Sustainable Rivers Program

Lake Red Rock Research Collaboration

& Coordination Meeting

February 2023

- Perry Thostenson
  Natural Resource Specialist

U.S.ARMY

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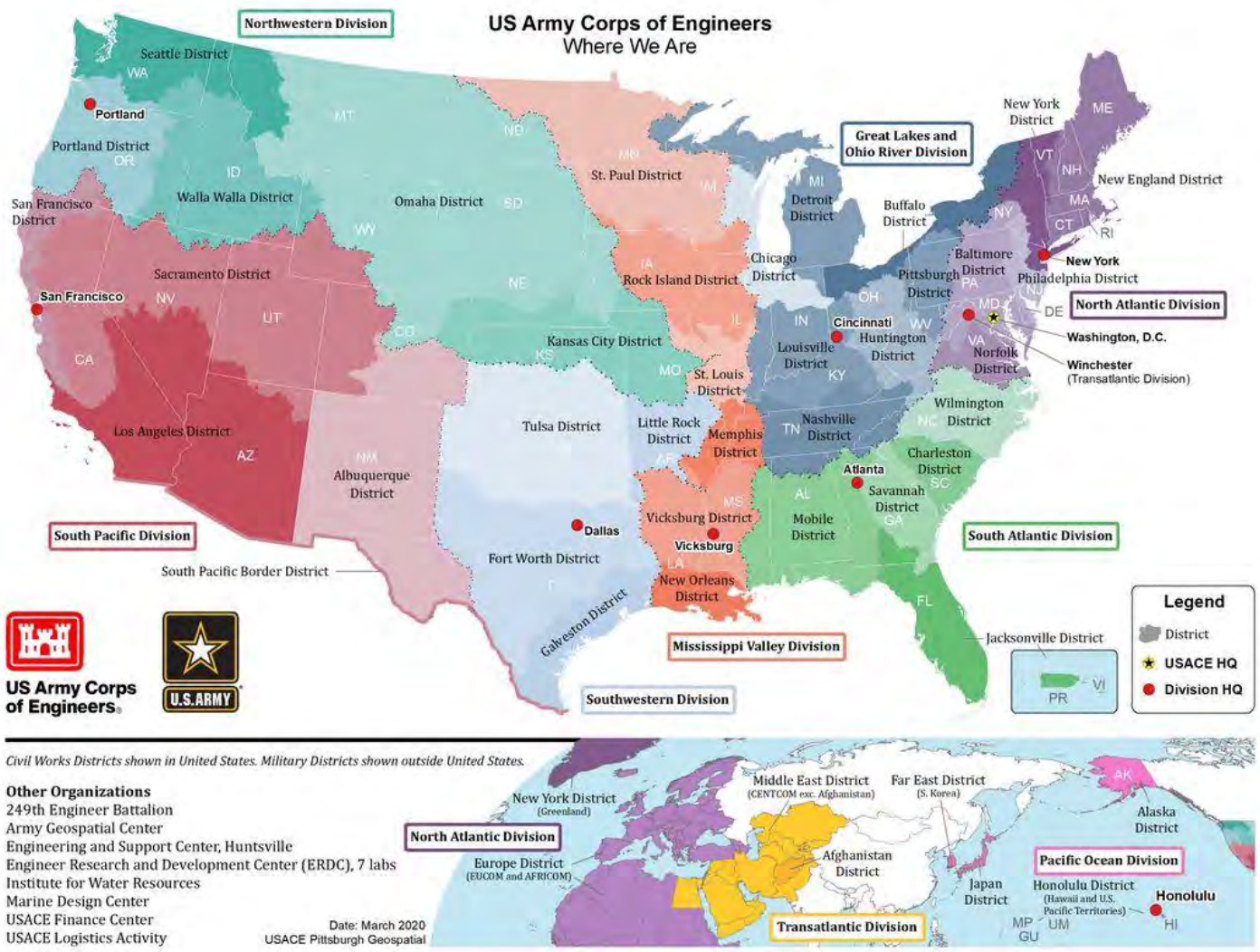
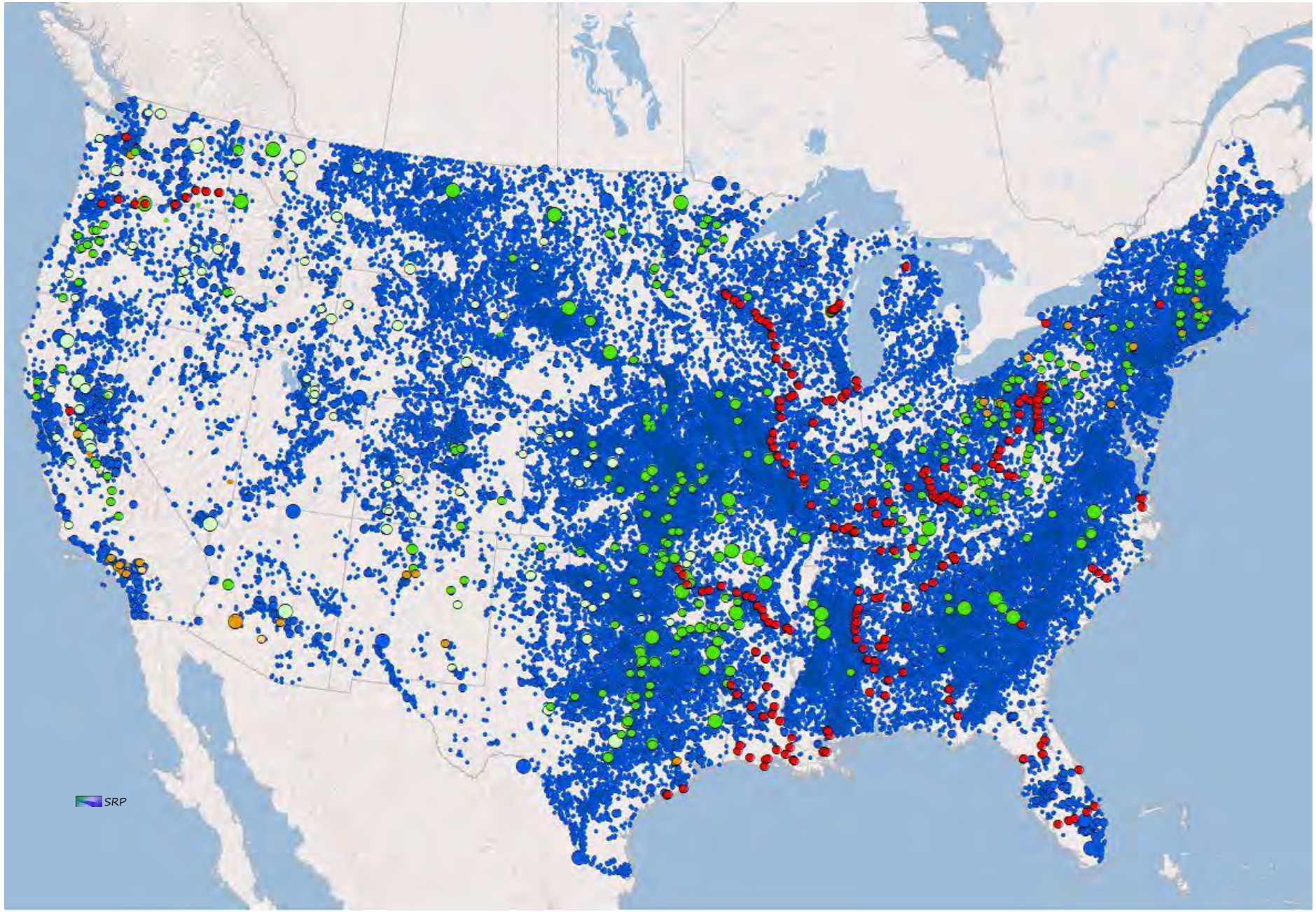
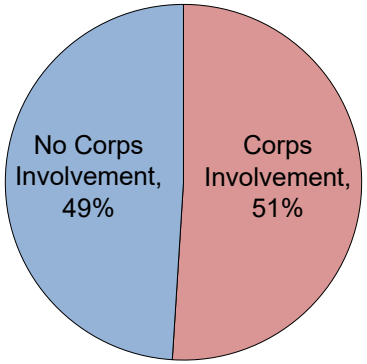

