

FEB 2024

Delta Science Tracker

Glossary



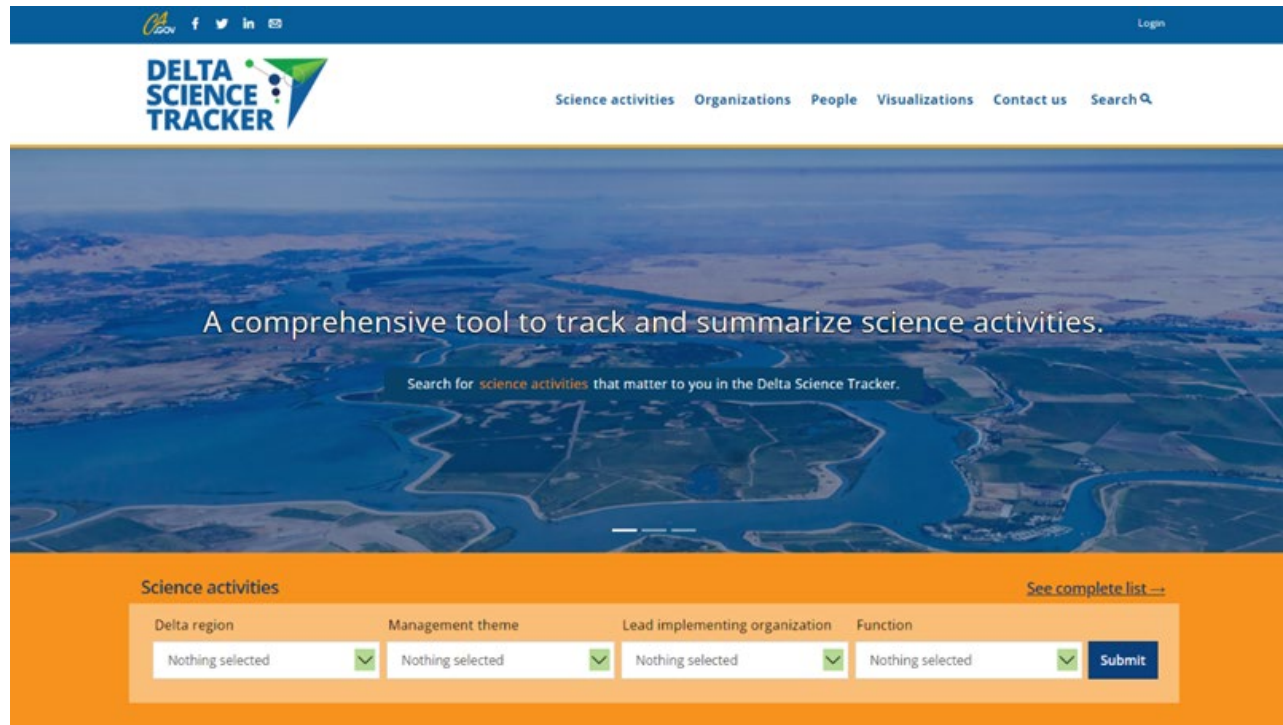
**Delta
Science
Program**

DELTA STEWARDSHIP COUNCIL



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General concepts

At its base, the Science Tracker characterizes science activities, organizations, and people using a list of standardized fields of data.

Science activity - Science activities included in the Science Tracker include research and monitoring efforts being implemented by a myriad of state, federal, and local government agencies, academic institutions, non-governmental organizations, and private research groups. Upon entering an activity to the Science Tracker, a user will complete an entry form with a variety of fields that describe the purpose, collaborators, funding, geographic location, and topics involved in the activity. A complete list of these fields is provided below (see "[Activity entry fields](#)").

Organization - An organization is any government, private, academic, or other agency, institution, or company. Organizations can be those that are funding the activity or doing the work for the activity.

People - People who work on a science activity. People associated with projects are also referred to as "Collaborators." A complete list of terms associated with adding people to the Science Tracker is provided below (see "[People \(collaborators\)](#)").

Science activity ID - Unique identifier for each science activity automatically assigned by the system when an activity is added to the database.

Activity entry fields

When adding a project to the Science Tracker, there are many possible fields and tags that can be used to describe the activity. Fields are listed below in the order they appear on the science activity entry form. Asterisks (*) denote fields required for entry when a project is added to the database.

