CALIFORNIA COASTAL COMMISSION
45 FREMONT, SUITE 2000
SAN FRANCISCO, CA 94105- 2219
VOICE (415) 904- 5200
FAX (415) 904- 5400
TDD (415) 597-5885

W3

May 7, 2013

For the May 8, 2013 Meeting of the California Coastal Commission

To: Commissioners and Interested Persons

From: Charles Lester, Executive Director

Subject: **Addendum: Public Workshop on Agriculture in the Coastal Zone**

Following is the correspondence received as of May 7, 2013, two documents referenced in the staff report and two minor corrections to the staff report.

Referenced Documents Attached:	Page
Breeden Staff Counsel to State Commissioners and Interested Parties, with Exhibits.	
Memorandum from Ralph Faust, Chief Counsel and Mary Hudson, Staff Counsel to Commissioners and Interested Persons, "Interpretation of Coastal Act Agricultural Policies in Relation to Proposed Conversion of Agricultural Lands Through Amendment of Mendocino County Land Use Plan," May 1, 1987.	127

Correction to Page 16 First full Paragraph:

The Commission has to date protected approximately ~~1,048~~ 1,766 acres of agricultural lands through ~~12~~ 13 Offers to Dedicate open space and conservation easements for agricultural purposes. These easements range in size from 1.5 acres to ~~343~~ 718 acres in size, and the accepting entities include: the Ag Land Trust (formerly, the Monterey County Agricultural and Historical Land Conservancy), the Marin Agricultural Land Trust, Humboldt County, San Mateo County, Santa Cruz County, Monterey County, and the State Coastal Conservancy. These recorded conditions ensure that the land is permanently protected for agriculture even after the property is sold to a subsequent purchaser.

Correction on Page 30:

C. FUTURE IMPLEMENTATION

Fuchs, Elizabeth@Coastal

From: Santa Lucia Chapter of the Sierra Club <sierraclub8@gmail.com>
Sent: Friday, April 19, 2013 11:08 PM
To: Fuchs, Elizabeth@Coastal
Subject: Comments for the May Ag Policy workshop
Attachments: Areweprotect2.pdf; Areweprotect.pdf

W3

SIERRA CLUB
FOUNDED 1892

Santa Lucia Chapter
P.O. Box 15755
San Luis Obispo, CA 93406
(805) 543-8717
www.santalucia.sierraclub.org

April 19, 2013

TO: Coastal Commissioners

RE: Your May 2013 ag policy workshop

In San Luis Obispo County, the implementation of policies that could be put in place to ensure the viability of agriculture is something we are keenly aware by virtue of its absence. Because such policies are not in place, farmers and ranchers are being forced to fight over a claim to income from activities that are not related to the direct marketing of that agriculture and are out of scale to the site; events that would be allowed in such high numbers they would not be secondary to agriculture and would cause the term "incidental and secondary" in our existing Agricultural Policy to lose its meaning.

Policies that should be implemented to ensure the viability of our agriculture should realize the goal of aiding small and midsize producers by helping to provide the infrastructure they need for storing, packing, processing, shipping and distribution. We need support for local food stores -- help with the permit process, mini grants, and helping farmers establish relationships with service providers.

Our farmers need policies that improve their ability to provide food to farm-to-school programs. With the school districts as major purchasers, farmers would have significant incentive to expand existing operations. We would actually see new farms, and new opportunities for service providers like processors and distributors. Part of making that happen means helping small farmers get access to processing facilities. Processing value-added products is something we should do before we consider vastly expanding ag tourism and permitting non-agricultural uses of ag land.

The adoption by Organics Conversion Policies and Local Food Purchase Policies would enhance the value of agricultural operations and forestall their loss to development, as well as enhance the local economy by keeping food purchase dollars local. As recounted on the W.K. Kellog Foundation's "Food and Society" website:

In June 2005, Woodbury County, Iowa, passed an "Organics Conversion Policy", offering up to $50,000 annually in property tax rebates for those who convert from conventional to organic farming practices. The policy is intended to address a growing problem

1

in Iowa—rural population decline resulting from the growth of large commodity farms. Because the average age of a farmer in Woodbury County is 57—over half of the county's farmland will need to change hands in the next 10-15 years. The County needs new farmers to continue its agricultural tradition. "We want to make it economically possible for young families to enter farming—our next generation of farmers," said George Boykin, Chairman of the Woodbury County Board of Supervisors.

