

# **Recommendations for Variance for Significant Populations of Horses and Other Livestock, Methods of Calculation, and Supporting Data Requirements**

**WUES-DWR-2021-07**

**A Report to the State Water Resources Control Board  
Prepared Pursuant to California Water Code  
Section 10609.14**

**September 2022**



California Department of Water Resources  
Water Use Efficiency Branch

Note: This report is part of the package of reports developed by the California Department of Water Resources to meet the requirements of Senate Bill 606 and Assembly Bill 1668 of 2018 for urban water use efficiency.

State of California  
**Gavin Newsom, Governor**

California Natural Resources Agency  
**Wade Crowfoot, Secretary for Natural Resources**  
**Saul Gomez, Undersecretary**  
**Andrea Ambriz, Deputy Secretary for External Affairs**

California Department of Water Resources  
**Karla A. Nemeth, Director**  
**Cindy Messer, Lead Deputy Director**

**Deputy Directors**

Business Operations  
**Stephanie Varrelman**

Climate Resilience  
**John Andrew**

Flood Management and Dam  
Safety  
**Gary Lippner**

Integrated Watershed  
Management  
**Kristopher A. Tjernell**

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State Water Project  
**Ted Craddock**

Statewide Water and Energy  
*Vacant Position*

Sustainable Groundwater  
Management  
**Paul Gosselin**

Legislative Affairs  
**Kasey Schimke**

Public Affairs  
**Margaret Mohr**

**Office Executives**

Office of General  
Counsel  
**Thomas R. Gibson**

Government and  
Community Liaison  
**Anecita Agustinez**

Internal Audit Office  
**David Whitsell**

Office of Workforce Equality  
**Tiffany Vital**

**Division of Regional Assistance**

Arthur Hinojosa, Manager

**Water Use Efficiency Branch**

Ryan Bailey, Manager

*Peter Brostrom (in memoriam)<sup>1</sup>*

**Recommendations for Variance for Significant Populations of Horses and Other  
Livestock, Methods of Calculation, and Supporting Data Requirements Project  
Team**

***California Department of Water Resources***

**Water Use Efficiency Branch**

Sabrina Cook

Shem Stygar

**Division of Planning**

Manucher Alemi, Policy Advisor

**Division of Regional Assistance**

Matthew Bates, Assistant Manager

Diana S. Brooks, Policy Advisor

**Integrated Watershed Management**

Teji Sandhu, Policy Advisor to the Deputy Director

Andria Avila, Executive Assistant to the Deputy Director

**Special Restoration Initiatives Branch**

James Campagna, Office Technician

---

<sup>1</sup> Peter Brostrom served as the California Department of Water Resources Water Use Efficiency Branch Manager through October 29, 2020, and he was instrumental in assembling the stakeholder working groups and study design.

## **Water Use Studies Working Group Members**

### ***Arcadis***

Greg Imamura

### ***California American Water***

Patrick Pilz

### ***City of Sacramento***

William Granger

### ***County of Napa***

Christopher M. Silke

### ***Ecolab***

Mark Muellner

### ***Kennedy Jenks Consultants***

Meredith Clement

### ***Los Angeles Department of Water and Power***

Terrence McCarthy

### ***Municipal Water District of Orange County***

Rachel Waite

### ***Niemela Pappas & Associates***

Tiffany Phan

### ***Plumbing Manufacturers International***

Cambria McLeod

### ***Private Citizen***

Martha Davis

### ***San Francisco Public Utilities Commission***

Julie Ortiz

### ***Santa Clarita Valley Water Agency***

Matthew S. Dickens

### ***South Tahoe Public Utility District***

Shelly Thomsen

### ***Valley County Water District***

Tara Robinson

### ***Walnut Valley Water District***

Donna DiLaura

### ***Association of California Water Agencies***

Dave Bolland

### ***Camrosa Water District***

Charlotte Lopez

### ***Coachella Valley Water District***

Jason Lucas

### ***Eastern Municipal Water District***

Sara Quintero

### ***Irvine Ranch Water District***

Amy McNulty

### ***Long Beach Water Department***

Dean Wang

### ***Moulton Niguel Water District***

Justin Finch

### ***Natural Resources Defense Council***

Tracy Quinn

### ***Pacific Institute***

Heather Cooley

### ***Rancho California Water District***

Jason Martin

### ***Sacramento Suburban Water District***

Greg Bundesen

### ***San Jose Water***

Courtney Rubin

### ***Sonoma-Marin Saving Water Partnership***

Chelsea Thompson

### ***Stanford University***

Newsha Ajami

### ***Valley Water***

Metra Richert

### ***WateReuse CA***

Charles LaSalle

**WaterNow Alliance**

Caroline Koch

**Western Municipal Water District**

Jason Pivovaroff

**West Yost Associates**

Elizabeth Drayer

**Standards, Methodologies, and Performance Measures Working Group Members**

**Alameda County Water District**

Stephanie Nevins

**Bay Area Water Supply and  
Conservation Agency**

Andree Johnson

**City of Glendale**

Michael De Ghetto

**City of Petaluma**

Chelsea Thompson

**City of Sacramento**

Roshini Das

**Coachella Valley Water District**

Katie Evans

**Delta Stewardship Council**

Cory Copeland

**Ecolab**

Mark Muellner

**Gardenworks Inc.**

Peter Estournes

**Los Angeles Department of Water and  
Power**

Sofia Marcus

**Mission Springs Water District**

John M. Soulliere

**Olivenhain Municipal Water District**

Brian Sodeman

**Plumbing Manufacturers International**

Cambria McLeod

**Regional Water Authority**

Amy Talbot

**Association of California Water  
Agencies**

Dave Bolland

**California Water Service**

Ken Jenkins

**City of Lakewood**

Toyasha Sebbag

**City of Pleasanton**

Rita Di Candia

**City of Santa Monica**

Russell Ackerman

**Contra Costa Water District**

Bob Eagle

**East Bay Municipal Utility District**

Alice Towey

**EKI Environment & Water, Inc.**

Kat Wuelfing

**Irvine Ranch Water District**

Fiona Sanchez

**Metropolitan Water District**

Krista Guerrero

**Natural Resources Defense Council**

Tracy Quinn

**Pacific Institute**

Heather Cooley

**Rancho California Water District**

Tyson Heine

**San Diego County Water Authority**

Elizabeth Lovsted

**San Jose Water**  
Kurt Elvert

**Santa Clara Valley Water District,  
Pajaro River Watershed**  
Samantha Greene

**Stanford University**  
Newsha Ajami

**Water Systems Optimization**  
Kate Gasner

**Western Municipal Water District**  
Karly Gaynor

**Other Entities Providing Significant Resources and Information**

Rancho California Water District, Justin Haessly and Jason Martin  
San Juan Water District, Lisa Brown  
University of California, Davis, James W. Oltjen

**Technical Consultants**

***Stantec Consulting Services Inc.***

Yung-Hsin Sun  
Jillian Young  
Vanessa Nishikawa  
Maliheh Karamigolbaghi  
Samuel Price

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## Abbreviations and Acronyms

2018 Legislation	2018 Legislation on Water Conservation and Drought Planning (Senate Bill 606 [Hertzberg] and Assembly Bill 1668 [Friedman], as amended)
CFR	United States Code of Federal Regulations
CII	commercial, industrial, and institutional
CII-DIMWUS	Commercial, Industrial, and Institutional Outdoor Irrigation of Landscape Areas with Dedicated Irrigation Meters Water Use Efficiency Standard
DIM	dedicated irrigation meter
DM	dedicated meter
DWR	California Department of Water Resources
IRWUS	Indoor Residential Water Use Efficiency Standard
lb	pound
ORWUS	Outdoor Residential Water Use Efficiency Standard
Recommendation Package	Urban Water Use Efficiency Recommendation Package
SB	Senate Bill
State	State of California
State Water Board	State Water Resources Control Board
UWUO	urban water use objective
UWUO_SB	urban water use objective without any variances
WC	California Water Code
WLS	Water Loss Standard

# Executive Summary

The California State Legislature passed the 2018 Legislation on Water Conservation and Drought Planning (Senate Bill 606 [Hertzberg] and Assembly Bill 1668 [Friedman], as amended; hereinafter referred to as the “2018 Legislation”), which included provisions for advancing urban water use efficiency through developing and implementing various water use efficiency standards, variances, and performance measures. This report provides the purpose and details of review and development, and recommendations for a variance for “significant populations of horses and other livestock,” consistent with the directives under California Water Code (WC) Section 10609.14.

WC Section 10609.14 directs the California Department of Water Resources (DWR), in coordination with the State Water Resources Control Board (State Water Board), to conduct necessary studies to recommend appropriate variances for unique uses of water that could have a material effect on an urban retail water supplier’s urban water use objective (UWUO). A variance for “significant populations of horses and other livestock” is one of the eight potential variances identified in the legislation. For each variance, the recommendations include a threshold of significance and guidelines and methodologies for calculating efficient water use allowable under the variance.

DWR conducted topic-specific research and investigations to answer three critical questions prior to developing recommendations for a variance for significant populations of horses and other livestock:

1. Is this water use outside of the scope of the UWUO? In other words, is this water for non-urban use or part of the commercial, industrial, and institutional water uses other than irrigating landscape with dedicated irrigation meters? If so, the water use is either not subject to the provisions of urban water use efficiency in the 2018 Legislation or excluded from the UWUO and, thus, there is no need for a variance.
2. Is this water use unique within the context of the UWUO? If no, it is not eligible. If yes, the water use is potentially eligible for a variance, and the following two questions need to be answered “yes” to be determined eligible:
  - a. Is this water use shared by some urban retail water suppliers or needed in unusual circumstances, but not commonly used enough to be included in one of the standards?
  - b. Is this water use excluded from all urban water use efficiency standards and other variances?

3. Could this unique water use have a material effect on the UWUO of some urban retail water suppliers? If so, the water use is warranted for variance development.

After confirming the above in collaboration with stakeholders and the State Water Board, DWR proceeded with variance development with a clarified scope, whereby the efficient water use for significant populations of horses and other livestock can be appropriately estimated and incorporated in an urban retail water supplier's UWUO.

Consistent with the legislative directive, DWR used a public process involving a diverse group of stakeholders in the review and development of the variance for significant use of water for horses and other livestock. The Water Use Studies Working Group and the Standards, Methods, and Performance Measures Working Group that DWR established to assist in implementing the 2018 Legislation were the primary stakeholders involved in the variance development process. Additional stakeholders included State of California agencies, cities, counties, urban retail water suppliers, environmental organizations, and other interested parties. Working group members and stakeholders were provided with many opportunities to comment on and inform the appropriateness of recommending a variance for significant populations of horses and other livestock. Additionally, they were able to comment on, and inform the development and refinements for, the applicable scope, specifications, and methodologies for estimating the efficient water use volume for such a purpose. The resource requirements for administering the variance and associated supporting data requirements, accessibility, and quality were considered in the evaluation.

Through investigation of available data and stakeholder input, DWR has concluded that establishing a variance to accommodate the efficient water use for "significant populations of horses and other livestock" is appropriate as that water use is unique, excluded from other standards and variances, and can have a material effect on an urban retail water supplier's UWUO. In this recommended variance, DWR focused on the calculation of efficient water use of horses and other livestock by Animal Type-Class. Implementation considerations, including the need for technical assistance, are included with the recommendations.

The recommendations for a variance for significant populations of horses and other livestock is part of the *Recommendations for Urban Water Use Efficiency Standards, Variances, Performance Measures, and Annual Water Use Reporting* (WUES-DWR-2021-01A). The recommendations were prepared per the requirements of the 2018 Legislation and are to be transmitted to the State Water Board for adoption.

