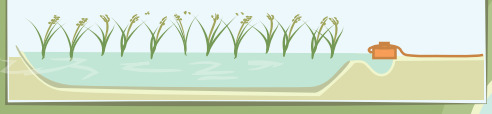
Accounting for every drop.

Water management in the Sacramento Valley.

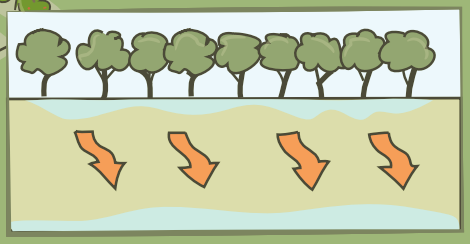
In the Sacramento Valley, a highly efficient "flow-through" system allows water to move from mountains to ocean. Water resources managers work with the Valley's unique topography, geology and hydrology to gather, use and reuse this precious resource.

This system is the heart of the Valley's healthy ecosystem, diverse economy and rich recreational opportunities.

Rice is grown on dense clay soil which prevents seepage and ensures water is available for re-use downstream.



The water not used in one district is a source of water for others down-stream.



All water not used by crops and wetlands returns to the river or percolates down to groundwater, recharging Valley aquifers.

This flow-through system works well. Natural vegetation, birds, fish, crops and people require a portion. The rest flows to the delta.

The Sacramento River and its tributaries are the prime sources for this system. They also gather water from irrigation and wetlands to reuse downstream.

Information compiled by
Northern California Water Association and
California Rice Commission.

Facebook.com/SacValleyCA

Active management of the Sacramento Valley's flow-through system ensures that the water we need and the benefits we enjoy will continue to be available.

