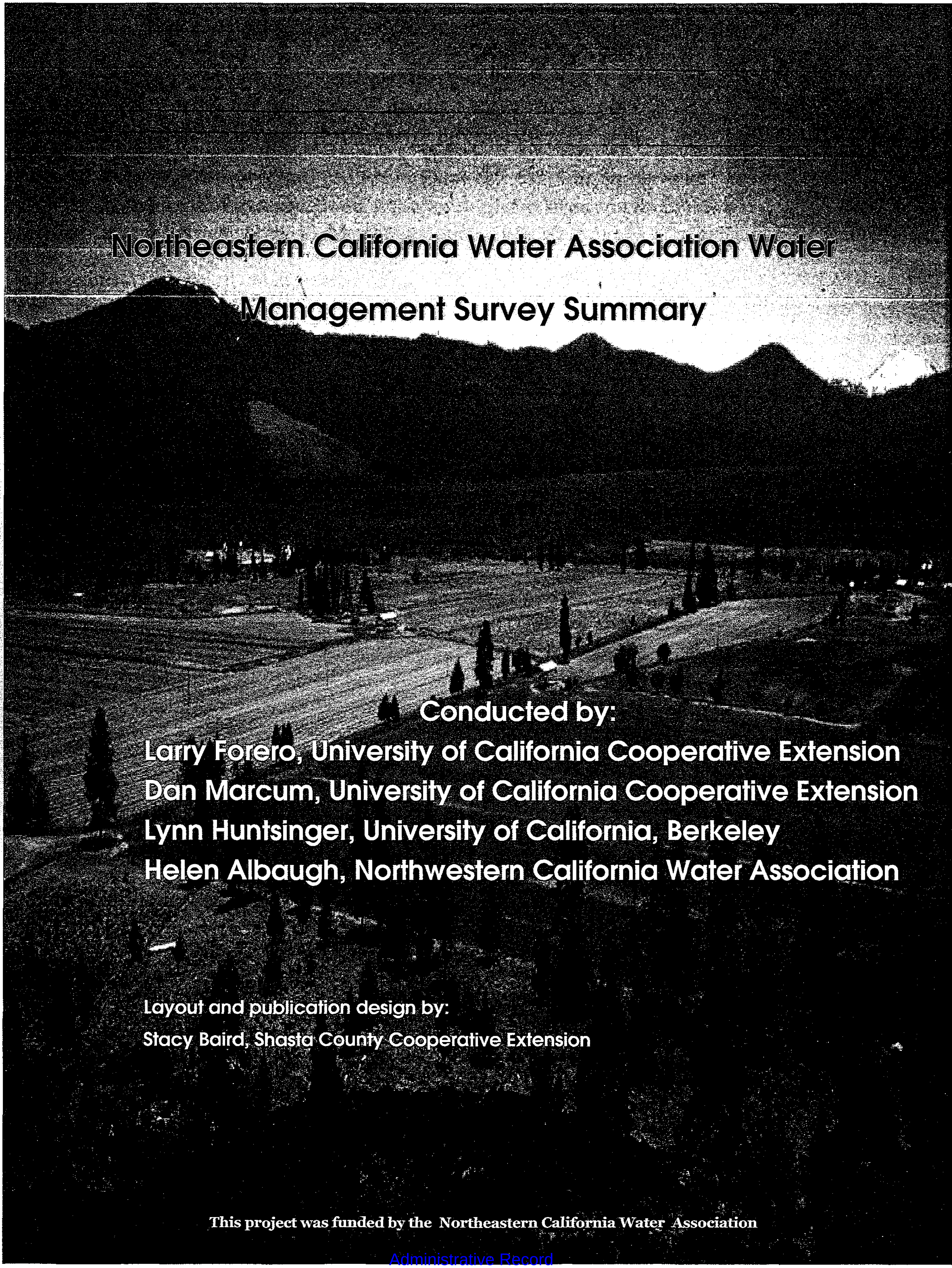

Northeastern California Water Association Water Management Survey Summary

Conducted by:

Larry Forero, University of California Cooperative Extension

Dan Marcum, University of California Cooperative Extension

Lynn Huntsinger, University of California, Berkeley

Helen Albaugh, Northwestern California Water Association

Layout and publication design by:

Stacy Baird, Shasta County Cooperative Extension

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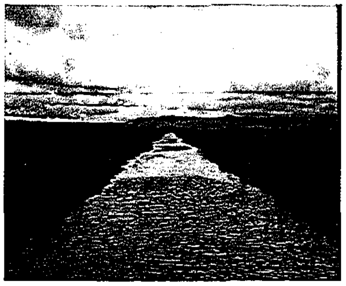


Believing they could accomplish more as a group than as individuals, in 2001 a small group of growers formed Northeastern California Water Association (NECWA) in response to the Klamath Water Crisis, the Talent Decision and the 303(d) listing of the Pit and Fall Rivers. The mission of the organization is

"To protect and enhance water rights, water quality and riparian areas to the benefit of agriculture, the environment, recreation and wildlife in the Northeastern California region."

In 2010 NECWA felt it was important to ascertain baseline information related to general farming practices and water quality management efforts. To accomplish this, a standardized survey instrument was developed and administered to their membership.

