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This report was written by WestWater Research, 205 South Meldrum St., Fort Collins, CO 80521; and submitted to ESMC as a deliverable.

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Introduction

Background & Purpose

The Ecosystem Services Market Consortium (ESMC) is a non-profit organization that works to compensate farmers and ranchers who improve the environment through their agricultural practices. The ESMC program seeks to reduce greenhouse gases, improve water quality, and increase other ecosystem services benefits by providing compensation to producers for modified practices. The ESMC program continues to expand with separate protocols and policies developed for common agricultural production regions in the United States. The Western Range region encompasses the majority of the Colorado River Basin and is a target region of interest for the Walton Family Foundation (WFF). ESMC and WFF are cooperating to explore the feasibility of implementing the ESMC program for the Western Range region and contracted with WestWater Research, LLC (WestWater) to evaluate supply and demand factors, such as agricultural production systems, conservation practices, and potential demand for the benefits created by implementing conservation practices. Tetra Tech, Inc. (Tetra Tech) provided support to WestWater for this project.

This project provides WFF and ESMC with information to support an evaluation of whether and how the ESMC platform can be implemented in the Western Range region. The project is divided into two parts: (1) a market supply analysis of farm and ranch practices, and activities that could generate ESMC benefits; and (2) market demand analysis of interest in purchasing ESMC credits or benefits. This report presents the results of the market demand analysis as part two.

Summary of ESMC Program

ESMC was formed in May 2019 and became a stand-alone non-profit organization in 2021. ESMC’s mission is to advance ecosystem service markets that incentivize farmers and ranchers to create sustainable agricultural sector outcomes, including increased soil carbon, reduced net greenhouse gases, and improved water quality and water use conservation. The ESMC program aims to create a national-scale program that works with farmers and ranchers to improve soil health and create natural resource impacts at significant scale by incentivizing them to adopt conservation practices. The ESMC program is targeting four environmental attributes or benefit categories:

1. **Greenhouse Gases and Carbon:** A reduction of greenhouse gases (GHGs) including methane, carbon dioxide and nitrous oxide reductions and an increase in carbon storage such as soil organic carbon.

2. **Water Quality:** An improvement to water quality, specifically measured as phosphorus, nitrogen, and sediment (or total suspended solids).

3. **Water Quantity:** A reduction of water use as diversions from natural water sources through irrigation efficiency improvements and water conservation actions.

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1 [https://ecosystemservicesmarket.org/](https://ecosystemservicesmarket.org/)
2 [https://www.waltonfamilyfoundation.org/stories/colorado-river](https://www.waltonfamilyfoundation.org/stories/colorado-river)
4. **Biodiversity**: An increase to the ecological health and species diversity.

The ESMC program is intended to function as a market. Participating ranchers and farmers can generate saleable credits as a result of implementing project activities within their operations. Credits are quantified and defined by an ESMC protocol specific to a given agricultural production region. A variety of credit buyers are represented by various sectors of the food supply chain and multi-national companies with sustainability goals. The goal is to catalyze environmentally beneficial changes to agricultural production systems through a market-based program, by incentivizing producers to implement changes and having corporate members willing to pay for such changes. Early work has indicated that there is substantial market demand for ecosystem services\(^3\). ESMC is planning to launch a national market program.

**Definition of Western Range Study Region**

As part of the initial protocol development and technical analysis, ESMC partners divided the United States into agricultural production regions based on crop type, cultivation practices, and climate conditions. These regions have been defined primarily based upon the U.S. Department of Agriculture (USDA)-Natural Resource Conservation Service (NRCS) Land Resource Regions\(^4\) although differences exist. The Western Range region under the ESMC program includes all of the area identified as Western Range in the NRCS report as well as some areas in the Colorado River Basin headwaters labeled as Rocky Mountain Range and Forest.

The Western Range region encompasses most of the southwest U.S. as shown in *Appendix A*. The region encompasses about 677,000 square miles and is characterized by an arid and semi-arid climate. Native vegetation consists mainly of grasses and shrubs that are often described as rangeland and much of the region is used for cattle grazing.

**Report Organization**

This market demand analysis is organized into the following sections:

1. **Regulatory Demand for Environmental Benefits**: This section provides an overview of the current regulatory regime for each of the four outcome attributes: carbon, water quality, water quantity, and biodiversity. Current regulations are evaluated as a driver of demand for ESMC benefits.

2. **Non-Regulatory Demand for Environmental Benefits**: This section defines the market demand among corporations or other public entities with a significant footprint in the Western U.S. Leaders from selected corporate and municipal entities were surveyed for their institutions’ current sustainability initiatives and interest in ecosystem market benefit

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\(^3\) [https://ecosystemservicesmarket.org/resources/economic-analysis](https://ecosystemservicesmarket.org/resources/economic-analysis). Potential purchases of U.S. ecosystem credits from agriculture could be as high as $13.9 billion according to an IHS Markit (formerly Informa) economic assessment released by ESMC.

3. **Summary and Conclusions**: Key findings of the analysis are summarized, and recommendations are provided about how ESMC can support demand for credits.

Overall, two types of demand will be evaluated in this report. First, demand stimulated by federal, state, or local laws or regulations that create certain environmental benchmarks (e.g., federal clean water standards) that force investment in current practices to reduce pollution or use of resources through market or non-market means. Second, voluntary commitments from companies that are seeking to reduce the environmental impact of their operations, or that of other companies within their supply chain. These commitments will be evaluated independently of regulatory factors that steer corporate operations and will examine how companies evaluate opportunities to offset environmental impacts through 3rd-party derived projects.
Regulatory Demand Drivers

Markets are often shaped by external factors that create both demand and supply. Laws, policies, and regulations that provide for certain environmental outcomes can also allow for market-based mechanisms to deliver these environmental outcomes. For instance, California’s state-regulated carbon credit market is an opportunity for entities such as ESMC to provide credit or incentive to companies covered by the market. This chapter explores the extent of regulatory factors that may influence demand for each of ESMC’s covered outcomes. For each outcome, the core regulatory driver, its geographic scope, timeline for implementation, potential impact to agriculture in the Western Range, and any existing funding incentives will be discussed.

Carbon Credits

Regulatory Driver – State Climate Plans

While there is no federal law to reduce the United States’ emissions, individual states have instead initiated their own commitments to reducing carbon emissions.

Half of the states in the Western Range have existing or planned regulatory requirements to reduce greenhouse gas emissions (GHG emissions)\(^5\). As shown in Table 1, these states have a mix of plans that are enforced via legislative statute or executive (gubernatorial) order. The 5 states that have emissions reductions plans will be discussed in further detail below. A state-by-state discussion of the specific emissions goals and plans are analyzed in Appendix B.

The states that do not have current plans — Arizona, Idaho, Texas, Utah, and Wyoming — lack any sort of regulatory or legal incentive to reduce GHG emissions. However, it should be noted that while these states do not have statewide caps on emissions or adaptation plans, Arizona, Texas, and Utah do have renewable energy portfolio standards. These standards apply only to generation of renewable energy, not towards a cap on total emissions or other mechanisms that would create a potential market for carbon credits. Additionally, the current status of any state’s response or commitment to reduce emissions can change quickly through legislation or gubernatorial order. Likewise, the states with gubernatorial orders underpinning climate emissions may have them rescinded or altered with the change of gubernatorial administrations.

\(^5\) Often, state plans refer to carbon dioxide as a catch-all term for all gases that contribute to atmospheric warming, such as “carbon credits.” In this report, GHG emissions refers to the main greenhouse gases: carbon dioxide (CO\(_2\)), methane (CH\(_4\)), nitrous oxide (N\(_2\)O), other fluorinated gases such as sulfur hexafluoride (SF\(_6\)) and hydrofluorocarbons (HFCs).

Overview of Greenhouse Gases | US EPA
### Table 1: State Emission Reduction Goals

<table>
<thead>
<tr>
<th>State</th>
<th>2030 Goal</th>
<th>2050 Goal</th>
<th>Regulatory Type</th>
<th>Natural &amp; Working Lands Emissions Reduction Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arizona</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>California</td>
<td>40% below 1990 levels</td>
<td>85% below 1990 levels by 2045</td>
<td>2019 Statute</td>
<td>2030 goal of cumulative emissions of 21.6-56.8 million metric tons (MMT) and reduction of -36.6-11.7 MMT by 2045</td>
</tr>
<tr>
<td>Colorado</td>
<td>50% below 2005 levels</td>
<td>90% below 2005 levels</td>
<td>2019 Statute</td>
<td>1 MMT by 2030</td>
</tr>
<tr>
<td>Idaho</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Nevada</td>
<td>45% below 2005 levels by 2025</td>
<td>100% below 2005 levels</td>
<td>2019 Statute</td>
<td>Reduce Ag emissions to 1.7 MMT and NWL to -5.75 MMT by 2030</td>
</tr>
<tr>
<td>New Mexico</td>
<td>45% below 2005 levels</td>
<td>-</td>
<td>2019 Executive Order</td>
<td>Reduce NWL &amp; Ag emissions by 9.9 MMT by 2030</td>
</tr>
<tr>
<td>Oregon</td>
<td>45% below 1990 levels by 2035</td>
<td>80% below 1990 levels by 2050</td>
<td>2020 Executive Order</td>
<td>Reduce by 5 MMT by 2030 and 9.5 MMT by 2050</td>
</tr>
<tr>
<td>Texas</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Utah</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Wyoming</td>
<td>-</td>
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</tr>
</tbody>
</table>

### Geographic Extent

Currently, the Federal government has a goal to reduce its carbon emissions 50% below 2005 levels by 2030. However, this goal is not Federal law, but rather an executive order established by President Biden in January 2021. Thus, it is subject to changes or rescindment in subsequent administrations. The Executive Order includes a reference to “reduce emissions from forests and agriculture and enhance carbon sinks through a range of programs and measures including nature-based solutions.” Since then, the U.S. Dept. of Agriculture (USDA) has announced a $1 billion investment in “climate-smart agriculture” that finances pilot projects to create market opportunities for agricultural products that use established practices and can measure GHG benefits. As a federal policy, the E.O. allows for projects on public or private lands across the U.S., independent of any state’s

---

6 FACT SHEET: President Biden Sets 2030 Greenhouse Gas Pollution Reduction Target Aimed at Creating Good-Paying Union Jobs and Securing U.S. Leadership on Clean Energy Technologies | The White House

7 USDA to Invest $1 Billion in Climate Smart Commodities, Expanding Markets, Strengthening Rural America | USDA
individual climate or strategy.

Recent legislation was included in the omnibus funding bill at the end of the 117th Congress in December 2022. The “Growing Climate Solutions Act” authorizes USDA to create a registry for farm, forestry, and ranch landowners to participate in voluntary environmental credit markets. The registry includes 3rd party verifiers that will measure the amount of GHG emissions reductions that have been achieved. It is expected that the next Farm Bill, developed in 2023, will provide further authorization and incentives for farmers that engage in climate-smart practices.

As the Federal government manages 260.7 million acres within the Western Range (55% of the total area), it can have a significant role in creating carbon sinks on its landscapes. Currently, there is no regulatory driver for the Federal government as a land manager to create ecosystem-benefit outcomes that align with the 50% GHG emissions reduction goal on lands that it leases to private entities, such as for livestock grazing, mining, or other resource extraction activities. Regulatory incentives to improve carbon sequestration on natural or working landscapes (NWL) that are Federally managed may exist at the state level, working with the private sector that leases from the Federal government, potentially unlocking millions of acres that otherwise would not be a target for conservation practices.

California’s carbon market, further described in Appendix B, allows projects to market offsets generated from outside the state. Only a fraction of offsets (a total of 11.8 MMT in 2023) can be credited towards total emissions by covered entities in the state, but up to half of those offsets can come from outside California. This rule effectively broadens the market for ecosystem benefit projects across the Western Range for producers that engage in climate-smart practices and participate in voluntary credit markets.

**Regulatory Incentives for Market Formation**

As noted in Table 1, the five states with committed GHG emissions reduction goals have targets to reduce GHG emissions from NWL. These lands are often perceived to be carbon sinks (sequestering more carbon than emitted), not just sources of emissions. Each states’ implementation plans often include increasing carbon sequestration on farms and ranchland from conservation practices. However, the states vary in their progress of quantifying current emissions levels from agriculture or natural lands. California and Oregon have progressed the furthest in establishing baseline amounts of carbon emissions or impacted acres.

In California, the 2030 goal is to reduce emissions by 15 – 20 MMT (capping cumulative emissions at 21.6 – 56.8 MMT). By 2045, the state plans to have a reduction of -36.6 to -11.7 MMT. To achieve this, the state will need to enroll 2.7-4.3 million acres in certain conservation practices by 2030. **Appendix B** includes a table of the conservation practices and acreage goals.

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8 Climate-focused agriculture bill hitches ride on omnibus - E&E News (eenews.net)
9 As calculated in the Phase 1 report provided to ESMC
Although California has an established statutory requirement to reduce statewide GHG emissions, there is no regulatory driver for emissions reductions from natural and working lands (other than projects that create offsets as part of the cap-and-trade program). Yet, California is investing resources and capital into generating emissions reductions projects on NWL landscapes across the state. The state is updating the original 2017 Scoping Plan, stating that the NWL Climate Smart Strategy must be established by July 1, 2023. This will create specific GHG removal targets for 2030 and beyond. The Climate Smart Strategy will also create a registry for NWL projects that are seeking funding.

Other states are still in the process of quantifying total GHG emissions from NWL and developing strategic plans to convert NWL from carbon sources to sinks, such as Nevada and Colorado. Because these states are in the earlier stages of identifying and outlining emissions/sequestration targets, it is unclear to what extent market voluntary credit markets may be used to achieve the statewide emissions targets. For instance, in Colorado, the state is examining the potential of markets to assist producers in sequestering 1 MMT by 2030. While the state released its draft Strategic Plan in November 2022, state officials also acknowledge that carbon markets may not be a panacea for reaching the sequestration target. For instance, one state official stated that, “existing markets are either too complicated or time consuming for producers to engage with, or they are not rigorous enough to verify outcomes. [Also,] Colorado soils don’t hold as much carbon as other climates and thus the payoff for farmers would likely be fairly low.”

Timeline

The five states with identified GHG emissions goals have targets levels for both 2030 and 2045-50 (except for New Mexico, which only has a 2030 goal). All states have a goal to reduce emissions by at least 40% by 2030. The most common next milestone year is 2050, although California’s next target year is 2045. The state specific NWL reduction goals also operate on 2030 and 2045 timelines.

More broadly, states without current GHG emissions goals (Arizona, Idaho, Texas, Utah, and Wyoming), may focus on targeted programs or policies to that address other environmental outcomes, but have a co-benefit of sequestering GHGs, such as soil health programs. Further, Federal programs, such as those authorized in the Farm Bill, would still provide an option for private farm & ranch owners to participate in voluntary markets for GHG emissions.