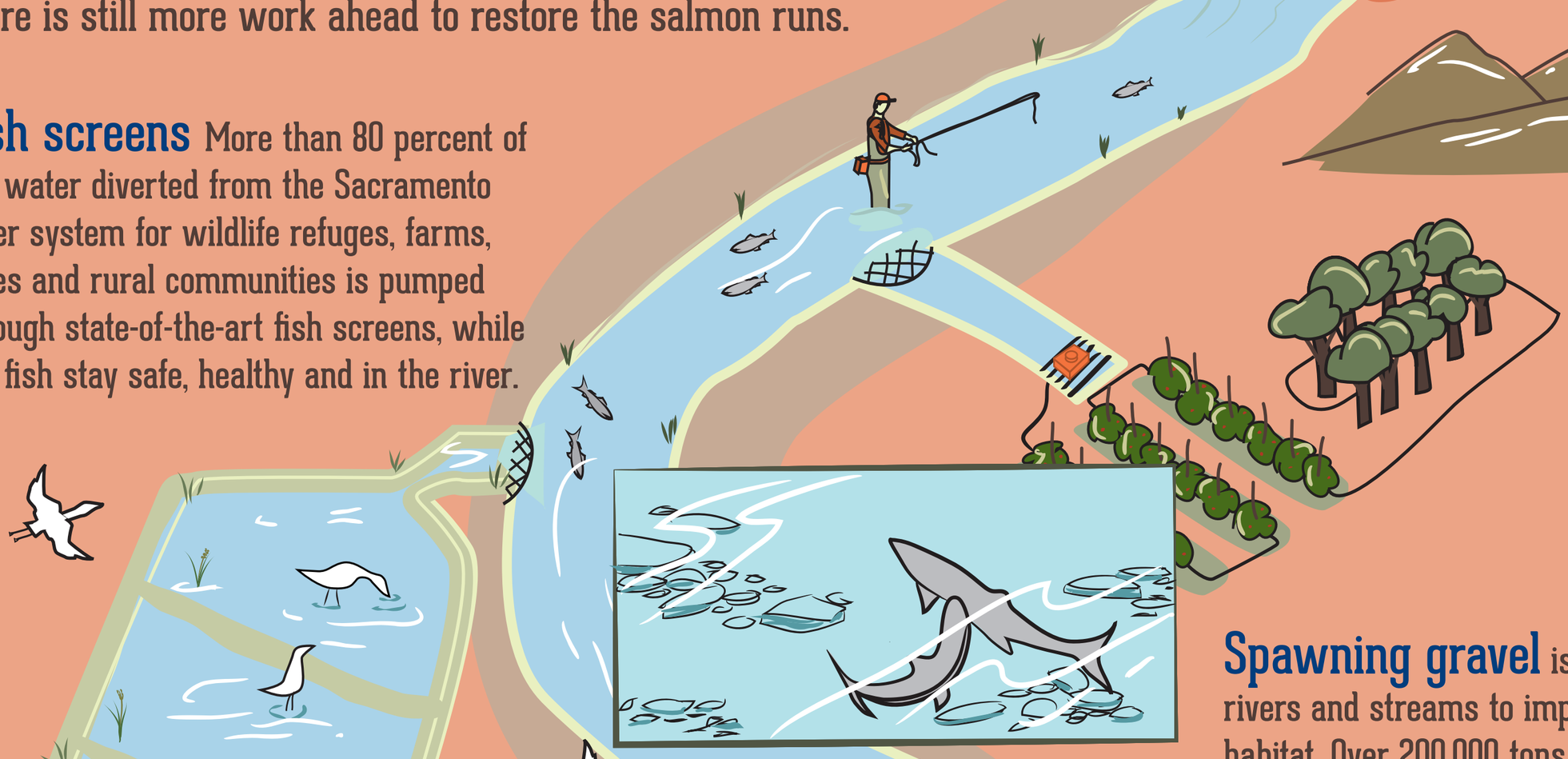
The Sacramento Valley

Like a human fingerprint, California's Sacramento Valley is truly unique. On the leading edge of ecological and economical sustainability, it's also an **exceptional** place to live, work and raise a family. The Sacramento Valley joins together a world renowned mosaic of natural abundance: productive farmlands, wildlife refuges and managed wetlands, cities and rural communities, and meandering rivers that support and feed fisheries and natural habitats. Through **efficient** management of the region's water resources, the Sacramento Valley will continue to provide what's **essential** to California's future success and prosperity. Nourishment and sustenance from the fields, habitats for fish and wildlife, recreation and a special quality of life—the Sacramento Valley is home to all of this, and more…

Restoring the Salmon Runs – a Time for Action

Sacramento Valley water resources managers are partnering with federal and state agencies and conservation organizations to improve migratory corridors and habitat for salmon. The measures taken and the money spent – more than $1 billion over the past two decades – have been helpful but there is still more work ahead to restore the salmon runs.

Fish screens More than 80 percent of the water diverted from the Sacramento River system for wildlife refuges, farms, cities and rural communities is pumped through state-of-the-art fish screens, while the fish stay safe, healthy and in the river.



Spawning gravel is reintroduced to rivers and streams to improve spawning habitat. Over 200,000 tons of gravel has been added to the Sacramento River since 1997.

Flow agreements to benefit salmon and other fish are on every major watercourse in the Sacramento Valley. Get the details at www.norcalwater.org/efficient-watermanagement/instream-flows/

Migration corridors are important to help young salmon [smolts] avoid predators in their migration from the Valley to the ocean. Water managers in the Sacramento Valley are currently building a Salmon Smolt Escapement Plan to time pulses of water with fish releases.

Our thanks to California Fisheries biologist Dave Vogel, who made these recommendations as part of his report, Insights into the Problems, Progress and Potential Solutions for Sacramento River Basin Native Anadromous Fish Restoration
www.norcalwater.org/efficient-water-management/fisheries-enhancements/

NCWA Northern California Water Association

/SacValleyCA

Pacific Flyway Habitat in the Sacramento Valley.

Considerable progress has been made to enhance habitat for migratory waterfowl, wintering shorebirds, raptors, riparian songbirds and other wetland dependent species in the Sacramento Valley.

During the winter, reliable water supplies in the Sacramento Valley flood harvested rice fields, provide habitat, irrigate managed wetlands and deliver water to refuges and wildlife areas.

Flooded rice fields, National Wildlife Refuges and State Wildlife Management Areas and intensively managed private wetlands help compensate for the 95% of Central Valley wetlands lost over the years.

National Wildlife Refuges and State Wildlife Areas in the Sacramento Valley provide nearly 27,000 acres of wetland habitats, while privately-managed wetlands provide another 43,000 acres.

Up to 350,000 acres of rice are flooded each winter to provide bird habitats. An additional 43,000 acres of Sacramento Valley wetlands rely on the water drained off rice fields for fall flooding.

The amazing array of bird habitat in the Sacramento Valley receives surface water directly from irrigation water suppliers or indirectly from the return flow of surface water.

Nearly seven million waterfowl and 300,000 shorebirds rely on the Sacramento Valley for food and habitat. Other species which benefit include raptors, riparian songbirds and additional wetland dependent species.

Information compiled by

Northern California Water Association
www.norcalwater.org/

California Rice Commission
www.calrice.org/

NCWA Northern California Water Association

California Rice

Active management of the Sacramento Valley's flow-through system ensures that the water needed for birds and their habitats will continue to be available.