Title* – A descriptive label for the project, often the title of the project as identified in a proposal or funding award (e.g., grant or contract). Required entry field.

Science activity description* - Free-form description of science activity and its purpose, goals, and/or objectives. This field can be quite long, and there is an option to provide a shorter summary to display on the activity page.

Linked science activities - List of other science activities linked to this science activity.

Activity status* – Description of the current status of the science activity. Required entry field. Three options are allowed:

- Awarded / Initiating - the project has been awarded funds and either has or hasn't been initiated.
- In progress / Ongoing - work is ongoing and/or some deliverables have been completed.
- Complete - all deliverables are complete, and work related to this project is no longer being performed.

California sub-basin - California sub-basins (based on hydrologic unit codes) of most relevance to the Delta with which the science activity has a direct spatial overlap. For a map of these areas, see [Figure 1 in Appendix A](#). Options include:

- Legal Delta & Suisun Marsh
- Sacramento River
- San Francisco Bay
- San Joaquin River
- North Coast
- Central Coast
- South Coast
- Tulare lake
- South Lahontan
- North Lahontan
- Colorado River

Delta region - Delta regions with which the science activity has a direct spatial overlap. Multiple regions can be selected. For a map of these areas, see [Figure 2 in Appendix A](#). Options include:

- Cache Slough Complex
- East Delta
- North Delta
- South Delta
- Suisun Marsh
- Twitchell and Sherman Complex
- West Delta
- Yolo Bypass
- Yolo Bypass and Cache Slough Complex

Geographic tags - User defined tags for Delta islands and sloughs or other place names with which the science activity has a direct spatial overlap. Multiple selections can be made, and additional fields can be added.

Year awarded* - Year the funding was awarded. Free form field requiring a single integer value (e.g., 2020).

Years in progress - Years the activity was implemented. Free-form field with multiple integer values allowed.

Year completed - The year that the activity was completed. Free form field requiring a single integer value (e.g., 2020).

Management themes* - Broad categories of management in the Delta Plan that represent groupings of related decisions over which Delta agencies have some degree of management control and which directly relate to the science activity. Definitions are taken from the [Delta Independent Science Board \(ISB\) Monitoring Enterprise Review](#). Multiple options can be selected. See "[Management Themes](#)" below for descriptions of each option.

Science themes* - Specific groupings of natural and social science topics of relevance to the Delta which directly relate to the science activity. Multiple options can be selected.

Type of science activity* - Categories of science activities based on the white paper, [Funding Science to Meet Tomorrow's Challenges](#). Multiple options can be selected. See "[Project Types](#)" below for descriptions of each option.

Science function - Primary science functions being served or provided by the science activity. Multiple options can be selected. Options include:

- Data application
 - Data analysis
 - Information management
 - Modeling
 - Science communication / knowledge synthesis
- Independent peer review
- Monitoring
 - Effectiveness monitoring
 - Implementation monitoring
 - Status & trend monitoring
- Planning & guidance
- Research

Management actions - Specific types of decisions or management actions of relevance to the Delta Plan over which Delta agencies have some degree of management control and which directly relate to the science activity. Multiple options can be selected, and additional fields can be added.

Science topics - User defined tags for specific science topics of relevance. Multiple options can be selected, and additional fields can be added.

Lead implementing organization* - Name of the primary organization implementing a science activity. Typically the lead implementing organization is affiliated with the principal investigator or project manager.

Partner implementing organization(s) - Name(s) of partner organization(s) supporting the implementation of the science activity, such as organization(s) associated with co-investigators and other collaborators on the project. Multiple organizations can be added for this field.

Science action agenda areas & needs - Applicable current or past action areas from the [Science Action Agenda](#). See "[Science Action Agenda Areas](#)" below for a descriptive list of options.

Notes - Free-form field providing an opportunity for any additional notes about context for a science activity.

A few additional fields are automatically generated by the system upon addition of an activity to the database. When activities are downloaded (exported) from the

Science Tracker, these fields will be shown in the exported file. Examples include the Science Activity ID (see definition in "[General Concepts](#)").

Project types

Standardized definitions for categories of science activities (based on the white paper, [Funding Science to Meet Tomorrow's Challenges](#)). Principally a funding concept, of interest to DPIIC parties who are tracking funding.

