



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

Preparing for Drought in the Sacramento Valley August, 2013

The Northern California Water Association (NCWA) and its members manage surface and groundwater supplies in the Sacramento Valley--the northern part of the Great Central Valley. The region is blessed with natural resources and good quality water supplies that support a rich mosaic of inter-dependent farmlands, rural communities and cities, habitat for birds and migrating waterfowl along the Pacific Flyway (including wildlife refuges, ricelands and managed wetlands), spawning grounds for numerous salmon and steelhead, and recreational opportunities.

Droughts are an increasingly challenging part of water management in California and droughts have a significant effect on the Sacramento Valley. As part of our ongoing efforts to prepare for dry conditions, the NCWA Board of Directors and water resource managers throughout the region convened earlier this year on January 30 in Richvale to discuss how the Sacramento Valley can better prepare for the next drought. (See [drought assessment planning](#).) NCWA also has a Water Management Task Force that brings together water leaders throughout the Sacramento Valley to advance active water management in the region to assure more reliable water supplies during dry periods. These discussions have led to a heightened awareness in the Sacramento Valley about the need to better prepare for future dry conditions, including climate change scenarios that could lead to more extreme dry periods. The themes and recommendations that follow were informed by these meetings and the vigorous discussions that have taken place in board rooms across the region.

This document will first provide a historical perspective on drought in the Sacramento Valley, which is instructive on how to better prepare in the future. This will be followed by a general description of how the Sacramento Valley has been impacted by droughts, how it has responded to these droughts, and how water resources managers are planning for future dry conditions. Finally, we provide a set of policy recommendations that we believe will assist state and federal agencies, working with Sacramento Valley water resources managers, better prepare for the next drought.

I. A Historical Perspective on Drought and the Sacramento Valley

The Sacramento Valley is challenged by both ravaging floods and droughts, which have had a significant impact on the Valley and its inhabitants. For purposes of this discussion, we consider drought as a prolonged period of dryness or a chronic shortage of water. Historically, the droughts correspond to critical water years as defined by the Department of Water Resources in its "Sacramento Valley Water Year Hydrologic Classification." To

put this in perspective, since 1906, there have been 14 critical years in the Sacramento Valley, including four of the six years from 1929 through 1934, both 1976-77, and five of the seven years between 1988 and 1994 (see attached graphs). The two most recent of these periods are illustrative to understand how the Sacramento Valley responds to different drought scenarios.

The 1976-77 drought was the sharpest on record. The flows in rivers and streams were low and affected the ability to divert water throughout the region; several water districts in the Sacramento Valley did not deliver any water to their landowners; Central Valley Project (CVP) water service contracts were reduced to 25% of contract supplies; CVP water right settlement contracts were reduced to 75%; CVP urban contractors were reduced to 50%; and State Water Project (SWP) exchange contracts were reduced to 50%.

The 1988-1994 drought was the most prolonged drought in recent history and led to major water policy changes in California. In the Sacramento Valley, stream flows and surface water supplies were reduced significantly across the Valley. As an example, the CVP water service contracts along the west side of the Sacramento Valley were reduced to 25% in 1991 and 1992, and 35% in 1994; CVP water right settlement contracts along the river were reduced to 75% in 1991, 1992, and 1994; and SWP exchange contracts were reduced by 50% in 1991 and 1992. During this time, CVP urban contractors received between 50% and 75% of their supply or historical use.

As a result of the 1988-1994 drought and 23 counties declaring drought emergencies, Governor Wilson in 1991 (in the third year of a seven year drought) created the Drought Water Bank and the Department of Water Resources (DWR) purchased 821,045 acre-feet of water in the Sacramento Valley. In 1991, water in the Sacramento Valley was made available by substituting groundwater for surface water and by both crop idling and shifting. In the next year, 1992, only groundwater substitution was pursued for this program. Although the Drought Water Bank served its purpose and avoided a water crisis in California, it was hampered by unclear processes that created tremendous fear and acrimony in the Sacramento Valley. This led to numerous local measures, such as county groundwater export ordinances, that are deeply imbedded in the Northern California culture and landscape today. Additionally, the Legislature and DWR also developed additional rules for water transfers. Perhaps most importantly, water resources managers in the region advanced various new water management tools to better understand and manage our precious water resources, including monitoring, modeling, basin management objectives, and other planning tools.