Financial Incentives

Despite the lack of legal or regulatory imperatives for carbon markets outside of California, there exist a variety of financial incentives and programs to promote carbon sequestration. The Federal government operates funding programs, primarily through USDA, to incentive the adoption of conservation practices that provide carbon sequestration benefits. Those practices, funded through

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10 Draft 2022 Scoping Plan Update (ca.gov) pg. 25.
11 NWL Strategic Plan_Public Draft Nov 2022.pdf - Google Drive
12 Conversation with Kristen Boyd, Colorado Dept. of Agriculture, 10/26/22.
the Environmental Quality Incentives Program\textsuperscript{13}, have been previously discussed in the Phase 1 report that quantified the GHG emissions sequestration potential of select practices.

In addition to EQIP, USDA also runs voluntary programs that promote the adoption of “climate-smart” practices, such as: the Agricultural Conservation Easement Program, Conservation Stewardship Program, Conservation Reserve Program, Regional Conservation Partnership Program, and Conservation Innovation Grants\textsuperscript{14}.

In February 2022, USDA announced initial funding of $1 billion for Partnerships for Climate-Smart Commodities. The initiative is designed to “expand markets for America’s climate-smart commodities, leverage the greenhouse gas benefits of climate-smart commodity production, and provide direct, meaningful benefits to production agriculture, including for small and underserved producers.” By the end of 2022, USDA has already allocated $3.1 billion to 141 projects. According to USDA, the total impact is estimated to be 25 million acres of working lands with climate-smart production practices and 60 MMT of GHG sequestered.

Of the 141 projects, 46 are estimated to be partially or wholly located in the Western Range\textsuperscript{15}. Presently, it is unclear if USDA will provide additional funding for projects in 2023 and beyond. Outside of California, no state has a carbon market established or provides related incentive financing for projects to achieve the NWL climate goals.

**Water Quality Credits**

Water quality trading is an active market-based approach to achieve improvements to water quality. The main goal of water quality trading is to control the release of pollutants into waterbodies from several sources that have a collective impact on water quality. This section discusses active water quality trading markets in the Western Range and how they may create opportunities for 3\textsuperscript{rd}-party entities to participate in water quality outcomes.

**Regulatory Driver – Clean Water Act**

Water quality regulations are governed at the Federal level by the Clean Water Act (CWA) and the Safe Drinking Water Act (SDWA), but are mainly implemented by state-level agencies. The Clean Water Act, originally passed in 1972, regulates pollutant discharges into surface waters\textsuperscript{16}. The Act is administered by the Environmental Protection Agency, which sets water quality standards for pollutants discharged from point sources. Crucially, point sources only cover physical pipes or man-made structures that release directly to surface waters. Covered entities, such as industrial facilities or municipal wastewater treatment plants, must apply for permits from the National Pollutant Discharge Elimination System (NPDES).

\textsuperscript{13} Environmental Quality Incentives Program | Natural Resources Conservation Service (usda.gov)
\textsuperscript{14} Climate-Smart Agriculture and Forestry Resources | Farmers.gov
\textsuperscript{15} Projects were listed by state, not specific regions. Partnerships for Climate-Smart Commodities Project Summaries | USDA
\textsuperscript{16} Summary of the Clean Water Act | US EPA
The Safe Drinking Water Act protects the quality of drinking water and its sources, including groundwater wells\(^{17}\). Public water supply systems must comply with treatment standards set by the EPA to remove contaminants to a certain threshold.

Farms and ranches are not covered by the CWA as they are considered non-point sources. Therefore, they do not need to obtain NPDES permits before releasing pollutants, such as nitrogen or phosphorus, into waterways. This impacts downstream users, such as public water service agencies that must treat water to comply with drinking water regulations. Wastewater treatment agencies must also comply with discharge standards and receive NPDES permits; however, waterbodies may still have elevated contaminants because of excessive discharge from non-point sources. As a result, point source regulations have eliminated much of the pollutant discharge that prompted the CWA and SDWA, and 80-90% of the remaining pollution is from non-point sources\(^{18}\).

As a result, trading within water quality credit markets provides an opportunity for point source polluters to offset their contaminant discharge by purchasing credits from reductions of pollutants within the same watershed or region. The EPA first established policy guidance for credit trading in 2003. The most common pollutants traded are nitrogen and phosphorus. Oregon also has credits for stream temperature reductions, which target salmon species that are temperature sensitive.

Trading volume remains low due to the difficulty in measuring the reduction outcomes from non-point sources, transaction costs, and risk aversion from point source polluters. Yet, there are economic advantages to trading programs. For instance, upgrading treatment plants to comply with discharge limits can cost between $15 and $47 per pound of annual nitrogen reduction. Instead, planting cover crops costs less than $5 per pound\(^ {19}\).

**Geographic Extent**

Currently, three states in the Western Range have designed rules or policies for water quality trading programs: Colorado, Idaho, and Oregon. Specific trading projects have also occurred in Arizona, California, Nevada, New Mexico, Utah, and Wyoming. A review of each state’s credit trading programs and projects is in Appendix C. A multi-state program to reduce salinity levels in the Colorado River Basin also funds water quality improvement projects.

The primary regulatory driver of water quality credit trading is to comply with the CWA and impaired waterways are an indication of where CWA compliance is being tested. Data on 303(d) impaired waterways were analyzed for the Western Range region. Streams or rivers that are impaired due to nitrogen, phosphorus, or temperature levels above TMDL thresholds were quantified. The total number of stream miles in each state for each of the three pollutants is shown below in Table 2. Maps of each type of impaired waterbody are in Appendix A.

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\(^{17}\) [Ground Water and Drinking Water | US EPA](https://www.epa.gov/water-science-glossary/water-supply-and-quality)


Table 2: Impaired Streams in the Western Range

<table>
<thead>
<tr>
<th>State</th>
<th>Temperature</th>
<th>Phosphorus</th>
<th>Nitrogen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arizona</td>
<td>-</td>
<td>8.8</td>
<td>11.9</td>
</tr>
<tr>
<td>California</td>
<td>713.8</td>
<td>-</td>
<td>35.5</td>
</tr>
<tr>
<td>Colorado</td>
<td>356.2</td>
<td>1.0</td>
<td>-</td>
</tr>
<tr>
<td>Idaho</td>
<td>332.3</td>
<td>8.6</td>
<td>-</td>
</tr>
<tr>
<td>New Mexico</td>
<td>716.8</td>
<td>19.1</td>
<td>-</td>
</tr>
<tr>
<td>Nevada</td>
<td>911.6</td>
<td>1,036.8</td>
<td>0.1</td>
</tr>
<tr>
<td>Oregon</td>
<td>795.3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Utah</td>
<td>832.6</td>
<td>195.9</td>
<td>-</td>
</tr>
<tr>
<td>Wyoming</td>
<td>2.8</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

**Temperature**

The most common land cover types within temperature impaired watersheds are shrubland and evergreen forest, with 67.8m and 31.3m acres respectively. The most common agricultural land types are grassland or pasture, with 13m acres and alfalfa, with 1.6m acres in production along temperature impaired streamways.

In California, the majority of its temperature impaired streamways are the mainstem Pit River, which drains into the Sacramento River, and the upper Klamath Basin, which has suffered from drought and irrigation diversions that reduce available streamflows. Oregon’s portion of the upper Klamath Basin also faces temperature degradation in shrubland-dominant landscapes. Utah and Nevada both have temperature degraded tributaries to the Virgin and Muddy Rivers, which flow into the Colorado River above Lake Mead. Several of Nevada’s terminus rivers in the Owyhee River Basin (that do not ultimately flow into the ocean) also are listed as temperature degraded. Grassland and pasture are the most common agricultural uses in those regions. In Colorado, listed streams are most common in the mountains that flow down to the Front Range, as well as the headwaters of the Colorado River. Reaches of the mainstem Rio Grande and its tributary streams experience temperature degradation in New Mexico, with the most common land type either shrubland or grassland/pasture.

**Nitrogen**

Only three states have nitrogen impaired rivers: Arizona, California, and Nevada. In Both California and Nevada, the impaired waters are located in the Sierra Nevada mountains. The most common agricultural land use is grassland or pasture, along with alfalfa production, totaling 402,000 and 110,000 acres, respectively. In Nevada, the impaired river is part of the Truckee River watershed near Reno, likely reflecting urban uses that contribute nitrogen to the water.

In Arizona, the affected watersheds are the Verde and Salt Rivers with a mix of shrubland, grassland, and urban uses dominating the landscapes around the impaired reaches.

**Phosphorus**

The most common agricultural land use is grassland pasture and alfalfa, with 6.3m and .85m acres, respectively. Nevada has the most stream miles impacted by phosphorus pollution. Nevada’s
impaired streams include tributaries to Lake Tahoe and the Truckee River (which drains from Lake Tahoe), the Walker River, several tributaries to the Owyhee River that are also impacted by temperature where grassland and pasture is the dominant use, and the Muddy River with irrigated pasture. Utah’s phosphorus pollution is concentrated in and around Utah Lake. The Lake is surrounded by urban developed and a mix of shrubland and grassland production. The Bear River, which flows directly into the Great Salt Lake, is a mix of irrigated agriculture and urban development that has a small stretch of excess pollution in both Utah and Idaho.

Many of the impaired streams in the Western Range are outside of current water quality trading programs, providing an opportunity to identify new credit trading markets in these impacted regions. In particular, Nevada experiences all three types of pollution, the only state to do so. The most common land uses within the state are shrubland and grassland, offering potential market pathway for water quality trading within those watersheds.

**Timeline**

While the majority of Western Range states have established statewide trading policies or have had individual trading programs, it is unclear to what extent water quality trading activity may increase. EPA guidance for establishing water quality trading programs was first published in 2003, and because all water quality trading programs are voluntary, there is no set deadline for regions to establish trading programs to meet CWA compliance.

**Financial Incentives**

As all of the water quality trading programs and projects are voluntary, there is no regulatory component that directly funds best management practices (BMPs) on agricultural lands. However, farm and ranch producers are directly compensated for installing or instituting certain BMPs that reduce pollutants in waterways. There is no standard for project payments, yet they are generally consistent throughout an entire region or trading program.

Credits may also be treated as capital assets for accounting purposes, which allows government agencies (which purchase the majority of credits in certain states) to capitalize the credit costs and finance the purchase through bonds or Clean Water State Revolving Funds\(^\text{20}\). Based on guidance from relevant state agencies, water quality credits may also be securitized financial assets, which could lead to secondary transactions among parties.

**Water Quantity Credits**

The most common regulatory driver affecting water quantity is irrigation diversion reductions. In some areas in the Western Range, overdraft of groundwater aquifers and surface water depletions are causing regulatory programs to address irrigation diversions that reduce instream water availability for fish and wildlife.

\(^\text{20}\) [PNW-Joint-Regional-Recommendations-on-WQT_ThirdDraft_2014-08-05_full1.pdf](willamettepartnership.org)
Geographic Extent

Due to the general dry climate and high desert characteristics of the Western Range, water scarcity is one of the most pressing issues within the region. There is no comprehensive Federal or State initiative or regulation to reduce water diversions. Several initiatives to address groundwater pumping and downstream surface water depletions exist within the Western Range at the local level. The examples below are not an exhaustive list of regulated groundwater basins or management districts within the Western Range but provide perspective on how local regulatory drivers may influence the demand for conservation practice adoption. Many basins that have aquifer overdraft issues regulate groundwater pumping, but not through market mechanisms that compensate producers for reducing diversions.

San Luis Valley, Colorado

The San Luis Valley is located in south-central Colorado and features the upper Rio Grande River before it enters New Mexico. It is one of the most important agricultural regions in the state, generating over $300 million in economic activity per year. The primary crops are barley, potato, and alfalfa. Molson Coors and other large brewers purchase much of the barley, and it is the second-largest potato growing region in the U.S. Its relatively high elevation (average of 7,500 feet above sea level) and dry climate (8 inches of rain per year) causes agricultural producers to rely heavily on groundwater to meet any shortfalls from precipitation. However, pumping over the last few decades has caused the water table to decline, land to subside, and water quality to degrade, increasing pumping costs and treatment costs.

After a severe drought in 2002 that reduced available surface water, the state legislature passed a bill allowing the Colorado State Engineer (which has ultimate authority over water rights) to bring the groundwater basins within the Valley into balance, protect senior water rights, and comply with the Rio Grande Compact to deliver a certain volume of water to New Mexico. Voluntary fallowing programs were established to pay producers to not irrigate, thereby reducing groundwater demand. The Colorado Rio Grande Conservation Reserve Enhancement Program (CREP) is run by the USDA Farm Service Agency and the Rio Grande Water Conservancy District (RGWCD). The CREP fallowing contracts are for 15 years, targeting a total of 40,000 acres. Short-term fallowing programs also exist for 1-4 years, paying producers $200 per acre irrigated by center pivot sprinkler systems, and $144 per acre irrigated by flood. The RGWCD has pursued and implemented several other farm water conservation programs, including farm buyouts, water source substitution projects, and payments for reduced pumping.

One drawback to these programs is that they cause land to be taken out of production, causing negative economic impacts within the Valley. Additionally, the programs do not create permanent groundwater savings, but are only able to reduce annual demand. However, CREP and the other short-term fallowing programs have not substantially raised groundwater to a sustainable level, and

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21 Groundwater-Conservation-Easements-for-Aquifer-Recovery-in-the-San-Luis-Valley-web-1.pdf (coloradoopenlands.org)
22 Colorado Division of Water Resources (rgwcd.org)
the State Engineer retains the authority to shutdown wells if necessary.

**Groundwater Basins, California**

California’s passage of the Sustainable Groundwater Management Act (SGMA) in 2014 brought the state’s groundwater basins under regulatory control for the first time. SGMA requires basins to achieve sustainable yield by 2040, defined as annual consumptive use withdrawals equaling natural recharge volume\(^{23}\). High and medium priority basins must form groundwater sustainability agencies (GSAs) and develop plans to bring the aquifer depletions into compliance. There are 12 basins in California’s portion of the Western Range that are in medium or high priority, as shown in **Table 3**.

**Table 3: SGMA Basins in California’s Western Range**

<table>
<thead>
<tr>
<th>Basin Number</th>
<th>Basin</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-002</td>
<td>Klamath River Valley - Tulelake</td>
<td>Medium</td>
</tr>
<tr>
<td>1-003</td>
<td>Butte Valley</td>
<td>Medium</td>
</tr>
<tr>
<td>1-004</td>
<td>Shasta Valley</td>
<td>Medium</td>
</tr>
<tr>
<td>1-005</td>
<td>Scott River Valley</td>
<td>Medium</td>
</tr>
<tr>
<td>5-004</td>
<td>Big Valley</td>
<td>Medium</td>
</tr>
<tr>
<td>5-012</td>
<td>Sierra Valley - Sierra Valley</td>
<td>Medium</td>
</tr>
<tr>
<td>6-005</td>
<td>Tahoe Valley - Tahoe South</td>
<td>Medium</td>
</tr>
<tr>
<td>6-054</td>
<td>Indian Wells Valley</td>
<td>High</td>
</tr>
<tr>
<td>7-021</td>
<td>Coachella Valley - Mission Creek</td>
<td>Medium</td>
</tr>
<tr>
<td>7-021</td>
<td>Coachella Valley - Indio</td>
<td>Medium</td>
</tr>
<tr>
<td>7-024</td>
<td>Coachella Valley - San Gorgonio Pass</td>
<td>Medium</td>
</tr>
<tr>
<td>7-024</td>
<td>Borrego Valley - Borrego Springs</td>
<td>High</td>
</tr>
</tbody>
</table>

Because each basin is responsible for creating and implementing its own groundwater sustainability plans (GSPs) with approval by the Department of Water Resources (DWR), it is unclear how many will ultimately use market mechanisms to compensate water users to reduce pumping diversions. The GPs of the two high priority basins are reviewed here.

