Land of the West Wind

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Diet Preferences of Suisun Marsh Dabbling Ducks

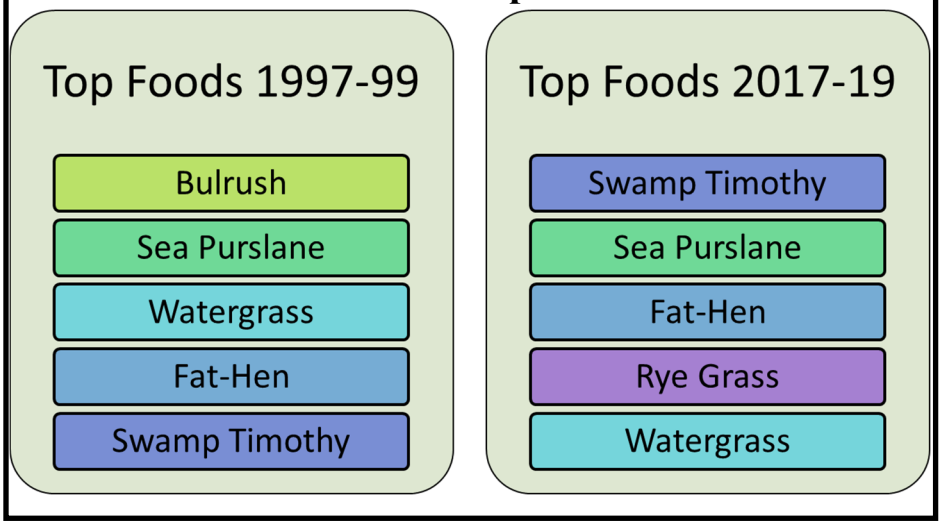
UC Davis Eadie Lab

One of the most pressing question to duck hunters in Suisun is: **"What are the ducks eating?"** This is a question that graduate students Dan Smith and Jackie Satter at UC Davis are answering by conducting a diet and body condition study that expands upon the parameters measured by former UC Davis graduate student Ed Burns in the late 1990s. This data set is one of the largest of its kind collected in California, and the results that will be produced over the next few years are sure to be useful to managers in Suisun Marsh.

Many managers in the marsh have a good idea of what sorts of food items attract ducks simply from spending enough time in a blind observing them. Some may remember the last diet study in Suisun Marsh conducted by Burns from 1997 to 1999. The results from that study were published in 2003 and have helped duck clubs manage and operate for the last 20 years.

However, the Suisun Marsh landscape, water, and birds are constantly changing. One of the goals of the current UC Davis research is to update the data from the Burns study and compare dietary trends two decades later. Burns found that the three most important dietary items for Green-winged Teal, Mallards, and Northern Pintail in Suisun Marsh in 1997-1999 were the seeds of sea purslane, fat-hen, and watergrass, with sea purslane being the top preferred food for all three species. These plant species still comprise important components of the diets of several dabbling duck species in the recent 2017-2019 study, but the top three now include swamp timothy rather than watergrass. It is notable and significant that diet preferences have changed, reflecting the change to the vegetation and environmental conditions in the marsh over the past 20 years.

Top Foods by Mass Found In Scientifically Collected Birds Compared



The data is representative of total seed dry mass (not % occurrence). The 1997-99 diet data was collected from Mallards, Northern Pintail, and Green-winged Teal. The 2017-19 diet data was collected from Mallards, Northern Pintail, Green-winged Teal, Gadwall, American Wigeon, Northern Shoveler, and Cinnamon Teal and Mallards, Pintail, and Green-winged Teal comprised 56% of the 2017-19 sample.

Diet preferences continued on page 4

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Quarterly newsletter of the Suisun Resource Conservation District
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SRCD's public meetings are held at 2 PM on the second Wednesday of each month at the Solano County Supervisors Chambers 675 Texas Street Fairfield, CA 94533

(Held remotely during Covid-19 restrictions)

SRCD represents private landowners of the Suisun Marsh at the Federal, State, and local levels. Its historic goal has been to achieve a water supply of adequate quality so that preferred wetland habitat values will be retained through appropriate management practices Through cooperation with landowners and various agencies, SRCD seeks to develop new programs aimed at protecting and improving the Suisun Marsh for future generations.