# 1.0 Introduction

Senate Bill (SB) 606 (Hertzberg) and Assembly Bill 1668 (Friedman) of 2018, as amended (hereinafter referred to as the “2018 Legislation”), established a new foundation for long-term improvements in water conservation and drought planning to adapt to climate change and the resulting longer and more intense droughts in the State of California (State). These two bills provide expanded and new authorities and requirements to enable permanent changes and actions for those purposes, thereby improving the State’s water future for generations to come. Details of these provisions are summarized in *Making Water Conservation a California Way of Life: Primer of 2018 Legislation on Water Conservation and Drought Planning, Senate Bill 606 (Hertzberg) and Assembly Bill 1668 (Friedman)* (DWR and State Water Board, 2018).

## 1.1 New Approach to Urban Water Use Efficiency

Among other things, the 2018 Legislation contains provisions for advancing urban water use efficiency through developing and implementing various water use efficiency standards, variances, and performance measures per California Water Code (WC) Section 10609. The new water conservation framework is different than SB X7-7, which was established in 2009. The focus of SB X7-7 was to reduce statewide urban water use by 20 percent in 2020 compared to baseline calculated in 2010. The 2018 Legislation requires a bottom-up estimate from urban retail water suppliers of the urban water use objective (UWUO) based on the aggregated efficient water use volume by considering four urban water use efficiency standards and appropriate variances. The four standards are:

- Indoor Residential Water Use Efficiency Standard (IRWUS).
- Outdoor Residential Water Use Efficiency Standard (ORWUS).
- Commercial, Industrial, and Institutional Outdoor Irrigation of Landscape Areas with Dedicated Irrigation Meters Water Use Efficiency Standard (CII-DIMWUS).
- Water Loss Standard (WLS).

Commercial, industrial, and institutional (CII) water use not associated with dedicated irrigation meters (DIM) (or equivalent technologies) for outdoor irrigation of landscape areas is excluded from the UWUO.

Each of the procedural requirements to formalize these four standards for implementation is different. The 2018 Legislation includes a default progressively reduced IRWUS (WC Section 10609.4(a)). In November 2021, in collaboration with the

State Water Resources Control Board (State Water Board), the California Department of Water Resources (DWR) submitted the joint recommendations for IRWUS to the California State Legislature for further consideration per WC Section 10609.4(b). Separately, the State Water Board is currently conducting a rulemaking process to adopt the proposed WLS, which was originally authorized by SB 555 of 2015. For ORWUS and CII-DIMWUS, the 2018 Legislation requires DWR, in coordination with the State Water Board, to conduct necessary studies and investigations and develop recommendations to the State Water Board by October 1, 2021 (WC Sections 10609.6 and 10609.8).

Another major difference between the SB X7-7 requirements and those of the 2018 Legislation is that the anticipated outcome was measured on a statewide level per SB X7-7 and on an individual urban retail water supplier level per the 2018 Legislation. Recognizing the diversity of water use to support local economic, social, and environmental needs and varying climate conditions in the State, the 2018 Legislation requires DWR, in coordination with the State Water Board, to conduct necessary studies and investigations. It also requires DWR to develop recommendations for adoption by the State Water Board by October 1, 2021, for appropriate variances for unique uses that can have a material effect on an urban retail water supplier's UWUO and the corresponding thresholds of significance (WC Section 10609.14). In this context, DWR interpreted that a material effect means that this unique water use, although used in an efficient manner, could unfairly jeopardize an urban retail water supplier's ability to meet the UWUO when not explicitly addressed and calculated separately from the volume based on the four water use efficiency standards.

As a supporting recommendation, the 2018 Legislation requires DWR to develop accompanying guidelines and methodologies for calculating the UWUO (WC Section 10609.16) and provide the recommendation to the State Water Board for adoption, along with DWR's recommendations on ORWUS, CII-DIMWUS, and appropriate variances by June 30, 2022 (WC Section 10609.2). The 2018 Legislation further requires DWR and the State Water Board to solicit broad public participation throughout the development and adoption processes (WC Section 10609(b)(3)).

## 1.2 Appropriate Variances

Per the 2018 Legislation, appropriate variances **may include, but are not limited to**, the following eight identified in WC Section 10609.14(b):

1. Significant use of evaporative coolers.
2. Significant populations of horses and other livestock.
3. Significant fluctuations in seasonal populations.



4. Significant landscaped areas irrigated with recycled water having high levels of total dissolved solids.
5. Significant use of water for soil compaction and dust control.
6. Significant use of water to supplement ponds and lakes to sustain wildlife.
7. Significant use of water to irrigate vegetation for fire protection.
8. Significant use of water for commercial or noncommercial agricultural use.

The eight identified potential variances were subject to further review to affirm the unique use and the likelihood of a material effect on an urban retail water supplier's UWUO before DWR engaged in additional efforts in variance development. Through stakeholder engagement, additional potential variances could also be identified. Additional potential variances may emerge in the future due to changes in water use to meet economic, social, and environmental needs.

When a recommended variance is adopted by the State Water Board, the variance becomes available to urban retail water suppliers. However, before a variance can be included in an urban retail water supplier's UWUO, the urban retail water supplier is required to request, with supporting data, and receive approval from the State Water Board (WC Section 10609.14(d)). This procedural requirement is urban retail water supplier-specific and variance-specific. The State Water Board is required to post on its website a list of approved variances, the specific variances approved for each urban retail water supplier, and the data supporting the approval of each variance for individual urban retail water suppliers (WC Section 10609.14(e)).

## 1.3 Purpose of the Report

Per legislative requirements, DWR conducted studies and investigations to determine if the legislatively identified potential variances and others suggested by stakeholders should be developed and recommended for adoption. This report is one of the variance-specific reports that focuses on the potential variance for "significant populations of horses and other livestock" identified in the legislation.

### Water Use of Horses and Other Livestock

Large populations of horses and other livestock (e.g., cattle and sheep) reside throughout the State and are allowed in many urban areas on residential properties. The allowable animal types and number per property, while controlled via local regulations and ordinances, are not typically tracked or recorded. Regardless, horses and other livestock can consume large amounts of water each day, depending on their size and the local climate conditions; more water is consumed by larger animals or those in hotter climates. As such, to estimate potential water use, information about

animal size and local climate conditions are necessary in addition to population counts. Therefore, a properly defined scope for this water use is critically important for the considerations of this potential variance.

## **Relationship to California Department of Water Resources' Urban Water Use Efficiency Recommendation Package**

DWR has completed a significant body of work to meet the requirements of the 2018 Legislation and provide recommendations on different topics to the State Water Board for adoption. To streamline document development and recognize the inherent interrelationship among different topics and the need for overall consistency, DWR organized the various reports into an Urban Water Use Efficiency Recommendation Package (Recommendation Package) that allows mutual referencing and incorporates content by reference. All reports in this Recommendation Package are given a serial number in the form of "WUES-DWR-2021-xx." For each report, Appendix A includes the list of documents within the Recommendation Package that are incorporated by reference.

Specifically, this report, *Recommendations for Variance for Significant Populations of Horses and Other Livestock, Methods of Calculation, and Supporting Data Requirements* (WUES-DWR-2021-07), provides the detailed documentation for the review and subsequent variance development for specifications, guidelines, and methodologies for the potential variance for use of water for significant populations of horses and other livestock only. The recommendations for this variance were summarized in the report *Summary of Recommendations for Variances* (WUES-DWR-2021-04) and the corresponding guidelines and methodologies for calculating efficient water use for this variance were summarized in *Recommendations for Guidelines and Methodologies for Calculating Urban Water Use Objective* (WUES-DWR-2021-01B). The additional context, variance development process and approach, evaluation of options, and stakeholder input included in this document are incorporated by reference. Key terms and their definitions used in this report, along with abbreviations and acronyms, are included in *Urban Water Use Efficiency Recommendation Package: Glossary and Abbreviations and Acronyms* (WUES-DWR-2021-21).

## **Effects on Existing Law and Regulations**

DWR developed this variance per a legislative directive. The resulting variance, when adopted, does not set, rescind, or modify existing or future requirements on horses and other livestock.

Significant populations of horses and other livestock are governed by local restrictions and regulations such as the number of animals and types of animals allowed on properties within the service area. In some locations, animal health and safety requirements may also be regulated. This report does not address these potential additional requirements.

## 1.4 Report Organization

This report is organized into six sections:

- **Section 1 – Introduction** provides the background and purpose of this document.
- **Section 2 – Scope Definition** provides the process and rationales used in confirming the scope for this potential variance that reflects unique water use with potential material effects on an urban retail water supplier's UWUO.
- **Section 3 – Approach to Variance Design** describes the technical approach and stakeholder engagement that DWR conducted to support the variance development. Options for different coverages and methods for calculating efficient water use for this variance are discussed and evaluated for technical feasibility, reasonableness, and ability to be implemented.
- **Section 4 – Recommendations** provides DWR's recommendations on this variance, including the specifications, guidelines, and methodologies for calculating efficient water use for this variance and supporting data and information requirements.
- **Section 5 – Glossary** provides a list of key terms and their definitions used in this document.
- **Section 6 – References** provides a list of references used in this document.

This report includes two appendices:

- **Appendix A** provides the list of documents in DWR's Recommendation Package that are incorporated by reference.
- **Appendix B** provides a template for calculating the efficient water use of significant populations of horses and other livestock. This template is provided for illustrative purposes and is subject to revision after the State Water Board's adoption.

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## 2.0 Scope Definition

In accordance with the legislative directive, DWR conducted studies and investigations to develop the information necessary to determine if a variance for significant populations of horses and other livestock was needed and, if so, to support any recommendation made to the State Water Board on the guidelines and methodologies pertaining to the calculation of an urban retail water supplier's UWUO.

The goals of these studies and investigations were to achieve the following:

- Confirm whether water use for significant populations of horses and other livestock is a unique use that could have a material effect on the UWUO of urban retail water suppliers.
- Inform the recommendations for variance specifications, including the threshold of significance.
- Provide the basis for developing guidelines and methodologies for urban retail water suppliers to use in calculating the aggregated efficient water use allowable under this variance.

The first study goal provided a clarified scope for variance development, which was to be accomplished by addressing the remaining two study goals. The process and findings for scope definition are provided in Section 2. Section 3 contains additional variance development and option evaluation to inform the recommendations in Section 4.

### 2.1 Interpretation of Horses and Other Livestock Nexus

While populations of horses are self-evident, WC does not define what is meant by "other livestock." California Civil Code Section 3080 states "Livestock means any cattle, sheep, swine, goat, or horse, mule or other equines." The United States Code of Federal Regulations (CFR) Section 760.404 defines eligible livestock for indemnity programs as: (a) the kind of livestock must be alpacas, adult or non-adult dairy cattle, beef cattle, buffalo, beefalo, elk, emus, equine, llamas, sheep, goats, swine, poultry, deer, or reindeer and meet all the conditions in paragraph (c) of this section; whereas, CFR Section 780.328 defines "livestock" as, "cattle, sheep, horses, goats, and other domestic animals ordinarily raised or used on the farm. Turkeys or domesticated fowl are considered poultry and not livestock." Local codes and ordinances may also have meanings and definitions different from those listed above.

On residential parcels, horses and other livestock are more commonly found in rural areas than urban areas. While some jurisdictions allow for urban properties to support populations of horses and other livestock, there are often limitations on where they are allowed and the total number or the number allowed per area of land. However, codes allowing for the keeping of horses and other livestock do not necessarily mean that this condition is prevalent. A few examples of urban areas where horses and other livestock are permitted are listed below:

- Some counties, such as San Luis Obispo, and cities, such as Santa Clarita, allow the keeping of livestock on residential and suburban properties subject to the size of the property (i.e., number of animals per area) (San Luis Obispo County Code 23.08.46 and Santa Clarita County Chapter 17.62).
- In Los Angeles County, “heavy livestock” are permitted in 59 of 73 cities; and horses are allowed in 65 cities (University of California Los Angeles, 2013).
- The City of Brentwood allows horses and large livestock in certain areas depending on zoning and lot sizes (City of Brentwood Municipal Code 17.670.005).

Given the large, recorded CII population numbers for horses and other livestock, it is likely that a number of uncounted animals that are not part of commercial production may exist in residential areas and could be subject to the UWUO. It is reasonable to consider a variance to address such horses and other livestock.