The Indian Wells Valley GSA, located between the Tehachapi Mountains and Death Valley National Park, is one of the two high-priority basins in the Western Range. GSP establishes a voluntary fallowing program that allows landowners to sell Transient Pool Allocations back to the GSA\(^{24}\). The annual cost to the GSA of purchasing unused allocations from the fallowing program is expected to be $9 million.

The other high priority basin is the Borrego Springs, located between San Diego and the Salton Sea. The Borrego Springs GSA has created a water trading program that builds off of existing water credit programs by the Borrego Water District (BWD)\(^{25}\). BWD’s credit program originally began in 2005 to fallow agricultural land, supplying credits based on crop type and transferring the credits to new development to offset water demand. The GSA will allow permanent transfer or leases of baseline

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\(^{23}\) Sustainable Groundwater Management Act (SGMA) (ca.gov)
\(^{24}\) GSP Chapters — Indian Wells Valley Groundwater Authority (iwvga.org)
\(^{25}\) GSP-Combined-Appendices-Opt-WithErrorBrackets.pdf (sandiegocounty.gov)
pumping allocations to offset new development or uses. The pumping allocations will adjust annually, ratcheting down over the 20-year implementation period to bring the basin into compliance. All trades will be subject to the approval of the GSA and are designed to prevent hoarding or speculation of credits. Other GSAs within the Western Range may also establish similar trading programs but were not analyzed in this report.

**Great Salt Lake**

The Great Salt Lake surface water levels have declined to historic levels. It is currently 19 feet below its average natural level (since 1850) and has lost 73% of its historic water volume. The decline in water levels is attributable partly to withdrawals from tributary rivers for irrigation and urban use. The annual deficit of flows necessary to stabilize the lake is over 1.2 million AF. As a result, the Utah state legislature and agencies are working to create voluntary compensation programs to reduce diversions. In 2021, the Governor signed into law a bill that establishes the Great Salt Lake Watershed Enhancement Program through a $40 million Trust that will support “voluntary transactions to enhance or preserve water flows to the lake.” This Trust is currently being formed but is expecting to begin operations in 2023. The state Department of Natural Resources is also working directly with irrigation companies to identify voluntary conservation programs to improve flows into the Lake.

Other groundwater basins in the Western Range are regulated to manage aquifer levels, but do not offer incentives to reduce pumping diversions. For instance, agricultural management areas (AMAs) and Irrigation Non-Expansion Areas (INAs) in Arizona were established in 1980 to reduce overdraft. In INAs, the development of new agricultural land is prohibited and pumping in excess of 10 AFY must be reported. There are five AMAs that have individual regulatory plans to bring each AMA into safe yield by 2025. Well pumping greater than 25 AFY must be reported, and landowners must receive a permit to pump. However, market mechanisms to incentive landowners to reduce groundwater diversions have not been a solution to bring the aquifers into sustainable balance.

**Colorado River Basin**

The Colorado River provides drinking water for 40 million people and irrigated 5.5 million acres of farmland in 7 states. It is one of the most important river systems in the United States, and certainly within the Western Range. However, since 2000, annual flows have declined 20%; the two main storage reservoirs, Lakes Mead and Powell, have reached historic low levels that threaten continued hydropower operations and water delivery to users. The Secretary of the Interior is the designated watermaster for the Lower Basin (Arizona, California, Nevada) and has the authority to impose cuts or curtailments to state’s water rights due to demands continuing to exceed available supplies. Additionally, the Lower Basin states have the right to “call” the Upper Basin states to receive their annual allocation of 7.5 million AF if it is not delivered to Lake Powell. Known as a compact call, this

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26 [Emergency measures needed to rescue Great Salt Lake from ongoing collapse](byu.edu)
27 [Emergency measures needed to rescue Great Salt Lake from ongoing collapse](byu.edu)
28 [Arroyo-2021-Groundwater-Management.pdf](arizona.edu)
29 [Colorado River Basin | DNR CWCB](arizona.edu)
30 [Lower Colorado Region | Bureau of Reclamation](usbr.gov)
would likely lead to the curtailment of water rights junior to the 1922 Colorado River Compact in the Upper Basin states (Colorado, Wyoming, New Mexico, and Utah).

In June 2022, the Bureau of Reclamation Commissioner, Camille Touton declared at a Congressional hearing that all Basin states must develop plans to reduce water use to protect the water levels at Lake Powell and Lake Mead. The cuts could total 2-4 million AF\(^3\). Since that announcement, the states have been working to develop plans to reduce demand and also prevent a compact call from the Lower Basin states. Two separate funding programs, each targeting the Upper and Lower Basins, are beginning in 2023 and further described below.

**Endangered Species Act Recovery Programs**

Under the Endangered Species Act, there are recovery programs that target listed species, mainly freshwater fishes, that drive reductions to water diversions. These programs are typically voluntary and compensatory, rather than forcing non-use of water to be left instream. In the Western Range, the only recovery program for freshwater fish species in the Colorado and San Juan Endangered Fish Recovery Programs.

In Colorado, irrigation diversions often dry up a 15-mile reach of the Colorado River above Grand Junction. The reach is key habitat for four endangered fish species – the Colorado Pikeminnow, Humpback Chub, Bonytail, and Razorback Sucker\(^3\). Under the Colorado River Endangered Fish Recovery Program, water is leased from upstream storage reservoirs to supplement low flows from irrigation diversions. If the leased water was not added to the stream, water levels would drop below recommended thresholds set by the U.S. Fish & Wildlife Service that aid in the fishes’ recovery. The Program, established in the 1990s with partners including the senior irrigation rights holders in the region, has been successful enough to delist the Humpback Chub from endangered to threatened in 2021\(^3\). A similar program also operates in the San Juan River watershed, which flows from Colorado into New Mexico above Lake Powell.

Similarly, the Bureau of Reclamation leases water from the Middle Rio Grande Water Conservancy District to supplement flows in the middle reach of the Rio Grande River in New Mexico\(^3\). This stretch of the Rio Grande is often dewatered during irrigation season, reducing habitat connectivity for the silvery minnow. As part of other conservation measures, the Bureau leases water from Pueblos and other senior water rights holders for environmental purposes.

While there are other initiatives to acquire water for instream purposes to improve fish and wildlife habitat or water quality, they are typically not structured as market-based programs that compensate water rights holders for reducing withdrawals from impacted streams or aquifers. For instance, the Walker River Conservancy in Nevada acquires water rights along the Walker River to permanently dedicate for instream purposes to improve water quality in Walker Lake for native cutthroat trout\(^3\).

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\(^3\) [2022-July-18-Letter-to-Reclamation.pdf](https://usbr.gov)  
\(^2\) [Colorado River – 15-Mile Reach](https://coloradorivertrust.org)  
\(^3\) [Upper Colorado Website](https://coloradoriverrecovery.org)  
\(^4\) [NMESFO](https://mrgcd.com)  
\(^5\) Water Acquisition FAQs — Walker Basin Conservancy
Regulatory Incentives for Market Formation

Agriculture is heavily dependent on irrigation in the Western Range to meet full crop water requirements, consuming approximately 70% of all water withdrawals. As described in the Phase 1 report, Market Supply Analysis, there is approximately 127.2 million acres under current agricultural production in the Western Range. Of that, 17.9 million acres are dedicated to irrigated cropland and 1.9 million acres are irrigated pastureland for livestock. Continuing intensification of drought and regulatory responses to reduce demand force an uncertain future for irrigated agriculture in the region.

As a result of the potential compact call or across-the-board water cuts in the Colorado River Basin to protect municipal supplies, Federal and state conservation programs are likely to expand in both scope and funding to reduce consumptive use of irrigation withdrawals and provide environmental benefits. For example, approximately 5 million acres are irrigated within the Colorado River Basin. Conservation programs to ensure continued water deliveries from Lake Powell or Lake Mead are targeting irrigated agriculture throughout the Basin. As such, a large percentage of the 5 million irrigated acres are now eligible for new conservation programs in the Upper and Lower Basins.

The Upper Basin states have recently reestablished the System Conservation Pilot Program (SCPP), which will begin during the 2023 irrigation year. SCPP initially launched from 2015-2018 and conserved an estimated 47,000 AF over that period. SCPP compensates farmers and ranchers for voluntarily reducing diversions that ultimately creates “system water” that can be used to stabilize the reservoir levels downstream.

Timeline

The timeline for current and new regulatory drivers to incentivize water quantity benefits is based on local initiatives and programs. There is no global timeline to address water scarcity issues in the Western Range. Provided below are the timelines associated with the example programs described above:

Colorado River: The consensus on the urgent need to reduce withdrawals from the Colorado River system is likely to increase the pace of conservation programs and payments to landowners over the next few years. The current operating rules governing water use on the Colorado River expire in 2026. Negotiations for the next set of operating rules may address a “new normal” of reduced water supply availability, and the need for permanent conservation payments to lower demand. The Upper Colorado River Commission’s new System Conservation Pilot Program is accepting applications for 2023, with the Program running through 2026. The Lower Basin Conservation Program begins in 2023 for up to three-year contract terms (through 2025).

California Groundwater Basins: SGMA set a deadline of 2040 for California groundwater basins to achieve sustainable yield. Implementation of the GSPs began in 2020, and thus GSAs are only beginning to understand how conservation measures to reduce groundwater overdraft will work. It is possible that more GSAs will develop trading programs for allocation credits to bring basins into

36 USDA ERS - Agriculture Dominates Freshwater Use in the U.S.
37 System Conservation Pilot Program (SCPP) in 2023 – Upper Colorado River Commission (ucrcommission.com)
compliance more quickly than the 2040 deadline, particularly if California continues to experience prolonged drought periods.

**Great Salt Lake:** There is no certain deadline for enhancing flows into the Lake, but recent studies indicate that the Lake is on track to “disappear” within five years if no further action is taken.\(^{38}\) Voluntary compensation programs will likely be designed around this five-year timeline, seeking an additional 1 million AF annually to increase the surface elevation of the Lake.

**Financial Incentives**

There are market-based financial incentives for each of the programs described above:

**Colorado River:** The new version of SCPP is funded with $125 million to pay for projects through 2026. Payments will be $150 per AF of water conserved, but there is not target volume yet.

In the Lower Basin, the Bureau of Reclamation is looking to directly compensate farmers in California and Arizona to reduce diversions.\(^{39}\) Payments will be as much as $400 per AF for 3-year agreements and $330 per AF for 1-year leases. This funding is available from the $4 billion allocated to address drought in the west in the Inflation Reduction Act passed in August 2022.\(^{40}\)

**California Groundwater Basins:** SGMA-derived groundwater trading markets provide financial incentives via assessment fees or other penalties for landowners exceeding their volumetric pumping limit. The assessment, or augmentation fees, help to fund conservation practices that reduce irrigation demand or incentivize land falling. The Borrego Springs GSA is creating a credit program that will value the credits based on crop type and irrigation method.

**Colorado River Endangered Fish Recovery Program:** The Recovery Program leases water from upstream storage reservoirs to supplement stream flows. Environmental buyers for the 15-Mile Reach pay between $20-$69.75 per AF for instream flow leases.\(^{41}\)

**Great Salt Lake:** The Great Salt Lake Watershed Enhancement Program Trust is still determining the market-based incentive structures to boost the lake levels. It is anticipated that the compensation program will provide a range of short- and long-term leases, permanent acquisitions, and other compensation types that reflect the market value of water in the Great Salt Lake watershed.

**Biodiversity Credits**

**Regulatory Drivers**

**30 x 30 Initiative**

While there is currently no regulatory standard for biodiversity targets, many states are beginning to adopt target levels for conservation of land and waters that may contribute to overall biodiversity and species protection. These targets are often aligned with the 30 x 30 Initiative, which aims to conserve 30% of a state’s land and waters by 2030. The 30 x 30 Initiative was also signed by President Biden in

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\(^{38}\) [Emergency measures needed to rescue Great Salt Lake from ongoing collapse](byu.edu)

\(^{39}\) [Programs and Activities | Lower Colorado Region | Bureau of Reclamation](usb.gov)

\(^{40}\) [Reconciliation package includes $4B for Western drought resilience | The Hill](thehill.com)

\(^{41}\) [Waterlittix Data, WestWater Research](waterlittix.com)
an executive order in 2021 that aims to conserve 30% of the United States’ land and waters by 2030. However, there is not currently an established standard for what constitutes “conserved” and may be counted towards this goal. As such, states may adopt their own definitions of conserved to achieve the 30% goal. For example, rangelands with active livestock grazing or croplands in conservation may in some cases be counted as conserved.

States within the Western Range that have 30 x 30 plans include: California, Nevada, and New Mexico. California Governor Gavin Newsom signed an executive order in 2020 that establishes a Biodiversity Collaborative. The Collaborative will assess the baseline conditions of the state’s biodiversity, analyze the impacts of climate change and other stressors on biodiversity, inventory other current biodiversity initiatives across all sectors, and highlight opportunities for additional action.

The Nevada state legislature passed a resolution in 2021 supporting the 30 x 30 Initiative. The resolution “urges state and local agencies to encourage private landowners to participate in voluntary programs to protect wildlife habitat and increase carbon sequestration.”

In New Mexico, the Governor signed an executive order to protect 30% of the state’s land and waters by 2030. The Order directs relevant state agencies to leverage funding from existing state and federal wildlife or conservation programs to increase conservation on “all land types.” Presumably, this includes private lands that are also part of the state’s climate NWL strategy. In January 2023, Governor Lujan Grisham recommended establishing the Land of Enchantment Legacy Fund. The Fund outlined in the FY 2024 Executive Budget Recommendation, is a conservation fund for state programs that address environmental protection, including the River Stewardship Program and Healthy Soils Program. The Fund would have a budget of $75m over 3 - 5 years. The Fund also may provide grant funding opportunities to increase the number of protected lands to achieve its 30 x 30 target.