US Army Corps of Engineers
Where We Are
Northwestern Division
Seattle District
WA
Portland
Portland District
OR
ID
Walla Walla District
MT
Omaha District
ND
SD
WY
NE
San Francisco District
Sacramento District
San Francisco
NV
UT
CA
CO
Los Angeles District
AZ
NM
Albuquerque District
South Pacific Division
South Pacific Border District
Dallas
Fort Worth District
Tulsa District
Kansas City District
KS
MO
St. Paul District
MN
IA
Rock Island District
IL
St. Louis District
Little Rock District
AR
Memphis District
Vicksburg District
Vicksburg
MS
LA
New Orleans District
Galveston District
Mississippi Valley Division
Southwestern Division
Great Lakes and Ohio River Division
Detroit District
MI
Chicago District
Buffalo District
NY
Pittsburgh District
PA
OH
IN
Cincinnati
Louisville District
KY
WV
Huntington District
Nashville District
TN
Baltimore District
MD
DE
NJ
Philadelphia District
New York
New York District
ME
VT
NH
MA
CT
RI
New England District
North Atlantic Division
Washington, D.C.
Winchester
(Transatlantic Division)
Norfolk District
VA
Wilmington District
NC
Charleston District
SC
Atlanta
Savannah District
GA
AL
Mobile District
South Atlantic Division
FL
Jacksonville District
PR
VI
Legend
District
USACE HQ
Division HQ
US Army Corps of Engineers
U.S.ARMY
Civil Works Districts shown in United States. Military Districts shown outside United States.
Other Organizations
249th Engineer Battalion
Army Geospatial Center
Engineering and Support Center, Huntsville
Engineer Research and Development Center (ERDC), 7 labs
Institute for Water Resources
Marine Design Center
USACE Finance Center
USACE Logistics Activity
Date: March 2020
USACE Pittsburgh Geospatial
New York District
(Greenland)
North Atlantic Division
Europe District
(EUCOM and AFRICOM)
Middle East District
(CENTCOM exc. Afghanistan)
Afghanistan District
Transatlantic Division
Far East District
(S. Korea)
Japan District
AK
Alaska District
Pacific Ocean Division
Honolulu District
(Hawaii and U.S. Pacific Territories)
Honolulu
HI
MP
GU
UM

Dams & Reservoirs



by Storage (795 MAF)



- Count = 0.5%
  NID = 89,028 (dams);
  Corps FRM = 465 (reservoirs)

- Storage (NID_Storage) = 51.0%
  NID = 795 million ac-ft
  Corps FRM = 405 million ac-ft

Type:
National Inventory of Dams (2016)
Corps General Reservoirs
Corps Dry Dams
Section 7 Dams
Corps Locks and Dams = 235

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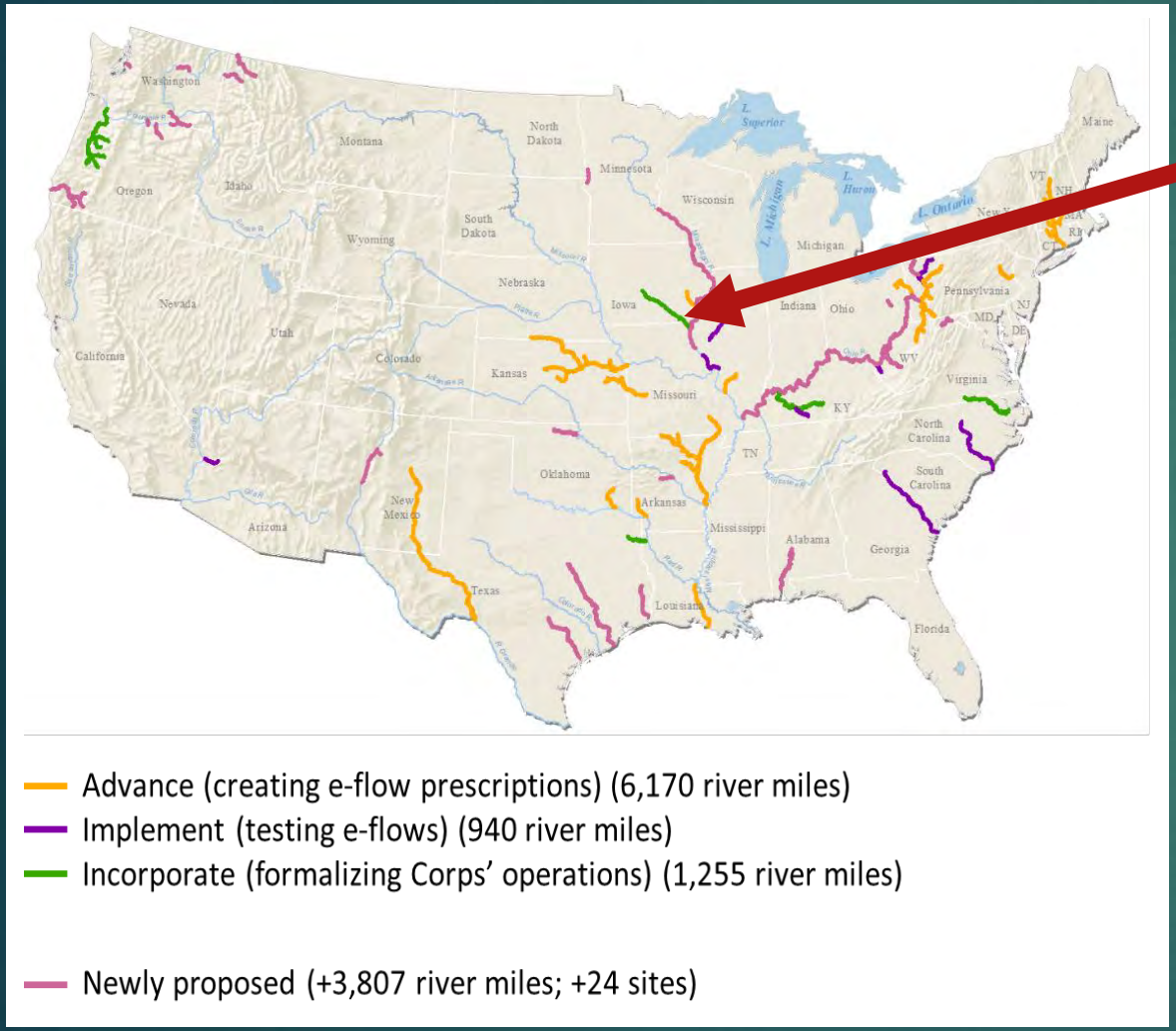
Des Moines River Sustainable Rivers Project