SRCD UPDATE

Suisun Resource Conservation District Water Manager Biologists

The end of the year is a very busy period for us here at SRCD. A year's worth of reporting, applications, and agency reports are due for the new year. The Portable Pumping, Lepidium control, and Preservation Agreement and Implementation Programs will all begin in spring 2021.

It is a good time to plan your maintenance activities for 2021!

Duck season is when all the hard work that managers have put into their clubs each summer is supposed to pay off. It is also the time when most club members notice the things that they wish to improve on for next year. The 2021 Regional General Permit will be sent out in January, and applications will be sent to the USACE for authorization starting January 31st. Contact your Water Managers with any questions of permitting or the work application process.

Reminder!

The Annual Unscreened Diversion Restrictions

If you are a diverter from a slough or bay that is under the Chinook Salmon Unscreened Diversion Restriction (November 1st to January 31st), you are required close intake gates to 25 percent of maximum capacity for any of your gates without a fish-screen. During the delta smelt restriction period, 20 percent of diversion capacity is allowed.

Landowners are prohibited from diverting any unscreened water from Suisun, Montezuma, Nurse, and Denverton Sloughs from February 21st through March 31st.

The Benefits of Changing Water Levels Through Duck Season

By SRCD Water Managers

Duck season always has its ups and downs, especially in years like 2020. It can seem like there are no birds near your blind.

Changing the water level in a pond can help attract birds to new areas that they were previously uninterested in. "The food is out there, its about availability", says SRCD Executive Director Steve Chappell. "Both raising and lowering your water level can make new food available for dabblers."

Lowered water levels can expose food resources that were previously too deep underwater for dabbling ducks to effectively forage on. Conversely, higher water levels may cause new areas to show water and attract ducks and free up new food resources as the plants on the edge of ponds at the high ground break down.

Many ponds fluctuate in depth naturally due to rain and tides, and managers often expend lots of effort to keep ponds to a certain depth. As always, a shoot level is about balance and tradeoffs, but changing the depth of your ponds can have beneficial results and is worth experimenting with.

DWR Water Flow Experiment Successfully Increases Habitat for Endangered Delta Smelt

By experimenting with how salty ocean water mixes with fresh water within the Suisun Marsh, the Department of Water Resources (DWR) has found a way to improve habitat conditions for endangered delta smelt within the upper San Francisco Estuary.

DWR experimented in August 2018 with using existing water control structures, known as the Suisun Marsh Salinity Control Gates, to direct a pulse of fresh water from the Sacramento River into the saltier water of the marsh. Delta smelt move with the tides as they swim through the Delta and Suisun Marsh. The control gates were used twice a day for six hours during the ebb tide, allowing the marsh to fill with fresh water. The gates were closed at other times during the tidal cycle.

A newly published report on data collected from the 2018 experiment shows this action resulted in more habitat for delta smelt, a species listed in the California Endangered Species Act.

"We know delta smelt thrive in less salty water," said Rosemary Hartman, DWR environmental program manager. "By using the Suisun Marsh salinity control gates to direct more fresh water into the Marsh, we reduced salinity and improved habitat conditions for smelt during a critical rearing period of their life cycle."

The delta smelt, a small, nearly translucent fish with steely-blue sides, is less than three inches in length. They can tolerate a wide range of salinity and temperatures but are generally found in brackish water (more saline than freshwater but not as saline as seawater) at water temperatures below 77 degrees Fahrenheit.

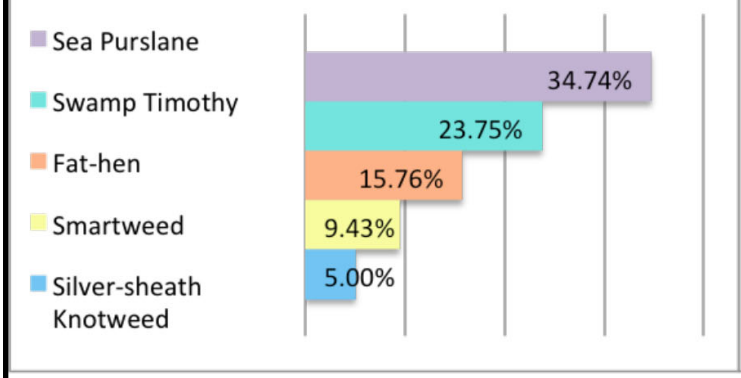
Historically, the Suisun Marsh has been an important piece of the puzzle when it comes to understanding ideal habitat conditions that delta smelt can survive in. The murky, low-salinity water of the Marsh is not only ideal for smelt survival, but it also provides safety from predators and an abundant food supply.

