



California Project WET Gazette

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Seeing the Elephant

*"I think that I may without vanity affirm that I have
"seen the elephant."*

- Louisa Clapp aka 'Dame Shirley'

No expression characterized the California Gold Rush more than 'seeing the elephant.' Still a rare and exotic sight during the 19th Century, the elephant was the symbol for an undertaking on a grand scale such as the once in a lifetime adventure in traveling to California with all its myriad possibilities for great wealth as well as disaster and misfortune. The third largest state and among the top ten economies on the planet, California has always been a 'larger than life' place of grand ideas that play out on an elephantine scale and every generation since the Gold Rush has dealt with its own versions of the elephant – and water has bred some of the largest. Like elephants on parade, our history timeline is filled with massive engineering projects from the building of the Central Valley levee system to the Los Angeles Aqueduct, the Hetch-Hetchy system, Hoover Dam, the Central Valley Project and State Water Project. The new elephant that has entered the room seems like a mere calf compared to some of its ancestors, but it would restructure the very heart of the California water system, shifting the arteries that delivers water to millions of Californians and grows the food that feeds millions more. To some it is a rampaging elephant that will trample human lives and those of other species, while others view it as a benevolent beast that can be harnessed to restore health to the Delta ecosystem and secure California water supplies. It is also rich in material that unlike ivory can be safely harvested for use with Common Core, Next Generation Science and existing content standards. The new elephant in the room is known as the Bay Delta Conservation Plan – or BDCP for short.



One could read the general consensus on the Delta ecosystem like the opening lines of a Charles Dickens novel – *'The Delta system is broken to begin with. There is no doubt whatsoever about that.'* The vast tidal marsh that greeted the Forty-Niners is today a mere shade of channelized flows, subsided islands protected by levees against the higher surrounding waters and plagued by failing native wildlife populations, expanding non- native species, greater salt water intrusion and water quality contaminants

generated from the Gold Rush to our present day cities streets and land use practices. Add climate change, major flood concerns and the potential threat from a massive earthquake and the recipe exists for an apparition far more frightening than the mercurial ghost of Christmas future. The Bay Delta Conservation Plan is designed to provide a more reliable water supply for the 25 million Californians and 3 million acres of farmland that receive water from the Delta, while improving the scale and function of the Delta ecosystem for [63 sensitive wildlife and plant species](#). Water flowing through the Delta sustains the multi-billion dollar California agriculture, high tech, fishing and power industries and thousands of small businesses. The BDCP plan seeks to improve the health of the Delta utilizing a whole ecosystem approach, which is a significant change from the species-by-species approach utilized in previous efforts to manage Delta-specific species and habitats.

The water infrastructure element is a dual conveyance system. Some water flowing through the Delta will continue to be pumped from the existing Clifton Court Forebay, while new twin tunnels will draw freshwater from three locations north of Clarksburg and shuttle it under the Delta to a new Byron Tract Forebay adjacent to Clifton Court and into the current State and Federal pumping facilities near Tracy. Goals of the dual-conveyance system include securing freshwater supplies from the threat of sea level rise and earthquakes, while reduce the strain on aging levees and more easily managing the threat of salt water intrusion by reducing the quantity of water pumped directly from the Delta. The ecosystem health element involves the restoration of approximately 145,000 acres of aquatic and terrestrial habitat, reconnecting floodplains, developing new marshes and returning riverbanks to a more natural state to boost food supplies and protection for fish that depend upon the Delta. The plan has a \$25.5 billion estimated cost – \$14.5 billion of which is estimated to build the water diversion tunnels – and a 50-year window to fully implement the plan. Needless to say, there are multiple views on the BDCP plan making it a deep pool of content-rich material to dive into with students – particularly at the high school level.

'The Incredible Journey' (p: 155), *'Seeing Watersheds'* (p: 187), *'Blue River'* (p: 135) and *'Just Passing Through'* (p: 163) are just a few of the Project WET activities that build student understanding of basic hydrological processes that can then being applied to learn specific knowledge of California watersheds, including that of the Delta. But for students ready to cut to the chase, teachers can use the following activities to study current issues impacting the Delta. For those near a wetland, the activity *'Wetlands Soils in Living Color'* (p: 217) has students studying the properties of these soils and helps answer the question of why people wanted to create farms in the Delta. *'Color Me a Watershed'* (p: 239) studies the effect changing land use can have in a watershed through the use of maps – skills that can then be applied to a series of maps developed in part by [KQED](#) showing the change in Delta land use over time. *'Sum of the Parts'* (p: 283) zeroes in on the issue of run-off from communities upstream of the Delta – and having students study a map of developed areas within the Delta watershed helps drive home the concern regarding water contaminants flowing into the Delta. Delta species can be integrated into the activity *'Invaders!'* (p: 263) to help students understand how invasive species can alter an ecosystem, while learning about key species in the Delta –including Delta smelt, mitten crabs and introduced game fish – and uncovering some of the links to other issues in the Delta.