## 2.2 Process for Scope Refinement

In the context of the 2018 Legislation, the four water use efficiency standards cover types of water use commonly shared by most, if not all, urban retail water suppliers. The variances are effectively the less-common uses that may be important for only some urban retail water suppliers due to geographic location, local climate, and other local conditions. In concept, the scopes of standards and variances are mutually exclusive. However, local water use, facility connections, and account management can be complex due to years of development and implementation of practices without the structure suggested in the 2018 Legislation. Therefore, DWR examined different scenarios associated with significant populations of horses and other livestock against three questions in sequence prior to developing variance recommendations:

1. Is this water use out of the scope of the UWUO? In other words, is this water for non-urban use or part of the CII water uses other than irrigating landscape with DIMs? If so, the water use is either not subject to the provisions of urban water use efficiency in the 2018 Legislation or excluded from the UWUO and has no need for a variance.

2. Is this water use unique in the context of the UWUO? If no, it is not eligible. If yes, the water use is potentially eligible for a variance, and the following two questions need to be answered “yes” to be determined eligible:
  - a. Is this water use shared by only some urban retail water suppliers or needed in unusual circumstances, but not commonly used enough to be included in one of the standards?
  - b. Is this water use excluded from all urban water use efficiency standards and other variances?
3. Could this unique water use have a material effect on the UWUO of some urban retail water suppliers? If so, the water use is warranted for variance development.

The following summarizes the results of the above process of elimination for clarifying the scope of the variance.

### Unique Use

The unique use for variance consideration was established by addressing the first two questions listed above.

In April 2021, DWR conducted a survey regarding potential concerns over significant populations of horses and other livestock. The survey was completed by 68 urban retail water suppliers in the State. About 40 percent of the participants mentioned that significant populations of horses and other livestock exist in their service areas which might result in a significant use of water for their utilities. However, only 22 percent of the participants expected that the effect would be more than five percent of their total water use. These results suggest that the water use could be considered as a variance due to its use by only some urban retail water suppliers.

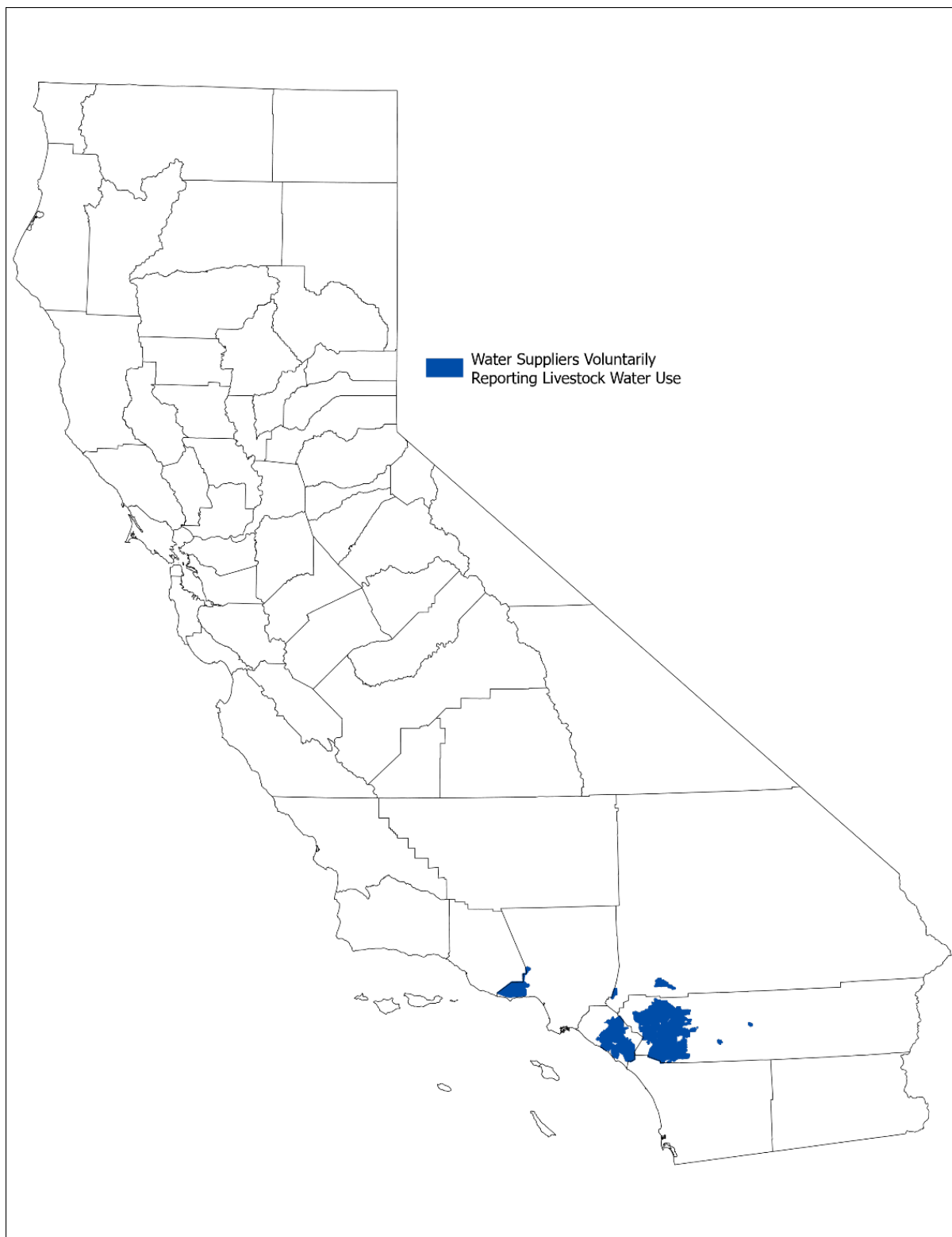
DWR examined multiple scenarios in determining the status of a unique water use as summarized below. Note that for the purpose of this variance, residential parcels mean that property parcels have a residential land use designation under the governing general plans of counties and cities. Also, the conditions described below illustrate the filtering process for variance applicability. In practice, an urban retail water supplier would need to assess its actual conditions for variance applicability.

- Conditions that are categorically excluded from variance considerations due to the water use not being part of the UWUO:
  - Water use for horses and other livestock associated with commercial operations is considered under CII water use and is not subject to UWUO calculation and reporting. Commercial operations could include racetracks,

- feedlots, chickens grown on a large scale, or other commercial animal operations.
- Water for horses and other livestock served through agricultural water meters are considered agricultural use and are not subject to the UWUO calculation and reporting.
  - Condition that is categorically excluded from variance considerations due to prohibited water use:
    - Water use for horses and other livestock where local regulations and ordinances do not allow for horses or other livestock on residential properties would be indirectly prohibited and is not appropriate for receiving a variance.
  - Conditions where water use is within the scope of UWUO:
    - Consumptive water use by horses and other livestock on residential parcels are excluded from IRWUS as IRWUS focuses on human consumption (DWR, 2021). Therefore, the water use is potentially allowable under a variance; however, DWR determined that this water use would be more appropriately considered against ORWUS instead of IRWUS.
    - Consumptive water use by horses and other livestock on residential parcels is excluded from ORWUS. ORWUS only includes landscape irrigation (see *Recommendations for Outdoor Residential Water Use Efficiency Standard [WUES-DWR-2021-02]*). Therefore, the water use is potentially allowable under a variance.

Populations of horses and other livestock in urban areas are not reported throughout the State. Horses and other livestock are more prevalent in rural residential areas than urban residential areas. County agricultural commissioners and urban retail water suppliers do not typically record and verify populations of horses and other livestock their service areas. The United States Department of Agriculture (USDA) statistics for other livestock populations such as cattle, sheep, and swine are limited to CII operations and do not include residential properties (USDA, 2021a and 2021b). It is anticipated that in most service areas, a few customers may have horses or other livestock, but the overall population of horses and other livestock in a residential area would be minimal. Figure 2-1 summarizes the urban retail water suppliers voluntarily reporting water use by horses and other livestock to the State Water Board in their electronic Annual Reports. Although these data are limited because of the voluntary nature of reporting and not all urban retail water suppliers collect this type of data from their customers, the data that is reported speaks to the uniqueness of these conditions in the State.





Source: Water Resources Control Board electronic Annual Reporting System, 2020 data.

**Figure 2-1 Urban Retail Water Suppliers that Voluntarily Report Livestock Water Use Throughout the State of California**

In the above analyses, the unique use of water for horses and other livestock in certain areas of the State was confirmed. Therefore, it was reasonable for DWR to proceed with the evaluation of the potential for a material effect on an urban retail water supplier's UWUO.

### **Potential for a Material Effect**

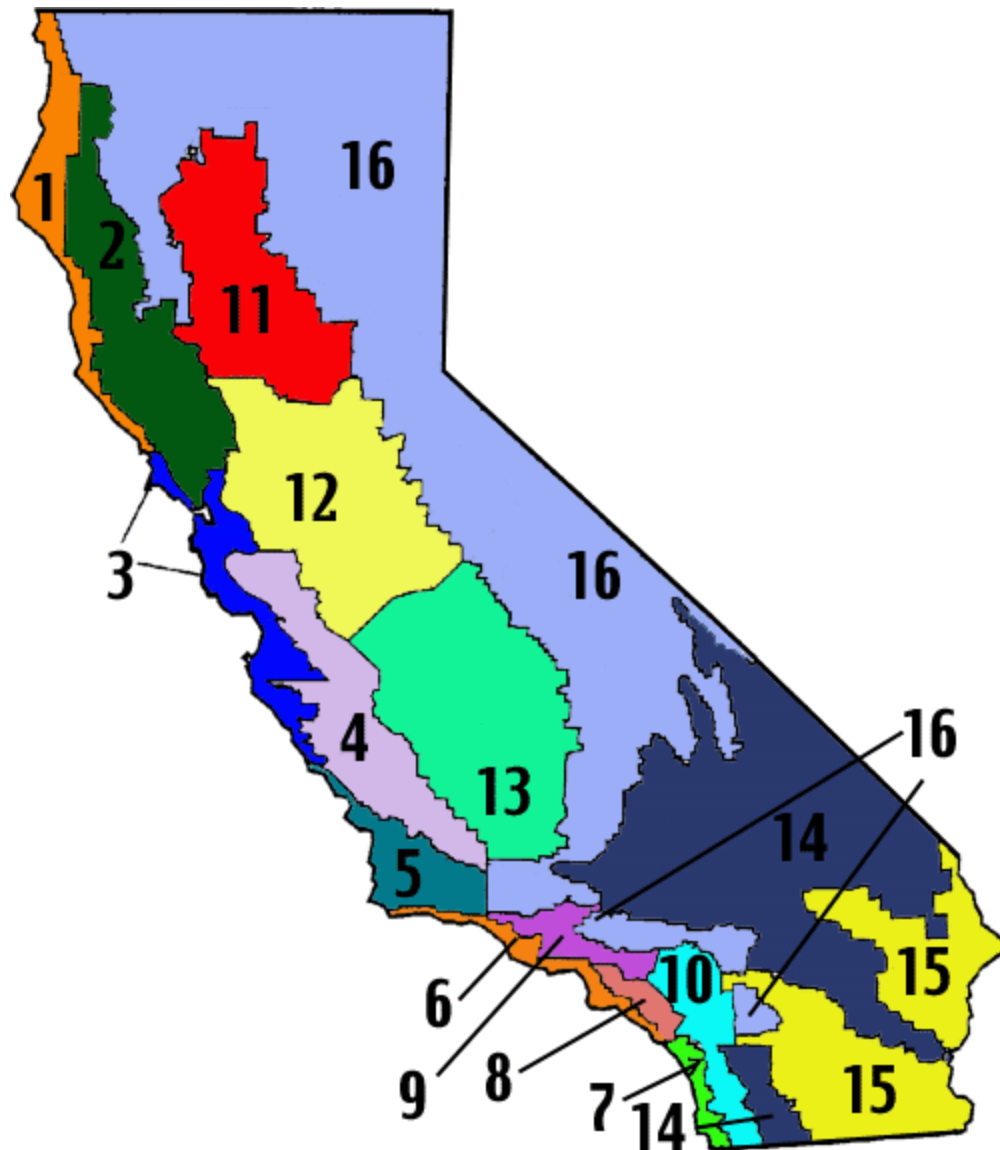
Horses and other livestock are prevalent in urban retail water suppliers' service areas throughout the State. In 2017, the American Horse Council Foundation reported that the State had the second highest horse population in the United States, with an estimated population of over 500,000 horses (American Horse Council Foundation, 2017). The International Llama Registry recorded 2,562 owners of llamas in the State but did not provide the population of llamas (International Llama Registry, 2021). Very little information is available on livestock populations in residential areas throughout the State. However, it is estimated that the City of Ramona has about 10,000 horses with a population of about 20,000 people, and the City of Norco has about 20,000 horses with a population of 27,000 people (Carlson, 2012; Associated Press, 2017).