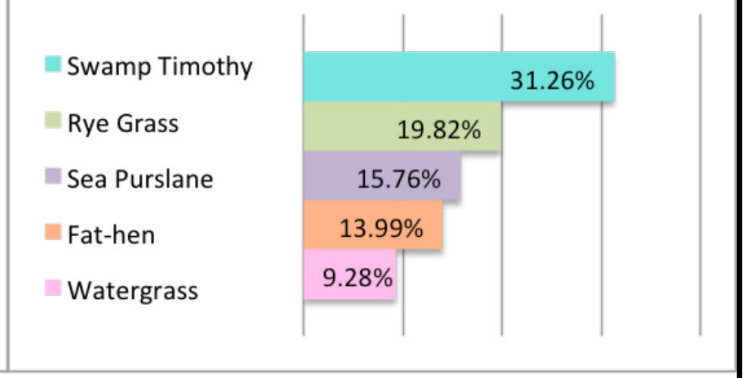
"During drier periods such as the summer, the Suisun Marsh is often too salty for delta smelt," said Dr. Ted Sommer, DWR's lead fisheries scientist who directed the salinity control gate study. "This is also a critical time period for juvenile delta smelt rearing. The 2018 flow action resulted in a small number of the species colonizing Suisun Marsh from the Sacramento River, supporting our hypothesis that the flow action would have some benefit for this rare species."

Up until 2018, the salinity control gates were only used during the fall and the winter months to lower marsh salinity levels for waterfowl habitat management. As a result of the successful 2018 flow action experiment, the summer operations are now required by the Biological Opinion and Incidental Take Permit for operation of the State Water Project in most water years starting in 2021.

From California Department of Water Resources Water Blog

Diet Preferences continued





Preliminary data (about 40 % of the total collected samples) has also shown general trends between dabbling duck sexes. Females and males have preferences that include the top species overall but still differ significantly. As shown above, males prefer rye grass over sea purslane and fat-hen, and females prefer sea purslane over swamp timothy and fat-hen, followed by smartweed , and silver-sheath knotweed.
Continued analysis of the dabbling duck diet data is ongoing as part of the PhD thesis of Jackie Satter. These data will be compared to the body condition data to evaluate relationships between food preferences and body condition for each species, between sexes, and over time. Diets from collected specimens will be compared to diets from hunter-shot specimens to investigate similarities or differences.

How Did the Data get Collected?

Jackie Satter, UC Davis PHD Student

What were your methods?

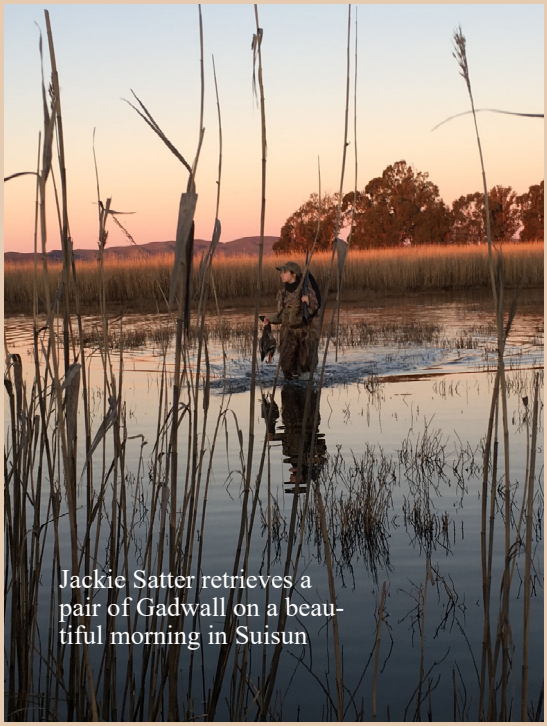
Our diet samples were obtained from both hunter-shot birds and ducks collected under scientific collection permits during the winters of 2017-2018 and 2018-2019. A total of 691 birds were collected by pass-shooting during two years of the study. An additional 477 samples were donated from participating duck clubs. All the collected specimens obtained through pass-shooting were measured, necropsied, and the esophageal contents were extracted. Esophageal contents were removed from samples and analyzed by microscope, where each consumed item was sorted, dried, and weighed. The carcass was then homogenized and processed for proximate analysis of body composition (lipids, protein and minerals) using the UC Davis Analytic Laboratory. In total, 1,168 diet samples were collected and approximately 25% of those samples (269) have been analyzed for the figures above, but about 50% have been sorted (analysis in progress).

