

NOV 2025

Agenda Item: 10, Presentation
Meeting Date: November 20, 2025
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Research Impact Assessment

Ash Zemenick, PhD, Senior Environmental Scientist
Rachael Klopfenstein, Environmental Program Manager



**Delta
Science
Program**

DELTA STEWARDSHIP COUNCIL

Delta Science Program (DSP)

Provide the best possible unbiased scientific information to inform water and environmental decision-making in the Delta.

A Core Function: Funding research

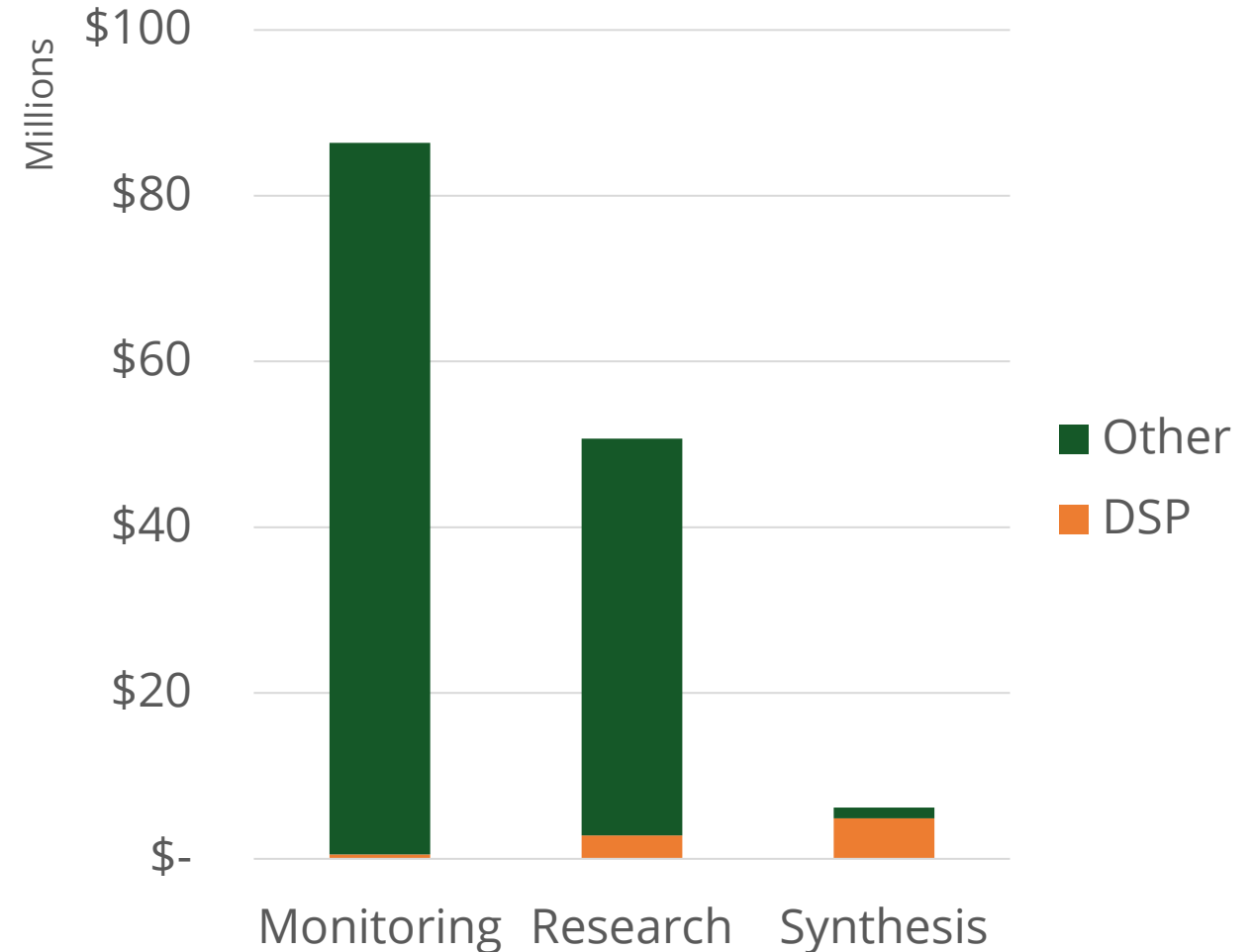
- Delta Research Awards (DRA)
- Delta Science Fellows (DSF)
- Directed Actions



Why identify the impact of DSP-funded research?

