March 2024

Agenda Item: 4
Meeting Date: March 1, 2024

Delta Adapts: Draft Adaptation Plan Overview & Discussion

Delta Stewardship Council

A CALIFORNIA STATE AGENCY

SUMMER 2021

Vulnerability Assessment Findings

Flooding

- More flooding
- Climate change will impact Delta residents disproportionately

Extreme Heat

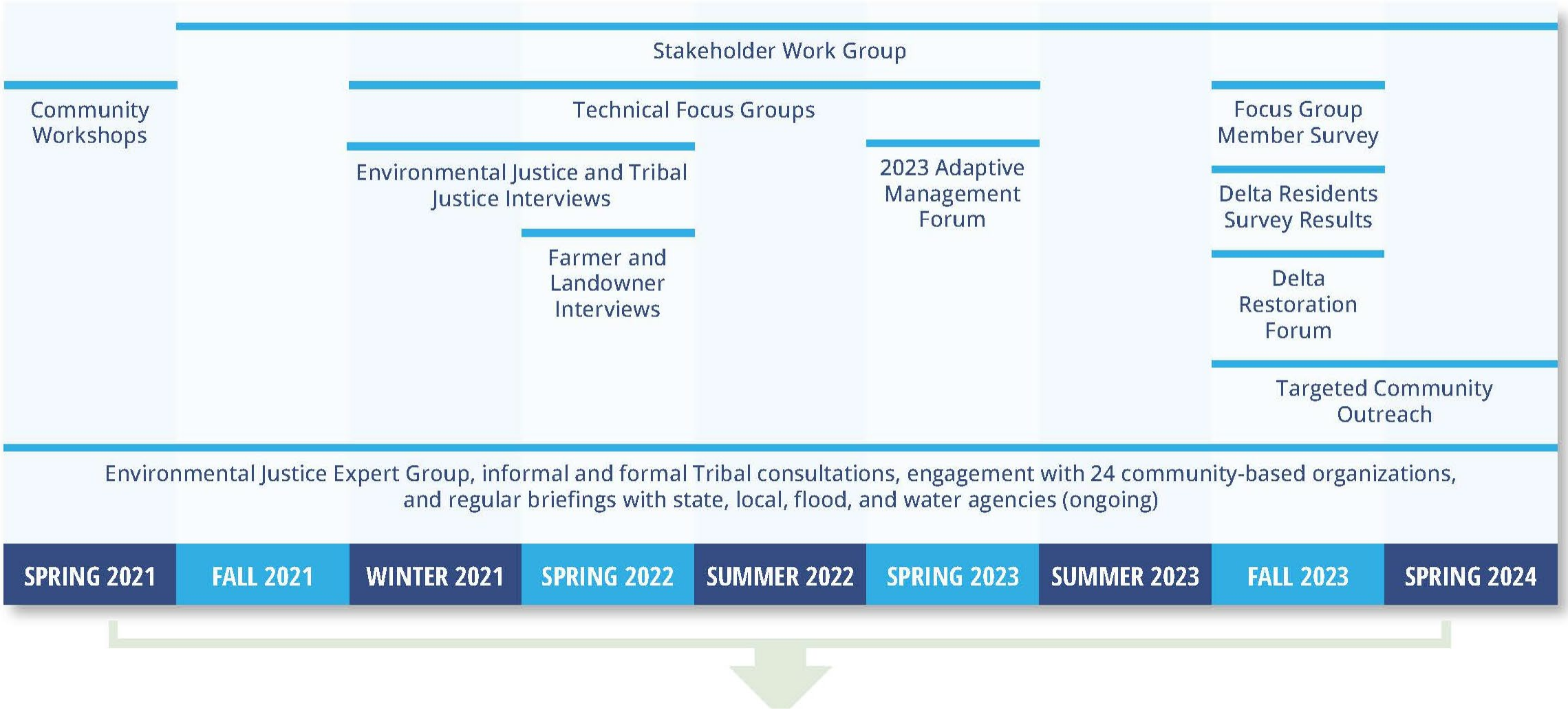
- Less reliable Delta water exports
- Periodic decreases in water quality for in-Delta users

Drought

- Increased loss and stress on ecosystems
- Decreased agricultural yields

Wildfire

Partner Input



SUMMER 2024

Water Supply Reliability

Ecosystem Restoration

Adaptation Plan

Agriculture

Flooding

- Adaptation strategies
- Responsible entities
- Funding and financing
- Governance best practices

Equity in Adaptation

- Representational justice
- Prioritize adaptation investments in communities most socially vulnerable to climate impacts
- Culturally appropriate risk communication and education campaigns

FLOOD RISK REDUCTION

DELTA ADAPTS
Focus Area

Vulnerabilities

Climate-induced hydrologic variability and sea level rise are expected to **intensify flooding** across the entire Delta region

The Delta's **1,100 miles of levees** are designed to operate under historical conditions that did not consider climate change, which will stress the whole system

Strategies

- Develop climate-informed understanding Delta flood dynamics
- Strengthen and upgrade Delta levee system
- Restore ecosystems for flood mitigation
- Improve emergency preparedness and risk communication
- Manage and expand upstream water storage capability
- Use adaptive urban planning and farming practices to reduce risk

Example Actions

- Integrate climate change into risk assessment models (FL-1-1)
- Integrate climate risks and equity into the Delta Levees Investment Strategy (FL-2-2)
- Monitor and evaluate the effectiveness of multi-benefit projects for flood risk reduction (FL-3-2)
- Raise awareness about the availability and importance of flood insurance (FL-4-6)
- Use excess floodwater to recharge underground aquifers (FL-9-2)
- Limit development in flood-prone areas (FL-7-4)

Strategy Highlights:

Emergency preparedness, risk communication, and levee strengthening

- Liz Ramos, KSN Engineers

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Flood Emergency Preparedness in the Delta