Why pass-shooting?

We wanted to make sure that there was as little bias as possible in the birds collected to best represent the overall population. Birds shot under the influence of decoys, calls, and blinds are disproportionately younger and often of inferior body condition. As veteran hunters will attest, it is easier to get a solo male spoonie to work than it is to call in an eight-year-old female mallard. Older ducks tend to have higher survival rates and part of that is avoiding harvest by hunters. We chose not to use decoys or calls so as not to skew our data towards younger and more easily swayed birds.

Was it difficult to hunt without calls or decoys?

It was certainly different. Without calling birds to us we had to rely on camouflage and cover far more than normal hunting from a blind. We used jump-shooting and took advantage of taller cover in order to be as successful as possible while not artificially selecting birds.



Jackie Satter retrieves a pair of Gadwall on a beautiful morning in Suisun

Food Availability and Seed Abundance in Suisun Marsh

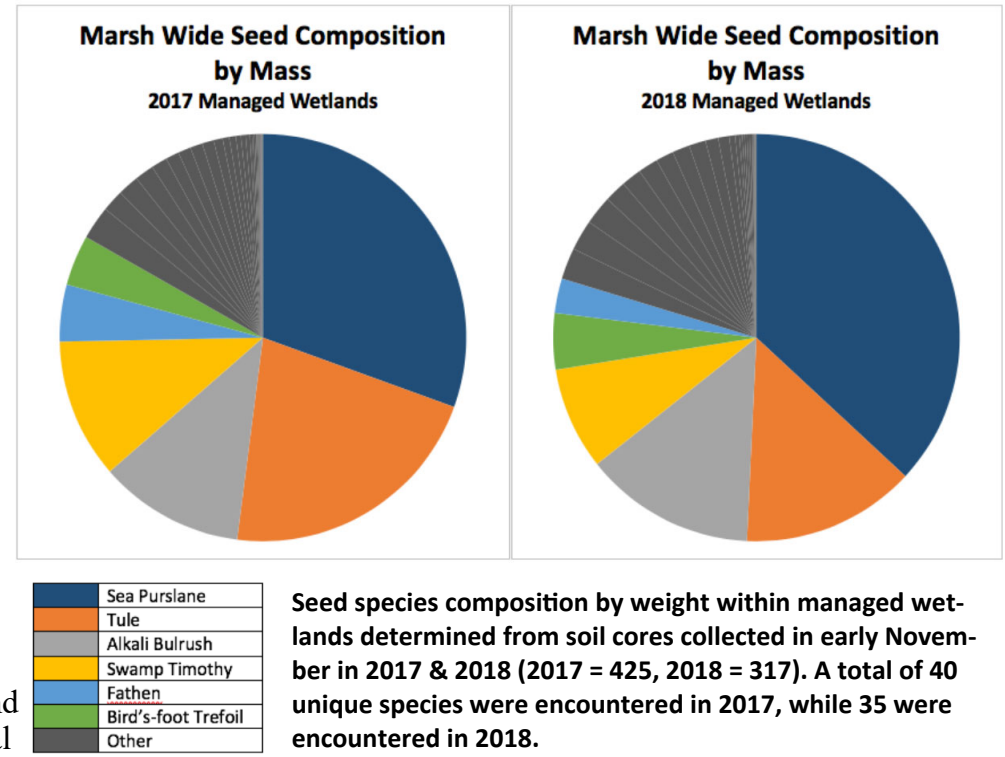
Dan Smith, UC Davis PHD Candidate

Besides determining food preference, it was important to determine food availability in Marsh in order to form estimates of food use and related carrying capacity. We collected a total of 1,915 soil core sample in the two years of the study comprising 900 samples from managed wetland units and 640 samples from tidal marsh in 2017-18, and 640 samples from managed wetland units and 160 samples from tidal marsh in 2018-19. Our marsh wide sampling effort has provided a detailed assessment of seed availability in managed and tidal wetlands over two consecutive years. We found that managed and tidal wetlands had similarly low average seed abundances of roughly 150 lb/acre.

What about carrying capacity?

We used our seed abundance data to conduct a preliminary carrying capacity analysis and found that approximately 90,000 waterfowl could be supported over a 180-day wintering period within Suisun Marsh. The results of the 2018 mid-winter waterfowl survey counted 82,000 waterfowl within Suisun Marsh. This suggests that wintering waterfowl numbers may indeed be constrained by limited food resources. The same carrying capacity calculations predict that if average seed abundance were increased to 200 lb/acre, an additional 45,000 waterfowl could be supported. We are currently working to determine how seed depletion and decomposition may influence carrying capacity, and how these variables are influenced by location and time.

How does understanding seed abundance assist managers?



Seed species composition by weight within managed wetlands determined from soil cores collected in early November in 2017 & 2018 (2017 = 425, 2018 = 317). A total of 40 unique species were encountered in 2017, while 35 were encountered in 2018.

There are growing opportunities to better integrate and jointly maximize the value of managed and restored habitats in the marsh for multiple species, including waterfowl, fish, small mammals and herps. For example, thoughtful management of water to promote food production on managed wetlands for waterfowl can also create high quality habitat for fishes, especially for juvenile stages. Likewise, habitats managed for ducks may provide high quality habitats for the Salt Marsh Harvest Mouse. We are just at the beginning of efforts to understand the linkages among these integral constituents and there is growing excitement and enthusiasm to explore mutually beneficial management solutions. This component of the project seeks to do so, focusing on the waterfowl and wetland resources in the marsh. The next step in our research will focus on determining how seed abundance changes over time. Specifically, we are examining seed depletion and decomposition rates of seeds resident in the Marsh. We are currently processing soil cores and the full results from these studies will enable us to provide an updated estimate of waterfowl carrying capacity.

What Kind of Water Year Can We Expect?