All of the above activities build student knowledge and science skills to analyze past and current issues in the Delta, but what happens when science meets the realm of behavioral and social science – i.e., public opinion? The Project WET activity *'8-4-1, One For All'* (p: 299) launches students straight into this arena. After being introduced to eight categories of water users and four common needs, students work in teams to shepherd a supply through a variety of obstacles to the next community downstream. The course can be laid-out with two 'stream' channels leading into a wide spot from opposite directions to represent the Sacramento and San Joaquin rivers flowing into the central 'bulge' of the Delta. The flood obstacle can be placed in the river representing the Sacramento; drought in the San Joaquin – the very issues that originally led to the building of the Federal and State water projects in an attempt to alleviate these issues – and in the case of the State Water Project – extend the water benefit to other areas of California. The pollution and invasive species obstacles can both be placed in the 'bulge' of the Delta – and one Project WET facilitator has added a maze as a fifth element representing government regulation!

The activity is a perfect launch pad to introduce students to the BDCP – you can pull the overview documents right off the State [website](#) – then have students investigate specific users in each category for the Sacramento Valley, Bay-Delta, San Joaquin Valley and Southern California and their positions on the four common water needs. What are some concerns and/or potential benefits of the BDCP plan for users in each region?

Cost is one of the issues and the *'The Price is Right'* (p: 357) is a High School Project WET activity that takes students into the world of environmental planning and economics, as they calculate the building costs of a water development project. The activity includes the cost of building the Central Valley Project from 1955 as an example– a great opportunity to have students calculate the price tag in terms of current dollars and compare to the estimated costs of the BDCP – this is also included on the BDCP [website](#). Some municipal water users that would benefit from the BDCP are concerned about the investment that they will be required to make in the next decade versus the need to begin replacing aging water infrastructure within their communities. The extension activity for *'Money Down the Drain'* (p: 353) allows students to build a simple simulation model to demonstrate the issue of failing infrastructure. Water and property rights are another concern, as the state is invoking the law of public trust to build the project. The activity *'Pass the Jug'* (p: 447) has students simulate the two primary form of water rights within California – riparian and appropriative. The background portion of the activity provides a very good overview on the two rights that can be shared with students, but the Water Education Foundation's new website – [Aquapedia](#) – will allow students and teachers to dig deeper into the details of water rights law and how it currently plays out in California. The Extension activities at the end of *'Pass the Jug'* (p: 447) include several scenarios that are very applicable to the Delta.

The Bay Delta Conservation Plan is an elephantine project and is already generating criticism once again proving the saying, *'Whiskey is for drinking; water is for fighting.'* Some fear the cost of the plan or question the Delta ecosystem restoration assertions in the plan, while others trumpet the security this beast can bring to millions of Californians dependent on Delta water if properly harnessed and implemented. But it is an elephant all Californians should see as it will have enormous impacts on water in the state of California for generations to come. I have included a list of website that I hope will help you learn about this project no matter what your prior knowledge may be in the [Websites of Interest](#). As ever, I hope you'll find information of use in this newsletter and hope you have a wonderful summer!

WEBSITES OF INTEREST

The Bay Delta Conservation Plan

<http://baydeltaconservationplan.com>

The Bay Delta Conservation Plan (BDCP) is designed to achieve the co-equal goals of providing for the conservation and management of aquatic and terrestrial species, including the restoration and enhancement of ecological functions in the Sacramento-San Joaquin River Delta, and improving current water supplies and the reliability of water supply delivery conveyed through the State Water Project (SWP) and the Central Valley Project (CVP). This website includes a short video overview, a [project timeline](#) and [information sheets](#) on various aspects of the project that could be used with students.

ARTICLE: The Once and Future Delta

<http://baynature.org/articles/the-once-and-future-delta/>

“However defined, the Delta is the meeting point of rivers that drain 40 percent of California’s landmass and carry just under half of the runoff from California’s mountains. It is a crossroads on migratory routes extending in the air from the arctic to the tropics, and in the water from the Sierra out into the Pacific. It is also a rich-soiled farm region and, directly or indirectly, the source of drinking and farming water for the majority of the state. And it is, as the whole state now knows, in several kinds of trouble...” Click the link above to read the rest of the article and visit this link on the Bay Nature website to find additional links to great information on the Delta: <http://baynature.org/articles/resources-for-learning-more-about-the-delta/>

Sacramento-San Joaquin Delta Historical Ecology Study <http://www.sfei.org/DeltaHEStudy>