In 2000, Governor Gray Davis convened a drought panel and appointed several representatives from Northern California to serve on the panel, including at the time: NCWA Chair Don Bransford, Butte County Supervisor Jane Dolan and Yuba County Supervisor Brent Hastey. The panel made several important recommendations to the Governor on how to prepare for the next drought, including a 1) Critical Water Shortage Reduction Marketing Program; 2) Assistance to Small Water Systems and Homeowners in Rural Communities; 3) Local Agency Groundwater Programs; 4) Local Agency Integrated Water Management Plans; 5) Drought-Related Research and Public Outreach Activities and 6) Accelerate Funding Assistance to Local Agencies. In July 2000 the Governor issued

Preparing for California's Next Drought. Several of these measures have been implemented and provide a framework for drought preparation today. In 2008 and 2009, CVP water service contracts along the west side of the Sacramento Valley were reduced to 40% and CVP urban contractors were reduced to 75% in 2008. Governor Schwarzenegger issued Executive Orders and drought proclamations for most of the San Joaquin Valley—the southern part of the Central Valley. This led to DWR developing the [*California Drought Contingency Plan*](#) in November 2010. The purpose of the *California Drought Contingency Plan* is to articulate a coordinated State government strategy for preparing, responding to, and recovering from drought. This included a 2009 Drought Water Bank. In 2012, DWR also prepared a *Climate Change Handbook*.

II. A Snapshot: How is the Sacramento Valley Impacted during Drought?

During the previous droughts, Sacramento Valley water supplies were generally affected in the following manner:

- Surface water supplies are significantly reduced for use in certain parts of the Sacramento Valley based on contract limitations, water rights priorities, conditions in SWRCB orders (i.e., Term 91), and decrees. Both surface storage and direct diversions are limited. This, in turn, reduces surface water use in these areas, which also reduces percolation and recharge to groundwater aquifers during these times.
- Groundwater pumping is significantly increased for all uses. For example, in 1977 more than 900 groundwater wells were developed in the five northern counties in the Sacramento Valley. This more than doubled the number of wells in this area. For context, when the availability of surface supplies are reduced, landowners generally increase groundwater pumping in areas where groundwater resources are available. Additionally, as the surface supplies tighten, less return flows are available for downstream use, which also increases groundwater pumping in these areas. It is also important to recognize that the groundwater aquifers are more sustainable during drought as a result of surface supplies and the availability and use of surface water in non-drought years, rather than the groundwater pumping that would occur otherwise. Conjunctive water management by water suppliers throughout the region has helped stabilize many groundwater basins in the region, which otherwise would be further depleted. Importantly, increased groundwater use is for beneficial purposes in the Sacramento Valley.
- Small water systems and individuals relying on less reliable groundwater resources (i.e., foothill areas with fractured rock aquifers) feel the first impact from droughts and they have limited options to meet water supply needs. DWR and rural counties have focused on this as part of its drought planning efforts.
- Water storage is depleted. The Sacramento Valley, as a managed water system, depends upon carryover storage from previous years to provide essential water supplies for all beneficial purposes within the Valley, including farms, cold water for fisheries, cities and rural communities, birds and recreation. The importance of surface storage becomes acute in dry years.

- Less water is generally available in the system so in-stream flows are reduced and the associated habitat for fish and other aquatic species may be impacted.