Building the Sites Reservoir

WATER FOR OUR CITIES, FARMS AND WILDLIFE

Trinity Lake

Shasta Lake

Whiskeytown Reservior

Location of Proposed **Sites Reservoir**

Redding

Tehama-Colusa Canel

Sutter Buttes

5

GCID Canel

Williams

Water would be pumped into reservoir from existing canals

The ongoing drought has cost our state billions of dollars of farm production, diminished wildlife habitat and reduced urban water supplies. For our future prosperity, we need to capture water in rainy years through offstream storage to help the state survive future dry years. Every Californian will benefit from the increased water storage and flexible water management that will come from Sites Reservoir.

Benefits:

- **More reliable water supplies** for millions of households, farms, birds and migrating salmon
- **Greater flexibility** to save water during surplus conditions for use during dry periods
- Stores water during the winter to generate **clean and renewable power** for peak summer demands
- Helps recharge **groundwater** supplies
- **Recreational opportunities** including boating, camping, fishing and hiking

California Rice
CalRice.org

NCWA
Northern California Water Association
norcalwater.org

Re-managing the Flow

The major rivers and streams of the Sacramento Valley provide essential pathways for spawning salmon and steelhead. Flow agreements to benefit these fish are on every major watercourse in the Sacramento Valley.

Trinity and **Shasta Lakes** are important sources of cold water storage. Timing the release of this cold water into the rivers is vital if spawning fish are to thrive.

Trinity Lake

Shasta Lake

Whiskeytown Reservior

Keswick Reservior

Clear Creek

In May and June, water is pulsed into Clear Creek to attract Spring-run salmon from the Sacramento River. From June through October, water released from Whiskeytown Reservoir keeps water temperatures cool.

Sacramento River Tributaries

Various flow agreements benefit spring run salmon.

Feather River

A water quality certification adopted in 2010 provides for specific flow and temperature requirements to accommodate spawning salmon and steelhead.

Lake Oroville

Sacramento River below Keswick Dam

In 1960, flow objectives were established for the protection of fish and wildlife. In 1990 and 1991 this policy was modified requiring more cold water when warmer temperatures would be harmful to fish.

Sutter Buttes

Bullards Bar Reservior

Yuba River

In 2008, the Yuba River Accord increased the streamflow requirements over previous levels, which benefits fish while insuring sufficient water supplies for irrigation and municipal uses.

Sacramento River at Wilkins Slough

The Rivers and Harbors Act of 1935 mandated a specific flow rate at Wilkins Slough be maintained. The primary goals at that time were navigation and flood control. In 1992, Congress made protection of fish and wildlife a secondary goal and this requirement was updated in 2009.

Folsom Lake

American River below Nimbus Dam

In 2000, the Flow Management Standard was developed, which established minimum flow standards to improve the conditions for fall-run Chinook salmon and steelhead. Additionally, releases are adjusted to maintain sufficiently low water temperatures for steelhead rearing in summer and Chinook spawning in the fall.

NCWA Northern California Water Association

For more details visit www.norcalwater.org/efficient-water-management/instream-flows/

To advance the economic, social and environmental sustainability of Northern California by enhancing and preserving the water rights, supplies and water quality.

Preserving our Precious Groundwater for the Future: Assessing the Sacramento Valley's Groundwater Resources

July 29, 2014

The third consecutive dry year in Northern California has illuminated the pressures on the Sacramento Valley's water resources and the challenges we face in providing reliable water supplies for various beneficial purposes in the Valley. Groundwater resources are critical, with groundwater providing nearly 30% of the region's water supplies, with this percentage greatly increasing during dry years and during sustained droughts. Recent reports and maps show that the groundwater resources in the Sacramento Valley are being actively managed and monitored (see e.g., CASGEM website at: www.water.ca.gov/groundwater/casgem/).

The preservation of Northern California's groundwater resources is critical to the economic, social and environmental fabric of the region. As part of ongoing efforts to achieve sustainability, water leaders, through the Northern California Water Association (NCWA), have made a concerted effort over the past several years to assess Sacramento Valley groundwater resources, both for groundwater levels and quality. Our objective is to help bring the region together to actively manage our water resources—both surface and groundwater—to assure sustainable water supplies for cities and rural communities, farms, fish, birds and recreation.

While we are pursuing efforts for sustainability, the Governor in his California Water Action Plan expressed his commitment to "work with the Legislature to ensure that local and regional agencies have the incentives, tools, authority and guidance to develop and enforce local and regional management plans that protect groundwater elevations, quality and surface water-groundwater interactions." There are now legislative deliberations on groundwater management in which we are fully engaged that may shape future groundwater management in the region.