On January 10, 2006, the County also became the first in the United States to mandate the purchase of locally grown, organic food. The "Local Food Purchase Policy" requires Woodbury County departments to purchase locally grown, organic food from within a 100 mile radius for regular city use. The policy has the potential to shift $281,000 in annual food purchases to a local farmer-operated cooperative, increasing local demand and spurring increased production and processing.

The policy also helps build connections between area farmers. Since the county must work with a contractor and broker, the farmers must network to aggregate supply. Together they are building an infrastructure that supports a locally-owned and controlled food system.

The "Local Food Purchase Policy" supports the "Organic Conversion Policy," providing a market for the farmers who convert to organic production. "In the end, we anticipate a quality local food brand emerging from the increased economic activity in our area," says Rob Marquesee, the Director of Rural Economic Development for Woodbury County.

Successful farmland protection programs combine substantial financial incentives to landowners with effective land use regulation. The American Farmland Trust wrote: "we all know we need our farms for the food and fiber they grow. But now, in addition, it is becoming clear that our farms can also provide critical environmental services like sequestering carbon, filtering water and providing wildlife habitat. So it is not a choice! Saving economically viable farms and securing their help in maintaining environmental quality for our communities are both vital to the survival of countless species as well as to our health, economy, and quality of life."

In emerging carbon markets, farmers and ranchers should be paid for adopting practices that reduce greenhouse gases, such as grass and tree plantings, conservation tillage, and producing low-carbon renewable energy.

Policies should encourage the use of agricultural conservation easements that can cover an entire parcel or a portion. The farmer doesn't have to keep farming, but agrees to maintain the land such that farming could resume in the future, ensuring that other farmers know the critical land mass will always be there.
Policies that secure the above results also meet our obligation to cut greenhouse gas emissions: food is transported a shorter distance, reducing the fuel needed to ship it, and the energy needed to cool it, package, and transport it.

We have attached two articles as they appeared in the October and November 2009 issues of our newsletter, the *Santa Lucian*, reprinted from the *Santa Ynez Valley News.* They represent the clearest illustration we have ever seen of the reasons why non-agricultural uses of ag land must be accessory and incidental to the agricultural use of the land. We concur with the conclusion of the authors:

"Our rural landscape is protected by supporting the evolution of agriculture — but converting agricultural lands to commercial entertainment venues is contrary to achieving the goal."

Thank you for your attention to these matters,

Greg McMillan

Chapter Chair

Santa Lucian – Nov. 2009

Are We "Protecting Agriculture?" – Part 2

by Gail Marshall, Santa Ynez Valley News, *Sept. 24, 2009*

Once again, there is a threat to the long-term viability of our agricultural lands.

On October 13, the Santa Barbara County Board of Supervisors will hear a request to approve a large number of so-called "special events," year after year, on the rural, ag zoned Crossroads property on Foxen Canyon Road.

This request, if approved, will set a terrible precedent, and it should be denied by the Board of Supervisors. The majority of these "special events" are simply "parties for profit," such as weddings, conventions and concerts that have nothing at all to do with the agricultural use of the property.

These "special events" should not be confused with the existing right of owners of rural properties to use them occasionally for fundraisers, family weddings or large parties for friends. In contrast, requests for permission to hold large parties for profit in perpetuity are clear attempts to turn our rural lands into commercial entertainment venues. People in residentially zoned areas are not allowed to compromise zoning ordinances and change the nature of their neighborhoods by continually renting out their properties for parties. It should not be allowed on ag lands, either.

The relationship of the events to the agricultural use of the property is a critical point. There is an obvious agricultural benefit to an annual Pumpkin Festival on a pumpkin farm, or a Christmas event at a Christmas tree farm. Visitor-serving uses like vegetable stands, pick-your-own fruit, and wine tasting have clear relationships to agriculture.

