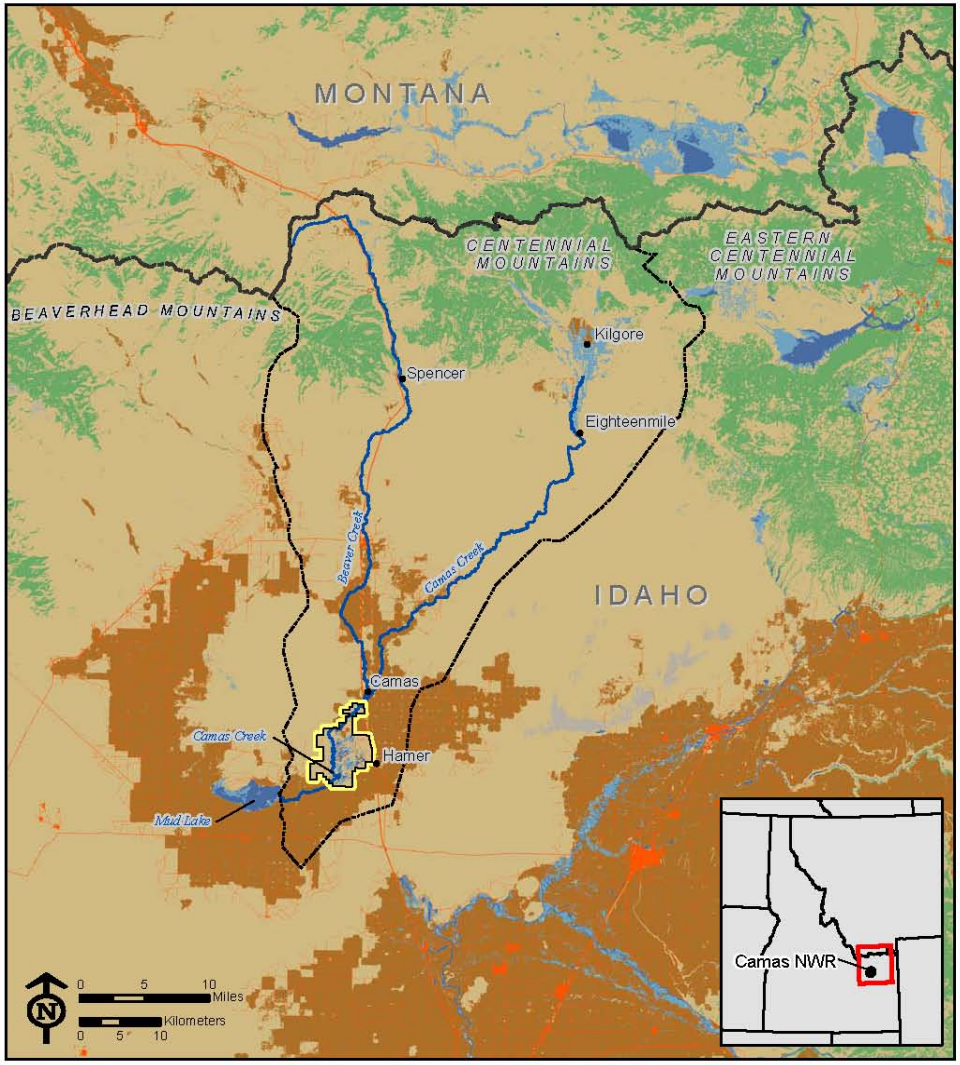
Bringing new life to an old refuge:
Revitalizing high desert wetlands in east Idaho

Andrea Kristof and Brian Wehausen, Camas National Wildlife Refuge

A Century of Hydrology in 40 minutes

- Part 1: Setting and History
- Part 2: Where did the water come from?
  - 1900 – 1980's
- Part 3: Water bird oasis
- Part 4: Where did the water go?
  - 1980's to present
- Part 5: Can we save the wetlands
- Part 6: Camas Creek restoration
- Part 7: Make the most of groundwater
- Part 8: Future of Camas Wetlands

Map 2 *Camas NWR - Regional Overview*



Map Date: 2/3/2012 File: Map2_CMS_RegionalOverview.mxd
Data Source: USGS 1:24,000 National Hydrography Dataset, USGS NLCD 2006.

History

Established on October 8, 1937 by Executive Order 7720

" … as a refuge and breeding ground for migratory birds and other wildlife."

" … for use as an inviolate sanctuary, or for any other management purpose, for migratory birds."

" … conservation, management, and … restoration of the fish, wildlife, and plant resources and their habitats … for the benefit of present and future generations of Americans …."

History

- 10,578 acres of the Snake River Plains
- 3000+ acres of wetland fed by springs & Camas Creek
- Idaho Livestock Company

History

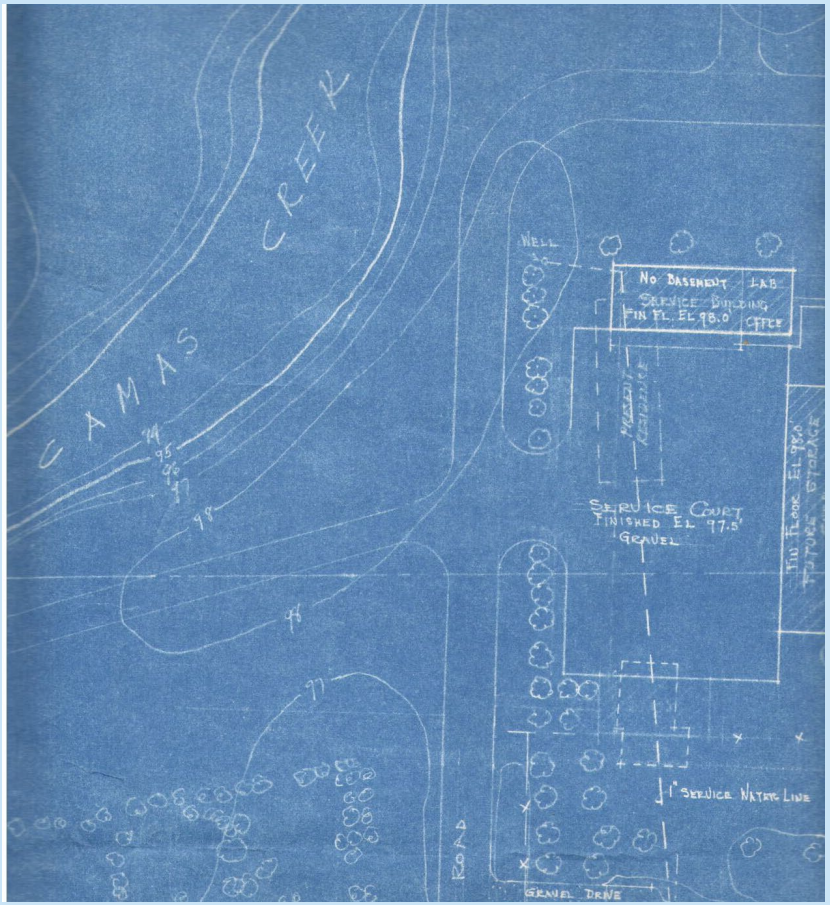
Sometimes water was a little too abundant…

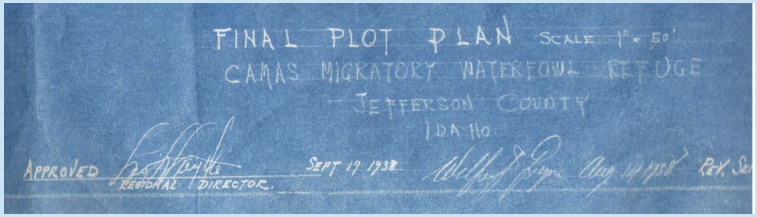
So refuge staff excavated the creek bed

History

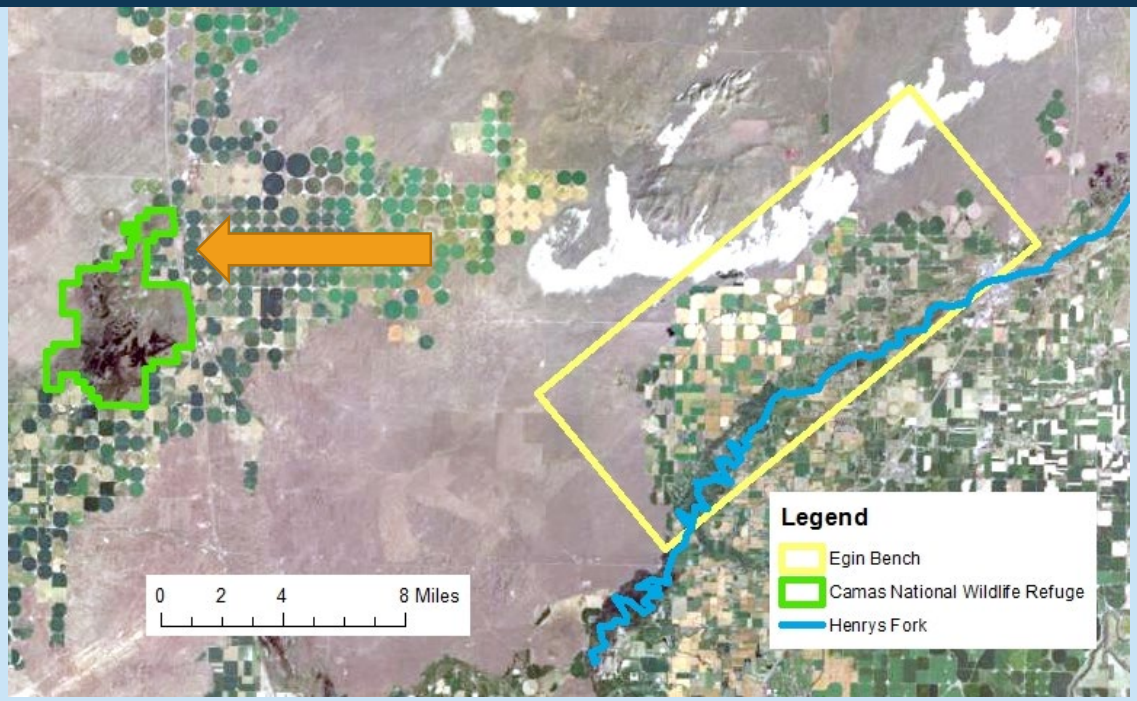
Camas Creek was systematically transformed from a flood prone 3 foot deep stream…

To a highly-incised 12 foot deep channel





Where did the water come from?

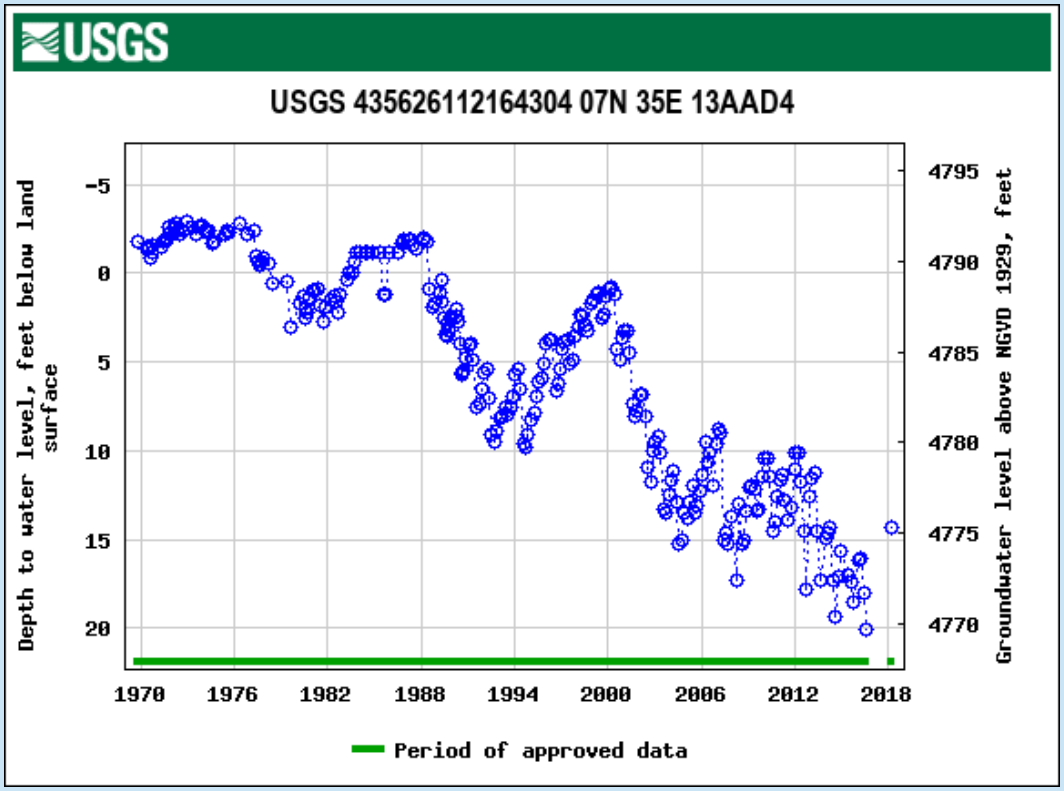


- But mostly it stayed in the Snake River ~20 miles to the east
- Egin Bench farmers diverted water from the Henry's Fork to flood irrigate
- Water transported by subterranean lava tubes to Mud Lake basin

Where did the water go?

