Chapter 6

Industry Cluster Analysis

This chapter identifies key industry clusters with the potential for sustainable growth and family-sustaining careers, such as the Working Lands and Blue Economy, Arts, Culture, and Tourism, Renewable and Resilient Energy, and Health and Caregiving sectors.[85] These industry clusters will drive the regional strategy detailed in the forthcoming Part 2 of this report. Figure 6.1 below shows the specific industries within the clusters and their individual projected growth.

Key Takeaways

The Redwood Region's economic landscape is defined by four key industry clusters, each contributing uniquely to its growth, sustainability, and potential for development of family-sustaining careers:

- **Working Lands and Blue Economy:** The sector's strengths include that it is a traded cluster that is highly diversified. Its weaknesses are GHG emissions in certain of its industries and the need for higher wages and worker protections in certain of its value-chain segments. Dominated by wine grapes in Lake and Mendocino, diverse livestock in the north, and significant aquaculture in Humboldt Bay. Forestry and Wood Products remains the region's most concentrated sector with a high location quotient. Despite the volatile price fluctuations this sector frequently experiences, it is defined by stable timber production and increasing market values. The sector's priority is the innovation needed to increase incomes and opportunities while meeting the challenges of transitioning to sustainable forest management.
- **Arts, Culture, and Tourism:** The region's natural wonders and cultural events attract visitors, making this cluster a vital driver of the local economy. Despite recent disruptions, the cluster shows resilience and potential for growth, especially in creating jobs compatible with meeting low-carbon goals. Projections indicate that the cluster will grow much faster than average. However, translating this growth into family-sustaining jobs remains a challenge.
- **Renewable and Resilient Energy:** The development of utility-scale wind energy, particularly offshore, offers substantial economic and employment potential, aligning with the region's environmental goals and supporting related industries. Abundant opportunities also exist for smaller scale programs focused on energy efficiency and distributed renewables (i.e., residential-, commercial-, and community-scale projects). These industries have the highest projected job growth in occupations paying the highest wages. The region's challenge is building out career pathways and smoothing labor shortages due to industry transfers (i.e., building construction trades).
- **Health and Caregiving:** This cluster addresses the region's critical health and social care needs and is expected to grow faster than average. It aligns with regional strategic goals such as minimizing greenhouse gas emissions and offering numerous family-sustaining jobs. The primary challenge lies in attracting, training, and retaining skilled professionals to meet growing demands for healthcare and caregiving.

[85] In this report and other Collaborative documents, industries referring to a specific NAICS-defined industry code are capitalized, as are the region's identified industry clusters.

Key Metrics

- **Percentage of occupations that pay a family-sustaining wage:** Calculate the proportion of jobs in each industry cluster that provide wages sufficient to support a family of four. A higher percentage indicates better job quality and economic opportunity within the cluster.
- **Job-to-job multiplier:** Estimate the impact of job growth in each cluster on total employment across all industries. A higher multiplier suggests greater potential for the cluster to drive broad-based economic growth and job creation.
- **Location quotient and market share:** Assess the relative concentration and competitiveness of each cluster in the region compared to state and national benchmarks. Higher values indicate specialized strengths and potential for export-oriented growth.
- **Pollution emissions per job:** Measure the environmental impact of each cluster by calculating greenhouse gas emissions and other pollutants per job. Lower emissions per job indicate a more sustainable industry mix and so can guide efforts to promote cleaner, greener economic development.
- **Labor force demographics:** Measure indicators (age, race, educational status, etc.) that gauge opportunities for disinvested communities in these key industries .

Methodology

The industry clusters reported on here were identified using the following methodology:

1 Identification of Specialized and Resilient Industries

Industries labeled “Specialized and Resilient” in this report are ones that have shown competitive advantage through specialization and resilience against secular trends. For detailed criteria on identification of these industries, refer to the “Detailed Methodology” section of the Appendix.

2 Evaluation of Industry Performance

Evaluation of Industry Performance: Industries were selected based on their potential to support family-sustaining careers and their alignment with environmental policies. Such factors as employment stability, wage levels, and environmental impact were considered.

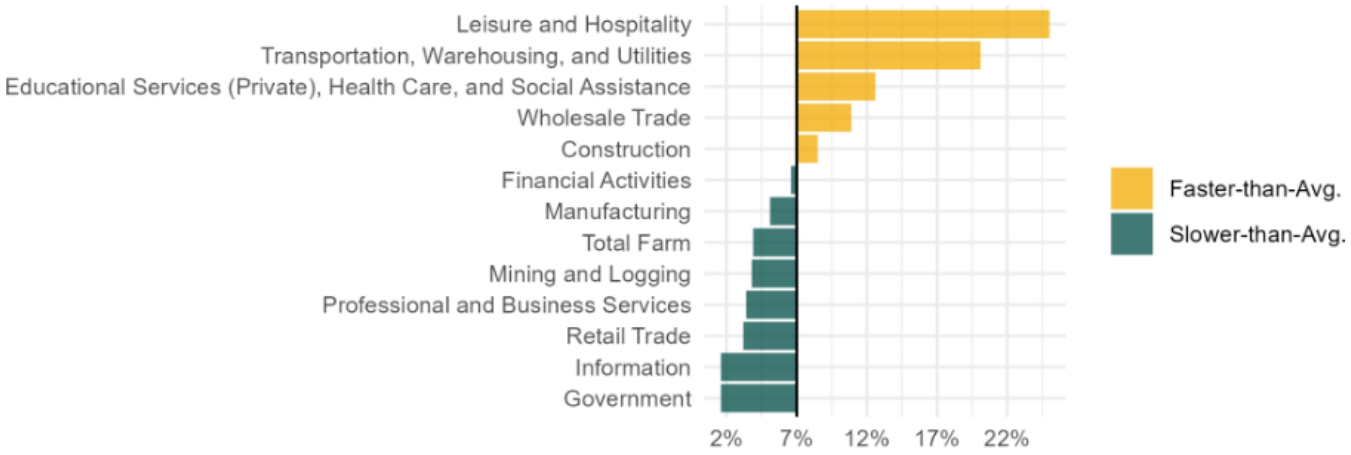
3 Analysis of Industry Cluster Outlook

This analysis of regional clusters assessed market trends, industry projections, industry-specific assets, resources, innovation, and policy trends. Its aim was also to evaluate the clusters’ ability to maintain or enhance market power through competitive advantages such as access to unique or scarce resources (e.g., redwoods, ocean resources, grasslands) and product differentiation (e.g., premium grass-fed livestock, wine, cannabis). Special focus was given to industries that can command premium prices through differentiated or unique products rather than competing solely on cost cutting and lower prices.

Overall Potential Job Growth for Major Industry Sectors, Redwood Region

Environmental pollutants can contribute to respiratory disease, heart disease, and some cancers (Healthy People 2030 initiative, "Environmental Health"). CalEnviroScreen 4.0 data (see page 78 in the Climate Analysis) indicate that, overall, the region's pollution burden is lower than statewide estimates. However, certain environmental risks are elevated in some areas of the region, including children's lead risk as well as presence of drinking water contaminants.

Figure 6.1 Potential Rate of Job Growth for Major Economic Sectors (2020-2030)