Core monitoring - Monitoring that provides information on a seasonal and daily basis to inform specific decisions on operations for water supply and fish species status. Core monitoring is conducted almost entirely to fulfill requirements for regulatory compliance.

Status and trends monitoring - Monitoring that contributes to long-term datasets used to compare environmental conditions (e.g. species populations, water quality) over time. Information improves system understanding and can be applicable to a variety of management decisions rather than a specific action. Status and trends monitoring is primarily required for regulatory compliance, although it may also be associated with non-regulatory efforts.

Synthesis - The combining of diverse information from multiple sources into one concept, model, finding, or report. Synthesis can take many forms from (1) analyzing and integrating data across multiple datasets (2) to summarizing findings across a range of sources to help support decision-making needs.

Targeted foundational research - Science efforts that provides the knowledge and context to inform long-term management and policymaking, while also identifying and understanding emerging issues so that natural resource managers can be better prepared for future challenges. This is not typically supported by funds allocated for science efforts linked to regulatory requirements.

Targeted immediate research - Science efforts that answer current management questions by providing evidence to support or refute hypotheses. This is not typically supported by funds allocated for science efforts linked to regulatory requirements.

Management themes

Broad categories of management in the Delta Plan that represent groupings of related decisions over which Delta agencies have some degree of management control and which directly relate to the science activity. Definitions are taken from the [Delta ISB Monitoring Enterprise Review](#).

Delta as Place - Activities focusing on cultural, natural, recreational, resource, and/or agricultural values of the Delta as an evolving place. Such activities include studying the effects of agricultural practices on the environment, studies related to activities that affect socio-economics of the area, and activities that affect recreational use by the public.

Environmental Conditions - Activities focusing on the natural environment that can affect the health and well-being of living organisms. Such activities include studying the effects of toxins on the organisms and their habitat, effect of drought on plants and animals, effect of invasive species, and effects of tidal flows.

Flood Risk and Land Use Management - Activities focusing on how flood waters are managed affecting ecosystems, people, and property in the Delta. Such activities actions include construction and operation of flood-control structures; protection and expansion of floodways, floodplains, and bypasses; subsidence reversal; and floodplain and land use management to reduce flood damage vulnerability.

Governance - Activities focusing on a system of rules, processes and institutions within which collective decision-making occurs.

Habitat Management - Activities focusing on how terrestrial, riparian, and aquatic habitats are managed within the Delta. Such actions activities include restoration, protection, and the use of flows and habitat to improve ecosystem conditions.

Invasive / Non-native Species Management - Activities focusing on the population abundance and habitats of invasive/nonnative species in the Delta. Such management activities actions include preventing introductions, avoiding creation of favorable habitat conditions, and controlling populations (e.g., harvest, culling, biocontrol).

Native Species Management - Activities focusing on the abundance of native aquatic or terrestrial animal or plant species relevant to the Delta. Such activities actions influence incidental take or mortality (e.g., at fish screens and water

intakes), harvest (e.g., recreational harvesting of fish and wildlife), and population enhancement (e.g., through hatcheries).

Water Quality - Activities focusing on surface and groundwater quality within the Delta. Such activities actions include wastewater management (e.g., effluent reuse, recycling, and treatment of wastewater), pollution discharge controls (e.g., pyrethroids, methylmercury, CECs, pesticides, nutrients), and their adverse events on aspects of water quality in the Delta (such as dissolved oxygen, turbidity, salinity, and harmful algal blooms or HABs).

Water Supply Management - Activities focusing on how water resources affect the Delta and its users. Such activities actions include water operations, water storage, water demand, water conveyance/infrastructure, and groundwater protection and management.

Science Action Agenda Areas

The [Science Action Agenda](#) (SAA) is a four- to five-year science agenda for the Sacramento-San Joaquin Delta that prioritizes and aligns science actions to inform management decisions, identifies major gaps in knowledge, promotes collaborative science, and builds science infrastructure. The SAA is developed by and for the Delta science community.

SAA Need 1 (2022-2026): Improve coordination and integration of large-scale experiments, data collection, and evaluation across scales and institutions.