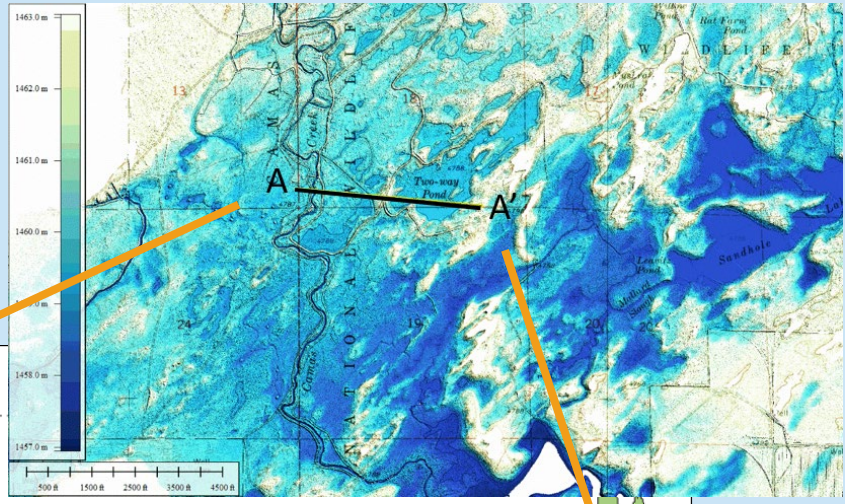
1977 - 1978

Ground level



- Late 1970s – groundwater began a steep retreat
- Transitioned from discharge to recharge system

Waterbird Oasis



From Pos: 626843.02, 824814.86

4797.5 ft
4795.0 ft
4792.5 ft
4790.0 ft
4787.5 ft
4785.0 ft

Camas Creek

A

A'

CNWR-TWO-WAY-POND-A
2016:
Min = 4,787.77 ft
Max = 4,790.15 ft

Historical Channel Elevation

Incised Channel

Theoretical flow-path (historical)

Theoretical flow-path (current)

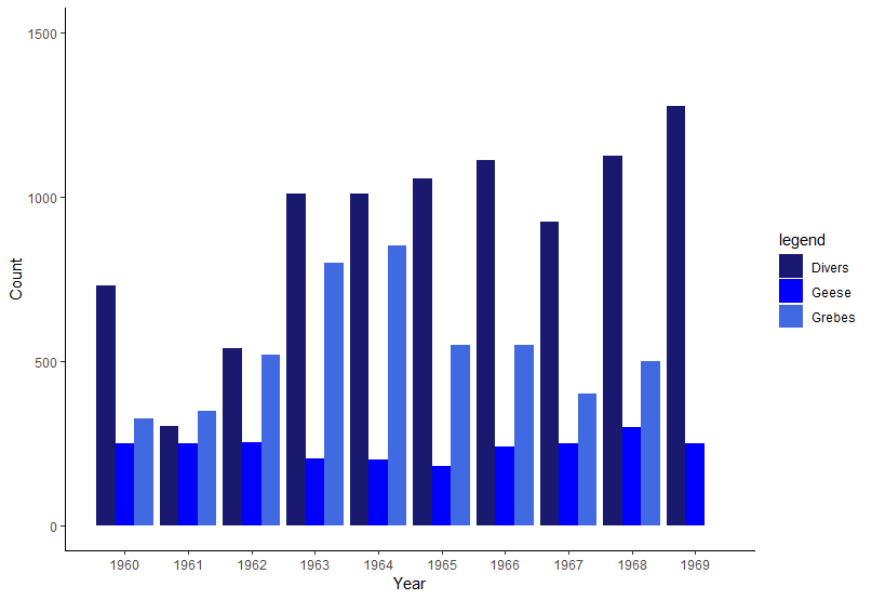
Potential Storage Volume

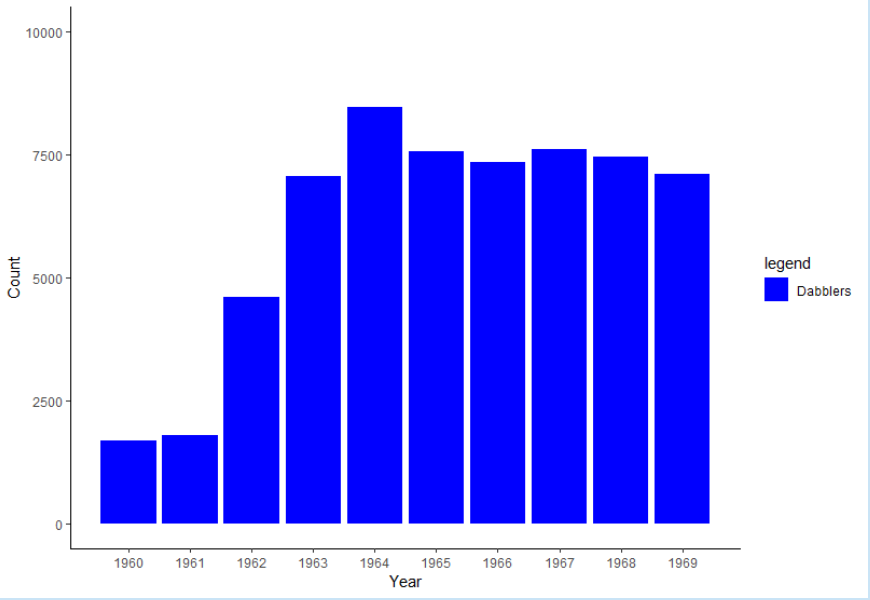
Current Groundwater Level

500 ft 1000 ft 1500 ft 2000 ft 2500 ft 3000 ft 3500 ft 4000 ft 4276 ft

Waterbird Oasis

Produced 1,000s of waterbirds

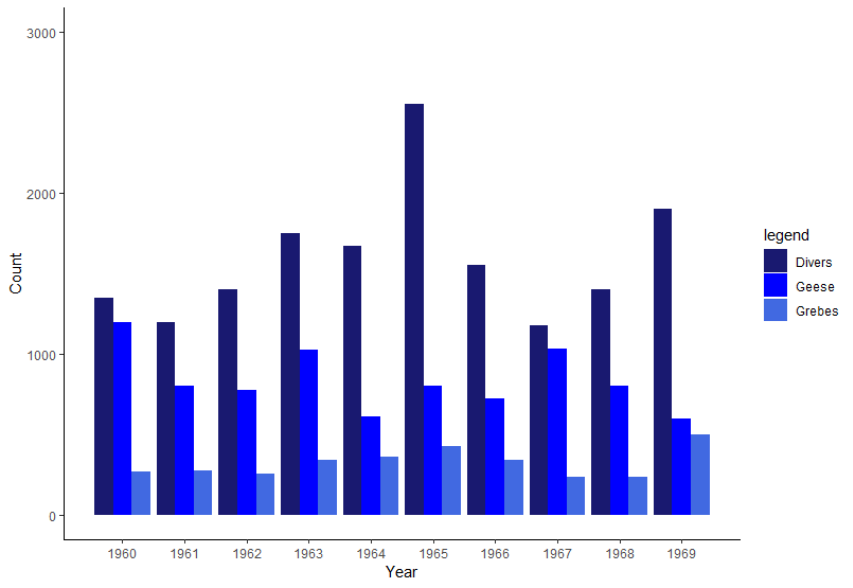


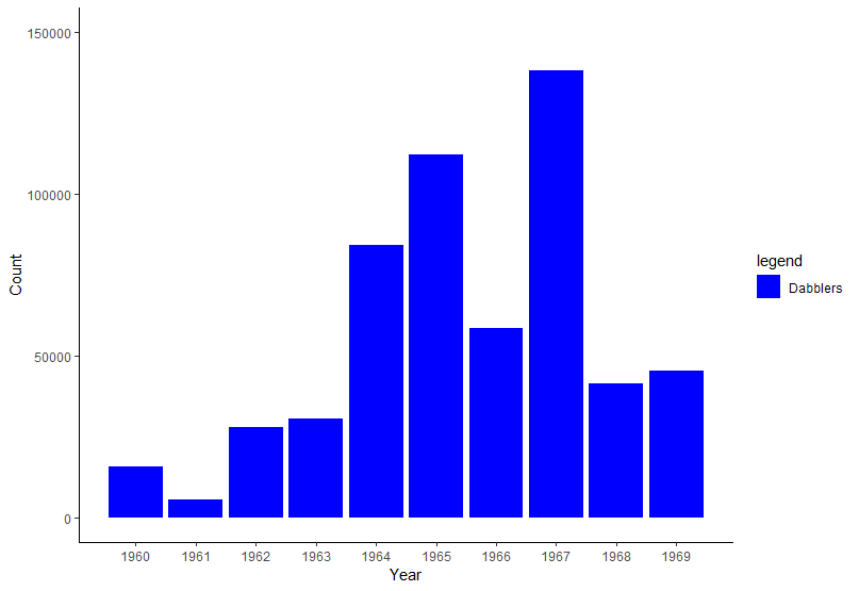


Waterbird Oasis

Produced 1,000s of waterbirds

Energized 10,000s of migrating waterbirds





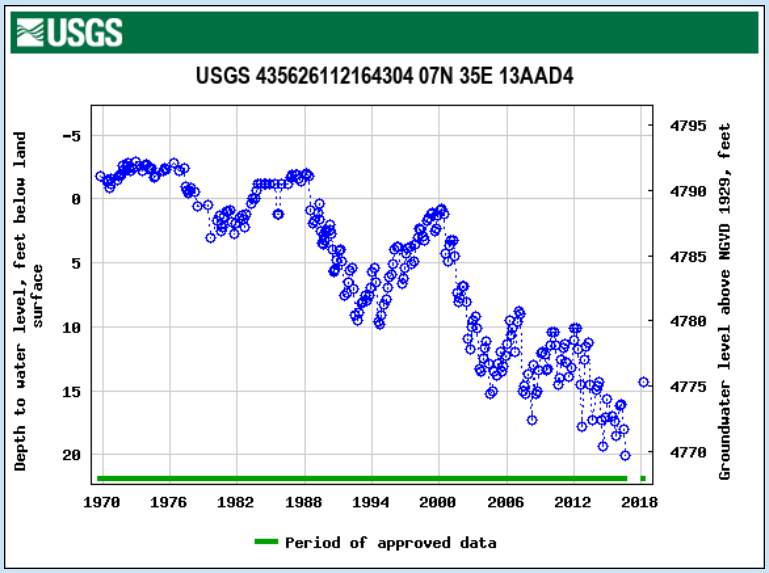
Waterbird Oasis

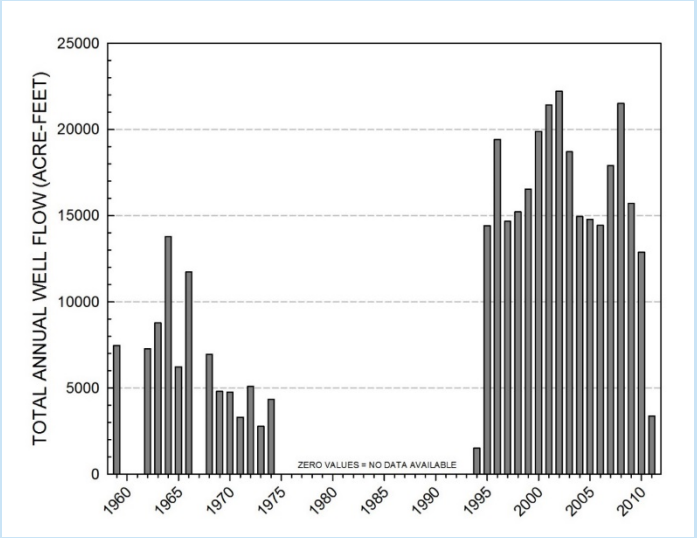
Produced 1,000s of waterbirds

Energized 10,000s of migrating waterbirds

Year-round habitat for hemi-marsh obligate species

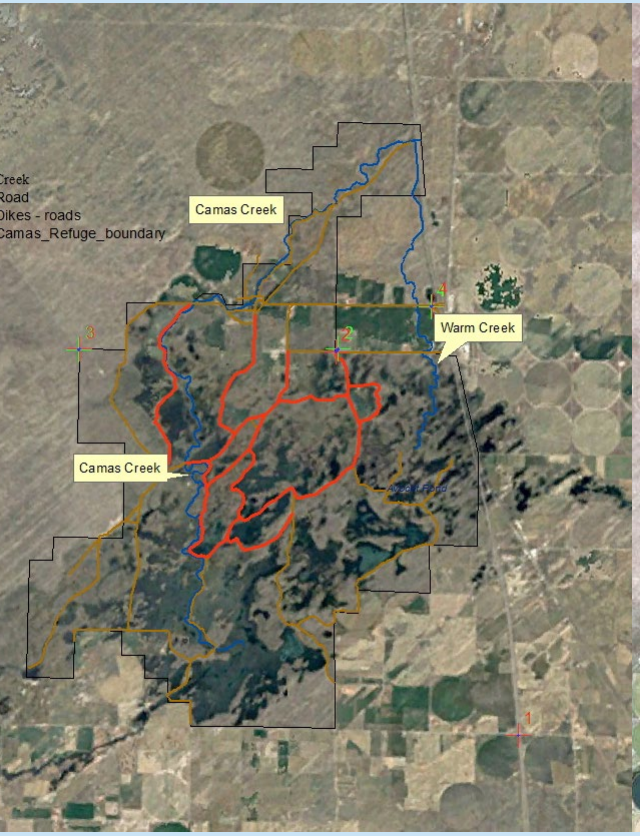
Where did the water go?