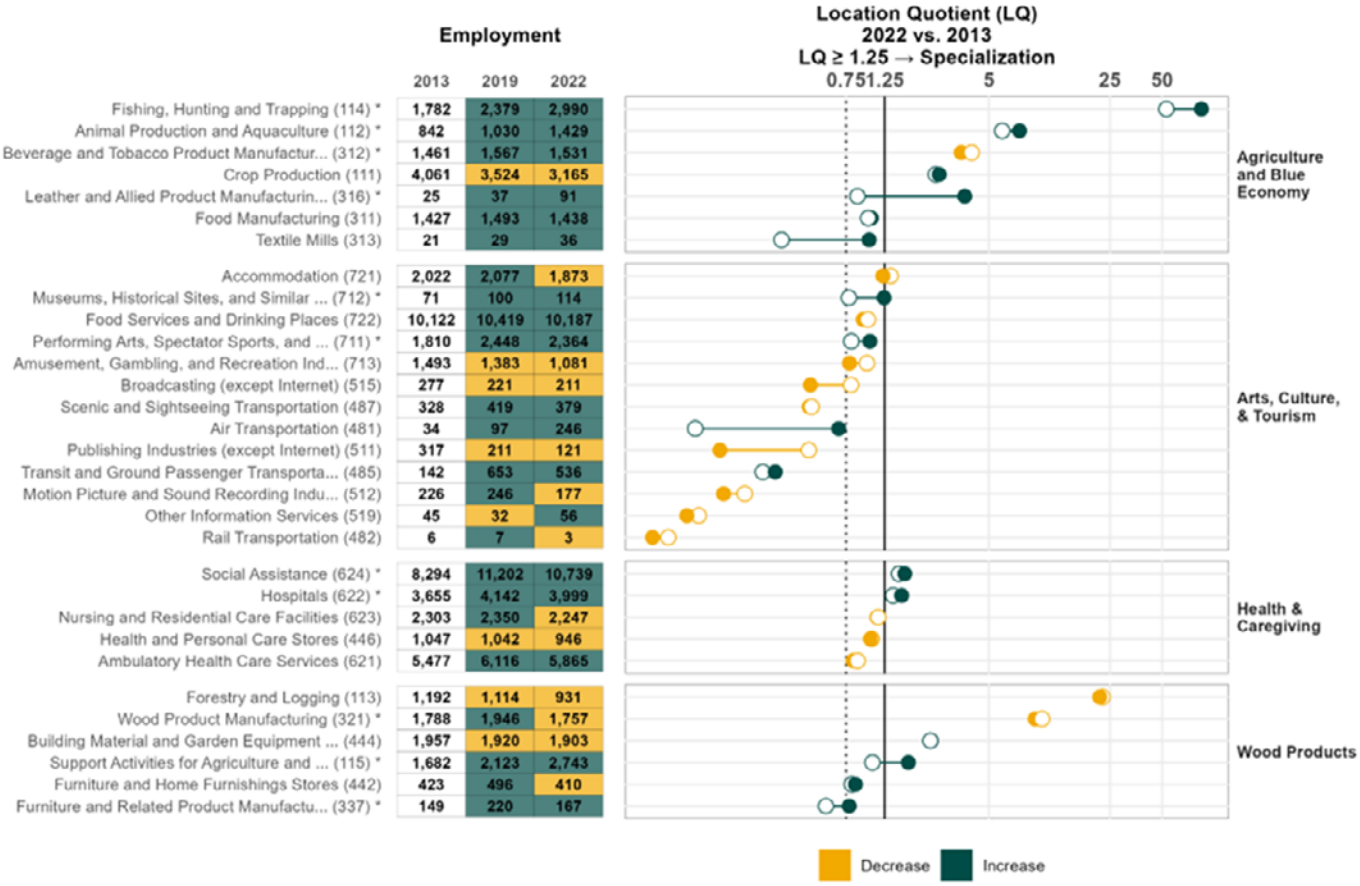


Note. Data sourced from California Employment Development Department (EDD). Overall employment growth is projected to be 7%.

Figure 6.2 below illustrates the results of the analysis for existing identified industry clusters.

While all industry clusters include multiple specialized and resilient industries (denoted below by *), **Agriculture and Blue Economy** emerges as a particularly strong cluster, except for Crop Production, all industries in this cluster-maintained employment or experienced employment growth over the past decade and most industries either maintained a high LQ or substantially increased in specialization. The **Renewable and Resilient Energy** Sector does not appear in this figure due to methodological issues but is addressed later in the chapter.

Figure 6.2 Employment Trends and Location Quotients, Identified Industry Clusters



Note. Data sourced from IMPLAN.

Agriculture and Blue Economy

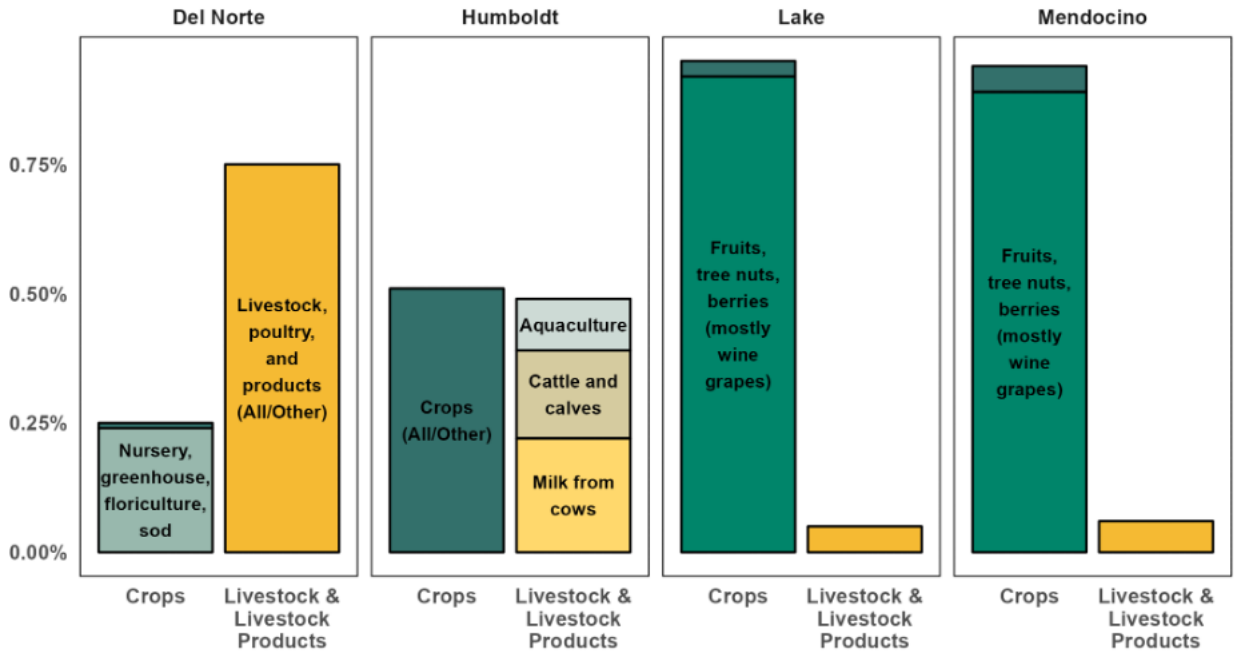
Major commodities traded within the Redwood Region's Agriculture and Blue Economy sectoral cluster[86] include livestock (e.g. beef and dairy), wine grapes and wine, cannabis, Dungeness crabs, and oysters. In Lake and Mendocino, wine grapes are the dominant agricultural commodity, whereasthe northern counties specialize somewhat in livestock production and are more diversified than the southern counties. For example, by market value, about one-quarter of Del Norte's agricultural output consists of nursery products (e.g., plants for landscaping, flowers, sod).

The region's aquaculture, which consists almost entirely of oyster farming, constitutes a substantial portion of Humboldt's agricultural output, amounting to $17.4 million in market value or 12% of statewide aquaculture production by market value. In the three coastal counties, commercial fishing—by market value, almost entirely Dungeness crabs —remains a key industry as well, with an annual market value of approximately $37.4 million[87] and accounts for nearly 80% of the state's Dungeness crab landings. See Figure 6.2 for a by-county agricultural and aquacultural breakdown for the region.

[86] *Blue Economy* refers to the sustainable use of ocean resources for economic growth, improved livelihoods, and jobs while preserving the health of ocean ecosystems and encompasses fisheries, aquaculture, coastal tourism, marine biotechnology, offshore renewable energy, seabed mining, and maritime transport.

[87] Year-to-year fish landings are highly volatile. This is the average of 2019 through 2023.

Figure 6.3 Intraregional Agriculture Specialization, Percent of Total Market Value Produced



Note. Data sourced from USDA Census of Agriculture County Profiles. Does not include commercial fishing. The 2022 data include hemp production.

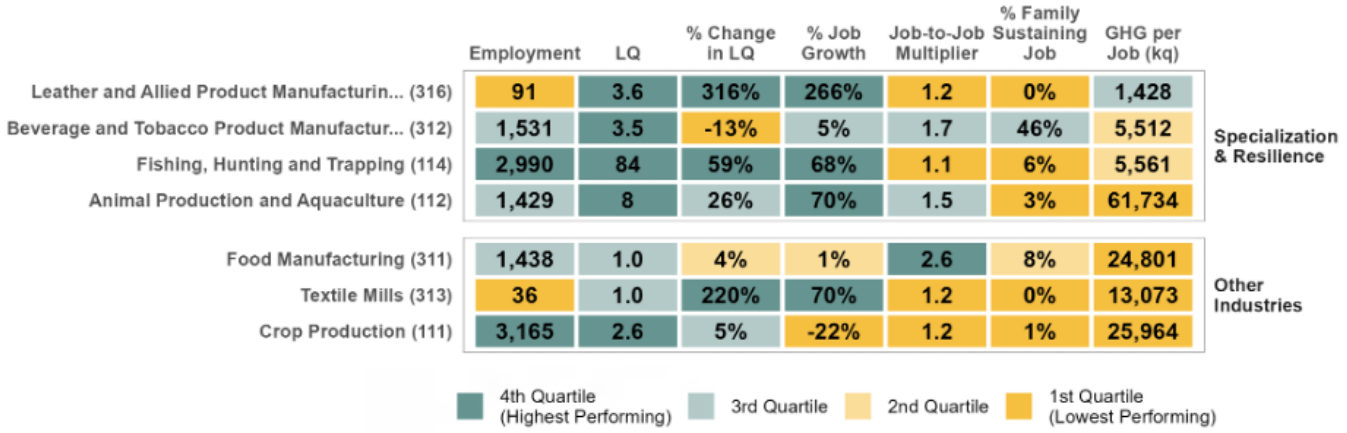
Cluster Performance and Alignment with RRRISE Goals

Agriculture and the Blue Economy represent key areas of regional employment specialization as shown by their sector LQs[88] and job growth (see Figure 6.4 below). Notably, the Fishing, Hunting, and trapping sectors (NAICS code 114) along with Animal Production and Aquaculture (NAICS code 112) have experienced significant increases in employment and specialization. Additionally, the region shows emerging potential in leather goods manufacturing (NAICS code 316), likely benefiting from its connections to the livestock industry. However, compared to other industries, these sectors face significant challenges, including lower wages and higher environmental impacts.[89]

[88] Location quotient (LQ)—defined at the beginning of this chapter—indicates the relative level of employment in an industry. An LQ > 1 for an area indicates that proportionately more workers there are employed in a given industry than in the state as a whole. An LQ > 1.25 is generally considered to indicate an industry with potential specialization.