The Sacramento Valley and its groundwater resources are unique. To build a strong, objective platform for sustainable management and to better prepare for the public policy discussions in Sacramento, NCWA has convened a robust series of technical reports that include:

> **Sacramento Valley Groundwater Assessment**. Macaulay Water Resources, Davids Engineering, and West Yost Associates prepared a *Sacramento Valley Groundwater Assessment*, which provides an overview of the Sacramento Valley's groundwater resources and the evolving efforts to better understand and actively manage the resources to provide sustainable benefits for the Sacramento Valley. The report provides a discussion on the historical development of land and water resources; the ongoing efforts for sustainable groundwater management; the effects of increasing use of groundwater; and recommendations for the future. Most importantly, the report summarizes long-term trends within the Sacramento Valley that affect our groundwater resources.Although groundwater levels in the Sacramento Valley have been generally consistent--draw down during dry years and then recovery in wet years--we are starting to see certain areas where groundwater levels are not recovering as they have in the past. While we cannot yet distinguish between the impacts of the ongoing drought and what may be longer-term changes to the Sacramento Valley water balance, the lack of surface supplies and the expanding and intensifying use of

groundwater in the Sacramento Valley are contributing to this dynamic. There have also been reports by the California Water Foundation that suggest subsidence may be occurring in certain parts of the Valley, particularly in areas where there are no surface supplies available.

The Sacramento Valley Groundwater Assessment and the technical supplement are available at www.norcalwater.org/efficient-water-management/groundwater-management/. The California Water Foundation report is available at: www.californiawaterfoundation.org/uploads/1397858208-SubsidenceFullReport_Final.pdf.

Groundwater Quality Assessment. CH2M HILL has developed a *Groundwater Quality Assessment Report* (GAR) for the Sacramento Valley, which will provide water resources managers and the leaders in the water quality coalitions with a current assessment of groundwater quality in the region. The GAR provides a rigorous review of regional settings of irrigated farmlands in the Sacramento River watershed, including agriculture practices, soils and hydrogeology, and existing groundwater monitoring networks and data. In this manner, the GAR serves as an initial framework that establishes the technical basis of the groundwater quality monitoring and implementation program. This report identifies areas of low and high vulnerability to water quality impacts from irrigated agriculture, and areas having data gaps that indicate the need for further evaluation. The GAR supports the Central Valley Regional Water Quality Control Board's Waste Discharge Requirements for the Long-Term Irrigated Lands Program and informs the Central Valley SALTS Basin Plan process.

The Sacramento Valley generally has high quality groundwater, although there are areas with water quality concerns that need to be addressed. The goal is to preserve these high quality groundwater resources in the Valley for future generations, while continuing to support economic and environmental uses in the Valley. The report is available at www.norcalwater.org/groundwater-quality-report/.

Together, these comprehensive reports pose the question: are we at a tipping point on the sustainability of our groundwater resources in certain parts of the Sacramento Valley? The conclusion in both reports is clear--the Sacramento Valley must improve our efforts to ensure sustainable groundwater management. We should also be collectively exploring the efforts necessary to maintain a balanced water system, including both the supply and demand parts of the equation. This will require all water users in the Sacramento Valley working together toward this common goal. It is our intent through these reports to better understand this invisible resource, to bring greater awareness to its vulnerability, to paint a picture of the real challenges we face in preserving our groundwater resources, and to provide more sophisticated tools to actively manage our water and land resources for all the beneficial purposes described above. Most importantly, we encourage the leaders in the Sacramento Valley to make a conscious and concerted effort to better understand the surface and groundwater resources in their area and to work together to assure that we have the appropriate technical, institutional and legal knowledge and tools to define and measure sustainability and support local groundwater management. We also need to work together to expand our ability to store our surface water resources, such as Sites reservoir, for critical times of need. We must assure sustainability of our water resources going forward.

We look forward to working with you in preserving our precious groundwater resources. For more information, please visit www.norcalwater.org.