Having a material effect in an urban retail water supplier's water use in its service area will depend on the number of livestock in the service area and the amount of water consumed by these animals per day. The CFR Section 780.328 definition is the most suitable for looking at water use requirements for "other livestock" as it provides the most flexibility in its definition of "other livestock."

Water requirements are dependent on both climate and consumption for different types of animals as described below.

### ***Climate***

Climate conditions affect the water requirements for horses and other livestock. Horses and other livestock need more water in hot, dry areas compared to cold, wet areas. The California Climate Zones, defined by the California Building Standards Code, California Code of Regulations Title 24, were developed to advise energy-conscious design decisions. The climate zones were created using basic climate conditions, design day data, climate design priorities, Title 24 requirements, climate description, and heating and cooling degree days. Sixteen climate zones are identified throughout the State and are shown in Figure 2-2 (Pacific Energy Center, 2006).



Source: Pacific Energy Center, 2006

**Figure 2-2 California Climate Zones (as Defined in California Building Standards Code, California Code of Regulations Title 24)**

### ***Animal Water Use Requirements***

- **Horses.** Most horses weigh between 500 and 2,000 pounds (lb). Horses can consume anywhere from 3 to 36 gallons of water per day, depending on weight, activity level, or condition (e.g., resting, working, pregnant), and environment or climate conditions (Center for Equine Health of the School of Veterinary Medicine of the University of California at Davis, 2019). Minimum daily water requirements for horses are presented in Table 2-1. Mules are considered to have similar water use requirements as horses. Considering the City of Ramona and City of Norco horse and human population accounts noted above, the human indoor

residential water use efficiency standard of no more than 50 gallons per capita per day starting in 2030, and assuming an average resting water use requirement for horses of 8 gallons per day, the horse populations in these cities could consume an estimated 8 to 12 percent of the indoor residential water use budget.

**Table 2-1 Minimum Daily Water Requirements for Horses in Gallons Per Day**

Minimum Daily Water Requirement for Horses of Various Weights	Resting/Normal Environmental Temperature (41-77 degrees Fahrenheit)	Heavy Workload (Double to Triple Resting Requirement)	Gestation/Lactation (Add Minimum of 30 Percent to Resting Requirement)	High Heat and Humidity (Double to Triple Resting Requirement)
500-lb horse	3	6 to 9	4	6 to 9
1,000-lb horse	6	12 to 18	8	12 to 18
1,500-lb horse	9	18 to 27	12	18 to 27
2,000-lb horse	12	24 to 36	16	24 to 36

Source: Center for Equine Health of the School of Veterinary Medicine of the University of California at Davis, 2019

Key:

lb = pound

- Cattle.** Most cattle weigh between 400 lb (e.g., growing cattle) and 1,600 lb (e.g., mature bull) and consume 4 to 21 gallons of water per day, depending on the temperature and development level or condition (North Dakota State University, 2021). Table 2-2 presents daily water requirements for cattle.

**Table 2-2 Daily Water Requirements for Cattle in Gallons Per Day**

Temp.	Growing Cattle			Finishing Cattle			Pregnant Cows		Lactating Cows	Mature Bulls	
	400 lb	600 lb	800 lb	600 lb	800 lb	1,000 lb	900 lb	1,100 lb	900 lb	1,400 lb	1,600 lb
40	4.0	5.3	6.3	6.0	7.3	8.7	6.7	6.0	11.4	8.0	8.7
50	4.3	5.8	6.8	6.5	7.9	9.4	7.2	6.5	12.6	8.6	9.4
60	5.0	6.6	7.9	7.4	9.1	10.8	8.3	7.4	14.5	9.9	10.8
70	5.8	7.8	9.2	8.7	10.7	12.6	9.7	8.7	16.9	11.7	12.6
80	6.7	8.9	10.6	10.0	12.3	14.5	--	--	17.9	13.4	14.5
90	9.5	12.7	15.0	14.3	17.4	20.6	--	--	16.2	19.0	20.6

Source: North Dakota State University, 2021

Key:

lb = pound

temp. = temperature in degrees Fahrenheit

- Llamas, Sheep, and Swine.** Compared to horses and cattle, less research has been conducted on the water consumption rates of llamas, sheep, and swine in varying temperatures and climatic conditions. Most llamas weigh between 230 and 400 lb, and they typically consume 2 to 5 gallons of water per day (Boileau and Giedt, 2017; UCANR, N.D.). Many adult sheep weigh 175 lb or more, and

they consume 1 to 3 gallons of water per day (North Dakota State University, 2021). Adult swine can weigh 200 lb or more, and they consume 2 to 8 gallons of water per day. Table 2-3 provides daily water requirements for llamas, sheep, and swine.

**Table 2-3 Daily Water Requirements for Llamas, Sheep, and Swine in Gallons Per Day**

<b>Animal Type</b>	<b>Water Requirement (gallons per day)</b>
<b>Llamas</b>	2 to 5
<b>Sheep</b>	
Lambs (5 to 20 lb)	0.1 to 0.3
Feeder lambs (60 to 110 lb)	1.0 to 1.5
Pregnant ewes (175 lb or more)	1.0 to 2.0
Lactating ewes (175 lb or more)	2.0 to 3.0
Rams (175 lb or more)	1.0 to 2.0
<b>Swine</b>	
Nursery (up to 60 lb)	0.2 to 0.5
Grower (60 to 100 lb)	0.5 to 2.0
Finishing (100 to 250 lb)	2.0 to 3.0
Nonpregnant gilts	3.0 to 5.0
Pregnant sows	3.0 to 6.0
Lactating sows	5.0 to 8.0
Boars	3.0 to 6.0

Sources: North Dakota State University, 2021

Key:

lb = pound

- Small Livestock or Animals Less Than 200 Pounds.** Smaller livestock or animals include, but are not limited to: chickens, turkeys, rabbits, goats, and dogs. Using the definition for livestock that includes smaller animals such as rabbits or poultry, the amount of water consumed per animal is very low compared to water use for medium to large livestock (e.g., sheep, pigs, llamas, cattle, horses, and others). Typically, a mature chicken needs about 0.125 gallon of water a day, and a mature turkey needs about 0.07 to 0.19 gallon per day (Ward and McKague, 2007). Rabbits and mink need less than 0.1 to 0.26 gallon per day (Ward and McKague, 2007). Large dogs weighing upwards of 200 lb consume 1.5 gallons of water per day (Larsen, 2020), but they are not considered “livestock” per CFR Section 780.328.

Similar to larger livestock, there is often a limit on the number of smaller livestock allowed on an urban property. While these populations could be higher than large livestock, the low daily water use, along with local ordinances for sanitation and control, mean that it is unlikely these small livestock would have a material effect on an urban retail water supplier’s UWUO.

Although there are potential limitations related to the best available data, DWR confirmed that there are reasons to believe that significant populations of horses and other livestock could have a material effect on the UWUO for some urban retail water suppliers, and a variance is warranted.

## 2.3 Clarified Scope for Variance Development

Based on the analysis, DWR has established that consumptive water use by significant populations of horses and other livestock is a unique use and may have a material effect on an urban retail water supplier's UWUO under certain conditions. The unique use is limited to direct consumption only and does not include related water uses on a residential parcel:

- **Water use for crops or feed.** This water use is covered in the variance for significant use of water for commercial or noncommercial agricultural use on residential parcels or excluded from the UWUO as CII or agricultural water use (see *Recommendations for Variance for Significant Use of Water for Commercial or Noncommercial Agricultural Use, Methods of Calculation, and Supporting Data Requirements* [WUES-DWR-2021-13]).
- **Water use for dust control purposes.** This water use is covered in the variance for dust control for horse corrals and animal exercising arenas (see *Recommendations for Variance for Significant Use of Water for Dust Control for Horse Corrals and Animal Exercising Arenas, Methods of Calculation, and Supporting Data Requirements* [WUES-DWR-2021-10]).
- **Washing and sanitation.** Although animal washing and sanitation also use water, such use is not considered in this variance at this time because it is not applicable to direct consumption, and there is no evidence it is a significant use of water. This use is also not included in another recommended variance or any of the water use efficiency standards.

This variance is limited to horses and other livestock greater than 200 lb (with livestock as defined by CFR Section 780.328) that are served residential water, or in limited cases, with a meter designated as a dedicated meter (DM) specific for residential use, and this use is allowed by local codes and ordinances. The resulting variance would be against IRWUS and ORWUS.

## 3.0 Approach to Variance Design

DWR's approach to variance design was an iterative process in collaboration with stakeholders and the State Water Board to assist DWR with refining options and associated specifications and data needs. Taking into consideration findings from the studies, research, and input and feedback from the collaborative process, DWR formulated the recommendations.

### 3.1 Stakeholder Process

Consistent with the legislative directive, DWR used a public process involving diverse stakeholders in the review and development of the variance for significant populations of horses and other livestock. The stakeholder process was part of the larger engagement process to implement the provisions of urban water use efficiency in the 2018 Legislation (see *Stakeholder Outreach Summary for Developing Urban Water Use Efficiency Standards, Variances, and Performance Measures* [WUES-DWR-2021-20]). Focused stakeholder engagements specifically for variances started in November 2020, with periodic meetings and workshops held through early 2022.

DWR established two working groups to assist in implementing the 2018 Legislation, and these groups formed the base of the stakeholder involvement process that included State agencies, cities, counties, urban retail water suppliers, environmental organizations, professionals, and other stakeholders and interested parties. The Water Use Studies Working Group was established in July 2019 to inform DWR in developing water use studies for setting up standards, variances, and performance measures. Concurrently, the Standards, Methods, and Performance Measures Working Group was also established to provide input to DWR on developing the structure and specifications of water use efficiency standards, variances, methodologies, and performance measures. However, due to the close relationship between research and variance design, members of both working groups were invited to participate in the same stakeholder meetings and workshops. DWR opened working group meetings and workshops to the public to allow for broader participation and input from other stakeholders, interested parties, and individuals.

Working group members and other participants had ample opportunities to learn about the variance design process and provide feedback on the appropriateness of this specific variance being developed and the scope, specifications, and methodologies for estimating efficient water use. They provided input on variance implementation, such as resource needs (i.e., staff), supporting data requirements, and accessibility considerations.

DWR also conducted and responded to requests for additional meetings and public outreach and engagement activities with both individuals and groups of stakeholders to

learn from their experiences, understand their specific concerns, and receive other feedback. In addition to accessing available literature and reports for this variance, DWR also consulted with animal husbandry experts and stakeholders (University of California, Davis; Rancho California Water District, and San Juan Water District) to gather information related to determining the volume of efficient water use for horses and other livestock; some of the factors that may affect this water use; what might be a reasonable threshold for when this variance would apply; and how an urban retail water supplier might calculate its variance amount.