→ The DSP provides a reliable source of research funding in the system

FY22-23 Science Expenditures by Project Category



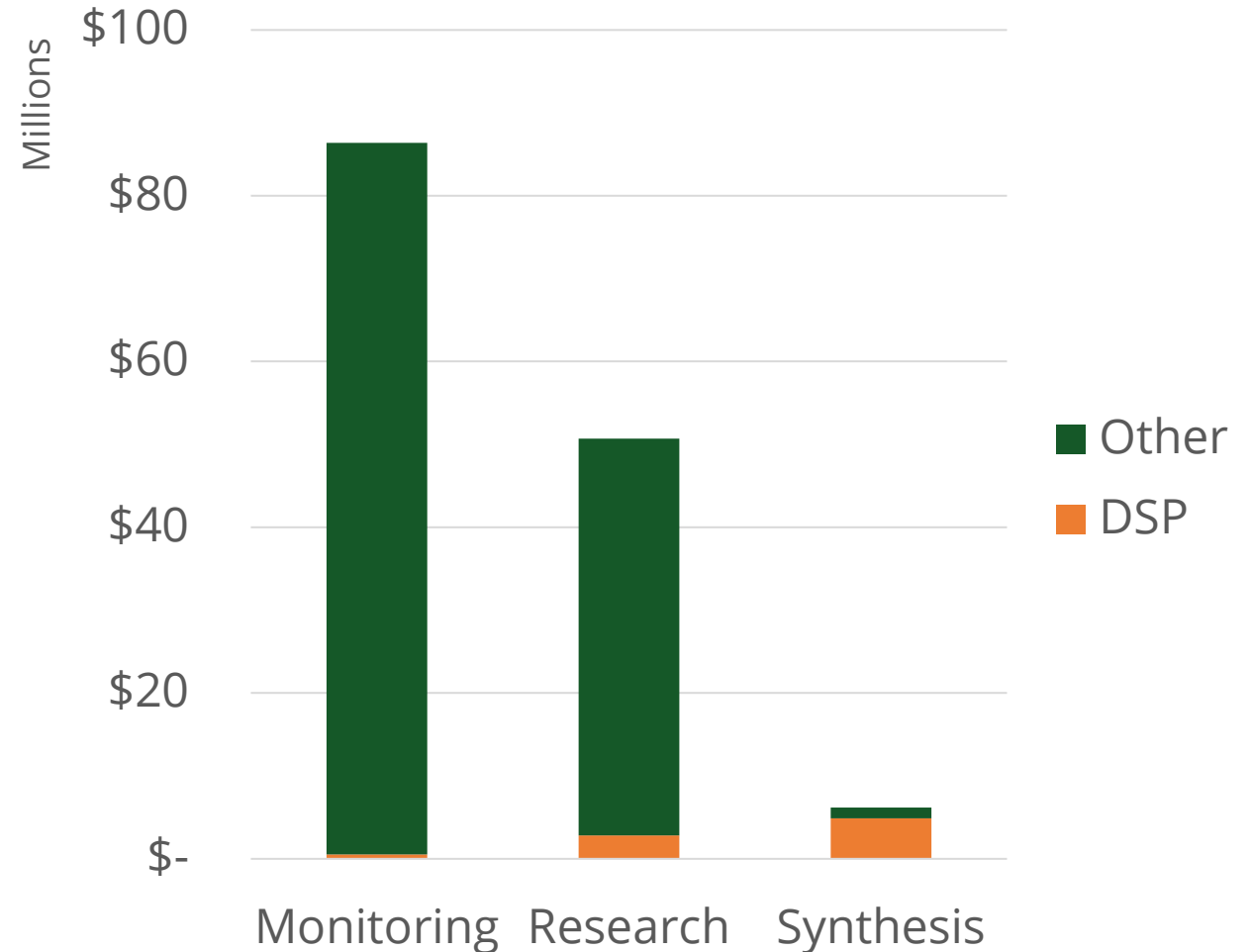
Why identify the impact of DSP-funded research?

→ The DSP provides a reliable source of research funding in the system

Goals of measuring impact:

- Identify management impacts
- Enhance future impacts
- Advocate for continued and increased funding

FY22-23 Science Expenditures by Project Category



How to measure research impact

- **It's complicated**
 - Impact takes time
 - Management decisions based on a variety of factors and evidence



How to measure research impact

- **It's complicated**
 - Impact takes time
 - Management decisions based on a variety of factors and evidence
- **Past approaches**
 - Dollars spent
 - Return on Investment (ROI)

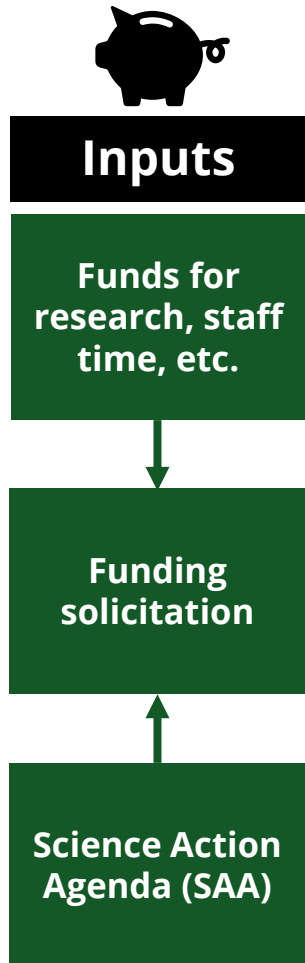


How to measure research impact

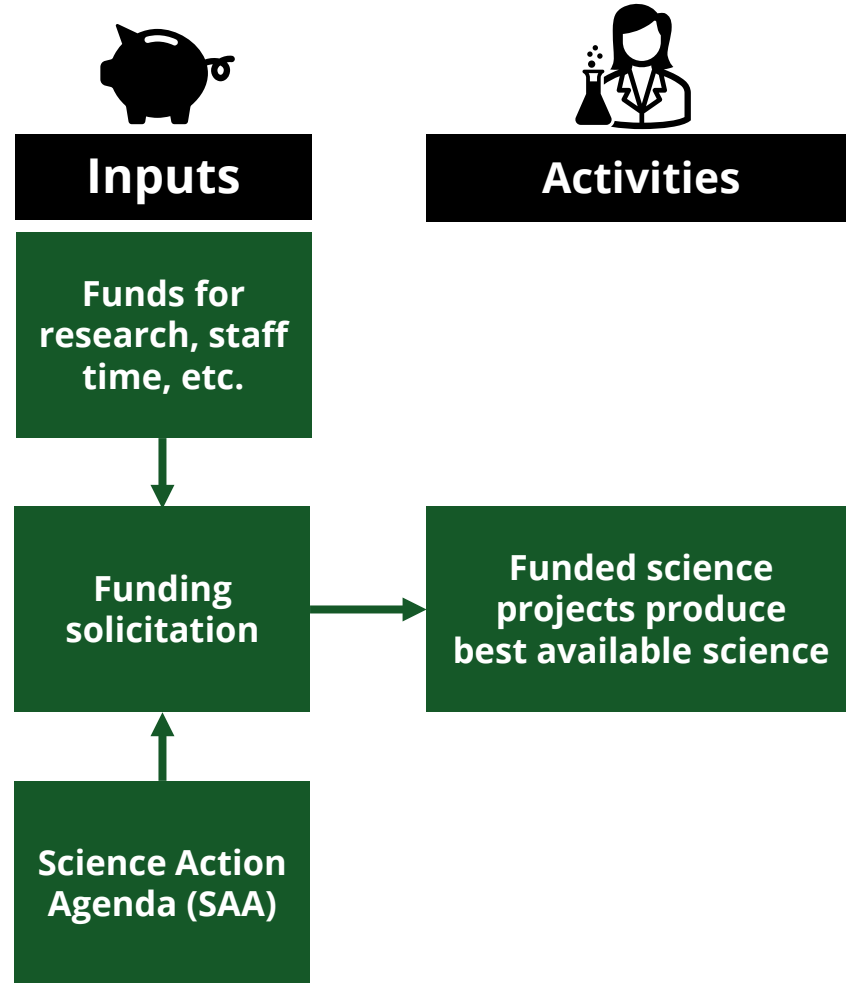
- **It's complicated**
 - Impact takes time
 - Management decisions based on a variety of factors and evidence
- **Past approaches**
 - Dollars spent
 - Return on Investment (ROI)
- **Research Impact Assessment (RIA)**
 - Measure societal impacts
 - Utilizes impact model