[89] See "GHG Emissions, Air, Water, and Hazardous Waste" in the Appendix for a more comprehensive range of environmental impacts. Despite the environmental concerns identified, there are opportunities for more sustainable production practices. For example, aquaculture has a relatively lower greenhouse gas impact than other animal protein sources (Ritchie & Roser, 2024). The impact of organic versus industrial farming on greenhouse gas emissions remains ambiguous overall (Ritchie & Roser, 2024). However, in fruit production, organic methods tend to have a lower impact. In Lake and Mendocino counties, where fruit farming is prevalent, organic farming methods are employed at more than double the rate of the state average (Census of Agriculture - 2022 Census Publications - State and County Profiles - California, n.d.).

Figure 6.4 Agriculture and Blue Economy Cluster Performance



Note. Data source from IMPLAN. Author's calculations. 2022 data with 2013 growth comparison. NAICS codes shown in parentheses. Employment figures include proprietors and may differ substantially from QCEW data which include only employees.

Overall Cluster Outlook

Data from the California Employment Development Department (EDD) project positive but slower than average employment growth in the agricultural sector.[90] The outlook for employment growth is not encouraging, as employment in Crop Production has declined substantially over the past decade (see Figure 6.4 above, NAICS 111). In Lake County, for example, only eight acres could be identified as dedicated to food production.[91]

Consistent with national trends, farmers in the region are aging. According to the latest Census of Agriculture, 46% percent of Redwood Region farmers are 65 years or older (*USDA - National Agricultural Statistics Service - Census of Agriculture*, n.d.). Groups in the region, for example the Del Norte Community Food Council and the Humboldt-based North Coast Growers Alliance, have programming to assist new farmers and farmers of color to acquire farmland and establish businesses.

Despite these issues, the Agriculture and Blue Economy cluster still includes opportunities for development, growth, and innovation within certain commodities.

Livestock and Related Products Outlook

Farm product prices, including those for livestock, have shown long-term deflationary trends. However, in recent years, the COVID-19 pandemic and the war in Ukraine, a major grain producer, have disrupted these trends,[92] leading to a significant rise in farm product prices, particularly in livestock. As a potential indication of this impact, Del Norte farms—heavily concentrated in livestock production—have experienced an increase in farm net cash flow relative to 2017 as the market value of the county's production slightly out-paced the rise in farm production expenses.

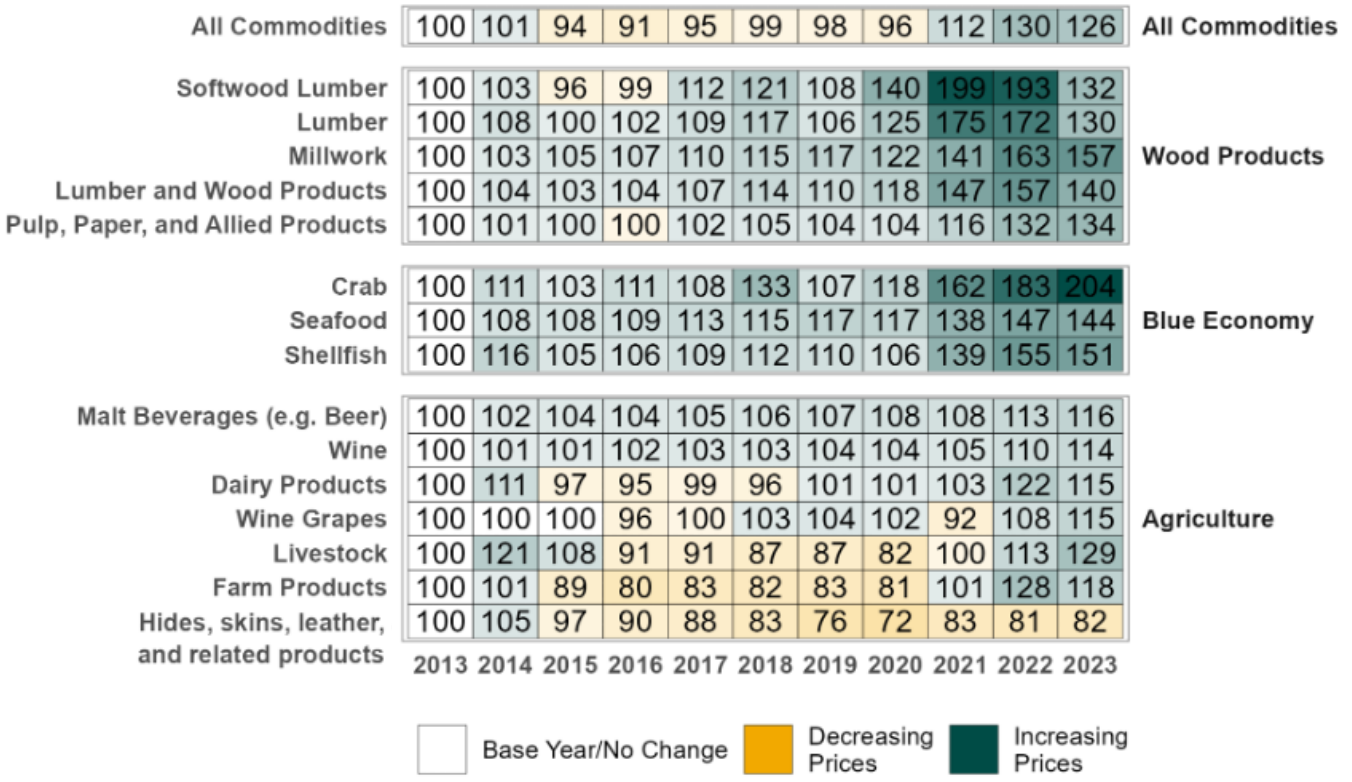
[90] See "Potential Job Growth for Major Industry Sectors, Redwood Region" in the Appendix.

[91] RRRISE Collaborative Meeting 4/30/24 which hosted an expert panel on food security and regional food systems.

[92] According to the USDA, Ukraine produces 4.3% of world wheat output, 3.5% of corn output, 6.8% of barley and nearly a third of world sunflower output (Foreign Agricultural Service & U.S. DEPARTMENT OF AGRICULTURE, 2022).

Like other commodity industries, the outlook for Livestock and Related Products depends largely on global and national commodity price trends (see Figure 6.5). The industry's growth potential will largely depend on whether agricultural commodity prices revert to their previous deflationary patterns.

Figure 6.5 U.S. Commodity Market Price Signals, Producer Price Index Adjusted to 2013 = 100



Note. Data sourced from FRED.

Vineyards and Wineries Outlook

Recent trends in global wine consumption have shifted from volume-driven growth to value-driven growth, a shift often referred to as "premiumisation." This trend particularly benefits producers of premium wines (*WEP:Wine Economics and Policy:12, 1, 2023*, 2023). In Napa County, for instance, crop report data indicate that red wine grape prices increased by 24.6% ($7,707 vs. $6,187 per ton) and white wine prices increased by 27.6% ($3,323 vs. $3,220 per ton) from 2017 to 2022. In comparison, Lake County red wine grape prices increased just 4.1% ($2,209 vs. $2,121 per ton) and white increased by 7.6% ($1,321 vs. $1,228) during the same period. Price growth is similarly muted in Mendocino, but the crop report data are not comparable to these other sources—available reports for Mendocino indicate that overall wine grape prices there increased by 5.8% ($1,794 vs. $1,696 per ton) from 2017 to 2021 (California Department of Food and Agriculture, n.d.).

These modest price increases indicate that the region's two wine-producing counties have experienced difficulty passing rising production costs on to consumers in recent years.[93] In the vineyard-dominated Mendocino and Lake Counties, average farm production expenses during this period increased 41% and 22% in Lake and Mendocino counties, respectively, while the market value of products sold in Lake

[93] See "All Commodities" in Commodity Market Trends in the Industry Cluster Appendix.

increased by 8% and decreased by 4% in Mendocino. Consequently, farm cash income fell sharply in both counties to just $6,819 per farm in Mendocino and was net-negative in Lake.[94]

The outlook for the wine industry in Mendocino and Lake counties is challenging due to modest price increases that have not kept pace with rising production costs. Vineyards may need to adopt strategies such as raising prices, producing higher-value wines, and improving operational efficiencies to sustain and grow in the competitive market.