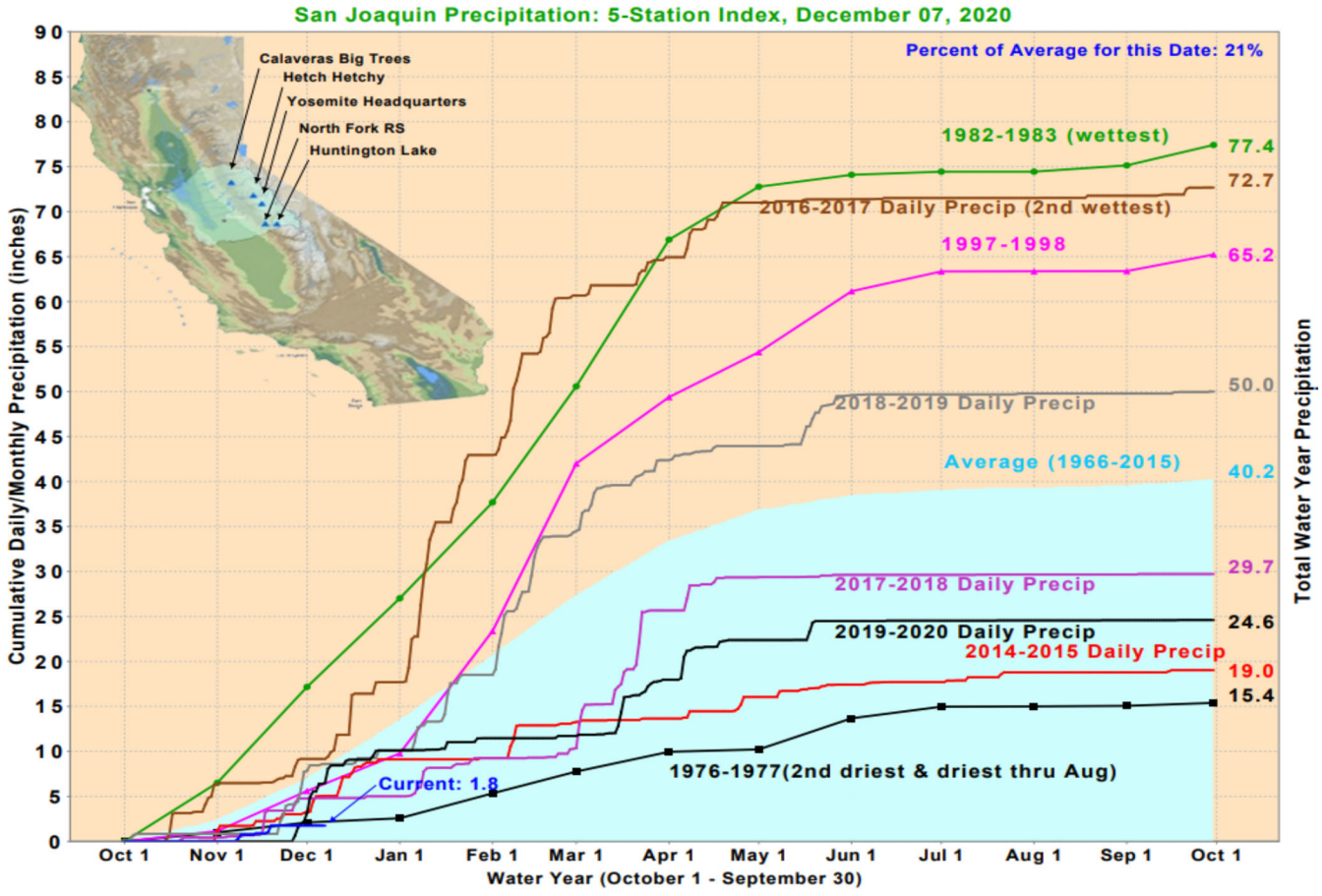
SRCD Staff

The 2020 water year concluded this October with rainfall well below average. The winter continues to be dry, and there are no signs that Suisun Marsh will be seeing significant delta outflow anytime soon. We are now into the second month of the current water year, the reservoir stores are getting lower, and the Central Valley has experienced just half of the rainfall that the San Joaquin region received by December in 2019-2020.

We know we are entering a dry year, so the question becomes: **How should drought conditions affect your pond management?** The answer is fairly simple and intuitive: club managers should take advantage of low salinity water when it is available in February and March. While we don't know for sure, based on long-range forecasts it is likely that there will not be significant spring rainfall or a hefty snowpack in 2021. Without releases from storage reservoirs like Folsom, Shasta, and Oroville, salinities are expected to climb in the Suisun Marsh sloughs.

