A Decade of Change: A Case Study of Regulatory Compliance Costs in the Produce Industry

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EXECUTIVE SUMMARY:

Regulatory pressure is a source of increasing concern to the California agricultural industry. In the decade since 2006, new rules at both the state and federal levels have imposed significantly higher regulatory burdens on growers, specifically with respect to food safety, water quality, labor wages, air quality; and worker health and safety. Additional regulations are in process as the Sustainable Groundwater Management Act is developed at the local levels for implementation in 2022, and minimum wage and overtime laws for farmworkers are phased in, also by 2022.

Previous studies regarding the regulatory environment in California have quantified the total cost of regulation on the state's agricultural producers. The goal of this project was to update a 2006 case study that documented the regulatory costs on a commercial-scale head lettuce grower in the Salinas Valley. The same grower was willing to cooperate on this study, and we used 2017 as the current year, primarily because it was the most recently completed full production year.

In the 2006 study, the cooperating lettuce grower reported regulatory costs totaling $109.16 per acre or 1.26% of total production costs. Lettuce production costs in 2006 were $8,793 per acre. Workers' compensation was by far the highest regulatory cost for the California producer, totaling almost $59 per acre, followed by pesticide regulations that totaled nearly $23 per acre. Assessments per carton from lettuce marketing orders comprised nearly $20 per acre. Other regulatory costs included water quality, food safety, worker education and training

However, by 2017, the regulatory landscape had significantly changed, precipitated by a 2006 E. coli outbreak in spinach in the Salinas Valley (that occurred after the 2006 data was collected) that altered the landscape for food safety compliance. New environmental and worker wage and safety laws were also imposed in the ensuing years. The 2017 reported regulatory costs were $977.30 per acre, or 8.90% of total production costs. Total production costs in 2017 were $10,977 per acre for this grower. Workers' compensation was again the highest cost of regulatory compliance and had risen to $336 per acre. Labor wage regulations comprised another $189 per acre, and food safety compliance followed closely behind at $181 per acre. Affordable Care Act requirements added $141 per acre, while pesticide regulatory compliance totaled over $35 per acre. Other regulatory compliance costs totaled between $5.50 and $28 per acre.

The results of this case study show that, for this lettuce grower, production costs have increased by 24.8% from 2006 to 2017, but the costs of regulatory compliance have risen by 795%. A summary of the most notable changes in regulations from 2006 to 2017 are listed on the following pages.

Summary of Major Regulatory Changes Affecting Agriculture, 2006-2017

Food Safety

- 2007: The Leafy Greens Marketing Agreement: passed by California leafy greens grower and handlers; requires growers to create and follow a food safety plan and trace-back program, environmental assessments for food safety risks, extensive water and soil amendment testing and certification, and field audits to verify compliance with worker practices and field sanitation.

- 2011: Food Safety Modernization Act: incorporated Hazard Analysis and Critical Control to the food system, increased inspections and food safety practices on the farm and in the handling/processing sectors. Adopts many of the same practices in the fresh produce sector (known as the Produce Safety Rule) as the LGMA; the LGMA updated its metrics in 2018 to align with FSMA.

Air Quality:

- 2006: AB 32, California Global Warming Solutions Act. Instituted a cap-and-trade system for greenhouse gas emission reductions with the goal of reducing California's GHG emissions to 1990 levels by 2020.

Water Quality:

- 2012 and 2017: Updates to the Region 3 (Central Coast) Irrigated Lands Regulatory Program. Groundwater well monitoring was added in 2012, and as of 2017, all Tier 2 and Tier 3 (medium and large) farms must report total nitrogen applied to their crops.

- 2014: Sustainable Groundwater Management Act: requires critical and high-priority groundwater basins to develop a local Groundwater Sustainability Authority by January 2018, which are then tasked with developing Groundwater Sustainability Plans to prevent further groundwater overdraft and pollution.

Labor Health and Safety

- 2010: Affordable Care Act: Requires employers with at least 50 employees to provide health insurance.

- 2014: AB 1522, Healthy Workplace, Healthy Family Act: As of July 1, 2015, employers must provide paid sick leave to any full or part-time worker; employees earn at least one hour of paid leave for every 30 hours worked.

- 2015: Cal OSHA updated its Heat Stress Prevention regulations, requiring shade and water provision to outdoor employees when the temperature reaches 80º F, as well as supervisor and employee training about heat stress prevention.

Labor Wages

- 2016: AB 1513, Piece Rate Compensation: As of July 1, 2016, companies that employ piece-rate workers are required to compensate unproductive time (i.e. rest breaks) at either the legal minimum wage or the workers' average wage, whichever is higher, and employees must receive documentation of the non-productive time on their pay stubs.

- 2016: SB 3, Minimum Wage Phase-In Requirement: California employers with 26 or more employees must scale up minimum wage, starting at $10.50/hr in 2017 to $15/hr by 2022. Employers with 25 or fewer employees have an additional year to phase in the increases.

Introduction

The regulatory environment in California is constantly evolving in response to new laws, policies, and legislative mandates. Regulations can provide benefits to the agricultural industry and society at large by increasing food safety, improving air and water quality, and improving conditions for farm workers. However, regulations also impose compliance costs on agricultural businesses. Regulatory costs can be classified as either direct, involving a cash outlay in response to the regulation, or indirect, involving an opportunity cost to the business or industry as a result of the regulation. Both direct and indirect costs of regulations to agricultural producers in California have been increasing in recent years. For example, in 2012 groundwater regulations were added to the Irrigated Lands Regulatory Program, which was initiated in 2003 to regulate run-off from irrigated acreage. AB 32, the California Global Warming Solutions Act of 2006, which requires reduction of greenhouse gas emissions, imposes more stringent emissions standards for agricultural equipment and animal agriculture. SB 700, signed in 2003, brought agriculture into compliance with federal air quality regulations in 2006. Cal OSHA adopted the nation's first heat stress regulations in 2006 that required farm managers and contractors to provide shade structures, breaks and cold water for farm employees; these were strengthened in 2015. Federal laws affecting agriculture include the Affordable Care Act, which requires health care benefits to be paid by many employers.