- Des Moines River SRP est. in 2015
- "Incorporate" since 2019
- SRP Science Investments

Sustainable Rivers Program

(Mission, Goal, and Process)

Mission: Improve the health and life of rivers by changing infrastructure operations to restore and protect ecosystems, while maintaining or enhancing other project benefits

Goal: Advance, implement, and incorporate environmental strategies at USACE water resources infrastructure

Process for SRP work has three phases:

- Advance - engaging teams in a science-based processes to define potentially beneficial environmental strategies
- Implement - testing the effectiveness and feasibility of the defined strategies
- Incorporate - including reviewed strategies in operations guidance such as water control manuals.

Sustainable Rivers Program

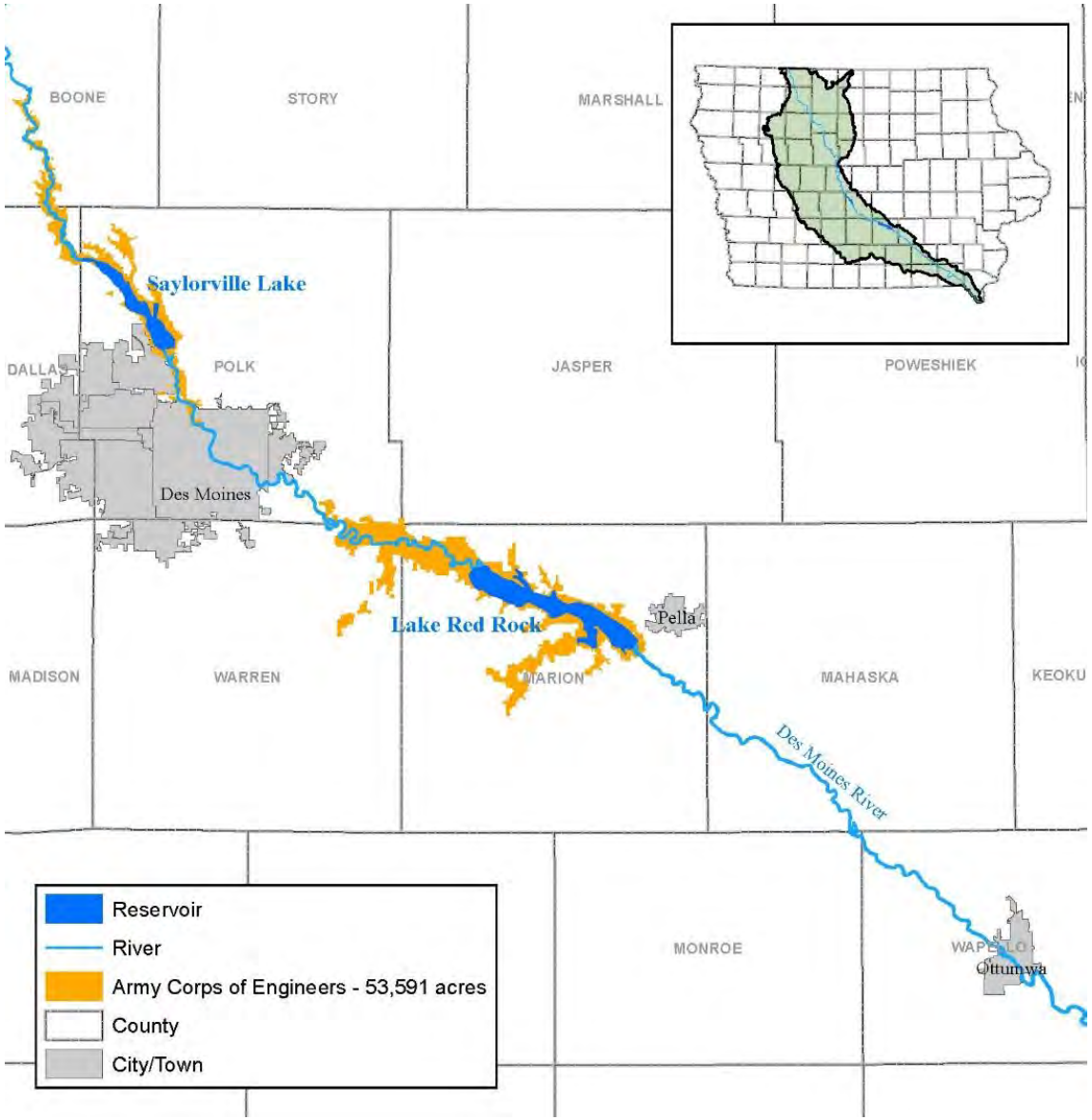
(Summary)

SRP works with water managers, operators, planners, scientists, and stakeholders to:

- Modernize strategies for operating purposes related to the environment at Corps water resources infrastructure
- Deliver more benefits from infrastructure
- Formulate alternative management strategies for rivers and ecosystems associated with infrastructure

40 rivers, 89 reservoirs, 10,953 river miles (2021)

Advance, implement, incorporate e-strategies



Des Moines River Watershed

Saylorville Dam – Des Moines River

- 5,950 SURFACE ACRES
- 5,823 Mi^2 DRAINAGE
- FLOOD RISK MANAGEMENT.
- WATER SUPPLY
- LOW-FLOW AUGMENTATION
- RECREATION
- FISH & WILDLIFE

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Red Rock Dam – Des Moines River

- 15,250 SURFACE ACRES
- 12,323 Mi^2 DRAINAGE
- FLOOD RISK MANAGEMENT.
- LOW-FLOW AUGMENTATION
- RECREATION
- FISH & WILDLIFE