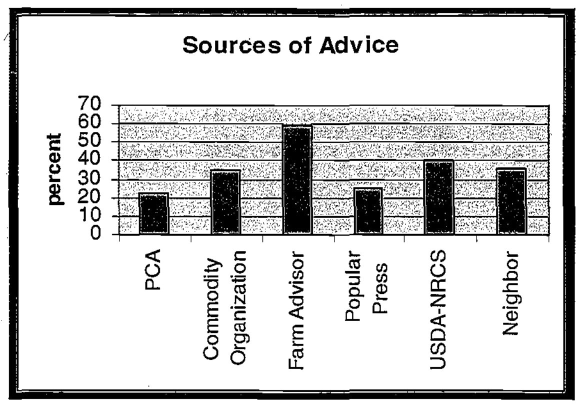
General Demographics

Surveys were sent to the entire membership (172 members) of NECWA in the winter of 2010. Members were asked to complete the survey and return it. The anonymous surveys were forwarded to University of California staff for data entry and analysis. The response rate was about 76% (130 returned surveys).

The survey was completed and returned by both owners (80%) and managers (16%) of agricultural properties in Northeastern California. Length of land ownership varied from a few years to over 100 years. Most of the respondents (66%) have ownership history of less than 29 years. The majority of respondents (66%) pay their dues to the Association but are not actively involved in the activities of the organization much beyond that. Roughly 28% noted they do not go to any meetings while just 35% attended only annual meetings. Respondents serving on the board of directors made up 12% of the survey population.

A minority of respondents (28%) have used United States Department of Agriculture National Resource Conservation Service (NRCS) Environmental Quality Incentive Program (EQIP) programs over the past five years to make improvements to their farms and ranches. Growers get advice related to water quality issues and practices from a variety of sources. Figure 1 outlines these sources.

Figure 1-Sources of production Information



The respondents to the survey answered questions based upon their actual practices. For example, respondents to "irrigated grain" may produce this commodity for hay, grain and pasture. They may irrigate a particular commodity using a variety of systems (flood, handline, wheel line). Because of this, the percentages reported may be more or less than 100%.

Many of the respondents report being involved in business activities in addition to their agricultural pursuits. These include opening their properties for recreational activities (33%), harvest timber or firewood (13%), while 8% report being involved in other enterprises. The majority of respondents (70%) predict the future of agriculture in Northeastern California to be "somewhat favorable" or "very favorable."

Wild Rice

Wild rice has been produced in Northeastern California for about 25 years. Wild rice is an important commodity produced in Northeastern California. A total of 35 survey respondents (27%) report growing wild rice. Most of the member wild rice growers (46%) produce this commodity on under 100 acres. The largest percentage of rice growers (40%) report growing production acreage between 100 and 499 acres. About 11% report producing certified organic wild rice.

Fertilizer

Most (about 74%) report using fertilizer with about 12% indicating they use both conventional and organic sources. Most (69%) report using the same amount of fertilizer over the past five years with a small percentage (6%) report using less. About 11% indicated they have increased their fertilizer use over the same time period. Table 1 outlines fertilizer type and range of use for wild rice. Some growers reported applying zinc, gypsum and boron.

Element	Range (lbs/acre)
Nitrogen	90-300
Phosphorus	50-115
Sulfur	20-1000

Pesticides

About half (49%) of wild rice producers report applying pesticides. Most of those who treat fields with pesticides do so to manage insects (37%). Weeds are treated by 29% of the growers, 9% treating vertebrate pests and 6% report managing avian species with pesticides. A small percentage of wild rice growers rely upon a variety of sources to manage, detect and determine appropriate treatment for these pests with 49% relying upon field sweeps and observations to guide their pesticide treatment decisions.

Irrigation

Because wild rice is grown in paddies, flood irrigation is required.

The vast majority (69%) of growers reported laser leveling fields in an effort to better manage water. Other improvements included 29% installing a new pump and 17% changing from an open ditch to a pipeline.

Tailwater Management

Wild rice growers have installed tailwater recovery ponds (43%) and have worked to improve irrigation scheduling (37%). Other tailwater management practices that have been implemented include filter strips (11%) and water meters (6%).

Hay

Hay is an important commodity produced in Northeastern California. About 85% of survey respondents report producing hay. The largest percentage of member hay producers (43%) report production acreage of between 100 and 499 acres. About 3% report producing certified organic hay.

Fertilizer

Most (about 64%) report using fertilizer with about 3% using organic sources. Over half of the hay producers report using the same amount of fertilizer over the past five years (57%). About half of this group rely upon past experience while the other half seek advice from a variety of sources. Just under half (45%) of the hay growers report using soil/tissue testing routinely. Table 2 outlines fertilizer type and range of use for production of hay.

Table 2-Element applied and range of application rates in hay

Fertilizer Type	Range (lbs/acre)
Nitrogen	30-750
Phosphorus	26-250
Sulfur	28-1000

Some hay growers reported applying manure, cogeneration ash, gypsum and lime.

Pesticides

About half (49%) of hay producers report applying pesticides. Most of those who treat fields with pesticides do so to manage weeds (49%). A relatively small percentage (14%) report using pesticides to manage vertebrate pests. About 22% noted using pesticides to manage insects. Hay growers rely upon a variety of sources to manage, detect and determine appropriate treatment for these pests with 45% relying upon field sweeps and observations to guide their pesticide treatment decisions.

Irrigation

The majority of hay (67%) is grown under a flood irrigation system. Growers irrigate under sprinklers as well, handline (25%), wheel line (53%) and pivot (26%). Keep in mind that oftentimes growers irrigate different fields using different irrigation methods.

