bitter Lake, Bosque del Apache, Las Vegas (NM)
- Hagerman (TX)
- Salt Plains (OK)
- Wichita Mountains (OK)
- Quivira (KS)

National Wildlife Refuges

➤ Quivira NWR (KS)

- ❖ Droughts are part of a natural cycle at Quivira
- ❖ However “exceptionally high risk of a multidecadal megadrought occurring over the Central Plains and Southwest regions during the late 21st century”



ESA-listed Species

- Bay Delta (CA) – Delta smelt
- Santa Ana River system (CA) – Santa Ana sucker, Santa Ana woolly-star, and other species
- Clear Lake (CA) – Lost River and shortnose suckers
- S. California – Peninsular bighorn sheep
- Warner Lakes (OR) – Warner sucker
- Oregon – Oregon spotted frog
- Middle Rio Grande (NM) – Rio Grande Silvery Minnow
- Mojave Desert (NV) – Desert tortoise
- Arizona – Chiricahua leopard frog
- Nevada – Lahontan cutthroat trout



Migratory Birds

➤ California –

❖ Spring 2015, locally breeding waterfowl reached lowest population level since 1992

➤ Nevada –

❖ Stillwater NWR in 4th consecutive year of extreme drought



Certain Migratory Fish

➤ California –

- ❖ Relative abundance of Delta and longfin smelt has decreased
- ❖ Natural spawning runs of salmon have experienced near failure of entire year classes.

➤ Oregon and Washington –

- ❖ Warm water temperatures in mainstem Columbia R. are impeding upstream migration of adult salmon.



National Fish Hatcheries

➤ NFHs impacted include:

- ❖ Leavenworth
- ❖ Warm Springs
- ❖ Coleman
- ❖ Winthrop
- ❖ Makah
- ❖ Hagerman
- ❖ Kooskia
- ❖ Entiat
- ❖ Lahontan



Responding
to Western
Drought:
*Short-term
Intervention
vs .
Long-term
Solutions*



Responding
to Western
Drought:
*Short-term
Intervention*



Responding to Western Drought: *National Wildlife Refuges*



- ❖ Many western NWRs depend on “delivered water” to maintain managed wetlands
- ❖ To address needs, NWRs have:
 - ✓ Prioritized habitat areas receiving water
 - ✓ Received water allocations later in season
 - ✓ Increased groundwater pumping
 - ✓ Allowed some wetlands to dry
 - ✓ Reduced grazing on wetlands
 - ✓ Treated invasive plants
 - ✓ Worked with water mgmt agencies on water rights/allocations
 - ✓ Identified gaps and needs
 - ✓ Continued to monitor flows at refuges

Responding to Western Drought: *ESA-listed Species*



- ❖ **Activities have included:**
 - ✓ **Capture and translocation or captive maintenance**
 - ✓ **Creation of new, artificial habitats**
 - ✓ **Grazing and vegetation management in riparian areas**
 - ✓ **Woody fuels thinning to reduce wildfire risk**
 - ✓ **Emergency Section 7 consultations directed at drought response and wildfires**
 - ✓ **Increased interaction with water management and other agencies to address water needs**

Responding to Western Drought: *Migratory Birds*



- ❖ Response has primarily involved providing habitat on refuges and private lands
- ❖ Activities have included:
 - ✓ Using groundwater to offset lack of surface water
 - ✓ JVs using incentives to get farmers to flood ag areas, esp. rice fields
 - ✓ Prioritizing wetlands to receive water
 - ✓ Translocation of some birds
 - ✓ Using drought conditions for good—invasives removal

Responding to Western Drought: *Fisheries*



- ❖ Fisheries in the west are challenged by changing flow and temperature regimes
- ❖ Activities have included:
 - ✓ Fish translocations
 - ✓ Disease monitoring
 - ✓ Increased monitoring of populations
 - ✓ Collaboration with partners to develop measures to increase resiliency of streamflows
- ❖ See activities of National Fish Hatcheries (next slide)

Responding to Western Drought: *National Fish Hatcheries*



- ❖ **National Fish Hatcheries in the west are also challenged by changing flow and temperature regimes**
- ❖ **Activities have included:**
 - ✓ **Removing unhealthy fish**
 - ✓ **Moving healthy fish to other facilities**
 - ✓ **Releasing fish earlier than normal**
 - ✓ **Monitoring and controlling disease outbreaks**
 - ✓ **Monitoring water flows and temperatures**
 - ✓ **Infrastructure and operational changes**
 - ✓ **Assessing climate vulnerability:**
 - ❑ **Winthrop NFH – Climate Change Vulnerability Assessment -- 2013**

Responding
to Western
Drought:
*Long-term
Solutions*



COLLABORATIVE APPROACHES: *SHARED SOLUTIONS TO PROTECT SHARED VALUES*



NATIONAL *fish, wildlife & plants*
CLIMATE ADAPTATION STRATEGY

❖ In Oregon (R1), USFWS is engaging in collaborative efforts in the Deschutes Basin

❖ Participating in a Basin Study that will:

- ✓ (1) analyze water supply and demand;
- ✓ (2) assess how existing operations and infrastructure will perform under projected future conditions and demands;
- ✓ (3) develop and evaluate options for addressing water imbalances.



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CLIMATE ADAPTATION STRATEGY

❖ In California (R8), USFWS is working with many partners:

- ✓ Water allocation optimization model development with UC Davis
- ✓ Project to better estimate water requirements for wetlands in the Sacramento Valley
- ✓ Participate in the Central Valley drought coordination team
- ✓ Developing a data portal with partners to share water availability conditions across the Central Valley.



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CLIMATE ADAPTATION STRATEGY

❖ In 2015, the Southwest Region's (R2) Science Applications Program initiated a project that focuses on holding basin-specific forums:

- ✓ To review land and water management practices
- ✓ To improve the capacity of resource managers to more reliably meet the needs of all water users



NATIONAL *fish, wildlife & plants*
CLIMATE ADAPTATION STRATEGY

MORE PARTNERS



LANDSCAPE CONSERVATION
COOPERATIVES

MORE SOLUTIONS

LCC Tools for Managing Drought & Other Climate Stressors



Vulnerability



Predictability



Collaboration



Knowledge



WaterSMART



Predictability



SOUTHERN ROCKIES
Landscape Conservation Cooperative

"Planning for Salt Lake City's future water supply due to climate change impacts will depend on both the experience of water managers and expertise of the science community."

-Tracie Kirkham

Salt Lake City Department
of Public Utilities



SOUTHERN ROCKIES
Landscape Conservation Cooperative

southernrockieslcc.org

Central Valley Landscape Conservation Design Project



Collaboration



californialcc.org

Central Valley Landscape Conservation Design Project

- ❖ Collaborative effort including state, federal and local agencies, non-profits and existing partnerships.
- ❖ Developed suite of plausible futures through scenario planning – “Central Valley Future Scenarios”
- ❖ Assessed vulnerability of key resources
- ❖ Developing adaptation strategies to guide climate-smart actions in the future.



californialcc.org

Southwest Climate Summit



Knowledge

LCCs & CSCs

The background of the slide is a photograph of a desert landscape at sunset or sunrise. In the foreground, there is a field of tall, dry, golden-brown grass. A small, brown and white goat-like animal with small horns is standing in the grass, facing left. In the background, there are rolling hills and mountains under a hazy, orange-tinted sky.

Southwest Climate Summit

- ❖ Discover emerging climate science
- ❖ Explore adaptive management
- ❖ Share Climate-Smart Conservation results
- ❖ Discuss management and policy responses

swcsc.arizona.edu

MORE INVOLVEMENT MORE SUCCESS



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