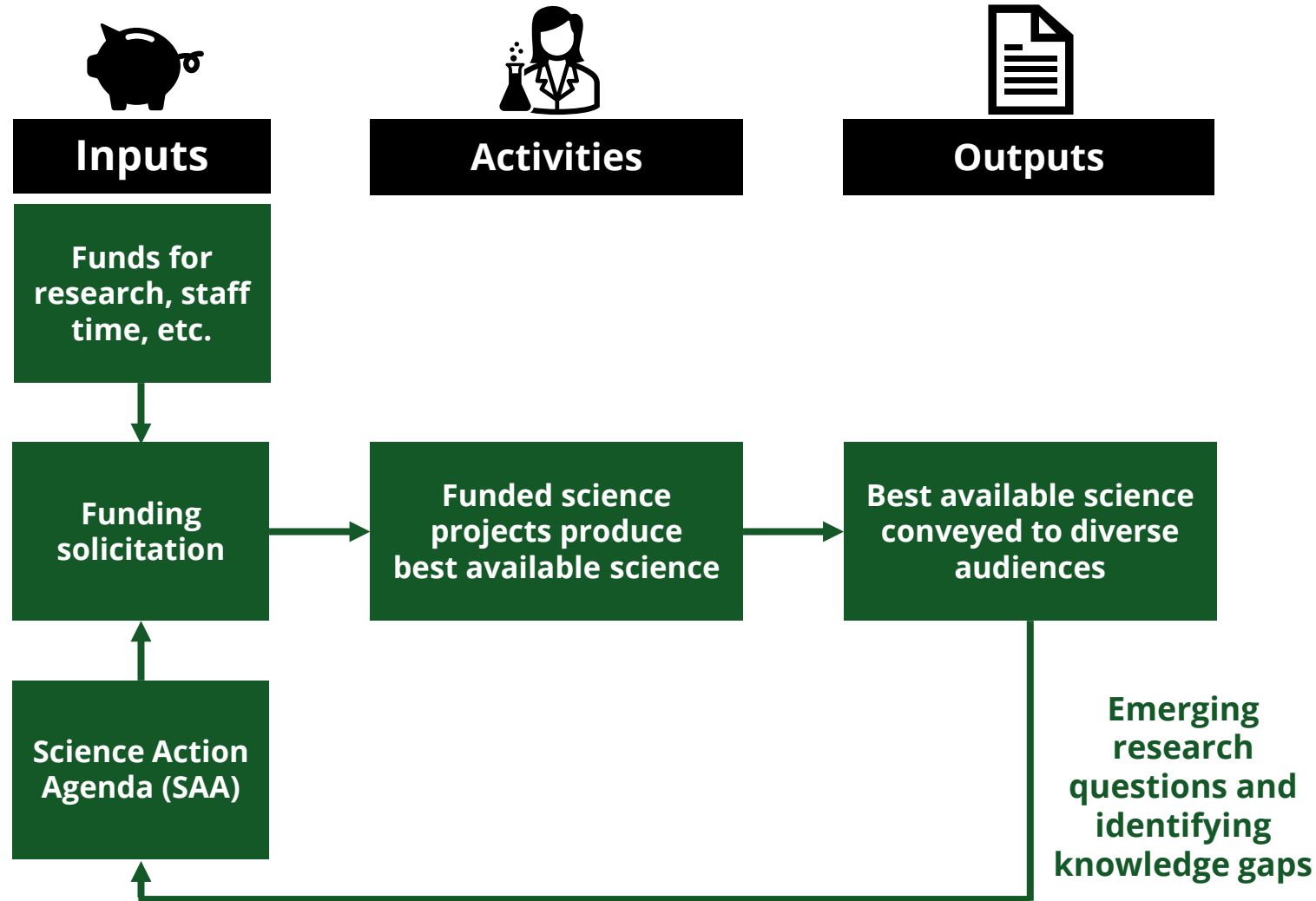
Impact Model



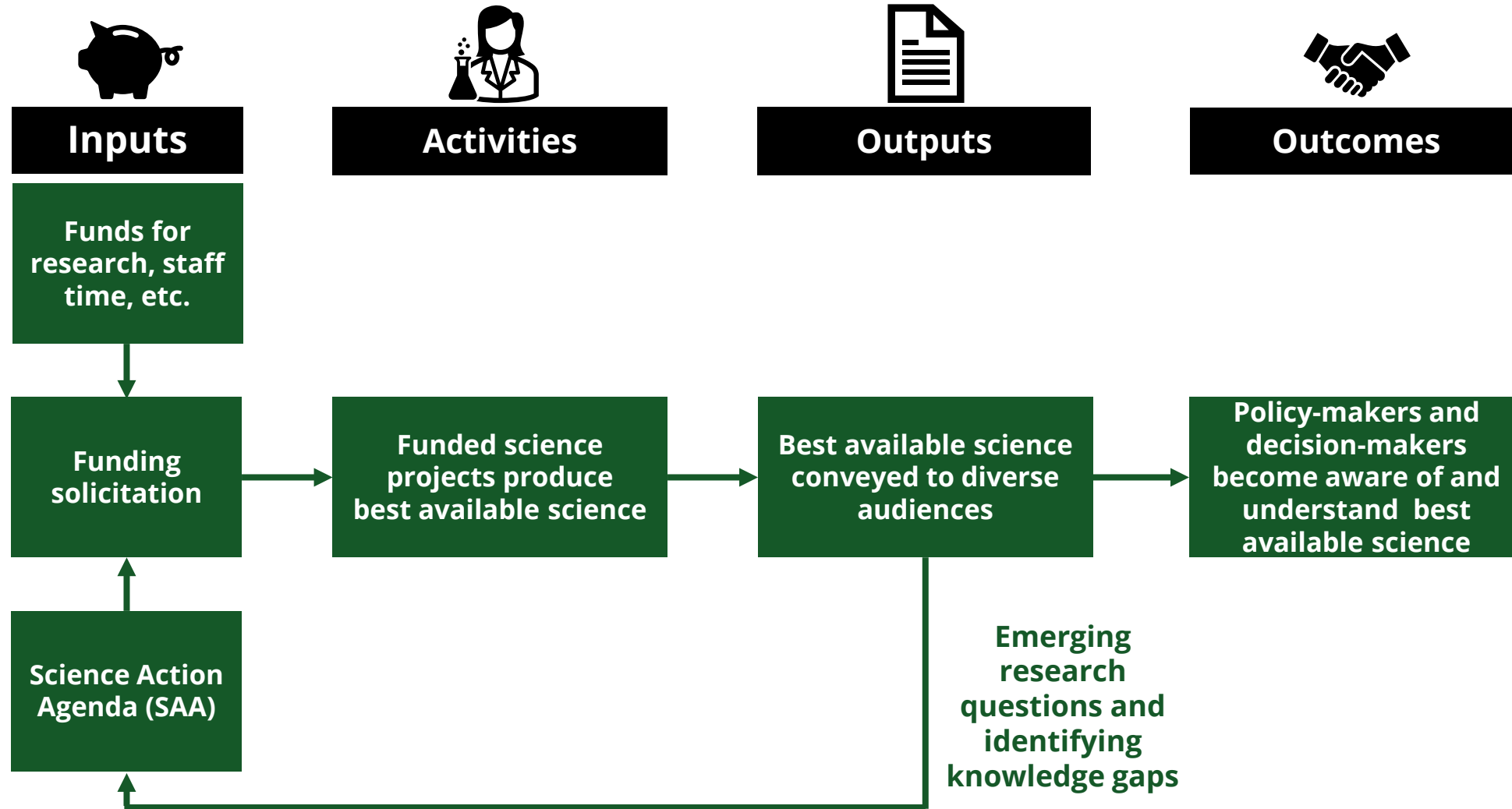
Impact Model



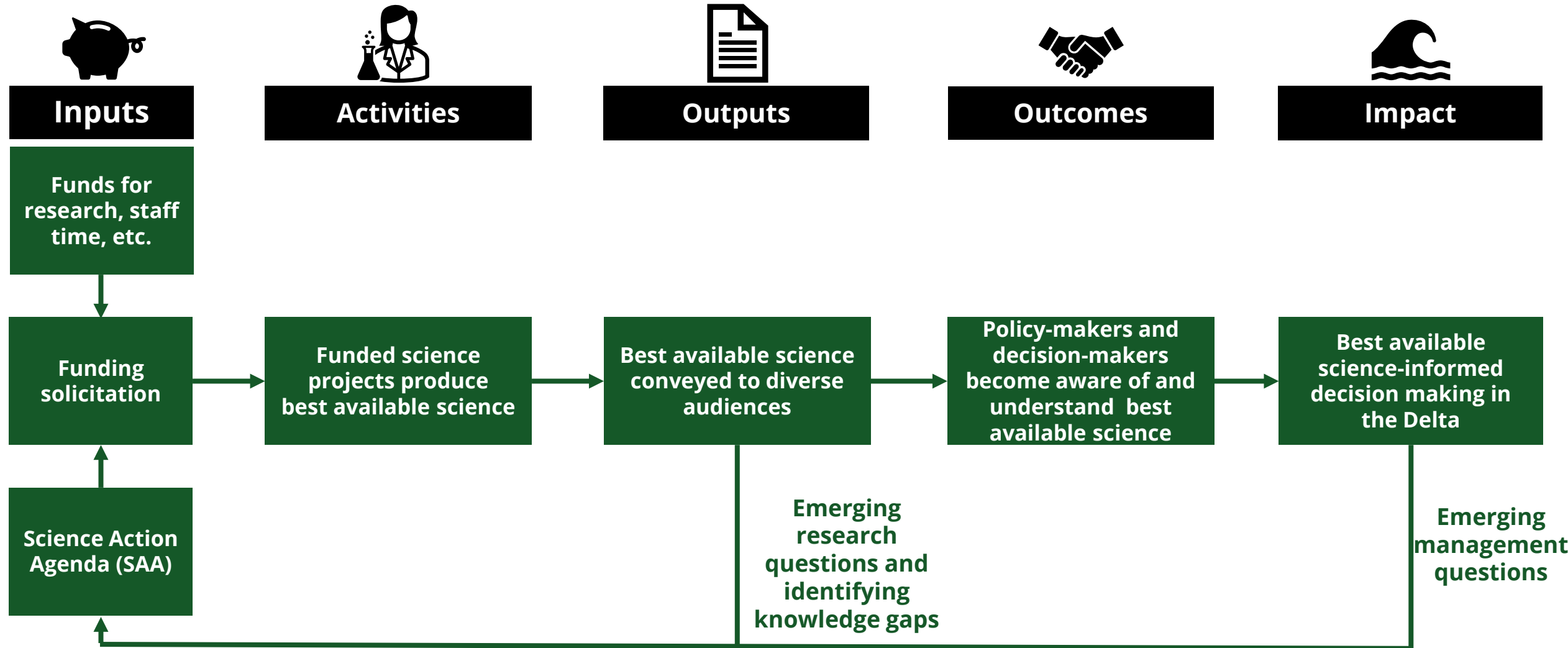
Impact Model



Impact Model



Impact Model



Pilot effort to measure DSP research impact

2018 Delta Research Awards

2020 Delta Science Fellows

Why these projects?