Tailwater Management

Growers reported making changes to improve tailwater management with 19% reporting the installation of a tailwater recovery pond, 36% improving irrigation scheduling and 25% leveling a field.

Irrigated Grain (4 way, triticale, wheat, oats, barley)

Forty respondents (31%) indicated they grew irrigated grain. The majority of it was produced for hay (90%) followed by grain (20%) and pasture (15%). A relatively small amount (9%) was grown for seed. The largest percentage of irrigated grain producers (40%) report production acreage of less than 100 acres. None of the respondents produce this commodity as certified organic.

Fertilizer

Most (about 65%) report using fertilizer. The majority of this population, (65%) determine what and how much fertilizer to apply based upon past experience. Most (60%) report using about the same amount of fertilizer they have historically used. About 13% noted they have decreased the amount applied. A relatively small percentage use analytical methods (28%) to guide them in their fertilizer selection. Table 3 outlines fertilizer type and range of use for irrigated grain.

Table 3-Element applied and range of application rates in irrigated grain

Fertilizer Type	Range (lbs/acre)
Nitrogen	40-200
Phosphorus	25-200
Sulfur	8-200

Pesticides

About half (55%) of irrigated grain producers report applying pesticides. Most of those who treat fields with pesticides do so to manage weeds (55%). A relatively small percentage (13%) report using pesticides do so to manage vertebrate pests. About 10% noted using pesticides to manage insects. Irrigated grain producers rely upon a variety of sources to manage detect and determine appropriate treatment for these pests with 60% relying upon field sweeps and observations to guide their pesticide treatment decisions.

Irrigation

The majority of irrigated grain (30%) is grown under a flood irrigation system. Growers irrigate under sprinklers as well, hand line (15%), wheel line (65%) and pivot (20%.) Keep in mind that often times growers irrigate different fields using different irrigation methods.

Growers reported making changes to improve tailwater management with 17% reporting the installation of a tailwater recovery pond, 15% improving irrigation scheduling and 25% leveling a field.

Mint

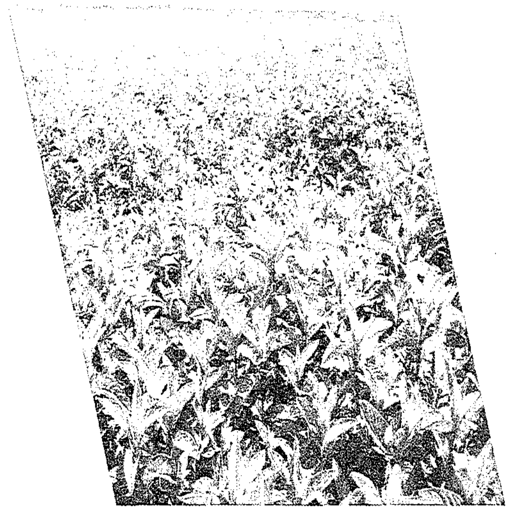
Mint has been produced in Northeastern California for about 25 years. Approximately 70% of survey respondents report producing mint. Most of the members producing mint (75%) grow it on less than 100 acres. None of the mint growers who responded to the survey note producing the commodity organically.

Fertilizer

Most mint growers (83%) report using conventional fertilizer. Most (58%) report using the same amount of fertilizer over the past five years with a small percentage (8%) report using less. About 8% indicated they have increased their fertilizer use over the same time period. Over half (60%) report routinely test soil and tissue to guide their former selection. Table 4 outlines fertilizer type and range of use for mint production.

Table 4-Element applied and range of application rates in mint

Fertilizer Type	Range (lbs/acre)
Nitrogen	120-500
Phosphorus	50-120
Sulfur	50-120



One grower reported applying 100 lbs of Potassium.

Pesticides

The majority (75%) of mint producers report applying pesticides. Those who treat fields with pesticides do so to manage insects (37%). A small percentage (8%) treat weeds. Mint growers rely upon a variety of sources to manage, detect and determine appropriate treatment for these pests with 58% relying on Pest Controller Advisor (PCA) recommendations to guide their pesticide treatment decisions.

Irrigation

Mint is irrigated using a variety of methods. About 60% of the growers note flood irrigation, 60% wheel line, 30% pivot and 10% hand line to irrigate this crop. Keep in mind that often times growers irrigate different fields using different irrigation methods. Growers report making improvements to their irrigations systems that include installation of a new pump (50%), laser leveling fields (42%) upgrading to a pivot.

Strawberries/Nursery

The production of strawberry plants for the nursery industry has long been a component of agriculture in Northeastern California. Only two members of NECWA report producing these plants. Both report having less than 100 acres devoted to this crop. Both certified organic and conventional production methods for this commodity are noted.