Management Need 1 focuses on reducing uncertainty and building capacity for collaboration and coordination of large-scale experiments, completing the adaptive management cycle, and data collection. Although science in the Delta is coordinated on several fronts, Delta science could more directly inform management and advance more efficiently with increased coordination, communication, and deliberate action to dissolve barriers to collaboration. Effective management in the face of unavoidable uncertainties requires addressing barriers to integrating datasets, disciplines, institutions, and communication efforts throughout the Delta and its watershed. Relevant activities include supporting greater integration among agencies and interest groups within the legal Delta, as well as improved coordination between San Francisco Bay and Delta science activities, which has been identified as an important need for enhancing science and management in the Bay Delta watershed.

SAA Need 2 (2022-2026): Enhance monitoring and model interoperability, integration, and forecasting.

Management Need 2 focuses on advancing modeling, monitoring, and tools to forecast, detect, and respond to changes in the system. In the context of modeling, interoperability and integration refer to coupling different types of models (e.g., of climate, flow, water quality, habitat, or fish). “Integration” refers to the outputs of one model (e.g., flow) being foundational inputs to another model (e.g., water quality). “Interoperability” refers to active communication between models while they run (e.g., a flow model driving changes in submersed aquatic vegetation, which drives further changes in flow). Integration and interoperability can also refer to the assimilation of monitoring data into models. Forecasting with models relies on historical data and assumptions as inputs to models that predict future conditions and trends to inform management.

SAA Need 3 (2022-2026): Expand multi-benefit approaches to managing the Delta as a social-ecological system.

Management Need 3 focuses on how the Delta could be managed more comprehensively as a social-ecological system, in a way that is cognizant of interactions among its human, nonhuman, and physical components across spatial and temporal scales. There is a need for more multi-benefit solutions that protect and restore species biodiversity, maintain working lands, and support economic opportunities, especially considering climate change. Such integrated, comprehensive management is called for in Governor Newsom’s 2020 Executive Order N-82-20 and is particularly essential when managing large systems with limited resources. Relevant science actions include ways to assess tradeoffs, motivate coordination and collaboration across many actors, respond to rapidly changing environmental conditions, and optimize management approaches for multi-benefit objectives.

SAA Need 4 (2022-2026): Build and integrate knowledge on social processes and human behavior to support effective and equitable management.

Management Need 4 focuses on improving understandings of social processes and human behavior in the Delta that are crucial to effective and equitable management. It also calls for actions that work to build trust and engage communities, including communities in the Delta, reliant on the Delta, and those with historical ties to the Delta, with a particular focus on historically marginalized or underserved communities. Increased engagement with Tribal governments,

inter-Tribal organizations, and Indigenous community organizations is also a key priority both for relationship-building and to understand the needs and interests of Indigenous peoples with ancestral ties to the Delta. The social sciences provide tools for investigating how people living, working, and recreating in and around the Delta view and interact with the system, how the Delta impacts their health and well-being, and how their behaviors influence environmental issues. Improved understanding of the human dimensions of the Delta are critical to informing more holistic management approaches that incorporate the interactions between human and non-human parts of the system and to optimizing both ecological and human well-being.

SAA Need 5 (2022-2026): Acquire new knowledge and synthesize existing knowledge of interacting stressors to support species recovery.

Management Need 5 seeks to reduce uncertainty in approaches to fostering ecosystem health and native species recovery, including identification of dominant stressors and their interactions. Here, “stressor” is defined as any factor that affects the behavior, health, or fitness of a target species. Examples of stressors include both flow (e.g., drought and unintended consequences of flow management actions) and non-flow related factors (e.g., predation, competing species, contaminants, and limited supplies of food or nutrients). Stressors often co-occur and can have synergistic effects on species populations, but the nature and magnitude of these impacts are not well understood. For example, high variability in hydrologic conditions, driven by climate change, can impact contaminant loading, presenting a need to understand areas of the Delta that are vulnerable to amplified contaminant exposure during extreme events (e.g., droughts, floods). This Management Need recognizes that for some topic areas (e.g., fisheries, water quality), there are longstanding datasets and published work that, when integrated and synthesized, can serve to enhance the knowledge base. In these cases, needed Science Actions may entail data science and synthesis activities to leverage these existing resources.

SAA Need 6 (2022-2026): Assess and anticipate climate change impacts to support successful adaptation strategies.