III. How Does the Sacramento Valley Respond to Drought

The primary response to drought in the Sacramento Valley is groundwater pumping by landowners. Importantly, when land does not have access to surface supplies or surface water is deemed too expensive or unsuitable for irrigation practices, landowners will pump groundwater resources.

For surface supplies, local agencies prepare and implement contingency plans and conservation measures that internally allocate water and help contain costs for landowners and water users during shortages. Each agency is unique in the way they approach dry periods based on their water rights, contracts and the hydrology in the area. The following are the types of actions the various water management agencies implement in the Sacramento Valley:

- Neighbor to neighbor water transfers or exchanges to help meet demands in certain areas. These arrangements primarily occur within districts, but districts also pursue creative transfers with neighboring districts. For example, many farmers redirect their overall water supplies to a certain portion of their lands to make sure water is available for permanent plantings.
- Internal management opportunities to maximize their supplies by recapturing or recycling surface water leaving their property or facilities. This, in turn, may degrade water quality and reduce water supplies for downstream water users, both inside and outside the specific district.
- Assisting landowners in their efforts to shift crops or other plantings that require less water or can avoid irrigation.

IV. Looking to the Future

As water resources managers and their consultants plan for future droughts, there are several important elements that will be considered:

A. The Changing Landscape in the Sacramento Valley

The Sacramento Valley is a dynamic region and it continues to evolve in ways that affect water use and management in the region. Many of these changes have become more visible and place pressure on the region during dry periods.

- The Sacramento Valley population continues to increase, with people generally relying upon additional groundwater use for their domestic water supplies.
- The Sacramento Valley, like the rest of the Central Valley, has seen a significant increase in irrigated acreage and permanent plantings (i.e., trees). These factors result in additional demand and reduced elasticity with respect to water supplies

during all years. Groundwater is pumped to support most of these new plantings and demand, which has led to greater pressure on the groundwater resources, particularly during drought. New irrigation technology has also changed the way water is applied, which has affected the recharge of groundwater resources. Additionally, permanent crops may also require water earlier in the year for frost protection and late in the season to maintain soil moisture until fall rains.

- In pursuit of the Central Valley Joint Venture water supply plan, the wildlife refuges and managed wetlands are utilizing more water throughout the year, including fall water for rice straw decomposition and the related waterfowl habitat. Most of this water is conveyed to these lands by water agencies as part of their integrated operations.
- Urban areas, including the Cities of Davis and Woodland and the East Bay Municipal Utility District, will utilize surface water supplies from the Sacramento River.
- Additional regulatory requirements have reduced the amount of water available for use within the Sacramento Valley and the State. This includes SWRCB decisions, the Central Valley Project Improvement Act (CVPIA), Federal Energy Regulatory Commission (FERC) requirements and other regulatory actions. (See [Retrospective Analysis](#).)

B. External Pressures that Affect the Sacramento Valley during Drought

The leaders in the Sacramento Valley are cognizant of the challenges facing the rest of the state during drought and are aware that much of California has and will continue to look to Sacramento Valley water supplies during drought conditions. California's population is expected to cross the 50 million mark in 2049 and grow to nearly 52.7 million by 2060, according to recent population projections by the California Department of Finance. The 2060 population will be 39 percent higher than the state's most recent 2012 population estimate.

The demand for water is hardening in many other parts of the state, including water for the increasing population, the industry to support this population and many permanent plantings that need water every year. The reliance in California on the SWP and the CVP, which have their major facilities located within the Sacramento Valley (i.e., Lakes Oroville, Shasta and Folsom), is tested and heightened during a drought as the economic forces to the south and in the Bay Area seek additional water supplies. To better prepare for this pressure, NCWA and water interests throughout the region have been working with the state and federal agencies and water suppliers in other parts of the state. This includes opportunities for re-operating facilities, forbearance agreements and water transfers. These efforts will help meet water demands in other parts of the state, but only if water uses in the Sacramento Valley are met and the water rights and contracts are fully honored and protected.