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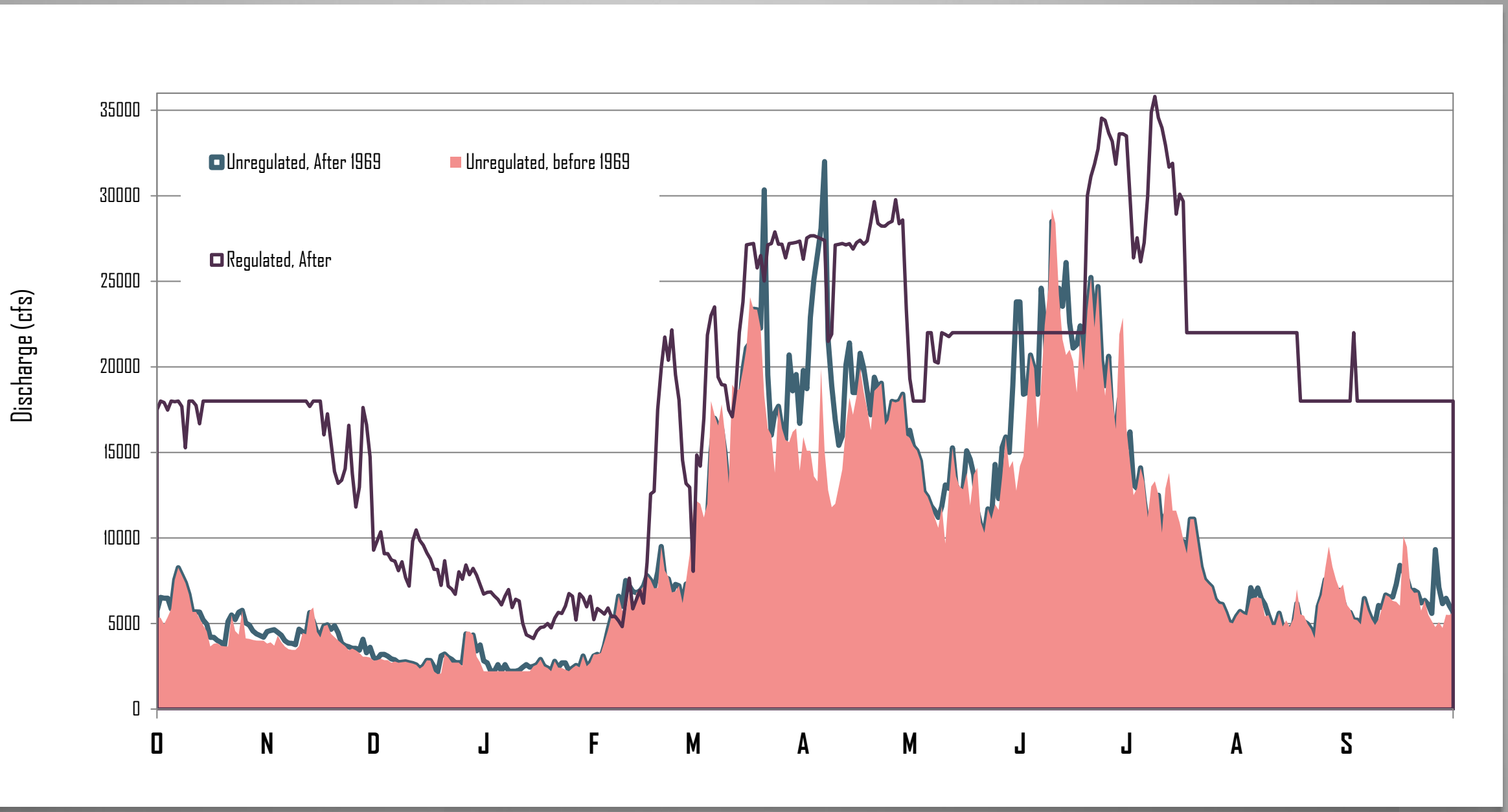
Discharge (cfs)
35000
30000
25000
20000
15000
10000
5000
0
Unregulated, After 1969
Unregulated, before 1969
Regulated, After
O
N
D
J
F
M
A
M
J
J
A
S

Why SRP on the DES MOINES RIVER?

- Lower Des Moines is important for ancient large river fishes – paddlefish and sturgeon – and other fish and aquatic species.
- Des Moines River is designated as a Globally Significant Bird Area by the American Bird Conservancy.
- Potential to improve WATER QUALITY & other environmental issues of the Des Moines River.

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Des Moines River SRP Process Overview

Environmental Flows Workshop

- 50 Expert Attendees
  - Fish and Mussels
  - Water Quality & Other Considerations
  - Floodplain habitat, riverine waterfowl and wildlife
- Summary Report with recommendations.