This paper presents a follow-up of a 2006 study of regulatory costs for a large Salinas Valley lettuce grower (Hamilton 2006). In the months following the original study, an historic E. coli outbreak in spinach significantly changed the regulatory landscape for food safety in leafy greens with the implementation of the Leafy Greens Marketing Agreement, followed several years later with the Produce Rule of the Food Safety Modernization Act, in addition to the environmental and worker laws noted above. This study documents both the direct cash and indirect opportunity costs of compliance in 2017 and compares them to the original 2006 costs for the same grower. The 2006 study found that regulatory compliance costs totaled $109.16 per acre, or 4.25% of cultural costs and 1.26% of total production costs (Hamilton 2006). The same study compared the costs of regulation between California and Arizona for lettuce production, and between

California and Texas for citrus. California's costs of regulation in lettuce were 55.7% higher than Arizona's ($109.16 vs. $70.10 per acre) and in citrus, California growers' regulatory compliance cost was 994.7% higher than Texas's ($347.12 vs. $31.71 per acre) (Hamilton 2006).

As in 2006, lettuce continues to be an important crop in California, consistently ranked in the top five commodities in California. The most recent California agricultural statistics for lettuce in the 2016 crop year reported a value of $1.96 billion in farmgate sales and 209,100 harvested acres. California grows 68% of all lettuce in the U.S. Monterey County, where the data for this study was collected, produces 64% of California's lettuce (CDFA).

Very few studies exist that examine the costs of regulation at the producer level. A study completed in 2006 estimated the total cost of regulatory compliance for specialty crop[1] producers in California to be more than $2 billion (approximately 10% of cash receipts) per year (Hurley and Noel 2006). The increasing complexity of the regulatory environment in California has been cited by several studies as an area of growing concern for California producers and a factor that is likely to have negative impacts on the future competitiveness of the industry (Hurley 2005; Johnston and McCalla 2004; Noel, Paggi, and Yamazaki 2013). A UC Davis study documenting growers' cost of compliance with the 2007 Leafy Greens Marketing Agreement found an average modification cost for food safety at $13.60 per acre, and seasonal food safety compliance cost of $68.93 per acre. However, the authors note that growers underreported some costs and estimated the likely combined cost at closer to $100 per acre (Hardesty and Kusunose 2009).

A study of regulatory costs accruing to agriculture in 2012 in the San Joaquin Valley found regulatory compliance for labor and environmental laws was between .98% and 5.6% of cash operating costs. This study investigated 22 growers across the eight most important crops in the Central Valley (McCullough et al., 2018).

Problem Statement: This study will update and expand upon a case study conducted in 2006 to examine the expanded array of regulatory costs faced by California farms. In 2016, California producers sold over $45 billion of farm-gate products (CDFA).

[1] Specialty crops include fruits, vegetables, nuts, and nurseries.

However, other states (and countries) produce a number of similar agricultural products, and California producers could be at a competitive disadvantage if their costs of regulation are significantly higher.

Objectives: To conduct a case study analysis of 2017 regulatory costs in lettuce production, and compare them to the regulatory costs documented in 2006 with the same grower in the Salinas Valley. We also review the changes in regulations for California agriculture since 2006, primarily with respect to food safety, water quality, groundwater legislation, and labor regulations including minimum wage, overtime and worker health and safety protocols. The findings of this study will provide the agricultural industry and policy makers with more complete information when making policy decisions regarding regulatory issues for California farmers.

Methodology

Western Growers' Association agreed to assist in identifying cooperating grower for the study in 2006, and the same grower was contacted in 2017 to confirm participation for this study. The initial interview took place in March 2018, with follow-up emails for additional information following in later months; confirmation for all data was provided in August 2018. The cooperating producer was assured anonymity as proprietary production cost data would be the centerpiece of the study.

In addition to the regulatory cost interview, we used the 2017 U.C. Davis Extension cost of production budget for head lettuce in the Salinas Valley (Tourte, et al. 2017). This was used as a means to help identify production areas in which regulatory costs might occur. It also provided a baseline from which to compare the growers' production costs.

A review of recent regulatory cost studies, cited above, provided background for the types of regulatory pressures that growers may face. Regulatory changes since 2006 were reviewed and are included in the regulatory cost narrative. Of particular note, major changes in food safety, labor wages, employee health and safety rules, water quality and groundwater allocation have either gone into effect or are being phased in as of 2017.

The cooperating grower was provided a spreadsheet that outlined the regulatory cost areas that were expected to impact the operations. They were asked to estimate the

annual amount of time maintaining compliance in each regulatory area; the value of that time; whether it was their time or an employee's; and to provide the fees they were assessed for any permits, licenses, training sessions or exams. In some cases, the regulatory costs in question accrued to the entire farm operation, while some regulatory costs could be segmented specifically to the iceberg lettuce portion of the farm. In the cases where the regulatory costs accrued to the entire farm, the costs were apportioned to the iceberg lettuce operation. This information was collected during an in-person interview with the owner(s) and relevant staff members. The owners were also asked to provide the annual production budgets for their crops, as a means to compare the impact of regulatory expenses on their growing costs. A total cost of regulation was summarized for the grower, and the regulatory cost per acre was calculated and compared to the 2006 findings. We do not report the total farm acreage or proportion devoted to lettuce to maintain confidentiality. However, the lettuce grower fits into the "large" grower category (greater than 1,000) acres as defined by the U.S. Census of Agriculture.

Results

The discussion and regulatory cost areas are divided into the following categories:

- Education and Training for Regulatory Compliance
- Air Quality Requirements
- Water Quality Requirements
- Department of Pesticide Regulation
- Food Safety
- Workers Compensation
- Affordable Care Act
- Labor Health & Safety Requirements
- Assessments

Education and Training for Regulatory Compliance

This category summarized all education and training efforts on the part of the grower to maintain compliance with Cal OSHA as well as pesticide and food safety requirements. In 2006 all of the costs of this category were due to the grower's time spent in staying current with worker safety laws and environmental issues, and amounted to $1.27 per acre. However, in 2017, much more was required of growers in terms of worker training, and employee training time also became part of this category. The

operation has added a full-time human resources staff member at a $72,500 annual salary to handle employee regulatory compliance issues. This staff person manages on-boarding training with all employees with respect to health/safety compliance required by Cal OSHA and the Department of Pesticide Regulation, and the grower estimated that the staff member spends 50% of his time on this effort. The Worker Protection Standard, updated for 2017 by the California Department of Pesticide Regulation, requires the staff member to attend a "train the trainer" session; the training fees, travel and hotel stay costs $750.