**Endangered Species Act**

A key regulatory driver of land management actions and decisions that affect biodiversity is the federal Endangered Species Act (and related state Endangered Species Act, such as California, hereafter ESA). The ESA, created in 1973, is the primary tool for protecting species threatened or at-risk of extinction. The ESA is enforced by the U.S. Fish and Wildlife Service. Grant funding is allocated for voluntary conservation projects to provide financial assistance to state and territorial wildlife agencies. The Cooperative Endangered Species Conservation Fund (known as Section 6) supports the development and implementation of programs to conserve species currently listed, candidate species for listing, or at-risk on non-federal lands. In FY 2021, the Section 6 grants totaled $113m under 4 different programs: Habitat Conservation Plan Land Acquisition, Conservation Planning

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**Progress Toward 30x30 — THE ROAD TO 30**

**30x30 Partnership | California Nature**

**AJR3 Text (state.nv.us)**

**Gov. Lujan Grisham sets 2030 preservation goal, protecting N.M. land, watersheds, wildlife and heritage**

**Office of the Governor - Michelle Lujan Grisham (state.nm.us)**

**Western Resource Advocates Responds to Gov. Lujan Grisham’s Budget Recommendation for the Land of Enchantment Legacy Fund - Western Resource Advocates**

**Cooperative Endangered Species Conservation Fund | What We Do | U.S. Fish & Wildlife Service (fws.gov)**
Assistance, Recovery Land Acquisition, and traditional conservation grants.

**Geographic Extent**

As described above, there are 3 states, in addition to the Federal government, that have 30 x 30 initiatives. As part of the initiative, the U.S. Geological Survey has inventoried and classified all land types in the U.S. In total, there are 93.1 million acres in the Western Range designated as currently “protected.” Figure 1 displays the total acres by state. These protected areas are referred to as “GAP Status” in 3 categories: 1) an area with permanent protection from land conversion and a management plan to maintain a natural state; 2) same as level 1, but ongoing management practices degrade existing ecosystems; and 3) an area with permanent protection but it faces extractive uses such as mining or logging. As a percentage of the total state area, the protected lands status varies from less than 1% of Texas to 24% of California. The total protected percent of each state is shown in Table 4.

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**Figure 1: Protected Lands in the Western Range**

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48 USGS PAD-US Data Explorer
### Table 4: Protected Lands in the Western Range

<table>
<thead>
<tr>
<th>State</th>
<th>Western Range GAP Status (acres)</th>
<th>Percent of WR Protected</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>AZ</td>
<td>4,555,568</td>
<td>3,698,883</td>
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<tr>
<td>CA</td>
<td>12,260,712</td>
<td>3,909,761</td>
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<tr>
<td>CO</td>
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<tr>
<td>ID</td>
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<tr>
<td>NM</td>
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<td>3,347,303</td>
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<td>OR</td>
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<td>2,780,508</td>
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<td>TX</td>
<td>622,532</td>
<td>188</td>
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<td>UT</td>
<td>1,528,171</td>
<td>2,669,655</td>
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<tr>
<td>WY</td>
<td>4,319,382</td>
<td>888,898</td>
</tr>
<tr>
<td>Total</td>
<td><strong>32,867,206</strong></td>
<td><strong>24,243,012</strong></td>
</tr>
</tbody>
</table>

### Regulatory Incentives for Market Formation

As states and Federal land management agencies begin to determine where and how to classify additional lands as “protected” to achieve the 30 x 30 goal, certain working lands could be considered eligible for “protected” status. In particular, working farm and ranch lands with a conservation easement may be considered protected because of the easement’s perpetual restrictions on development or other uses. Likely, these lands would stay in continued production, although some may be considered for retirement and receive funding to “restore” them to a prior natural state.

Enforcement of the ESA has had a large, and at times, adversarial impact on agriculture within the Western Range. Regulatory actions, such as restricting the use of certain pesticides to promote the recovery of pollinator bee species, can affect agricultural production. As a result, landowners often feel antagonistic toward Federal and state land managers.

However, in some cases, collaborative partnerships that tackle the challenge of production and protection together have led to positive outcomes for the species and landowners. The Sage Grouse Initiative is a partnership organized by the Natural Resources Conservation Service (NRCS) to conserve habitat for the imperiled sage grouse. The Initiative is designed to prevent further habitat fragmenting and degradation that would prevent the bird from being listed under the ESA and thus triggering more draconian regulatory restrictions. It is a partnership between NRCS, state agencies and over 700 landowners in 11 states to fund and implement conservation projects in core sage grouse habitat. Over 40% of the grouse’s habitat is on private lands, but conservation projects can also be used on public lands with livestock grazing leases.

This collaborative conservation effort is an example of how regulatory actions to protect or promote

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49 [Assessing Pesticides under the Endangered Species Act | US EPA](https://www.epa.gov/)

50 [For Landowners - Sage Grouse Initiative](https://www.sagegrouse.org/)

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biodiversity can also improve outcomes for landowners. Landowners receive funding (typically via EQIP) to install fencing or livestock water tanks that allow for rotational grazing and promote the recovery of sagebrush-steppe grasslands that are key to the protection of the grouse.

**Timeline**

The 30 x 30 Initiative has a self-imposed deadline of 2030. Most states and the federal land management agencies are still determining how to protect landscapes that meet the goals of the Initiative. It is possible that states accelerate the pace of land conservation between 2023-2030 to meet the deadline. However, as this is not a true regulatory requirement, there is no penalty for not meeting the 2030 deadline.

For Endangered Species Act programs, there is no set deadline for the recovery of species. Rather, species are often listed for decades before being dropped to threatened, let alone considered fully recovered. For example, the humpback chub was down listed in 2021 from endangered to threatened after originally being listed in 1967\(^51\). Yet, the same level of protection and actions exist to secure existing populations of the species.

**Financial Incentives**

There are two main types of financial incentives for protection of private lands – tax deductions or credits for conservation easements, or direct funding of permanent protection. Conservation easements permanently protect open space or working lands that can contribute to the 30 x 30 Initiative. The federal government offers a tax deduction for donation of conservation easements, allowing landowners to deduct 50-100% of their income against the donated conservation value\(^52\). Several states, including Colorado and New Mexico in the Western Range, also offer a tax credit for the donated conservation value.

Direct funding often occurs through Farm Bill conservation programs, such as the Agricultural Land Easement Program\(^53\). This program provides matching grants to state agencies or land trusts to purchase easements on agricultural land. Similar federal programs target wetlands or forests. As described above, the U.S. Fish & Wildlife Service administers Section 6 grants, which fund land conservation projects (not permanent acquisition) for endangered species habitat.

\(^{51}\) Humpback Chub (Gila cypha) | U.S. Fish & Wildlife Service (fws.gov)
\(^{52}\) Income Tax Incentives for Land Conservation - Land Trust Alliance
\(^{53}\) Agricultural Land Easements | Natural Resources Conservation Service (usda.gov)
Non-Regulatory Demand Drivers

Regulatory drivers can only partially address demand for GHG emissions, water quantity, water quality, or biodiversity outcomes. Voluntary demand drivers, such as corporate sustainability commitments, are a growing factor in ecosystem outcome trading markets. This section reviews relevant corporate sustainability plans or initiatives for companies with a footprint in the Western Range and analyzes the results of several surveyed companies for their interest in funding on-farm conservation practices that address one or more of the four identified outcomes.

Demand Factors for Voluntary Targets

There are several factors that determine companies’ potential interest in ecosystem service benefit outcomes. One, discussed in the previous chapter, is a regulatory requirement to offset or mitigate certain environmental harms, such as GHG emissions or water quality degradation. Other motivating factors include risk mitigation, financial opportunities, or reputational risk. Mitigating climate change risk, such as prolonged drought that may reduce crop yields for agricultural companies, can allow businesses to adapt to changing conditions while continuing to meet its underlying business goals. Mitigating or adapting to climate change can also create operational efficiencies or reduce costs that improve a company’s bottom line, such as reducing packaging waste, or improving industrial water use. Finally, consumers are increasingly seeking more sustainable products or buying from companies that are investing in sustainable initiatives. Businesses that do not engage in such practices, or do not act to mitigate environmental impacts, face risk to corporate reputations, or negative perceptions of their brand.

Companies are responsible for 70% of global emissions, in addition to a major source of water withdrawals. As the urgency for global action on climate change has increased, companies have responded by aligning themselves with global accords to limit emissions to 1.5 degrees Celsius of warming. The 1.5-degree target was set at the 2015 United Nations Conference in Paris and is widely accepted as the upper limit to prevent the worst effects of climate change. Large, multi-national companies, as well as smaller businesses, are setting targets to reduce GHG emissions, improve water use efficiency, or achieve other environmentally beneficial outcomes.

Corporate interest in sustainability initiatives provides an opportunity for non-governmental groups (NGOs) or other related third-party groups to advise, design, partner, monitor, or implement projects with a demonstrated environmental outcome such as carbon sequestration or water conservation. Entities such as ESMC, the CEO Water Mandate, or Business for Water Stewardship are able to connect with companies that are seeking to, for example, reduce water security risks for their own operations, or improve local water quality as a community stakeholder.

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54 How companies manage sustainability | McKinsey
55 Water Stewardship 101: The Basics → The Business Case for Water Stewardship - CEO Water Mandate University
56 Companies - CDP
Data Collection & Analysis

To understand how ESMC can engage or partner with companies or other entities on the four environmental outcomes, WestWater conducted a research effort to collect data from entities that have a footprint, or physical presence within the Western Range. These companies are from industries including agriculture or food processing, technology, large municipalities, think tanks or NGOs, and consumer packaged goods (CPG) companies. Because the focus of ESMC’s work is generating environmental benefits through on-farm or on-ranch conservation practices, particular emphasis was placed on identifying agricultural companies or food processors. Companies from specific agricultural sectors were identified, including:

- Beef
- Cotton
- Dairy
- Grains Processing

These sectors were selected because of their particular impact and scale within the Western Range. In particular, 5.9 million acres is devoted to alfalfa hay production, and 109.3 million acres to irrigated or dryland pasture that is key forage for beef and dairy production. Approximately 1.6 million acres are dedicated to small grains production, and 350,000 acres to cotton production. CPG companies, such as Walmart or Frito-Lay that do not directly own farmland but contract with growers as part of their supply chain are also critical to understanding corporate interest in environmental outcomes.

As a first step, companies within the selected industries were identified to understand if they grow crops (directly or as part of their supply chain) or otherwise have a presence within the Western Range. In some cases, such information was readily available from companies directly, or on trade association websites (e.g., National Cattlemen’s Beef Association).

However, companies often do not disclose location information of where crops are produced beyond broad geographical areas, such as “the United States,” or “Oregon.” That can make it difficult to assess whether companies are directly within the Western Range and as such would be interested in ESMC’s work in the region.

Second, publicly available data was assessed from companies that have released disclosures or goals related to each of the four ecosystem outcomes. Finally, all companies and entities were contacted for discussion of their internal goals or metrics, as well as broader ideas on environmental benefit markets. The questions are listed below.

Corporate Demand Survey Questions

1. Does your company (or any of its suppliers) currently have any commitments to reduce or offset its impact in any of the four environmental benefit categories (carbon, water

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57 See WWR Phase 1 Report, Market Supply Analysis.
quality/quantity, biodiversity)?

a. If so, what are those targets?

2. Does your company currently purchase offset credits or participate in other sustainability programs?

a. If yes, where? How many credits? How often?

b. If not, is it willing or interested in doing so?

3. Is there an annual goal in mind for funding sustainability efforts? Is there a minimum time scale of benefits necessary to make a commitment (i.e., credits generated over 1, 5, or 10 years)?

4. Are there additional benefits that your company is looking for (i.e., currently purchasing carbon credits but interested in water quality credits, or methane reductions)?

5. Is there a minimum or maximum price that your company is willing to pay either on a per unit of benefit basis or on a per-project basis? Or how do you approach the value question when looking at different sustainability projects?

6. Is your company interested in working directly with producers (farmers/ranchers) or a 3rd-party intermediary (e.g., ESMC)?

7. What internal process do you run before investing in projects or purchasing credits?

8. Generally, what concerns do you have about investing in environmentally beneficial projects, or purchasing credits? What opportunities do you see?

9. At a high-level, please describe the location of your operations in the Western U.S. to help us understand potential environmental impacts in this region. Where are your farm fields, production and processing facilities, and markets for your product?

10. What are internal drivers or strategies that your company has to reduce or offset their impacts in carbon, water quality, etc.