Bryce Lundberg
Chair, Board of Directors

Fritz Durst
Chair, Water Management Task Force

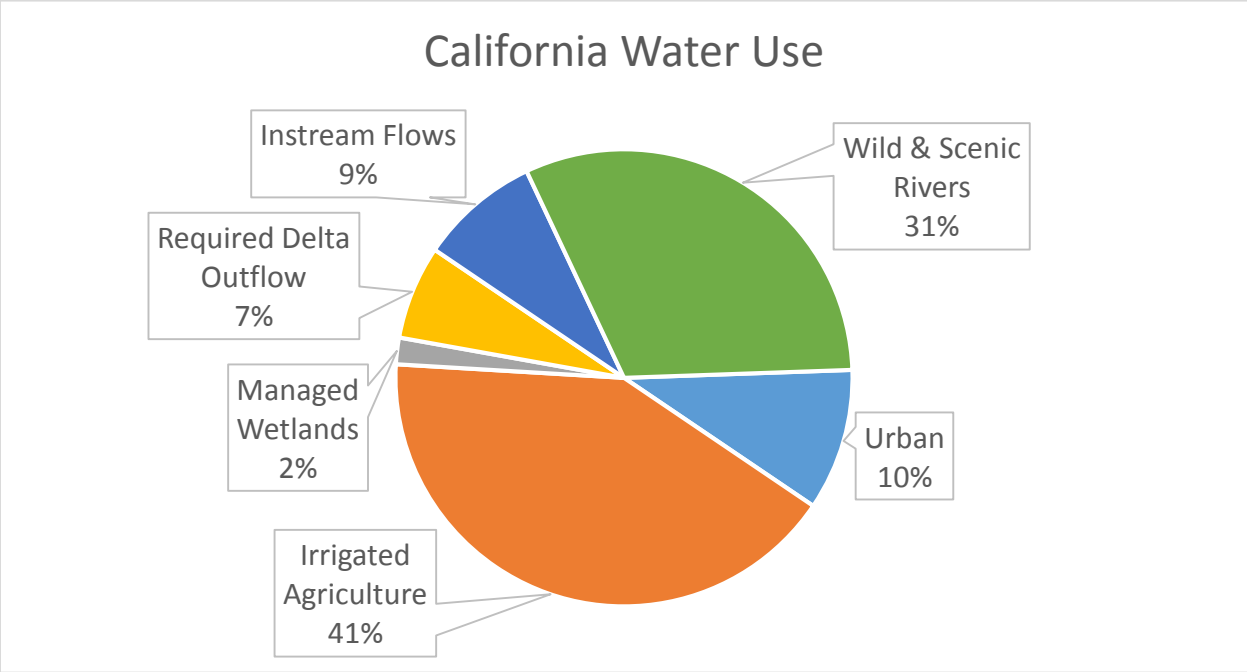
California Water Use

The Department of Water Resources' California Water Plan Update 2013, Public Review Draft contains a substantial amount of information regarding water use in the state. Chapter 3 in Volume 1 describes the many uses of water and how those uses vary in different water year types (critically dry, dry, below normal, above normal and wet).

The Water Plan has identified 2010 as the year that most closely resembles an average water year in California. The information below is from Water Year 2010 contained in Table 3.2 of the Water Plan.

In 2010, "applied water" use (water applied to provide a beneficial use) in California was approximately 79.8 million acre-feet. The "depleted water" use (water that was consumed and not available for other uses) was 58.3 million acre-feet.

Overall water use in the state was divided among beneficiaries in the following manner:



Statewide applied water uses:

Urban – 8 million acre-feet or 10% (8 maf/79.8 maf total applied water)

Irrigated agriculture – 33.1 million acre-feet, or 41%

Environmental – 38.7 million acre feet, or 49% (includes 1.5 maf for managed wetlands, 5.3 maf for required Delta outflow, 6.8 maf for instream flows, and 25.1 maf for Wild and Scenic Rivers)