Presented to the Delta Stewardship Council

Elizabeth Ramos, PE, CFM

March 1, 2024

KSN inc. KJELDSEN SINNOCK NEUDECK
CIVIL ENGINEERS & LAND SURVEYORS

South Delta Unified Food Fight Command Meeting, 2017

FLOOD EMERGENCY PREPAREDNESS IN THE DELTA

FLOOD EMERGENCY PREPAREDNESS: INVEST IN FIRST LINE OF DEFENSE

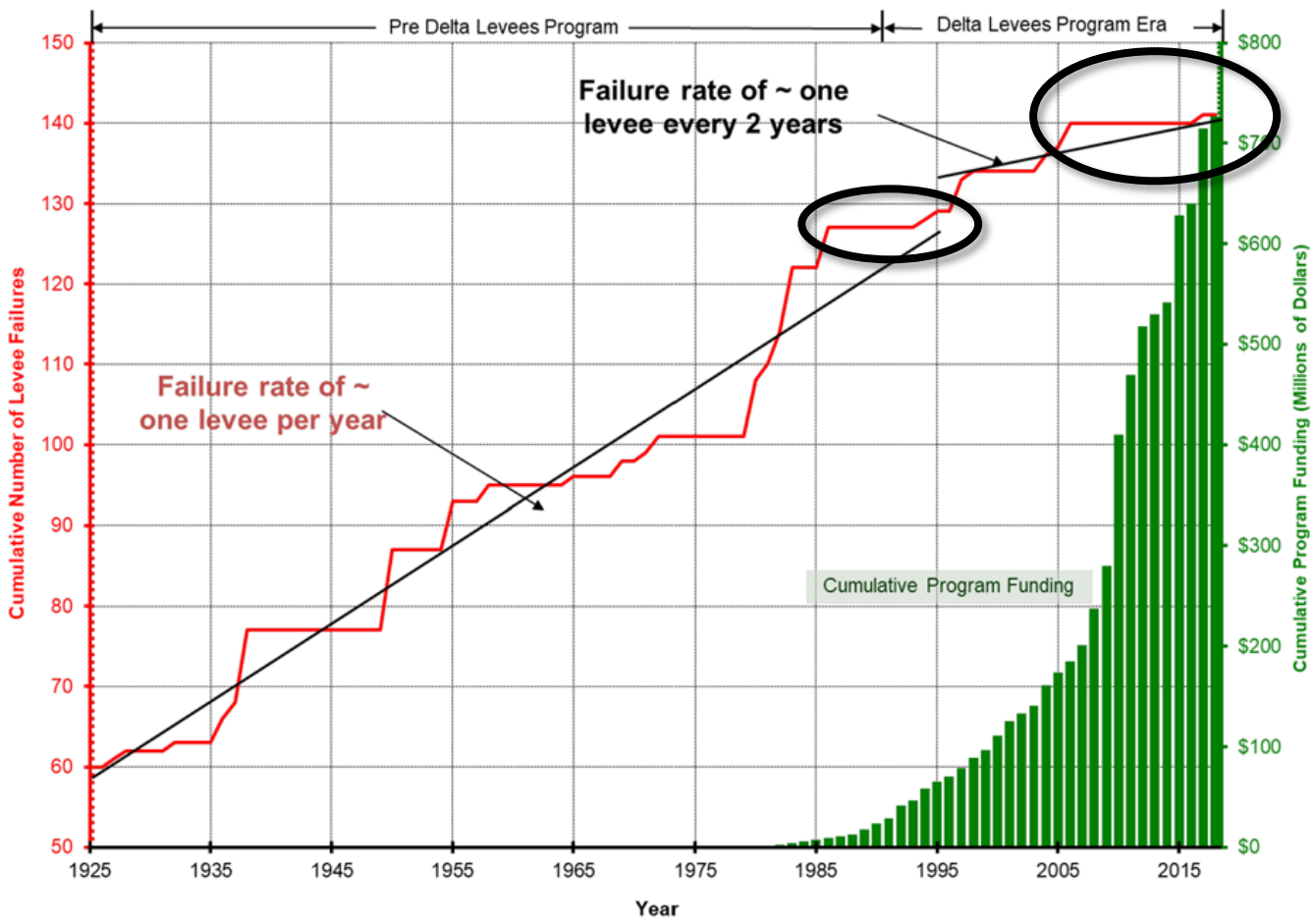
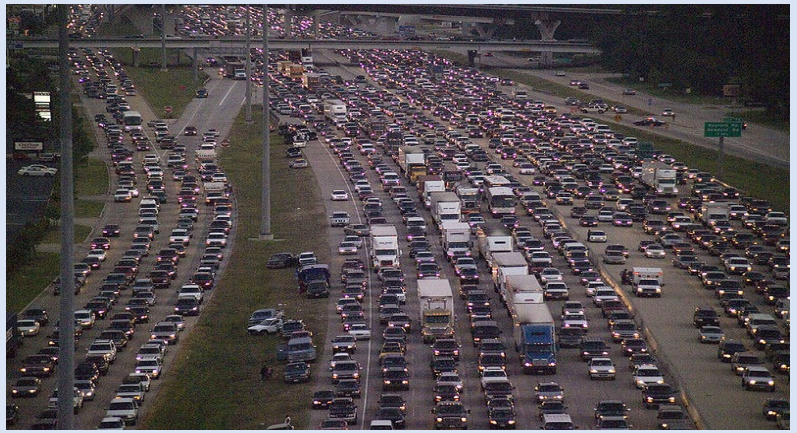


Figure 4 - Cumulative Delta Levee Failures (Source: DWR Delta Levees Program)

Key Components of Flood Emergency Preparedness

1. Flood Fight Effort

2. Public Safety Effort



FLOOD EMERGENCY PREPAREDNESS: FUNDING IN THE DELTA

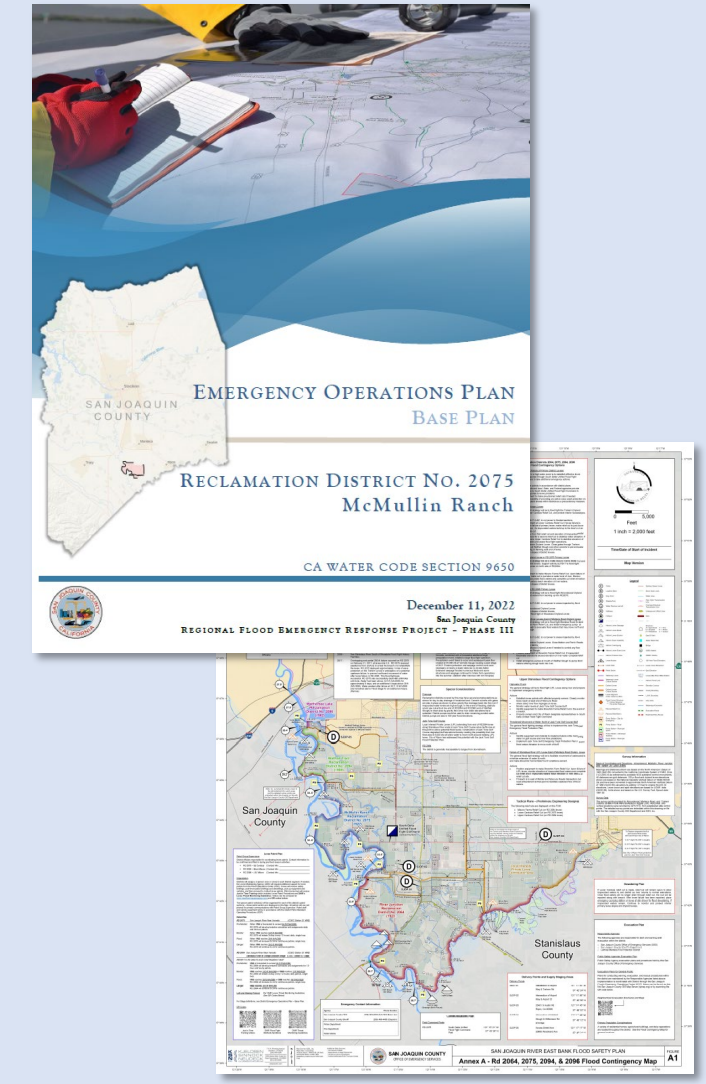
1997

- Under leadership of San Joaquin County, LMAs begin to develop Flood Safety Maps

2012

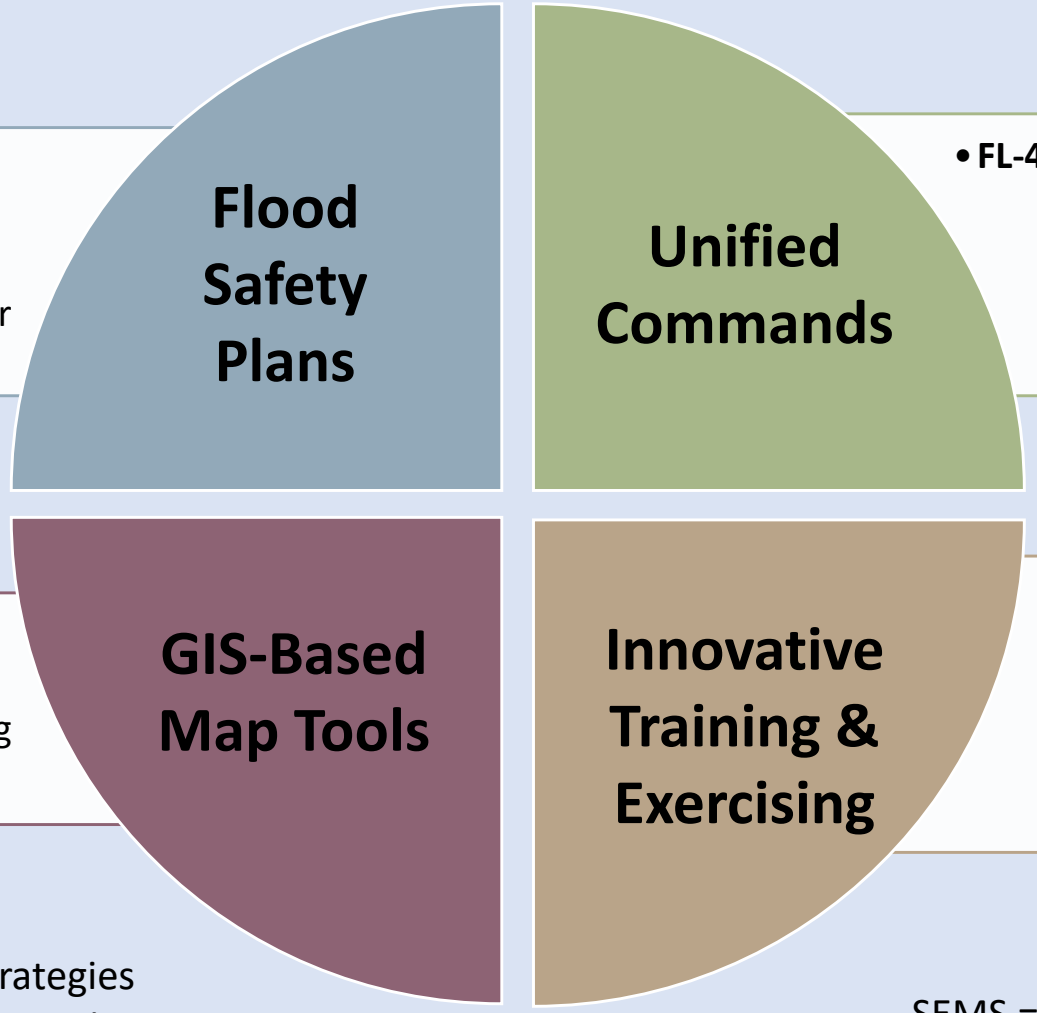
- Since 2012, DWR has invested $30M in Emergency Preparedness
  - Flood Safety Plans for Levee Maintaining Agencies
  - Training and Exercises
  - Flood Fight Supplies