Fertilizer

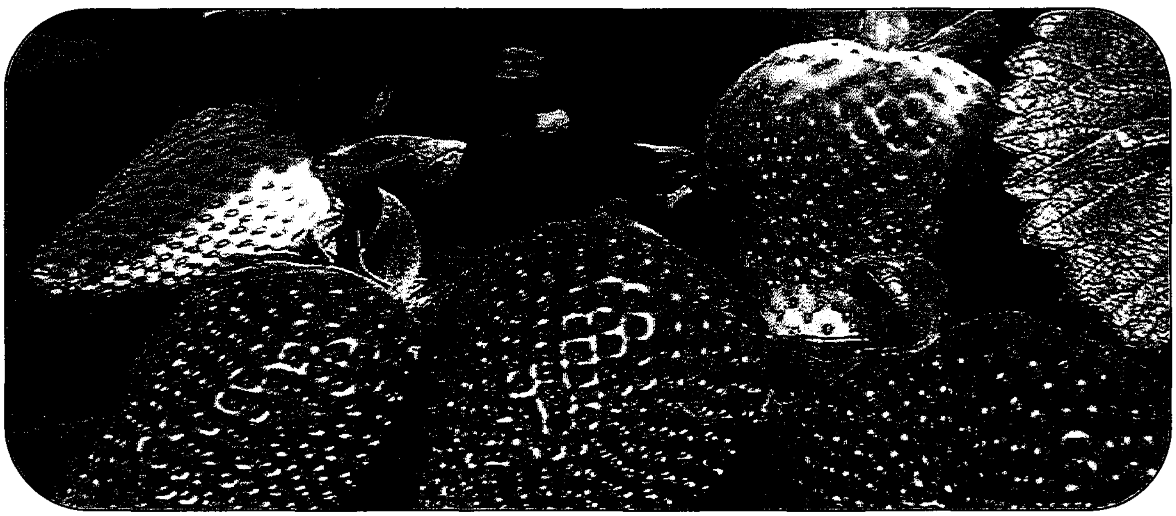
Both conventional and organic fertilizers are used. Nitrogen (170 lbs/acre), Phosphorus (100 lbs/acre) and Sulfur (90 lbs/acre) are used by these growers. Strawberry growers rely upon PCA, Farm Advisor, Consultants and past experience to guide their fertilization decisions. Both note their use of fertilizer has remained constant across the past five years. Soil and tissue testing is reported as being commonly used by one of the respondents.

Pesticides

One of the respondents notes using pesticides routinely. Weeds, vertebrate pests, and insects are the targets. Treatment decisions are guided by PCA, consultant, field sweeps and personal observation.

Irrigation

Strawberries are reported to be grown under both flood and hand line irrigation systems.



Other Crops (teff, sudan, perennial, floral crops, grapes, garlic, horseradish)

Five growers responded in this category. None indicated the crops they produced. Acreage devoted to "other crops" was noted as 40% less than 100 acres, 40% responded having acreage between 100 and 500 acres and 20% reported 500-1000 acres. None produce these commodities under certified organic requirements.

Fertilizer

All report fertilizing using conventional sources. The majority (80%) consult with a PCA to determine what and how much fertilizer to apply based upon past experience. Most (80%) report using about the same amount of fertilizer they have historically used. About 20% noted they have increased the amount applied. A relatively large percentage use analytical methods (80%) to guide them in their fertilizer selection. Table 5 outlines fertilizer type and range of use for other.

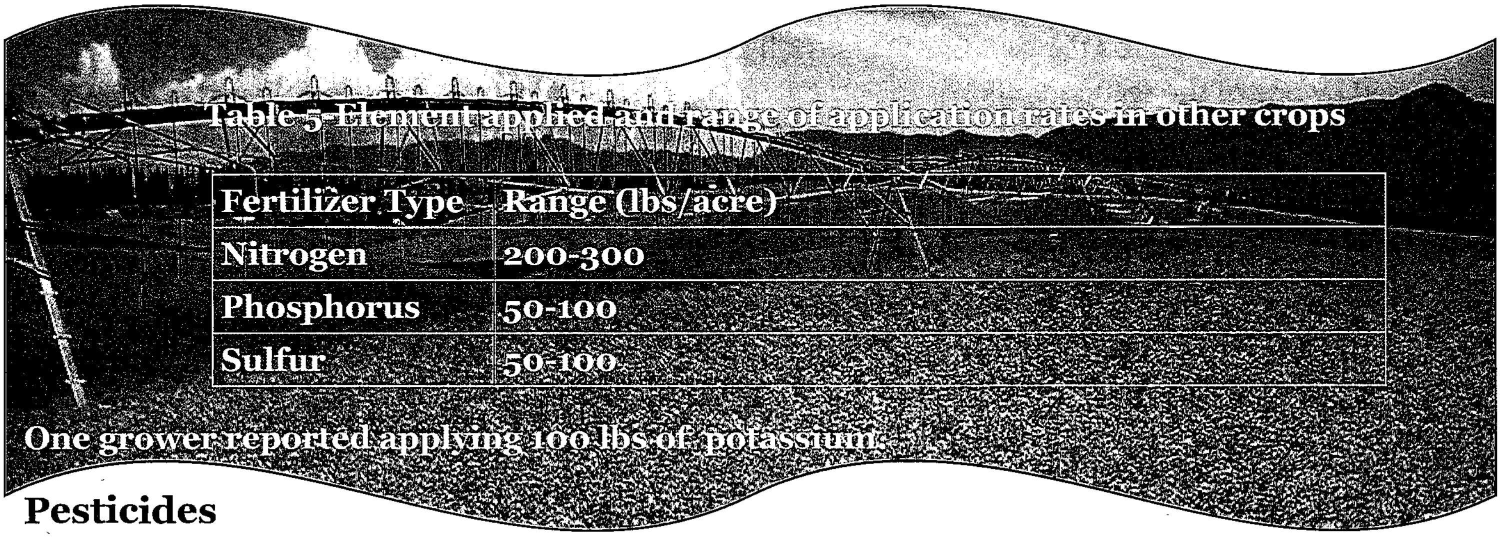


Table 5-Element applied and range of application rates in other crops

Fertilizer Type	Range (lbs/acre)
Nitrogen	200-300
Phosphorus	50-100
Sulfur	50-100

One grower reported applying 100 lbs of potassium.