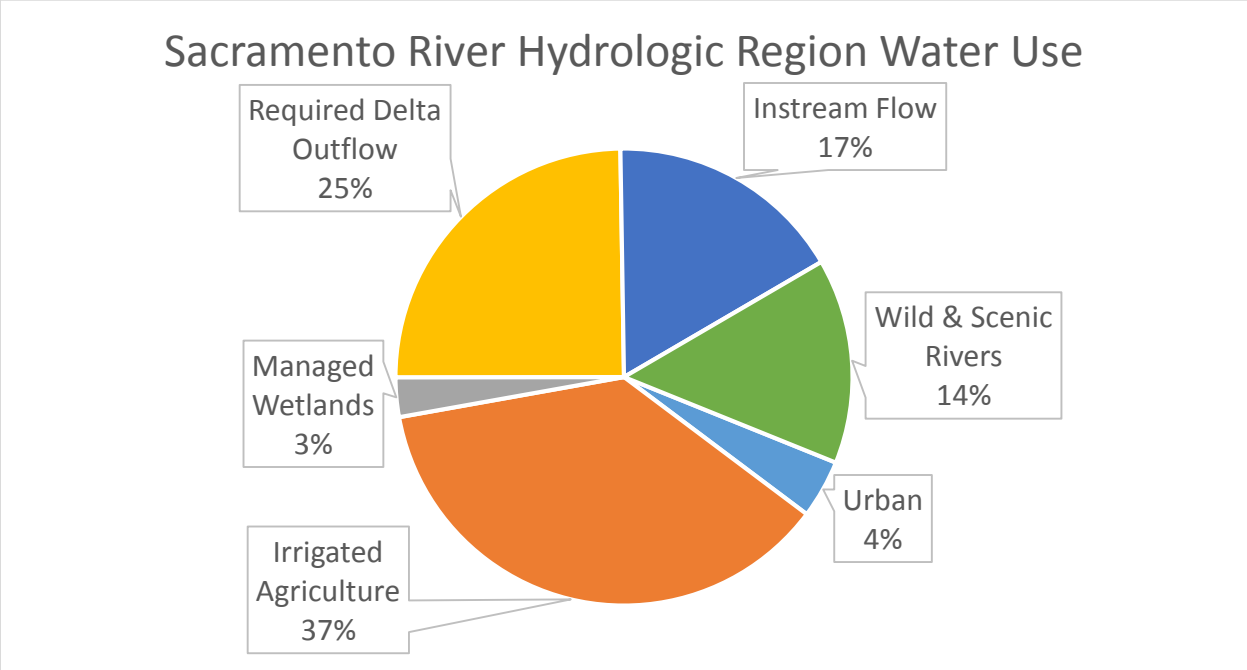
Sacramento River Hydrologic Region Water Use

Volume 2 of the California Water Plan 2013 includes water use information from the hydrologic regions in the state, including the Sacramento River Hydrologic Region.

The California Water Plan has identified 2010 as the year that most closely resembles an average water year in California. The information below is from Water Year 2010 contained in Figure SR14 of the Sacramento River Hydrologic Region chapter of Volume 2.

In 2010, "applied water" use (water applied to provide a beneficial use) in the Sacramento River Hydrologic Region was approximately 21.5 million acre-feet. The "depleted water" use (water that was consumed and not available for other uses) was 12.824 million acre-feet.

In the Sacramento River Hydrologic Region, the percentage of water dedicated to the environment is much greater than the statewide average. Overall water use in the Sacramento River Hydrologic Region was divided among beneficiaries in the following manner:



<u>Sacramento River applied water uses:</u>

<u>Urban</u> – 889,000 acre-feet, or 4% (889,000 af/21.499 maf total applied water)

<u>Irrigated Agriculture</u> – 7.942 million acre-feet, or 37%

<u>Environmental</u> – 12.668 million acre-feet, or 59% (includes 602,000 af for managed wetlands, 5.323 maf for required Delta outflow, 3.622 maf for instream flows, and 3.121 maf for Wild and Scenic Rivers)

The Drought in the Sacramento Valley
Questions and Answers

May 6, 2014

How will the drought impact the Sacramento Valley?

The economy and ecosystem will be negatively impacted.

- Despite recent rainfall, the third consecutive year of drought will mean significant surface water cutbacks, which will reduce water use by farms and wildlife refuges.
- Reduced crops will directly impact wildlife habitat, rural communities and our economy. Family farmers in the Sacramento Valley (valley) grow a wide variety of crops on two million acres, generating $10 billion in economic activity each year.
- More groundwater will be pumped to try to make up for the lack of surface water.

Less water for farms will also damage the valley ecosystem. Area rice fields, for example, supply nearly 60 percent of the food for the millions of ducks and geese that migrate through the Sacramento Valley each winter. Rice fields in the valley are recognized as providing some of the best shorebird habitat in North America. Additionally, over half of the region's wetlands (about 40,000 acres) rely on drainage water flowing through rice fields, which will now get reduced deliveries.

How will valley water be used this year?

In all areas of the valley where water is available for use this year, water has multiple uses. For example, water released from the various reservoirs will serve **triple duty:**