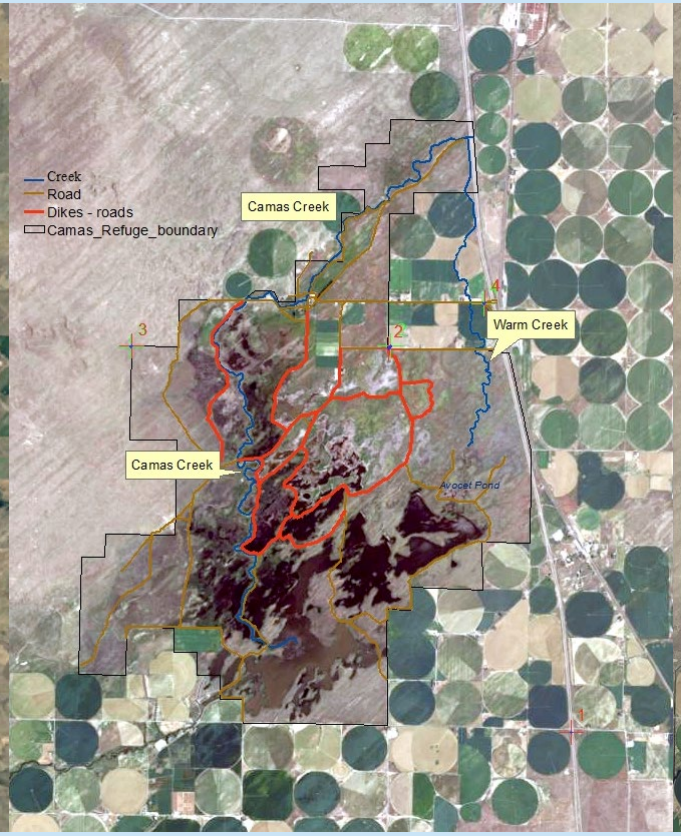


- Late 1970s – groundwater began a steep retreat
- Transitioned from discharge to recharge system
- Agricultural groundwater wells co-opted to deliver water from the retreating aquifer into wetland impoundments

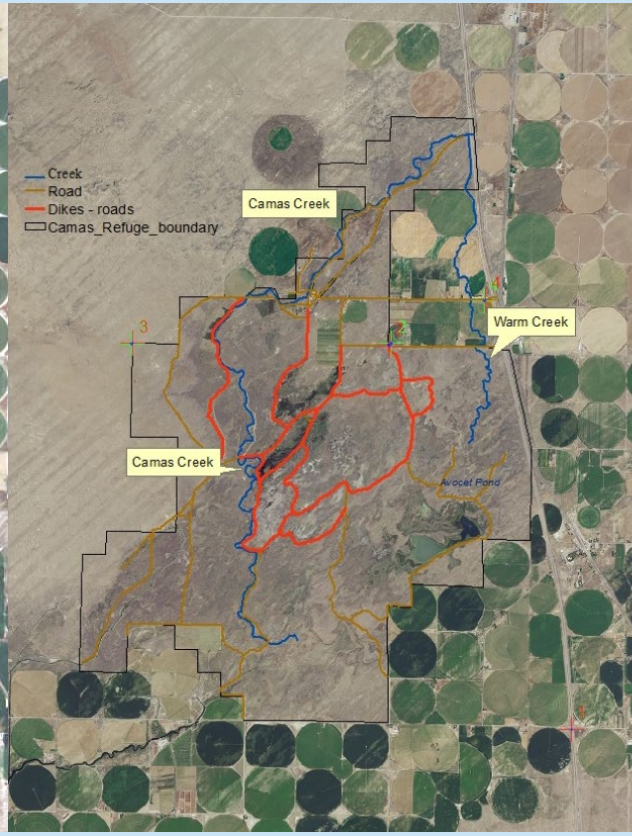
Where did the water go?