## 3.2 Considerations for Variance Design

As stated in Section 2.3, the clarified scope for the variance for significant populations of horses and other livestock is limited to horses and other livestock greater than 200 lb (as defined by CFR Section 780.328) that are served residential water, or in limited cases, a meter designated as a DM specific for residential use, and as allowed by local codes and ordinances. As presented in Section 2.2, livestock greater than 200 lb consume more water on a daily basis than do smaller animals. DWR proceeded with variance development after confirming this clarified scope with stakeholders and working group members.

In variance design, DWR determined what would constitute efficient water use by significant populations of horses and other livestock, the level of estimated water use that could be considered to have a material effect on an urban retail water supplier's UWUO (i.e., significance threshold), and how to calculate the aggregated water use under the variance with credible data and supporting information. Based on the research and stakeholder input, DWR considered the following factors:

- The variance should focus on water use by significant populations of horses and other livestock on residential parcels. (Livestock is as defined by CFR Section 780.328.)
- If exclusion criteria in ORWUS or IRWUS change, the variance criteria may also need to change.
- DWR recognized that the definition of this variance should be limited to animals 200 lb or heavier to recognize the legislative intent to focus on significant water use.
- DWR considered the effects of statewide average climate on daily water consumption by horses and other livestock should be incorporated based on the California Climate Zones, as defined by Title 24, and maximum average monthly air temperatures.



- The number of animals in the service area of an urban retail water supplier would be needed to determine the total water use. It was not and will not be possible for DWR to collect data on populations of horses or other livestock that reside in all urban retail water suppliers' service areas. An urban retail water supplier that believes it might be eligible for this variance will have to determine the number (and potentially type) of animals meeting the definition in its service area.
  - DWR expected that some potentially eligible urban retail water suppliers will not have this information readily available and will have to gather it through site visits or surveys prior to applying for a variance. However, some urban retail water suppliers may have their own billing system variance for horses and other livestock that they can use to estimate the populations in their service areas. DWR recognized that the collected information may also need to be verified.
- DWR recognized that an urban retail water supplier may choose to calculate the variance efficient water use volume for only one or any number up to all type-classes of qualified animals. Populations of horses and other livestock by type-class must be based on the urban retail water supplier's verified survey, worksheet, or other data collection method.
- DWR recognized that specific data are needed for the calculation of water use for this variance. Many urban retail water suppliers expressed concerns over the potential burden and costs to pursue a variance in addition to compliance with many other requirements under the provisions of urban water use efficiency in the 2018 Legislation. Therefore, DWR considered the following to be reasonable:
  - The methodology for calculating aggregated water use under this variance should, to the extent reasonable, stay consistent with existing water use efficiency laws and regulations or build on existing methodologies used by urban retail water suppliers in SB X7-7 compliance.
  - The data and information required to support a variance and calculated amount need to be credible, reasonably accessible to urban retail water suppliers or reasonably obtainable by urban retail water suppliers, or separately provided by DWR to the extent possible.
  - Necessary technical assistance from DWR related to implementation should be incorporated into the variance development process.

### **Animal Type-Class Categories**

Animal types were grouped into four major categories based on similar water use and weights:

- Milking cows.
- Horses, mules.
- Cattle, bulls, other livestock greater than 500 lb.
- Sheep, llamas, donkeys, swine, other livestock between 200 and 500 lb.

Animal Type-Classes were developed to assist urban retail water suppliers in gathering data from customers in their service areas. Customers would only need to indicate the type(s) of animal(s) (e.g., horse, cattle, or sheep) they own instead of having to determine a weight class for each animal. For example, the 1,001 to 1,500 lb weight class would be comparable to the horses and mules Animal Type-Class. Milking (lactating) cows were the exception because although they may weigh less than bulls and horses, they have the highest daily water consumption rate during that life stage.

The section below describes different conditions for which DWR determined allowable daily water consumption for horses and other livestock. Two of the three conditions of allowable daily water consumption make use of these Animal Type-Classes, and one condition is for all qualified animals (i.e., makes no Type-Class distinctions).

### **Allowable Daily Water Consumption**

In accordance with WC and State goals for efficient water use, DWR determined allowable daily water consumption for horses and other livestock. These water consumption rates were determined for three conditions:

1. No Animal Type-Class distinction (i.e., one rate for all horses and other livestock).
2. By Animal Type-Class, but without adjusting for statewide average climate conditions.
3. By Animal Type-Class, adjusting for statewide average climate.

For each condition, DWR used data from both the University of California, Davis (Table 2-1) and North Dakota State University (Table 2-2), as described below.

### ***Allowable Daily Water Consumption with no Type-Class Distinctions***

Daily water requirements for cattle and horses (Tables 2-1 and 2-2) were averaged together, which resulted in a single value of 10 gallons per day per animal. To account for smaller livestock (e.g., sheep and pigs), this value was reduced to 8 gallons per day per animal (based on stakeholder experiences provided as input during the July 21, 2021, working group meeting).

### ***Allowable Daily Water Consumption Without Adjusting for Climate***

Horse and cattle data from Tables 2-1 and 2-2, respectively, were averaged together for each weight class to determine allowable daily water consumption values for horses and other livestock without adjusting for effects of statewide average climate, and those values are shown in Table 3-1. For the smallest qualified animals (e.g., sheep, llamas, donkeys, swine, and other livestock between 200 and 500 lb), the consumption value from the similar cattle weight class was used.

**Table 3-1 Allowable Daily Water Consumption for Horses and Other Livestock (Without Statewide Average Climate Adjustment)**

<b>Animal Type-Class</b>	<b>Allowable Daily Water Consumption per Animal (gallons)</b>
Sheep, llamas, donkeys, swine, other livestock between 200 and 500 lb	5
Cattle, bulls, other livestock greater than 500 lb	10
Horses, mules	12
Milking cows	16

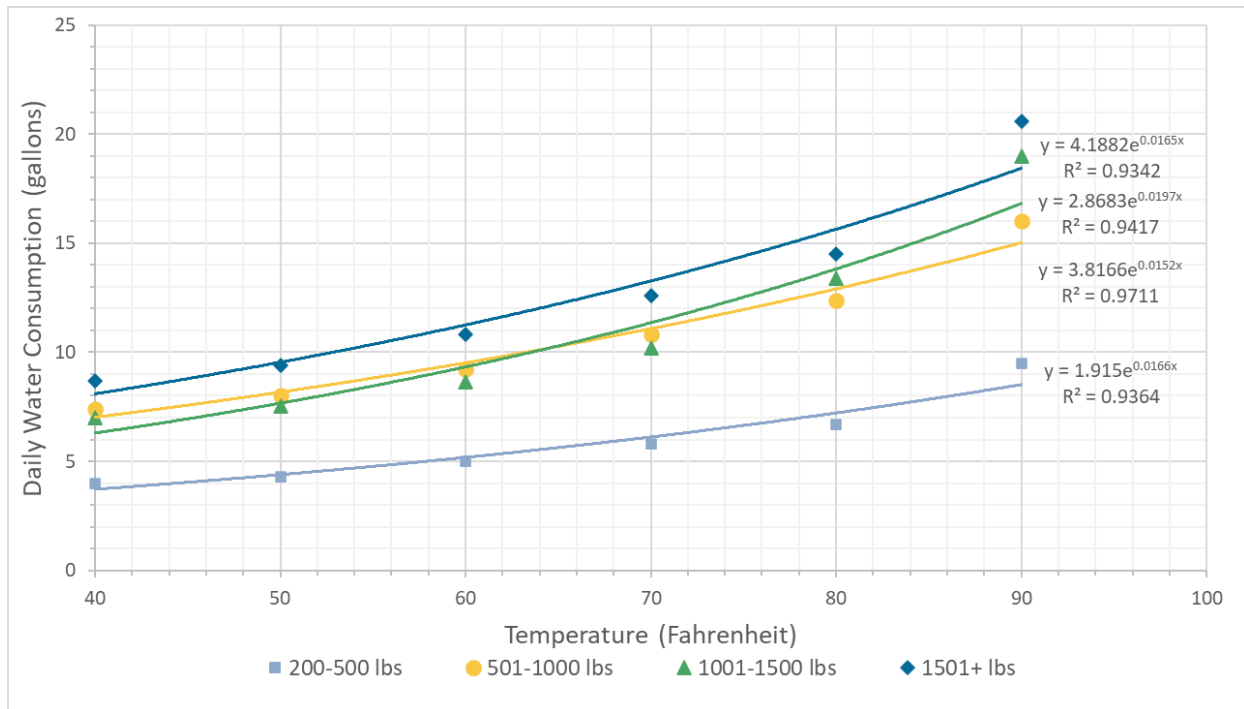
Key:  
lb = pound

### ***Allowable Daily Water Consumption Adjusting for Climate***

The same data from Tables 2-1 and 2-2 were used to determine allowable daily water consumption values for horses and other livestock that were adjusted for statewide average climate conditions. These values were determined using the methodology described below.

Data from the North Dakota State University were graphed by weight class and temperature to determine rates at which water was consumed based on temperature. (Note that these data are not specific to California conditions.) Figure 3-1 shows the data for each of the four weight classes (as dots): 200 to 500 lb; 501 to 1,000 lb; 1,001 to 1,500 lb; and 1,501 lb or more.

Using the graphed data (Figure 3-1), equations were developed based on the trendlines (solid lines) with each having a high  $R^2$  value indicative of a direct relationship of daily water consumption and temperature for each weight class (as listed in Table 3-2). In each equation, the x value represents temperature in degrees Fahrenheit, and the y value represents daily water consumption in gallons. For example, the daily water consumption in the 200 to 500 lb weight class at 50 degrees Fahrenheit would be 4.4 gallons of water per day per animal, and the daily water consumption in the 501 to 1,000 lb weight class at 80 degrees Fahrenheit would be 12.9 gallons of water per day per animal.



Source: North Dakota State University, 2021

**Figure 3-1 Relationships of Temperature and Daily Water Consumption for Cattle by Weight Class**

**Table 3-2 Exponential Equations for Daily Water Consumption for Cattle by Weight Class**

Weight Class	Equation
200 to 500 lb	$y = 1.915e^{0.0166x}$
501 to 1,000 lb	$y = 3.8166e^{0.0152x}$
1,001 to 1,500 lb	$y = 2.8683e^{0.0197x}$
1,501 or more lb	$y = 4.1882e^{0.0165x}$

Key:

lb = pound

x = temperature value (degrees Fahrenheit)

y = daily water consumption value (gallon)

Note that the daily water consumption equations (shown in Figure 3-1 and Table 3-2) are not specific to the State's climate conditions. However, the developed equations are reasonable for use with the State's climate data.

DWR used the California Climate Zones, as defined by California Building Standards Code, California Code of Regulations Title 24, to estimate the State's climate conditions for use in the equations. Refer to Figure 2-2 for a map of the 16 climate zones. Using the Pacific Energy Center's Guide to California Climate Zones, the maximum average monthly air temperature in each of the 16 climate zones was determined (see Table 3-3). The Climate Zone maximum average air temperature was used in each of the

weight-class equations (“x” variable) to calculate the consumption rates, by weight-class, for each Climate Zone. Those 16 rates were then averaged to arrive at an average daily water consumption by cattle by weight class, as presented in Table 3-4.

**Table 3-3 Maximum Average Air Temperature in Each California Climate Zone**

<b>Climate Zone</b>	<b>Maximum Average Air Temperature (degrees Fahrenheit)<sup>1</sup></b>
1	58
2	68
3	65
4	69
5	63
6	70
7	57
8	73
9	74
10	78
11	82
12	78
13	80
14	85
15	92
16	76

Notes:

<sup>1</sup> Maximum average temperature by climate zone was determined using Pacific Energy Center’s Guide to California Climate Zones.