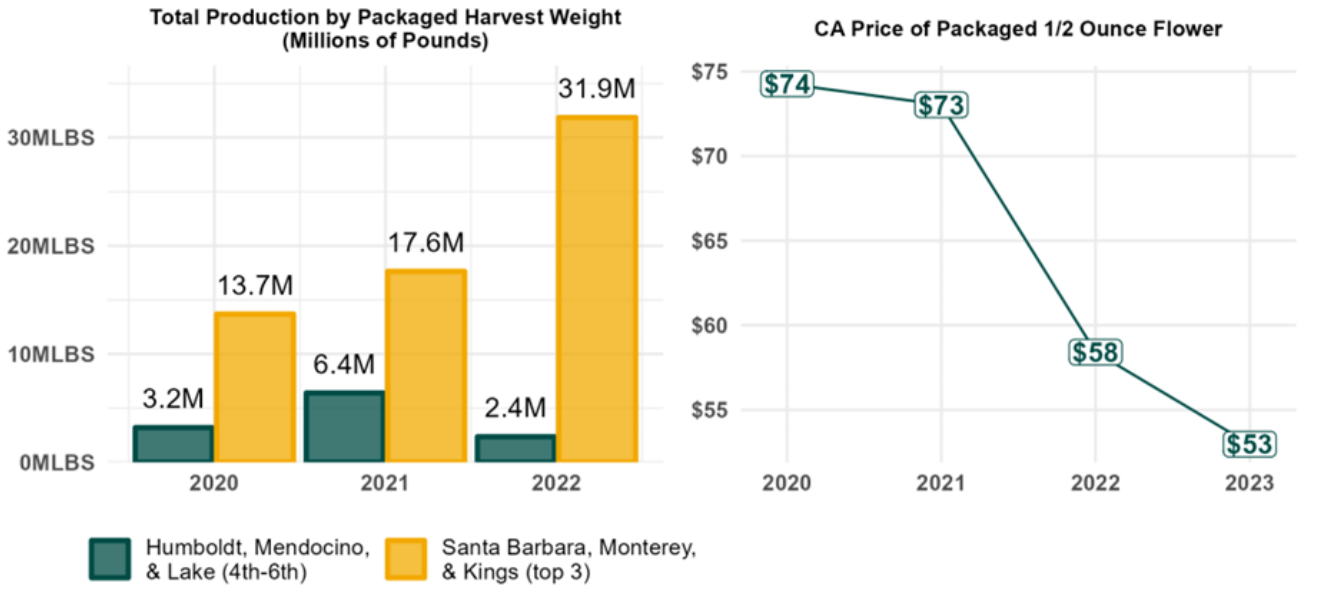
While low wages are generally a challenge for the Agriculture and Blue Economy cluster industries, the wine industry appears to be an important exception to this rule. As shown above, nearly half (46%) of Beverage and Tobacco Product Manufacturing (NAICS 312)[95] occupations are family-sustaining.

Cannabis Outlook

Following statewide legalization of cannabis in 2016, counties and cities not historically known as cannabis cultivators began to embrace the new legal industry. Santa Barbara, with its streamlined regulatory approach and proximity to markets (Mozingo, 2019), has now become the largest legal producer in the state followed by Monterey and Kings Counties (Department of Cannabis Control - State of California, n.d.-a). As shown in Figure 6.6 below, rising production, especially from these new producers, has eclipsed legal production in the legacy "Emerald Triangle" region, flooding the market and sharply lowering prices.

Historically, in the Emerald Triangle growers benefitted from the region's remoteness and challenging terrain, which limited law enforcement activities. However, with the change in the legal landscape, these geographical factors no longer offer a competitive edge, and legacy growers in the Emerald Triangle now must compete with large-scale, efficient producers from other regions. To remain viable, these traditional growers may need to focus on enhancing product quality and customer experience, capitalizing on the region's unique legacy and brand recognition.

Figure 6.6 Redwood Region Cannabis Production and Statewide Prices



Note. Data sourced from the California Department of Cannabis Control Harvest Report (https://cannabis.ca.gov/resources/data-dashboard/harvest-report/)

[95] The NAICS title of this industry is being adhered to, this industry reflects the wine and beer industry in the region not tobacco production. According to the USDA, there are no tobacco farms in the state. This is predominantly wine production.

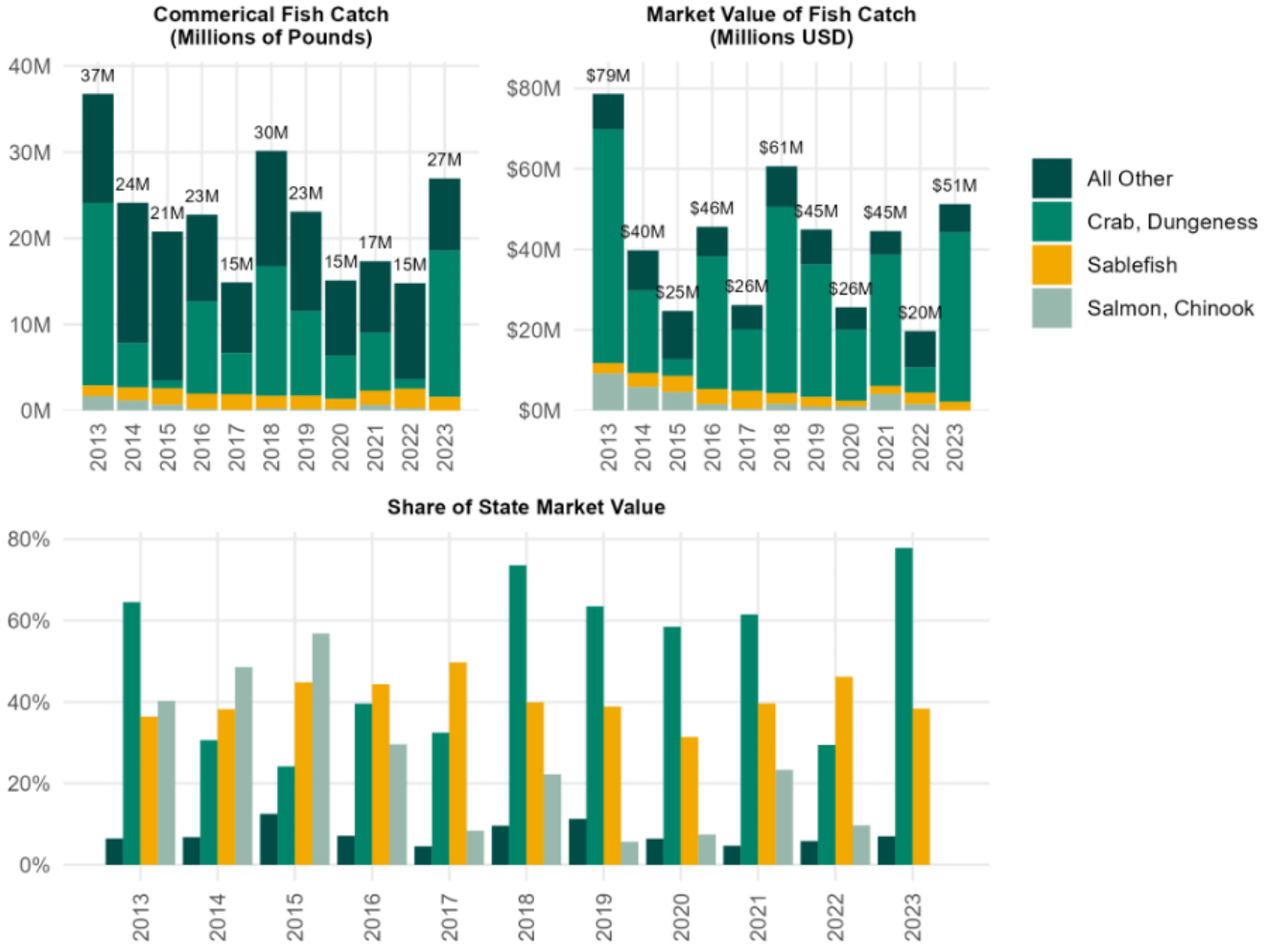
[94] See Farm Cash Flows and Income in the Industry Cluster Appendix.

Commercial Fishing Outlook

Nationwide, seafood product prices have been on an upward trend for a decade, defying the deflationary forces impacting other commodities. Specifically, crab prices have seen a substantial increase, doubling since 2013.[96] In California, the Redwood Region's commercial fisheries play a pivotal role, accounting for nearly 80% of the state's market value for Dungeness crab as of 2023 (see Figure 6.7).