All workers must go through the Worker Protection Standard training for 30 minutes annually. The grower has 100 workers for the lettuce operation. In addition, these employees must take part in food safety/pesticide training every two weeks for 30 minutes. Four supervisors and three foremen are also involved, and the farm's HR staff person runs these meetings. In addition, all managers (which includes supervisors and foremen) must take part in sexual harassment training every two years; this amounts to an hour per year. One of the ranch owners spends about 30% of his time on regulatory compliance with the Leafy Greens Marketing Agreement and worker safety. His salary is $150,000 per year.

The sum of the education and training efforts for regulatory compliance are $26.31 per acre annually for this grower – a 1,966% percent increase from 2006's value of $1.27 per acre.

Air Quality Requirements

The Federal Clean Air Act requires the Environmental Protection Agency to authorize state implementation of air quality plans. The main component of the Clean Air Act that concerns agriculture is compliance with National Ambient Air Quality Standards, which sets limits on six pollutants known to cause health hazards, environmental damage, and/or contribute to the formation of smog: ozone, particulate matter, sulfur dioxide, carbon monoxide, nitrogen dioxide and lead. The EPA mandates a national standard in each of these pollutants. Each state is required to submit a State Implementation Plan to reduce or maintain pollutant levels below those standards. The regulatory burden in each region is based primarily on whether the air quality in that

region meets or exceeds the pollutant levels set by the EPA under Title V, which requires the monitoring of and meeting standards for major source pollutants. This approach establishes different regulatory requirements from one air region to the next (U.S. EPA).

Prior to 2003, agricultural operations in California were exempt from the federal Clean Air Act requirements. However, on September 22, 2003, Governor Gray Davis signed into law Senate Bill 700 which imposed new regulations on agricultural operations with respect to air quality. The bill contained six main provisions: 1) It defined "agricultural source" in state law; 2) It removed the restriction on air districts to not require permits for agricultural source air pollution; 3) It established specific permitting and exemption requirements for agriculture; 4) It required emission control regulations in areas that exceed federal air quality standards for PM10 (particulate matter); 5) It required permits and emission mitigation from Confined Animal Facilities (CAFs); 6) It requires CAPCOA (California Agricultural Pollution Control Officers Association) to compile a clearinghouse of information about current emissions control and mitigation activities (California Air Resources Board; Feather River Air Quality Management District).

California is comprised of 35 air districts. Requirements for air quality compliance vary greatly, depending on the pollution levels inherent in a particular region. The lettuce grower in Salinas falls under the jurisdiction of the Monterey Bay Unified Air Pollution Control District, which considers agricultural operations for growing crops or livestock as generally exempt from air quality permits and regulations. Monterey County, on the Central Coast of California, has no non-attainment areas for air quality, and thus does not fall under EPA's Title V regulations for pollution reduction. In 2006, the lettuce grower reported no costs for air quality regulation.

However, in 2006, the California Legislature passed the Global Warming Solutions Act or AB 32 to reduce greenhouse gas emissions to 1990 levels by 2020. While agriculture operations emissions were not capped under this law, air districts introduced new regulations with respect to vehicle and other types of emissions that contribute to greenhouse gas formation. Even "clear air" areas such as Monterey County imposed more stringent regulations. As of May 2007, all agricultural diesel engine equipment, both stationary and mobile, must be registered with the Monterey Bay

Unified Air Pollution Control District, and equipment emissions must be monitored (California Air Resources Board, Monterey). The lettuce grower now has two staff members who each spend 40 hours annually reporting equipment and emissions information to the MBUAPCD. The grower also had two trucks that were found non-complaint with current emissions standards and new emissions filters had to be installed. The cost of the truck filters was $25,000 each; the life span is expected to be six years. The total air quality compliance costs per acre in 2017 was $5.26, the lowest of all regulatory categories.

Water Quality

The United States Clean Water Act is the primary federal statute that mandates states to control water quality. The EPA provides funding for states to administer the required planning and regulatory programs, but states must submit plans to control water pollution that meet the criteria established by federal law. The most difficult type of pollution to control is non-point source pollution, or NPS. According the U.S. EPA, nonpoint source pollution is the largest source of water quality problems in the U.S.

Two California agencies are responsible for developing and carrying out the NPS pollution control policies; the State Water Resources Board (SWRB) and the nine Regional Water Quality Control Boards (RWQCB). The Porter-Cologne Act, initially adopted in 1969, is the state law that provides the authority to the SWRB and the RWQCB to control NPS pollution (Gerstein, et al. 2005). Each regional board develops "basin plans" for their hydrologic areas, governs requirements and issues waste discharge permits, takes enforcement action against violators, and monitors water quality. The California Water Code gives RWQCBs the authority to regulate discharges of waste that could impact the waters of the state of California, through permits called “Waste Discharge Requirements.” A discharge is any release of waste, such as fertilizer, pesticide or sediment, to a water of the state. Waters of the state include rivers, streams, lakes, bays and estuaries, and groundwater.

The lettuce producer’s operation is in Region 3 which is comprised of Santa Cruz, San Benito, Monterey, San Luis Obispo, and Santa Barbara counties as well as the southern parts of Santa Clara and San Mateo counties, the northern portion of Ventura

County, and small portions of Kern County. Since the 2006 study, the Central Coast Regional Water Quality Control Board adopted much more stringent rules for water quality on irrigated lands; a revised Agricultural Order was introduced in 2012 and updated in 2017, now referred to as the Agricultural Order 3.0. More than 424,000 irrigated acres spread among 4,440 farms were enrolled in the 2012 Agricultural Order (CCRWQCB). Agricultural operations are divided into three tiers based on risk to water quality. Farm size and chemical and fertilizer applications determine the relevant tier.