Management Need 6 focuses on uncertainties around climate change impacts in the Delta (e.g., invasive species prevalence and spread, public health and safety, native species management, and water operations) and the need to evaluate methods for adapting to the rapidly changing climate. It calls for new studies and

updates to existing scientific paradigms to adequately track rapidly changing and increasingly extreme climate conditions (e.g., frequent droughts and floods) that affect all aspects of the Delta system, including both ecological and human communities. In addition to tracking rapid change, another focus of Management Need Six is to rigorously compare and evaluate effective approaches to responding to changing conditions while maintaining water supply and ecosystem functioning. Relevant science actions target uncertainties concerning individual and cumulative climate change impacts while considering different adaptation strategies and approaches.

SAA Action Area 1 (2017-2021): Invest in assessing the human dimensions of natural resource management decisions.

Humans are inextricably linked with the Delta ecosystem. Investments in social and behavioral sciences (e.g., economics, sociology, and psychology) that assess the human aspects of natural resource management have been minimal when compared to investments in the physical and biological sciences in the Delta. Despite increasing awareness of the importance of integrative and transdisciplinary research, the Delta is not alone in its struggle to integrate social sciences with physical and biological science programs. Other large estuarine and coastal systems in the United States are engaged in similar struggles. Science activities related to this area include studies aimed at understanding human responses to management actions, evaluating value-based tradeoffs among alternatives, and evaluating balancing limited resources among human and wildlife uses.

SAA Action Area 2 (2017-2021): Capitalize on existing data through increasing science synthesis.

Science synthesis is critical to providing a reliable knowledge base for decision-making in the Delta's dynamic and wickedly complex environment. Science synthesis involves the distillation of existing data drawn from many sources across multiple fields to accelerate the generation of new scientific knowledge at a broad scale. Science synthesis can help manage conflict over data interpretation, maximizing support for decision-making. Science actions addressing this area include emphasis on implementation of the Delta Science Plan's mechanisms and protocols for making ongoing synthesis more relevant to management issues.

SAA Action Area 3 (2017-2021): Develop tools and methods to support and evaluate habitat restoration.

For more than 150 years, management actions and human alterations to the landscape have reduced large areas of native and migratory species habitat in the Delta to small fragmented parcels with stressors described below in SAA Action Area 4 (2017-2021), has severely compromised the historical Delta ecosystem and its native species. In response to declining species populations and overall ecosystem health, there have been increased efforts to restore natural processes and improve the ecological functions of the Delta as called for in the Delta Reform Act (e.g., Delta Plan, Ecosystem Restoration Program, EcoRestore, CA Department of Fish and Wildlife's Delta Conservation Framework, and Delta Conservancy's Strategic Plan).

SAA Action Area 4 (2017-2021): Improve understanding of interactions between stressors and managed species and their communities.

In the Delta, stressors are factors that negatively affect species and their communities with the most notable impact manifesting in the often precipitous decline of populations of native species. Prominent stressors include increasing climate variability; increasing water and air temperatures; habitat loss; invasive species; and changes in flows, contaminants, and nutrient concentrations. The negative role stressors play in the Delta is well acknowledged, but it is very difficult to design and implement management actions that holistically address multiple and interacting stressors on species and their communities. Research and monitoring approaches focused on single stressors should be updated to recognize this complexity and take into account system-wide impacts, including thresholds, at multiple spatial scales. Such improvements will help shed light on the simultaneous effects of multiple constituents stressing the ecosystem.

SAA Action Area 5 (2017-2021): Modernize monitoring, data management, and modeling.

A robust science enterprise requires a comprehensive monitoring program paired with infrastructure that supports an intuitive, streamlined system for accessing data to support management actions. In the Delta, this concept is especially relevant given the rapidly evolving nature of the region systems that allow it to be nimble and well-coordinated in the face of growing uncertainty. Existing computational models (e.g., DSM2, RMA2, and CASCaDE 2) have been instrumental in informing management actions (e.g., temperature plans for the Sacramento River; ecosystem effects of the Emergency Drought Barrier on False River) by improving understanding of monitoring data and conceptual thinking about the Delta

Transparent Water Data Act (AB 1755) aim to promote more timely access to information that supports these integrated water data platform that ... [will] integrate existing water and ecological data information from multiple databases.” In addition, established monitoring programs (e.g., IEP and DRMP) that collect continuous, comprehensive, and long-term data sets will be critical for continued optimal model performance and enhanced tool development. Supporting existing collaborative monitoring groups and developing “data stewardship” that provides wide access to information is critical for forward thinking, nimble, and coordinated decision- making.