Commercial fishing, like other industries based on natural resource extraction, faces significant ecological limits that restrict the volume of fish that can be harvested. Despite these constraints, the increasing prices of seafood and the dominant market position in the Dungeness crab sector suggest that commercial fishing will remain a crucial component of both the regional economy and employment landscape for the foreseeable future.

Figure 6.7 Redwood Region Commercial Fish Landings and Market Value



Note. Data sourced from California Department of Fish and Wildlife (CDFW). Data drawn from a custom query and figures may differ slightly from those presented on the CDFW Data Explorer page. See CDFW data disclaimer.[97] *https://wildlife.ca.gov/Conservation/Marine/Data-Management-Research/MFDE/Custom-Queries*

[96] See Commodity Market Trends in the Appendix.

[97] CDFW Data Disclaimer: "CDFW collects data from various sources for fisheries management purposes, and data may be modified at any time to improve accuracy and as new data are acquired. CDFW may provide data upon request under a formal agreement. Data are provided as-is and in good faith, but CDFW does not endorse any particular analytical methods, interpretations, or conclusions based upon the data it provides. Unless otherwise stated, use of CDFW's data does not constitute CDFW's professional advice or formal recommendation of any given analysis. CDFW recommends users consult with CDFW prior to data use regarding known limitations of certain data sets. The MFDE is not intended to be used for management purposes, and CDFW requests to be contacted if state or federal partners need data for management reasons" (*MFDE*: *Custom Queries*, n.d.).

However, the prospects for stable, several phenomena challenge quality employment in commercial fishing: year-to-year volatility in production and relatively low wages (as illustrated in Figure 6.7). Moreover, the crab season is restricted to the period from December 1 to July 15 (Fisheries, n.d.), and the season is typically prone to such disruptions as delayed openings and early closures, further impacting the industry's stability and predictability (*CDFW News | CDFW Closes Commercial Dungeness Crab Fishery and Restricts Recreational Crab Traps in the Central Management Area, Limits Commercial Fishing to Inside 30-Fathoms in Northern Management Area to Protect Whales From Entanglement*, n.d.; "California's Commercial Dungeness Crab Fishing Season Further Delayed," 2023). Consolidated purchasing and distribution (rendering local boats as price takers rather than price makers) and lack of necessary harbor infrastructure are two issues local fisherfolk elevated as disabling for their industry (see SWOT analysis).

Aquaculture Outlook

A substantial rise in seafood prices, particularly shellfish,[98] has also contributed to a more promising market outlook for fish farming in regions equipped with the necessary resources.

Humboldt Bay is one of just a handful of areas along the California coast permitted to cultivate shellfish for safe human consumption[99] (Department of Public Health, n.d.) and offers unique natural advantages that enhance its suitability for aquaculture. Similar to wine, oysters—even within the same species—acquire a unique flavor based on their harvesting environment, creating a natural product differentiation. These factors, combined with institutional regulations, establish Humboldt Bay as a competitive player in the oyster market due to its natural and regulatory barriers to entry.

Industry data provide further support for a positive outlook. A 2016 survey conducted among aquaculture farms in Humboldt Bay revealed a generally optimistic view on future prospects, with expectations of a 47.5% increase in employment and a 34.2% increase in cultivation area by the end of 2022 (Richmond et al., 2018). Although historical data on the industry is incomplete, findings indicate that the market value of production stood at $9.8 million in 2016. More recent figures from the USDA in 2022 estimate the market value at approximately $17.4 million, indicating potential growth in line with earlier projections (*Census of Agriculture - 2022 Census Publications - State and County Profiles - California*, n.d.).

Wood Products

Timber continues to be a key commodity in Del Norte, Humboldt, and Mendocino Counties (see Figure 6.8). Although the importance of timber to the regional economy has declined over the past decades, recent years have seen a stabilization in production levels. Concurrently, there has been a significant increase in the market value of this production[100]—nearly doubling the region's share of the overall market value of lumber produced in California.

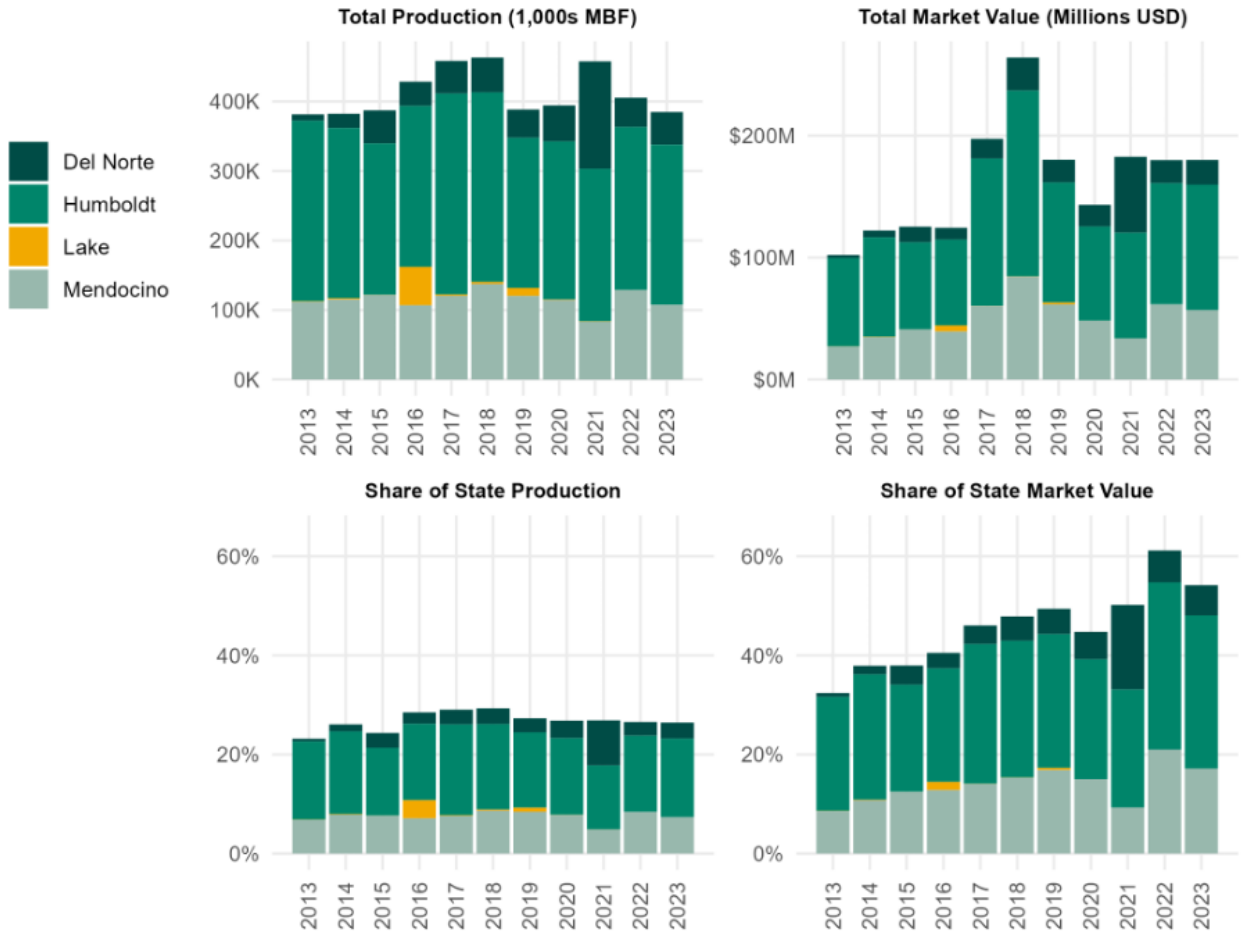
[98] See "Commodity Market Trends" in the Appendix.

[99] These areas include Humboldt Bay, Tomales Bay, Morro Bay, and the Santa Barbara Channel,which are "conditionally approved" and Agua Hedionda Lagoon near San Diego, which is "conditionally restricted" by the California Department of Public Health. In Humboldt Bay the following companies are approved by the CDPH: Aqua Rodeo Farms, Hog Island Oyster Company, Humboldt Bay Oyster Company, North Bay Shellfish LLC, and Pacific Shellfish Humboldt LLC.

[100] See lumber in "Commodity Market Trends" in the Industry Cluster Appendix.

Stable production levels and consistency in proportion of production by volume in relation to state figures, coupled with a marked increase in market value share, suggest that the value of the Redwood Region's definitive commodity has appreciated relative to other timber materials produced in the state. As shown below (see Figure 6.8, bottom right), in 2013, the Redwood Region produced about 32% of statewide lumber market value; by 2023, this had increased to 54%.

