

Creek and Watershed Interactive Map of Western Alameda County

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The Alameda County Flood Control and Water Conservation District (ACFC&WCD) sought to increase access and use of watershed information. Maps and information had only been available on paper or in for certain watersheds, some digital resources were online, but difficult to find and use.

To increase access, the ACFC&WCD took advantage of Google Earth technology to create a dynamic map of watersheds in Western Alameda County, featuring details on creeks, culverts, channels, storm drains, geographical features, roads and points of interest.

Approach:

To create the map, we engaged map professionals to design a layered file, giving users the ability to turn features on and off. Each mapped watershed is accompanied by information on the area; including lists of waterbodies, flora, fauna, restoration projects, recreation opportunities, and ways that volunteers can get involved. To support access, the map and the watershed information is hosted on the ACFC&WCD website, <http://acffloodcontrol.org/resources/explore-watersheds>. The content for each watershed is hosted on its own page, which increases search optimization.

Results:

Presentations of the Map have resulted in interest from environmental professionals, naturalists and educators. It will be used as part of an ACFC&WCD/Sulphur Creek Nature Center partnership Watershed Education Program. A Google Earth Station in the program allows students and visitors to use the map. Teachers can use it to perform simple lessons, such as locating their school on a map and finding the nearest creek and then its watershed.

Conclusions:

The map provides access and improved learning about watersheds while exposing the public and students to current technology. The regional map has the ability to demonstrate the larger watershed picture. Students can easily make connections between their surroundings and the system of watersheds in which they live.

Keywords: Education Map Google Earth, website, interactive, learning, teaching tools

Poster Topic: Data/Tools: Mapping

Mapping Dynamic Estuarine Intertidal Features using WorldView-3 and Unmanned Aerial Surveillance

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One key uncertainty identified within the South Bay Salt Pond Restoration Project (SBSRP) Adaptive Management Plan is whether the use of mudflats as a sediment source for restoration will come at the expense of critical mudflat habitat. If so, erosion of existing mudflats may result in changes in foraging area and food resources, thus reducing the ecosystem benefits of this habitat to waterbirds and other species. As a result, the SBSRP requires methods for tracking changes to the distributions, extent and quality of mudflats. One impediment to tracking mudflats using imagery is that they must be mapped while they are exposed at the lowest tides (mean lower low water, MLLW), due to restricted wavelength penetration in water for most sensors. An interdisciplinary team of scientists is developing a three step approach for mapping mudflats that is both cost-effective and modular. As a first step, the USGS obtained a World View-3 satellite image close to MLLW in Spring 2015 through the Commercial Imagery Derived Requirements Program. In addition to the demonstrated potential of standard multispectral imagery to map exposed mudflats, the team will utilize the Coastal Blue Bird (CBB) to map shallow water mudflats. Mudflat boundaries derived from this image will be compared to existing high resolution LIDAR to delineate a baseline for tracking changes into the future. Second, we will explore the use of integrating Unmanned Aerial Surveillance (UAS) with commercial cameras outfitted with CBB filters for tracking mudflat extent and quality. Mudflat "quality" here refers to the presence (and density) of biofilm along the mudflat. Third, we will compare and assess the ability of both the satellite and UAS based CBB imagery to delineate mudflat distribution, extent and quality.

Keywords: mudflats, remote sensing, biofilm, UAS, restoration, salt pond, LIDAR

Poster Topic: Data/Tools: Mapping

Use of GIS and GPS Technology in the Invasive *Spartina* Project's Revegetation Program

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Since 2011, the State Coastal Conservancy's Invasive *Spartina* Project (ISP) has undertaken a program of active revegetation in San Francisco Bay salt marshes with the goal of enhancing habitat for the endangered California Ridgway's Rail (*Rallus obsoletus obsoletus*). Most of the ISP's revegetation plantings involve two plant species, Pacific cordgrass (*Spartina foliosa*) and marsh gumplant (*Grindelia stricta*), which are important components of rail habitat. Throughout all stages of the implementation of the ISP's revegetation program, GIS and GPS technology is used to plan, install, and monitor plantings. During the planning and ground-truthing stage, the ISP uses remote sensing data including aerial imagery and LiDAR to target plantings to particular areas within each revegetation site. After the general planting area has been selected, biologists go into the field to select and flag locations for individual patch locations based on both planting suitability and likely value as rail habitat. At each patch location, biologists use a professional-grade GPS unit to map the plot and collect data concerning biotic and abiotic characteristics of the patch location. During installation, GPS units loaded with this data are used to plan efficient movement of materials and personnel through the site and to record progress of installation. Every year, the ISP monitors revegetation plantings, using GPS units to collect data on survivorship and expansion. The ability to easily couple the data collected during ground-truthing, the data collected during installation, and the data collected in each year's monitoring allows us to easily compare the success of sites and of installation techniques. These comparisons allow us to make informed adaptive management decisions concerning the selection of future revegetation sites and planting methods.