Pesticides

The majority (80%) of other crop producers report applying pesticides. Most of those who treat fields with pesticides do so to manage weeds (80%). About 60% noted using pesticides to manage insects. A relatively small percentage (20%) report using pesticides to manage vertebrate pests. Producers rely upon a variety of sources to manage, detect and determine appropriate treatment for these pests with 60% using PCA and Farm Advisor to guide their pesticide treatment decisions. Consultant and field sweeps were noted by 40% as what is used to guide pesticide treatments.

Irrigation

These crops are irrigated under a variety of methods. Flood irrigation system (40%), hand line (60%), wheel line (40%) and pivot (80%). Keep in mind that oftentimes growers irrigate different fields using different irrigation methods.

Tailwater Management

Growers reported making changes to improve tailwater management with 40% noting they have upgraded irrigation systems, 40% laser leveling a field and 20% installing a new pump or deepening a well. Growers report making improvements in their tailwater management with 40% installing a tailwater recovery pond, 40% installing soil moisture sensors and 20% improving irrigation scheduling and installing filter strips.

Irrigated Pasture

Irrigated pasture is an important commodity produced in Northeastern California. About 60% of survey respondents report producing irrigated pasture for grazing. The largest percentage of member irrigated pasture producers (46%) report production acreage of between 100 and 499 acres. About 13% report producing certified organic pasture.

Fertilizer

Most (about 72%) report using fertilizer with about 3% using organic sources. About half the irrigated pasture producers report using the same amount of fertilizer over the past five years. About half of this group rely upon past experience while the other half seek advice (PCA=13%, Farm Advisor=23%, Consultant=14%, other growers=13%). Only about 21% use soil/tissue testing routinely. Table 6 outlines fertilizer type and range of use for irrigated pasture.

Table 6-Type and of Fertilizer used for irrigated pasture and range of quantity applied

Fertilizer Type	Range (lbs/acre)
Nitrogen	35-200
Phosphorus	25-200
Sulfur	20-200

Growers also reported applying manure and ash to irrigated pasture.

Pesticides

Less than 20% of irrigated pasture producers report applying pesticides. Most of those who treat fields with pesticides do so to manage weeds. A small percentage (3%) report using pesticides to manage insects (3%) and vertebrate pests (3%). Pasture growers rely upon a variety of sources to manage detect and determine appropriate treatment for these pests with 29% relying upon field sweeps and observations to guide their pesticide treatment decisions.

Irrigation

The vast number of producers (87%) report producing pasture under a flood irrigated system. Growers irrigate under sprinklers as well, handline (5%), wheel line (14%) and pivot(5%). Keep in mind that often times growers irrigate different fields using different irrigation methods.

Tailwater Management

Growers reported making changes to improve tailwater management with 14% reporting the installation of a tailwater recovery pond and, 42% improving irrigation scheduling and 19% leveling a field.

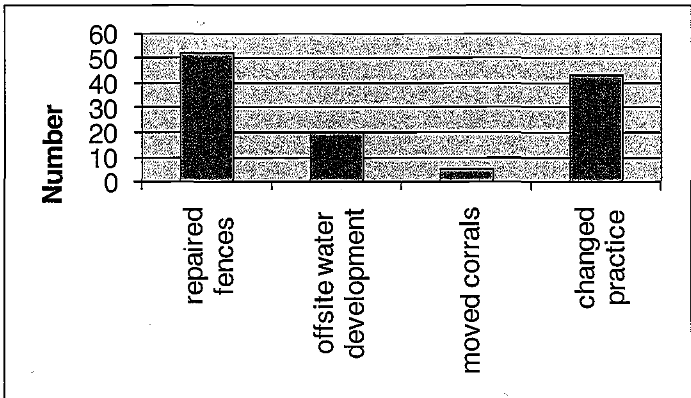
Livestock

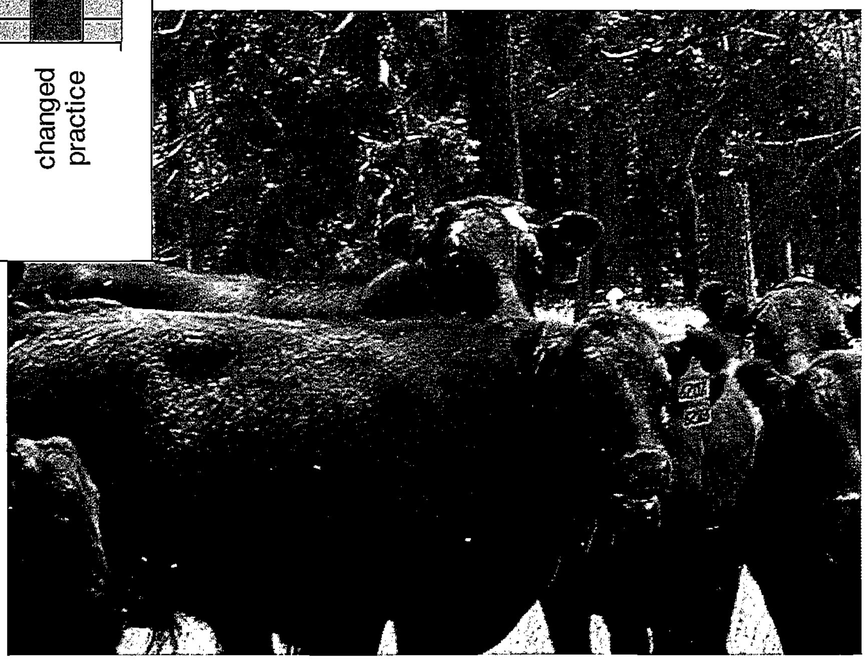
The majority of respondents (approximately 77%) reported having livestock on the farms and ranches they operate. Cattle make up the largest percentage of livestock grazed (94%) followed by horses (25%) then sheep (9%). The majority of livestock are on the ranches during the summer (66%) and fall (60%). Only 1/3 of the respondents report wintering livestock on their agricultural properties. Pasture is the most commonly grazed forage resource (87%) with 48% report grazing on rangeland and 31% graze crop stubble.