Data Results & Findings

A total of 39 entities were contacted directly for further discussion. Only 8 responded, either willing to be interviewed or declining the interview but providing further information about participating in ecosystem markets. The full list of contacted entities is in Table 5 with their contact status and sustainability targets. Additional organizations are also listed in the table that could not be contacted directly or their presence within the Western Range could not be determined. Each company’s or municipality’s sustainability goals are discussed individually in Appendix D.
<table>
<thead>
<tr>
<th>Company</th>
<th>Industry</th>
<th>Contact Status</th>
<th>Notes</th>
<th>WR Footprint</th>
<th>Climate</th>
<th>Water Quality</th>
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</thead>
<tbody>
<tr>
<td>JBS</td>
<td>Beef</td>
<td>Declined Interview</td>
<td></td>
<td>AZ, CA, UT</td>
<td>Net-zero by 2040 against 2019 baseline. North American operations reduced nearly 20% since 2015.</td>
<td>Reduce water use intensity by 15% by 2030</td>
<td>-</td>
<td>Zero deforestation by 2035, Invest $100MM by 2030 in fostering innovation.</td>
</tr>
<tr>
<td>NCBA</td>
<td>Beef</td>
<td>Not Contacted</td>
<td>Demonstrate the climate neutrality of U.S. cattle production by 2040.</td>
<td></td>
<td>-</td>
<td>Member of AG water network</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Five Rivers Cattle</td>
<td>Beef</td>
<td>Interviewed</td>
<td>Member of U.S. roundtable for sustainable beef</td>
<td>Northern CO</td>
<td>Goal to turn byproduct into renewable fuel</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>JR Simplot</td>
<td>Beef</td>
<td>Did not respond</td>
<td></td>
<td>Western US</td>
<td>Reduce emissions 20% per ton product by 2030</td>
<td>Reduce worldwide operational water use 15% per ton of product 2030</td>
<td>-</td>
<td>Foster soil health and nutrient stewardship</td>
</tr>
<tr>
<td>Smithfield</td>
<td>Beef</td>
<td>Did not respond</td>
<td></td>
<td>Western US</td>
<td>30% reduction by 2030. Reduce NOx to zero</td>
<td>-</td>
<td>80.828gal withdrawal in 2020; &quot;reappraise entire U.S water supply footprint&quot;</td>
<td></td>
</tr>
<tr>
<td>Olam Foods</td>
<td>Cotton</td>
<td>Did not respond</td>
<td>No specific reporting for US operations</td>
<td>South Arizona</td>
<td>-</td>
<td>Partner with California water action collaborative</td>
<td>Protect and restore degraded soil</td>
<td></td>
</tr>
<tr>
<td>Liberty Agricultural Cooperative Association</td>
<td>Cotton</td>
<td>Did not respond</td>
<td>Has exclusive marketing agreement with Olam</td>
<td>AZ, CA, TX</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
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<tr>
<td>Company</td>
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<tr>
<td>Darling Ingredients</td>
<td>CPG</td>
<td>Not Contacted</td>
<td></td>
<td></td>
<td>Reduce energy consumption by 5% by 2025</td>
<td>5% less water withdrawal per unit processed by 2025</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Nestle Waters</td>
<td>CPG</td>
<td>Did not respond</td>
<td>Investing $3 Billion over next few years</td>
<td>AZ</td>
<td>Net zero by 2050</td>
<td>Protect, renew, and restore water</td>
<td>Regenerative agriculture and forest positive strategy</td>
<td>-</td>
</tr>
<tr>
<td>Dow</td>
<td>CPG</td>
<td>Did not respond</td>
<td></td>
<td>CA</td>
<td>Net zero 2050, Reduced GHG by 15% last 15 years</td>
<td>Use Innovative irrigation technologies</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Anonymous</td>
<td>CPG</td>
<td>Interviewed</td>
<td>CO, ID, TX</td>
<td></td>
<td>100% renewable fleet</td>
<td>Reduce water use intensity by 4.8% annually</td>
<td>Sustainable ag sourced corn and potatoes.</td>
<td>-</td>
</tr>
<tr>
<td>Kroger</td>
<td>CPG</td>
<td>Did not respond</td>
<td>Western Slope</td>
<td></td>
<td>30% reduction of GHG emissions by 2030.</td>
<td>Reuse and manage water discharge to protect local water sources</td>
<td>Water reduction and repurposing</td>
<td>-</td>
</tr>
<tr>
<td>Navajo Trucking</td>
<td>CPG</td>
<td>Did not respond</td>
<td>AZ, CO, UT</td>
<td></td>
<td>Reduce GHG</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Sysco</td>
<td>CPG</td>
<td>Did not respond</td>
<td>Western Slope, CO</td>
<td></td>
<td>27.5% reduction by 2030. Set science-based targets for suppliers by 2026</td>
<td>2021 9.9M pounds of pesticides avoided</td>
<td>Indoor farming (95% less water intensive)</td>
<td>Sustainable ag practices</td>
</tr>
<tr>
<td>ConAgra</td>
<td>CPG</td>
<td>Did not respond</td>
<td>Western Range</td>
<td></td>
<td>Scope 18.2 reduce GHG emissions by 25% and scope 3 GHG emissions 20% by 2030.</td>
<td>2021 CDP water response survey to implement best management practices for water quality</td>
<td>Water Use Report lists locations of low, medium and high risk water stress Med-High - Denver/Aurora; Oakdale, CA = high-risk</td>
<td>Partner with US Farmers &amp; Ranchers In Action, farmers in supply-chain do a Good Ag Practices (GAP) survey to minimize ESK risks -- include soil health (crop rotation, cover crops, min</td>
</tr>
<tr>
<td>Company</td>
<td>Industry</td>
<td>Contact</td>
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<tr>
<td>Utah's Own</td>
<td>Dairy</td>
<td>Did not respond</td>
<td></td>
<td>UT</td>
<td>25% GHG emissions by 2025, 30% by 2030</td>
<td>Reappraise our entire U.S. water supply footprint and adopt internationally recognized water stewardship standards by 2025.</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Danone</td>
<td>Dairy</td>
<td>Did not respond</td>
<td></td>
<td>CO</td>
<td>Goal of net zero; 19.7% of key ingredients (by vol.) sources from farms that are transitioning to regen ag (target of 15%)</td>
<td>Increase buffer zones of at least 15% to decrease run off. 2020 require suppliers to set up water plans.</td>
<td>Goal of becoming ‘water positive’. Integrate SDG 6, SDG 8, and SDG 15. Reduce total water use by 25% through better irrigation management. By 2030, 100% of 55 watersheds in highly stressed areas will have preservation and restoration plans.</td>
<td>Working on regen ag practices 2030. Clean supply chain 2025. Responsible suppliers 2025.</td>
</tr>
<tr>
<td>Laprino</td>
<td>Dairy</td>
<td>Declined interview</td>
<td>Goals align with SDGs. $50 MM by 2025 in projects for energy use.</td>
<td>Northern Colorado, San Joaquin Valley CA, Southeastern NM</td>
<td>2030 goal to reduce absolute emissions by 305. Carbon neutral by 2050.</td>
<td>Use wastewater to offset water withdrawals</td>
<td>Water intensity decreased 7% in 2021 from 2020. Reduce water intensity by 20% in gal/1000 lbs. of milk.</td>
<td>-</td>
</tr>
<tr>
<td>Company</td>
<td>Industry</td>
<td>Contact Status</td>
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<tr>
<td>Dairy Farmers of America</td>
<td>Dairy</td>
<td>Did not respond</td>
<td>Goals align with SDGs. Gold Standard Dairy Program.</td>
<td>Northern CO, Utah, NV, CA</td>
<td>Reducing emissions by 30% by 2030, GHG neutral by 2050.</td>
<td>Water Recycling</td>
<td></td>
<td>Regenerative ag. practices (92% have soil management plans to improve soil health), nutrient management</td>
</tr>
<tr>
<td>Dairy West</td>
<td>Dairy</td>
<td>Interviewed</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>CEO Water Mandate</td>
<td>ESG</td>
<td>Interviewed</td>
<td>Works with companies to improve water sustainability</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Sunkist</td>
<td>Fruit</td>
<td>Did not respond</td>
<td>No sustainability commitment/plan</td>
<td></td>
<td></td>
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<tr>
<td>Dole</td>
<td>Fruit</td>
<td>Did not respond</td>
<td></td>
<td>Southern CA, CA</td>
<td>Net-zero by 2030</td>
<td></td>
<td>10% overall water reduction for all Dole owned operations by 2030</td>
<td></td>
</tr>
<tr>
<td>Driscoll</td>
<td>Fruit</td>
<td>Did not respond</td>
<td></td>
<td>Oregon</td>
<td>&quot;Protect water quality&quot;</td>
<td></td>
<td></td>
<td>Bring overdrafted groundwater basins into balance</td>
</tr>
<tr>
<td>Morton’s orchards</td>
<td>Fruit</td>
<td>Not Contacted</td>
<td></td>
<td>NW CO</td>
<td>Solar panels to reduce footprint</td>
<td></td>
<td></td>
<td>Efficiently irrigate by microjets Best management practices to enrich soil, manage water, control pests and disease</td>
</tr>
<tr>
<td>Bay State Milling</td>
<td>Grains</td>
<td>Did not respond</td>
<td>Soil health practices, water conservation, and other best management practices per farm operations.</td>
<td>AZ, CO</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Modelo</td>
<td>Grains</td>
<td>Did not respond</td>
<td></td>
<td>ID</td>
<td>-</td>
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<td></td>
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<tr>
<td>Company</td>
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<tr>
<td>ADM</td>
<td>Grains Processing</td>
<td>Did not respond</td>
<td>Carbon capture and sequestration facility in IL permanently store more than 3.5 million metric tons of carbon</td>
<td>CO</td>
<td>25% GHG reduction by 2035, carbon neutral for U.S. flour milling operations in 2021. Developing global improvement strategy in priority watersheds by 2025.</td>
<td>10% reduction in water intensity by 2035</td>
<td>100% deforestation by 2025. Sustainable ag practices for wheat acres that contribute to 10% volume in US facilities.</td>
<td>Regenerative ag, eliminating deforestation</td>
</tr>
<tr>
<td>Coors</td>
<td>Grains Processing</td>
<td>Interviewed</td>
<td>Molson Coors beverage company</td>
<td>San Luis Valley CO</td>
<td>2025 50% reduction of CO2</td>
<td>-</td>
<td>2025 10% less water for barley than 2016. By 2025 brew beer with 22% less water than 2016. Restore 3.5 billion gal of water in stressed watersheds by 2025.</td>
<td>-</td>
</tr>
<tr>
<td>ABInBev</td>
<td>Grains Processing</td>
<td>Did not respond</td>
<td>Western Range</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>“By 2025, 100% of our communities in high-stress areas will have measurably improved water availability and quantity”</td>
</tr>
<tr>
<td>Phoenix</td>
<td>Municipal</td>
<td>Did not respond</td>
<td>Colorado River Resilience Fund, Sustainable purchasing policy</td>
<td></td>
<td></td>
<td></td>
<td>2050 goal is to maintain clean and reliable 100-year supply of water</td>
<td>Last 20 years per capita water usage decreased 20%</td>
</tr>
<tr>
<td>Company</td>
<td>Industry</td>
<td>Contact Status</td>
<td>Notes</td>
<td>WR Footprint</td>
<td>Climate</td>
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<tr>
<td>Denver</td>
<td>Municipal</td>
<td>Interviewed</td>
<td>Climate Protection Fund</td>
<td>65% reduction in emissions by 2030 and net-zero by 2040.</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Salt Lake</td>
<td>Municipal</td>
<td>Did not respond</td>
<td></td>
<td>80% reduction GHG by 2040</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>El Paso</td>
<td>Municipal</td>
<td>Did not respond</td>
<td>Focused on renewable energy</td>
<td></td>
<td>-</td>
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<td></td>
</tr>
<tr>
<td>Las Vegas</td>
<td>Municipal</td>
<td>Did not respond</td>
<td>&quot;NV Energy...receives 100% of energy it needs from renewable sources&quot;</td>
<td>Regional management efforts by Southern NV Water Authority</td>
<td>&quot;Southern Nevada will soon surpass the region’s 2035 goal to reduce consumption through conservation to 199 GPCD.&quot;</td>
<td>Adopted urban forestry program to assist with 2050 master plan’s urban forestry goal.</td>
<td></td>
<td></td>
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<tr>
<td>Albuquerque</td>
<td>Municipal</td>
<td>Did not respond</td>
<td>Reduce GHG by 26-28% below 2015 by 2025</td>
<td>Revise city water code to increase gray and black water reclamation and other water technologies</td>
<td>Create climate action plan water budget</td>
<td>Greening efforts in frontline communities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salt River Project</td>
<td>Power</td>
<td>Not Contacted</td>
<td>Reducing GHG emissions 65% by 2035 and 50% by 2050</td>
<td>Store 1 million AF underground. Partnerships with Valley cities to identify programs to conserve 15,300 AF by 2035.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Arizona Power Company</td>
<td>Power</td>
<td>Not Contacted</td>
<td>AZ Carbon free electricity to consumers by 2050</td>
<td>-</td>
<td>-</td>
<td>Protecting wildlife, managing trees and vegetation.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SoCal Edison</td>
<td>Power</td>
<td>Not Contacted</td>
<td>CA Zero GHG emissions by 2045</td>
<td>-</td>
<td>-</td>
<td>-</td>
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</tbody>
</table>

[Table with data about companies and their climate protection plans and strategies]
Of the 45 entities listed above, 26 (57%) have a defined goal or plan to reduce GHG emissions. An additional 8 companies or organizations only refer to using renewable energy as part of their climate plan. The 26 companies or municipalities most commonly refer to reducing GHG emissions by a certain percentage by 2030 or 2040. Some commit to net-zero emissions, ranging from a deadline of 2030-2040. A portion of the climate reports disclose progress on current GHG emissions, along with future plans. However, the majority of climate plans refer to future emissions reductions only.

Water quality reporting is less well-defined, particularly among the agriculture companies. Only 16 entities have a plan or commitment to improve water quality. Of those, 3 report a metric goal. For example, Danone, headquartered in Broomfield, CO, requires a 15% increase in use of buffer zones to reduce water and nutrient runoff. The dearth of water quality reporting and defined goals may be due to the fact that food processing plants or other industrial facilities are already subject to water quality permitting and have NPDES permits. Companies are also not responsible for the water quality discharge of their suppliers. Companies such as Danone are the exception to this, working with suppliers to improve their operations that result in less nutrient runoff and other pollution.

Goals and plans to improve water use are more common than water quality plans, a total of 29 companies disclose water use or have a plan to become “water positive.” 15 companies define a metric or goal to improve water use within their operations. For example, Danone is integrating its water-related operations with the U.N. Sustainable Development Goals, as well as reducing total water use by 25% through better irrigation management. It is also developing “preservation and restoration” plans for 55 high-stress watersheds where it has operations. Often, the listed companies describe partnerships or efforts with NGOs, such as the CEO Water Mandate to improve water stewardship. However, other companies, like Nestle Waters, only mention a goal to “protect, renew, and restore water.”
Efforts to improve biodiversity or conservation are declared by 21 companies. However, only 5 disclose a specific metric or goal. For instance, Smithfield Foods, has implemented “sustainable farming practices” on over 1 million acres of farmland within the U.S. Most commonly, companies reference installing “regenerative agriculture practices” that has a related biodiversity outcome. The Dairy Farmers of America, a cooperative group, discloses that 92% of its members have a soil health plan. Other companies, notably Apple and Amazon, refer to reducing deforestation, which may include purchasing offsets.

Some companies requested anonymity to discuss non-public information related to their operations or sustainability initiatives. Therefore, quotes or specific information are not attributed directly to any individual and conversations are summarized. Throughout the interviews, several themes emerged regarding corporate goals and potential demand for ecosystem service market outcomes.

Prominent themes from the interviews include:

- **Focus on direct emissions reductions.** Companies are initially focused on reducing GHG emissions directly through their operations, rather than purchasing offsets or other similar types of credits. According to an employee at a consumer-packaged goods (CPG) company with agricultural suppliers, direct reductions are important to the company because of the operational efficiencies associated with it. After this company achieves its interim reduction goal by 2030, it may consider purchasing third-party emissions outcomes to achieve its net-zero goal. An official with the City of Denver also declared that the city is only looking to directly reduce emissions (to zero) by 2040. For water quality, it would only look to upstream water quality protection projects if there was a “future regulatory requirement” it could only meet by looking at upstream projects in the South Platte Basin.

- **Projects must be “local.”** In particular, companies that are working to improve water stewardship or have water-positive goals are interested in projects local to their operations. The emphasis on locality helps companies improve their community relations and stakeholder relations. While what is “local” may be defined on a project-by-project basis, this is the prevailing sentiment regarding potential water quality or water quantity projects. While some companies have anti-deforestation goals and may be willing to purchase offsets from international reforestation projects, on-farm and ranch projects must be local to where companies have a facility or suppliers.

- **Sustainability initiatives can be siloed throughout different companies.** Often, companies have split management of climate and water-related stewardships initiatives throughout different departments within a company. For instance, Amazon has an office focused on water-stewardship projects related to its data centers that does not work on any GHG emissions reductions. This fragmentation of sustainability-related efforts can make it difficult for a company to evaluate the co-benefits of projects that sequester carbon and improve water use efficiency; in particular for on-farm projects in the Western Range. The scale of outcomes (e.g., tons of carbon reduced, gallons of water conserved) are too different for co-investment opportunities to be cost-effective. Program managers for water or climate efforts may have different metrics or internal assessments used to evaluate projects. However, for agricultural companies, siloing may be less of a barrier as operations can be
consolidated into one department. For instance, 5 Rivers Feedyards has one environmental sustainability program office.

- **Companies are using established verification methods or protocols.** Currently, companies that are actively engaged in carbon reduction or sequestration projects are using carbon offset protocols, such as the American Carbon Registry. On water replenishment projects, companies work through entities such as the Alliance for Water Stewardship to measure and verify water conservation outcomes. However, there is a broad range of what types of projects qualify for replenishment credits, non-diversion, or off-take and they can be defined by the applicants. Water stewardship projects and markets are “immature” as described by one former executive at a technology company and it can be difficult to know what exactly a company is buying when it agrees to a contract for water replenishment. The standard verification tool used by companies is the World Resources Institute’s volumetric water benefit account tool to verify outcomes. Companies may be wary of engaging with another provider that has a separate verification system or protocol.