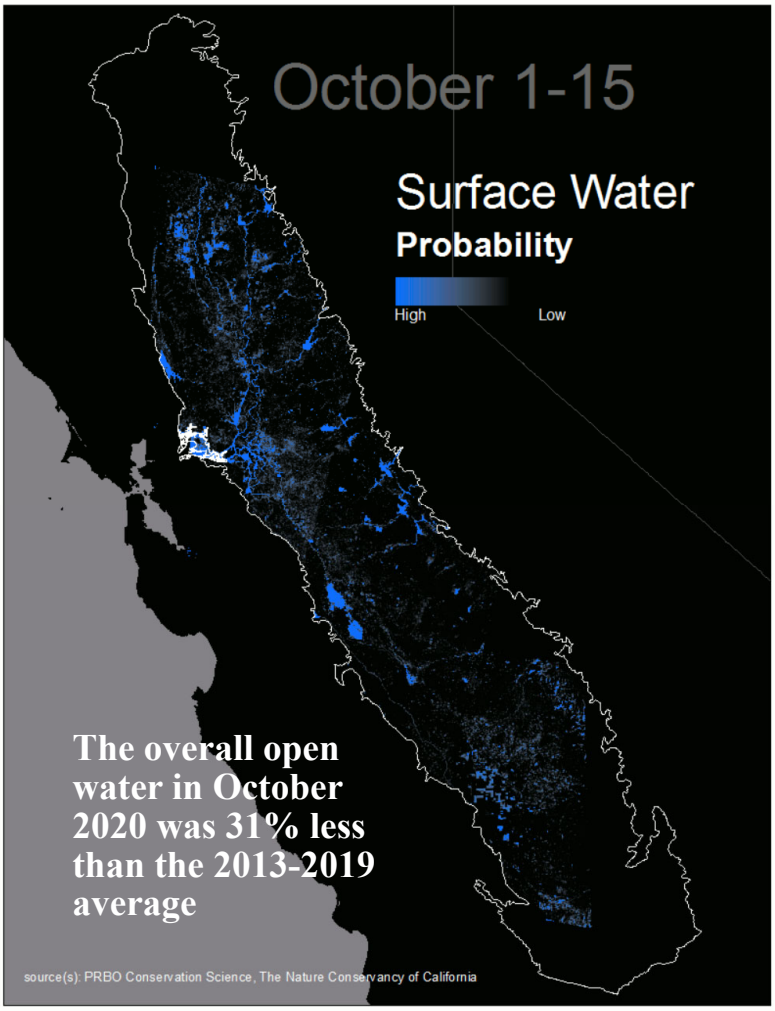
In dry years, the fresh water that Suisun often gets during the early spring months will not last until the late spring. It becomes all the more important to dry up ponds early. Leach cycles to improve soil salinities can be a valuable tool in order to increase growth of waterfowl food plants, but are limited by the slough conditions. Plan to get leach cycles done early! Flooding your ponds in the summer does more harm than good if the water quality is poor. While habitat objectives differ between ponds and between clubs, if growth of waterfowl food is desired, circulating water or irrigating late in the year can load salts into your soil and end up being counterproductive.

If possible, drain your ponds just after duck season and perform leaches until April or May, unless the pond is used as brood habitat. If leaching isn't an option for your club, try to circulate lots of fresh water in the early spring, and remove water when the salinities climb.



Tools Of The Trade:
Estimating Open Water In The Central Valley