C. Active Water Management: Sustainability in the Sacramento Valley

NCWA and water resources managers throughout the Sacramento Valley are committed to advance the economic, social, and environmental sustainability of the Sacramento Valley by enhancing and preserving its water rights, supplies, and water quality. This is particularly important during dry periods. These water resources managers are actively managing the region's precious water resources to support the rich mosaic of inter-dependent farmlands, habitat for birds and migrating waterfowl along the Pacific Flyway (including wildlife refuges, ricelands and managed wetlands), meandering rivers that support fisheries, wildlife, and recreation, and the cities and rural communities sprinkled throughout the region. The overarching goal is to continually improve water management as a means of achieving regional sustainability with respect to water resources in the region. Importantly, the ongoing sustainability initiative in the Sacramento Valley advances the state policy "to improve regional self-reliance for water through investment in water use efficiency, water recycling, advanced water technologies, local and regional water supply projects and improved regional coordination of local and regional water supply efforts." (Water Code §85021.)

To facilitate and coordinate these efforts in the Sacramento Valley, NCWA has convened a Water Management Task Force to bring leaders throughout the region together to think about new water management opportunities and to engage thought-leaders from throughout the state to assist in this process. To better understand and portray the Sacramento River watershed—the Water Management Task Force commissioned a technical report articulating [*Efficient Water Management for Regional Sustainability in the Sacramento Valley*](#). The technical report, which brought together a team of water management experts, provides a sophisticated foundation to initiate the process to evaluate improved water management opportunities in the Sacramento Valley and the trade-offs that will need to be considered in making future management decisions in this region. The report articulates a framework for addressing water use efficiency in the Sacramento Valley (given the Valley's unique hydrologic characteristics and existing condition), establishes a basis for assessing and identifying water use efficiency improvements, and provides a basis for constructive dialogue. The report builds upon decades of continually improving water use efficiency in the Sacramento Valley at the farm, refuge, district, and basin level. Importantly, the report is part of our ongoing effort to seek broad input and rigorous discourse on water management in the Sacramento Valley and to continually improve our understanding and efforts to actively manage water resources in the region. For purposes of drought planning, the report provides the context in which water resources managers are actively making water management decisions in the Sacramento Valley.

V. A Policy Framework to Assist the Sacramento Valley during Drought

As California prepares for the next drought, we believe that the following provides a policy framework for state and federal agencies to partner and cooperate with Sacramento Valley interests. This, in turn, will help better prepare the Sacramento Valley and the State of California for the next drought.

- 1) *Ensure System Stability.* As previously discussed, the ability to utilize surface supplies during drought is critical to all of the beneficial purposes in the Sacramento Valley. Any drought program must adhere strictly to California's water rights priority system and must also adhere strictly to the contracts and commitments and policies articulated in state and federal law regarding the areas and watersheds of origin. The ability to protect water rights and the ability to utilize and manage water for all uses during drought is essential to the Sacramento Valley. Federal and state agencies should help stabilize the water system in California and they should refrain from simply relying on the reallocation of existing supplies to address water supply shortages in other parts of the state.
- 2) *Promote Sustainable Local Groundwater Management and Conjunctive Management.* As this document highlights, the region's groundwater resources are critical during dry periods. Having sustainable groundwater resources is critical to the long-term viability of the region's economic prosperity and environmental well-being. The protection of the groundwater resources can best be accomplished through the implementation of local groundwater management plans and through the regional coordination of these resources. As an example, DWR's local assistance program (i.e., AB 303 program) has been very helpful to local entities in developing, refining and implementing groundwater management plans and projects. The various Integrated Regional Water Management Plans (IRWMPs) have also served a valuable role in coordination. The continuation of these efforts and the further empowerment of local entities to actively manage groundwater is important to prepare for the next drought.
- 3) *Recognize the Value of Surface Storage.* The value of surface storage becomes very acute during drought when the increment of stored water is critical to meet the various purposes throughout the Sacramento Valley and the State of California. This, coupled with new challenges posed by climate change, highlight the importance of surface storage and strongly suggests that additional storage must be part of a long-term strategy to provide water and food security for California. The state and federal agencies should promote opportunities to maximize the use of existing storage (i.e., reoperation) and work with local joint powers authorities to conclude the ongoing storage investigations, such as Sites Reservoir, and move forward with the necessary efforts to more effectively manage water supplies in California.
- 4) *Better Coordinate Project Operations.* With the cornerstone facilities in the Sacramento Valley, we encourage the operators of the CVP and the SWP to better plan and coordinate their operations in tandem with water resources managers in the Sacramento Valley to help meet the various beneficial water demands within the Sacramento Valley, as well as project deliveries outside the region.
- 5) *Invest in Upstream Infrastructure.* In addition to honoring area of origin protections, a mechanism (including funding when appropriate) is necessary for local water agencies to access the water supplies in the region. This includes new infrastructure and upgrading existing infrastructure for current and future uses of water for farms, wildlife refuges and other managed wetlands, and cities and towns. This ability to deliver water for these various purposes is particularly important during drought.