The lettuce grower falls into Tier 2, which includes all farms/ranches between 50-500 acres of irrigated lands with a nitrogen loading crop, and/or application of certain chemicals. As of March 2017, the following water quality compliance activities are required of all Region 3 Tier 2 operations (California Water Boards – Central Coast R3):

- Submit or update an electronic Notice of Intent (enrollment with the Region 3 Water Board)
- Develop a farm water quality management plan
- Destroy abandoned groundwater wells
- Implement management practices to meet water quality standards and assess their effectiveness
- Minimize bare dirt and prevent erosion
- Maintain existing riparian vegetation
- Conduct surface water monitoring and reporting (either through cooperative agreement or by a qualified third party)
- Conduct groundwater monitoring of each well twice annually and report results (by a qualified third party)
- Submit or update the ranch Annual Compliance Form
- Maintain records for Total Nitrogen Applied, which include:
    - Track nitrogen applied in fertilizers and compost
    - Track volume of irrigation water used on ranch
    - Annually sample irrigation water nitrogen concentration
    - Annually sample soil nitrogen
- Submit a Total Nitrogen Report

Growers that are classified as Tier 3 (over 500 acres of nitrogen-loading crops and/or application of certain chemicals) must comply with all of the Tier 2 requirements and also:

- Conduct and report results of Individual Discharge monitoring
- Implement Certified Irrigation & Nutrient Management Plan
- Submit Certified Irrigation & Nutrient Management Plan Effectiveness report
- Implement Water Quality Buffer Plan and Update (if ranch is adjacent to affected surface water)

In 2006, the lettuce grower estimated a water quality compliance of $4.30 per acre. Agriculture water quality was covered under a Conditional Waiver program until 2012, and growers were able to implement a range of water quality improvement practices and pay a fee to join a coalition. The farm's primary cost in 2006 was for water monitoring systems; flow meters were installed to report water use. Irrigation water quality testing was done for food safety compliance, not to protect water quality.

In 2017, the grower reported that costs had risen to $18.57 per acre, a 331% increase over the 2006 costs. Most of these costs involved increased monitoring and reporting of both groundwater as well as fertilizer applications to the land. The grower reported paying $13,000 per year to a third-party testing service, and the reporting system for nitrates costs $10,000 per year, plus $5,000 in staff time. An accounts payable staff member spends one day per month reporting fertilizer type and quantity used as part of the Nitrogen Management Plan requirement. In addition, one of the owners tests all of the wells annually, at $130 per test. The grower also reported paying $21,000 as part of a required Salinas Valley agricultural stewardship coalition to provide clean water supplies to communities with polluted drinking water.

The water quality compliance costs will increase in the future as the Sustainable Groundwater Management Act is implemented in 2020. As of January 2018, each high-priority water basin (determined by primarily by overdraft) has formed a Groundwater Sustainability Agency, which is tasked with developing a Groundwater Sustainability Plan (GSP) for the basin, and must meet the sustainability goals within 20 years of implementing the plan (California Department of Water Resources). Growers anticipate additional enforcement as well as higher costs for both water quality and regulations on the quantity of water used. However, as no GSPs are yet in place, any estimation of these costs would be speculative.

Pesticide Use Regulations

The U.S. Environmental Protection Agency regulates pesticides under the auspices provided by two major acts of Congress; the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) and the Federal Food, Drug and Cosmetic Act (FFDCA). These were strengthened by the Food Quality Protection Act (FQPA), which became law

in 1996. States are authorized to regulate pesticides under FIFRA and under state pesticide laws. States may place more restrictive requirements on pesticides than EPA. Both the EPA and the state must register a pesticide before distribution. California pesticides must undergo a more rigorous review than all other states. The Department of Pesticide Regulation, under Cal EPA, administers the certification and licensing process. Owners of private firms who plan to use restricted-use pesticides (as classified by the U.S. EPA) on their own property (defined as property owned/leased or rented by him/her or his/her employer) can apply for a Private Applicator Certificate, which requires the passage of an exam that is administered through the County Agriculture Commissioner's office. To renew the Private Applicator Certificate, six hours of continuing education over the three years of the valid certification is required.

An Agricultural Pest Control Advisor's (PCA) license is required of anyone who advises the use of restricted materials, and a Qualified Applicator's license is required of anyone planning to apply restricted materials for hire. Many large growers in California use PCAs to advise their pest control needs. The requirements for a PCA include 42 semester units of core courses, over and above a B.S. degree or equivalent. The applicant must pass a Laws and Regulations exam, and must acquire 40 hours of DPR-approved continuing education every two years to maintain the license.

Both private applicators and PCAs are required to provide a Notice of Intent to the County Agricultural Commissioner at least 24 hours before the application of restricted materials. Since 1990, when the DPR began its "full-use reporting" program, private applicators and PCAs must report their applications monthly to the County Agricultural Commissioner, who then reports the data to the Department of Pesticide Regulation. The reports must include the data and location where the application was made, the type of crop, as well as the type and amount of pesticides used. The DPR keeps a comprehensive database of pesticide use in California (California Department of Pesticide Regulation).

The lettuce grower said that they contract out their crop protection services to third party providers, and so the cost of pesticide regulation is estimated to be around 5% of their pesticide costs, or $35.55 per acre. Depending on the provider, crop protection firms may bill PCA time separately, in which case it is easier to separate out the

regulatory costs, or the cost of the PCA services (which also includes posting signs, filing notices of intent, filing pesticide application reports, etc.) is included in the price of the chemicals. The grower noted that the ranch must keep spray application records for six years. In 2006, the ranch reported pesticide regulatory costs of $22.98 per acre. The costs of pesticide regulation for this ranch increased by nearly 55% by 2017. However, we note that these costs are likely underreported, as it is difficult without a comparison state (as in the 2006 study) to study the cost differences in pesticides due to increased registration costs in California. If a crop protection service includes their PCA and other regulatory services within the price of the chemicals, it is also difficult to ferret out the regulatory component. Some of the increased regulatory costs of pesticide use are also captured in other areas of this study, such as Education & Training for Regulatory Compliance as well as the Worker Protection Standard that accounts for the costs of safety gear for workers.