Direct Livestock Access to Streams/Rivers

Most of the respondents (66%) report livestock have direct access to streams and rivers flowing through their properties. Over the past five years members have implemented management practices and made structural improvements to reduce potential water quality impacts. Figure 2 outlines these improvements. The most significant is a change in irrigation and grazing management practices. About 44% report they no longer irrigate fields when livestock are present.

Figure 2-Producer efforts to reduce livestock access to streams/rivers.





Water Quality Management Techniques Implemented by Livestock Operators

Livestock producers reported they have made efforts to limit livestock impacts to water quality; these included installation of pump and trough systems (22% installed pump and trough systems), 28% have changed feeding location and 8% report moving corrals.

Closing Remarks

This survey took a commodity approach to ascertain what water quality and water management tools, techniques and improvements have been implemented by members of Northeastern California Water Association. When the data is considered as a whole, 90% of the respondents have made or are making some effort to improve management of water on their farming and ranching operations.

The results of this survey point to the fact that the vast majority of NECWA members have consciously made changes in their management practices in an effort to improve water quality. It is interesting to note that only 28% of the respondents had utilized the USDA NRCS EQIP program to help fund these improvements on these properties. It follows that most of the membership bore the cost for these improvements personally.

Future Opportunities

The primary objective of this project was to establish baseline information related to the water quality and water management improvements and practices that have been implemented by NECWA membership. The purpose of this was two fold:

1. Use the data to develop a targeted educational program.
2. Provide a reference point to which future surveys can be compared to determine if these educa tional efforts have been successful.

Without knowing the specifics of each of the agricultural operations included in the survey population, it is difficult to know what practices should be implemented to improve water quality over the coming ten years. The commodities produced and the geography of a given ranch influence the water quality practices to consider implementing (i.e., wild rice may lend itself better to tail water recovery ponds than mint fields). Economics also must be considered. Table 7 outlines the major commodities being produced in NE California and the percentage of growers implementing a few management practices by commodity. When considering educational programs, it appears a workshop session on soil and tissues testing might be of value to hay and irrigated pasture producers. A session on irrigation scheduling should benefit livestock, irrigated pasture and mint producers. A general session on opportunities to reduce tailwater impacts (i.e., filter strips, tail water ponds, etc) may be of benefit to the entire membership.

Table 7— Survey of commodities and selected management techniques implemented by NECWA members

Commodity	No. of respondents reporting commodity	Soil and Tissue Test	Soil moisture sensors	Irrigation Scheduling
Wild rice	35	60%	N/A	37%
Hay	110	45%	36%	36%
Irrigated Grain	40	28%	15%	15%
Mint	12	66%	0	0
Strawberry	2	50%		
Other Crops	5	80%	29%	20%
Irrigated Pasture	77	21%	4%	42%
Livestock	100	N/A	N/A	43%

Northeastern CA Water Association Monitoring Program-2005-2010

In 2005, Northeastern California Water Association contracted with the Sacramento Valley Coalition to conduct the monitoring required by the California Central Valley Water Quality Control Board (CVWQCB) to comply with the agriculture water discharge regulations. Through Northeastern California Water Association, members were in compliance of this regulatory program without having to conduct ranch level monitoring.

Since 2005, six broad categories of potential water quality contaminants were considered. These include pesticides, toxicity, physical attributes, microbial contamination, nutrients and various elements. Not all categories were tested all years. The number and location of sampling sites also changed. The results and a brief discussion by category will follow.

Pesticides

The CVWQCB is concerned about the level of pesticides in the water and required testing. In 2006 water samples were collected from Fall River (Fall River Ranch Bridge) and two locations on the Pit River (Canby Bridge and Pittville) on May 10 and July 27. In 2007 water samples were collected from the same locations on Feb. 13. Table 8 outlines constituents tested for and subsequent results. The monitoring program to date has not identified any exceedances for tested pesticides.