Figure 6.8 Redwood Region Lumber Production and Market Value



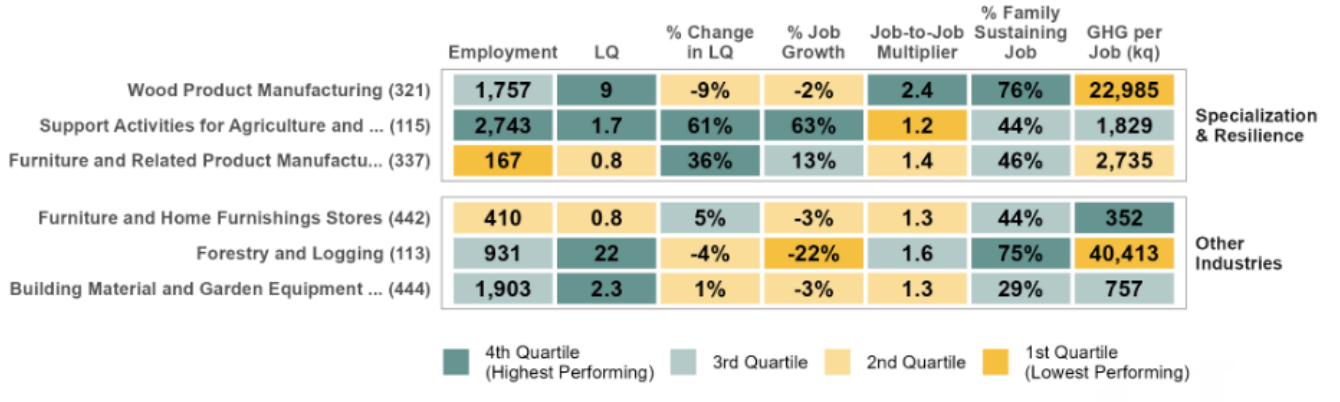
Note. Data sourced from the California Department of Tax and Fee Administration. MBF stands for one thousand board feet. A board foot is a 12 by 12 by 1 inch volume of lumber. These MBF figures are "net," referring to the usable volume of lumber produced after removal of waste and defects [101].

Cluster Performance and Alignment with RRRISE Goals

The Wood Products cluster maintains a high level of employment specialization, as illustrated in Figure 6.9 below. Despite a surge in market value, employment in core sectors like Forestry and Logging is experiencing long-term stagnation or decline. Conversely, industries higher up the value chain, such as Wood Products Manufacturing, show more resilience to these trends. As outlined in the Appendix under "Millwork," the price of value-added lumber products has steadily increased over the past decade. These products maintained their appreciated value in 2023, even as general lumber prices declined from their peak in 2021.

[101] REF

Figure 6.9 Wood Products Cluster Performance



Note. Data source from IMPLAN. Author's calculations. 2022 data with 2013 growth comparison. NAICS codes shown in parentheses. Employment figures include proprietors and may differ substantially from QCEW data, which include only employees.

The cluster supports numerous family-sustaining jobs; however, aligning with environmental goals is a challenge. The Wood Products Manufacturing industry, for instance, is associated with high levels of greenhouse gas (GHG) emissions per job and increased air pollution.[102]

Cluster Outlook

The EDD forecasts below-average employment growth in the Mining and Logging sector.[103] Coupled with employment declines in most Wood Products industries, the overall growth outlook for the cluster appears uncertain. Despite these challenges, redwood stands out for its valuable properties, such as rot and insect resistance (*The Redwoods of Coast and Sierra*, n.d.), offering substantial market advantages. The region's growing dominance in the California lumber market and near monopoly on redwood—a valuable, differentiated, and appreciating resource—provide market power and competitive edge. These factors are promising for the industry's continued contribution to economic activity and family-sustaining employment in the region. The challenge for the industry is preserving these family-sustaining occupations while aligning with environmental rules and policies.

Notable Policies and Impacts

Prop 64 - Cannabis Legalization. Prop 64 formalized the industry but resulted in greater competition from regions with competitive advantage, subsequent market flooding, and exit from the industry of an estimated 80% of firms from the Emerald Triangle.[104] Cultivating appellations and niche marketing is a strategy the remaining North Coast growers are pursuing to stay competitive, a strategy supported by recent legislation (SB-185) that requires California county of origin to be accurately reported in cannabis labeling.

[102] See GHG Emissions, Air, Water, and Hazardous Waste from Potential Growth Clusters in the Industry Cluster Appendix.

[103] See Potential Job Growth for Major Industry Sectors, Redwood Region in the Industry Cluster Appendix.

[104] Interview with Humboldt Growers Alliance, June 15, 2023.

Clean Air Resources Board (CARB) (*Medium- and Heavy-Duty Diesel Regulations | California Air Resources Board*, n.d.) restrictions on heavy-duty diesel vehicles are impacting the logging industry. Companies report bottlenecks in trucking as companies exited the market or limited service.[105]

After over 150 years, regulations banning the indigenous forest management practice known as cultural burning have been overturned. Passed in 2021, SB-332 protects those who provide prescribed fire-burning services against liability for the cost of fire suppression or a prescribed burn, provided all conditions are met (Stone et al., 2021). Further enabling private landowners to partake in beneficial management practices, AB-1867 allows landowners to sell timber produced from their land due to fire prevention activities. (Elizabeth, 2016)[106] .

Governance of shared waterways and marine resources naturally impacts the region's fisherfolk, including unpredictable season openings and closings for different species, as highlighted above. Port redevelopment and offshore wind will also impact those operators, and efforts are currently underway to consult with fisherfolk on project plans.

Arts, Culture, and Tourism

Cluster Overview

Tourism has been a significant industry for the region since the mid-19th century, whereas the contributions of Art and Culture have only more recently been recognized as providing synergistic growth and diversification opportunities. Historically, many industries within the sector deliver lower wages, may lack in typical employee safety nets and upward mobility, and are often defined by gig and seasonal work (Yang et al., 2021). With this important caveat in mind, the Arts, Culture, and Tourism industry cluster is a key economic sector in the region, drawing significant visitor numbers and revenue. Encompassing agritourism, the Redwoods and coastal attractions, seasonal festivals and heritage sites celebrating indigenous and other local cultures, the cluster has both well-established regional assets and capacity and potential for further development. Annually, the area's state and national parks attract approximately 5 million visitors.[107] Overall, visitors generate about $1.3 billion in spending (Dean Runyan Associates, 2023)—about $4,081 per Redwood Region resident, exceeding the statewide equivalent of $3,433.[108] See Figure 6.10 below.

Cluster Performance and Alignment with RRRISE Goals

Arts, Culture, and Tourism, shows signs of employment specialization and resilience in two industries, including **Museums, Historical Sites, and Similar Institutions** (NAICS 712)[109] and **Performing Arts, Spectator Sports, and Related Industries** (NAICS 711). These industries have a minimal carbon footprint, but support few family-sustaining occupations.

[105] REF

[106] REF

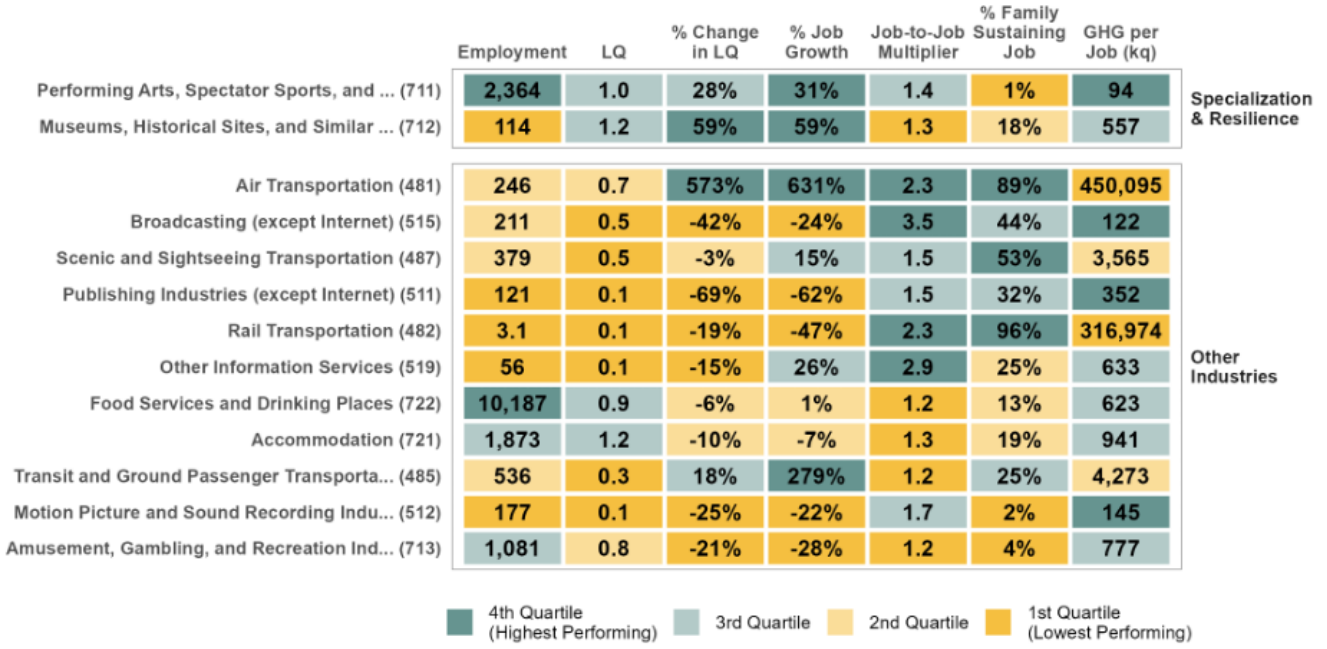
[107] In 2023 for instance 409,105 people visited Redwood National Park (Stats Report Viewer, n.d.) and 4,536,826 people visited the Redwood Region's state parks in fiscal year 2018/19 (the most recent year available) (Parks, n.d.).