Funding summary fields

After an activity is added to the Science Tracker database, additional information about project funding can be added by editing the “Funding Summary” portion of the activity profile page.

Contract number or labor code – Optional, free-form field to identify a grant or contract number associated with the funding award of the project.

Implementing organization - Name of either a lead or partner organization responsible for implementing the work funded.

Funding organization* - Name of organization responsible for providing funding for the award. This can be either a lead or partner funding organization.

Funding program – Funding programs provide specific funding opportunities (e.g., competitive solicitations, fellowships, etc.) and/or that are organized with specific research objectives (e.g., Operation Baseline, Delta Smelt Resiliency Strategy).

Funding source(s) - Sources of funding for the science activity, such as California state general fund, specific propositions or bonds, etc. When there are multiple or split funding sources, additional rows can be added for each source.

Date awarded - The award date.

Fiscal year end - This determines the integer years used for fiscal years on the Funding Expenditures table/entity.

Total award amount - Total awarded amount of funding.

Federal types of obligation (if applicable) - Federal types of obligation for funding.

State types of obligation (if applicable) - State types of obligation for funding.

Reimbursability – This field should be left blank if a user is not familiar with this term. Reimbursability refers to the percentage of a project that is reimbursable per the program authority. This field is mainly used to document the percent that the California Department of Water Resources (DWR) and the United States Bureau of Reclamation reimburses to the water users of the State Water Project (SWP) and Central Valley Project (CVP).

Procurement mechanism - Mechanism by which the science activity was procured.

Funding Expenditures - Allows for multiple years of funding and funders per science activity.

Funding Expenditures - Allows for multiple years of funding and funders per science activity

Fiscal (funding) year - The applicable fiscal year of funding (based on the funding organization's fiscal year).

Expenditures - Planned or actual expenditures in the fiscal year Free-form \$ amount

Planned/actual - Specification of whether the expenditures are planned or actual expenditures. If blank, assume planned.

Notes – Descriptive, free-form note to provide any additional comments about funding, if needed.

People (collaborators) entry fields

After an activity is added to the Science Tracker database, additional information about people involved in the project (collaborators) can be added to the activity profile page.

People Links - A field that allows quick linkages to people involved in the science activities. If a person is not already entered into the database, they can be added by following the link on the entry page.

Role* - Role of each person in relation to the science activity.

Status - Describes whether the person is currently actively involved in the project (Active) or a previous collaborator no longer actively involved in the activity (Inactive). Primarily relevant to long-term, ongoing projects; does not need to be updated if the activity itself is completed.

When adding a person to the Science Tracker database, the following fields appear:

First name* - First name of contact person

Last name* - Last name of contact person

Title - The job title of the individual at the time of the activity.

Organization* - Name of organization(s) with whom the contact person is affiliated at the time of the activity.

Email* - Primary work email address of each person.

Biography or Notes - Free-form field providing an opportunity for biographical summary or any additional notes about person.

Products and outputs entry fields

On each science activity profile page, products and outputs associated with the activity can be added as links or file uploads. Content of any uploaded file must be ADA compliant.

Title or citation* - A short title or name for product / output associated with science activity. Alternatively, the full citation can be added here.

Description* - Brief, free-form description or summary of the product / output.

Type* - Type of outputs associated with science activity. Examples include: data repository link, journal article, news article, etc.

File - Optional area to upload a file associated with the product / output. Content of any uploaded file must be ADA compliant. Alternatively, enter a link to the content in the field below. One file only, 100 MB limit. Allowed file types include: txt, pdf, doc, docx, ppt, pptx, zip, json, gejson, tex, ods, odt, xls, xlsx, mdb, sqlite, png, jpg, jpeg, kml, kmz.

Link or DOI – Field that allows an URL or Digital Object Identifier (DOI) associated with the product / output to be identified. The DOI system provides a technical and social infrastructure for the registration and use of persistent interoperable identifiers, called DOIs, for use on digital networks. Typically only applies to journal articles, occasionally may apply to reports.

Peer review and/or quality control – Brief, free-form description or summary of any peer review or quality control process applicable to the product / output.

Publication year – Year the product or output was created.

Contact Information

Delta Science Program

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Appendix A. Maps

Maps associated with geographic regions identified in the Science Tracker field entry options.

Figure 1. Map of California subbasins



Figure 2. Map of Delta regions