The San Francisco Estuary Institute-Aquatic Science Center, in collaboration with the California Department of Fish and Game, has completed a historical ecology study of the Sacramento-San Joaquin Delta. The project improves understanding of what the Delta looked like and how it functioned prior to the significant modification that has occurred over the last 160 years. Knowing how different parts of the vast historical Delta looked and functioned provides needed information for future restoration strategies. Use the information in this website with *'Color Me a Watershed'* (p: 239), including the interactive map noted in this month's article: <http://www.sfei.org/content/kqed-quest>

Where Rivers Meet—The Sacramento-San Joaquin Delta <http://www.water.ca.gov/swp/delta.cfm>

Today, the Delta is the hub of the State's water distribution system. About two-thirds of all Californians and millions of acres of irrigated farmland rely on the Delta for water from the State Water Project and federal Central Valley Project. Delta water is vital to California's economy, fifth largest in the world, and its growing population, expected to reach 53 million by 2030 (*Department of Finance*). The link above is part of the California Department of Water Resources website providing information on the [State Water Project \(SWP\)](#). You can also take your students on a photo journey from beginning to end courtesy of the Water Education Foundation: <http://aquaforia.com/projects/SWPSlideshowCP/SWPSlideshowCP.swf>.

Aquaforia <http://www.watereducation.org/topic-bay-delta-conservation-plan>

The Water Education Foundation's news aggregator is a great place to research different viewpoints on the Bay Delta Conservation Plan – and any other California water topic – to use with the Project WET activity *'8-4-1, One For All'* (p: 299). The above link will take you directly to current articles on Delta issues from both traditional and non-traditional news sources, presenting the many sides and views of the water picture, with the goal of fostering understanding of various positions and discussion toward resolution of these often controversial issues. This link <http://www.watereducation.org/general-information/all-about-delta> will take you to an Aquaforia BDCP overview that includes a short video our foundation put together on the BDCP issues.

USGS California Water Science Center <http://ca.water.usgs.gov>

The California Water Science Center (CAWSC) is one of 48 Water Science centers in the Water Resources Discipline of the [U.S. Geological Survey](#) (USGS). The Water Science Center's mission is to collect, analyze and disseminate the impartial hydrologic data and information needed to wisely manage water resources for the people of the United States and the state of California. Educators can also find overviews of current projects and articles produced using USGS research, such as the article ['Climate Change Projections for California's Bay-Delta System: Five Things Resource Managers Should Know'](#)

Delta REvision <http://www.deltarevision.com>

The purpose or mission of this website is to provide easy access to links and information regarding the various agencies and plans for the Delta. Our original intent with this website was to remain as neutral as possible on the various components of the new plans for the California Delta region, aka Sacramento Delta and Sacramento-San Joaquin Delta. It becomes impossible to remain neutral once you read some of the documents and analyze the truth of the matters. However, we hope the reader will come to his or her own opinions based on the information provided by all sides of the issues, and based on facts as they become available, not based on the media-spin of mainstream news sources.

ARTICLE: 'EPA survey ranks California No. 1 in water infrastructure needs' [Los Angeles Times](#)

In California and elsewhere, the biggest need was for repairing and upgrading water transmission and distribution lines. That will come as no surprise to residents of Los Angeles, where old mains routinely break, sending gushers of water flooding city streets. Treatment projects were next on the list. *"The*

nation's water systems have entered a rehabilitation and replacement era in which much of the existing infrastructure has reached, or is approaching, the end of its useful life..."

Aquapedia

<http://www.aquapedia.com/>

Coming July 2013! Developed and managed by the Water Education Foundation, Aquapedia aims to provide teachers, students, journalists, water professionals, policymakers and the general public, with balanced information on major water issues, topics, and terms. This new site will provide easy-to-use, easy-to-understand information on topical water issues from the Sacramento San Joaquin Delta to the Salton Sea to the possible impacts of climate change and rising seas with photos, videos, interactive maps and other online tools providing background and context to understand California's complex water issues.

California Regional Environmental Education Community

<http://www.creec.org>

The CREEC Network is the best source for Environmental Education resources in California! CREEC will be going through a metamorphosis this summer with a new website platform that will be easier to navigate, gives EE providers their own password and login and helps track teacher reservations for field trips and school presentations. The resource directory will also get an upgrade that includes EEI unit correlations to [Common Core State Standards](#) and [Next Generation Science Standards](#) as these become approved. *A great website to find additional professional development and school grant opportunities!*

Water Facts & Fun

<http://www.water.ca.gov/education/wffcatalog.cfm>

Lots of free materials for California educators, including *'The California Water Works'* that has a colorful comic book character, Professor Goodwater, leading students through the water cycle, showing them how water is delivered through California's built and natural water systems to the end users. Guidelines for water conservation are provided as well.

If you would like more information on Project WET please contact Brian Brown, California Project WET Coordinator at: projectwet@watereducation.org or (916) 444-6240.

Check our website www.watereducation.org and/or contact us for updates.