[108] Based on Department of Finance 2022 Redwood Region population of 318,561, state population of 39,146,273 (California, n.d.), and state total spending of $134,391 million.

[109] NAICS codes are included in parentheses when industry name is abbreviated in visualizations.

Scenic and Sightseeing Transportation (NAICS 487) appears underdeveloped, given the region's numerous natural attractions, with a location quotient of just 0.5. This industry supports a high proportion of family-sustaining occupations, with a relatively moderate climate impact.

Figure 6.10 Arts, Culture, and Tourism Industries Performance



Note. Data source from IMPLAN. Author's calculations. 2022 data with 2013 growth comparison. NAICS codes shown in parentheses. Employment figures include proprietors and may differ substantially from QCEW data, which include only employees.

Cluster Outlook

While the COVID-19 pandemic, inflation, and other shocks may have temporarily disrupted these industries (*COVID-19's Pandemic's Impact on the Arts: Research Update May 12, 2022*, 2022), the outlook for this cluster looks strong (*Economic Impact*, n.d.). From 2013 through 2022, traveler spending to the region has increased 27.1%, and industry earnings have increased 70.4%—outpacing the equivalent statewide figures of 20.3% and 53.6% (Dean Runyan Associates, 2023). Furthermore, the EDD projects that Redwood Region Leisure and Hospitality sector employment will grow faster than any other sector through 2030.[110] A challenge for the cluster is translating this growth into family-sustaining occupations.

> *"The creative sectors do not share a cohesive workforce infrastructure and employer-worker arrangements vary from one industry to another, which has created large obstacles for policy making. Many individuals do not practice their art or creative pursuits as their primary, wage-earning job. Yet many counts of the workforce focus only on those employed full-time by organizations"*
>
> **-(2023 Otis College Report on the Creative Economy, 2023).**

[110] See projection in the Appendix.

Industry-Specific Assets

Most current and proposed local and state investments in the sector are concentrated in eco-tourism. Currently under development, the Great Redwoods Trail,[111] for example, is an example of a highly anticipated asset. Cal Poly Humboldt and College of the Redwoods also bring in and produce young professionals in the Arts, Culture, and Tourism sector.

Agri-tourism in the cannabis, winery, and brewery industries, as well additional agricultural industries such as dairy, attract and serve tourists and provide a boost to local and regional economies, creating cross-cutting opportunities with the Working Lands sector.[112] The region possesses nine destination marketing organizations.[113] Embedded in community, the arts and culture workforce is well-suited to exploring, developing, and implementing new strategies rooted in community-building and cross-sector collaboration to address some of the most profound social, economic, and environmental challenges in the region.[114]

Notable Policies and Impacts

State and philanthropic arts funding for rural arts and artists—especially BIPOC-centered organizations—lags significantly behind urban arts organizations and individuals on a per capita basis in the Redwood Region, significantly impacting equitable access to arts and culture (Carnwath, 2022). Also important to recognize is the relationship between rural and urban areas, with many of the "best and brightest" driven to leave their rural regions to pursue job opportunities elsewhere. However, the risks of gentrification and rising costs loom when a rural community is able to attract new tourists, residents, and businesses (Moskowitz, 2017).

Renewable and Resilient Energy, Enabling Industries

The region aspires to develop a **Renewable and Resilient Energy (RRE)** industry cluster primarily centered around energy efficiency and renewable energy. Industries supporting such an industry include Utilities,[115] Construction,[116] and Repair and Maintenance,[117] among others.

Cluster Performance and Alignment with RRRISE Goals

As shown in Figure 6.11 , these industries support a high proportion of family-sustaining occupations. Therefore, additional economic activity in these industries is likely to continue to foster and promote family-sustaining occupations.

[111] The Great Redwood Trail will be a 307-mile multi-use rail-to-trail project connecting San Francisco to the Humboldt Bay via the Eel River Canyon. Preliminary impact studies project total annual benefits of over $102,000,000 from the trail.

[112] See, for example, Del Norte County's Agritourism strategy.

[113] According to Visit California, notable attractions include Clear Lake in Lake County and Glass Beach (MacKerricher State Park), Mendocino Coast Botanical Gardens, Redwood National Park, Point Arena Lighthouse, and the Skunk Train in Mendocino County.

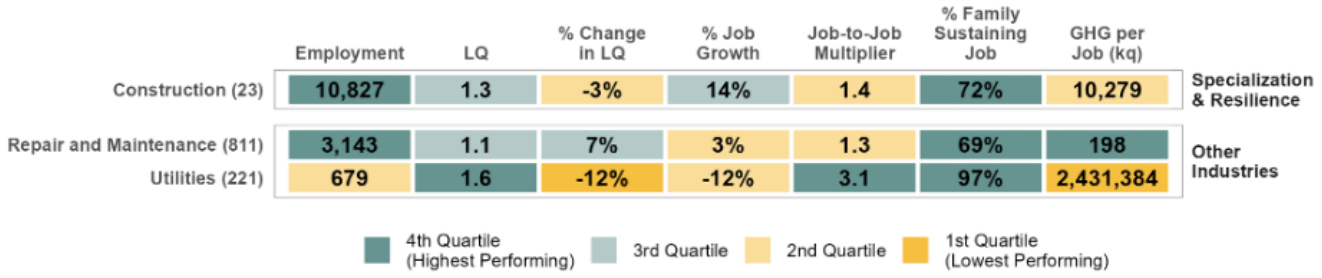
[114] REF

[115] Such as NAICS code 221115 Wind Electric Power Generation

[116] Such as NAICS code 237130 Power and Communication Line and Related Structures

[117] Such as NAICS code 811310 Commercial and Industrial Machinery and Equipment (except Automotive and Electronic) Repair and Maintenance

Figure 6.11 RRE Enabling Industries Performance



Note. Data sourced from IMPLAN. Author's calculations. 2022 data with 2013 growth comparison. NAICS codes shown in parentheses. Employment figures include proprietors and may differ substantially from QCEW data, which include only employees.

RRE Potential

The Redwood Region has great potential for developing its RRE sector, as both energy efficiency and renewable energy investments in it offer significant potential for job creation and economic development. Energy efficiency investments are often labor intensive and so tend to create more jobs per dollar invested than do renewable energy projects. Moreover, energy efficiency jobs are often cross-sectoral and local (in industries like construction, manufacturing, and installation/maintenance).[118] Further, from an economic development standpoint, energy efficiency provides ongoing energy cost savings for households and businesses and frees up dollars that can be spent in local economies. Efficiency also has the benefit of added resilience: For example, reducing total energy demand can mitigate energy price volatility and supply disruptions.

Renewable energy investments also generate jobs in construction, manufacturing, and operations, although at a somewhat lower labor intensity than does energy efficiency.[119] However, renewable energy can provide significant boosts to local economies as an export industry, especially in rural areas such as the Redwood Region, with strong renewable resources that can be sold outside the region (see the discussion below). Both efficiency and renewables offer opportunities for building local supply chains and spurring innovation as these industries grow. As such, a transition strategy (as is being developed by the RRE Sector Table) that prioritizes both energy efficiency and renewable energy based on regional strengths can maximize overall job creation and economic development while accelerating the shift to a clean, resilient energy system.

[118] Garrett-Peltier, H. (2017). Green versus brown: Comparing the employment impacts of energy efficiency, renewable energy, and fossil fuels using an input-output model. *Economic Modelling*, 61, , 439–447. http://dx.doi.org/10.1016/j.econmod.2016.11.012.

[119] Laitner, J.A. , Stephen O. A., Gabrielle B. D., and Kristen N. T. . (2021). Investing in US energy efficiency and infrastructure creates more nationally-distributed jobs while saving money and protecting the climate. Washington DC and Paris, France: The Institute for Governance & Sustainable Development (IGSD); and Tucson, AZ: Economic and Human Dimensions Research Associates. https://theresourceimperative.com/wp-content/uploads/2021/03/Energy-Efficiency-Upgrades-Protecting-the-Climate-Creating-Jobs.pdf

The offshore wind industry has high potential to contribute to the Redwood Region's economic growth, GHG emissions reduction, and climate goals. Preliminary economic modeling shows significant (yet highly uncertain) potential impacts statewide (modeling of regional impacts is currently being conducted).[120] Estimates of Humboldt offshore wind job creation potential are difficult to pin down at present; the Schatz Energy Research Center at Cal Poly Humboldt is currently working on IMPLAN models to do so. Actual jobs and job creation estimates per GW (gigawatt) from studies across the nation use different job calculation procedures or models (IMPLAN, JEDI) based upon different assumptions, and on-site, construction stage, supply chain, and induced job numbers are often aggregated. Offshore wind also presents opportunities for innovation and industry-specific asset development, and policy trends support renewable energy growth and job creation. As the industry grows over the next 10-20 years, further innovations in design, materials, and construction techniques are expected to drive down costs and improve technologies and operational efficiency.