Now



LMA = Levee Maintaining Agency

FLOOD EMERGENCY PREPAREDNESS: CONCEPT INTEGRATION



- **FL-4-1: Emergency Response Plans**
  - How LMAs respond
  - How LMAs interact with other agencies

- **FL-4-4: Improvements in Flood Preparedness**
  - Collaborative Emergency Response Plan Development
  - ICS, SEMS/NIMS concepts to manage emergencies

- **FL-4-4: Improvements in Flood Preparedness**
  - Utilize modern mapping technologies

- **FL-4-2: Flood-fighting Training Programs**
  - Just in Time Training Program
  - Training Classes tailored for audiences
  - Exercises

FL-4-1: Denote Flood Risk Reduction Strategies presented in the Delta Adapts: Adaptation Plan (Administrative Draft, December 2023)

ICS = Incident Command System
SEMS = Standardized Emergency Management System
NIMS = National Incident Management System

Hands-on Flood Fight Training

Delta-wide Full-Scale Exercise
San Joaquin County EOC

Delta-wide Full-Scale Exercise
RD 3 Field Command Post

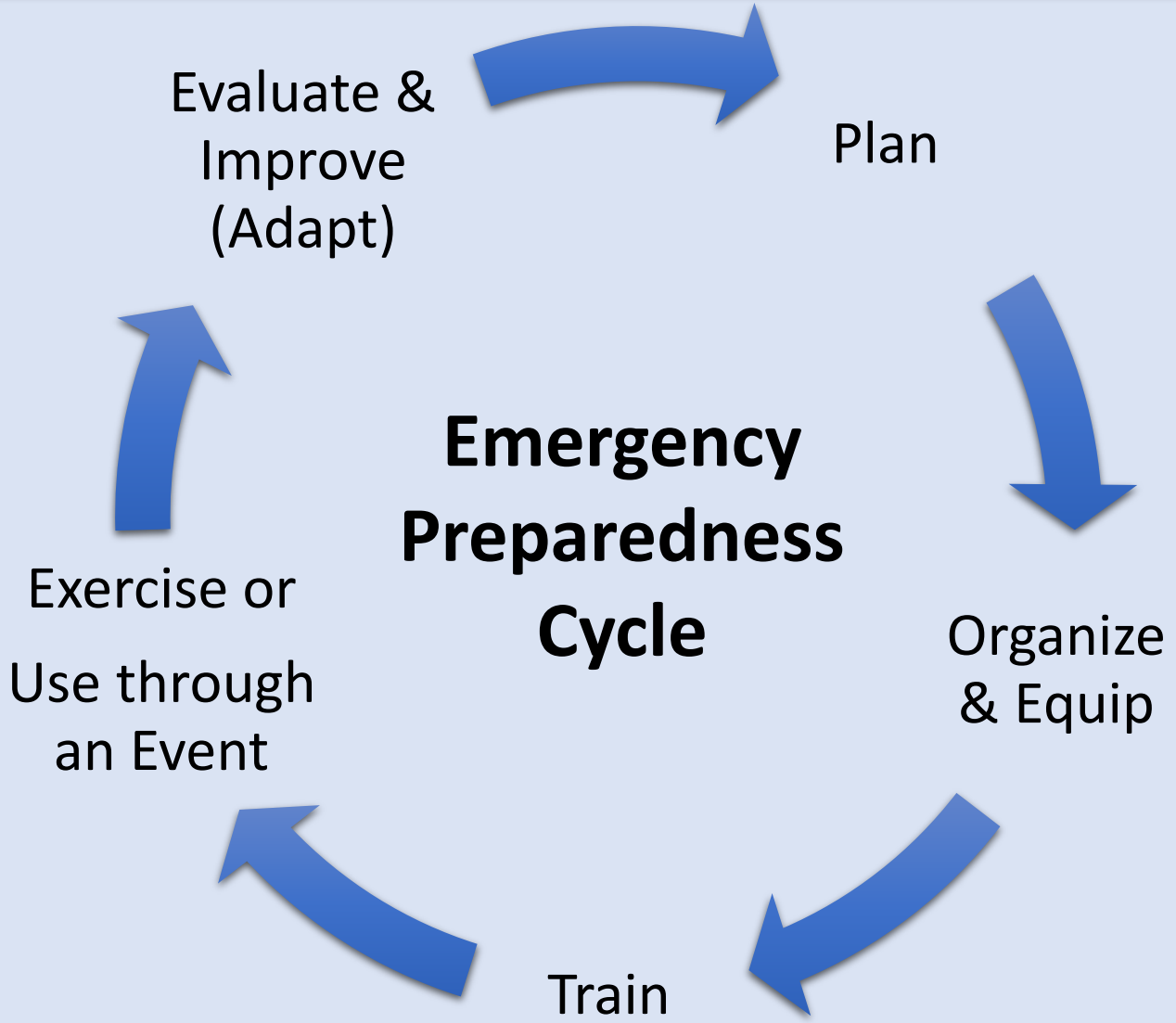
FLOOD EMERGENCY PREPAREDNESS: THE FUTURE

The Good News

1. Investment in the first line of defense levees proven successful
2. ICS, SEMS/NIMS are flexible and scalable
3. Strong foundation has been established, and continued implementation of the Emergency Preparedness Cycle

Priority Focus Areas

1. Mass Evacuation
2. Shelter-in-Place
3. Public Alert and Warning



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THANK YOU

QUESTIONS AND DISCUSSION

ECOSYSTEM

DELTA ADAPTS
Focus Area

Vulnerabilities

Land development leaves little room for **habitats and species** to migrate

Heat, sea level rise, and climate extremes impact **ecosystem health and biodiversity**

Strategies

- Improve capacity of ecosystems to adapt and thrive
- Build capacity and partnerships for ecosystem resilience
- Protect ecosystems by halting and reversing subsidence
- Enhance urban ecosystem health

Example Actions

- Work with Tribes and Tribal communities to interweave Traditional Knowledge (ECO-1-1)
- Prioritize multi-benefit projects (ECO-1-4)
- Prepare program-level environmental documentation to accelerate pace and scale of restoration (ECO-3-1)
- Prioritize and incentivize land use types that halt or reverse subsidence (ECO-2-1)
- Increase urban tree canopy cover and other green spaces in areas that have the least (ECO-4-2)

Strategy Highlights:

Subsidence halting

- Campbell Ingram, Sacramento-San Joaquin Delta Conservancy

Delta Subsidence and Carbon Management

Delta Adapts Public Meeting

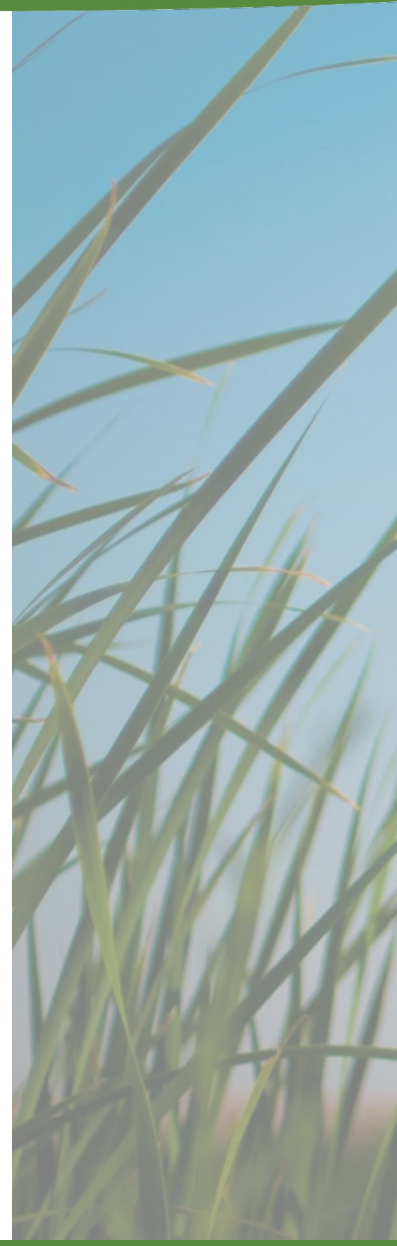
Campbell Ingram, Executive Officer

March 1, 2024

SACRAMENTO - SAN JOAQUIN
DELTA CONSERVANCY
A California State Agency

About the Delta Conservancy

- The Sacramento-San Joaquin Delta Conservancy is a state agency created as part of the 2009 Delta Reform Act.
- **Purpose:** Be a lead agency for ecosystem restoration and efforts that promote environmental protection and economic wellbeing of Delta residents.