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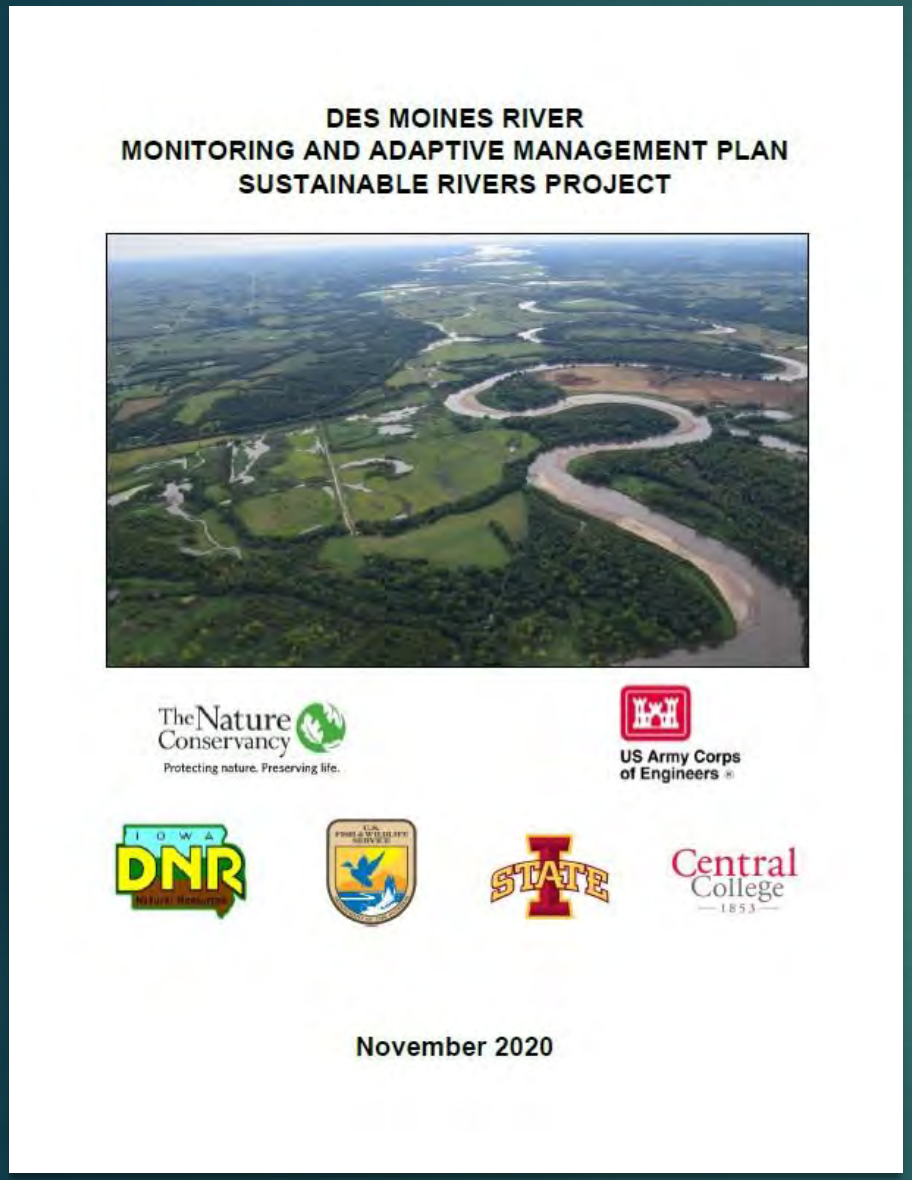
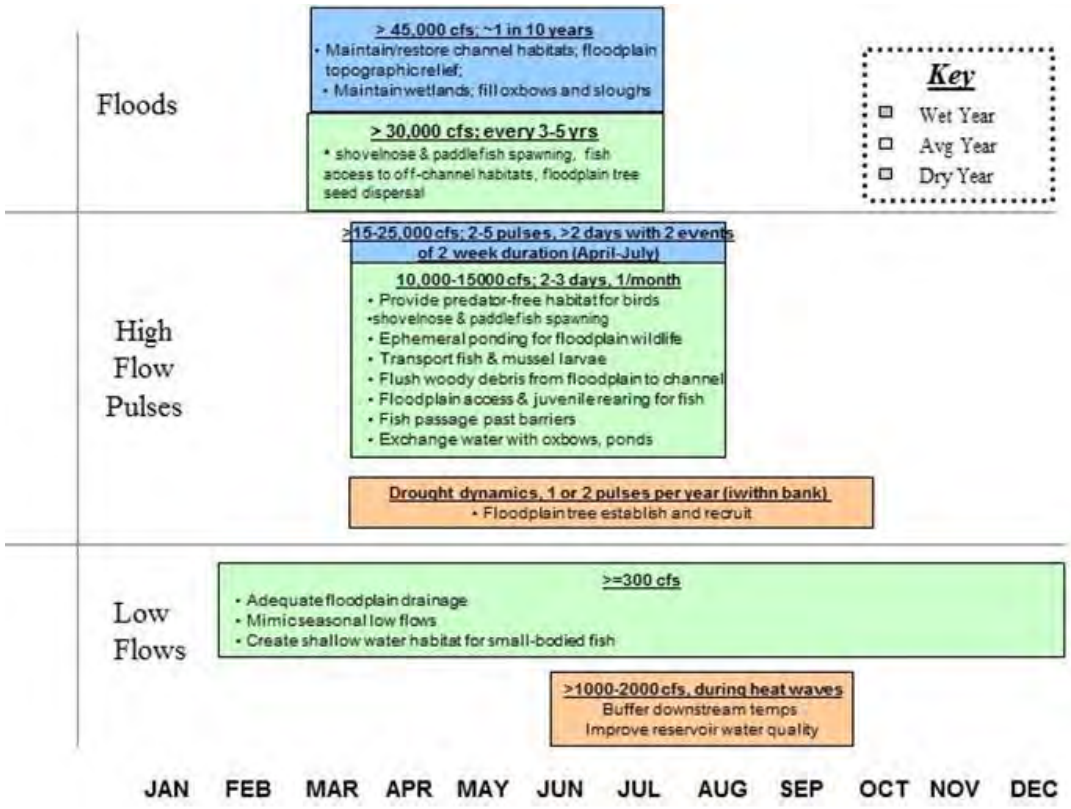


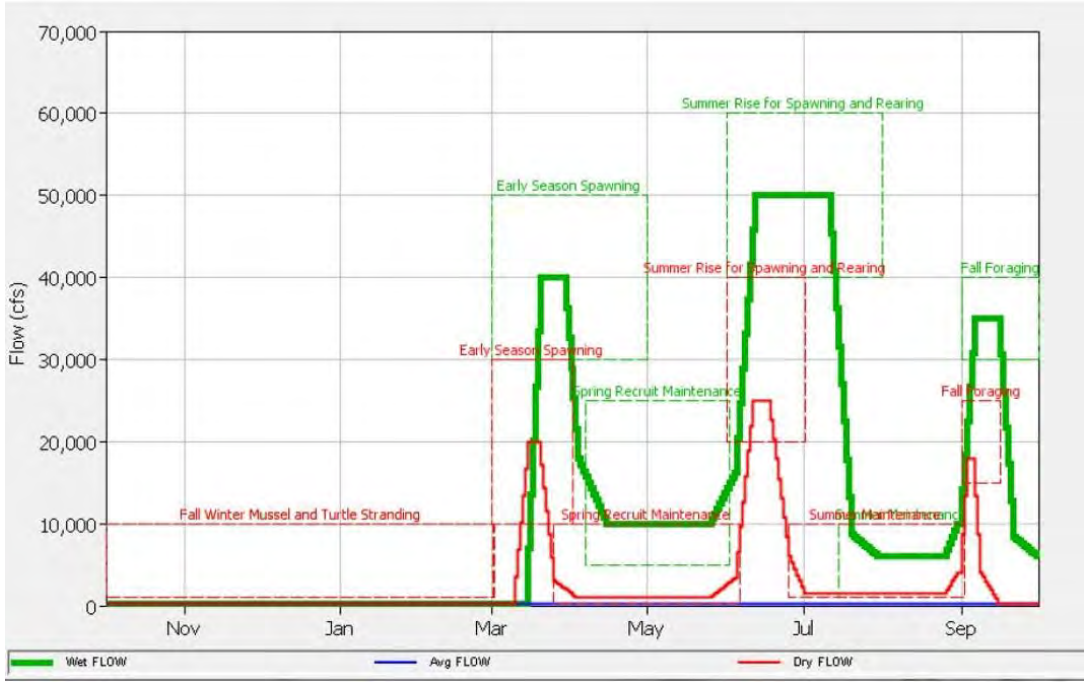
Adaptive Management and Monitoring Plan

- Plan created to guide implementation
- Maximize benefits of newly established Water Control Plan
- Define environmental metrics related to timing and quantity of flows
- Guide for monitoring and roles.