- **Companies may prefer to engage directly with stakeholders rather than with third-party groups.** In particular for water stewardship projects, companies are seeking to engage with local stakeholders to identify opportunities for water replenishment outcomes. This allows companies to boost their brand profile and also better control project design and outcomes. However, if third parties such as ESMC have existing relationships with producers or community groups in a particular area, companies would be interested in investing in those projects. Interviewees described projects with a defined scope or outcome related to water quality as a focus area where a third-party provider could add value to companies’ sustainability efforts.
Summary & Conclusions

This chapter summarizes and discusses the key results and findings.

Summary

Regulatory Drivers

With the exception of California, states that have committed to GHG emissions reduction targets are in the nascent stages of inventorying emissions and identifying pathways to sequestration on natural and working lands. Many states issued executive orders or passed bills in 2019-2020 and thus regulatory changes are expected to continue as states work towards implementation and on-the-ground results. Thus, regulatory demand for carbon credits or the creation of carbon markets is likely to change over the coming years. States such as Colorado that have identified voluntary market-based incentives for GHG emissions or ecosystem services have not yet declared how these markets may function. Regulatory demand for third-party, market-based credits is currently low but may increase as states look to increase the rate of emissions reductions and potential sequestration from key sectors, including natural and working lands.

Water quality trading volume remains low due to the difficulty in measuring the reduction outcomes from non-point sources, transaction costs, and risk aversion from point source polluters. Three states in the Western Range have designed rules or policies for water quality trading programs: Colorado, Idaho, and Oregon, although specific trading projects have also occurred in Arizona California, Nevada, New Mexico, Utah, and Wyoming. A multi-state program to reduce salinity levels in the Colorado River Basin also funds water quality improvement projects. There is no regulatory component that directly funds best management practices (BMPs) on agricultural lands because all trading programs are voluntary.

Overdraft of groundwater aquifers and surface water depletions are causing regulatory programs to address irrigation diversions that reduce instream water availability for fish and wildlife. Many basins that have aquifer overdraft or stream depletion issues regulate diversions through total volumetric limits, as well as market mechanisms that compensate producers for reducing diversions. Regulatory factors to reduce total water use are not prevalent in the studied basins in this report, but the use of market incentives is well-established and increasingly popular in areas of water scarcity. Market-based programs are one approach that federal and state agencies and local water districts are undertaking to reduce water withdrawals in the Colorado River Basin, San Luis Valley of Colorado, and groundwater basins in California. Federal programs for the Lower and Upper Basins of the Colorado River are set to being in 2023 to reduce irrigation and municipal demand through compensation.

In all three states, it is unclear to what extent the 30 x 30 Initiative will provide a market incentive or payment program for landowners to implement practices that promote or preserve biodiversity. It is likely that these biodiversity initiatives will be a co-benefit of other practices, such as those identified in state’s NWL climate plans, water quality improvement targets, or other conservation practices. Similarly, the federal government’s 30 x 30 goal does not currently define market incentives or payment for private landowners. Should the federal government introduce such incentives, that could increase participation in the Western Range states that do not have their own
30 x 30 goals. Further, the federal government has the authority to increase conserved lands within the Western Range via the creation of wilderness areas, Wild & Scenic Rivers, national monuments, national conservation areas or other management designations. How this may impact or restrict current activities on private lands like cropland, or public lands, such as livestock grazing, is unclear.

Non-Regulatory Drivers

To understand how ESMC can engage or partner with companies or other entities on the four environmental outcomes, WestWater conducted a research effort to collect data from 45 entities that have a footprint, or physical presence within the Western Range. Only 8 of 39 contacted entities responded, either willing to be interviewed or declining to interview but providing further information about participating in ecosystem markets.

Of the 45 entities, 26 (57%) have a defined goal or plan to reduce GHG emissions. Water quality reporting is not well-defined, particularly among the agriculture companies. Only 16 entities have a plan or commitment to improve water quality. A total of 29 companies disclose water use or have a plan to become “water positive.” 15 companies define a metric or goal to improve water use within their operations. Efforts to improve biodiversity or conservation are declared by 21 companies. However, only 5 disclose a specific metric or goal, primarily related to “regenerative agriculture practices.” Companies that agreed to interview shared common themes or findings related to their sustainability initiatives or participation in third party ecosystem markets:

- Focus first on direct emissions reductions.
- Projects must be “local” to their operations or suppliers.
- Sustainability initiatives can be siloed throughout different departments.
- Companies are using established verification methods or protocols.
- Companies may prefer to engage directly with stakeholders rather than with third-party groups.

Findings & Recommendations

Overall, this analysis found several takeaways that may inform potential development of, or barriers to, ecosystem service markets.

1. **State and Federal Policies are Rapidly Evolving**: The development of new regulatory regimes or programs to address environmental outcomes is shifting quickly. Within the last few years, several states in the Western Range have developed climate emissions reduction targets or worked collaboratively to implement water conservation programs. In particular, conservation programs in the Colorado River Basin are evolving to address long-term shifts in water supplies and may become permanent programs or lead to permanent reductions in water use.

2. **Natural & Working Lands Carbon Sequestration Targets are Nascent**: States with defined NWL carbon sequestration goals are still in the early stages of implementation. Strategic goals related to NWL sequestration often describe voluntary markets as an opportunity to achieve top-level carbon GHG emissions goals, but policies governing the formation of markets have not yet been developed. This is a particular area where ESMC could be helpful in understanding opportunities for sequestration projects using on-farm conservation practices.
3. **Projects located on State & Federal Lands**: Federal and state agencies manage 55% of all lands within the Western Range. However, it is unclear whether these agencies would invest in outcome projects on their own lands, such as improvements to grazing practices on BLM or Forest Service rangelands. These agencies often lack the funding or resources to implement these conservation practices on their own, but if entities can create a supply of ecosystem services benefits, agencies may be willing to be buyers.

4. **A working definition of Biodiversity**: Throughout this analysis, “biodiversity” was often assumed to equate with terms used by state wildlife agencies or companies, such as wildlife conservation or regenerative agriculture. A stronger definition of biodiversity benefit projects could help stimulate demand among companies.

5. **There is a fragmented landscape of sustainability efforts and progress**: While the majority of surveyed companies have declared at least one goal or target related to the four ecosystem service outcomes, there is still a wide range progress being made toward achieving GHG reductions, water stewardship, or water quality. Companies have often set 2030 or 2040 as deadlines to meet certain targets, while others use 2025 as the first year of implementation without setting deadlines. This can make it difficult to assess demand for third party ecosystem services projects because companies are often first focusing on direct reductions or not yet ready to declare implementation pathways.

6. **Companies’ internal evaluation processes are not disclosed**: One of the key takeaways from interviewing company officials is that they are not willing or able to disclose how they internally evaluate projects or outcomes. While some companies have an internal hurdle rate for water use or other methods of economic analysis to evaluate potential water stewardship projects, this is often considered proprietary information. This can make it difficult to determine if companies are willing to invest in on-farm conservation practices that have defined costs.

7. **Buyers want to lead on project siting/location**: As companies are focused on demonstrating outcomes where they have a physical presence, such as industrial facilities or agricultural production, these entities may want to lead on where outcome projects occur. This may not always align with where ESMC has relationships with producers or has readily available demonstration projects. As such, ESMC should directly engage with companies or other potential investors to design projects where they have a demonstrated interest in particular outcomes.
Total demand for each of the four ecosystem service outcomes is estimated below in Table 6. Local demand is defined as demand for that attribute within a particular state or region, such as the Colorado River Basin. Regional demand encompasses the entire Western Range study area.

Table 6: Summary Table of Demand for Ecosystem Service Markets

<table>
<thead>
<tr>
<th>Benefit Category</th>
<th>Regulatory Demand</th>
<th>Non-Regulatory Demand</th>
<th>Overall Demand</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Local</td>
<td>Regional</td>
<td>Local</td>
</tr>
<tr>
<td>Carbon / GHG</td>
<td>Strong</td>
<td>Weak</td>
<td>Strong</td>
</tr>
<tr>
<td>Water Quality</td>
<td>Moderate</td>
<td>Weak</td>
<td>Moderate</td>
</tr>
<tr>
<td>Water Quantity</td>
<td>Strong</td>
<td>Moderate</td>
<td>Strong</td>
</tr>
<tr>
<td>Biodiversity</td>
<td>Weak</td>
<td>Weak</td>
<td>Weak</td>
</tr>
</tbody>
</table>


Appendix A: Maps

Temperature Impaired Waters

Western Range
Temperature Impaired Waters

Ground Cover
- Alfalfa
- Barren
- Deciduous Forest
- Developed/Open Space
- Evergreen Forest
- Grassland/Pasture
- Herbaceous Wetlands
- Open Water
- Other Hay/Non Alfalfa
- Shrubland

*Only showing 10 largest Ground Cover types in legend*
Map of Companies with Presence in Western Range  Western Range Overview

Note: Not all companies from report are shown here. Some company logos display general HQ while others show where agricultural production or industrial facilities are located.
Appendix B: State-Level Carbon Reduction Targets

California
Cap-and-Trade Program

California has both a statewide emissions cap and a market for emissions offsets, or credits. California’s market is the 4th largest trading program in the world. The carbon offset market is a function of the emissions cap, which seeks to reduce GHG emissions to 40% below 1990 levels by 2030. On August 31, 2022, the California Legislature passed a bill with a goal to reduce emissions to 85% below 1990 levels by 2045. Any remaining emissions above that level will have to be fully offset. In 2019 (the most recent data year available), California’s total emissions was 418.2 million metric tons of carbon dioxide equivalent (MMT CO2e, hereafter MMT). The target emissions cap declines from 431 MMT in 2020 to 260 MMT by 2030. While the state is currently ahead of its goals, which has reduced pressure to purchase emissions offset credits, the state is not currently on track to meet its 2030 target.

To meet the emissions reductions targets, California created a cap-and-trade market program, administered by the state’s Air Resources Control Board (CARB). “Covered” entities that must reduce direct emissions or purchase offsets include large electric power plants, large stationary sources (including refineries, cement facilities, oil and gas facilities, and food processing plants), and fuel distributors (including natural gas) that emit more than 25,000 MMT annually. There are approximately 450 covered entities that are responsible for 85% of total GHG emissions.

The overall emissions cap declines 5% annually beginning in 2021, through 2030. This is an increase from the 3% annual decrease from 2015-20. Covered entities receive emission allowances as a mix of free credits and quarterly auction managed by the state. Table 7 provides a summary of the annual allowances and credit offsets through 2030.

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58 California Cap and Trade - Center for Climate and Energy Solutions Center for Climate and Energy Solutions (c2es.org)
59 Current California GHG Emission Inventory Data | California Air Resources Board
60 California Approves a Wave of Aggressive New Climate Measures - The New York Times (nytimes.com)
61 The 6 covered greenhouse gases all have varying levels of warming potential over a 100-year period. Often, the emissions contribution of methane or nitrogen are covered to equivalent values of carbon dioxide (CO2).
62 Current California GHG Emission Inventory Data | California Air Resources Board
63 California Isn’t Cutting Enough Greenhouse Gases for 2030 Goal (governing.com)
Table 7: California Emissions Allowance Budget (MMT)

<table>
<thead>
<tr>
<th>Year</th>
<th>2021</th>
<th>2022</th>
<th>2023</th>
<th>2024</th>
<th>2025</th>
<th>2026</th>
<th>2027</th>
<th>2028</th>
<th>2029</th>
<th>2030</th>
<th>2031</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allowances</td>
<td>320.8</td>
<td>307.5</td>
<td>294.1</td>
<td>280.7</td>
<td>267.4</td>
<td>254.0</td>
<td>240.6</td>
<td>227.3</td>
<td>213.9</td>
<td>200.5</td>
<td>193.8</td>
</tr>
<tr>
<td>Offsets</td>
<td>12.8</td>
<td>12.3</td>
<td>11.8</td>
<td>11.2</td>
<td>10.7</td>
<td>15.2</td>
<td>14.4</td>
<td>13.6</td>
<td>12.8</td>
<td>12.0</td>
<td>11.6</td>
</tr>
<tr>
<td>CA Offsets</td>
<td>6.4</td>
<td>6.2</td>
<td>5.9</td>
<td>5.6</td>
<td>5.3</td>
<td>7.6</td>
<td>7.2</td>
<td>6.8</td>
<td>6.4</td>
<td>6.0</td>
<td>5.8</td>
</tr>
</tbody>
</table>

While covered entities can purchase offsets, a cap is imposed at 4% of its total obligation through 2025, and 6% through 2026-30. Beginning in 2021, the law requires that half of offsets come from projects that originate in, or directly benefit, California.

The offsets issued by the state can be considered the primary market for emissions credits. A portion of credits are freely allocated, while the remainder are auctioned every quarter. In 2021, the auction floor price was $16.20 per metric ton, rising to $19.70 in 2025 and $25.20 in 2030.

The secondary market is credits issued by third parties, both inside and outside California. To offer offset credits, a third party must have an established protocol to reduce and measure the emissions from the project. Protocols must be approved by CARB and currently exist for: forestry, dairy digesters, mine methane capture, ozone depleting substances and rice cultivation⁶⁴.

**Natural and Working Lands**

An important component of California’s GHG reduction target is emissions generated from, and sequestered to, natural and working lands (NWL). NWL is a broad range of land use types, including farms, ranches, forests, grasslands, deserts, wetlands, riparian areas, and green spaces in urban areas. The state’s 2017 scoping plan identifies a goal of reducing NWL emissions by 15-20 MMT by 2030 and then subsequently maintaining those landscapes as a carbon sink. Currently, these lands are a source of carbon emissions, generating roughly 150 MMT between 2001-2010, primarily from wildfires. Other sources include methane and nitrous oxide emissions from the agricultural sector, totaling 8% of statewide GHG emissions⁶⁵.

In 2019, the state issued an implementation plan to cap cumulative emissions of 21.6 – 56.8 MMT by 2030 and ultimately reductions of -84.2 to -83.1 MMT. To achieve these goals, the state has identified that between 2.7 million to 4.3 million acres need to be enrolled in various conservation practices by 2030⁶⁶. Those practices are shown in Table 8.