**Table 3-4 Average Daily Water Consumption by Cattle in Each Weight Class**

<b>Weight Class</b>	<b>Average Daily Water Consumption (gallons)</b>
200 to 500 lb	7
501 to 1,000 lb	12
1,001 to 1,500 lb	12
1,501 or more lb	14

Key:

lb = pound

To add horses into the average daily water consumption values, DWR took the University of California, Davis data (Table 2-1) and, by weight class, averaged the minimum daily water requirements for each of the 4 categories of horses (note that where there was a range in water requirement, the lesser value was used to represent minimum daily water requirements, and weight classes for the horse data aligned with those for the cattle data). The horse values were not climate adjusted. However, since the recommendations were made for horses in the State and weight class averages included water consumption in high heat/humidity conditions, this was considered sufficient for estimating climate-adjusted horse values. The resulting values for horses were relatively similar to those for cattle in each of the 4 weight classes, so the horse and cattle values were averaged to determine average daily water consumption by both cattle and horses by weight class (see Table 3-5).

**Table 3-5 Average Daily Water Consumption by Cattle and Horses in Each Weight Class**

<b>Weight Class</b>	<b>Average Daily Water Consumption (gallons)</b>
200 to 500 lb	6
501 to 1,000 lb	11
1,001 to 1,500 lb	13
1,501 or more lb	16

Key:  
lb = pound

In developing equations for this variance, DWR used the cattle and horse datasets because they both provided daily water consumption values in relation to the average State climate and additional resolution at weight classes. No supporting evidence was found that smaller livestock (e.g., 200-500 lb) consumed water at different rates than similar-sized growing cattle (Table 2-2, North Dakota State University cattle dataset, and Table 3-5 above). Therefore, growing cattle values were considered to be representative of smaller livestock.

Discussions with stakeholders about their practices and experiences with livestock water use revealed that 6 gallons of water per day per animal would be too low to account for water consumption by smaller livestock, especially in drier weather conditions, but that 8 gallons per day would likely be sufficient. DWR revised the daily water consumption value for the lowest weight class, 200 to 500 lb, to reflect that input. As noted in Section 2.2, washing and sanitation are not included in this variance.

Table 3-6 provides the allowable daily water consumption by Animal Type-Class, adjusted for statewide climate.

**Table 3-6 Allowable Daily Water Consumption for Horses and Other Livestock (with Statewide Average Climate Adjustment)**

Animal Type-Class	Allowable Daily Water Consumption per Animal (gallons)
Sheep, llamas, donkeys, swine, other livestock between 200 and 500 lb	8
Cattle, bulls, other livestock greater than 500 lb	11
Horses, mules	13
Milking cows	16

Key:

lb = pound

DWR also compared the calculated allowable daily water consumption values (Table 3-6) to information provided by an urban retail water supplier in southern California (Climate Zone 10) that indicated: (1) its current practices allowed for daily water use of 12 gallons per day per animal greater than 200 lb inclusive of consumption and bathing; and (2) that amount had been shown to work well in its service area.

### 3.3 Variance Options

The two dimensions of consideration associated with the variance for significant populations of horses and other livestock were use of a constant value for daily water consumption (i.e., not differentiating by Animal Type-Class), and variability in daily water consumption by Animal Type-Class with and without an adjustment for average statewide climate conditions. DWR developed three options for the calculation of efficient water use under this variance and discussed all options with stakeholders. The purposes of designing different options with various considerations were to explore pros and cons for different settings and solicit input from stakeholders regarding their corresponding reasonableness and ability to implement them. Based on the resulting findings and insights, DWR then developed the recommendations (Section 4).

#### Options for Calculating Efficient Water Use

The three options developed by DWR and discussed with stakeholders in working group meetings included:

- **Option 1** – One value for allowable daily water consumption irrespective of Animal Type-Class.
- **Option 2a** – Variable allowable daily water consumption by Animal Type-Class with statewide average climate adjustment.
- **Option 2b** – Variable allowable daily water consumption by Animal Type-Class without statewide average climate adjustment.

It may be unreasonable to assume that urban retail water suppliers would be able to track populations of horses and other livestock by factors such as weight class, development stage, or activity level. Further, development of detailed information to inform exact water use requirements would not be feasible. Therefore, options were developed for populations of horses and other livestock in general categories with no detailed specifications.

Described below, these three options were presented to stakeholders during working group meetings conducted on April 8, 2021, and July 21, 2021; and stakeholder feedback was collected and considered by DWR. A summary table of the different options is provided in Table 3-7 (following the option descriptions). Included in this table are important characteristics of each option including data requirements, data sources, and thresholds of significance.

### ***Option 1***

This option used a constant value for allowable daily water consumption, regardless of Animal Type-Class, but the number of livestock was variable and based on the qualified animals in an urban retail water supplier's service area. This option requires the least effort for the urban retail water supplier in terms of data gathering and analysis, but the urban retail water supplier would still have to determine the number of qualified animals in their service area.

#### **Calculation**

$$\begin{aligned} &\text{Variance Efficient Water Use Volume (gallons)} \\ &= (\textit{Service Area Total Number of Animals in all Animal Type Class}) \\ &\quad \times (\textit{Gallons of Daily Water Use for all Animal Type Class}) \times \textit{Days/Year} \end{aligned}$$

where,

- *Service Area Total Number of Animals in All Animal Type Class* is the total number of qualified animals (in accordance with the definition and greater than 200 lb) and based on records provided by an urban retail water supplier for its service area. This number could be obtained through site visits, surveys sent out to residential customers, new residential water service registrations or recertification process questionnaires, or other mechanisms.
- *Gallons of Daily Water Use for All Animal Type Class* is set at 8 gallons per animal per day, as described in Section 3.2.
- *Days/Year* is the number of days in a year (365 for a non-leap year and 366 for a leap year).



As Option 1 requires the least data and analysis of the 3 options and would be the least accurate, the threshold of significance was set at 5 percent of total aggregated efficient water use volume based on the four standards.

### **Option 2a**

Option 2a used values for allowable daily water consumption that vary by Animal Type-Class and were adjusted for average statewide climate (see Table 3-6 in Section 3.2). Numbers of livestock were variable as they were based on the qualified animals in each Animal Type-Class reported by an urban retail water supplier in its service area. The urban retail water supplier would need to gather data on the number of each type of qualified animal in its service area.

### Calculation

$$\begin{aligned} & \text{Variance Efficient Water Use Volume (gallons)} \\ &= \sum_{\text{Animal Type-Classes}} ((\text{Service Area Total Number of Animals in Animal Type Class}) \\ & \times (\text{Gallons of Daily Water Use for Animal Type Class})) \times \text{Days/Year} \end{aligned}$$

where,

- *Service Area Total Number of Animals in Animal Type Class* is the total number of qualified animals in a given Animal Type-Class (in accordance with the definition) and based on records provided by an urban retail water supplier for its service area. This number could be obtained through site visits, surveys sent out to residential customers, new residential water service registrations or recertification process questionnaires, or other mechanisms.
- *Gallons of Daily Water Use for Animal Type Class* is as described in Section 3.2 and shown in Table 3-6. For each Animal Type-Class, the value reflects average statewide climate effects.
- *Days/Year* is the number of days in a year (365 for a non-leap year and 366 for a leap year).

Under Option 2a, the total Variance Efficient Water Use Volume is the summation of the above information for all Animal Type-Classes claimed by an urban retail water supplier.

For Option 2a, the threshold of significance was set at 3 percent of total aggregated efficient water use volume based on the four standards. The threshold was set lower than Option 1 because this option has less data uncertainty and a more detailed analysis.

## Option 2b

Similar to Option 2a, Option 2b used values for allowable daily water consumption that varied by Animal Type-Class, but these values were not adjusted for statewide average climate effects (see Table 3-1 in Section 3.2). As in Option 2a, numbers of livestock were variable as they were based on the qualified animals in each Animal Type-Class reported by an urban retail water supplier in its service area. The urban retail water supplier would need to gather data on the number of each type of qualified animal in its service area.

### Calculation

Variance Efficient Water Use Volume (gallons)

$$= \sum_{\text{Animal Type-Classes}} ((\text{Service Area Total Number of Animals in Animal Type Class}) \times (\text{Gallons of Daily Water Use for Animal Type Class})) \times \text{Days/Year}$$

where,

- *Service Area Total Number of Animals in Animal Type Class* is the total number of qualified animals in a given Animal Type-Class (in accordance with the definition) and based on records provided by an urban retail water supplier for its service area. This number could be obtained through site visits, surveys sent out to residential customers, new residential water service registrations or recertification process questionnaires, or other mechanisms.
- *Gallons of Daily Water Use for Animal Type Class* is as described in Section 3.2 and shown in Table 3-1. Unlike Option 2a, this value does not reflect average statewide climate effects.
- *Days/Year* is the number of days in a year (365 for a non-leap year and 366 for a leap year).

Similar to Option 2a, the total Variance Efficient Water Use Volume under Option 2b is the summation of the above information for all Animal Type-Classes claimed by an urban retail water supplier.

For Option 2b, the threshold of significance was set at 3 percent of total aggregated efficient water use volume based on the four standards. Although Option 2b does not reflect climate effects, it is still considered to have less data uncertainty and a more detailed analysis than Option 1.

**Table 3-7 Summary of the Three Options for Variance for Significant Populations of Horses and Other Livestock**

Items	Option 1	Option 2a	Option 2b
Threshold of Significance	More than 5 percent of the total aggregated efficient water use volume based on the four standards without variances.	More than 3 percent of the total aggregated efficient water use volume based on the four standards without variances.	More than 3 percent of the total aggregated efficient water use volume based on the four standards without variances.
Level of Detail	One value for allowable daily water consumption irrespective of Animal Type-Class.	Variable allowable daily water consumption by Animal Type-Class with statewide average climate adjustment.	Variable allowable daily water consumption by Animal Type-Class without statewide average climate adjustment.
Equation	$\text{Variance Efficient Water Use Volume (gallons)} = (\text{Service Area Total Number of Animals in all Animal Type Class}) \times (\text{Gallons of Daily Water Use for all Animal Type Class}) \times \text{Days/Year}$	$\text{Variance Efficient Water Use Volume (gallons)} = \sum_{\text{Animal Type-Classes}} ((\text{Service Area Total Number of Animals in Animal Type Class}) \times (\text{Gallons of Daily Water Use for Animal Type Class})) \times \text{Days/Year}$	$\text{Variance Efficient Water Use Volume (gallons)} = \sum_{\text{Animal Type-Classes}} ((\text{Service Area Total Number of Animals in Animal Type Class}) \times (\text{Gallons of Daily Water Use for Animal Type Class})) \times \text{Days/Year}$
Number of Livestock	<ul style="list-style-type: none"> <li>Total number of qualified animals.</li> <li>Data could be obtained through site visits, surveys sent out to residential customers, new residential water service registrations or recertification process questionnaires, or other mechanisms.</li> </ul> <p><i>Source of data:</i> urban retail water supplier</p>	<ul style="list-style-type: none"> <li>Total number of qualified animals by Animal Type-Class.</li> <li>Data could be obtained through site visits, surveys sent out to residential customers, new residential water service registrations or recertification process questionnaires, or other mechanisms.</li> </ul> <p><i>Source of data:</i> urban retail water supplier</p>	<ul style="list-style-type: none"> <li>Total number of qualified animals by Animal Type-Class.</li> <li>Data could be obtained through site visits, surveys sent out to residential customers, new residential water service registrations or recertification process questionnaires, or other mechanisms.</li> </ul> <p><i>Source of data:</i> urban retail water supplier</p>
Gallons of Daily Water Use (gallons per animal per day)	<ul style="list-style-type: none"> <li>8 (irrespective of Animal Type-Class).</li> </ul> <p>Calculated using horse data from University of California, Davis, and cattle data from North Dakota State University (datasets are reflective of temperature but not specific to California's climate).</p> <p><i>Source of daily water use:</i> DWR</p>	<p>By Animal Type-Class:</p> <ul style="list-style-type: none"> <li>Sheep, llamas, donkeys, swine, other livestock between 200 and 500 lb: 8.</li> <li>Cattle, bulls, other livestock greater than 500 lb: 11.</li> <li>Horses, mules: 13.</li> <li>Milking cows: 16.</li> </ul> <p>Calculated using horse data from University of California, Davis, and cattle data from North Dakota State University (datasets are reflective of temperature but not specific to California's climate).</p> <p>The 16 California Climate Zones were used to estimate California climate conditions for inclusion in daily water use by Animal Type-Class.</p> <p><i>Source of daily water use:</i> DWR</p>	<p>By Animal Type-Class:</p> <ul style="list-style-type: none"> <li>Sheep, llamas, donkeys, swine, other livestock between 200 and 500 lb: 5.</li> <li>Cattle, bulls, other livestock greater than 500 lb: 10.</li> <li>Horses, mules: 12.</li> <li>Milking cows: 16.</li> </ul> <p>Calculated using horse data from University of California, Davis, and cattle data from North Dakota State University (datasets are reflective of temperature but not specific to California's climate).</p> <p><i>Source of daily water use:</i> DWR</p>
Consideration of Climate	No adjustment for local (California) climate.	Adjustment for local (California) climate (see above).	No adjustment for local (California) climate.