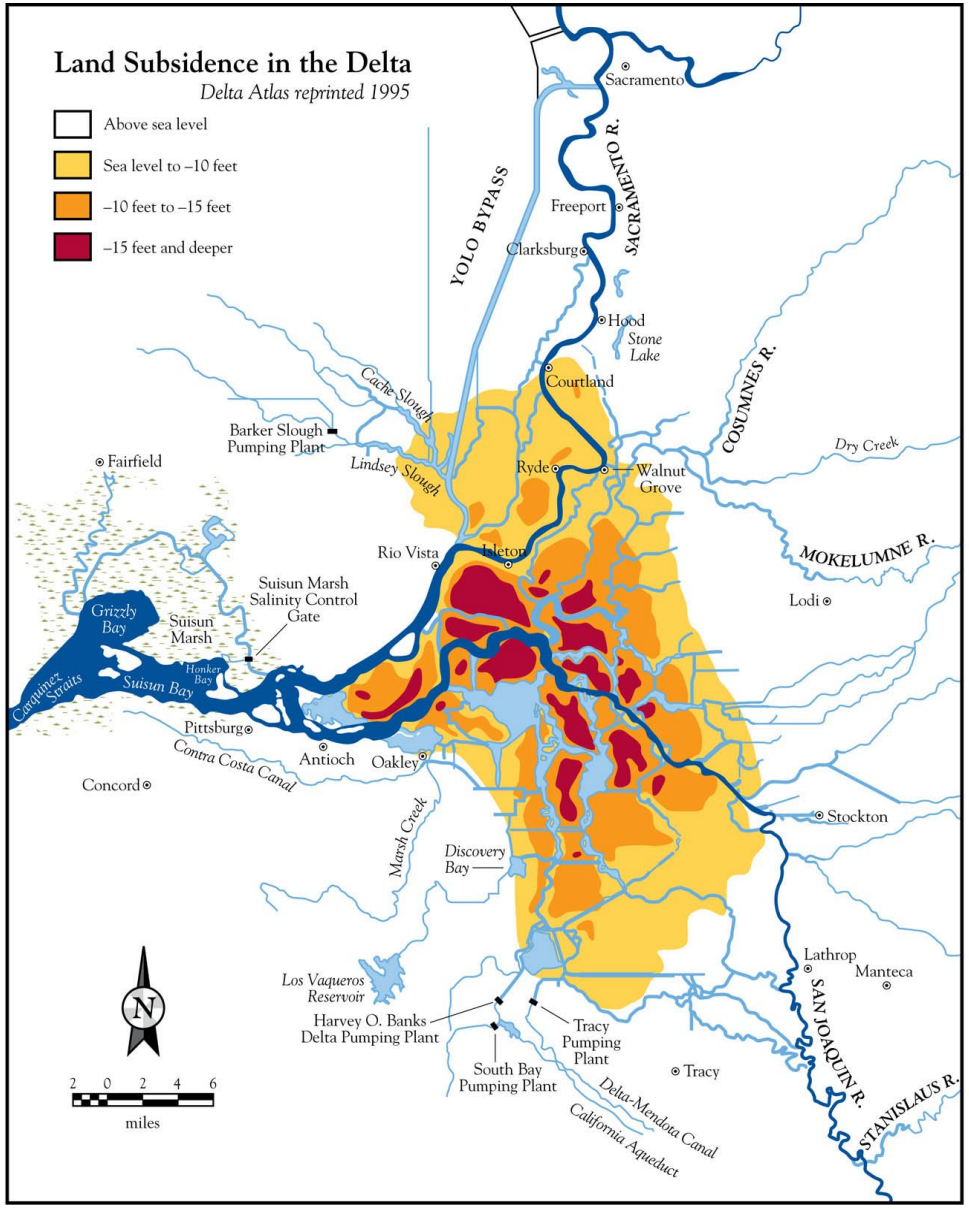
Our Mission

Exterior view of the 1883 Clarksburg Schoolhouse that will be restored and developed into a Delta Welcome Center under a Conservancy-funded grant.

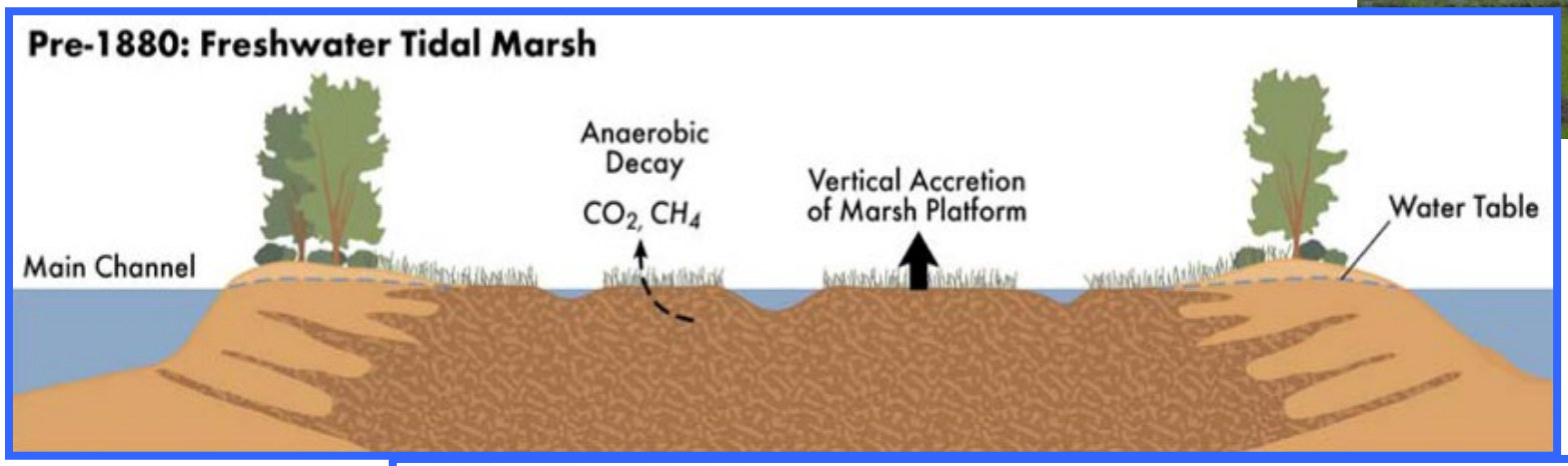
- The Conservancy leads efforts to preserve, protect, and restore the natural resources, economy, and agriculture of the Sacramento-San Joaquin Delta and Suisun Marsh.
- We've funded more than 140 projects.
- Conservancy climate change policy (2012) supports projects to stop subsidence and related carbon emissions in the Delta