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⁶⁴ [Compliance Offset Protocols](https://www.arb.ca.gov/cc/nap/offset_protocols/offset_protocols.pdf) | California Air Resources Board
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⁶⁵ [California’s 2017 Climate Change Scoping Plan](https://www.arb.ca.gov/cc/scoping/plans/2017_scoping_plan.pdf)

Table 8: Implementation Acreage Goals for California’s Natural Climate Solutions

<table>
<thead>
<tr>
<th>Conservation of Natural and Working Lands</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Avoided conversion</td>
<td>50-75% reduction in annual rate of conversion by 2030</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Forestry</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Improved forest health and reduced wildfire severity</td>
<td></td>
</tr>
<tr>
<td>Prescribed fire</td>
<td>23,800-73,300 acres/year</td>
</tr>
<tr>
<td>Thinning</td>
<td>59,000-73,000 acres/year</td>
</tr>
<tr>
<td>Understory treatment</td>
<td>23,500-25,300 acres/year</td>
</tr>
<tr>
<td>Enhanced carbon in forested ecosystems</td>
<td>49,800-58,800 acres/year</td>
</tr>
<tr>
<td>Less intensive forest management</td>
<td></td>
</tr>
<tr>
<td>Biomass utilization</td>
<td>Additional 50% of slash diverted from pile burn/decay</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Restoration</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Riparian restoration</td>
<td>9,100-19,600 acres/year</td>
</tr>
<tr>
<td>Oak woodland restoration</td>
<td>3,100-6,100 acres/year</td>
</tr>
<tr>
<td>Coastal wetland restoration</td>
<td>5,100-5,500 acres/year</td>
</tr>
<tr>
<td>Delta wetland restoration</td>
<td>2,500-2,800 acres/year</td>
</tr>
<tr>
<td>Meadow restoration</td>
<td>8,100 acres/year</td>
</tr>
<tr>
<td>Seagrass restoration</td>
<td>500-600 acres/year</td>
</tr>
<tr>
<td>Urban forest expansion</td>
<td>20% increase in canopy cover by 2030</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Agriculture</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Grazing land and grassland management</td>
<td>2,100-4,200 acres/year</td>
</tr>
<tr>
<td>Prescribed grazing</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Agroforestry</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Silvopasture</td>
<td>400-800 acres/year</td>
</tr>
<tr>
<td>Hedgerow establishment</td>
<td>800-1,700 acres/year</td>
</tr>
<tr>
<td>Windbreak establishment</td>
<td>800-1,700 acres/year</td>
</tr>
<tr>
<td>Riparian forest buffer</td>
<td>800-1,700 acres/year</td>
</tr>
<tr>
<td>Riparian herbaceous cover</td>
<td>800-1,700 acres/year</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cropland management</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cover cropping</td>
<td>10,400-20,800 acres/year</td>
</tr>
<tr>
<td>Mulching</td>
<td>10,400-20,800 acres/year</td>
</tr>
<tr>
<td>Practice</td>
<td>Acres/year</td>
</tr>
<tr>
<td>--------------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>No till</td>
<td>4,200-8,300</td>
</tr>
<tr>
<td>Reduced till</td>
<td>8,300-16,700</td>
</tr>
</tbody>
</table>

**Compost application**

<table>
<thead>
<tr>
<th>Practice</th>
<th>Acres/year</th>
</tr>
</thead>
<tbody>
<tr>
<td>On annual cropland</td>
<td>10,300-20,700</td>
</tr>
<tr>
<td>On perennial cropland</td>
<td>21,000-41,900</td>
</tr>
<tr>
<td>On non-irrigated rangeland</td>
<td>21,100-4,200</td>
</tr>
<tr>
<td>On irrigated pasture</td>
<td>2,100-4,200</td>
</tr>
</tbody>
</table>

While it is unclear how many acres within the Western Range will be eligible for these practices, the significant amount of cropland within the Range provides an indicator of the potential demand for credit-generating conservation practices. As discussed in the first report on the potential market supply of credits in the Western Range, there is over 3,704,688 acres of irrigated cropland and 278,932 acres of irrigated pasture in California’s portion of the Western Range.

Although California has an established, statutory requirement to reduce statewide GHG emissions, there is no regulatory driver for emissions reductions from natural and working lands (other than projects that create offsets as part of the cap-and-trade program). Yet, California is investing resources and capital into generating emissions reductions projects on NWL landscapes across the state. The state is updating the original 2017 Scoping Plan, stating that the NWL Climate Smart Strategy must be established by July 1, 2023. This will create specific CO2 removal targets for 2030 and beyond. The Climate Smart Strategy will also create a registry for NWL projects that are seeking funding.

As described earlier, the voluntary carbon market allows covered and non-covered entities to offset emissions through credit purchases. The variety of landscapes within the Western Range region offer significant opportunity to generate credits from identified NWL conservation practices that can be sold on the voluntary carbon market. For example, the Sacramento-San Joaquin Delta Conservancy has received approval from the American Carbon Registry on a voluntary market protocol that allows landowners to convert their land to managed wetlands or rice fields to stop subsidence and related carbon emissions.

**Colorado**

In 2019, the Colorado legislature passed a bill establishing a target to reduce GHG emissions 26% by 2025, 50% by 2030, and 90% by 2050, as compared to 2005 levels. In 2021, the state released its Pollution Reduction Roadmap, outlining scenarios to achieve the required emissions cuts. Among the key findings from the report is that: “protecting, restoring, and enhancing the resilience of Colorado’s natural and working lands is critical for sequestering carbon.”

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67 Draft 2022 Scoping Plan Update [ca.gov], pg. 25.
68 Natural and Working Lands Climate Smart Strategy [ca.gov], pg. 20.
69 2019a_1261_signed.pdf [colorado.gov]
70 CO GHG Pollution Reduction Roadmap Final Report.pdf - Google Drive
Several actions are identified related to Colorado’s NWL, including developing an emissions inventory and strategic plan and supporting voluntary participation in existing programs, such as the Field to Market, Soil Health Partnership, and Precisions Agriculture programs. The report targets a 1 MMT reduction in NWL emissions from the 2005 baseline by 2030.

In 2022 the state released its Strategic Plan related to agriculture and the NWL sector\(^{71}\). The Strategic Plan references new mechanisms to incentive producers toward conservation practices that sequester additional carbon on farms and ranches. Specifically, it states that: “ecosystem services markets…could be leveraged to support producers as they adapt to climate change…. The state should track these opportunities and, where feasible, support innovative partnerships and financial tools that will support producers and the goals of this Plan.”

In 2021, a legislative bill created the Agricultural Soil Health Program, administered by the state Department of Agriculture and supported by other relevant agencies\(^{72}\). The program pays producers to adopt conservation practices that sequester carbon, reduce GHG emissions while also promoting increased drought resilience. Ultimately, the program may “create a pathway for Colorado farmers and ranchers to participate in emerging environmental services and carbon markets.”

### Nevada

In 2019, the Nevada legislature created target emissions reductions levels. The state aims to reduce emissions 28% by 2025 and 45% by 2030, and net-zero by 2050 as compared to 2005 levels\(^{73}\).

However, the state’s Climate Strategy, released in 2021, does not identify specific reduction goals from the agricultural or NWL sectors\(^{74}\). This is partly due to a gap in understanding the number of current emissions and potential reductions from the state’s natural lands, a result of the unique features of Nevada’s topography and land ownership. Much of the current available science used to estimate GHG emissions from natural lands is concentrated in forestlands, not the predominate landscapes of rangelands and sagebrush ecosystems\(^{75}\). Currently, the state is working on demonstration restoration projects to estimate the carbon flux and amount of carbon stored per acre on converting non-native grasslands back to native landscapes. This will provide a baseline for the amount of carbon sequestration potential and the estimated restoration costs. Further, 85% of the state is owned by the federal government, which limits actions the state can directly take to improve landscapes as a carbon sink (of which wildfire is an increasingly large part of Nevada’s net GHG emissions).

In 2019, the state released an inventory of emissions from all major economic sectors, including agriculture and land use (land use change and forestry). In 2016, the latest year for which data are available, agriculture emitted 1.835 MMT and land use sequestered 5.331 MMT\(^{76}\). The inventory

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\(^{71}\) Working Draft: NWL Strategic Plan Agriculture Section - Google Docs

\(^{72}\) Soil Health | Department of Agriculture (colorado.gov)

\(^{73}\) SB254 | Nevada 2019-2020 | AN ACT relating to greenhouse gas emissions; requiring the State Department of Conservation and Natural Resources to issue an annual report concerning greenhouse gas emissions in this State; and providing other matters properly relating thereto. | TrackBill

\(^{74}\) NVClimateStrategy_011921.pdf

\(^{75}\) Complex Challenges - Climate Action NV

\(^{76}\) ghg_report_2019.pdf (nv.gov)
plans for agricultural emissions to decline to 1.688 MMT and land use to increase its sequestration to 5.747 MMT by 2030. The main sources of the agricultural sector’s emissions are methane from livestock and nitrous oxide from fertilizer application. For Nevada’s land use sector, which is primarily agricultural soil carbon, forest carbon, urban forestry carbon and landfill yard trimmings, there is high annual variability in the amount of carbon emitted or sequestered. Additionally, as mentioned above, measuring GHG levels in rangelands or shrublands is inexact and those landscapes are not accounted for in the state’s emissions inventory.

The inventory report outlines several steps that the agricultural and NWL sectors can take to achieve the emissions reduction targets. One action is incentives for carbon sequestration through land restoration and retirement. However, incentives are not defined in the report, and it is unknown if these would be incentives sponsored by the state government or third-party market-based programs.

New Mexico

In 2019, the Governor issued an executive order establishing an emissions target of 45% below 2005 levels by 2030. As this target is not codified into law, it is subject to change, but the state has taken several steps to implement emissions reduction plans more firmly. Indeed, the Climate Change Task Force, created by the executive order, “shall evaluate policies and regulatory strategies to achieve reductions, including adoption of a comprehensive market program that sets emissions limits.” In 2021, the state released its Climate Strategy Report, which inventoried statewide emissions, including from natural and working lands. Overall emissions as of 2018 were 113.6 MMT, of which 7% are from agriculture (7.7 MMT) and 5% from NWL (6.06 MMT). The Strategy Report established a goal to reduce agricultural emissions to 7 MMT by 2030 and NWL emissions to 2.9 MMT by 2030.

More specific initiatives to achieve those targets in a Climate Action Plan will be released later in 2022. However, overarching goals include landscape-scale restoration to improve soil health and mitigate drought stress and establish a baseline for carbon storage levels on cropland and rangeland. The state created a Healthy Soils Program in 2019 but is working on a best management practices manual for conservation activities related to agriculture, watershed management, and drought resilience.

It is unclear to what extent third party entities may be eligible to receive funding or payment for carbon sequestration projects on NWL landscapes. While a market program is being considered by the state’s Climate Change Task Force, there is not yet a regulatory requirement for offset credits generated by NWL conservation practices.

Oregon

Oregon has emissions targets set by both executive order and legislation. The statutory goal, however, only provides a target level for 2020 emissions to be 10% below 1990 levels. In 2020, the Governor signed an executive order to reduce emissions 45% by 2035 and 80% by 2050, as compared

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77 EO_2019-003.pdf (state.nm.us)
78 NMClim ateChange_2021_final.pdf
79 Microsoft Word - New Mexico GHG Inventory and Forecast Report_2020-10-27_final (colostate.edu)
80 Healthy Soil Program (nmsu.edu)
81 olis.leg.state.or.us
to 1990 levels\textsuperscript{82}. Similar to New Mexico, the executive order allows the Governor to create an interagency workgroup to develop strategies guiding climate action. The Order also authorizes the Department of Environmental Quality (DEQ) and Environmental Quality Commission (EQC) to cap and reduce GHG emissions from large stationary sources, transportation fuels, and other liquid fuels (including natural gas).

Additionally, the Oregon Global Warming Commission must “submit a proposal for consideration of adoption” of statewide goals for carbon sequestration and storage on NWL\textsuperscript{83}. A proposed NWL implementation strategy released in 2021 called for sequestering an additional 5 MMT by 2030 and 9.5 MMT by 2050. These targets are above the current sequestration amount of 21.7 MMT\textsuperscript{84}. Academic research estimating the range of carbon sequestration potential on Oregon’s NWL from practices including avoided conversion of landscapes, best management practices, and restoration\textsuperscript{85}. A baseline of these current practices is shown in Table 9.

### Table 9: Current Conservation Activities in Oregon

<table>
<thead>
<tr>
<th>Practice</th>
<th>Activity</th>
<th>Baseline (current annual rate, acres)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conversion</td>
<td>Forests to rural development</td>
<td>4,769</td>
</tr>
<tr>
<td></td>
<td>Forests to urban development</td>
<td>366</td>
</tr>
<tr>
<td></td>
<td>Sagebrush-steppe to invasive annual grasses</td>
<td>9,884</td>
</tr>
<tr>
<td></td>
<td>Grassland to agriculture</td>
<td>2,298</td>
</tr>
<tr>
<td>Land Management</td>
<td>Timber harvest</td>
<td>3.4 billion board feet</td>
</tr>
<tr>
<td></td>
<td>Cover crops</td>
<td>120,439</td>
</tr>
<tr>
<td></td>
<td>No-till agriculture</td>
<td>996,525</td>
</tr>
<tr>
<td></td>
<td>Nutrient management</td>
<td>476,913</td>
</tr>
<tr>
<td>Restoration</td>
<td>Replanting after wildfire on federal land</td>
<td>9-12% of moderate to high severity burned area</td>
</tr>
<tr>
<td></td>
<td>Riparian forest restoration</td>
<td>5,918</td>
</tr>
<tr>
<td></td>
<td>Tidal wetland restoration</td>
<td>121</td>
</tr>
<tr>
<td></td>
<td>Invasive annual grasses to sagebrush-steppe</td>
<td>13,813</td>
</tr>
</tbody>
</table>


\textsuperscript{84} The average amount sequestered between 2001-16.

\textsuperscript{85} Potential greenhouse gas reductions from Natural Climate Solutions in Oregon, USA | PLOS ONE
To achieve the additional 5 MMT and 9.5 MMT sequestration targets, the state will adopt activity-based metrics such as the number of acres with soil health practices, or the number of acres of riparian reforestation. Public engagement and stakeholder input on the NWL Proposal broadly supported incentives for voluntary conservation measures to increase carbon sequestration, with an emphasis on equity and collaboration, using Traditional Indigenous Practices, and funding. However, the Proposal did not explicitly mention private funding sources or the participation of third-party entities, beyond NGO conservation groups.$^{86}$

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$^{86}$ These groups are likely to participate through the acquisition of conservation easements on key NWL landscapes such as cropland or forestland.
Appendix C: State-Level Water Quality Credit Trading Programs

Arizona

In Arizona, water quality limits for dissolved copper were exceeded in Pinto Creek. An inactive mining operation discharged the copper into Pinto Creek, near the Salt River. However, specific information about water quality trading could not be determined.

California

In California, only one project has occurred within the Western Range, the Lake Tahoe Clarity Crediting Program. The program is designed to meet Total Maximum Daily Loads (TMDLs) for improving the clarity of the lake’s water to a depth of 80 feet by 2031 and 100 feet by 2076. The Clarity Credits are used to determine compliance by municipal stormwater dischargers with meeting the TMDLs. The TMDLs aim to achieve by 2026 a reduction of 34% fine sediment particles, 19% total nitrogen, and 21% total phosphorus. “Urban Implementing Partners” includes state transportation departments, the governments of counties that border the lake, and the City of South Lake Tahoe. For 2021, the most recent year for which data is available, all 7 implementers achieved their individual credit targets for fine sediment, phosphorus, and nitrogen.