STAKEHOLDER ENGAGEMENT
* Recommendations

- Reduce Nitrate Levels
- Reduce Mussel Mortality
- Reduce Sturgeon Mortality
- Reduce Gas Bubble Trauma in Fish
- Improve Conditions for Migrating Waterfowl and Shorebirds
- Improve Conditions for Reptiles and Amphibians.
- Reduce Streambank Erosion
- Improve Conditions for River Recreation


Floods
> 45,000 cfs; ~1 in 10 years
• Maintain/restore channel habitats; floodplain topographic relief;
• Maintain wetlands; fill oxbows and sloughs
> 30,000 cfs; every 3-5 yrs
* shovelnose & paddlefish spawning, fish access to off-channel habitats, floodplain tree seed dispersal
Key
Wet Year
Avg Year
Dry Year
High Flow Pulses
>15-25,000 cfs; 2-5 pulses, >2 days with 2 events of 2 week duration (April-July)
10,000-15000 cfs; 2-3 days, 1/month
• Provide predator-free habitat for birds
•shovelnose & paddlefish spawning
• Ephemeral ponding for floodplain wildlife
• Transport fish & mussel larvae
• Flush woody debris from floodplain to channel
• Floodplain access & juvenile rearing for fish
• Fish passage past barriers
• Exchange water with oxbows, ponds
Drought dynamics, 1 or 2 pulses per year (iwithn bank)
• Floodplain tree establish and recruit
Low Flows
>=300 cfs
• Adequate floodplain drainage
• Mimic seasonal low flows
• Create shallow water habitat for small-bodied fish
>1000-2000 cfs, during heat waves
Buffer downstream temps
Improve reservoir water quality
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC


70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
Flow (cfs)
Summer Rise for Spawning and Rearing
Early Season Spawning
Summer Rise for Spawning and Rearing
Fall Foraging
Early Season Spawning
Spring Recruit Maintenance
Fall Foraging
Fall Winter Mussel and Turtle Stranding
Nov
Jan
Mar
May
Jul
Sep
Wet FLOW
Avg FLOW
Dry FLOW

Des Moines River Literature Review

- Review available scientific literature and identify the flow related needs of the aquatic community.
- Develop flow hypotheses and recommendations for consideration.
- Native communities depend on a mosaic of riverine habitats and fluvial processes to complete life cycle.
- KEY CONCEPT – Natural flow regimes & floodplain connectivity maintains ecological integrity.
- ULTIMATE GOAL - Integrate understanding of flow needs into real-time decisions about how and when water is released from reservoirs to achieve more natural flow regimes.

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Water Control Manual Revision

- Increased maximum releases.
- Avoid rapid stepdown of flows at Red Rock.
- Higher fall pool raise.
- Hold the fall pool raise through winter months.
- Spring retention for fish spawning.
- Implemented seasonal "conservation band" at Saylorville and Red Rock.

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Conservation Band = Adaptive Management

Saylorville Lake:

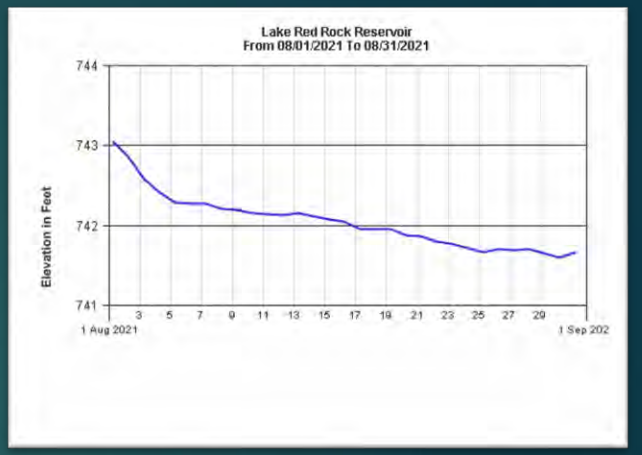
- 836 – 837 for Spring/Summer band (Mar 1 – Sept 1)
- 836 – 840 for Fall/Winter band (Sept 1 – Mar 1)

Lake Red Rock:

- 741.5 – 743 for Spring/Summer band (Mar 1 – Sept 1)
- 741.5 – 747 for Fall/Winter band (Sept 1 – Mar 1)

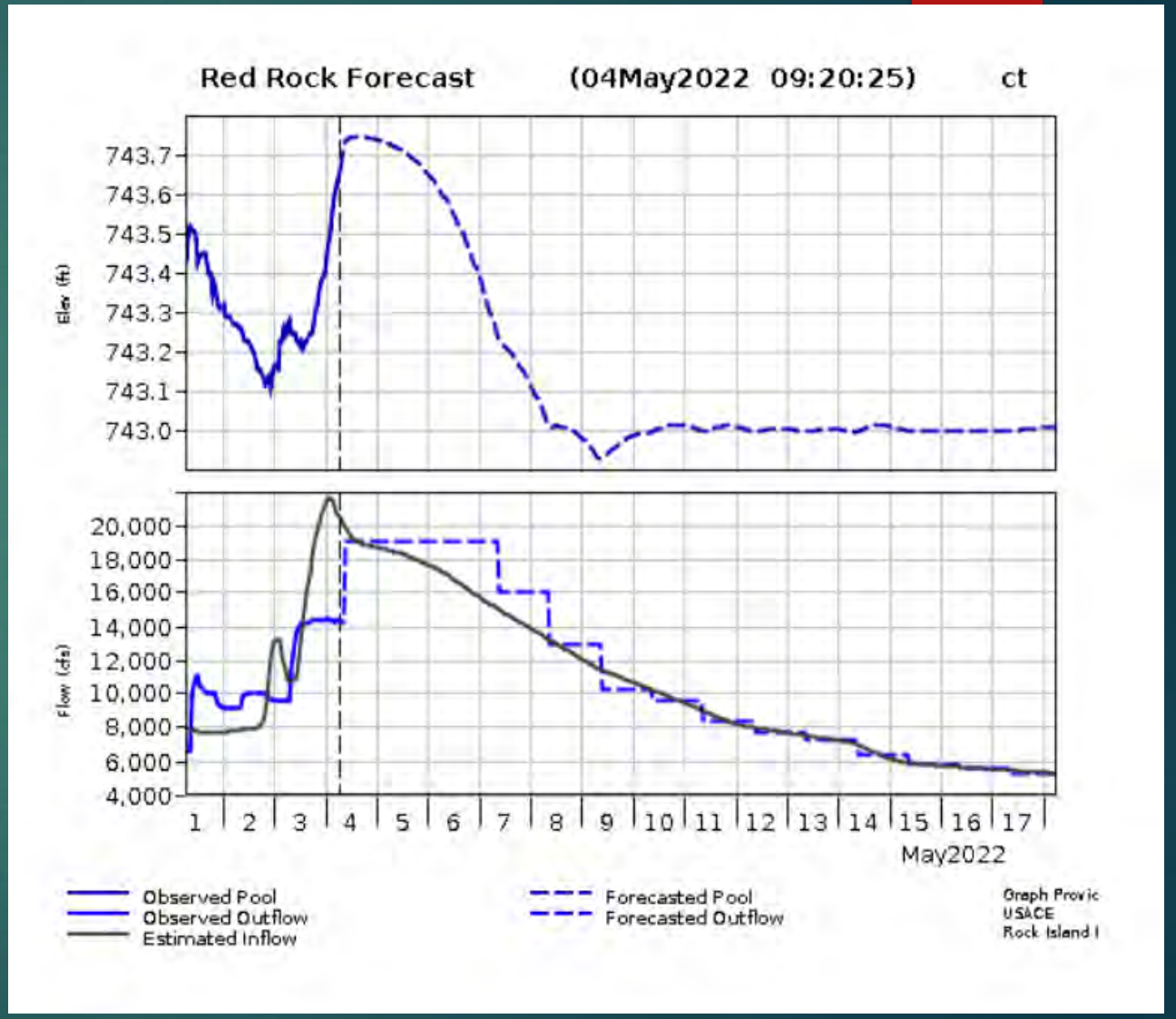
Reservoir Water Level Management (WLM)