Santa Barbara County land use policies and zoning ordinances have been crafted with this principle in mind. Important tests must be met prior to approval of requests for nonagricultural uses of ag-zoned properties.

AG-II zoning rules clearly state, "The intent is to preserve these lands for long term agricultural use." In order to ensure this preservation, land use codes require that approval of non-agricultural uses must be found to be "incidental" to the agricultural use of the property.

Otherwise, the addition of non-ag uses effectively becomes a de facto rezoning of the property to commercial zoning.

For the Crossroads property, no rational argument can be made that the requested number and type of events are "incidental" to the ag use. Economically, the events business is 10 to 20 times more lucrative than the agriculture.

This also sets a bad precedent for other ag-zoned lands. If it is acceptable in this case, then why not on all other ag-zoned properties in the Santa Ynez Valley? Why not also on the Gaviota coast or the Carpinteria foothills?

This request also drives up the value of the agricultural lands so those serious about farming simply cannot afford to buy or lease land whose prices have been driven up by the de-facto rezoning.

Another serious problem is the interference of the public events with necessary agricultural activities that produce noise, dust and pesticide drift. Does the wedding stop, or does the neighboring agriculturist have to wait?

The majority of Santa Ynez Valley residents know that our rural landscape is protected by supporting the evolution of agriculture — but converting agricultural lands to commercial entertainment venues is contrary to achieving the goal.

Until this county undertakes a comprehensive study of the nature and impacts of tourism-related activities on agriculturally zoned properties, all requests like this should be denied.

Business owner Gail Marshall is a former Santa Barbara county supervisor.

Update: On a 3-2 vote, the request for 20 commercial and 5 non-profit events per year was defeated. The Santa Barbara supervisors agreed that "temporary" commercial events on non-winery ag parcels need to be "accessory and incidental" to the primary use (ag). There was great concern about precedent because the county has several thousand ag parcels that could say "me too."

Santa Lucian - Oct. 2009

Are We "Protecting Agriculture?"

by Bob Field

You may wonder what the ongoing policy struggle over agricultural land-use is about, particularly since both sides in this debate claim to have the same goal: protecting agriculture.

Sometimes when people say they have the same goal but they can't agree, it indicates that they do *not*

Not surprisingly, this issue is about money. Land-use decisions that increase the market value of ag land are profitable to the current owners but are detrimental to the economic viability of agriculture in the longer term. The increasing land cost makes it increasingly difficult for future buyers to make money through agricultural use of the property.

Since the high price of ag-zoned land is a primary threat to the long-term survival of agriculture in Santa Barbara County, it helps to understand the building blocks of the market price:

1) The intrinsic value: This basic value reflects the land's ability to produce economic profit through agricultural production. Factors include soil, climate, exposure and access to water, labor and markets. Alone, this should never be a problem because no rational agricultural businessman would pay more than would allow a reasonable return on investment.

2) The development rights value: Added to the intrinsic value is the value of the development rights available under the zoning. Quite simply, more development rights equals more market value. Aggravating the problem are development rights not related to agriculture, such as bed and breakfasts, non-agricultural housing or businesses, and so-called special events.

3) The speculative value: The price rises again when the buyer has reason to believe the market value of the land will go up over time, and return a profit upon sale. A trend in adding development rights increases the speculative value.

4) The size of the parcel is an additional and significant factor. A very reliable rule of thumb is that the smaller the parcel, the higher the cost per acre. A routine practice of allowing subdivision of ag-zoned lands also adds to the speculative value.

So two of the worst land-use decisions we could make would be to add non-agricultural development rights to ag-zoned land, and to allow further subdivisions.

Interestingly, these actions are precisely what some agricultural landowners are lobbying for.

Their first argument goes like this: "Anything that puts money in the hands of the current owners makes it more likely they will stay in agriculture." In the short term this may or may not be true, but in the long term it raises the market price of the land and certainly is detrimental.

Their second argument is the threat that if their requests are not granted, it will lead directly to urban development of the land.

First, this is not true because urban uses are not allowed under ag zoning. Second, and most ironically, the circular argument is that if we don't let them build houses, hotels and businesses on ag land, then the result will be houses, hotels and businesses on ag land! This argument invites intellectual whiplash.