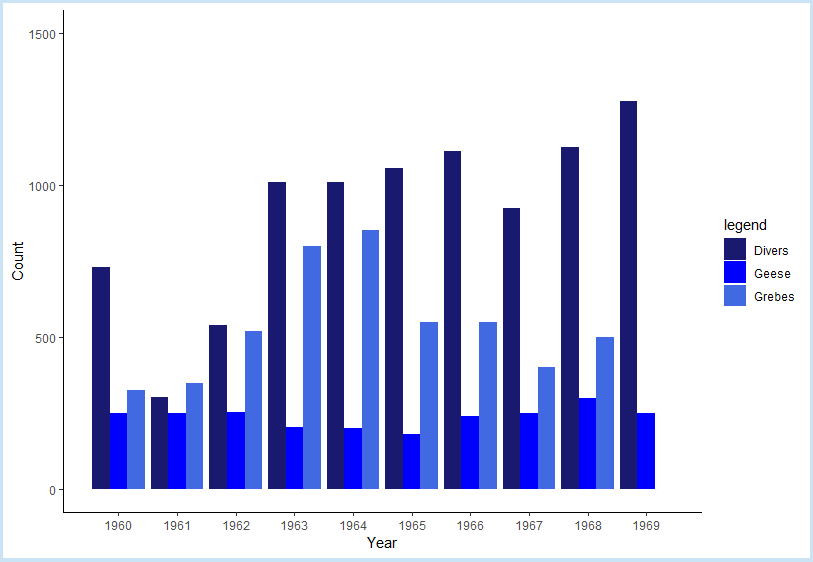
1984

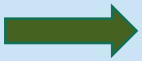


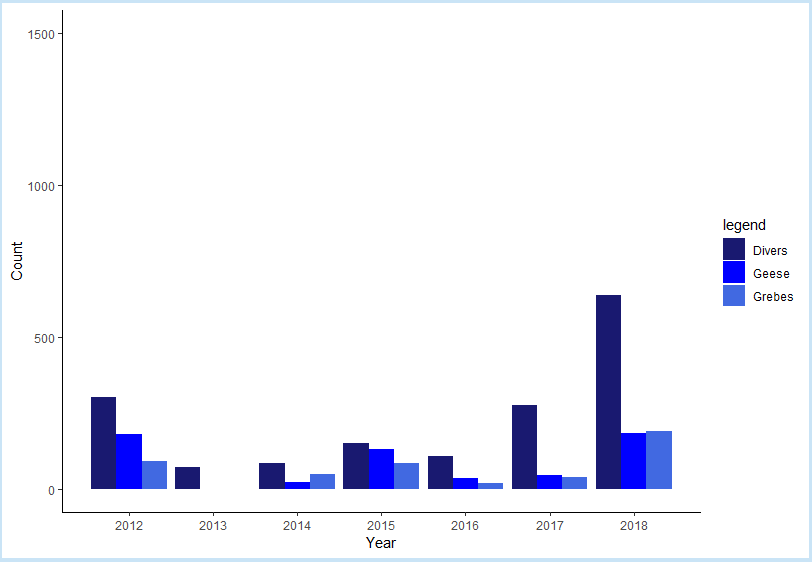
2011



2015

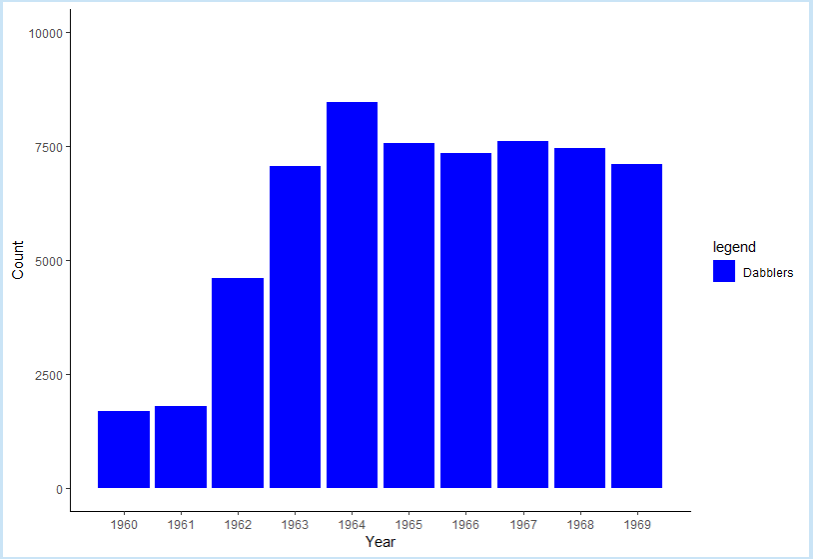


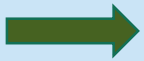


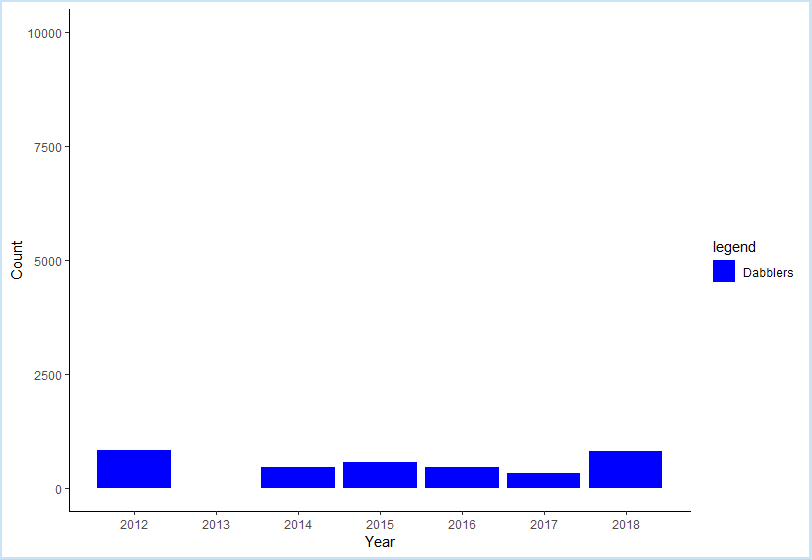


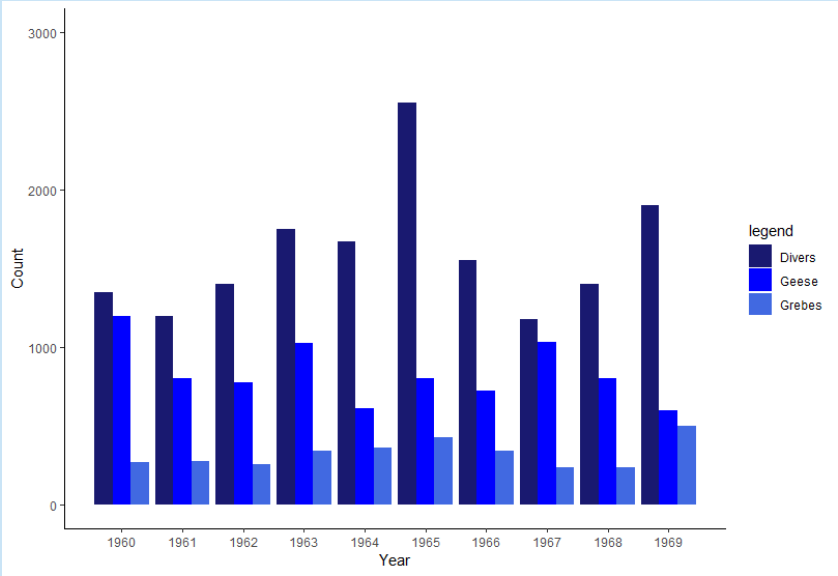
1960 - 1969

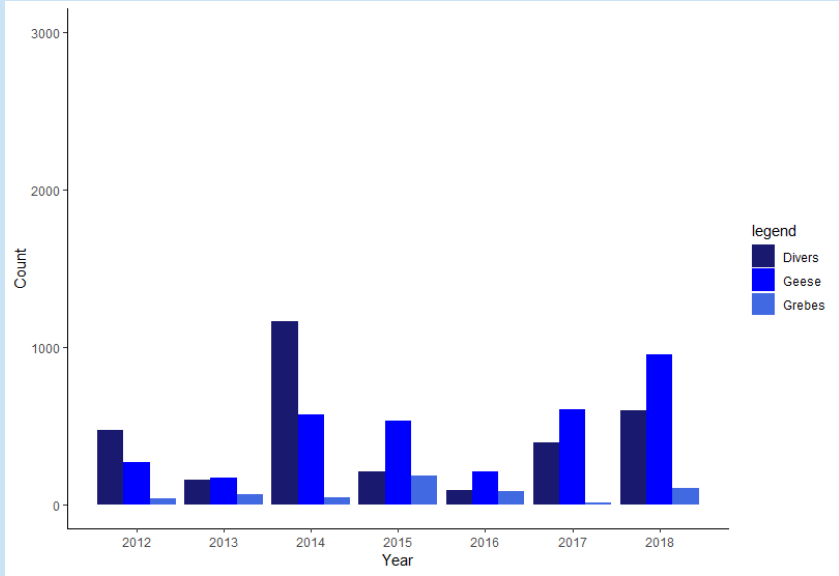
2012 - 2018





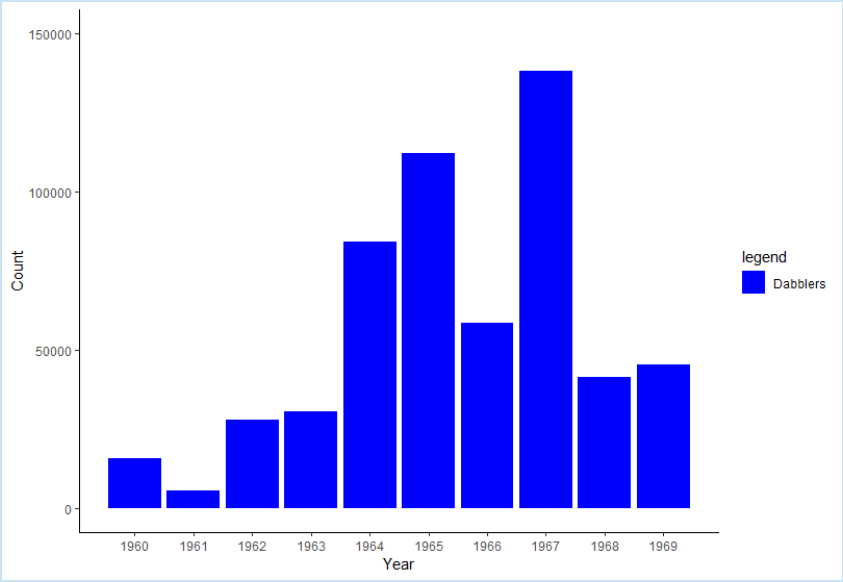


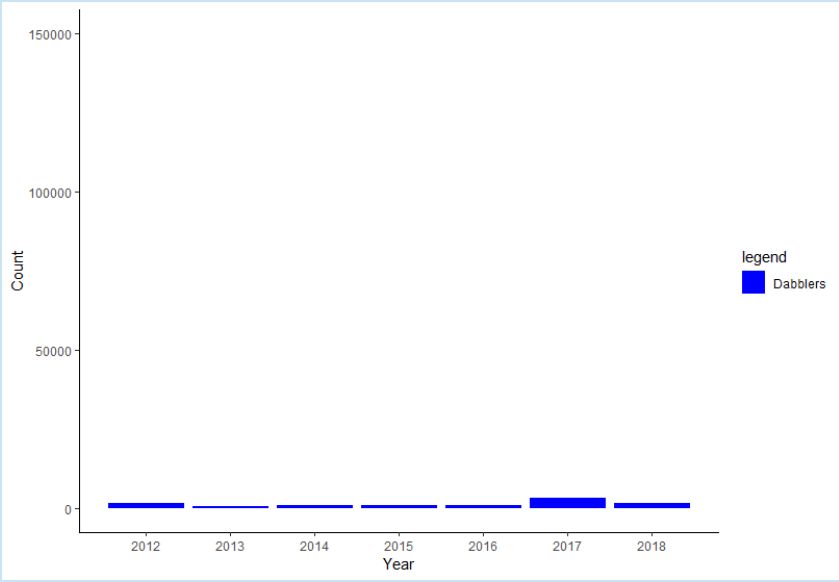




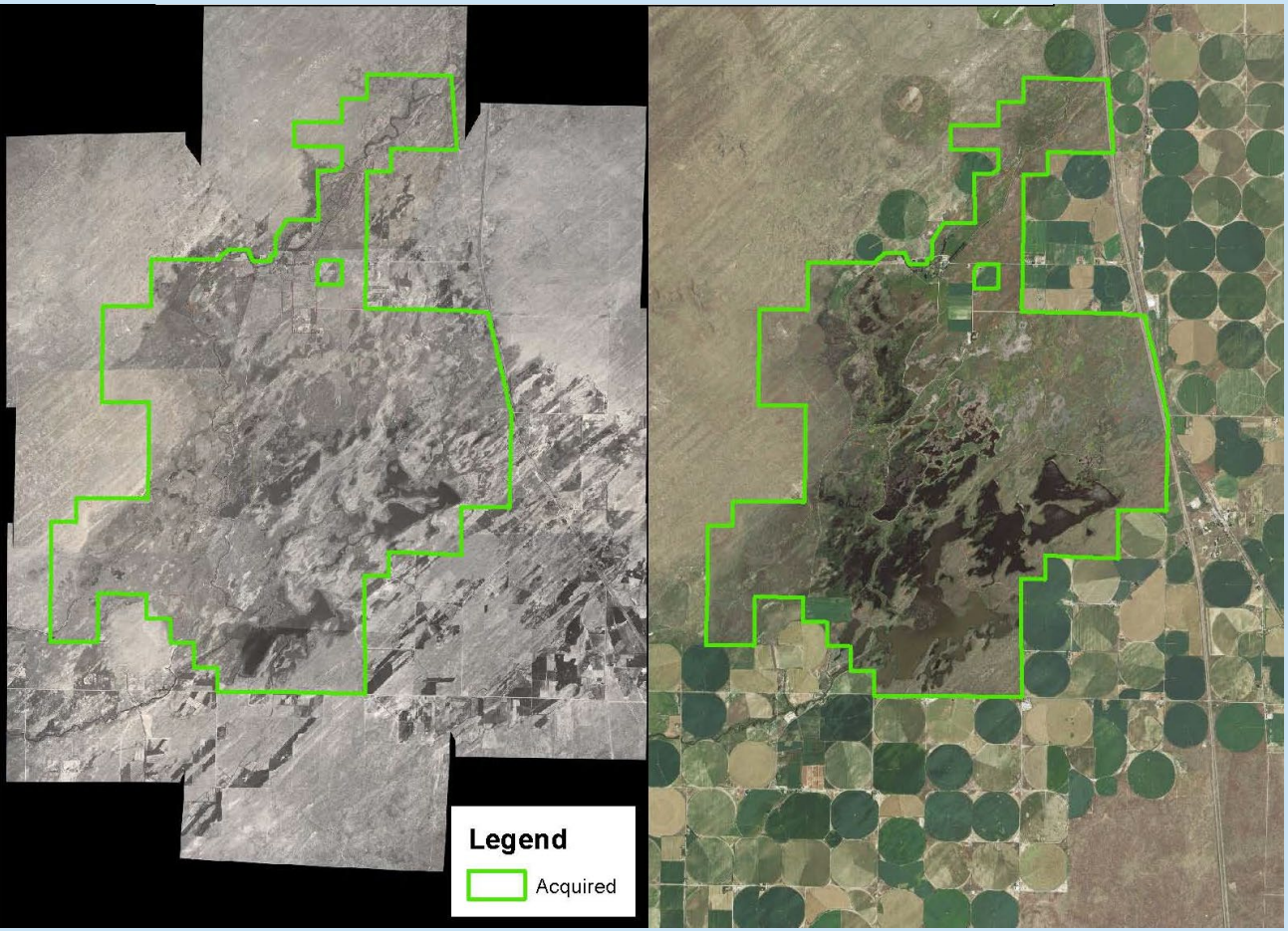
1960 - 1969

2012 - 2018





Where did the water go?

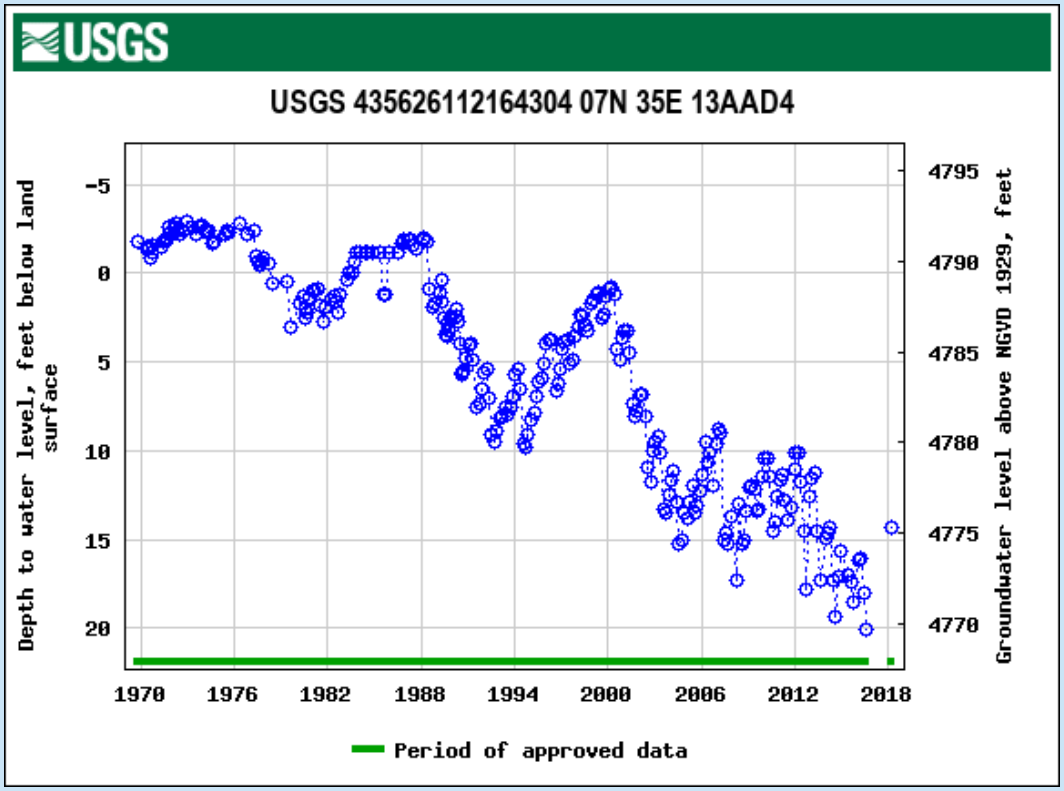


- To sprinkler irrigation
- Extensive agricultural development of the local area
- 1951 versus 2011

Where did the water go?

1977 - 1978

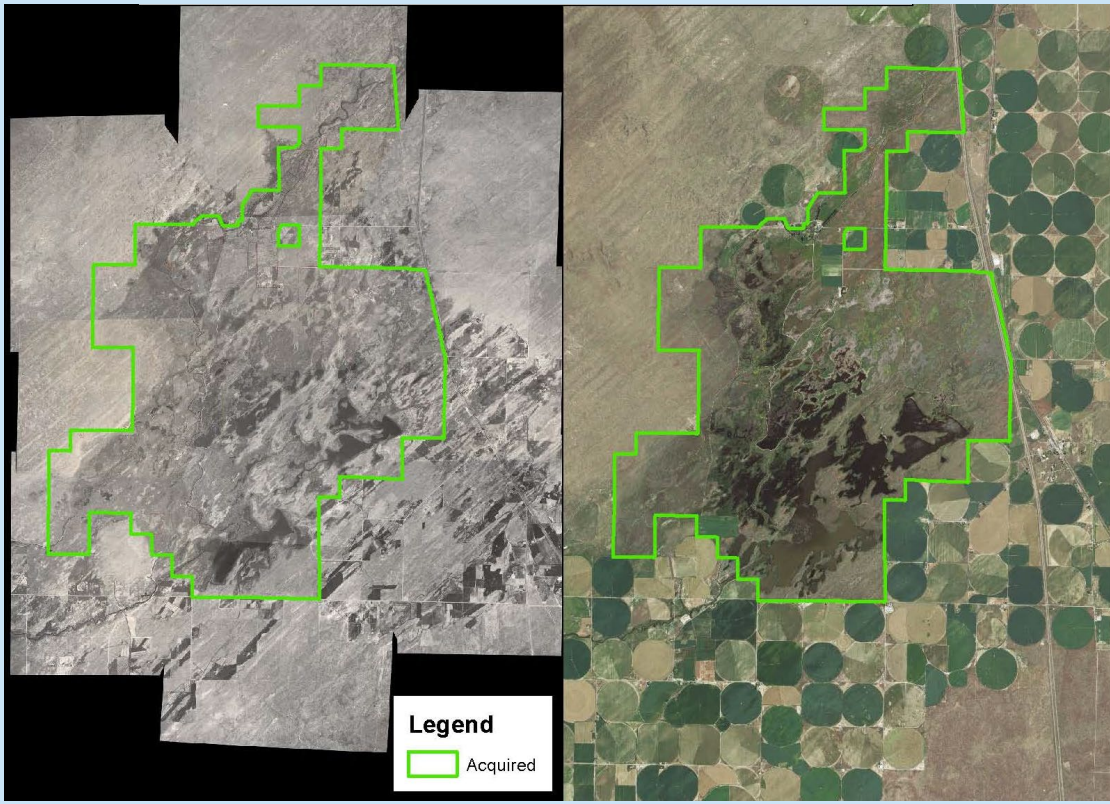
Ground level



- Late 1970s – groundwater began a steep retreat
- Transitioned from discharge to recharge system

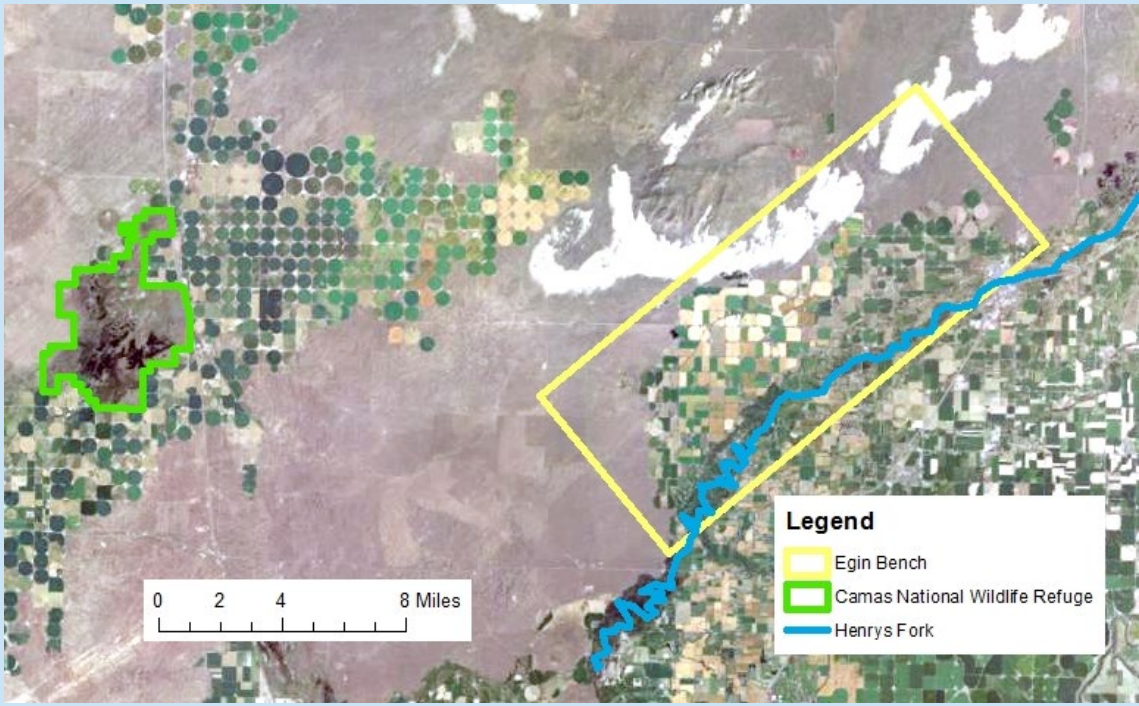
Can we save the wetlands?