Pesticide use regulations will become more onerous starting in 2018 as the California Department of Pesticide Regulation adopted new rules restricting pesticide applications within ¼ mile of schools and daycare centers. Pesticide applications are prohibited Monday through Friday from the hours of 6 a.m. to 6 p.m., and growers must notify schools at the beginning of the year regarding their pesticide application plans, and again 48 hours before the actual application. A UC Davis study estimated the economics effects of this regulation on California's agricultural industry. The study covered 13 top agricultural counties in California – though Monterey County was not included because of data limitations. The notification effort was estimated to cost each affected grower $1,234 (Goodhue, et al. 2016).

Food Safety

When the 2006 study was conducted, it preceded the E. coli outbreak in spinach that occurred later that year. Thus, regulatory compliance for food safety was far less stringent than 2017. In 2006, the grower paid a third-party food safety audit company $3,000 for ranch and harvest crew inspections, and a staff person spent about three hours per month preparing documents for the audits. The total cost per acre for food safety regulatory activities was $.64.

In 2017, food safety regulations were the grower's third highest compliance cost behind workers' compensation and other labor wage regulatory costs. Most of these compliance costs were born out of the Leafy Greens Marketing Agreement (LGMA) of 2007, an industry-developed set of food safety practices for California leafy greens producers and handlers. These were updated to correspond with the federal Food Safety Modernization Act of 2011, which included the Standards for the Growing, Harvesting, Packing, and Holding of Produce for Human Consumption, which went into effect in 2016, commonly known as the Produce Safety Rule. The rule established, for the first time, scientific minimum standards for food safety throughout the entire food supply chain, from production and harvest to packaging, handling and transporting (U.S Food and Drug Administration).

The LGMA has five basic provisions at the farm level, covering the following areas:

- Environment
- Water
- Soil Amendments
- Worker Practices
- Field Operations

Each farm must have a written food safety plan that describes their management practices with respect to these provisions. Environmental risk factors include past flooding, land use near fields, and animal intrusion. Growers must maintain buffer zones between fields and any areas used for livestock, compost or septic leach fields. Fields must be inspected prior to harvest for animal intrusion, either wild or domestic, and staff must document the incident and all or part of the crop might be destroyed. Irrigation water must be tested regularly for E. coli, and must not exceed the maximum allowable level. The grower also must prepare a description of their water system. No soil amendments may contain animal manure, or if they do, the grower must prove they have been heat-treated or composted, and they must be tested for E.coli 0157 H7 and Salmonella (LGMA 2018).

With respect to worker practices, growers must provide toilet facilities and hand washing stations that are regularly cleaned and stocked with supplies. The

facilities must be accessible from the workers' locations, and workers must participate in on-going training sessions and have signage posted regarding employer rules regarding hand washing and other sanitation issues such as eating and drinking near adjacent fields. Field operations with respect to cross-contamination between other leafy greens fields is another component of the LGMA; growers must have in place a process to clean equipment between fields and identify any sources of contamination. Each production block must have a food safety harvest assessment, documenting cleaning and sanitation procedures, any evidence of animal intrusion, and equipment storage procedures. Farms are subject to both scheduled and unscheduled audits of their food safety practices (LGMA 2018).

In order to comply with these regulations, the grower hired a staff person at a $65,000 salary who spends approximately 40% of his time on food safety issues for the LGMA. Much of this time is spent in documenting the farm's food safety practices. Harvest machinery sanitation requires one full-time worker for each of the three crews during the 32 weeks of the growing season, which costs over $100,000 annually. The foreman of each crew must test all of the workers' equipment and making sure the crew is following sanitation practices, as well as conduct the preharvest inspection and paperwork. This time totals over $50,000 during the season. The toilet facilities must be cleaned every day during the season; the value of employee time is $100 per day per crew. Provision of the toilet facilities themselves costs $150 per week per toilet during the growing season, this totals over $14,000. Third party food safety audits for the lettuce portion of the farm costs nearly $4,000. The combined costs of food safety compliance for this grower was $181.48 per acre – an enormous increase from the $.64/acre cost in 2006.

Workers' Compensation

As with many regulatory costs, workers' compensation is a cost of doing business in California. All employers, even those with only one employee, are required to carry worker's compensation in California. In California, the Division of Workers Compensation monitors and administers workers' compensation claims. California

employers generally have three options to fund their workers' compensation benefits: (1) self-insurance, (2) private insurance, or (3) state insurance.

- Self-Insurance – This option is available for employers with at least $5 million in net worth, net income of $500,000 per year and be certified from the Department of Industrial Relations. Private employers must post security as a condition of receiving a certificate of consent to self-insure.
- Private Insurance -- Employers may purchase insurance from any of the approximately 300 private insurance companies which are licensed by the Department of Insurance to provide workers' compensation insurance in California. Insurance companies are free to price this insurance at a level they deem appropriate for the insurance and services provided.
- State Insurance -- Employers may also purchase insurance from the State Compensation Insurance Fund, a state-operated entity that exists solely to provide workers' compensation insurance on a non-profit basis (California Department of Industrial Relations).

Prior to the 2006 study, the state had undergone workers compensation reform in 2003 and 2004, a result of which reduced premiums for employers. The grower reported his costs for workers' compensation as $58.94 per acre in 2006, 95% of which came from the 10% insurance premium on worker pay. The additional five percent came from clerical staff filing paperwork with the State of California. In 2006, workers' compensation comprised 54% of this grower's total regulatory costs.

California passed additional workers' compensation reforms in 2012; the primary changes were increased benefits to injured workers and new processes for independent bill review, new fee schedule and changes in the calculations of permanent disability benefits, among others. Despite these reforms, workers compensation costs increased dramatically for the grower by 2017.

The grower reported that the workers' compensation premium for field workers, supervisors and foremen is 15% of their wages. He noted that the harvest crews are paid on piece rate, and can earn $18 to $20 per hour. Workers' compensation is calculated on top of the actual earnings, so the grower's total cost of workers compensation premiums came to over $300 per acre. One of the managers spends about half of his time on

workers' compensation issues, adding another $32 per acre. Overall, the grower's reported costs of workers' compensation in 2017 was $336.23 – a nearly five-fold increase from 2006. Both the increased insurance premium as well as the much higher wage rate contributed to this increase. It is also possible that the 2006 study underestimated the workers' compensation costs to some degree – we did not consider the impact of piece rate wages, and thus used the minimum wage at the time, which was $6.75 per hour in 2006.