- 6) *Facilitate Sound Water Transfers.* Water transfers can provide improved reliability, local and regional operational flexibility, and environmental benefits. Intra-basin water transfers, sometimes referred to as neighbor to neighbor water transfers, are critical for the region to meet its water supply needs during dry periods. Additionally, during a drought, strategic water transfers outside the region on a temporary basis are important to protect water rights and can help meet water demands in other parts of the state, while reducing regulatory pressure on the region. Federal and state agencies should facilitate these efforts through the establishment of appropriate policies and rules before the next drought.
- 7) *Consider Regulatory Policies that Reflect Drought Conditions.* California’s regulatory policies do not always reflect dry conditions in California and the actions that are necessary to manage water supplies for various beneficial purposes. It is important that state and federal agencies incorporate drought planning in their regulatory processes and they fully understand the implications of such policies during drought conditions.
- 8) *Implement Cost-Containment Policies.* The ability to access surface supplies in an affordable manner is critical during drought when less water is available for use. With respect to CVP water supplies, it is important that the Bureau of Reclamation implement cost-containment measures, including a process that reduces discretionary expenditures that are passed on to contractors during these conditions.
- 9) *Recognize Energy Issues Related to Drought.* A sound state policy to prepare for drought must look beyond the pure hydrologic issues and consider related issues, such as the availability and cost of energy related to water. This relationship will be particularly important during droughts.