Colorado

Colorado has several water quality trading programs. Its statewide trading policy was established in 2004. The Cherry Creek Basin Water Quality Authority was formed in 1988 to preserve Cherry Creek and Cherry Creek Reservoir for recreation, fisheries management, and water supply. The trading program began in 1996 due to the high cost of achieving TMDL phosphorus targets from existing point sources. Instead, four pollutant reduction facilities were constructed that provide the trading credits, primarily revegetation of landscapes, construction of detention ponds, and bioswales. The credit trading ratios range from 1.3 to 3 pounds of phosphorus reduced to 1 discharge credit.

The first trading program in the country began in Summit County for Dillon Reservoir. The Reservoir is maintained by Denver Water for drinking water supplies and growth around the reservoir impacted the water quality. In 1986, municipal facilities began to obtain phosphorous reduction credits by funding reductions from existing urban non-point sources. A trading ration of 2:1 of two pounds of non-point phosphorus reductions to 1 pound per credit was implemented to provide an extra margin for compliance.

87 Tahoe – Lake Clarity Crediting Program Version 2.0 - Environmental Incentives (enviroincentives.com)
88 2023 TMDL Annual Strategy (laketahoeinfo.org)
89 2022 Performance Report (laketahoeinfo.org)
90 WQ_Pollutant-Trading-Policy-2004.pdf - Google Drive
91 Phosphorous Credit Trading in the Cherry Creek Basin. An Innovative Approach to Achieving Water Quality Benefits (waterrf.org)
Idaho

Idaho’s statewide trading guidance was originally developed in 2003, focusing on specific hydrologic basins, including the upper Snake, Bear, North Fork Payette, Spokane, Portneuf, and Lower Boise Rivers\(^2\). Of these, only the Bear is located within the Western Range. Each watershed develops a trading framework, which is approved by the state Department of Environmental Quality and sets standards that are incorporated into a NPDES permit. Individual trading plans facilitate actual water quality trading and incorporate aspects of the guiding framework.

Water quality trading in the Bear River watershed also includes Utah and Wyoming. It is focused on reducing phosphorus pollution in two areas: the Oneida Narrows to Cutler Reservoir (below Bear Lake within Idaho’s portion of the watershed), and the Little Bear River (in Utah)\(^3\). A water quality model has allocated the amount of tradeable phosphorous for each individual stakeholder in the Bear River Basin. Phosphorous loading is determined at the field level, quantifying total pounds per season that enters the river. The TMDL was originally set in 2006 for total phosphorus, ranging from \(0.050 - 0.075\) mg/L\(^4\). It is unclear how the trading program has contributed to achieving the TMDL target due to lack of available data.

Nevada

Water quality trading was once proposed for the Truckee River, which flows from Lake Tahoe, through Reno, and into Pyramid Lake. Excess discharge of total dissolved solids (TDS), nitrogen, and phosphorus from a point source, the Truckee Meadows Water Reclamation Facility contributes to elevated pollution levels in the Truckee River\(^5\). To avoid constructing additional wastewater processing facilities, credit trading from certain practices has been discussed as part of a suite of water quality improvements, that would include reduction of agricultural return flows, best management practices, treatment of storm water, and livestock management. However, it is unclear whether a formal trading program exists, or if merely monitoring programs have been established. However, the Pyramid Lake Paiute Tribe closely monitors the water quality of inflows into Pyramid Lake, a terminal basin. In 2007, the Tribe was given authority by the EPA to set water quality standards and monitor pollutants, similar to that of a state agency\(^6\).

In the Las Vegas Valley, the Las Vegas Wash flows into Lake Mead, mainly consisting of reclaimed wastewater, urban runoff, shallow groundwater, and stormwater. While the LVW Coordination Committee, established in 2000, regularly conducts water quality monitoring for TDS and selenium, nitrate, phosphorous and total suspended solids. It has implemented projects to control erosion, reestablish native vegetation, and construct wetlands, with funding from local groups, although a formal credit trading program has not been established\(^7\).

\(^2\) Water Quality Pollutant Trading Guidance (ilrpc.org)
\(^3\) Water Quality Trading - Bear River Watershed Info (bearriverinfo.org)
\(^4\) Bear River Basin 5-Year Review (idaho.gov)
\(^5\) Chapter 1 - Regional Water Planning Policies and Criteria (nnwpc.us)
\(^6\) Nonpoint Source Pollution — Pyramid Lake Paiute Tribe Water Quality (plptwq.org)
\(^7\) Las Vegas Wash Coordination Committee Year-End Report, 2021 (lvwash.org)
Oregon

Oregon's water quality trading program has been in place since 2015\(^{98}\). The main basins where trading activity occurs are in the Willamette River Basin, which flows into the Columbia, and the Rogue River, which flows east to west across southern Oregon into the Pacific Ocean. However, both of these river systems are outside of the Western Range. The main pollutant of concern in these basins is temperature, which is a key variable for maintaining functioning ecosystems for salmon species\(^{99}\). While Oregon has a statewide trading policy in place, the portion of the Western Range that covers eastern Oregon has not seen any trading of pollutant credits yet.

Colorado River Salinity Program

Elevated salinity levels in the Colorado River prompted the formation of the Salinity Control Forum in 1973. Since then, Congress passed the Salinity Control Act, which governs the salinity content of Colorado River water that is sent to Mexico, as well as salinity levels for water users above Imperial Dam\(^{100}\). The Program has reduced annual salt load into the river by 1.2 million tons and concentration levels at Hoover Dam by 100 mg/L. However, water users along the Colorado River still face damages of about $454 million due to water quality concerns.

Salinity levels rise from 50 mg/L at the headwaters in Colorado to 850 mg/L at the U.S.-Mexico border\(^{101}\). While much of the salts are naturally occurring due to the geological formations in the Basin, irrigation and exports of water outside the Basin contribute to increased salinity levels.

The Bureau of Reclamation operates the Basinwide Program, which funds on-farm irrigation improvements, such as canal lining or piping to reduce dissolved salt that seeps into the Colorado River and its tributaries. The conservation practices are funded through the Environmental Quality Incentives Program, another federally funded program at USDA. The main regions implementing salinity control measures is the Paradox Valley in Colorado\(^{102}\), in the Dolores River Basin, the Uinta Basin in Utah\(^{103}\), and the lower Gunnison Basin in Colorado\(^{104}\).

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99 Proposal Medford Regional Water Reclamation Facility Thermal Credit Training Program (oregon.gov)
100 Colorado River Basin Salinity Control Forum - Home Page (coloradoriversalinity.org)
101 CRBSCP Briefing Document 2019-03-20.pdf (coloradoriversalinity.org)
102 PVU Briefing Document 2015-04-30.pdf (coloradoriversalinity.org)
103 Uinta Basin - Final Report complete.pdf (coloradoriversalinity.org)
104 Lower Gunnison - Final Report complete.pdf (coloradoriversalinity.org)
Appendix D: Corporate Sustainability Goals

**Five Rivers Cattle Feeding:** Five Rivers Cattle Feeding company operates eleven feed yards, with four in Colorado, one in Idaho, and one in Arizona. As a whole company, Five Rivers collaborates with Colorado State University’s AgNext Sustainable Solutions for Animal Agriculture to further refine manure management practices and hope to turn their byproduct into high-quality organic fertilizer.

**NCBA:** National Cattle Beef Association is affiliated with beef industries in all sectors across North America and has committed to demonstrate climate neutrality of U.S. cattle production by 2040. NCBA will enhance sustainability efforts with up-to-date research and technology for carbon sequestration and GHG emission reduction.

**Coors:** Coors Brewing Company, located in Golden CO. promised to align with Molson Coors Beverage Company's sustainability target goals for all packaging, water, and climate goals/targets by 2025. Coors Brewing Company's water target goals include an increased replenishment of 3.5 billion gallons to stressed watersheds, a 22% decrease in water used to brew beer, and a 10% decrease in water used to grow Coors barley. Lastly, CO2 emissions will decrease by 50% in direct operations and 20% in the value chain.

**JBS Foods USA:** Greeley, CO is home to JBS Foods USA’s headquarters and has committed to environmental target goals in GHG emissions, energy, and water. Emission efforts will include global operations to reach net-zero greenhouse gas emissions by 2040 through reductions of GHG emissions by 30% in Scope 1 and 2 and $100 million toward investments to Scope 3 reductions in the value chain. Further efforts in emissions focus on reaching 60% renewable energy by 2030. JBS Foods USA believes there are more significant opportunities for water reduction but currently sets a goal to reduce water use intensity by 15% by 2030 against the 2019 baseline.

**JR Simplot:** J.R. Simplot Company’s “4sight 2030 goals” aim to reduce carbon emissions by 20% per ton of product in production facilities, reduce freshwater intake by 15% per ton of product, and improve conservation agriculture for more sustainable crop and beef production. Water conservation efforts include watershed restoration partnership with Upper Blackfoot Confluence and implementation of SmartFarm Technology to enhance water efficiency. Additional conservation efforts include developing best practices for land reclamation and utilizing the 4R Nutrient Stewardship program for all growers.

**Dole Plc:** Dole Plc is a global leader in the produce industry with ownership/control of Eco Farms, Progressive Produce, Dole, and joint ventures with The Fresh Connection, all located in southern California. Dole Plc suppliers must follow Science-based Target emission reductions by 2030. Global sustainability strategies align with the United Nations Sustainable Development Goals for water risk assessments, implementing high-risk water reduction by 10% overall on all Dole-owned farms by 2030 and developing sustainable farming frameworks on all Dole-owned operations.

**Leprino:** Leprino Foods operates nine full-scale manufacturing facilities in the U.S., with five facilities within the Western slope. Leprino Foods headquarters is in Denver, CO., and launched a Climate Action Trail Map in 2021 that establishes goals to be GHG neutral by 2050. On-farm opportunities to increase carbon sequestration, improve soil health, and nutrient management strategies outline a reduction in the milk supply (scope 3) emissions by 2030. In addition, Leprino Foods targets a long-
term goal to be ‘near zero water withdrawal’ with current efforts to reduce water intensity by 20% gallons per 1,000 pounds of milk and ensure outflow treated water meets permit standards for beneficial reuse.

**Nestle:** Nestle in the U.S. has committed to achieving net-zero GHG emissions by 2050 and advancing the regeneration of the water cycle by 2025. Additional sustainability approaches outline regenerative agriculture to improve soil health, fertility, biodiversity, and optimize livestock grazing systems.

**DOW:** Dow aims to protect the climate by reducing new carbon emissions by 5 million metric tons by 2030 and achieving carbon neutrality by 2050. In addition, Dow will continue to develop safer materials as sustainable alternatives in the market.

**Frito-Lay:** California’s Frito-Lay Modesto site is one of the largest manufacturing facilities in the U.S. and just became the all-star in sustainability efforts. With over $14.5 million in grant support from multiple California entities, Modesto manufacturing reduced GHG emissions by over 90% from direct fleet operations. It also works proactively with potato growers in the San Luis Valley of Colorado to implement sustainable agriculture practices to improve their bottom-line.

**Kroger:** Kroger set a goal to reduce GHG emissions by 30% by 2030. Most emission targets aim to reduce energy use in facilities, transportation, and refrigerants. In 2023, Kroger will release a revised ESG report to provide quantified targets for agriculture practices, chemical management, climate impacts, and water resource management.

**Dairy Farmers of America:** Dairy Farmers of America have locations across the United States, including Colorado, New Mexico, Utah, Nevada, Idaho, Washington, and California. By 2030, total emissions will decrease by 30% through initiatives in regenerative agriculture to store more carbon, optimize grazing management, and advance manure management practices to create energy and reuse it as fertilizer.

**Navajo Express:** Navajo Express states that ‘inventive ways to transport and emphasize fuel efficiency’ supports reduction efforts of Navajo clients’ carbon footprint.

**Sysco:** Sysco transports food across the Western U.S., intending to reduce Scope 1 and 2 emissions by 27.5% from the 2019 baseline year by 2030. Additionally, 27% of Sysco suppliers have committed to reduction goals, while Sysco continues to work with remaining suppliers that make up 67% of scope three emissions to set targets by 2026. Outside food distribution, Sysco has conserved 450M gallons of water, eliminated 9.9M pounds of pesticides, and expanded its Sustainable Agriculture program to include ten fresh crops during the 2021 growing season.

**Morton’s Organic Orchards:** Morton’s Organic Orchards, located in Palisade, Co., is fully organic and has established practices that enrich soil health and water retention. They have also adopted microjet irrigation technology to reduce their Colorado River withdrawals and set habitats for Great Horned Owls.

**Fresh Del Monte:** Fresh Del Monte’s climate action goals will reduce GHG emissions in scopes 1 and 2 by 27.5% and 12.3% in scope three by 2030. In addition, associate growers will implement responsible and regenerative farming for soil health management and water stewardship goals to improve water use efficiency by 2030. Preserved and protected biodiversity and wildlife acres will be
100% monitored with annual species inventories in each reserve.

**Chiquita:** Chiquita has a large global footprint with set targets to reduce emissions by 30% by 2030 and become fully net-zero by 2050.

**Walmart:** Walmart’s key sustainability goals are to reduce or avoid scope 3 carbon emissions by one billion metric tons by 2030 and source 20 commodities more sustainably by 2025. Some commodity examples for Walmart U.S. are canned tuna, coffee, tea, palm oil and produce.

**ConAgra:** ConAgra Brands is a global company with retail and plant facilities in the United States. Most locations are in the Midwest except for four plant operations in California, Colorado, and Washington. Companywide sustainability goals are to reduce GHG emissions by 25% in Scopes 1 and 2 and 20% in Scopes 3 by 2030. In addition, ConAgra supports individual farm management plans through a GAP survey to maximize soil health sustainability efforts, reduce chemical applications, and increase healthy pollinators. ConAgra also utilizes tools to determine water risk levels for each location and percentage of total water use and aims to support Oakland, CA’s high-risk facility through capital investment projects and to set an annual water goal.

**ADM:** In North America alone, ADM has 15 locations, but only one site in the Western region. The Fort Collins, CO grain processing facility is committed to supporting ADM’s strive 35 sustainability goals to reduce GHG emissions by 25% in scopes 1, 2 and 3 by 2035 and reduce water intensity by 10%. ADM is also implementing sustainable agriculture practices for wheat acres that represent 10% of US wheat processing volume.

**General Mills:** General Mills operates worldwide and has a large selection of products which is why they have ambitious sustainability goals. First, General Mills will reduce GHG emissions across the entire value chain by 30% by 2030 and eventually become net zero by 2050. Second, it will advance regenerative agriculture on 1 million acres of farmland by 2030 and continue pilot programs to accelerate farmer adoption. Lastly, General Mill’s water policy outlines four phases to ensure water stewardship. Phases 2 and 3 of the water policy analyze priority watersheds and encourage multi-stakeholder actions with local stakeholders to improve water stewardship.

**ABInBev:** In 2025, ABInBev aims to empower direct farmers to adopt sustainable agriculture practices, reduce GHG emissions by 25%, and improve water stewardship for measurable improvements in quantity and quality.

**Smithfield Foods:** Smithfield foods have been stewards for over 20 years and are on track to become carbon neutral in all US-owned companies by 2030. They also aim to revalue their US water supply footprint and adopt new standards by 2025.