- It takes time (~9 years) to generate impact



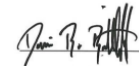
Data Collection

1. Surveyed funded scientists
2. Gathered publication metrics
 - Citations
 - Views
3. Searched management docs for citations
 - Biological Opinions
 - Science Plans
 - Adaptive Management Plans

Regulatory Document

2024 BIOLOGICAL OPINION

REINITIATION OF CONSULTATION ON THE
COORDINATED LONG-TERM OPERATION OF THE
CENTRAL VALLEY PROJECT AND STATE WATER
PROJECT

 11/08/24
Donald Ratcliff (Date)
Field Supervisor, San Francisco Bay-Delta Fish and
Wildlife Office

San Francisco Bay-Delta Fish and Wildlife Office
US Fish and Wildlife Service
650 Capitol Mall, Suite 8-300
Sacramento, CA, 95814

Management Plan

FRP AMMP (template version 17July2018)

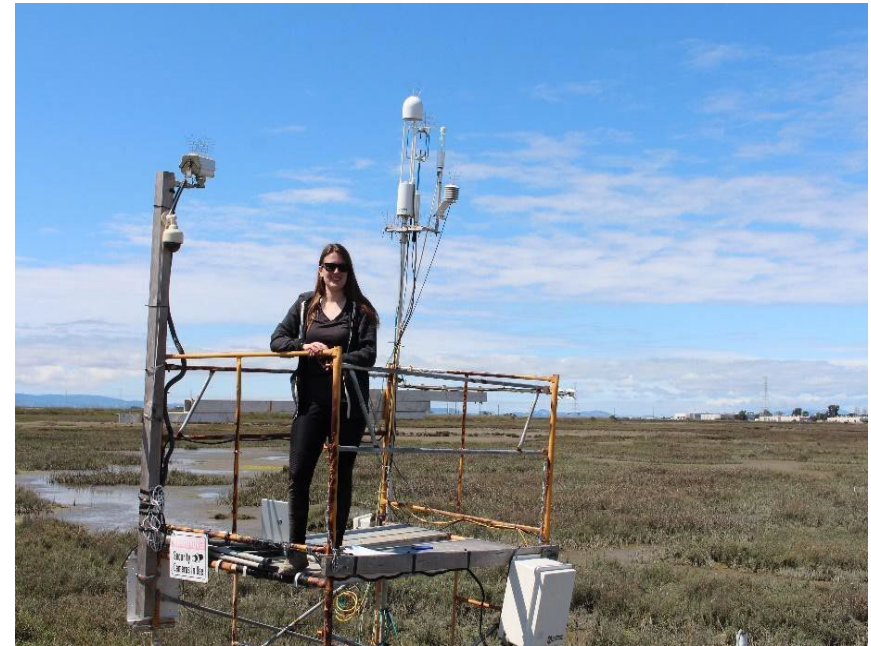
PROSPECT ISLAND TIDAL HABITAT RESTORATION ADAPTIVE MANAGEMENT AND MONITORING PLAN

Final April 9, 2020



Preliminary Results

- First comprehensive look at DSP research impact!
- Complete data for 22/25 projects
- Results presented by impact model stage
- Highlight one project with management impacts



Preliminary Results

Inputs Resources utilized for 2018 DRA and 2020 DSF

 ~\$8.6 million (DSP)

 25 Science Actions



+ Additional funding

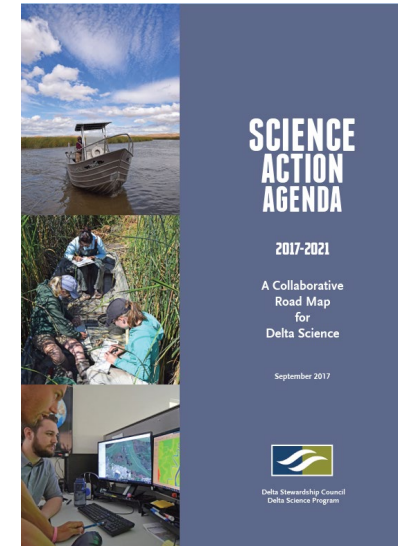


\$423,000



— BUREAU OF —
RECLAMATION

\$1.6 million



Preliminary Results

Activities Actions of 2018 DRA and 2020 DSF



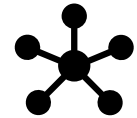
22 research projects



16 targeted foundational research projects



46 scientists



6 synthesis projects



6 multi-institution collaborations



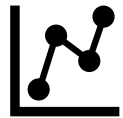
Preliminary Results

Outputs Direct results of 2018 DRA and 2020 DSF

Products



68 conference talks



13 published datasets



3 StoryMaps



1 dissertation



44 peer-reviewed publications



9 reports



2 book chapters

Preliminary Results

Outputs Direct results of 2018 DRA and 2020 DSF

Products

 **68** conference talks

 **13** published datasets

 **3** StoryMaps

 **1** dissertation

 **44** peer-reviewed publications

 **9** reports

 **2** book chapters

Media

 **17** blog posts

 **2** podcasts

 **6** press releases

Preliminary Results

Outputs Direct results of 2018 DRA and 2020 DSF

Products



68 conference talks



44 peer-reviewed publications

Peer-reviewed publications have been:

- Cited by peer-reviewed publications **>500** times
- Viewed/accessed **>88,000** times
- Downloaded **> 6,200** times