VI. What’s at Stake!

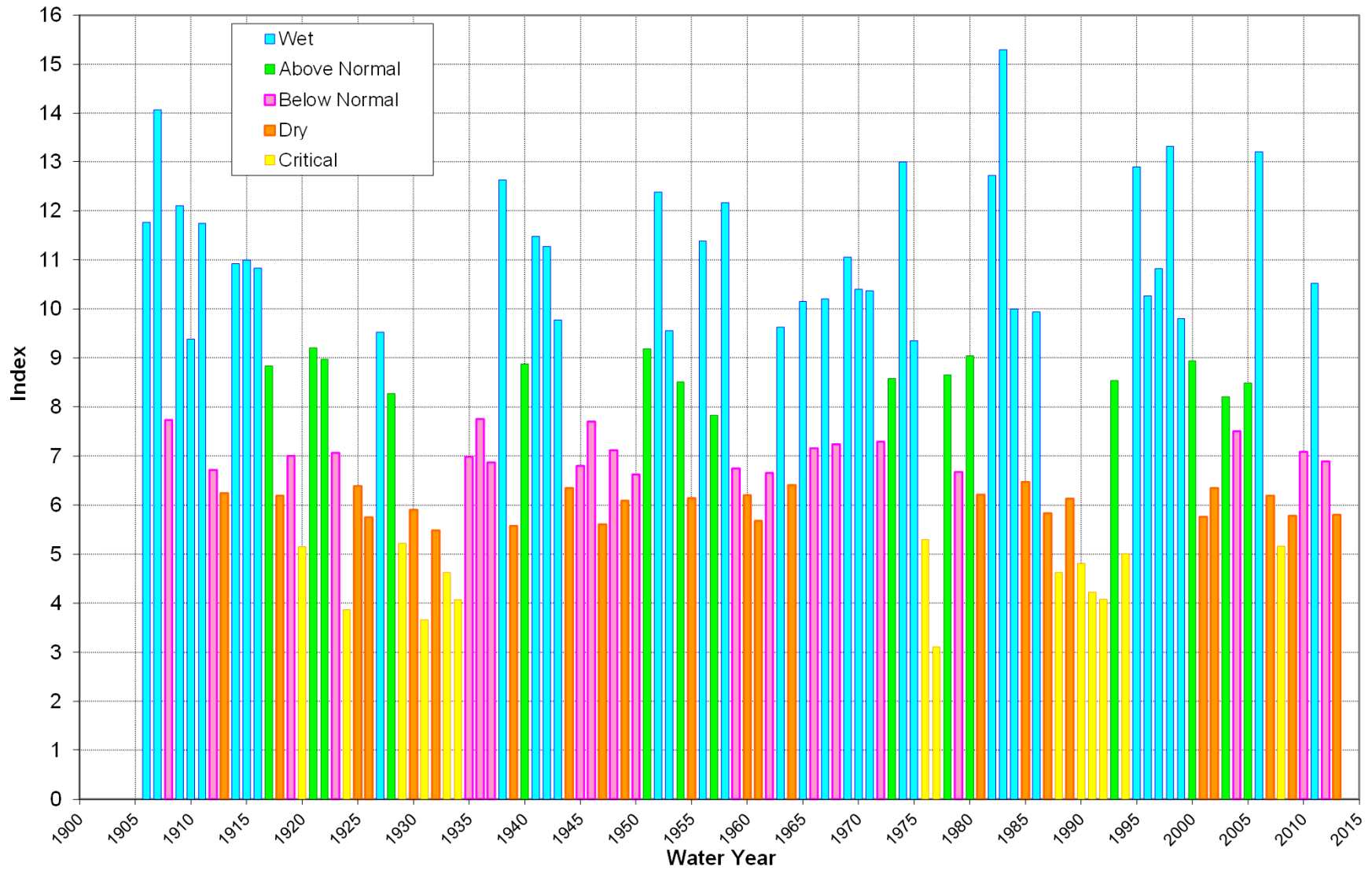
The Sacramento Valley is “on the leading edge of ecological and economical sustainability, it’s also an *exceptional* place to live, work and raise a family. The Sacramento Valley joins together a world-renowned mosaic of natural abundance: productive farmlands, wildlife refuges and managed wetlands, 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.”

These words capture and embrace the Sacramento Valley and are a reminder about [*What’s at Stake*](#) in the ongoing efforts to provide water for this special region, particularly during dry periods.

NCWA and water resources managers in the region are committed to the continuous improvement of water management in the region, with an eye to provide water for the various beneficial purposes during dry periods. We welcome any thoughts as we prepare for drought. Please call with any questions or thoughts at 916.442.8333.