Key:  
DWR = California Department of Water Resources  
lb = pound

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Working group members and stakeholders generally agreed with the variance construct. They also agreed with the Animal Type-Class differentiation as well as the associated allowable daily water consumption values based on their own implementation strategies and experiences in their service areas. Also based on practices and experience, they felt that a daily water consumption value of 6 gallons per day per animal would be too low to account for water consumption by livestock in the smallest Animal Type-Class, especially in drier weather conditions, but that 8 gallons per day would likely be sufficient.

Working group members and stakeholders agreed that Option 2a was more accurate than Option 1 and was the most realistic option to address daily water consumption needs of horses and other livestock throughout the State because it factored in average statewide climate effects. They agreed that Option 2b, while more accurate than Option 1, was less accurate than Option 2a because it did not factor in average statewide climate effects.

### **3.4 Summary of Findings**

Based on research and input from working group members and stakeholders, DWR concluded that water use for significant populations of horses and other livestock should be recognized and provided through a variance. Three options were designed to estimate water use under this variance. One value for all horses and other livestock types (Option 1) would not provide sufficient information nor would it be an accurate representation of water use. The State's climate should be considered in this variance (instead of not included, as in Option 2b). Option 2a best reflected the differences in allowable daily water consumption by Animal Type-Class and was adjusted to reflect effects of the State's climate.

The threshold of significance was initially considered at three percent for the more refined options (2a and 2b) to recognize that under certain options, an urban retail water supplier could have more refined data available. However, taking into account the range of qualified animals and the variability of water consumption under service area conditions, the data resolution and accuracy may not warrant a three percent threshold of significance. For simplicity and consistency with other variances, the threshold of significance of five percent is more appropriate.

DWR concluded that the allowable daily water consumption for each Animal Type-Class (Table 3-6) should be used when calculating the total water use of horses and livestock. An urban retail water supplier would still need to determine the quantities and types of animals meeting the definition of livestock (per CFR Section 780.328) in its service area using the four Animal Type-Classes.

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## 4.0 Recommendations

This section provides DWR’s recommendations for the variance for significant populations of horses and other livestock, including guidelines and methodologies, reporting requirements, and implementation considerations.

These recommendations and the resulting variance adopted by the State Water Board do not set, rescind, or modify existing or future requirements for horses and other livestock or other purposes.

### 4.1 Summary of Recommendations

Based on the analysis and stakeholder input, DWR’s recommendations are included below. **These recommendations are contingent upon DWR-recommended ORWUS and IRWUS and their adoption by the State Water Board.**

#### Recommendations for the Variance for Significant Populations of Horses and Other Livestock

DWR recommends that a variance should be established for significant populations of horses and other livestock that are excluded from ORWUS and IRWUS. The recommended variance against ORWUS and IRWUS should have the specifications detailed in Section 4.2. The calculation of aggregated efficient water use for significant populations of horses and other livestock (Variance Efficient Water Use Volume) as part of an urban retail water supplier’s UWUO should be subject to the guidelines and methodologies detailed in Section 4.3.

### 4.2 Specifications

DWR recommends that a variance be established for “significant populations of horses and other livestock” with the following specifications.

- This variance is limited to horses and other livestock meeting the definition of CFR Section 780.328 and exceeding 200 lb.
- The types and number of livestock that can be included are those allowed on residential properties per local codes and ordinances.
- Only water supplied through a residential meter or otherwise identified residential water use within an urban retail water supplier’s service area (e.g., non-irrigation DM unless it is used for a commercial livestock operation or other non-residential purpose) is allowed.

- The Variance Efficient Water Use Volume for horses and other livestock can be calculated using number of animals in Animal Type-Class multiplied by number of gallons of daily water use for each Animal Type-Class multiplied by the number of days per year.

Variance Efficient Water Use Volume (gallons)

$$= \sum_{\text{Animal Type-Classes}} ((\text{Service Area Total Number of Animals in Animal Type Class}) \times (\text{Gallons of Daily Water Use for Animal Type Class})) \times \text{Days/Year}$$

- The maximum daily water allowances for horses and other livestock are reflective of the California Climate Zones maximum average air temperature along with livestock weights, daily water consumption rates, and air temperatures, as follows:
  - Sheep, llamas, donkeys, swine, other livestock between 200 and 500 lb (e.g., large goat): 8 gallons water use per day per animal.
  - Cattle, bulls, other livestock greater than 500 lb: 11 gallons water use per day per animal.
  - Horses, mules: 13 gallons water use per day per animal.
  - Milking cows: 16 gallons water use per day per animal.
- The Variance Efficient Water Use Volume by qualified livestock should be greater than 5 percent of the sum of the aggregated estimates of efficient water uses based on four established standards, namely, IRWUS, ORWUS, CII-DIMWUS, and WLS (UWUO\_SB).
- The calculation of estimated water use under this variance should follow the guidelines and methodologies provided by DWR (see Section 4.3).

## 4.3 Guidelines and Methodologies

DWR recommends the following guidelines and methodologies for the variance for “significant populations of horses and other livestock.”

- An urban retail water supplier will be allowed to include the variance for horses and other livestock in calculating its UWUO when all following conditions are satisfied.
  1. The use of this variance by the urban retail water supplier has been previously approved by the State Water Board. (Reminder: The State Water



Board’s approval is for using the variance, but not for the quantity of water use, which may vary every year.)

2. The Variance Efficient Water Use Volume by qualified livestock is greater than 5 percent of the sum of the aggregated estimates of efficient water uses based on four established standards, namely, IRWUS, ORWUS, CII-DIMWUS, and WLS (UWUO\_SB).
    - This condition should be verified by the urban retail water supplier every year before using the variance to calculate the UWUO.
- The Variance Efficient Water Use Volume should be calculated based on data applicable to the conditions of the previous year.
  - DWR, in coordination with the State Water Board, may recommend revisions of the guidelines and methodologies in the future, as needed.
  - Use of alternative data is allowed if the urban retail water supplier can provide evidence that the alternative data is equal to or superior to DWR-provided data or DWR-suggested referenced data. Refer to “*Use of Alternative Data*” in a later section.
  - Urban retail water suppliers should provide all necessary data and information to support the use of this variance and associated calculated amount of estimated water use to be included in UWUO. The data and information should be made publicly available. Where applicable, DWR will specify validation and certification requirements for certain data use.

For general guidelines and methodologies for using variances for calculating the UWUO, refer to *Recommendations for Guidelines and Methodologies for Calculating Urban Water Use Objective* (WUES-DWR-2021-01B, Section 6.2).

### **Methodology for Estimating Variance Efficient Water Use Volume on Urban Retail Water Supplier Level**

The recommendation for this variance allows for calculation of the Variance Efficient Water Use Volume for significant populations of horses and other livestock.

Appendix B provides a template for calculating the Variance Efficient Water Use Volume of significant populations of horses and other livestock. This template is provided for illustrative purposes and is subject to revision after the State Water Board’s adoption.

An urban retail water supplier with a significant water use that is in the scope of this variance must follow the required development steps to apply for the variance, provided it meets the requirements and threshold.

### Data Needed for Calculation

- Service area population of horses and other livestock by Animal Type-Class.
- Efficient water use by Animal Type-Class.

### Variance Efficient Water Use Volume

The Variance Efficient Water Use Volume for horses and other livestock is to be estimated using the following equation:

$$\begin{aligned} & \text{Variance Efficient Water Use Volume (gallons)} \\ &= \sum_{\text{Animal Type-Classes}} ((\text{Service Area Total Number of Animals in Animal Type Class}) \\ & \times (\text{Gallons of Daily Water Use for Animal Type Class})) \times \text{Days/Year} \end{aligned}$$

Days per year are 365 during non-leap years and 366 during leap years.

### Significance Test

The Variance Efficient Water Use Volume must be equal to or greater than the minimum volume established below.

$$\text{Minimum Variance Volume (gallons)} = 5\% \times \text{UWUO\_SB}$$

### Data Provided by the California Department of Water Resources

Urban retail water suppliers shall use the efficient daily water use for Animal Type-Classes in their calculations in Table 4-1 (values from Table 3-6). Alternative data are allowed provided they meet or exceed the accuracy of DWR provided data as described in the section below.

**Table 4-1 Animal Type-Classes and Efficient Daily Water Use**

Animal Type-Class	Daily Water Use (in gallons)
Sheep, llamas, donkeys, swine, other livestock between 200 and 500 lb	8
Cattle, bulls, other livestock greater than 500 lb	11
Horses, mules	13
Milking cows	16

Key:

lb = pound

### Data Provided or Obtained by Urban Retail Water Supplier

#### Animal Populations

The number of livestock is variable since it is based on the urban retail water supplier's service area. An urban retail water supplier will need to gather data on the number and

specific Type-Classes of horses and/or other livestock in its service area. Data can be gathered through a survey sent to residential water users, when a user registers for water use or goes through a recertification process or using another information gathering process. Required data include:

- Number of livestock per Animal Type-Class in the service area based on an urban retail water supplier’s survey or other records.
  - Number of horses and each type of livestock may also be collected to determine the number of animals in each Animal Type-Class.
  - For livestock not listed specifically in Section 3.2 (e.g., “other livestock between 200 and 500 lb” or “other livestock greater than 500 lb”), an urban retail water supplier must indicate what types of animals are being counted, that they meet the definition of “other livestock,” and document that these animals are within the Animal Type-Class categories (weight classes).

### **Summary of Guidelines and Methodologies to Calculate the Variance Efficient Water Use Volume**

A summary of guidelines and methodologies to calculate the Variance Efficient Water Use Volume for significant populations of horses and other livestock on residential parcels is provided in Table 4-2.

**Table 4-2 Summary of Guidelines and Methodologies for Calculating the Variance Efficient Water Use Volume for Significant Populations of Horses and Other Livestock**

Guidelines and Methodologies	Calculation for 5 Percent Threshold Use
Data needed for calculation	<ul style="list-style-type: none"> <li>• Number of Livestock per Animal Type-Class.</li> <li>• Gallons of Daily Water Use for Animal Type Class.</li> </ul>
Maximum allowable water use	<ul style="list-style-type: none"> <li>• Daily Water Use by Animal Type-Class in gallons:                             <ul style="list-style-type: none"> <li>– Sheep, llamas, donkeys, swine, and other livestock between 200 to 500 pounds: 8 gallons per day per animal.</li> <li>– Cattle, bulls, and other livestock greater than 500 pounds: 11 gallons per day per animal.</li> <li>– Horses, mules: 13 gallons per day per animal.</li> <li>– Milking cows: 16 gallons per day per animal.</li> </ul> </li> <li>• The values for Daily Water Use by Animal reflect climate conditions averaged across the State.</li> </ul>
Equation	$\text{Variance Efficient Water Use Volume (gallons)} = \sum_{\text{Animal Type-Classes}} ((\text{Service Area Total Number of Animals in Animal Type Class}) \times (\text{Gallons of Daily Water Use for Animal Type Class})) \times \text{Days/Year}$
Source(s) of data	<p><b>Provided by DWR:</b></p> <ul style="list-style-type: none"> <li>• Gallons of Daily Water Use for Animal Type-Class.</li> </ul> <p><b>To be obtained/developed by urban retail water supplier:</b></p> <ul style="list-style-type: none"> <li>• Number of Livestock per Animal Type-Class.</li> </ul>
Reporting requirements (provided to DWR by urban retail water supplier)	<ul style="list-style-type: none"> <li>• Number of livestock by Animal Type-Class with associated documentation.</li> <li>• Proof of compliance with all existing laws and regulations regarding populations of horses and other livestock in the urban retail water supplier’s service area.</li> </ul>

Key:

DWR = California Department of Water Resources

**Data Accuracy**

To ensure data accuracy, an urban retail water supplier must also provide a detailed description of the method(s) used to obtain horses and other livestock population data.