Notable Policies and Impacts

Recent California legislation has created a supportive policy environment[121] for both energy efficiency and renewable energy, particularly with respect to offshore wind and transmission infrastructure development. In October 2015, California adopted SB 350, the Clean Energy and Pollution Reduction Act of 2015,[122] which established a 2030 greenhouse gas reduction target, increased the state's renewable energy requirement to 50 percent, and mandated a doubling of energy efficiency. SB-1020, the Clean Energy, Jobs, and Affordability Act of 2022, sets ambitious targets for renewable energy with the goal of creating new jobs in the sector. SB-100, the California Renewables Portfolio Standard Program, mandates that, by 2045, 100% of the state's electricity come from renewable and zero-carbon sources. AB-525, the Offshore Energy Project, requires the state to develop a strategic plan for offshore wind development, while AB-2316 directs the Public Utilities Commission to consider development of offshore wind and the necessary transmission infrastructure.

Case Study

Offshore Wind in Humboldt County: Balancing High-Road Job Creation and Local Economic Resilience

The proposed offshore wind project[123] in Humboldt County, California, has the potential to create hundreds of high-quality, family-supporting jobs. The project's commitments to local hiring, workforce training, and labor standards could set a new bar for high-road economic development in the Redwood Region. As the industry grows, it could create a multiplier effect throughout local and regional economies, supporting job creation and small business growth in sectors like Construction, Transportation, Hospitality, and Services (among others). The proposed scale of the offshore wind project also presents challenges for Humboldt County's existing industries and employers, however. An influx of new, high-paying jobs in the wind

[120] For example, the construction phase for offshore wind is predicted to generate between $330 million and $2.5 billion in economic output in California and to create between 1,600 and 13,000 new jobs in California, depending on the scale of the projects and the transmission pathways chosen. Annual operations could contribute an additional $3.2 million to $117 million in economic output, creating 26 to 960 new jobs in California (Hackett et al., 2020; Schatz Energy Research Center et al., 2024).

[121] See here for overview.

[122] [REF]

[123] [REF]

industry could make it harder for other sectors to attract and retain workers, particularly those that have historically struggled to offer competitive wages and benefits. Small businesses and non-profit organizations may find it especially difficult to compete for talent in a tighter labor market.

One example of efforts to ensure that the benefits of the offshore wind project are shared broadly is the Redwood Region Climate and Community Resilience (CORE) Hub program.[124] A key aspect of the CORE Hub's work is facilitating community engagement and dialogue to inform decision-making and ensure tangible and beneficial outcomes from the wind project, including providing resources for historically underrepresented and marginalized communities to participate in the development process. The program also focuses on providing trusted expert input, data, and analysis to help local communities make informed decisions.

[124] [REF]

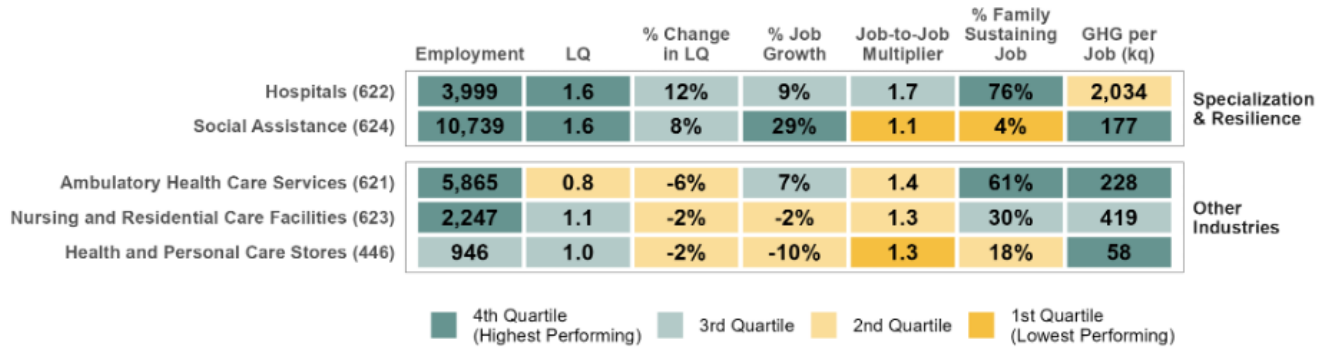
Health and Caregiving

Unlike traded sectors driven by market demand, the primary challenge for the Health and Caregiving cluster lies in attracting and retaining skilled workers to fulfill the region's health and social care needs. As discussed in the Public Health Analysis, the region faces health provider shortages and, as discussed in the Labor Market Analysis, the projected need for caregivers and health professionals is exceptional.

Cluster Performance and Alignment with RRRISE Goals

The cluster aligns well with High Road objectives, featuring minimal to moderate greenhouse gas (GHG) emissions and supporting industries that offer a significant number of family-sustaining jobs. However, the wages in the Social Assistance sector, which includes essential services like childcare, remain low. See Figure 6.12 below.

Figure 6.12 Health and Caregiving Industries Performance



Note. Data sourced from IMPLAN. Author's calculations. 2022 data with 2013 growth comparison. NAICS codes shown in parentheses. Employment figures include proprietors and may differ substantially from QCEW data, which include only employees.

Outlook

The employment growth outlook for these industries is projected to be faster than average,[125] reflecting in large part the evolving needs of an aging population. The primary constraint on sector employment growth seems to be the region's capacity to attract and train skilled providers. These workforce development challenges are explored in-depth in the Labor Market Analysis.

Industry-Specific Assets

The Healthcare and Caregiving cluster includes a wide range of industries and services dedicated to promoting, maintaining, and restoring the health and well-being of community members. Within the RRRISE region, a variety of ways exist by which to characterize these sectors: 1) the breadth of their industry concentrations and capacities for employment, 2) the ways in which the industries do or do not meet the basic infrastructure needs that lead to economically prosperous communities, and

[125] As shown in Potential Job Growth for Major Industry Sectors, Redwood Region in the Appendix, employment in the Educational Services (Private), Health Care, and Social Assistance sector is projected to grow faster than average.

3) their impact on health outcomes and health inequities in the region.[126] The Health and Caregiving Sector encompasses several industries across the Redwood Region Rise region: ambulatory and acute medical care, behavioral health care, dental care, allied medical care, caregiving, and social care sectors. The region has durable organizations and collaboratives that actively seek solution-oriented approaches while trying to continually adjust to population needs and economic challenges.

Notable Policies and Impacts

At the state level, Health in All Policies (HiAP) provides a framework for change in healthcare systems. Specifically, it ensures that local, state, and federal governments make and implement decisions that have neutral or beneficial impacts on the determinants of health. Adoption of HiAP is anticipated to promote mainstreaming of SDOH approaches across the region's healthcare system. Additionally, the Department of Health Care Access and Information (HCAI) provides state-level recommendations to address workforce challenges in the healthcare space. Its focus is on behavioral health, nursing, allied health, and oral health. Many of these policy endorsements support scholarships and stipends for students with prioritization given to underserved and underrepresented communities and to an increase in pathway programs and new training sites.

The Workforce for Healthy California Initiative commits funding across programs to increase number of providers, provide additional training, and increase cultural competency. To identify investment avenues that will have the greatest and most lasting impact, HCAI uses a workforce model to understand the region's by-specialty and by-region care gap.

Summary of Cluster Alignment with RRRISE Goals and Outlook

In the context of high-road job creation, industry, government, labor, education, and community partners must collaborate on workforce and economic development strategies. Initiatives to upskill local residents for future jobs and efforts to boost job quality and career opportunities across all sectors are becoming increasingly important. Proactive planning, community-driven problem-solving, and a commitment to high-road principles will help the region better leverage economic drivers. Figure 6.13 on the next page provides a summary of the region's cluster analysis.

[126] In considering Schroeder's Social Determinants of Health# (a framework that suggests that health disparities and outcomes are shaped not only by access to healthcare services but also by broader social, economic, and environmental factors) it makes sense to employ an aligned approach to these complementary industry sectors.

Figure 6.13 Industry Cluster Analysis Summary

	Wages	Climate & Environmental Impact	Outlook
Agriculture and Blue Economy	Low	High	Stable
Wood Products	High	High	Stable
Arts, Culture, Tourism	Low	Low	Growth
Renewable and Resilient Energy	Potential for High Wages	Potential for Low Impact	Development Opportunity
Health and Caregiving	High	Low	Growth