- Seasonal drawdowns for shorebirds (2017/2020/2021)
- Hold drawdown to establish vegetation
- Slowly flood vegetation for waterfowl migration *OR*
- Raise pool for fish spawning habitat in spring
- Hold pool steady in winter months to protect herptiles
- Maximize denitrification processes to improve water quality



2017 SRP success story – late summer drawdown results in 11,000 shorebirds, previous high was 4,000 in one day

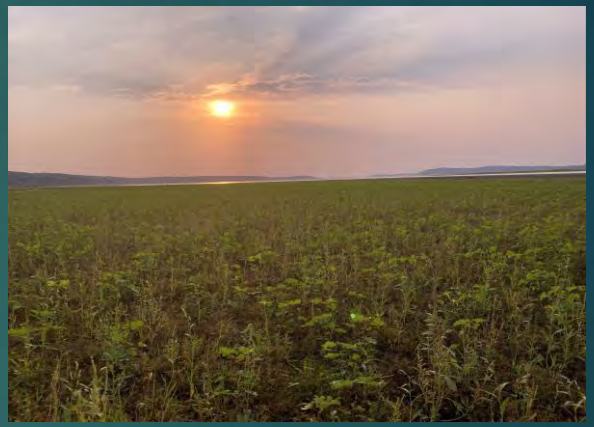
Environmental Flows

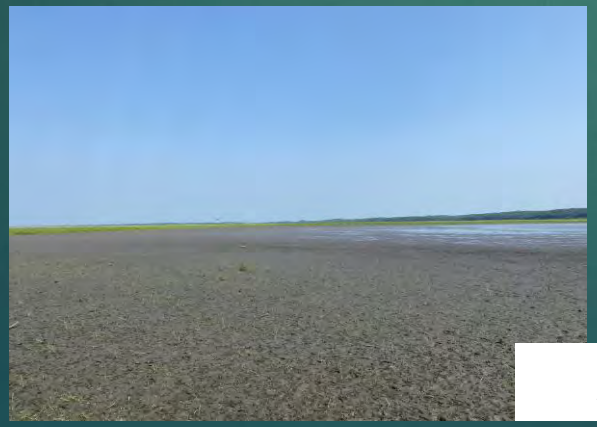


JULY

SEPTEMBER

Water Drawdown cycle





AUGUST

Lake Red Rock & Saylorville Lake

- Time Lapse Photography
- 2 Cameras at Lake Red Rock

- Red Rock cameras placed to focus on “delta”

Lake Red Rock

- Waterbird and Vegetation Study with Iowa State University

- Shorebird first season results:
- 57 Total shore bird species
- Waterbird total count: 175,245
- Shorebird : 35,593 total counted for the season.
- 60 least sandpipers that were trapped and got transmitters

Vegetation responses to controlled water level management in Iowa

NICOLE BOSCO[1] AND STEPHEN J. DINSMORE[1]

[1]DEPARTMENT OF NATURAL RESOURCE ECOLOGY AND MANAGEMENT, IOWA STATE UNIVERSITY

Study objectives

Two primary objectives:

1. Measure vegetation responses (species diversity, cover, etc.) to dropping water levels in late summer
2. Link vegetation responses with wildlife benefits

The Effect of Experimental Flows on Fish Reproduction Downstream of a Reservoir

Erik Griffen and Dr. Michael Weber

Department of Natural Resource Ecology and Management, Iowa State University, Ames, IA 50011, USA

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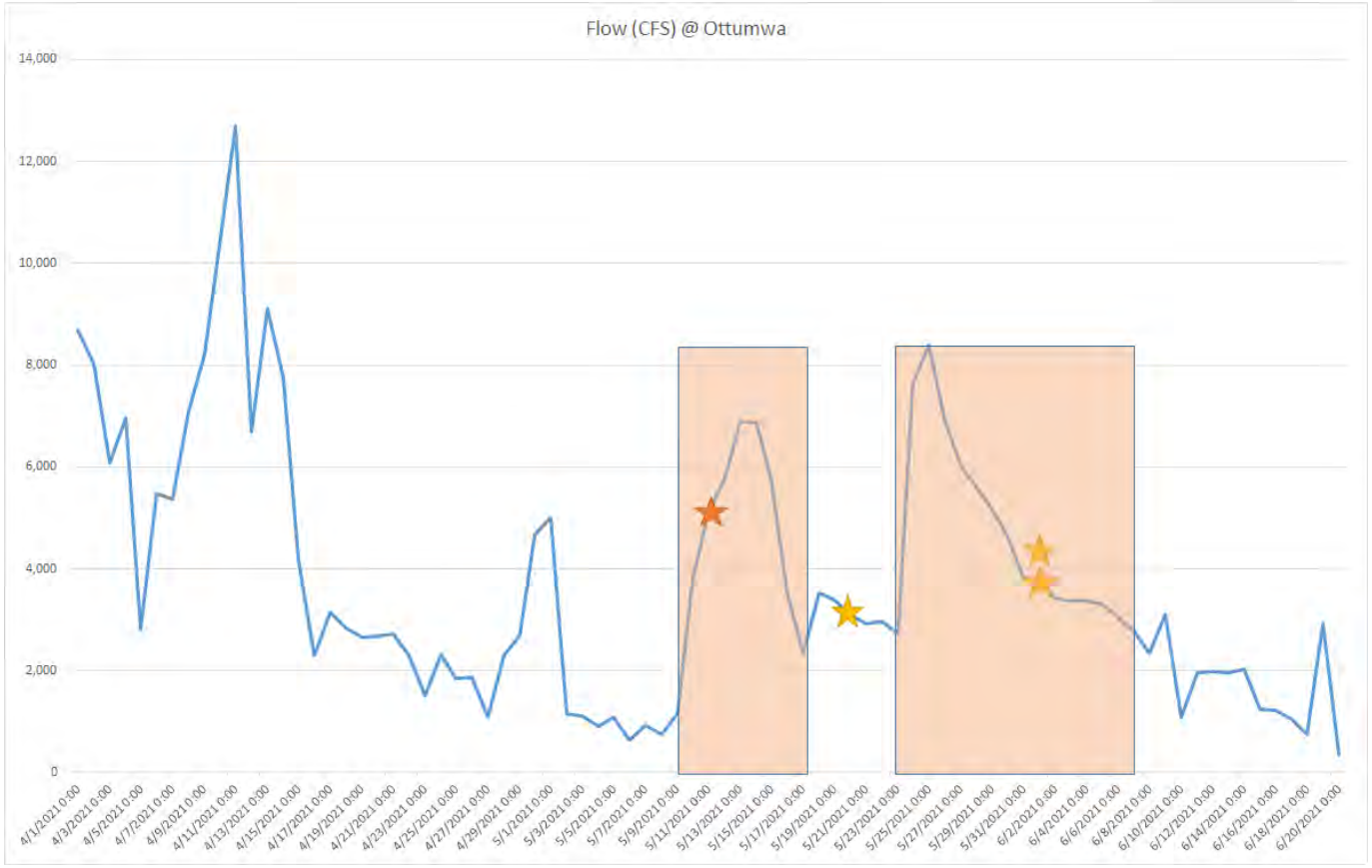
Monitoring the Environmental Flow Response