In conclusion: Beware of proposals to "protect agriculture" by taking actions that will increase the market price of the land.

This article originally appeared in the "Community Matters" column of the July 8, 2009, edition of the Santa Ynez Valley News. *Bob Field is a retired businessman, volunteer president of his neighborhood's mutual water company and past chairman of the Valley Planning Advisory Committee.*

FARM BUREAU MONTEREY

W3

April 27, 2013

California Coast Commission
Att: Charles Lester, Executive Director
45 Fremont St., Suite 2000
San Francisco, CA 94105-2219

VIA: Email delivery

RE: Comments for CCC Agricultural Workshop, May 8th 2013

Dear Mr. Lester:

Monterey County Farm Bureau represents family farmers and ranchers in the interest of protecting and promoting agriculture throughout our County. We strive to improve the ability of those engaged in production agriculture to provide a reliable supply of food and fiber through responsible stewardship of our local resources.

We appreciate the opportunity to make comments relating the future of agricultural operations as they are perceived under Coast Commission policy moving forward. It is our understanding that the Coast Commission Act supports Agriculture as one of the preferred uses in coastal zones and we fully support the continuation of farming and ranching as contributing to a healthy working environment.

Monterey County provides a unique situation for farming in the coastal zone, where we have moderate temperatures, rich soils, and source water that contributes to some of the most productive farmlands in our Nation. Total output for Monterey County Agriculture, as measured by our Agricultural Commissioner's Office, is nearly $4 billion annual, with a total economic contribution of over $8.2 billion to our local economy[1]. Many of the higher value crops that Monterey County is famous for, such as strawberries and artichokes, are grown in the coastal zone areas. Thus, continuation of these farming activities is of extreme importance to our County's economy and the food supply of our Nation.

It is important to remember that crop rotation is part of a healthy working environment for farming. Strawberries rotate in the same field with leafy greens and vegetables, to better manage resources and maintain soil viability. At no time should

[1] Sources: "2011 Monterey County Crop Report" and "Economic Contributions of Monterey County Agriculture-Leading the Field 2011," Monterey County Agricultural Commissioner's Office, Salinas CA.

T: (831) 751-3100 • F: (831) 751-3167 • 931 Blanco Circle, Salinas, CA 93901 • P.O. Box 1449, Salinas, CA 93902-1449

www.montereycfb.com

these simple crop rotational patterns be considered an intensification of agricultural practices, changes in land use designation, or a form of development. Farming operations should be free to rotate into crops as market and resource demands dictate, allowing for a continuity of production patterns that supply our fresh produce markets. Farming practices are ever-evolving and future Coast Commission policies should support utilizing new techniques to further enhance these resources.

Further related to intensification, use of water is a required element for crops in Agriculture, particularly the high value crops grown here in our County; changing of cropping patterns should not be considered an intensification of water use, either surface or groundwater, that places limits on the actions of any individual farm operation. Water rights are well established in Monterey County and specific solutions and resource conservation have been instituted in our coastal zones to protect our groundwater resources from further salt water intrusion. Farmers have been contributing financially to these solutions for decades and managing water supplies should be a local jurisdictional issue.

Additionally, the issue of vegetation removal may cross over into agricultural practices if not better refined in definition by the Commission. As an example, a field that currently has produced artichokes may necessitate a rotation to another crop after several years of cultivation; while artichokes are prolific growers and tend to resemble natural vegetation from afar, they are still indeed in a cropping pattern and removal of the artichoke plants after their useful life should not become a removal of vegetation under the current broad definition of vegetation removal in the coast zones. Simply changing crops in the same field should not become a requirement of the farming operation to obtain a coastal development permit. Further, all on-going agricultural practices should be allowed within Coastal Commission policies that define the beneficial use of agricultural operations in the coastal zones.

We submit that a clearer definition of what is considered prime agricultural land is necessary to protect farming and ranching operations in coastal zones. There is no reasonable distinction to determine how a determination of 'prime' is made, and even more so, how a sub-prime distinction would be made. We consider all farming and ranching as prime, otherwise the farming or ranching operation would be in an unsustainable situation that would resolve itself through business decisions. Support must be provided through Coastal Commission policies and actions that support all aspects of farming and ranching in the coastal zones, regardless of land quality or other conditions present.