Table 8—Results from pesticide in Pit River sub watershed 2005—2010

Pesticide	2005	2006	2007	2008	2009	2010
Azinphos methyl	N/A	Complies	Complies	N/A	N/A	N/A
Chlorpyrifos	N/A	Complies	Complies	N/A	N/A	N/A
Demeton	N/A	Complies	Complies	N/A	N/A	N/A
Diazinon	N/A	Complies	Complies	N/A	N/A	N/A
Dichlorvos	N/A	Complies	Complies	N/A	N/A	N/A
Dimethoate	N/A	Complies	Complies	N/A	N/A	N/A
Disulfoton	N/A	Complies	Complies	N/A	N/A	N/A
Ethoprop	N/A	Complies	Complies	N/A	N/A	N/A
Fenchlorphos	N/A	Complies	Complies	N/A	N/A	N/A
Fensulfothion	N/A	Complies	Complies	N/A	N/A	N/A
Fenthion	N/A	Complies	Complies	N/A	N/A	N/A
Malathion	N/A	Complies	Complies	N/A	N/A	N/A
Merphos	N/A	Complies	Complies	N/A	N/A	N/A
Methamidophos	N/A	Complies	Complies	N/A	N/A	N/A
Methidathion	N/A	Complies	Complies	N/A	N/A	N/A
Mevinphos	N/A	Complies	Complies	N/A	N/A	N/A
Parathion, Ethyl	N/A	Complies	Complies	N/A	N/A	N/A
Parathion, Methyl	N/A	Complies	Complies	N/A	N/A	N/A
Phorate	N/A	Complies	Complies	N/A	N/A	N/A
Phosmet	N/A	Complies	Complies	N/A	N/A	N/A
Sulprofos	N/A	Complies	Complies	N/A	N/A	N/A
Tetrachlorvinphos	N/A	Complies	Complies	N/A	N/A	N/A
Tokuthion	N/A	Complies	Complies	N/A	N/A	N/A
Trichloronate	N/A	Complies	Complies	N/A	N/A	N/A

Toxicity

Aquatic invertebrates, fish and algae are used as indicators of water toxicity. The testing regime requires that water samples are sent to the lab and invertebrates are placed in the water samples. Growth and survival of these invertebrates is evaluated. Toxicity was tested in 2006 and 2007. In 2006 water samples were collected from Fall River (Fall River Ranch Bridge) and two locations on the Pit River (Canby Bridge and Pittville) on Jan. 1, June 30, July 27, Aug. 29 and Sept. 28. In 2007 water samples were collected from the same locations on Feb. 13. Table 9 outlines constituents tested for and subsequent results. The monitoring program to date has not identified any exceedance for toxicity.

Table 9—results from Toxicity testing in the Pit River sub watershed 2005—2010

Toxicity	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Selenastrum growth	N/A	Complies	Complies	N/A	N/A	N/A
Pimephales survival	N/A	Complies	Complies	N/A	N/A	N/A
Ceriodaphnia survival	N/A	Complies	Complies	N/A	N/A	N/A

Physical Attributes

For the past six years, physical attributes were measured at various locations. Some attributes were measured each year while others were not. Monitoring locations were in the Pit River at Pittville all six years. Table 10 notes the physical attributes sampled.

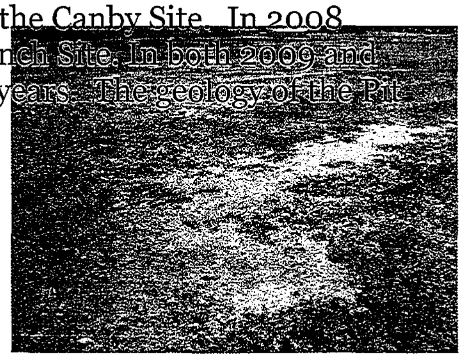
Turbidity is a measure of clarity and fine particulates. There is no numeric standard noted in the Basin Plan. For the six years data has been collected samples have been in compliance based upon the narrative standard.

While turbidity measures approximately the same water quality property as Total Suspended Solids, the latter is used because it provides an actual weight of the particulate material present in the sample. For the six sampling years, the Total Suspended Solids parameter was in compliance.

Total Organic Carbon is a well recognized analytic technique used to measure water quality. Total Organic Carbon in source waters comes from decaying natural organic matter and from synthetic sources (detergents, pesticides, fertilizers). There is no absolute numeric standard for Total Organic Carbon in the basin plan. The samples collected in 2008, 2009 and 2010 were found to be acceptable.

The compliance standard for temperature is a narrative objective that states, *"at no time or place shall the temperature of COLD or WARM intrastate waters be increased more than 5°F above natural receiving water temperature."* This provision was intended to apply to point sources discharges, rather than to non-point sources like agricultural return flows. The Basin Plan also refers specifically the Thermal Plan, which provides the following: "*Elevated temperature waste discharges into cold interstate waters are prohibited.*" The irrigated lands regulatory program states that "*Irrigation return water is not considered elevated temperature waste for the purpose of this plan.*" Temperature was measured in all years (was not measured in 2006) and was found to be in compliance.

The term used to describe acidity and alkalinity is pH. The basin plan states that pH shall not be depressed below 6.5 (acidic) nor raised above 8.5 (alkaline). In 2005 pH was found to be out of compliance four times at the Fall River Ranch Bridge and once at the Pittville site. In 2007 pH was out of compliance once at Fall River Ranch Bridge, twice at Pittville and once at the Canby Site. In 2008 there were three exceedances; one at Pittville and two at the Fall River Ranch Site. In both 2009 and 2010 Pittville water was sampled and found to be out of compliance both years. The geology of the Pit River is such that pH levels are naturally elevated.



Dissolved oxygen (DO) is the measure of oxygen in the water. Generally speaking there is a relationship between water temperature and DO. The colder the water, the higher dissolved oxygen level. The basin plan requires cold water fishery to have DO levels of 7.0 mg/l (or higher) and warm water fishery to have a minimum level of 5.0 mg/l. Measurements taken in 2007-2009 noted exceedances of the standard. In 2010 samples taken were in compliance with the basin standard.