- Probably not to Camas' initial glory



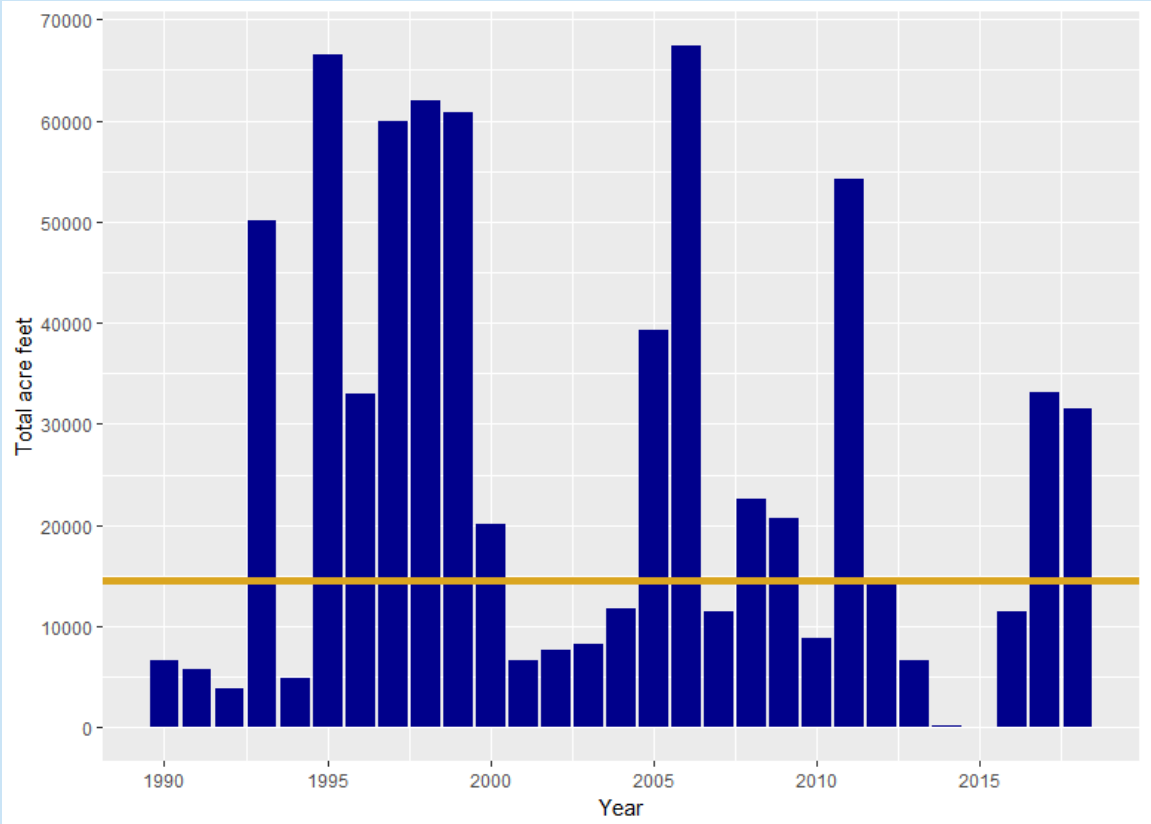
Can we save the wetlands?

- Probably not to Camas' initial glory
- Not by reversing the causes of groundwater retreat



Can we save the wetlands?

- Current water sources
  - Surface water via Camas Creek
  - Groundwater via 5 volume wells

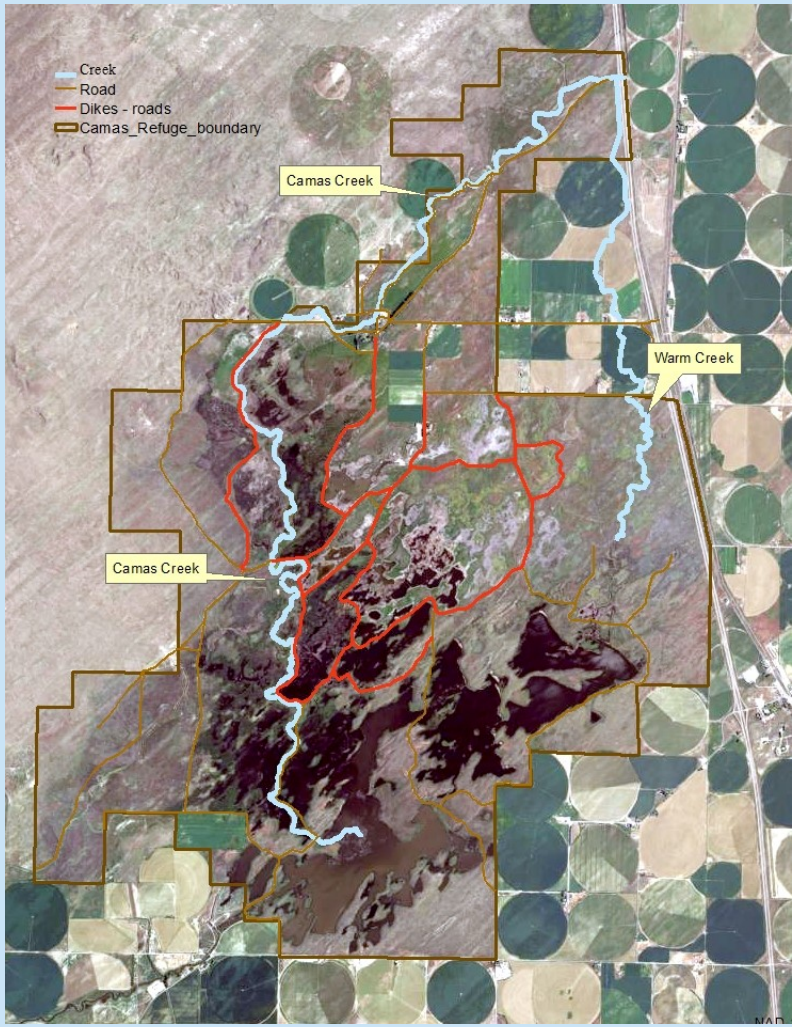


Total acre feet per year, Camas Creek @ Camas Idaho, 1990-2018 versus total acre feet of groundwater rights

Yes, pending snow-capped mountains: The Camas Creek Restoration

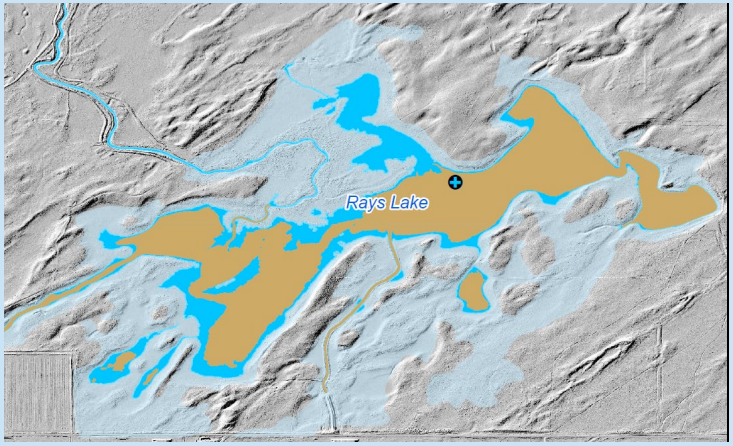
The Camas Creek Restoration

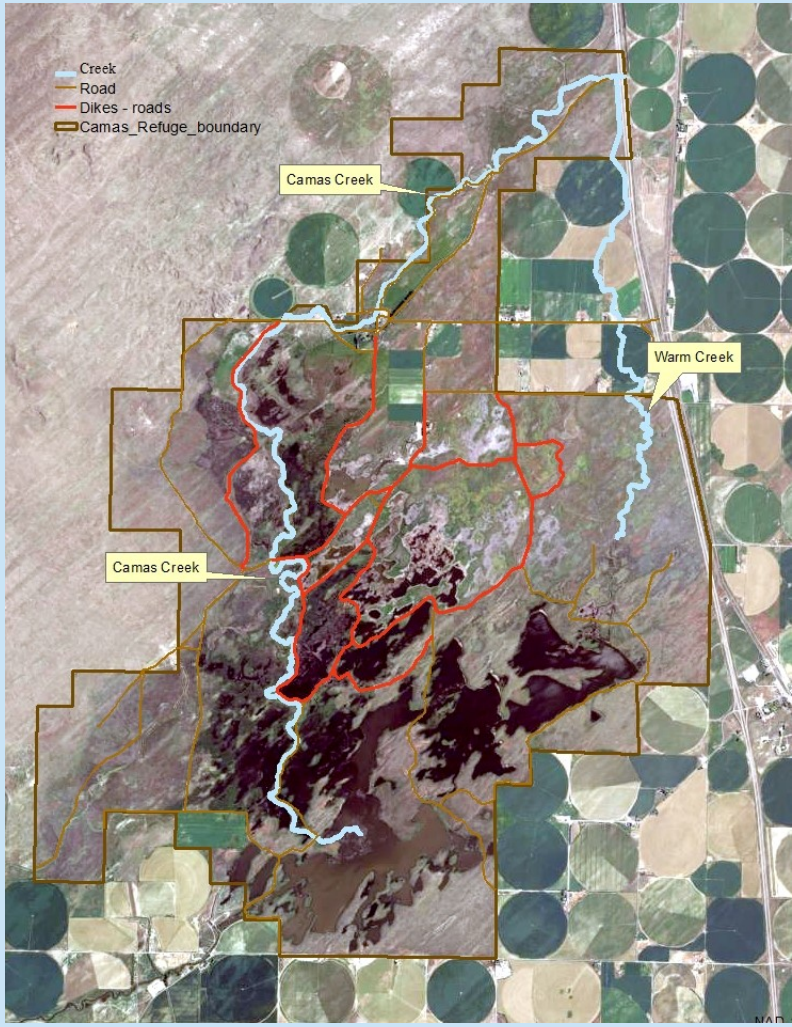
- 8 stream miles of Camas Creek are on the refuge
- ~4x its natural depth in many places, well below wetlands



The Camas Creek Restoration

- 8 stream miles of Camas Creek are on the refuge
- ~4x its natural depth in many places, well below wetlands
- Highly incised banks, abundant erosion, high water turbidity
  - ~63% of Rays Lake too light limited to produce SAV





The Camas Creek Restoration

The Objective:

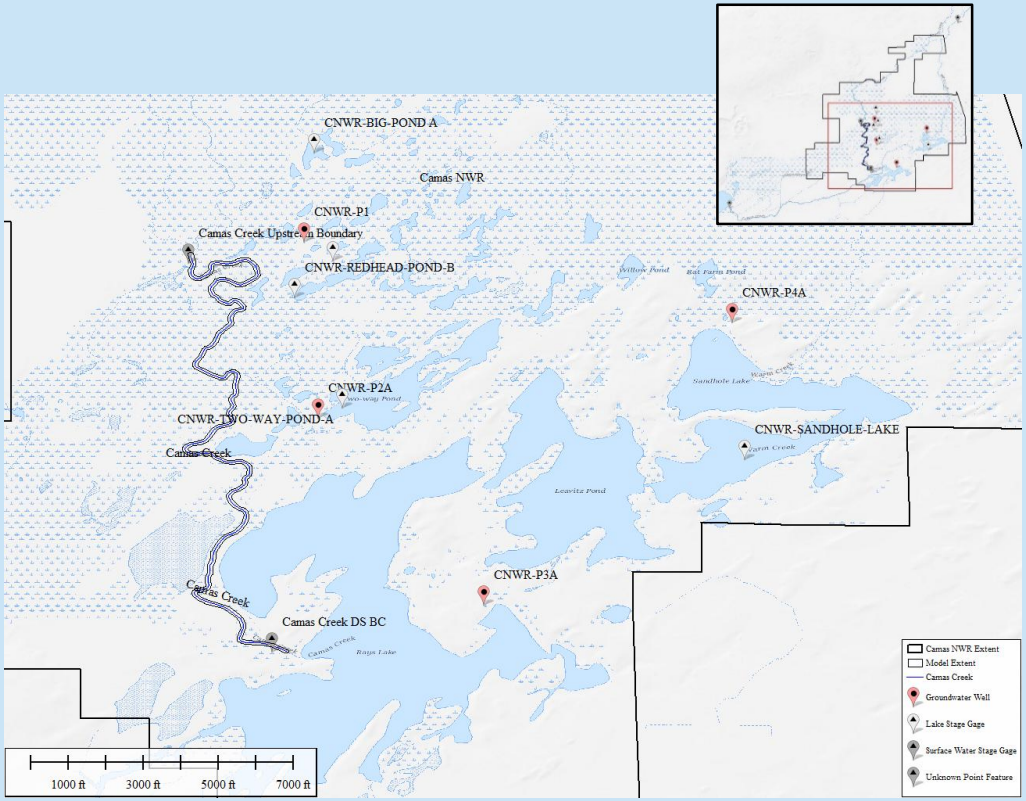
Raise the creek bottom to a more historic level

The Plan:

Install an array of weirs to trap sediment

Considerations

- Location, number, height of weirs?
- Minimizing flooding neighboring properties