Preliminary Results

Outcomes Community-level awareness of 2018 DRA and 2020 DSF

Preliminary Results

Outcomes Community-level awareness of 2018 DRA and 2020 DSF

Community engagement



5 projects informing



5 projects consulting



2 projects involving

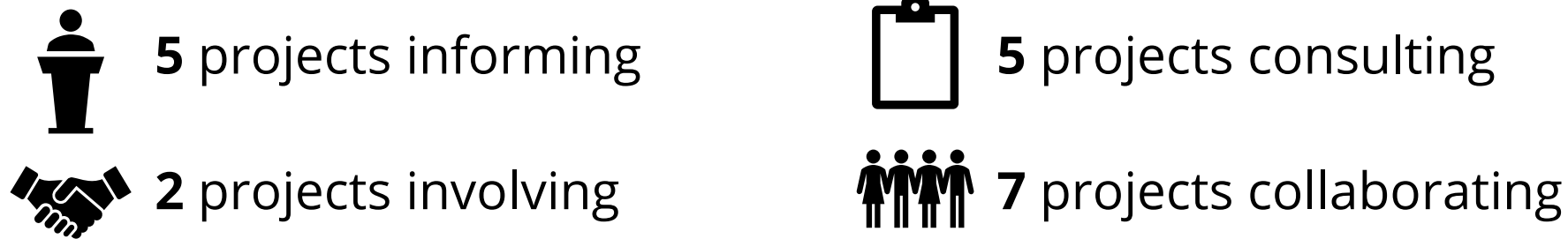


7 projects collaborating

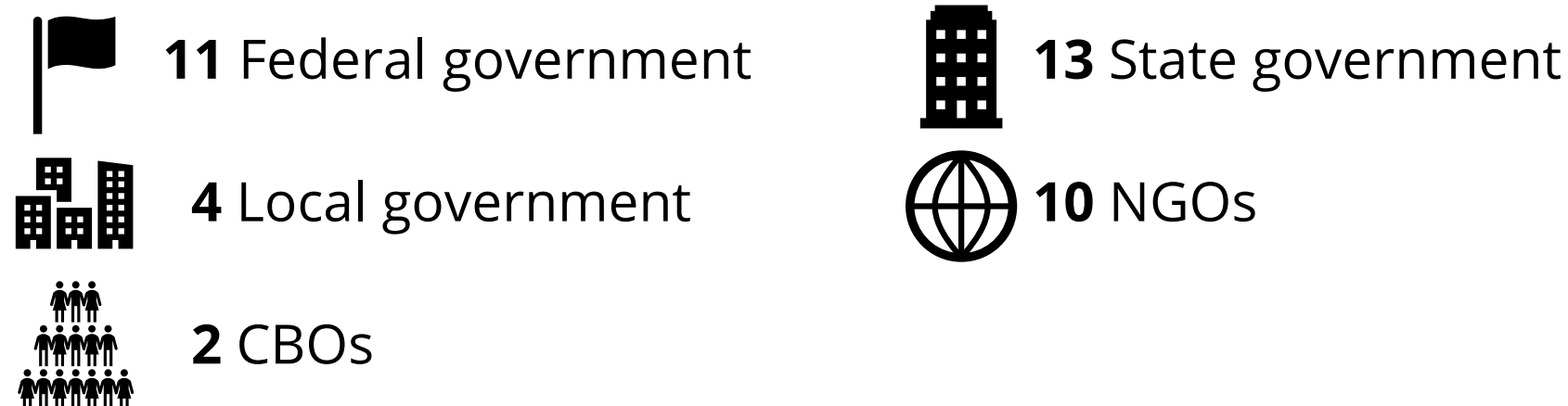
Preliminary Results

Outcomes Community-level awareness of 2018 DRA and 2020 DSF

Community engagement



Groups communicated with (# of projects)



Preliminary Results

Impacts System-level changes from 2018 DRA and 2020 DSF

Preliminary Results

Impacts System-level changes from 2018 DRA and 2020 DSF



Healthy Rivers and Landscapes Science Plan



Air Resources Board Greenhouse Gas Model



2024 Biological Opinion (USFWS)



2024 Biological Opinion (NOAA NMFS)



NOAA's Green Sturgeon Recovery 5-Year Update

Preliminary Results

Impacts System-level changes from 2018 DRA and 2020 DSF



Healthy Rivers and Landscapes Science Plan



Air Resources Board Greenhouse Gas Model



2024 Biological Opinion (USFWS)



2024 Biological Opinion (NOAA NMFS)



NOAA's Green Sturgeon Recovery 5-Year Update

Air Resource Control Board Carbon Inventory

Natural and Working Lands Carbon Inventory: Wetlands

2025 Proposed Inventory Update Methods
January 2025



For more information, contact:
nwl@arb.ca.gov
Nature Based Strategies Section
Industrial Strategies Division
California Air Resources Board

Air Resource Control Board Carbon Inventory

Natural and Working Lands Carbon Inventory: Wetlands

2025 Proposed Inventory Update Methods
January 2025



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AGU ADVANCING
EARTH AND
SPACE SCIENCES

JGR Biogeosciences

RESEARCH ARTICLE

10.1029/2023JG007943

Special Collection:
Quantifying Nature-based
Climate Solutions

Key Points:

- We present a process-based modeling

A New Coupled Biogeochemical Modeling Approach Provides Accurate Predictions of Methane and Carbon Dioxide Fluxes Across Diverse Tidal Wetlands

P. Y. Oikawa¹ , D. Sihi² , I. Forbrich^{3,4}, E. Fluet-Chouinard⁵, M. Najjarro¹, O. Thomas¹,
J. Shahan⁶ , A. Arias-Ortiz⁷ , S. Russell⁸, S. H. Knox^{8,9} , G. McNicol¹⁰ , J. Wolfe¹¹,
L. Windham-Myers¹² , E. Stuart-Haentjens¹² , S. D. Bridgham¹³, B. Needelman¹⁴, R. Vargas¹⁵ ,
K. Schäfer¹⁶, E. J. Ward^{17,18} , P. Megonigal¹¹, and J. Holmquist¹¹ 