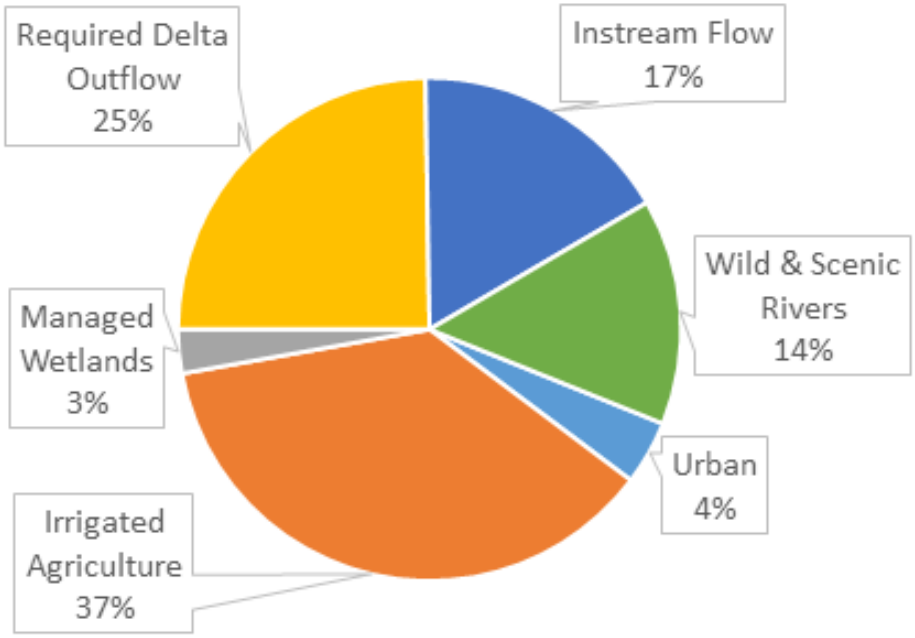
- as cold water for salmon rearing in the upper reaches;
- to grow crops in the valley; and
- to provide significant wildlife habitat for millions of birds along the Pacific Flyway.

Additionally, a significant portion of water released for salmon would also flow south to the Delta and be available for salinity control, fisheries and other water uses under State Water Board rules.

Water in the Sacramento Valley is highly valued and effectively used.

How is water used in the valley?

The valley is a highly managed water system. According to the State Department of Water Resources, farmers use 37 percent of the developed water in the Sacramento River Hydrologic Region. Four percent is used by cities and the remaining 59 percent is used for environmental purposes. In addition, the water for farms also benefits millions of birds along the Pacific Flyway - nearly 230 wildlife species in total.



Are we planning for next year if it is dry?

Yes, it is estimated that at the end of the water year (September 30, 2014) there will be 1,100,000 acre-feet of water in Lake Shasta; 1,000,000 acre-feet in Lake Oroville; and 300,000 acre-feet in Folsom Lake. As a result, the California Department of Water Resources and the federal Bureau of Reclamation have determined that these supplies are adequate for health and safety supplies for both 2014 and next year in 2015.

What is the process that guides water supplies in the valley?

California's water rights system operates to provide the most efficient and effective use of this precious resource. According to the State Water Board, "The water rights system

is designed to provide for the orderly allocation of water supplies in the event that there is not enough water to satisfy everyone's needs. When there is insufficient water for all, water diversions are allocated in order of water right priority."

As part of this system and the development of the state and federal water projects in the valley, there are various water right and supply contracts between the state and federal government and water suppliers in the valley that provide essential water supplies for farms, cities and wildlife refuges. Water rights and contracts are the foundation for water operations in California and provide the stability needed for the state and federal administrations to solve this crisis.

Is the valley dependent upon the operations of the Central Valley and State Water Projects?

Yes, areas along the Sacramento and Feather Rivers have settlement contracts with the project operators that assure water for these areas where water was served before the completion of the projects. Other areas in the valley depend upon water stored in these reservoirs. As a result, water suppliers in the valley are working closely with the project operators on their current operations plans to make sure that contracts are fully honored and the water projects are operated for multiple benefits in the valley, as described above.

Are the water supplies in the valley in balance? If not, what can be done to help with the valley's water supplies?

This year has shown that there simply is not enough water for all beneficial purposes in the valley. Additional water storage is a necessity to avoid similar impacts during future dry years. This includes exploring increased storage at existing reservoirs during dry periods and new off-stream storage through the Sites Reservoir. (See: www.sitesjpa.net/index.php).

What are the flooded fields I see in the valley?

Those fields are growing rice. Ninety-seven percent of the California rice crop is grown in the Sacramento Valley. From above the fields may look like lakes, but in reality the water depth is only five inches.

There has been steady progress in getting the most out of every drop of water used to farm rice. For example, improved varieties grown in heavy clay soils combined with precision leveling of fields has made rice a much more water-efficient crop.

Will any cities or rural communities in the valley be without drinking water this year?

At this time it does not appear that any communities in the valley will be without drinking water. Local officials will continue to monitor groundwater throughout the region and will be prepared in the event groundwater supplies are not available.

Are water resources managers planning for future years if this year is dry?