Point Blue Conservation Science has made recently made its Water Tracker system available to the public as a tool for wetland and water managers. The ability to look backwards at the amount of open water available in past years as compared to the current year could be of particular interest to managers trying to predict delta outflows and deliberating on moist soil management techniques.

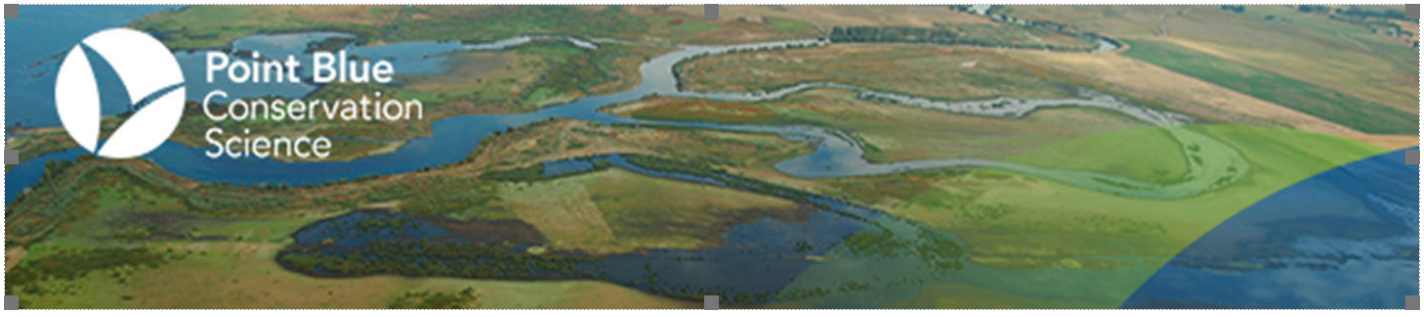


Recent data from Water Tracker suggest that the amount of open water overall in September and October 2020 across the Central Valley was lower (-25% and -31% respectively) than the 2013-2019 average. In particular, flooded rice was 31% lower than average. However, managed wetlands are about average for this time of year. As of the end of October, open water in managed seasonal wetlands was only 21 ha (<0.01%) more than the 2013-2019 average and open water in managed semi-permanent wetlands was only 344 ha (8%) more than the 2013-2019 average. So, we are seeing less water on rice fields and agricultural land. Will this change once Term 91 (halting diversions and use for permits granted after 1965 if supplemental water is required) is lifted? We will see!