Recognition must be included that multiple agencies, either Federal or State, have jurisdictional processes that cover Agricultural operations in the coastal zones, from water quality to land use to labor practices to resource conservation. Agricultural

FARM BUREAU MONTEREY

operations have consistently adapted to multiple layers of regulatory requirements and indeed, California Agriculture has become the heaviest regulated of all states in our Nation. The requirements are almost overwhelming that farms and ranches must comply with, and coordination by the Coastal Commission with local, State, and Federal agencies is necessary to ensure that duplicate or conflicting requirements are not additionally burdensome to agricultural operations in the coast zones. We support fully including all stakeholders in conversations when new regulatory policies are to be implemented that may cross these multiple jurisdictions.

Monterey County Farm Bureau asks for these considerations when coastal zone polices are implemented relating to Agricultural operations. We have a unique set of values here in Monterey County that need careful consideration outside a 'one size fits all' solution to managing and protecting coastal resources.

Sincerely,

Norman C. Groot
Executive Director

Santa Barbara County Farm Bureau
Affiliated with the California Farm Bureau Federation and the American Farm Bureau Federation

W3

Via First-Class Mail & Fax
415-904-5400

May 1, 2013

Dr. Charles Lester, Executive Director
California Coastal Commission
45 Fremont Street, Suite 2000
San Francisco, CA 94105-2219

Subject: Workshop on Agriculture in the Coastal Zone

Dear Dr. Lester,

On behalf of the Santa Barbara County Farm Bureau and it's over 500 farmer and rancher members I would like to thank you and your staff for organizing the upcoming workshop on agriculture in the coastal zone of California. The importance of coastal agriculture cannot be understated; and yet it faces unprecedented challenges that threaten its very existence in many of the coastal counties where it has not already been replaced by urban development.

As a preamble to the workshop, staff will no doubt recite a standard definition of agriculture, that it is the production of food and fiber, the growing of plants, the raising and keeping of animals, aquaculture, and so forth. We believe that agriculture is so much more than its textbook definition, especially along the coast. It is the living legacy of California; a cultural heritage that is essential to good land stewardship and the preservation of our shared values.

And yet, coastal agriculture is being challenged like never before; not just from traditional threats like urban development and rising land costs, but from heightened regulatory scrutiny, including, in particular, from the Coastal Commission.

Farmers and ranchers – who already operate on the narrowest of margins – are now being confronted with requirements to obtain development permits for traditional farming practices. Only last month, the Commission narrowly approved an agricultural project on condition that grazing been subject to annual reporting and adaptive management, agricultural and conservation easements be recorded, and grazing setbacks of more than 100 feet from a riparian corridor be established. Such actions are unprecedented and very harmful to the continuation of agriculture in the coastal zone.

We believe and hope that the upcoming workshop will provide a forum for common sense solutions to the challenges facing coastal agriculture.

Here are a few topics that deserve consideration during the workshop:

1. The Coastal Act does not authorize the Commission to diminish or abridge the authority of a local government to establish the precise content of their coastal land use plans; so too, the Commission should recognize the importance of local farm bureaus in working

with farmers and ranchers on implementing the best agricultural management practices. Coastal agriculture is of statewide importance, but is best understood and managed at the local level.

2. The Commission should recognize that many agricultural practices have been categorically excluded from permitting, and allow local agencies to incorporate such exclusions into their LCPs. Such things as new barns and fences, agricultural water lines, and crop rotations should not be subject to permitting, especially when such permitting may be subject to appeal.

3. The Commission should request an update from the Attorney General of Opinion No. SO 77/39 (issued in 1978) which provided guidance on how to apply the agricultural exemption contained in the Coastal Act's definition of *development*.