➡ *Hydrological modelling needed*

The Camas Creek Restoration

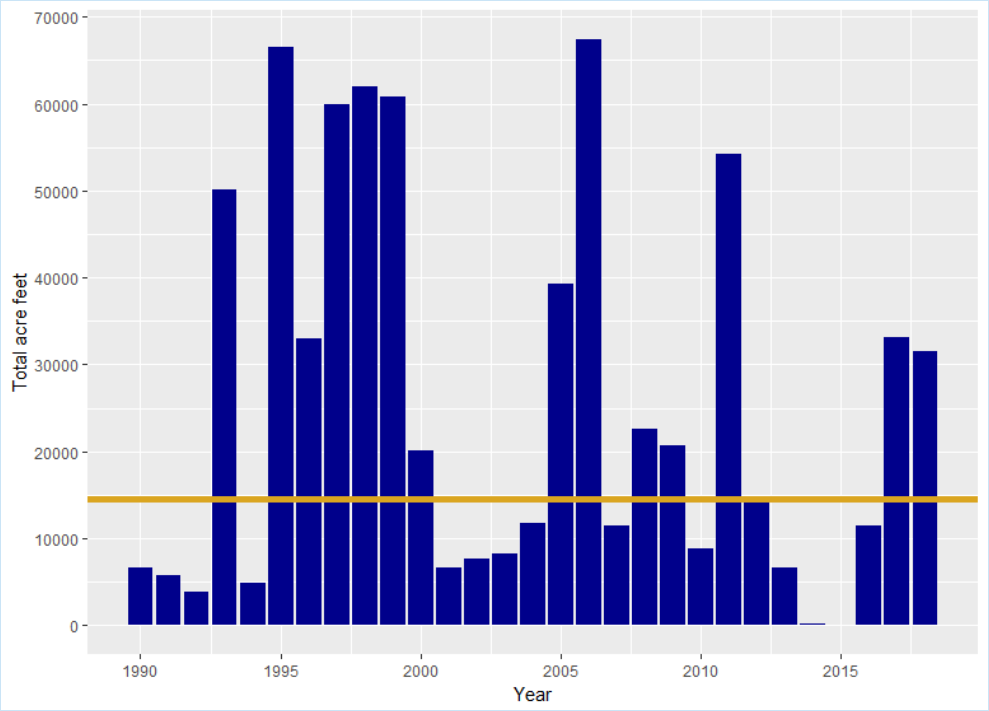
Challenges

- Legal challenge by downstream water users expected
- Trying to do outreach and educate the benefits of stream restoration.

"No dam or other obstruction to the natural flow of Camas Creek or its tributaries shall be maintained so as to divert water from the channel of the stream, except through ditches, canals or other works provided with head gates, control works and measuring devices. Holders of water rights that were previously decreed in Suave v. Abbott to divert water from Camas Creek or any of its tributaries, their successors, agents, servants and employees are hereby perpetually enjoined and restrained from maintaining in any stream or slough, or permitting to exist within such stream or slough where the same traverses their respective lands or any land owned or controlled by them, any obstruction to the flow of water, except in connection with the diversion of water through head gates equipped with measuring devices. In case any water right holder shall fail to remove any obstruction from the natural channel of Camas Creek, or any of its tributaries within 7 days after receiving notice from the watermaster, who has determined that the obstruction interferes with water delivery, the watermaster may authorize a water user to remove such obstruction in accordance with applicable federal and state laws and regulations. The expense thereof shall be the responsibility of the water right holder requesting the removal."

-From the Snake River Adjudication, August 2014

The Camas Creek Restoration



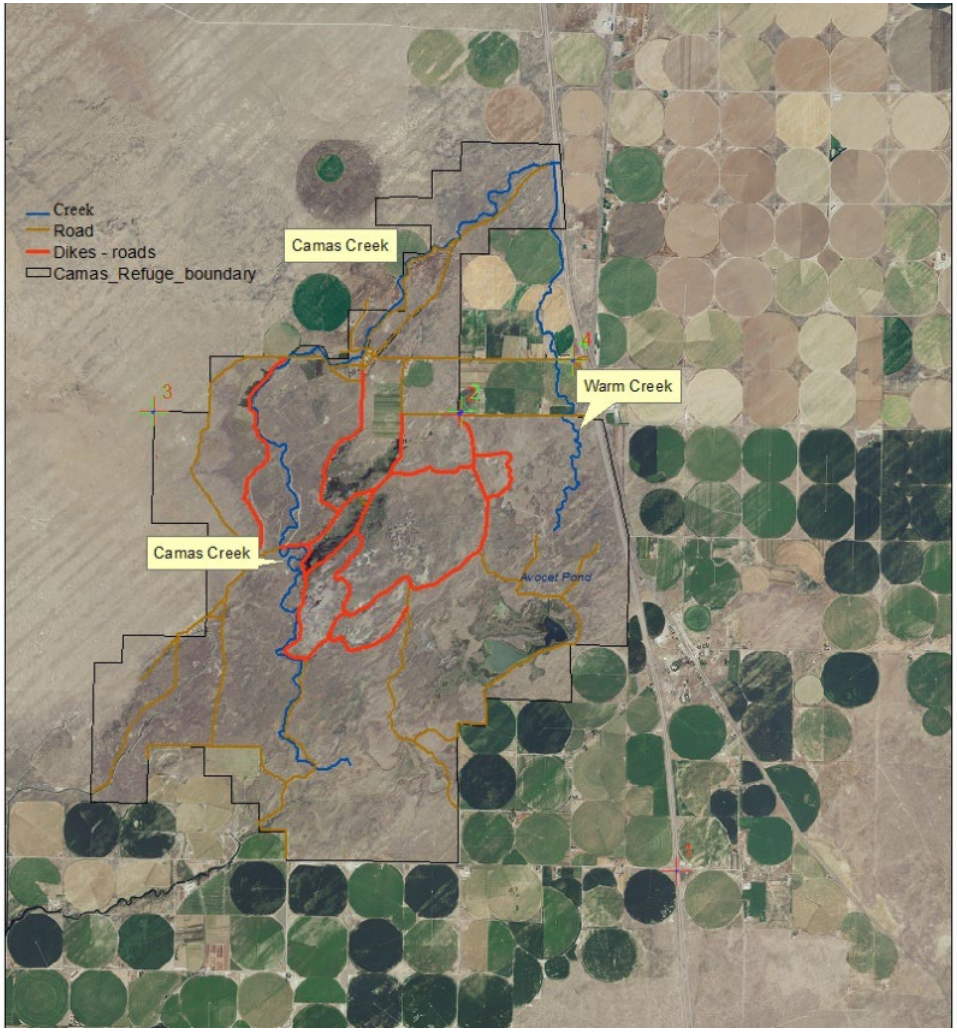
Total acre feet per year, Camas Creek @ Camas Idaho, 1990-2018 versus total acre feet of groundwater rights

- Proposed actions
  - Restore Camas Creek to retain more surface water on the refuge
  - Adjust the refuge's infrastructure to use groundwater more efficiently

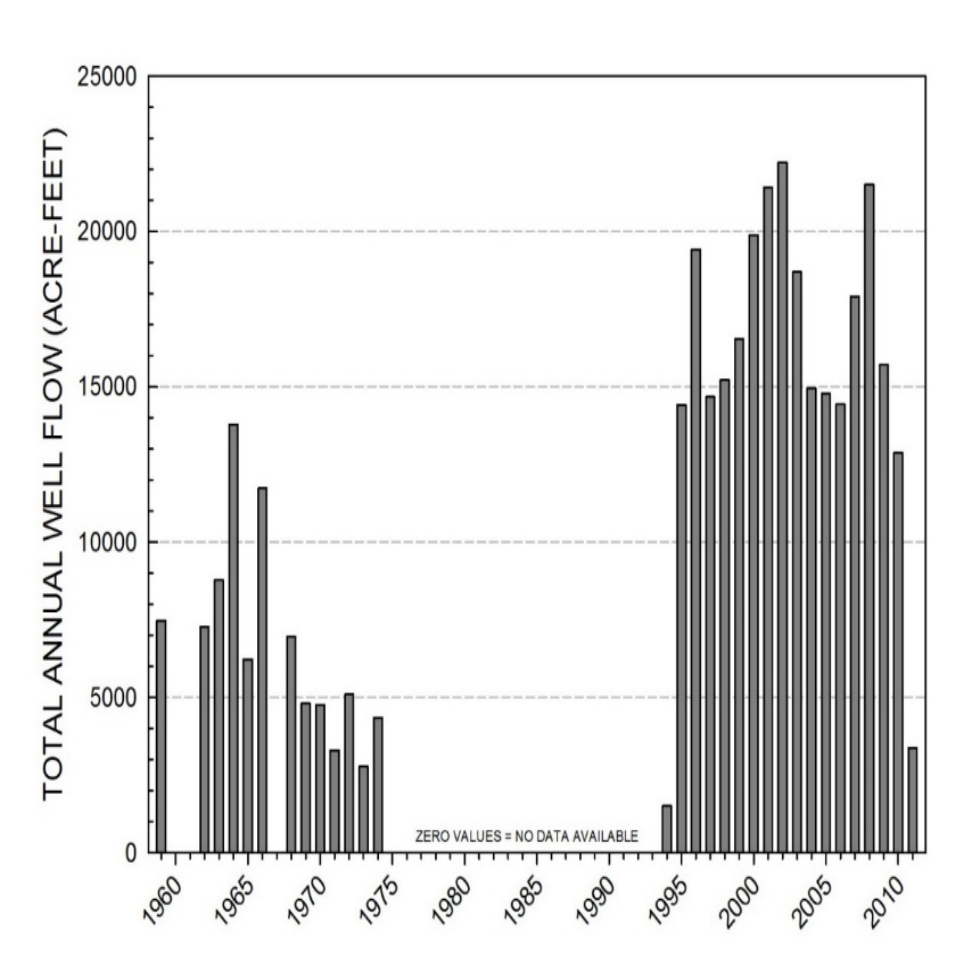
And an adequate electricity budget: Making the most of groundwater in a recharge system

Making the most of ground water in a recharge system.

In 2015 Camas NWR spent $72,000 on electricity for pumping of water from groundwater wells.

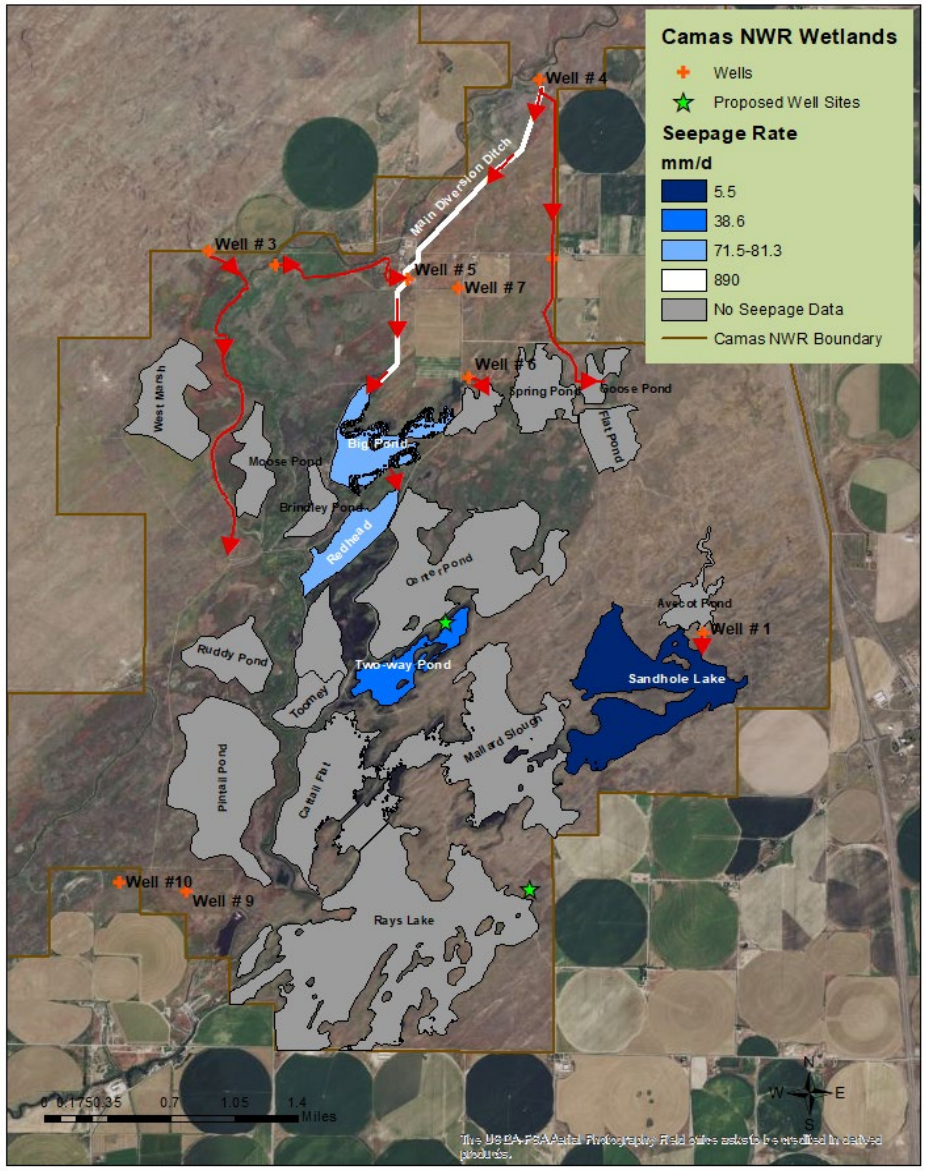


Making the most of groundwater in a recharge system



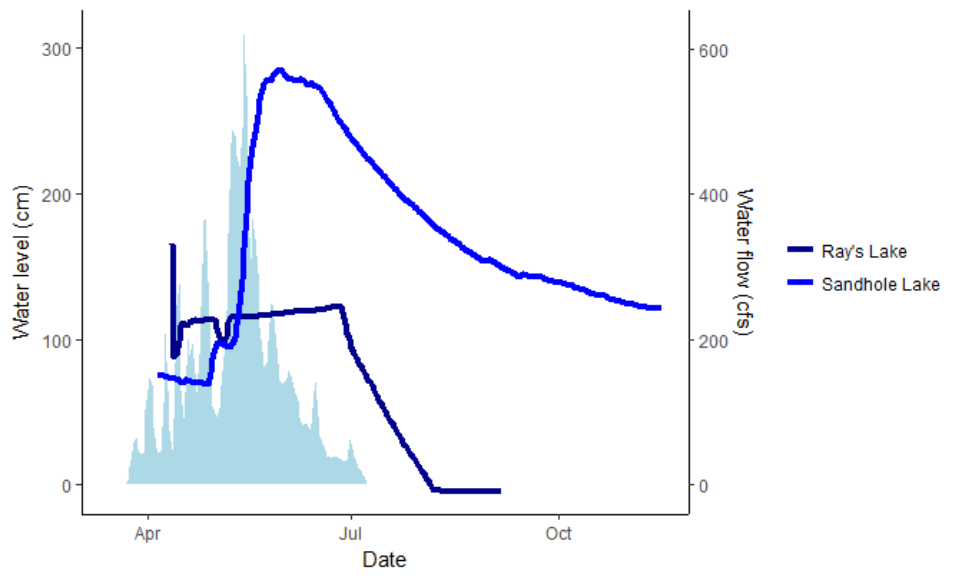
- 7 volume wells on refuge
  - 5 wells are connected to core wetlands
  - 4 wells feed in to Big Pond