Water Tracker uses Landsat satellite imagery to update the distribution of open surface water in the Central Valley. It's refreshed every 16 days. Water Tracker displays where open surface water is in the Central Valley in map form and also provides data summaries. Anyone can quickly and easily get a picture of where the water is and isn't, now and in the recent past. Data are available starting in 2013 (as far back as 2000 can be requested). Data can also be downloaded directly from Water Tracker.

You can use the water tracker and learn more about the distribution of surface water across the Central Valley both in the past and in near real-time by exploring these data at – www.pointblue.org/watertracker.

If you feel that this tool is useful for you, Point Blue invites you to share how you are using Water Tracker at watertracker@pointblue.org. Help Point Blue support this free, open-source resource through understanding and highlighting how it is most useful.



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SRCD Newsletter
2544 Grizzly Island Road
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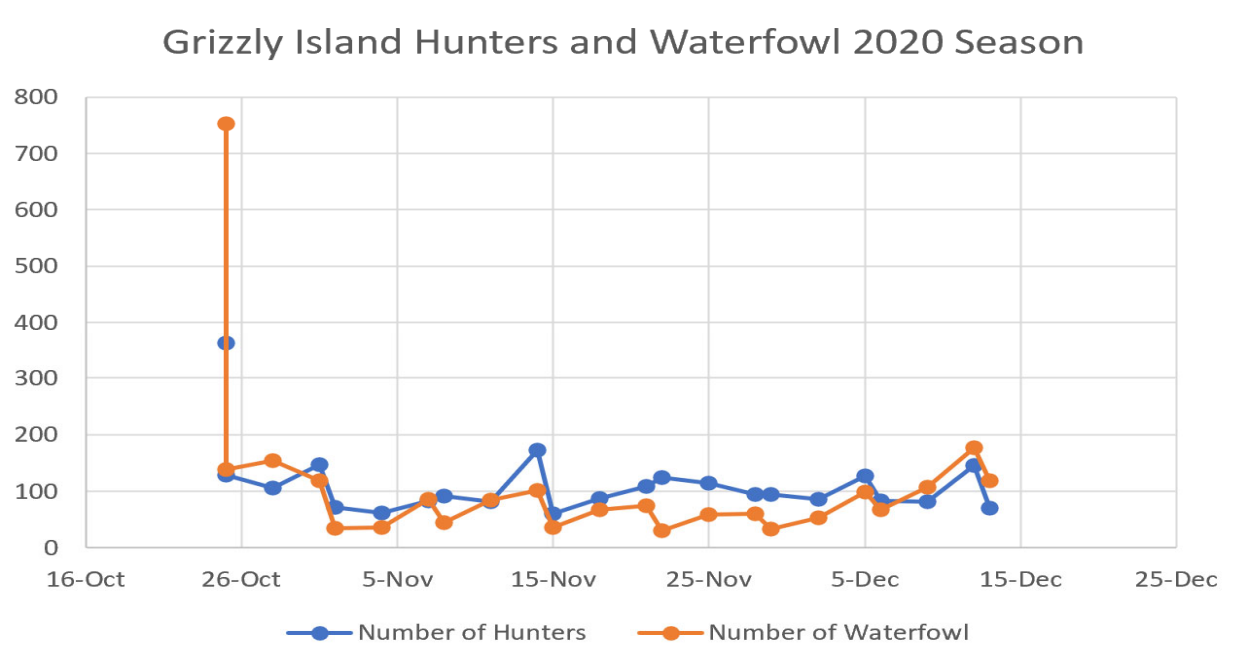

Grizzly Island Wildlife area shot a whopping 752 birds on opening day. Although November has been slow for both hunters and waterfowl, December is shaping up to be better with a 1.5 bird average per hunter on the weekend of December 12th and 13th.