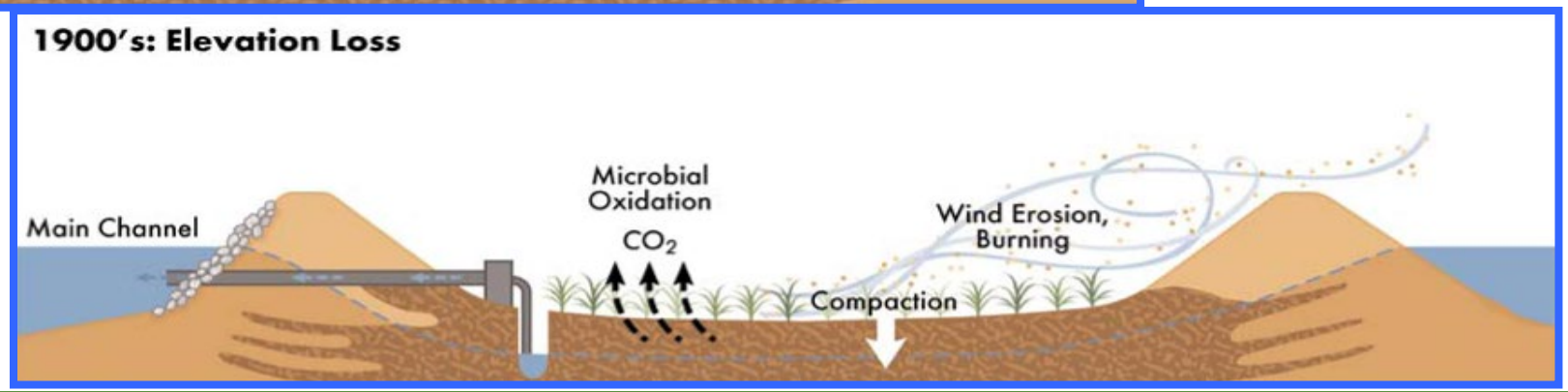
Subsidence and Risks

- Subsidence continues at rates ranging from about 0.5 to 1.5 inches per year
- Sea levels are rising at a rate of about 0.3 inch per year
- Threatens agriculture, communities and water supply



Subsidence Process





Staten Island Subsidence

Carbon Emissions Quantified

- Average of 10 metric tons of CO2 per acre per year
- ~1,200,000 metric tons of CO2 per year, Delta total
- ~300,000 vehicle equivalent
- Just under 25% of CA's total plant based agriculture carbon emissions

Nature-Based Solutions: Wetland Restoration Grant Funding

- Re-wetting peat soils stops subsidence and CO2 emissions - rice cultivation or managed wetlands
- DWR has implemented over 3,000 acres of managed wetlands on Sherman and Twitchell Islands
- DC has funded 4 projects that will realize up to 11,000 acres of conversion and approximately 110,000 tons of avoided CO2 emissions annually
  - Restoration of Webb Tract to a mosaic of 3,500 acres of rice and 1,500 acres of managed wetland
  - Program that will incentivize private landowners to convert up to 5,000 acres to rice
  - Two projects that will realize 1,100 acres of managed wetland

Carbon Market Protocol

- Conservancy championed Voluntary Market Protocol, approved by the American Carbon Registry in 2017
- Used on to verify carbon credits (tons of CO_2 emissions avoided) for sale

  Quantify → Verify → Certify → Sell
- Requesting the Air Resources Board adopt the existing voluntary market protocol under the Cap-and-Trade compliance market

Contact

Campbell Ingram
Executive Officer
Campbell.Ingram@deltaconservancy.ca.gov

SACRAMENTO - SAN JOAQUIN
DELTA CONSERVANCY
A California State Agency

QUESTIONS AND DISCUSSION

AGRICULTURE

DELTA ADAPTS
Focus Area

Vulnerabilities

Heat, drought, flooding, reduced chill hours, sea level rise, and decreased water quality can all decreased **crop yield and quality**

The above vulnerabilities and market forces impact the **economic stability of industry**

Subsidence, saline soils, and land use changes impact **land viability for agriculture**

Strategies

- Equitable food system
- Climate-smart farming
- Diversification of revenue on agricultural land
- Strategic land retirement

Example Actions

- Improve and expand irrigation efficiency practices (AG-1-1)
- Support and retain labor and workforce development in agriculture (AG-2-1)
- Support and fund environmental credits (AG-3-3)
- Allow for flooding, wetting for subsidence-halting or reversal, or conversion to managed wetland on marginal farm land (AG-4-1)

Strategy Highlights:

Climate-smart farming

- Michael Wolff, California Department of Food & Agriculture

Climate Smart Agriculture in California

Office of Environmental Farming and Innovation (OEFI)

Contributions to the *Delta Adapts* Adaptation Plan

Michael Wolff, Ph.D.

Healthy Soils Program Supervisor

Email for questions: michael.wolff@cdfa.ca.gov

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HSP Incentive Grants promote Adoption (fixed-rate, one-time, 1-3 years)

I. Cropland Management Practices

1) Cover Crop (USDA NRCS CPS 340)
2) Conservation Crop Rotation (USDA NRCS CPS 328)
3) Mulching (USDA NRCS CPS 484)
4) Nutrient Management (USDA NRCS CPS 590) (15% reduction in fertilizer application *only*)
5) Residue and Tillage Management – No-Till (USDA NRCS CPS 329)
6) Residue and Tillage Management – Reduced Till (USDA NRCS CPS 345)
7) Strip Cropping (USDA NRCS CPS 585)
8) Compost Application Practices (application rates consistent with those specified in CDFA Compost Application White Paper)
   - Compost Application
     - Compost Purchased from a Certified Composting Facility
     - On-farm Produced Compost *(compliant with all requirements in the RGA)*
9) Whole orchard Recycling (CDFA Whole Orchard Recycling Report)

III. Woody Cover Establishment

1) Alley Cropping (USDA NRCS CPS 311)
2) Hedgerow Planting (USDA NRCS CPS 422)
3) Multi-story Cropping (USDA NRCS CPS 379)
4) Riparian Forest Buffer (USDA NRCS CPS 391)
5) Tree/Shrub Establishment (USDA NRCS CPS 612)
6) Windbreak/Shelterbelt Establishment (USDA NRCS CPS 380)

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II. Herbaceous Cover Establishment

1) Conservation Cover (USDA NRCS CPS 327)
2) Contour Buffer Strips (USDA NRCS CPS 332)
3) Field Border (USDA NRCS CPS 386)
4) Filter Strip (USDA NRCS CPS 393)
5) Forage and Biomass Planting (USDA NRCS 512)
6) Grassed Waterway (USDA NRCS CPS 412)
7) Herbaceous Wind Barrier (USDA NRCS CPS 603)
8) Riparian Herbaceous Cover (USDA NRCS CPS 390)
9) Vegetative Barriers (601) (USDA NRCS CPS 601)

IV. Grazing Lands Practices

1) Compost Application to Grassland (application rates consistent with those specified in CDFA Compost Application White Paper)
   - Compost Purchased from a Certified Composting Facility
   - On-farm Produced Compost *(compliant with all requirements in the RGA)*
2) Prescribed Grazing (USDA NRCS CPS 528)
3) Range Planting (USDA NRCS CPS 550)
4) Silvopasture (USDA NRCS CPS 381)

HSP Practice Notes for Delta Soils

- Riparian plantings, crop rotation, hedgerows, windbreaks, and cover crops seem to offer particular potential, in Delta ecological context.
- The Program has begun to prioritize "stacked" practice applications.
- Compost and Whole Orchard Recycling cannot be carried out on soils with >20% Soil Organic Matter.
- Mulch may present a particular Delta use case with increasing shift to perennial crops (superior to Whole Orchard Recycling in this context), as well as excess biomass throughout the state.

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HSP moving forward

New Practices

- Rice cultivation-related incentives may become available later. Our recent offer of funding for research on "Re-saturating Delta peat soils through rice cultivation" went unanswered.
- Similarly, biochar is being explored by an HSP research grant and could present a particular Delta use case eventually.
- In the summer of 2024 we will likely solicit new practice proposals for HSP incentives.
- SB 27 Carbon Sequestration Registry can help over time to list unfunded projects for soil carbon, ecosystem, and socioeconomic benefits.

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SWEEP Grants

- Awards up to 100% of cost of each project, up to $200,000.
  - During grant period, a series of 25% advances are generally available.
- Projects must reduce current water application to agricultural land.
- Projects must reduce energy use and greenhouse gas emissions
- At least 25% of Program funds go to Socially Disadvantaged Farmers and Ranchers, including tribal members or entities.

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SWEEP Practice Examples

1. Upgrade to more efficient irrigation, such as furrow-to-drip.
2. Install components for the upgrade, such as sand filters.
3. Improve a pump's efficiency, including replacement or variable frequency drive.
4. Switch a diesel pump to electric.
5. Install solar power with electric pumps.
6. Install a weather station.
7. Install moisture sensors.