Affordable Care Act Requirements

Similar to the LGMA, the Affordable Care Act (ACA) of 2010 imposed an entire new set of regulatory costs. The ACA, which went into effect in 2014, requires all employers with 50 or more full time or full-time-equivalent employees to provide health care coverage for their workforce, and file an annual information return to the IRS reporting whether and what type of health insurance is provided to employees. The same information must be provided to the employees annually to provide the IRS on their tax returns.

The grower reported paying $250 per month for the 100 employees that work on the lettuce operation, plus 200 hours of an upper manager's time per year to file required reports to the IRS and employees. ACA coverage and documentation cost $141.19 per acre in 2017.

Labor Health and Safety Requirements

The 2006 study did not contain a category for this area of regulatory compliance. Any worker health and safety regulations were categorized under Workers' Compensation or Education and Training. Heat stress and illness prevention measures were adopted by Cal OSHA in 2006 for those in outdoor occupations, defined as agriculture, construction, oil and gas extraction, landscaping, and the transportation or delivery of agriculture, construction or heavy materials. This was the first law of its kind in the nation, but there was little training or enforcement during this initial period. In the ensuing years, training became mandatory for both supervisors and employees and additional worker protection standards have been developed. In 2015, Cal OSHA

approved changes to its Heat Illness Standard, effective May 1, 2015. Employers must provide shade structures that are sufficient to cover all employees taking breaks at one time when the temperature is above 80ºF. Clean, cool drinking water must be provided free of charge to employees, and both the shade structure and water must be nearby the workers' location. Many growers use portable shade wagons or trailers. Pre-shift heat stress trainings are required to remind workers about drinking sufficient water, taking breaks and the signs of heat stress. During extreme heat conditions, defined as 95ºF or above, workers must take a 10-minute rest break to cool down every two hours in an eight-hour shift. Workers must also be able to take at least a five-minute break upon request, even if temperatures are below those thresholds. Farming operations are subject to unannounced inspections by Cal OSHA to check for compliance. Fines are assessed for any violations (California DIR, Heat).

With respect to pesticide safety, the training costs for the 2017 Worker Protection Standard were covered in the Education/Training for Regulatory Compliance category. However, it is the grower's responsibility to provide safety gear to the workers, such as gloves and protective eyewear. Some of these provisions are part of the LGMA food safety protocols as well. The lettuce grower estimates that the costs for the worker supplies comes to about $.03 cents per carton, or $25.50 per acre. Shade trailers for the lettuce operation cost about $1,200 per crew; after depreciating the cost of the trailers over six years this comes to $.56 per acre. Providing sufficient clean, cool drinking water to the crews during the season costs about $5 per crew per day or $2.67 per acre. The total cost per acre for labor health and safety regulations in 2017 was $28.72.

Labor Wage Requirements

This category was part of the 2006 study, but again, costs increased in conjunction with regulatory expansion. In 2006, the grower's labor wage requirements were reported as the time spent in filing employee paperwork and taxes primarily with respect to the workforce – the grower reported 300 hours of staff time needed to file payroll taxes and state employee forms. We calculated this cost as $1.36 per acre. As in many other categories, new regulations greatly expanded this cost by 2017. In 2016, AB 1513 went into effect for employers of piece rate workers. The California Labor Code

was amended to establish separate wage calculations to compensation for rest or other non-productive time so as not to penalize workers for taking rest breaks. Most of this grower's workforce is paid on piece rate, so the foremen must document and payroll staff must calculate the non-productive time. This time is paid at an average hourly rate based on their piece work rate. The grower estimated this regulation cost $.11 per carton in additional staff time for documentation and higher wages for rest breaks. Additionally, SB 3, the Healthy Workplace Healthy Families Act of 2014, requires employers to provide paid sick leave for any employee who works 30 or more days within a year, including part-time and temporary workers. Employees earn at least one hour of paid sick leave for every 30 hours worked (California DIR). The grower estimates that paid sick leave costs $.10 per carton. The total combined cost to the grower for nonproductive time wage increases and sick leave are calculated at $178.50 per acre. The additional staff time needed to file payroll taxes and employee forms was reported at 800 hours per year, or $10.60 per carton, bringing the total cost for this category to $189.10, the second largest regulatory cost category in 2017.

Assessments

Since 2006, the California Lettuce Research Board has been disbanded and a new organization, the California Leafy Greens Research Board, started in 2008, after a referendum by the leafy greens growers and approval by the California Department of Food and Agriculture. The assessment on growers is $.006 per carton. This organization is separate from the Leafy Greens Marketing Agreement, which requires growers to pay .0115 per carton. The total cost per acre for these assessments is $14.88 per acre in 2017. This is the only regulatory category that decreased over the study time period; the 2006 assessments on the grower cost $19.66 per acre.

Summary and Conclusion

The results of this case study indicate that the regulatory environment in California agriculture has changed significantly over the 11-year time frame. Our study shows a 795% increase in regulatory costs, from $109.16 per acre in 2006 to $977.30 per acre in

2017. Total costs for lettuce production have increased by 24.8% in that time frame, from $8,793 per acre in 2006 to $10,977 in 2017.

Most of these changes in regulatory costs are due to new food safety or labor wage, health and safety laws. The most notable increases in regulatory costs are for food safety, as a result of the Leafy Greens Marketing Agreement and the Food Safety Modernization Act; increases in both piece rate wages as well as an increased workers' compensation premium; the Affordable Care Act requiring employer-provided health insurance, and the additional labor wage requirements for provision of sick leave and the higher average wages for piece rate workers for non-productive time. Table 1 summarizes the changes in the regulatory costs from 2006 to 2017.