Conductivity is a surrogate measure of dissolved minerals. It measures the ability of water to pass an electrical current. The basic unit of measurement of conductivity is the mho or siemens. Conductivity is measured in micromhos per centimeter (μmhos/cm) or microsiemens per centimeter (μs/cm). Distilled water has a conductivity in the range of 0.5 to 3 μmhos/cm. Studies of inland fresh waters indicate that streams supporting good mixed fisheries have a range between 150 and 500 μmhos/cm. Conductivity was measured in 2007-2010 and was found to be in compliance upon supporting agricultural uses.

Table 10— results from the measurement of physical attributes in the Pit River subwatershed 2005—2010

Physical	2005	2006	2007	2008	2009	2010
Turbidity	Complies	Complies	Complies	Complies	Complies	Complies
Total Susp Solid	Complies	Complies	Complies	Complies	Complies	Complies
Total organic carbon	N/A	N/A	N/A	Complies	Complies	Complies
Temp	Complies	N/A	Complies	Complies	Complies	Complies
pH	Exceed (5x)	N/A	Exceed (4x)	Exceed (3x)	Exceed	Exceed (3x)
Dissolved oxygen	N/A	N/A	Exceed (10x)	Exceed (2x)	Exceed	Complies
Conductivity	N/A	N/A	Complies	Complies	Complies	Complies

Microbiological

There are several microbiological indicators for fecal contamination of water. These include total coliforms, fecal coliforms and E. coli. E. coli was found to exceed the standard in 2005 and 2006. In July, 2010 the California Regional Water Quality Control Board waived the E. coli management plan requirement for the Pit River subwatershed because:

1. No exceedances observed in samples taken from Canby Bridge site since summer 2006.
2. No exceedances observed in 28 samples taken at Pittville site.
3. The Alturas Wastewater Treatment facility was upgraded in 2008 to address effluent limits for parameters including coliform bacteria.

Microbiological	2005	2006	2007	2008	2009	2010
Total Coliforms	Complies	Complies	Complies	Complies	Complies	Complies
Fecal Coliforms	Complies	Complies	Complies	Complies	Complies	Complies
E . coli	Exceed 2	Exceed	Complies	Complies	Complies	Complies

Nutrients

Nutrients are addressed in the narrative basin plan objectives. The basin plan requires that biostimulatory substances not be present in such quantity that they promote aquatic growths in concentrations that cause nuisance or adversely affect beneficial uses. There is no numeric standard for these constituents.

Table 12— results from nutrient sampling in Pit River sub watershed 2005-2010

Nutrients	2005	2006	2007	2008	2009	2010
Ammonia	N/A	N/A	N/A	N/A	Complies	N/A
Total Kjeldahl N	N/A	N/A	N/A	N/A	Complies	N/A
Orthophos	N/A	N/A	N/A	N/A	Complies	N/A
Phos P	Complies	Complies	Complies	Complies	Complies	Complies
Nitrate N	Complies	Complies	Complies	Complies	Complies	Complies

Trace Elements

High levels of trace elements can adversely affect water quality. Tests for elements were only conducted in 2009. Water samples were pulled from the Pit River (Pittville Bridge site) on May 20 and June 17. On June 17, the level of lead in the sample was found to exceed the standard set by the basin plan.

Table 13 -results from elemental sampling in Pit River sub watershed 2005-2010

Trace Element	2005	2006	2007	2008	2009	2010
Zinc	N/A	N/A	N/A	N/A	Complies	N/A
Selenium	N/A	N/A	N/A	N/A	Complies	N/A
Nickel	N/A	N/A	N/A	N/A	Complies	N/A
Molybdenum	N/A	N/A	N/A	N/A	Complies	N/A
Lead	N/A	N/A	N/A	N/A	Exceed	N/A
Copper	N/A	N/A	N/A	N/A	Complies	N/A
Cadmium	N/A	N/A	N/A	N/A	Complies	N/A
Boron	N/A	N/A	N/A	N/A	Complies	N/A
Arsenic	N/A	N/A	N/A	N/A	Complies	N/A

Summary

Six years of monitoring a variety of constituents has found the Pit River system to be relatively clean. The exceedances included pH, Dissolved Oxygen, E. coli and lead. The exceedances in pH are probably a function of natural levels in the environment and not related to agricultural activities in the watershed. Dissolved oxygen is affected by water temperature. As water temperature increases, the amount of oxygen that water can contain (saturation) decreases. For example, at ~60 °F pure, saturated water at sea level has a dissolved oxygen concentration of ~9.8 mg/L. At ~85 °F, it is only ~7.5 mg/l at saturation. When DO is plotted on the same graph as stream temperature, there is an inverse relationship between water temperature and DO. The DO exceedances occurred when temperatures were elevated. Because there were no temperature exceedances during the sampling period, it could make sense to pursue changing the designation of the Pit River from a cold water fishery (minimum DO of 7 mg/l) to a warm water fishery (DO 5 of mg/l).

The E. coli levels in the 2010 samples were found to be in compliance. Central Valley Regional Water Quality Board has suspended the monitoring requirement for E. coli in the Pit River Subwatershed based upon the data collected and the recent modifications made to the Alturas waste water treatment plant. The lead exceedance in 2009 needs to be considered and additional samples analyzed to determine if it is a problem or if the data is an anomaly.