- *But there is no set list of practices, and all projects will be assessed for water savings and GHG reductions.*

Flow meter

Double lined drip irrigation

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The Office of Environmental Farming and Innovation (OEFI)

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Partnerships with CDFA and HSP

- Local Block Grant Organizations now distributing SWEEP and HSP funding
- Continuous dialogue with NRCS
- Extensionists and Climate Education Specialists within UCCE
- RCDs and other Technical Assistance Providers
- CARB with Air Districts
- Water Resilience Portfolio (CNRA, CalEPA)
- Intertribal Ag Council

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Thank you!!!

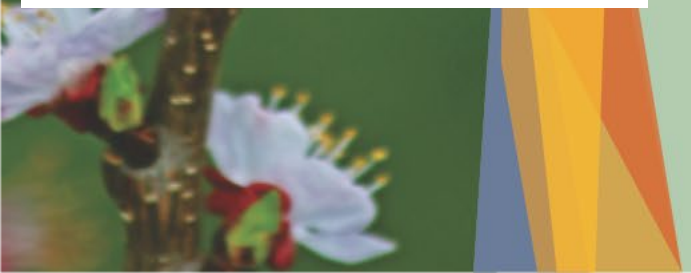
Climate Smart Ag webpage:
www.cdfa.ca.gov/oefi

Stay informed! Sign up for email notifications:

https://www.cdfa.ca.gov/subscriptions/MailChimp-signup.html

Questions?

Email: CDFA.OEFI@cdfa.ca.gov



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QUESTIONS AND DISCUSSION

WATER SUPPLY RELIABILITY

DELTA ADAPTS
Focus Area

Vulnerabilities

Water supply will likely decrease while demand increases due to heat, more variable precipitation, decreased snowpack, and sea level rise

Drought and salinity intrusion will harm **water quality**

Extreme weather could damage the network of **water conveyance** infrastructure and levees that protect water from salinity intrusion

Strategies

- Reduce reliance on the Delta through conservation local water supply development
- Increase storage of surface and groundwater supplies
- Modify reservoir operations
- Modify water quality standards
- Modify water infrastructure

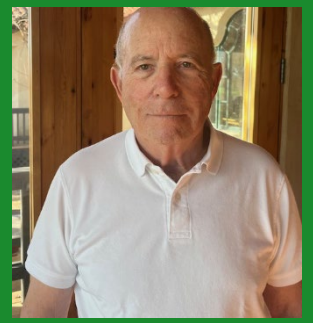
Example Actions

- Pilot projects promoting urban and agricultural water conservation (WSR-1-2)
- Invest in flood-managed aquifer recharge (WSR-2-4)
- Improve water supply and demand forecasting models for decision-making (WSR-4-1 through WSR-4-5)
- Develop comprehensive monitoring programs to detect HABs (WSR-5-7)
- Improve Delta levees (WSR-3-1)

Strategy Highlights:

Storage needs and levee maintenance

- Tom Zuckerman, Central Delta Water Agency



Tom Zuckerman – Water Supply Reliability

- Water availability in drier years
- Considerations for designing additional storage
- The importance of levees for water supply

Strategy Highlights:

Multi-benefit projects, water supply, collaborative approaches

- Louise Conrad, Department of
  tes

Agenda Item: 4
Meeting Date: March 1, 2024

Louise Conrad

Lead Scientist, Department of Water Resources

March 1, 2024

Delta Stewardship Council

DWR Priorities of Partnership & Innovation

- Nature-based approaches to achieve multiple benefits
- Modernization and innovation for water quality and supply
- Collaborative approaches for durable solution sets

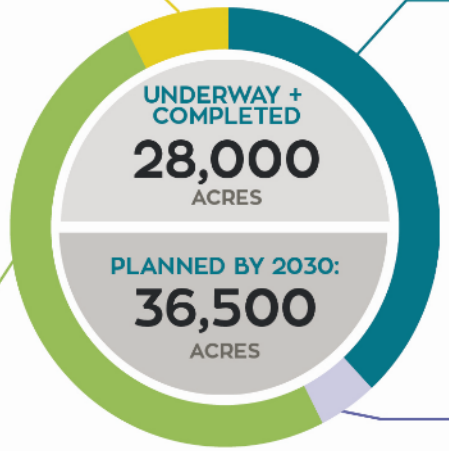
DWR's Multibenefit Habitat Restoration Projects