4. There has been a false dichotomy created between coastal agriculture and environmentally sensitive habitats. We hope the workshop will reveal that these interests are not in conflict, and that the best agricultural practices serve to protect endangered species and their habitats. Specifically, we believe that:

    a) It is inappropriate to treat agriculture as just another form of development, with arbitrary ESHA setbacks and slope standards;

    b) Urban floor-to-area (FAR) are should not be applied to agricultural lands, with arbitrary home size restrictions based on lot size; and

    c) Even if traditional grazing lands contain endangered plant species, and might therefore be considered ESHA, they should not been downzoned and turned into de facto conservation lands.

Again, I would like to thank you and your staff for your consideration of our concerns and also for organizing the workshop. If you have any questions regarding the above mentioned topics please don't hesitate to call Teri Bontrager, Executive Director at 688-7479.

Sincere regards,

Paul Van Leer, President
Santa Barbara County Farm Bureau

180 Industrial Way * P.O. Box 1846 * Buellton, California 93427 * Telephone (805) 688-7479 * FAX (805) 688-0428

W3

From: David Lewis [mailto:djllewis@ucanr.edu]
Sent: Friday, April 05, 2013 9:07 AM
To: Ainsworth, John@Coastal
Cc: Lester, Charles@Coastal; Hyman, Rick@Coastal
Subject: RE: CCC Ag Workshop Time and Date

Good morning Jack,

Thank you for this message and reaching out like this. Additionally, thank you and the Commission for having this workshop to continue to advance the discussion and development of agriculture and its role in the Coastal Zone. I wanted to continue to offer the University of California Cooperative Extension services in this process.

As the Watershed Management Advisor across Marin, Mendocino, and Sonoma counties, I have lead research programs on conservation practice effectiveness and educational programs for ranch water quality management. This includes on farm research to reduce the impacts of manure management and livestock on stream and bay water bacteria levels and the resulting outcomes from riparian vegetation (I have attached a few or our publications from this work).

Additionally, the University of California has across the Coastal counties and on several campuses, a number of UC Advisors, Specialist, and Faculty developing practices and conducting education to reduce potential impacts from nutrients and sediment that may result from animal, row crop, and perennial crop agriculture.

Dr. Kenneth Tate's program offers an example of this role and program for UC. He heads up the California Rangeland Watershed Laboratory directing research on rangeland ecology, water quality management, and conservation biology, among many. He has worked collaboratively with animal agricultural producers and resource agency staff in watersheds from Humboldt to Santa Barbara counties. I don't know if there is room for him on the May 8th workshop agenda and proposed panel. However, he like many of UC's Advisors, Specialist, and Faculty, is a wealth of information and data on many of the questions and issues the Coastal Commission and coastal county constituents are working through in the respective LCP updates.

Going forward, we welcome the opportunity to be of service to you and all of the stakeholders. Please do not hesitate to contact me with any thoughts or questions and I look forward to working with through the May 8th workshop and beyond.

Thank you,

David J. Lewis
Director
University of California Cooperative Extension - Marin
1682 Novato Blvd., Suite 150B
Novato, CA 94947
PH 415-473-4204
FAX 415-473-4209
djllewis@ucdavis.edu
http://cemarin.ucdavis.edu

Reducing microbial contamination in storm runoff from high use areas on California coastal dairies

D. J. Lewis, E. R. Atwill, M. S. Lennox, M. D. G. Pereira, W. A. Miller, P. A. Conrad and K. W. Tate

ABSTRACT

High use areas are a fundamental part of California coastal dairies and grazing livestock ranches as feeding areas, nurseries, and sick pens. High stocking densities and daily use in these areas lead to soil surfaces devoid of vegetation and covered in manure, with high potential for manure transport during winter rains to receiving waters regulated for shellfish harvesting and recreation. We characterized the association between California's Mediterranean climate and a series of existing and proposed management practices on fecal coliform bacteria (FCB) transport from high use areas on dairies and ranches. Results from 351 storm runoff samples collected below 35 high-use areas indicate that removal of cattle during winter, locating high use areas on level ground, application of straw and seeding, and vegetative buffer strip implementation were significantly associated with FCB concentration and load reductions. These results complement our findings for reductions of specific pathogens in runoff from these areas. These findings have practical significance because they document surface water quality benefits that the studied management practices provide in application on working farms and ranches. This direction is critical and timely for on-farm management efforts seeking to reduce microbial pollution in runoff and comply with indicator bacteria water quality criteria.