Yes, the valley is focused on making water available this year for all the beneficial purposes described above, while making sure that there is water storage for next year if the dry spell continues.

How do water officials in the Sacramento Valley work with the rest of the state?

Water officials in the valley have partnered with state and federal agencies, conservation organizations and water suppliers in other parts of the state to creatively provide water for cities and rural communities, farms, fish, birds and recreation in the valley, while also helping provide water to other regions that are suffering shortages.

Where do we go for more information?

You can go to www.norcalwater.org or www.CalRice.org, or call us at (916) 442-8333 or (916) 387-2264.

OPINION

The evolving value of Shasta Dam

DAVID J. GUY

SPEAK YOUR PIECE

Shasta Dam is one of our country's great public works projects. Both the dam and the resulting Lake Shasta have cast an indelible imprint on Northern California for the past 75 years, where they stand as an important interface between the natural and human environment. The anniversary this week commemorating the 1938 groundbreaking provides a moment to reflect on Shasta Dam, the role that surface storage serves today in California, and how these facilities have shaped the landscape in Northern California.

California is a semi-arid state with 38 million people and both droughts and floods. The first part of 2013 was the driest on record and California benefitted from carry-over storage in reservoirs that are now being slowly depleted, as you can see when visiting Lake Shasta. Without access to this increment of surface storage, California would already be suffering from water shortages.

The water supplies in Lake Shasta, as the keystone for the Central Valley Project, are managed for the benefit of the Sacramento Valley, which joins together a world-renowned mosaic of natural abundance: productive farmlands, wildlife refuges and managed wetlands, cities and rural communities, and meandering rivers that support and feed fisheries and natural habitats.

Water suppliers along the Sacramento River — including Redding, Sacramento, nearly a million acres of farms, and the National Wildlife Refuges — have priority for water. Additionally, areas in Shasta County and farms along the entire west side of the Sacramento Valley, from Corning to Dunnigan, receive water from Lake Shasta. Water supplies also benefit the San Francisco Bay Area and the San Joaquin Valley.

At the other extreme, during the wet spring two years ago Lake Shasta released water through its spillways to drop the lake level and provide flood control downstream. Lake Shasta is a critical part of the Central Valley Flood Protection Plan. By retaining flood flows on California's largest river with the largest reservoir, the project provides public safety and has reduced damage to property. Lake Shasta, in tandem with other reservoirs and an ingenious system of bypasses and levees, regulates ravaging flows and then releases water through the valley, avoiding impacts to rural and urban areas, including Sacramento, which simply would not exist today as we know it without Shasta Dam.

Nestled in between the fluctuating and sometimes conflicting management for floods and water supplies is the amazing recreational opportunities provided by Lake Shasta. Can you imagine the Redding area without Lake Shasta or these nearby recreational opportunities?

To be sure, Shasta Dam impeded salmon runs to upper reaches of the system and it has affected natural wetlands and early communities in the Sacramento Valley. The public values in our water system have evolved from the Great Depression to now, and they continue to evolve.

Today, the leaders in the Sacramento Valley are on the leading edge of ecological and economic sustainability — they recognize and champion both migrating salmon and birds. Water from the Sacramento River has been one of the key elements in the surrogate wetlands (ricelands and refuges) that are supporting tremendous increases in bird numbers. For salmon, the major water diversions have screens or siphons that keep fish safe in the river and cold water flows are timed to provide optimal habitat.

Yet the region continues to learn and improve. Water resources managers are continually exploring innovative new ways to optimize the Central Valley Project and Lake Shasta for all these beneficial purposes within the region. Nourishment and sustenance from the fields, habitats for fish and wildlife, recreation and a special quality of life — the Sacramento Valley is home to all of this, and more.

The challenge for this and future generations will be to improve the region's economic, environmental and social fabric within the context of a growing population and a highly managed water system that includes Lake Shasta. It will be important that Sacramento Valley residents help policy-makers understand what's at stake and the importance of managing Lake Shasta for regional sustainability of its water resources. California's regulatory system will also need to evolve to help assure reliable and affordable water for all these beneficial purposes within the region.

Like most great public works projects, the management of Lake Shasta will continue to evolve for the next 75 years to reflect new and changing values in our society.

Congratulations to the people in Northern California on this special occasion!

David J. Guy is the president of the Northern California Water Association, where he represents water suppliers and local governments throughout the Sacramento Valley in their integrated efforts to provide water for farms, fish, birds, cities and rural communities, and recreation. The NCWA website is at www.norcalwater.org and David blogs at www.waterfoodandtheenvironment.com.