NON-TIDAL WETLAND CREATED

UNDERWAY AND COMPLETED: 2,000 ACRES
PLANNED BY 2030: 2,800 ACRES

TIDAL AND SUBTIDAL HABITAT

UNDERWAY AND COMPLETED: 10,000 ACRES
PLANNED BY 2030: 14,000 ACRES

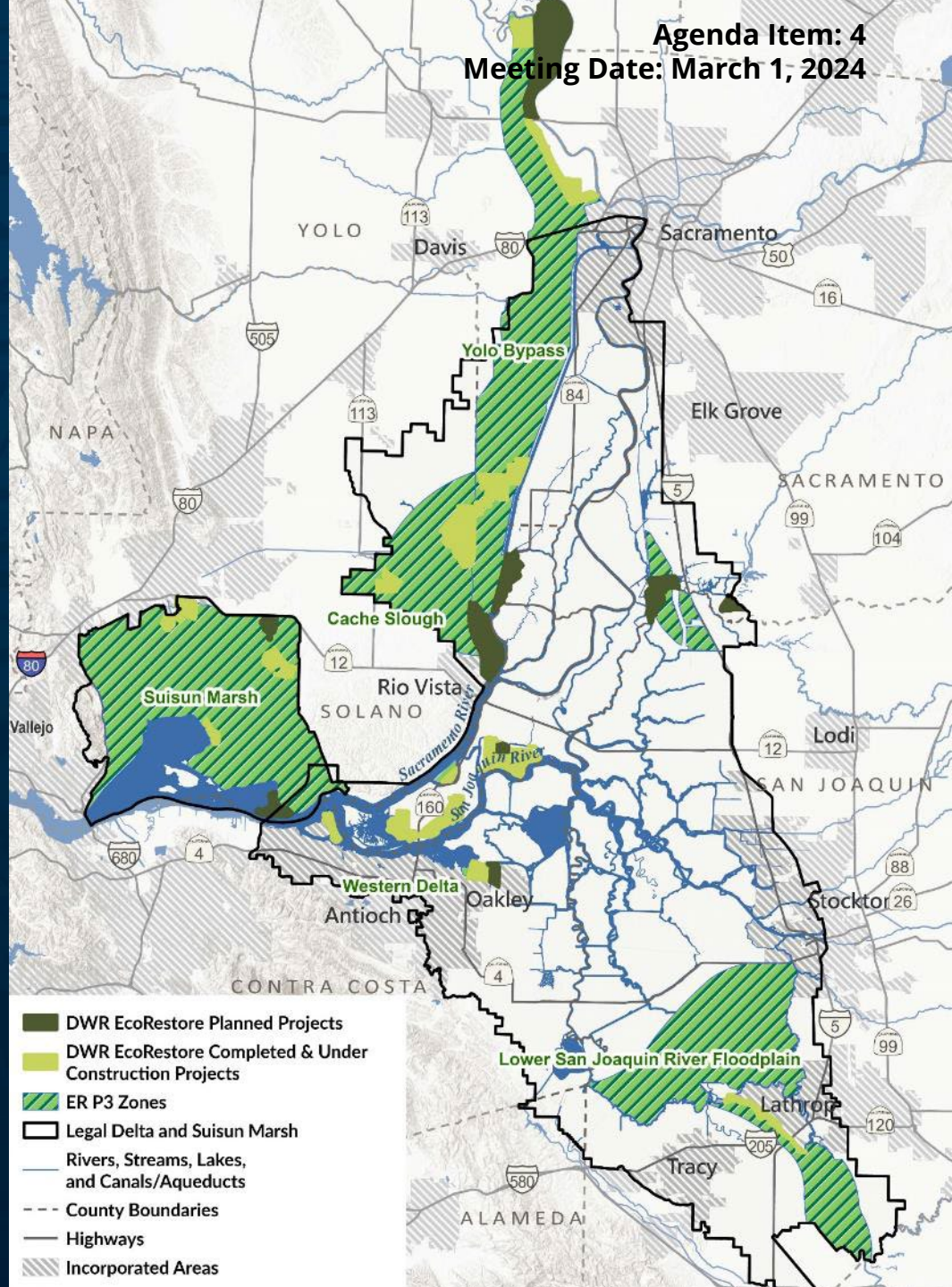


FLOODPLAIN RESTORATION

UNDERWAY AND COMPLETED: 16,000 ACRES
PLANNED BY 2030: 18,500 ACRES

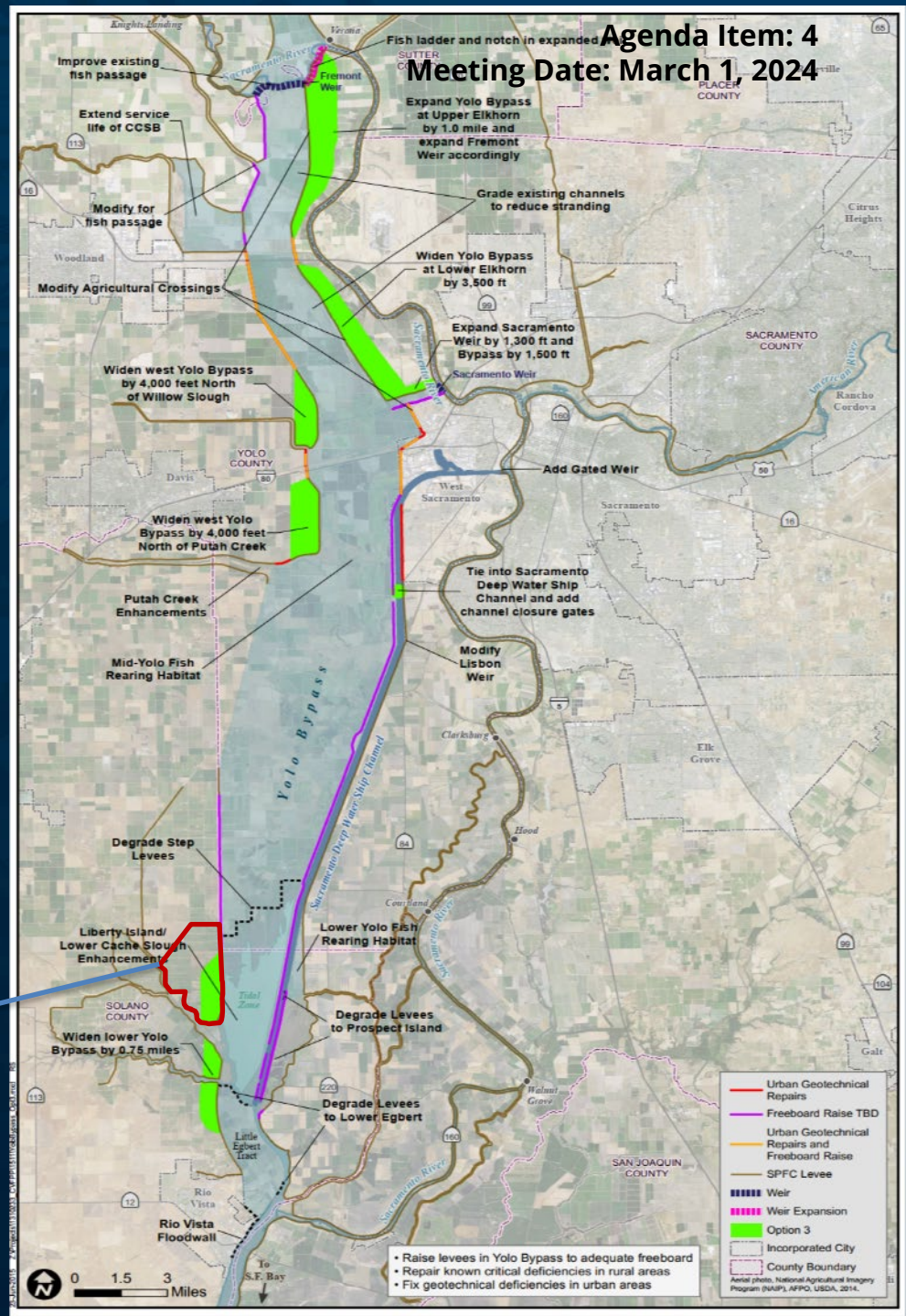
RIPARIAN AND UPLAND HABITAT

UNDERWAY AND COMPLETED: 875 ACRES
PLANNED BY 2030: 1,600 ACRES



Lookout Slough

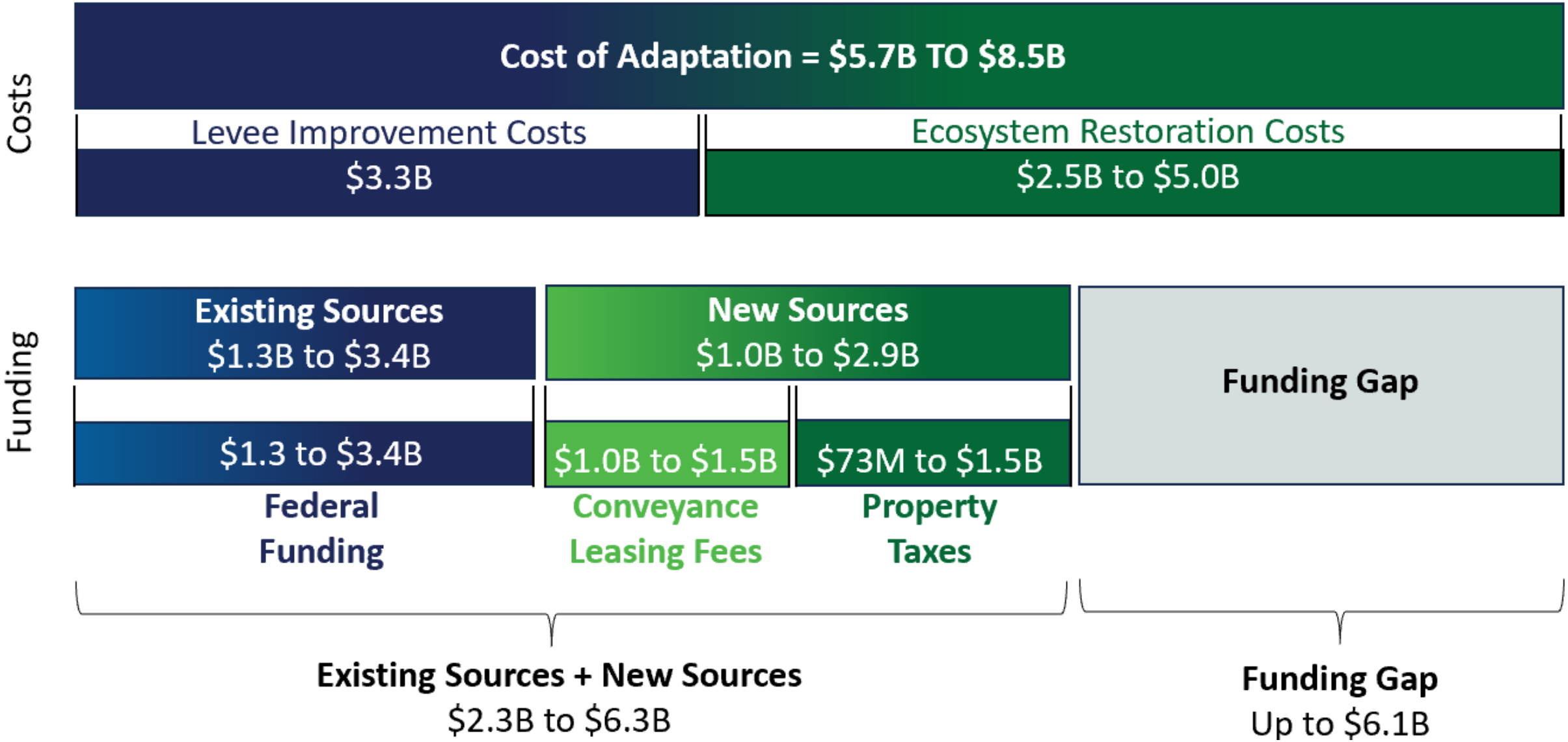
- Tidal Habitat for native fishes
- Increased flood storage and conveyance