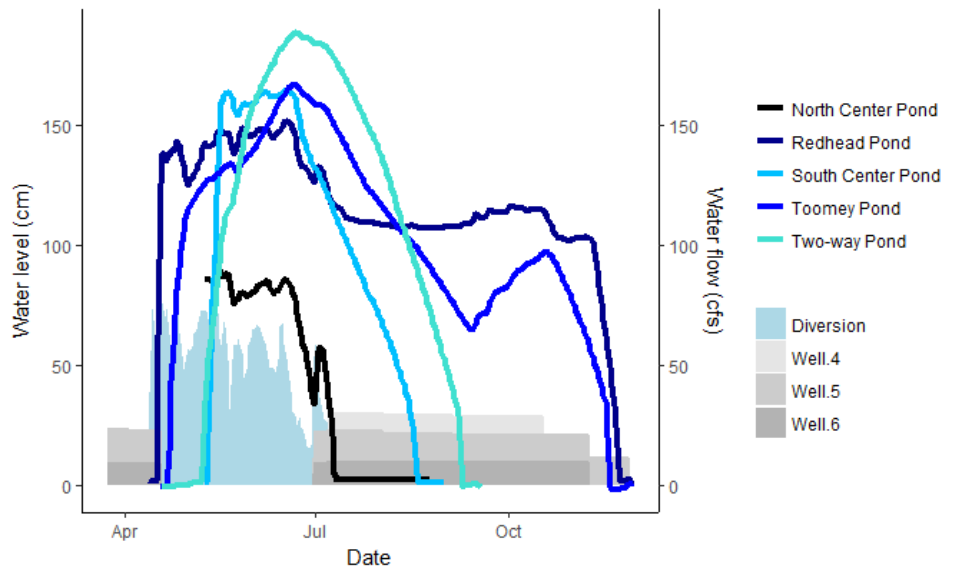
Making the most of groundwater in a recharge system



- 7 volume wells on refuge
  - 5 wells are connected to wetlands
  - 4 wells feed in to Big Pond
- Initial placement based on agricultural irrigation needs
  - Wells concentrated on the northern half of the refuge
- Not all wetlands are equal
  - southern wetland have lower seepage rates

Making the most of groundwater in a recharge system





- 7 volume wells on refuge
  - 5 wells are connected to wetlands
  - 4 wells feed in to Big Pond
- Initial placement based on agricultural irrigation needs
  - Wells concentrated on the northern half of the refuge
- Not all wetlands are equal
  - southern wetland have lower seepage rates

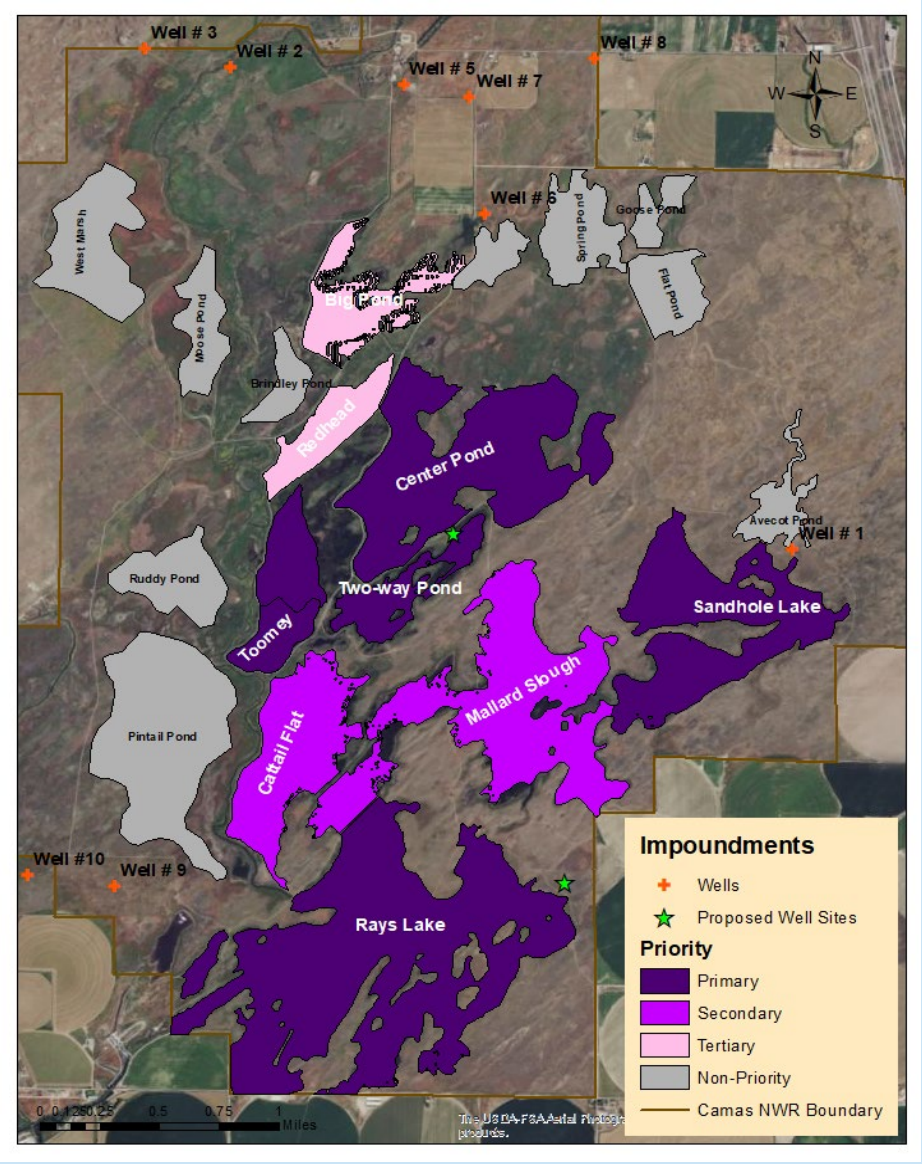
Making the most of groundwater in a recharge system

The Objective:

To efficiently translate expensive groundwater resources into quality wetland habitat during low creek flow years

The Plan:

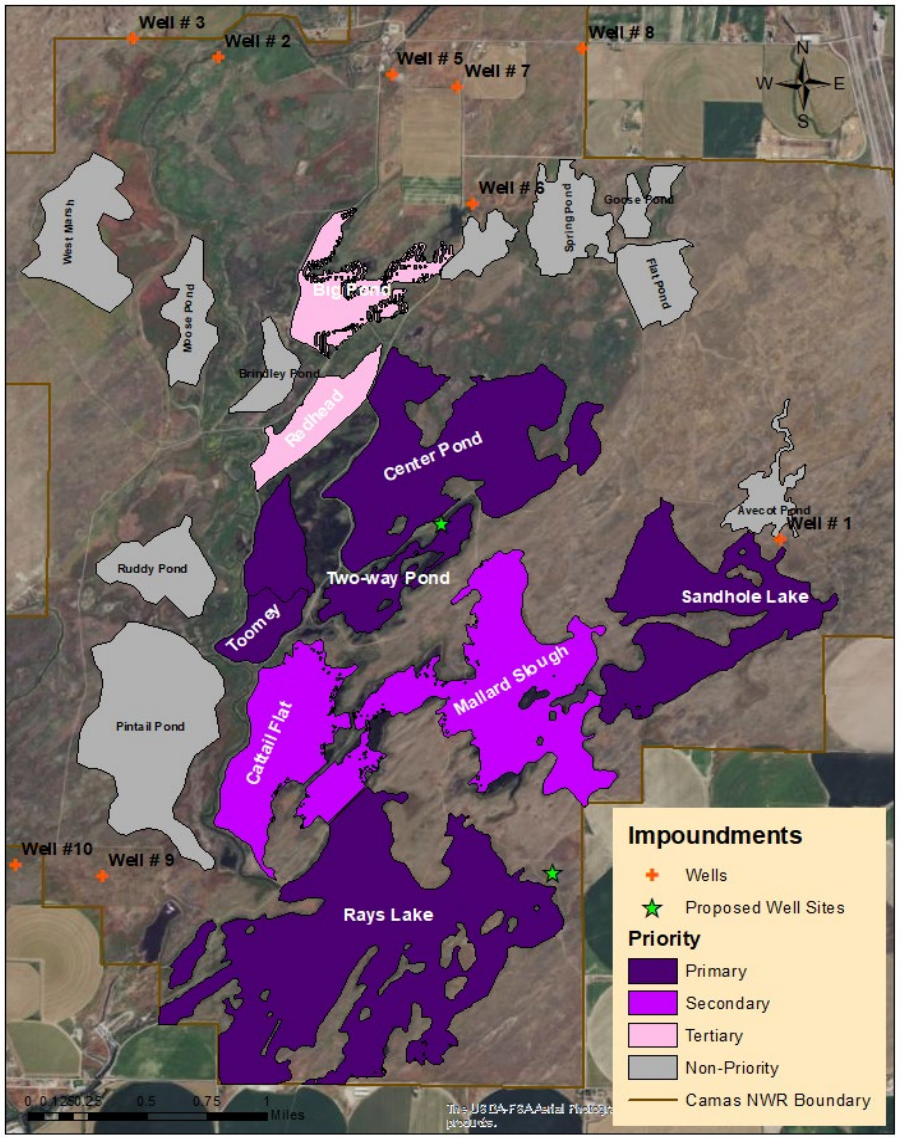
Relocate wells to locations adjacent to southern wetlands with demonstrated low seepage rates



Making the most of groundwater in a recharge system

Winning the seepage race

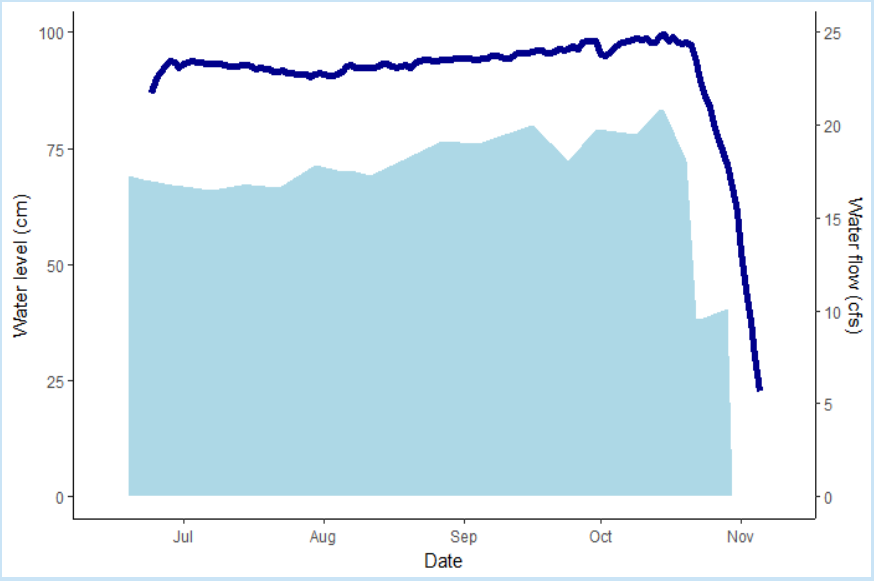
- In 2006, Well 1 was relocated to the north side of Sandhole Lake