Sacramento Valley Water Year Type Index (40-30-30) 1906 - 2013

Based on Observed Unimpaired Runoff

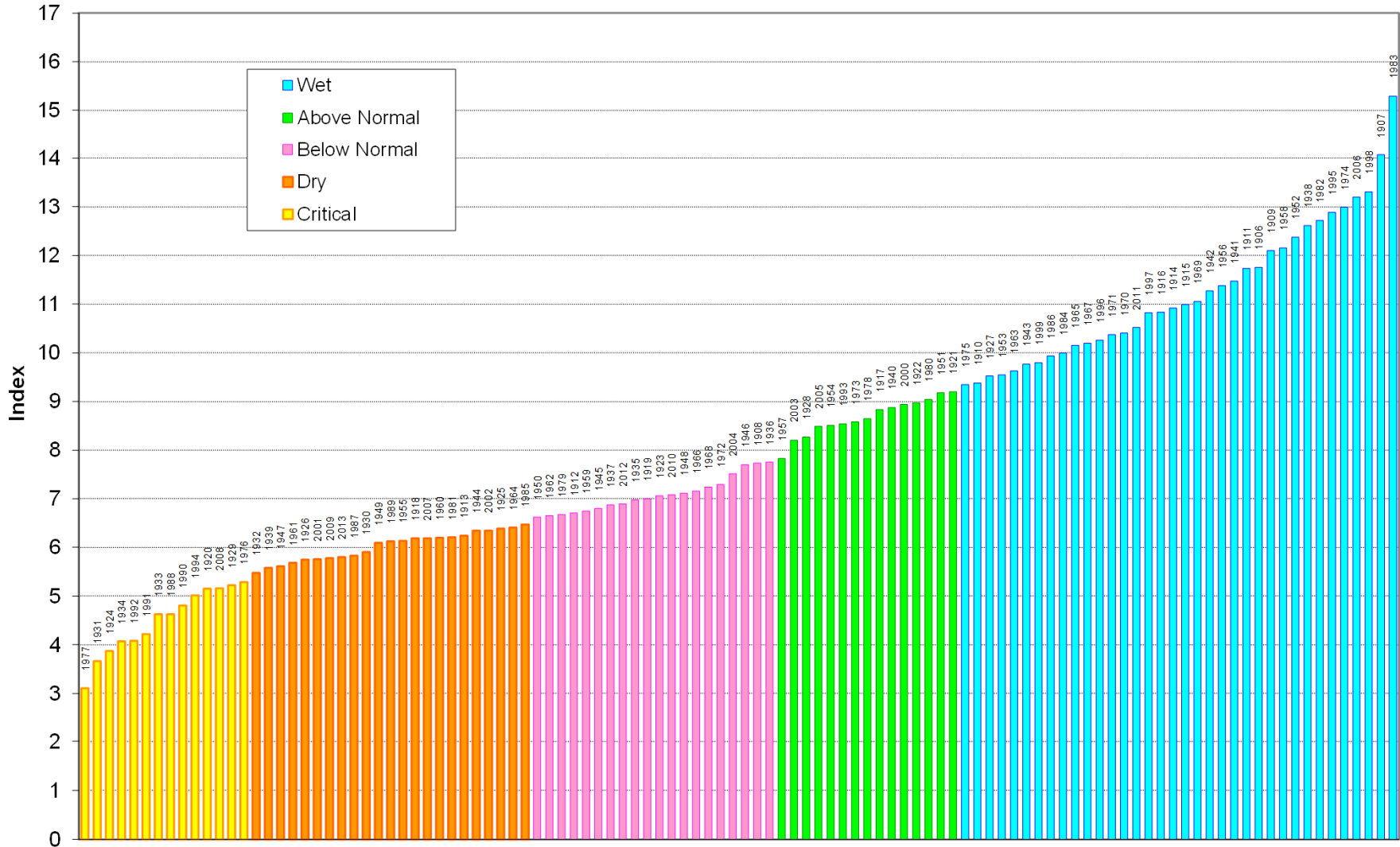


Note: The 2013 Water Supply Index is based on the May 1, 2013 Bulletin 120 forecast.



Sacramento Valley Year Type Index (40-30-30) 1906-2013 Sorted

Based on Observed Unimpaired Runoff



Note: The 2013 Water Supply Index is based on the May 1, 2013 Bulletin 120 forecast.