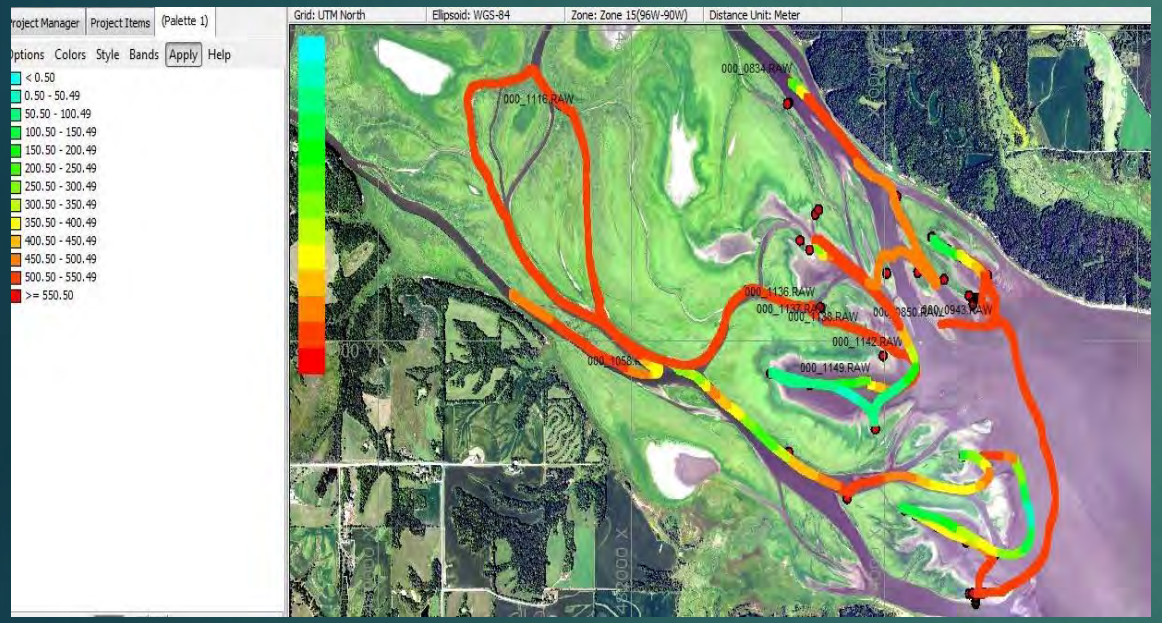


- Preliminary results indicate shovelnose sturgeon spawn during 2021 flow pulse.
- Stars = larval sturgeon captured

Estimating impact of experimental flows on the recruitment and survival of freshwater mussels below Red Rock Dam

Annika Richards, Dr. Michael Weber

Nitrate Reduction via Reservoir Water Level Management in Central Iowa



Study the geomorphology of the "delta" and reservoir de-nitrification

IIHR Hydroscience & Engineering

Dr. Keith Schilling, State Geologist
Iowa Geological Survey

FUNDING SUPPORT:
Sustainable Rivers Program
Engineering with Nature

TECHNICAL SUPPORT:
Engineer Research and Development Center

Assessing and Modeling the Impacts of Water Level Management on Overwintering Reptiles

FUNDING SUPPORT:

Ecosystem Management & Restoration Research Program

TECHNICAL SUPPORT:

Engineer Research and Development Center

- Started fall 2022
- Miranda Goss, ERDC

Watershed Resilience and Nutrient Reduction Workshop—Spring 2022

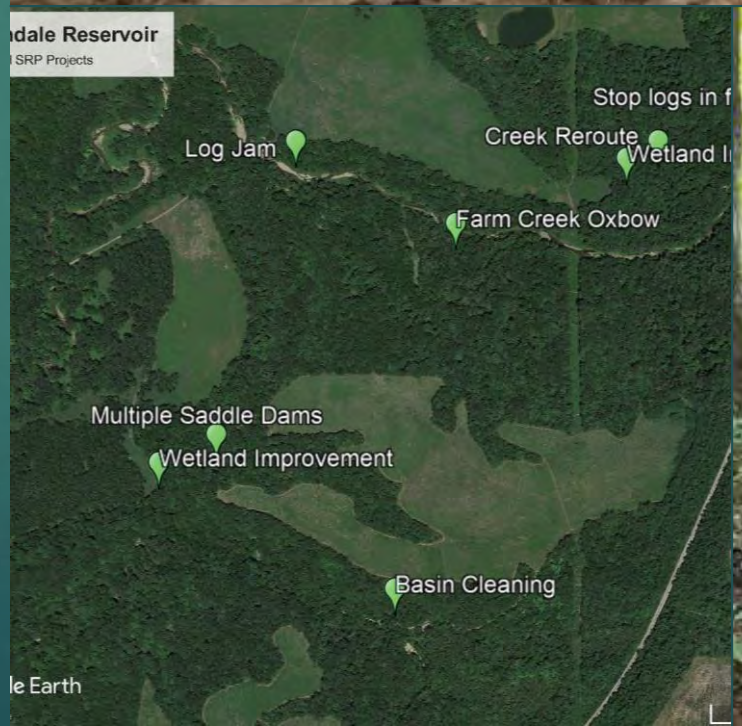
SPONSORED BY USACE & NATURAL RESOURCES CONSERVATION SERVICE

- Managers of federal land Red Rock and Saylorville
- Neal Smith National Wildlife Refuge—March 2022

FUNDING SUPPORT:
Sustainable Rivers Program

Rock Island District Expansion

- Iowa River – Coralville Dam
  - Stakeholder Input
  - Science Report
  - E-flows Development
- Farm Creek Dry Dam
  - Physical Habitat Creation
  - Ramped Wetlands
  - Ponds and Riffle



Iowa River—Coralville Lake

- Preliminary Flow Prescription Report in preparation
- Regulation Manual Revised
- Once flow prescriptions are completed, develop Adaptive Management & Monitoring Plan

Photo thanks Stephen J. Dinsmore & Nicole Bosco

Thank you!