This description must have a description of data collection and verification processes or procedures, including, but not limited to the type(s) of animal population data collected; documentation and records retention; follow-up procedures (if necessary); and verification process and associated statistics if not verifying all data.

An urban retail water supplier does not have to verify all survey information. A statistical sample for verification (e.g., random sample of a certain percentage of customers responding positively to a survey) may be used as long as the sample and survey process is described and documentation is provided (see Section 4.5 for information on

reporting requirements). DWR recommends that the statistical sampling meet the following minimum requirements:

- Verify a random sample of accounts identified with horses or other livestock.
  - A minimum of 10 percent of these accounts, but no less than five accounts.
  - A maximum of 100 verified accounts.
- Verification can include pictures, site visits, or other methods to be described in the application documentation of animals and populations. The person conducting site visits or verifying data should be familiar with the local codes for legal limits on large animal populations in the residential areas.

Documentation on individual surveys or other records, statistical sample results, and any other data supporting the population counts and verifications should be retained for the period the data are used in this process plus three years and should be available upon request.

Data should be updated or confirmed every three years to maintain reasonable accuracy.

### **Use of Alternative Data**

If an urban retail water supplier chooses to use alternative efficient daily water use data for horses or other livestock, it must receive approval from DWR and demonstrate that the data meet or exceed the quality and accuracy of data provided by DWR by submitting a package containing the following:

1. Description of why the alternative data meet or exceed the quality and accuracy of the DWR data.
2. Description of the methodology used for quantifying the efficient animal daily water use, including data sources and any locally applicable research and literature.
3. Confirmation of the populations in the service area (e.g., if choosing to use University of California, Davis, 2014 table to quantify efficient daily water use for weight classes and activity levels of service area horse populations, documentation and methodology used to identify and confirm the weight classes and activity levels are required).
4. Verification that the animal populations considered in the variance are for residential uses, which were categorically excluded from ORWUS and IRWUS.

5. Include credentials (such as licenses, certifications, education, training, or professional background of staff) for the entity/party that conducted the research or analysis and verification.
6. Affidavit or certification of the alternative data by a qualified urban retail water supplier staff member responsible for data quality.
  - a. Certification of the alternative data by the entity/party that produced it if it was not produced by the urban retail water supplier's staff.
  - b. Referenced, published research reports do not require certification but must be cited.
7. Submit the request signed by the General Manager of the urban retail water supplier to DWR.

## 4.4 Implementation Considerations

To prepare for this variance application, an urban retail water supplier must determine the populations and types of urban horses and other livestock in its service area using data collected from residential customers, as that information is not readily available through other sources.

## 4.5 Reporting Requirements

Official documentation to verify the accuracy of the data must be submitted with the package. All data used by an urban retail water supplier in its calculation(s), regardless of whether they were obtained by the urban retail water supplier or provided by DWR, must be reported with the variance application as listed below.

- Efficient daily water use per animal by Animal Type-Class.
- Number of animals in each Animal Type-Class with associated documentation.
  - An urban retail water supplier must provide a detailed description of the method(s) used to obtain horses and other large livestock population data. This method description must include a description of data collection and verification process or procedures, including, but not limited to the type(s) of animal population data collected; documentation and records retention; follow-up procedures (if necessary); and verification process and associated statistics if not verifying all data. An urban retail water supplier does not have to verify all survey information. For example, a statistical sample for verification based on the number of customers responding positively to a

survey may be used as long as the process is described and documentation is provided.

- If an urban retail water supplier is claiming a Variance Efficient Water Use Volume for livestock not specifically listed in Section 4.2 (e.g., “other livestock between 200 and 500 lb” or “other livestock greater than 500 lb”), that urban retail water supplier must indicate the types of animals that are being counted and documentation that these animals are within the appropriate weight class.
- Proof of compliance with all existing laws and regulations regarding populations of horses and other livestock in its service area.
- All other related information (as described in Section 4.4).

Documentation on individual surveys or other records, statistical sample results, and any other data supporting the populations and verification should be retained for the period the data are used in this process plus three years.

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## 5.0 Glossary

The following key terms are listed below for easy reference. Where applicable, existing definitions from statutes and regulations are provided.

**commercial, industrial, and institutional water use.** Water used by commercial water users, industrial water users, institutional water users, and large landscape water users, as defined in California Water Code Section 10608.12(d).

**commercial water user.** A water user that provides or distributes a product or service, as defined in California Water Code Section 10608.12(e).

**consumption rate.** The average amount an element is consumed or expended during a given time interval.

**dedicated irrigation meter.** A meter used only for irrigation of outdoor landscape areas. However, a mixed-use meter with no more than five percent of total delivered water serving non-landscape irrigation purposes can also be considered a dedicated irrigation meter for the purpose of the urban water use objective and actual water use calculations and reporting.

**dedicated meter.** A meter used for outdoor water use purposes.

**industrial water user.** A water user that is primarily a manufacturer or processor of materials as defined by the North American Industry Classification System code sectors 31 to 33, inclusive, or an entity that is a water user primarily engaged in research and development, as defined in California Water Code Section 10608.12(i).

**institutional water user.** A water user dedicated to public service. This type of user includes, among other users, higher education institutions, schools, courts, churches, hospitals, government facilities, and nonprofit research institutions, as defined in California Water Code Section 10608.12(j).

**livestock.** The U.S. Code of Federal Regulations Section 780.328 defines "livestock" as, "cattle, sheep, horses, goats, and other domestic animals ordinarily raised or used on the farm. Turkeys or domesticated fowl are considered poultry and not livestock." California Civil Code Section 3080 states "livestock means any cattle, sheep, swine, goat, or horse, mule or other equines." For the purposes of variance development, only livestock greater than 200 pounds were considered because they consume more water on a daily basis than smaller livestock and could therefore have a material effect on an urban retail water supplier's water use.

**material effect.** Having real importance or great consequences. In the context of California Department of Water Resources' recommendations regarding the urban

water use objective and variances, a material effect is an effect on the urban water use objective that could influence the compliance status of an urban retail water supplier.

**performance measures.** Actions to be taken by urban retail water suppliers that will result in increased water use efficiency by commercial, industrial, and institutional water users. Performance measures may include, but are not limited to, educating commercial, industrial, and institutional water users on best management practices, conducting water use audits, and preparing water management plans. Performance measures do not apply to process water, as defined in California Water Code Section 10608.12(n).

**residential parcels.** For the purposes of variance development, residential parcels are property parcels with a residential land use designation under the governing general plans of counties and cities.

**threshold of significance.** A minimum volume of unique water use in an urban retail water supplier's service area that could have a material effect on that urban retail water supplier's urban water use objective.

**urban retail water supplier.** A water supplier, either publicly or privately owned, that directly provides potable municipal water to more than 3,000 end users or that supplies more than 3,000 acre-feet of potable water annually at retail for municipal purposes, as defined in California Water Code Section 10608.12(t).

**urban water use efficiency standards.** The standards effective through California Water Code Section 10609.4 (indoor residential use) or adopted by the State Water Resources Control Board (outdoor residential, water loss, and commercial, industrial, and institutional outdoor irrigation of landscape areas with dedicated meters) pursuant to California Water Code Section 10609.2.

**urban water use objective.** An estimate of aggregate efficient water use for the previous year based on adopted water use efficiency standards and local service area characteristics for that year, as described in California Water Code Section 10609.20, as defined in California Water Code Section 10608.12(u).

**water loss.** The total of apparent loss and real loss (California Code of Regulations, Title 23, Section 638.1(a) and Section 638.1(k), respectively) in an urban retail water supplier's system. Apparent loss means loss due to unauthorized consumption and/or nonphysical (paper) loss attributed to inaccuracies associated with customer metering or systematic handling errors. Real loss means the physical water loss from the pressurized potable water system and the urban retail water supplier's potable water storage tanks, up to the point of customer consumption.

## 6.0 References

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# Appendix A – Urban Water Use Efficiency Recommendation Package Reports Incorporated by Reference

- DWR (California Department of Water Resources). September 2022. Recommendations for Urban Water Use Efficiency Standards, Variances, Performance Measures, and Annual Water Use Reporting. DWR Report Number: WUES-DWR-2021-01A.
- DWR (California Department of Water Resources). September 2022. Recommendations for Guidelines and Methodologies for Calculating Urban Water Use Objective. DWR Report Number: WUES-DWR-2021-01B.
- DWR (California Department of Water Resources). September 2022. Recommendations for Outdoor Residential Water Use Efficiency Standard. DWR Report Number: WUES-DWR-2021-02.
- DWR (California Department of Water Resources). September. Summary of Recommendations for Variances. DWR Report Number: WUES-DWR-2021-04.
- DWR (California Department of Water Resources). September 2022. Recommendations for Variance for Significant Use of Water for Dust Control for Horse Corrals and Animal Exercising Arenas, Methods of Calculation, and Supporting Data Requirements. DWR Report Number: WUES-DWR-2021-10.
- DWR (California Department of Water Resources). September 2022. Recommendations for Variance for Significant Use of Water for Commercial or Noncommercial Agricultural Use, Methods of Calculation, and Supporting Data Requirements. DWR Report Number: WUES-DWR-2021-13.
- DWR (California Department of Water Resources). September 2022. Stakeholder Outreach Summary for Developing Urban Water Use Efficiency Standards, Variances, and Performance Measures. DWR Report Number: WUES-DWR-2021-20.
- DWR (California Department of Water Resources). September 2022. Urban Water Use Efficiency Recommendation Package: Glossary and Abbreviations and Acronyms. DWR Report Number: WUES-DWR-2021-21.

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# **Appendix B – Template for Calculating the Efficient Water Use for Variance for Significant Populations of Horses and Other Livestock**

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Recommendations for Variance for Significant Populations of Horses and Other Livestock, Methods of Calculation, and Supporting Data Requirements | Appendix B – Template for Calculating the Efficient Water Use for Recommendations for Variance for Significant Populations of Horses and Other Livestock

Horses and Livestock Variance

Calculating Amount of Water Consumed by Horses and Livestock in Service Area

Efficient Water Use Volume = (Number of Livestock by Type) x (Number of Gallons of Water Use)

<b>Equation Components</b>
<b>Number of Livestock by Type</b> The number of livestock is based on the urban retail water supplier's service area survey or other data collection method.
<b>Type of Livestock</b> The type of livestock is based on the urban retail water supplier's service area survey or other data collection method.
<b>Number of Gallons of Water Use</b> The number of gallons of water use is based on the animal type. (See chart below)

CALCULATION						
ENTER VALUES BELOW IF HIGHLIGHTED (Values will show 0 until data is entered)						
EXAMPLE Calculation						
Animal Type	Daily Water Consumption Per Animal	# Animals/Type	Total Animals in Each Category	Total Daily Water Consumption/Day (gallons/day)	Number of Days per Year (365 for normal years or 366 for leap years)*	Total Water Consumption per Year (acre-feet/year)
Sheep	8		0	0		
Llama						
Donkey						
Swine						
Other Animals 200-500 lbs*						
Cattle	11		0	0		
Bull						
Other Animals >500 lbs*						
Horse	13		0	0		
Mule						
Milking cow	16		0	0		
<b>Total Horses and/or Livestock</b>			-	-		-

Water Supplier's Total Urban Water Use Objective	
Enter your Water Use Objective in acre-feet per year	
Are you qualified to apply for or use this variance?	NO

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