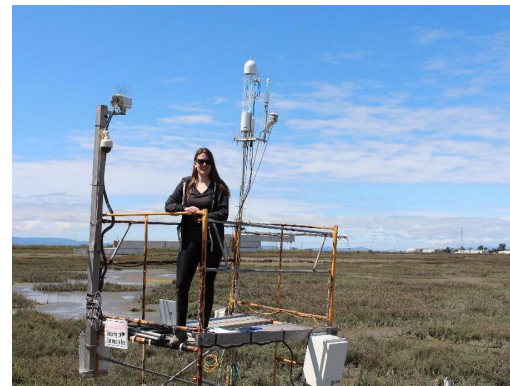
Key takeaways

Funded scientists are producing rigorous, actionable science

Funded research is influencing Delta management (and should continue to)

RIA is a new system for tracking DSP research impacts

Will inform solicitation updates



Thank you

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Deltacouncil.ca.gov



@DeltaCouncil



@deltastewardshipcouncil



Delta Stewardship Council

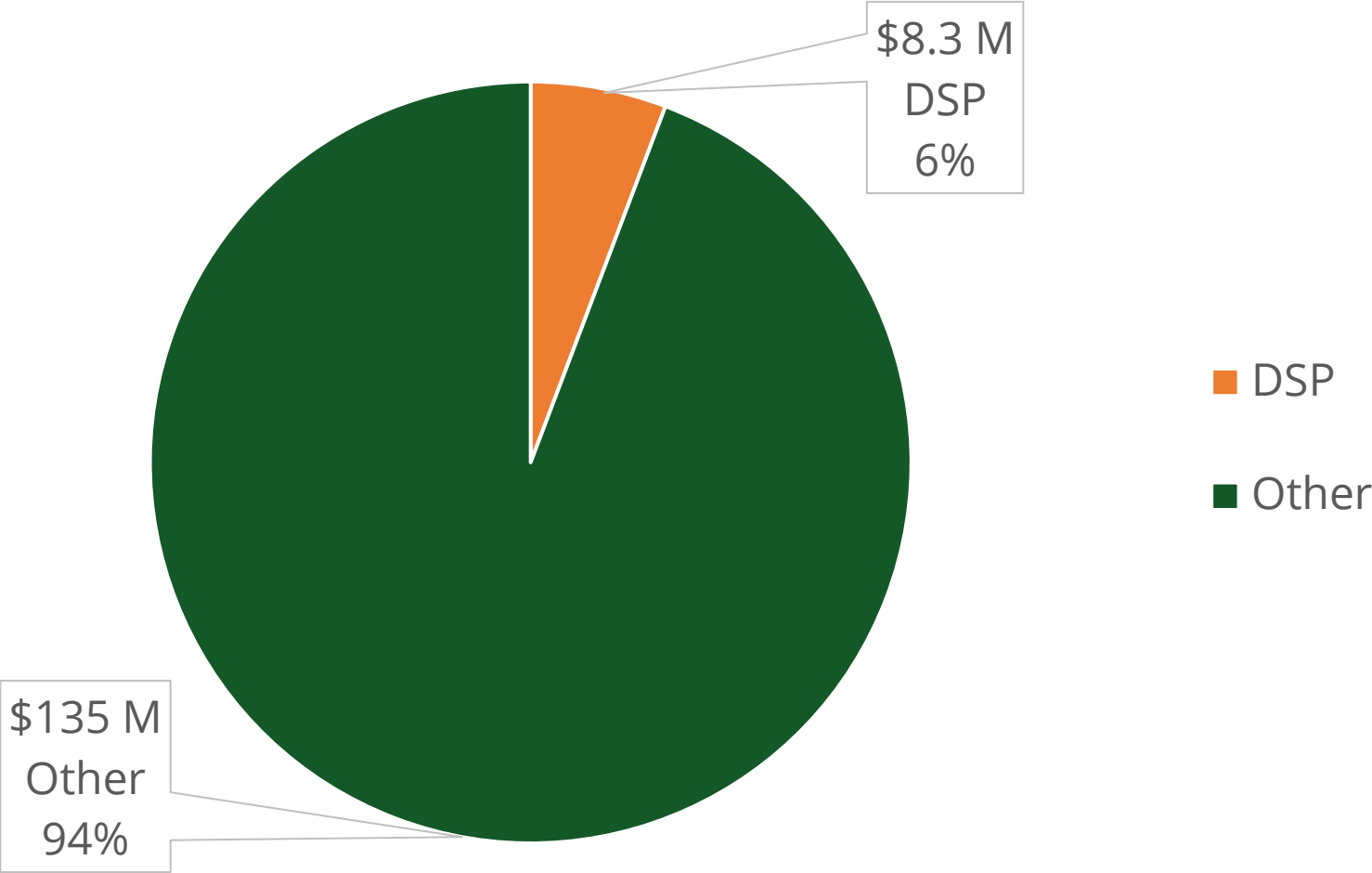


@deltastewardshipcouncil

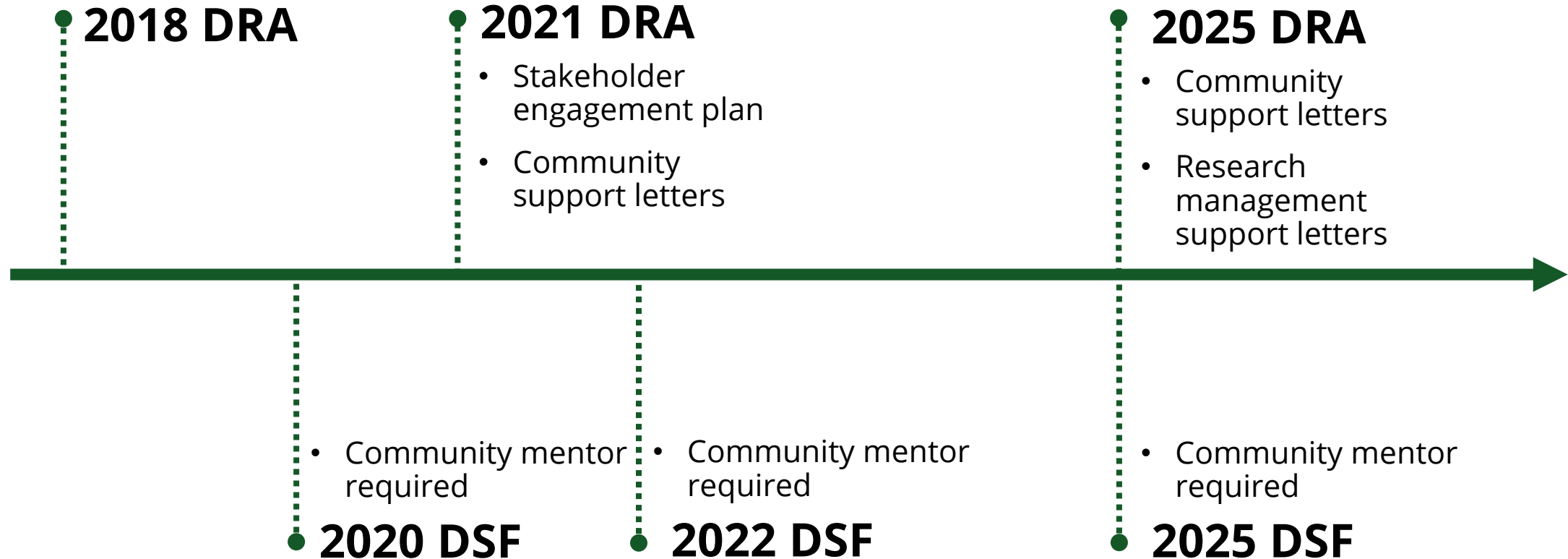
(self reported) Community engagement

- **Informing** (5 projects)
 - e.g. tabling at local events
- **Consulting** (5 projects)
 - e.g. soliciting community feedback
- **Involving** (2 projects)
 - e.g. citizen/community science projects
- **Collaborating** (7 projects)
 - e.g. funding communities to do community-identified research

Total FY22-23 Science Expenditures for Delta Science



Increasing management impacts in the future



Preliminary Results: Impacts

Science activity #49873, updated 27 February 2025

Risk of fish predation within and across tidal wetland complexes

Description / purpose

This study focuses on understanding how restored tidal wetlands with different physical configurations function as refuge and rearing habitat for fishes, including native and imperiled species such as delta smelt and juvenile Chinook salmon. This research will assess the spatial distribution of predation risk as it varies within and across tidal wetlands. The proposed research will generate a statistical model that helps predict predation outcomes from various restored tidal wetland designs and channel configurations. This will be a powerful tool for managers to forecast how proposed habitat restoration or water management actions may impact native fish populations.

Healthy Rivers and Landscapes Science Plan

Final Draft

September 6, 2024

Contents

Preliminary Results: Impacts

The effect of temperature on predation of juvenile salmonids

Description / purpose

This study will investigate fish swim performance in response to temperature, using salmon and two of its known predators: largemouth bass and Sacramento pikeminnow. The researcher will assess swim performance metrics and predation risk inside and outside the ideal thermal range of each species to determine if a temperature advantage predicts salmon survival in predation scenarios. This project's results will provide a mechanistic understanding of how temperature stress may influence mortality risk of juvenile Chinook salmon through predation, which will offer a more holistic perspective on the management of this species