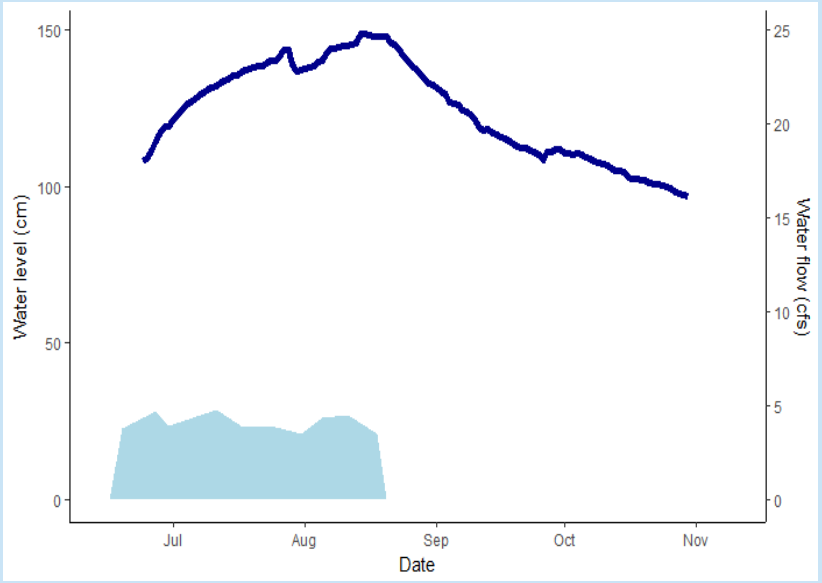
Making the most of groundwater in a recharge system

Winning the seepage race

- In 2006, Well 1 was relocated to the north side of Sandhole Lake
- Sandhole Lake can now hold water year-round, even in the absence of Camas Creek



Big Pond

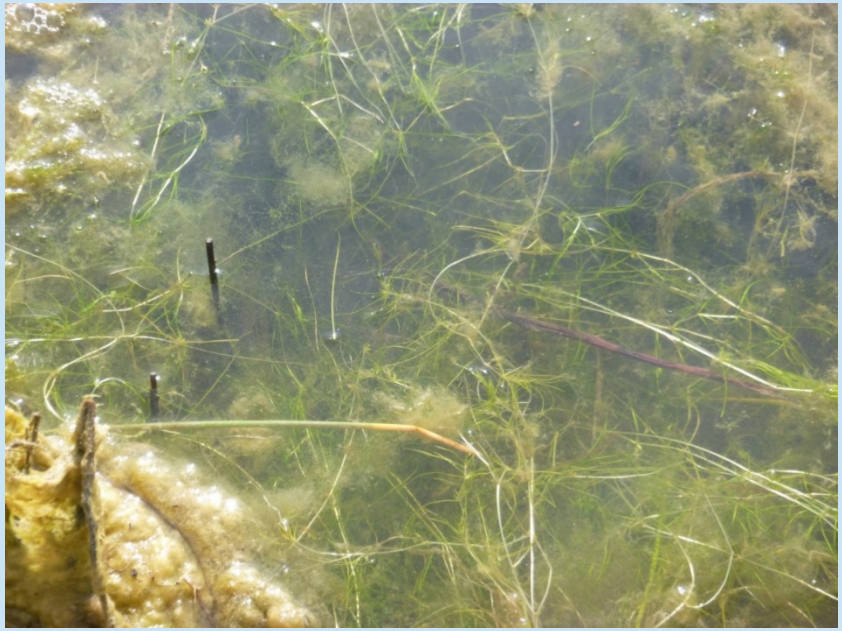


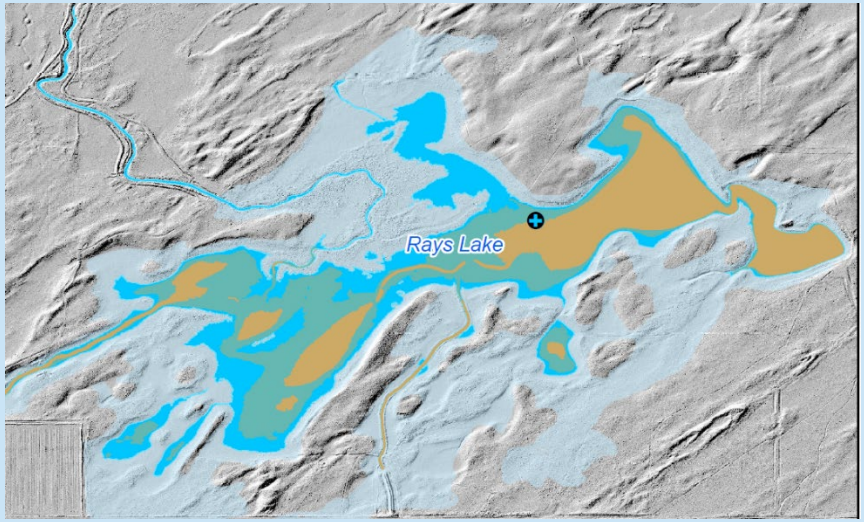
Sandhole Lake

The future of Camas wetlands

<u>Anticipated outcomes</u>

- More wetlands filled for more of the season
- Improved riparian habitat re-establishment and recruitment
- Improved water clarity
- Increased waterbird resources
  - secchi depth ↑ 1 foot = 92% increase in SAV beds





The future of Camas wetlands

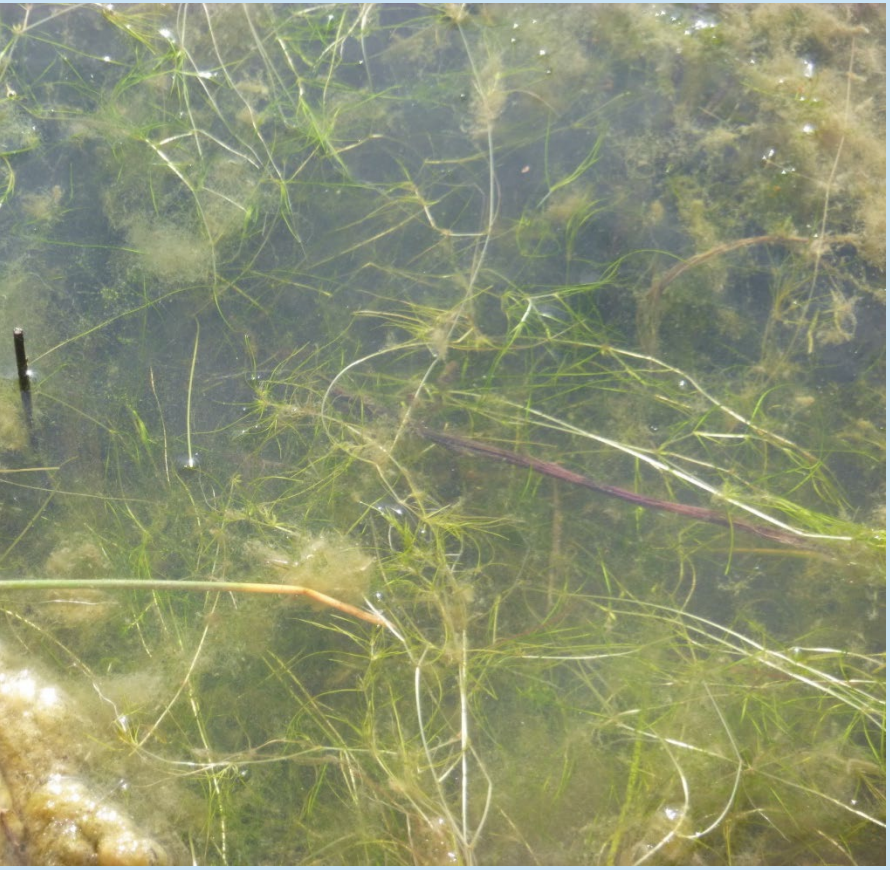
Anticipated outcomes

↑ waterbird production

↑ stopover resources for migrating waterbirds, especially during the fall

Recolonization by resident wetland obligates??

The future of Camas wetlands

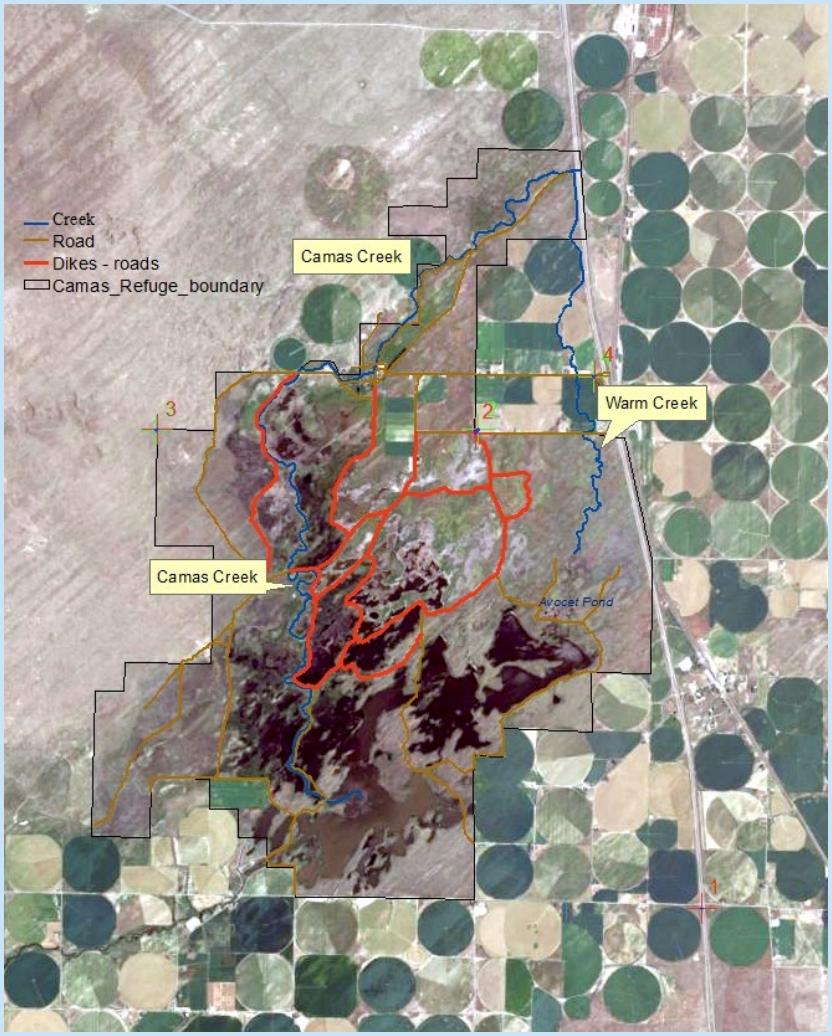


Monitoring:

- Water quantity
- Water quality
- Community structure and abundance
  - Vegetation
  - Birds
  - Reptiles and amphibians
  - Flying and aquatic mammals

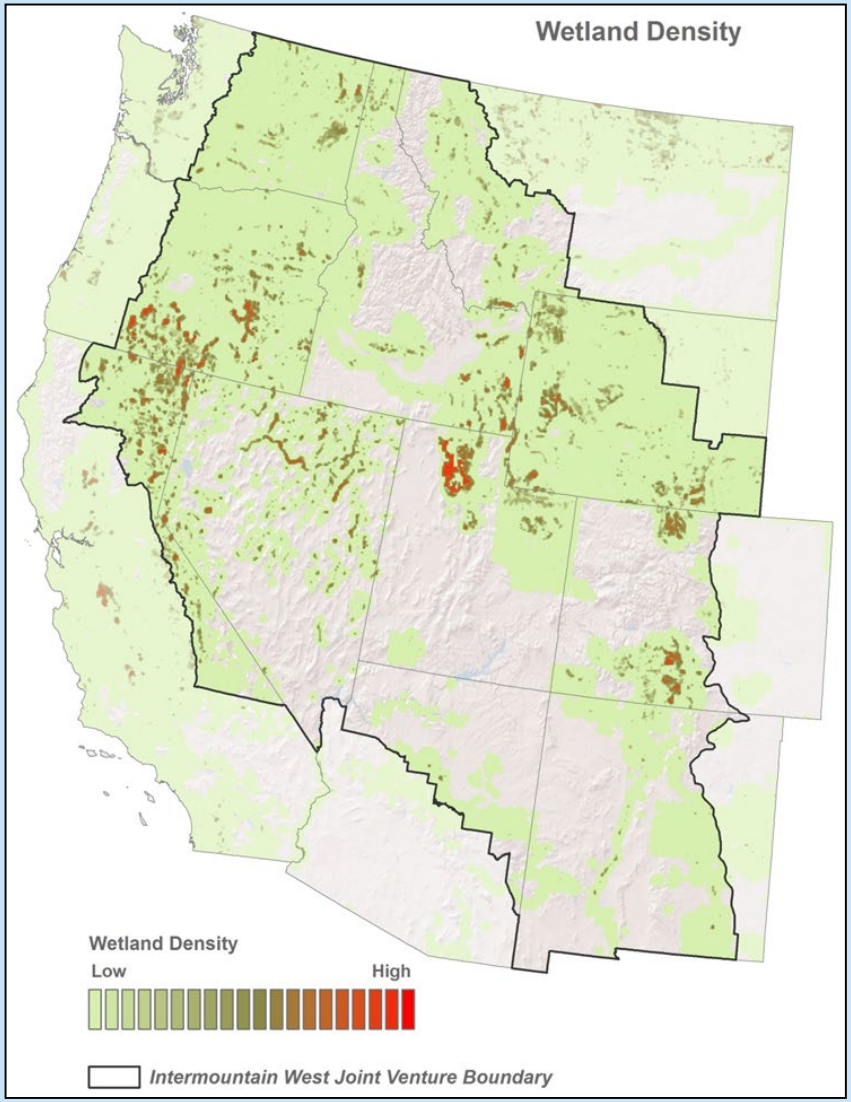
The future of Camas wetlands

- Goal of 2,000 acres/year of wetland habitat



The future of Camas wetlands

- Goal of 2,000 acres/year of wetland habitat
- In the context of the arid Intermountain West
  - 50% loss of naturally occurring wetlands
  - Reduced to 2% of the landscape



Questions?