Key words | animal feeding operation, conservation practice effectiveness, critical area planting, fecal coliform bacteria, vegetative buffer strip

D. J. Lewis (corresponding author)
University of California Cooperative Extension,
1682 Novato Blvd., Suite 150B,
Novato, California 94947-4209,
USA
E-mail: *djlewis@ucdavis.edu*

E. R. Atwill
Western Institute for Food Safety and Security,
School of Veterinary Medicine, Room 2009,
Haring Hall, University of California-Davis,
One Shields Ave, Davis,
CA 95616-8734,
USA
E-mail: *ratwill@ucdavis.edu*

M. S. Lennox
University of California Cooperative Extension,
133 Aviation Blvd., Suite 109,
Santa Rosa, California 95403,
USA
E-mail: *mslennox@ucdavis.edu*

M. D. G. Pereira
School of Veterinary Medicine,
University of California-Davis,
One Shields Ave, Davis,
CA 95616-8734,
USA
E-mail: *mpereira@ucdavis.edu*

W. A. Miller
P. A. Conrad
Department of Pathology, Microbiology, and Immunology,
School of Veterinary Medicine,
University of California, One Shields Ave,
Davis California 95616,
USA
E-mail: *wamiller@ucdavis.edu*;
paconrad@ucdavis.edu

K. W. Tate
Department of Plant Sciences, Mail Stop 1,
University of California, One Shields Ave,
Davis, CA 95616-8780,
USA
E-mail: *kwtate@ucdavis.edu*

INTRODUCTION

The impact of microbial contamination on water quality in coastal watersheds is an international concern. Programs such as the European Union's Water Framework Directive (CEC 2000, 2006) and Australia's National Water Quality management Strategy, including fresh and marine water quality guidelines (ANZECC 2000), are setting water quality criteria and directing water body assessment and mitigation. In the United States, similar action is being taken through

doi: 10.2166/wst.2009.561

Total Maximum Daily Loads (TMDLs). For example, the San Francisco Bay Regional Water Quality Control Board (CRWQCB) approved a pathogen TMDL for Tomales Bay in 2005 (CRWQCB 2005) and is now implementing a Conditional Waiver program for grazing lands (CRWQCB 2008). These policies established ambient water quality standards for FCB to protect beneficial uses of shellfish harvesting and contact and non-contact recreation in the watershed. The FCB standards are geometric means of 75 and 14 MPN/100 ml in tributary streams and bay water shellfish leases, respectively. The TMDL and Conditional Waiver also direct managers of FCB sources, including livestock agriculture operations, to implement management measures that will reduce FCB concentrations in storm water runoff from these operations.

Dairy farms and grazing livestock ranches commonly have designated high livestock use areas for the purpose of holding livestock during some portion of the year. These areas include exercise lots, sick pens, calving pens, calf corrals, feeding areas, and loafing areas. They are important production components for these dairies and ranches. For example, they provide lactating animals a place to exercise near milking facilities and facilitate cost-effective supplemental feeding. On these farms and ranches, sick pens, allow managers to monitor groups of animals that require direct and timely attention. The high stocking density and frequent heavy use of these areas results in relatively bare and compacted soils with limited infiltration capacity. This increases the susceptibility of these high use areas to accelerated runoff and pollutant transport capacity during winter storms, which can result in the delivery of manure, sediment and FCB to streams and coastal waters. In previous investigations, we found the highest FCB concentrations and loads in runoff coming from these high use areas in comparison to other dairy and ranch management units (Lewis *et al.* 2005). This finding is consistent with similar water quality findings from "farmyards" by Edwards *et al.* (2008) and for "steading" areas by Vinten *et al.* (2008).

The management challenge in these high use areas is to maintain animal productivity, health and welfare while complying with water quality regulations through the reduction of FCB mobilization and transport. Current steps producers take to meet this challenge include dry-season only use (April–October) to reduce the potential for hydrologic transport of fresh manure and FCB from these areas. Producers protect high use areas from stormwater run-on through the use of gutters and other storm drain networks. Finally, they scrape and remove manure from these surfaces in advance of winter storms. Even with such measures, high use areas still have the potential to deliver as much as ten fold more bacteria, nutrients, and sediment to surface waters in comparison to other management units (Lewis *et al.* 2005).