Table 1. Regulatory Cost Changes for Salinas Valley Lettuce Grower, 2006 to 2017

Regulatory Category	2006	2017
	Cost per acre	
Education/Training for Regulatory Compliance	$1.27	$26.31
Air Quality Requirements	$0.00	$5.26
Water Quality Requirements	$4.30	$18.57
Department of Pesticide Regulation	$22.98	$35.55
Food Safety - LGMA and PR	$0.64	$181.48
Assessments	$19.66	$14.88
Labor Health & Safety Requirements	$0.00	$28.72
Worker's Compensation	$58.94	$336.23
ACA Requirements	$0.00	$141.19
Labor Wage Requirements	$1.36	$189.10
Totals (per acre)	**$109.16**	**$977.30**

Figures 1 and 2 on the following page depict the percentage breakdown for each regulatory category by year. Though workers' compensation remains the most expensive regulatory category in 2017 and has dramatically increased since 2006, its relative cost has diminished as other regulatory costs, notably labor wage requirements, food safety, and health insurance, have increased.

Figure 1. 2006 Regulatory Category Comparison

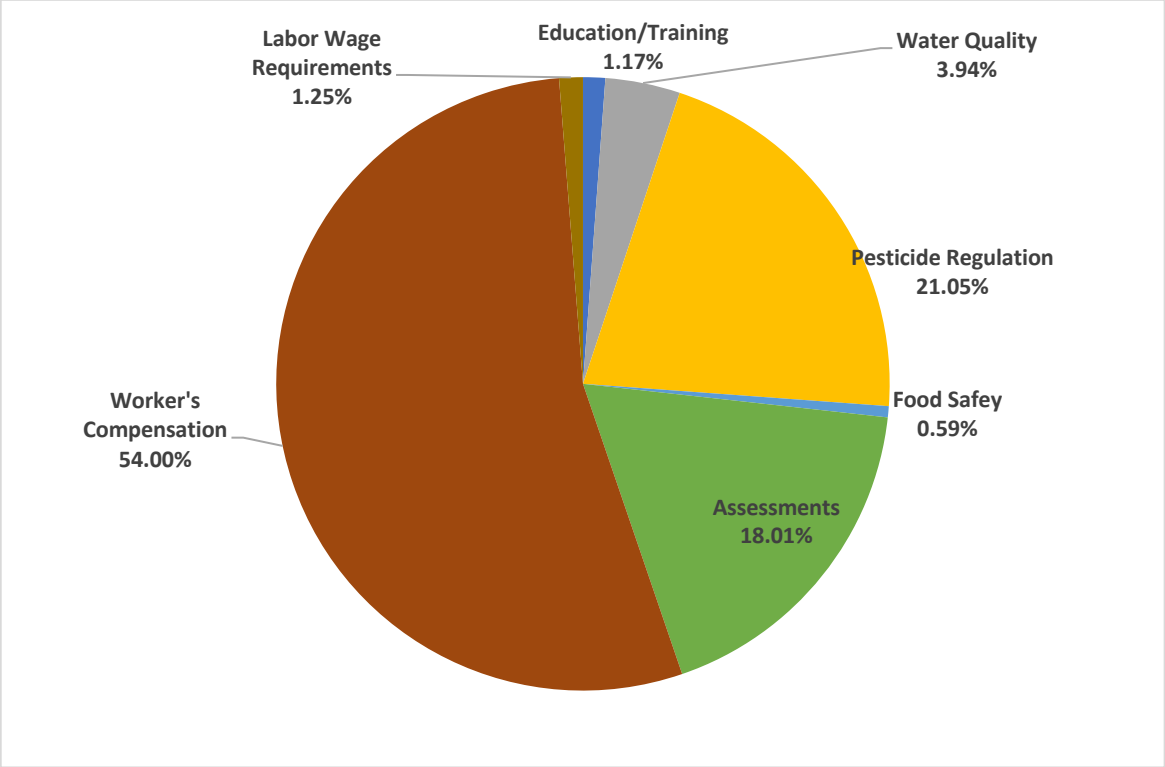
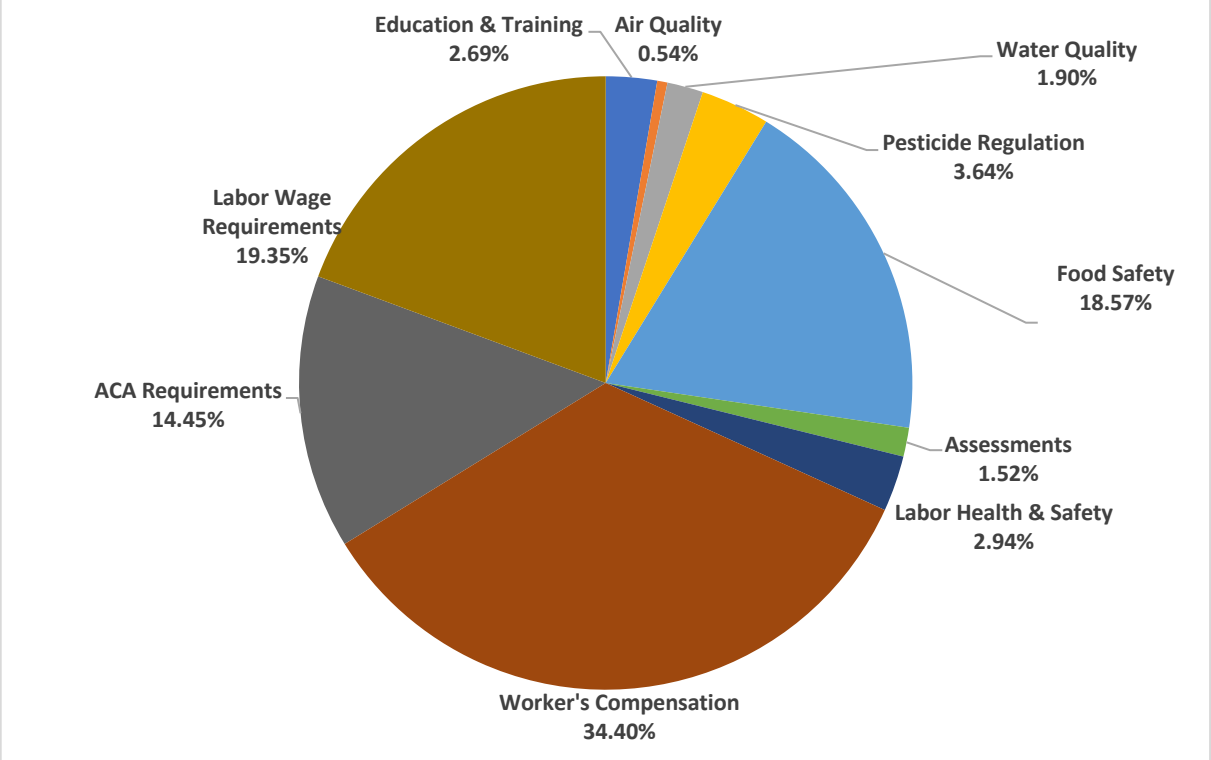