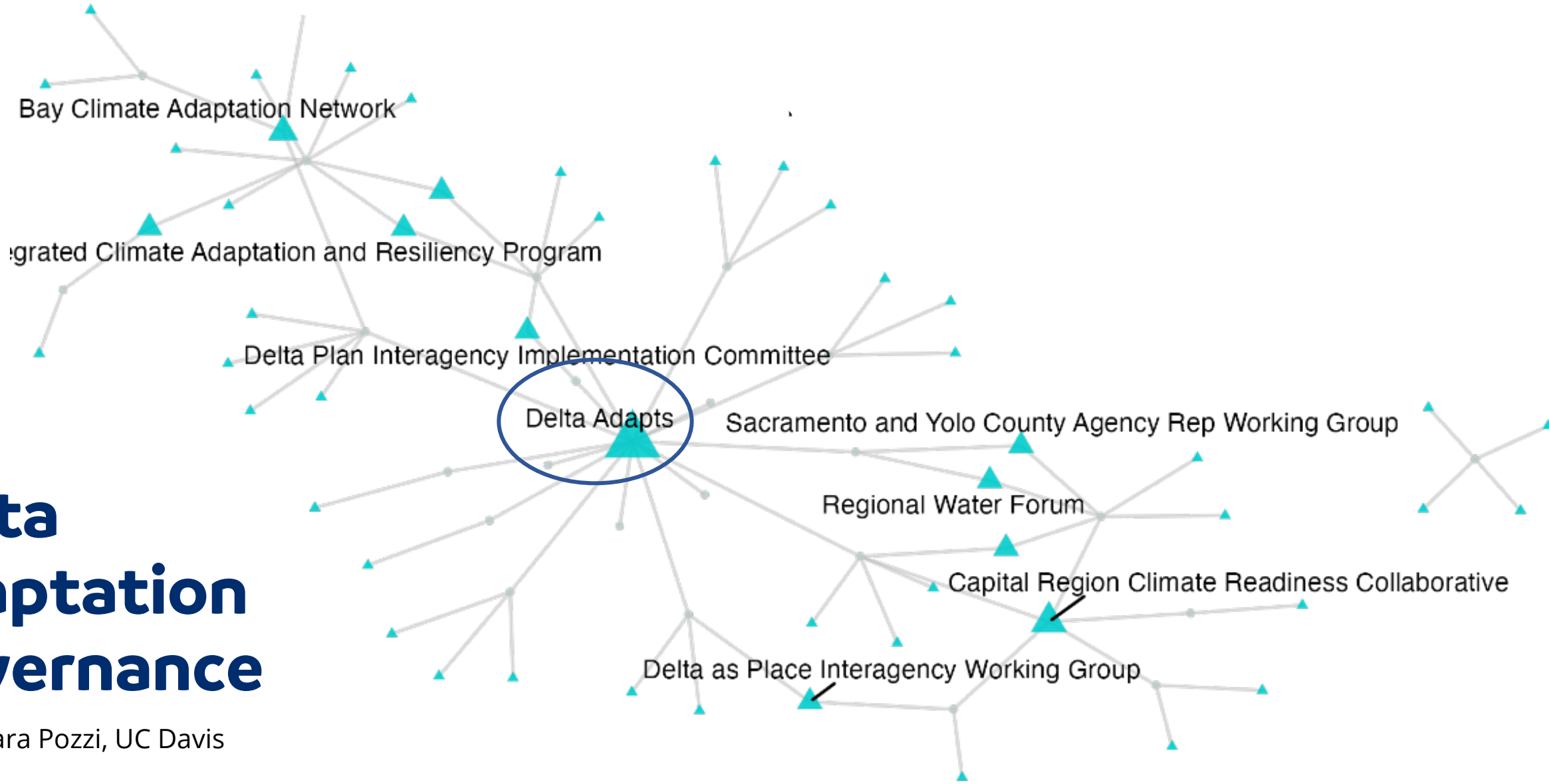
THANK YOU

QUESTIONS AND DISCUSSION

Funding


Costs
Cost of Adaptation = $5.7B TO $8.5B
Levee Improvement Costs
$3.3B
Ecosystem Restoration Costs
$2.5B to $5.0B
Funding
Existing Sources
$1.3B to $3.4B
New Sources
$1.0B to $2.9B
Funding Gap
$1.3 to $3.4B
$1.0B to $1.5B
$73M to $1.5B
Federal Funding
Conveyance Leasing Fees
Property Taxes
Existing Sources + New Sources
$2.3B to $6.3B
Funding Gap
Up to $6.1B

Delta Adaptation Governance



Credit: Tara Pozzi, UC Davis

Governance recommendations

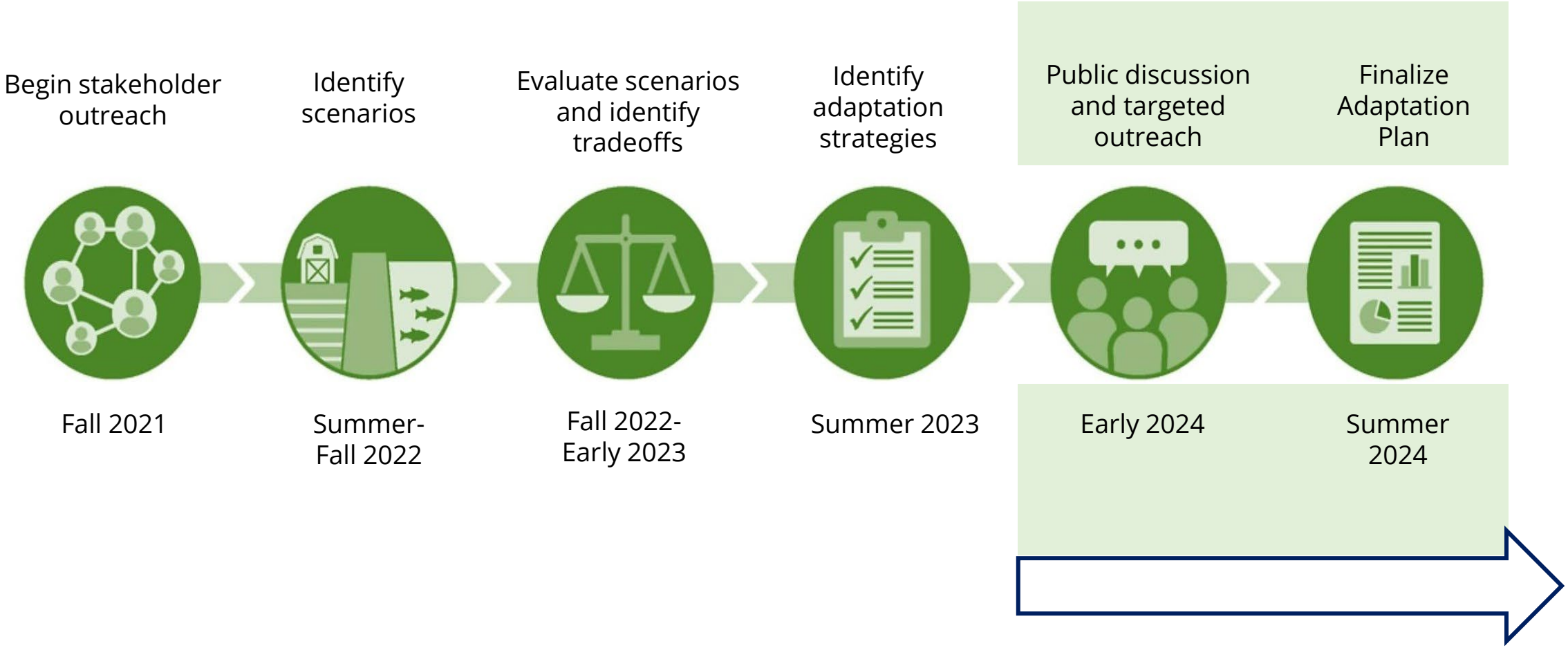
- Procedural justice Incorporate best practices for participatory governance
- Adopt adaptive management framework
- Explore inroads for Traditional Knowledge in Delta science and decision-making

Council's Role

- Advance representational justice in adaptation
- Create regionwide communication strategies on risk, restoration benefits, adaptation options
- Help fill research gaps through Delta Science Program
- Embrace other ways of knowing and Traditional Knowledge
- Work through DPIIC to create a regional funding strategy for adaptation
- Advance adaptation through Council's covered action authority

Photo: The Council's Tribal Listening Session 2023

Next Steps


Begin stakeholder outreach
Identify scenarios
Evaluate scenarios and identify tradeoffs
Identify adaptation strategies
Public discussion and targeted outreach
Finalize Adaptation Plan
Fall 2021
Summer-Fall 2022
Fall 2022-Early 2023
Summer 2023
Early 2024
Summer 2024

QUESTIONS AND DISCUSSION

Thank you

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