Received: 19 May 2022 | Accepted: 28 June 2022

DOI: 10.1002/ecs2.4264

ARTICLE

Freshwater Ecology

ECOSPHERE
AN ESA OPEN ACCESS JOURNAL

In hot water? Assessing the link between fundamental thermal physiology and predation of juvenile Chinook salmon

Alexandra G. McInturf^{1,2,3}  | Ken W. Zillig^{1,4}  | Katherine Cook¹ |
Jacqueline Fukumoto¹ | Anna Jones¹ | Emily Patterson¹ |
Dennis E. Cocherell¹ | Cyril J. Michel⁵  | Damien Caillaud⁶ | Nann A. Fangué¹

Preliminary Results: Impacts

An Evaluation of Sublethal and Latent Pyrethroid Toxicity Across a Salinity Gradient in Two Delta Fish Species

Description / purpose

Pyrethroids are a type of insecticide frequently detected in the San Francisco Bay and Delta (SFBD). They are highly toxic to fishes and may contribute to their decline. The Central Valley Water Resources Control Board has adopted regulations for many pyrethroids. These concentration goals for Delta surface waters are quite stringent. However, they do not take into account non-lethal effects in fishes, particularly during the early life stages and at the salinity conditions we see in the SFBD. Understanding non-lethal effects in fish is vital to influencing population health.

This study investigates pyrethroid toxicity on Delta smelt and Inland Silverside embryos, while accounting for changing SFBD salinity and other factors such as sediment. Results will inform the development of pesticide regulation criteria and control efforts, furthering the protection of SFBD fishes.



Article

Salinity Changes the Dynamics of Pyrethroid Toxicity in Terms of Behavioral Effects on Newly Hatched Delta Smelt Larvae

Amelie Segarra ^{1,*} , Florian Mauduit ¹, Nermeen R. Amer ^{1,2}, Felix Biefel ^{1,3}, Michelle L. Hladik ⁴ , Richard E. Connon ¹ and Susanne M. Brander ⁵

Preliminary Results: Impacts

Improving Green Sturgeon Population and Migration Monitoring

Description / purpose

Green sturgeon is a listed species under the federal Endangered Species Act. This project supports the recovery and management of the southern distinct population segment of green sturgeon by improving population and migration monitoring. Improved monitoring is recommended in multiple initiatives to help protect this species, such as the Green Sturgeon Recovery Plan. There is some uncertainty on whether the most appropriate green sturgeon monitoring techniques are being used.

Southern Distinct Population Segment of North American Green Sturgeon
(Acipenser medirostris)

5-Year Review:
Summary and Evaluation