Keywords: GIS, revegetation, *Spartina*, *Grindelia*, restoration, Ridgway's Rail

Poster Topic: Data/Tools: Mapping

Mapping Occurrences of California Ridgway's Rails

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Annual monitoring for the endangered California Ridgway's rail (*Rallus obsoletus obsoletus*; hereafter, rail) is an essential component of the State Coastal Conservancy's Invasive *Spartina* Project (ISP). Rails are year-round residents of the tidal wetlands of the Estuary and co-occur with native and non-native *Spartina*. The ISP requires information on the number and distribution of rails at each site for the planning and permitting of *Spartina* treatment. Every year since 2005, the ISP conducts breeding-season surveys for the rail. Biologists navigate to pre-selected survey stations using GPS and record the estimated distance and direction to each rail detected during the survey period. Then, using GIS in the office, they are able to plot the location of every rail detected on a map. This mapping method helps the ISP to more accurately estimate the number of rails at each marsh, as well as to visualize the distribution of rails throughout the marsh. Rail location data not only guide the ISP in planning and permitting, but also in site access during on-the-ground *Spartina* treatment and monitoring. Rail locations are included on ISP biologists' GPS units when mapping and treating non-native *Spartina*, helping to avoid rails and minimize the impacts of ISP activities in the marsh.

Keywords: California Ridgway's rail, GIS, GPS, mapping

Poster Topic: Data/Tools: Mapping

Enhancing Regional Capacity for Habitat Project Tracking, Assessment and Reporting

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This project significantly expanded EcoAtlas, the State's repository for wetland project data, to include hundreds of habitat protection, enhancement, and restoration projects throughout the Central Valley and San Francisco Bay-Delta regions. Detailed project data critical for natural resource managers, such as acres of distinct habitat types, species benefitted by project, project progress and status, and funding information, were added to the project tracking database. Additional functionality was added to EcoAtlas to allow for the visual display, querying and extraction of this tabular and spatial project data. As new projects are developed and existing projects enter new phases, information can be expanded and updated through the new data portal that allows project proponents to enter and update information displayed in EcoAtlas. Additional data layers such as modern Delta habitats were added to EcoAtlas to allow users to evaluate projects within the context of existing ecological resources and other landscape characteristics and uses.

Additional data, querying and mapping functionality will allow for improved analyses of changes in habitat extent and condition; landscape-scale conservation planning; prioritization of restoration areas; evaluation of progress toward meeting conservation objectives; partnership establishment; and leveraging of restoration resources. By providing the tools needed to track and analyze landscape change and measure success of these efforts, we will improve our ability to conserve important habitats strategically in the future.

Keywords: Database, Habitat Restoration, Project Tracking, Data

Poster Topic: Data/Tools: Mapping

Invasive *Spartina* Mapping and Monitoring Methods

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The State Coastal Conservancy's San Francisco Estuary Invasive *Spartina* Project (ISP) has used GIS and GPS data collection software since 2000 to map and monitor invasive *Spartina* in the San Francisco Bay. Mapping efforts have documented the reduction of the infestation from a peak of 319 hectares to less than 12 hectares as a result of regionally coordinated treatment efforts since 2005.

The project's mapping methods have become increasingly sophisticated over time in order to address the complexity of locating, identifying and ensuring the treatment of small remaining patches of invasive *Spartina*. The project integrates current-year genetic testing results into GPS data layers to inform differentiation between the invasive *S. alterniflora x foliosa* and the native *S. foliosa* in the field, and tracks the location and extent of patches of invasive *Spartina* and their treatment on an annual basis. Technical advances include use of tablet PCs running customized ArcPad data collection software to inform mapping efforts, speed data collection and validate data entry at time of collection; use of ArcGIS data reviewer software to automate data quality control tasks; and use of ArcGIS Server to allow real-time data synchronization between surveyors in the field to ensure thorough mapping and treatment efforts.

This poster addresses the complexity of mapping a hybridizing population of invasive plants to inform eradication efforts over time. The associated interactive GIS and GPS mapping displays demonstrate the patch-level data collection and visualization methods currently used by the ISP to map and track treatment of invasive *Spartina*.

Keywords: *Spartina*, Conservancy, Invasive, GPS, GIS

Poster Topic: Data/Tools: Mapping