Figure 2. 2017 Regulatory Category Comparison



The impact of California's minimum wage laws passed in 2016 were not directly included as a regulatory cost in this study, though the impacts are embedded. California's minimum wage was $6.75 per hour in 2006, and increased to $10.50 in 2017 for businesses with 26 or more employees. (Interim increases went into effect in 2007, raising the minimum wage to $10 by 2016). However, the fresh produce industry, which increasingly relies on the federal H2A program for workers to shore up a domestic agricultural labor shortage, has an adverse effective wage of $13.18 in California, thus becoming the effective minimum wage for industries reliant upon this program (U.S. Department of Labor). Additionally, the harvest workers are paid piece rate wages (with a guarantee of at least minimum wage), and the grower reported that his lettuce workforce earned between $18 - $20 per hour. Thus, the effect of higher California minimum wage laws is not factored into this particular case study, though we recognize that the minimum wage will impact regulatory costs in the future as it rises to $15 per hour by 2022. The same comment is relevant to California's agricultural overtime law passed in 2016, which will require agricultural overtime to be paid after 40 hours per week, rather than the current 60-hour agricultural workweek. The phase-in begins in 2019 when overtime must be paid for over 55 hours per week; final implementation occurs in 2022. This law will also increase regulatory costs for growers in the future, but the estimation goes beyond the scope and timeframe for this study.

Similarly, the Sustainable Groundwater Management Act, passed in 2014, will not be fully implemented until 2022 when each Groundwater Sustainability Authority starts requiring compliance with its Groundwater Sustainability Plan. Though economists and others are studying SGMA's potential effects on the agricultural industry, we are not able to estimate its future impact on this grower; it also is beyond this study's scope.

Policy Implications

The purpose of the initial case study conducted in 2006 was to compare regulatory costs between California, Arizona and Texas and to quantify, at the grower level, the cumulative effect of regulation. We know of no prior studies that document the total effect of environmental and employee regulations at the farm level, though subsequent work has been conducted by the authors as well as other researchers. Though

there are certainly limitations to the case-study method that make it difficult to extrapolate these results industry-wide, this study provides a snapshot of the regulatory burden faced by a large grower of one of California's top agricultural commodities over a time period characterized by a wave of new regulations. The policy structure is fragmented among a large number of government agencies, at regional, state and federal levels, and it is rare that a government agency understands the total regulatory burden growers face, or the impacts of increasing regulations. The 2006 study noted:

> *"It is hoped that policymakers can use this study to better understand the impact of adding further regulatory burden to California agriculture, particularly since in all areas documented by this study, California already leads the comparison states in terms of the number of regulations and the cost of compliance"* (Hamilton 2006, p. 71)

Clearly, this report shows the regulatory burden has dramatically increased, and most of the additional regulations since 2006 (the largest exception being the Affordable Care Act) were enacted at the state level. Amid the backdrop of existing environmental and economic stresses caused by the ongoing drought, climate change, labor shortages, and uncertainty in trade policy, Johnson and McCalla's 2004 question, "Wither California Agriculture: Up, Down or Out…." seems less likely to be a positive answer. Anecdotal evidence from growers as well as other case studies indicate that other states are not necessarily California's biggest competition, but other countries. Large specialty crop producers such as Driscoll's and Mission Avocado have expanded their operations into Central and South America where land, labor, water and regulatory costs are all much less expensive. Such a trend could permanently change California's dominant position in U.S. agriculture.

Policy makers may also consider what types of incentive-based or cost-share measures might be implemented to assist California growers with meeting the costs of regulatory compliance. As an example, the California Air Resources Board operates the Carl Moyer program which provides millions of dollars of funding annually to help farm owners upgrade both mobile and non-mobile agricultural equipment to meet more stringent emissions standards. For the most part, growers are expected to absorb the increased costs of regulation or face penalties for violations. The market structure of most

agricultural production at the farm level does not allow growers to pass on the increased costs of regulation up through the supply chain.

While it is difficult to establish a direct cause and effect, the lettuce industry has experienced a shift in production in California. Overall, the number of harvested acres has remained steady, even slightly increased since 2006. However, as shown in Table 2, that production has shifted both away from Monterey County, known as the "salad bowl of the world" and from head lettuce. A fully detailed explanation for this shift goes beyond the scope of the study; factors such as consumer preferences, competition for land with higher value crops such as berries are likely factors. But head lettuce is far more labor intensive than lettuce greens that comprise bagged salads – those crops are mechanically harvested – and the increased regulatory costs for labor, as well as an acute agricultural labor shortage, likely contribute part of the story of the changing production patterns.

Table 2. California and Monterey County Harvested Lettuce Acreage, 2006, 2016

Year	California (acres)		Monterey County (acres)	
	All Lettuce	**Head Lettuce**	**All Lettuce**	**Head Lettuce**
2006	207,000	125,000	169,000	66,007
2016/17	209,100	89,500	106,863	40,476

Source: CDFA and Monterey County Crop Reports, 2006 and 2017.

This case study indicates that California agricultural producers face increasingly intensifying regulatory pressure, and as noted in this study, further regulations are yet to be implemented that may have serious implications for two necessary resources that are already in short supply – groundwater and farm labor. While California agriculture has thus far shown resilience as regulations have escalated, the results of this study provide evidence that the regulatory burden has far surpassed production cost increases. Whether California agriculture continues to be a dominant force in the U.S. food system may at least in part depend on growers' abilities to withstand the increasingly expensive regulatory environment in the Golden State.

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