The objective of the management scale project reported here was to evaluate the effectiveness of management measures that provide soil surface protection cover and filter surface runoff on high use areas during winter rainfall-runoff events. Coupled with the management measures described above, we evaluated the additional reduction of FCB in runoff gained through annual implementation of soil cover and revegetation techniques (ABAG 1995; NRCS 2004; Raskin *et al.* 2005) in combination with vegetative buffer strips (NRCS 2004). As reviewed and referred to as "vegetative treatment systems" by Koelsch *et al.* (2006), these measures are being designed and implemented to improve the quality of runoff from open lots. Our specific objective was to implement practices that provide protective cover and filtering functions during winter rains to reduce erosion and transport of manure and sediment off of these areas to nearby receiving waters. We hypothesized that soil surface cover and buffer strip management measures would significantly decrease storm runoff FCB concentration and load from high use areas. This management scale investigation of these practices advances previous soil box and run-off plot investigations (Trask *et al.* 2004; Tate *et al.* 2006; Sullivan *et al.* 2007). The research presented in this paper complements previous investigations of *Giardia duodenalis* (Miller *et al.* 2007) and *Cryptosporidium* spp. (Miller *et al.* 2008) on the same coastal dairies and livestock ranches.

METHODS

Study location

The Tomales Bay Watershed is located approximately 64 kilometers north of San Francisco, California. It encompasses approximately 559 square kilometers divided among three main tributaries: Lagunitas, Olema, and Walker Creeks (Fischer *et al.* 1996). The Bay is approximately

19 kilometers long and less than 1.6 kilometers wide. Annual precipitation is 862 mm/year (standard deviation or SD = 312), occurring as rainfall predominately from October through May.

Agricultural production began in the watershed in approximately 1,850 and included dairying, livestock ranching, and row crop production such as potatoes. Row crop production declined in the early 1900s to less than 200 hectares of specialty crops today. Dairy farming and livestock grazing are still common in the watershed today. There are also records of a native oyster fishery as far back as 1890, with an even earlier use of the resource by native Americans. Commercial production of oysters began in 1918. Now approximately 280 hectares of leased bay tidal lands are in active production.

Five dairy farms were selected for this study based on voluntary participation and their location within the Tomales Bay watershed. Among the five cooperating dairies, 35 high use areas were enrolled as specific study sites.

Overall study design

This was an observational longitudinal study of a large cross-section of high use areas (Sample Size or $n = 35$) experiencing management scale implementation of measures designed to reduce FCB levels in stormwater discharge. Each high use area had one or more of the following management measures implemented during the study period: no management measures (control), soil surface cover (0 to 100%), winter livestock exclusion (yes, no), manure removal by scraping (yes, no), vegetative filter strip or treatment area (0 to 152 meters in length). The high use areas varied in size and slope (Table 1). FCB concentration, stormwater runoff rate, and FCB instantaneous load were determined for 351 sample events spread across these 35 study sites over 2 years (2002–2003 and 2003–2004). Multivariate analysis was used to determine associations between FCB levels discharged from high use areas and management measure implementation. The size, slope, stocking rate, animal age, curve number and hydrologic group (SCS 1985), and precipitation variables (24-hour and Annual cumulative) were treated as covariates to account for inherent area to area and storm to storm variation.

Management measure implementation

Soil surface cover

We adapted soil surface protection practices generally used for construction sites for implementation on bare soil surfaces typical of high use areas. These practices are designed to prepare sites in advance of the onset of winter storms and the associated potential for mobilization and

Table 1 | Rainfall, discharge, and management conditions of 35 dairy lots from which runoff samples were collected and analyzed during the 2002–2003 and 2003–2004 winter storm season

Lot Characteristic	Mean	Median	Min.	Max.
Precipitation and discharge				
24-Hour cumulative precip. (mm)	23	20	10	83
Annual cumulative precip. (mm)	388	481	37	713
Slope (°)	8.7	4	1	26
Instantaneous flow (m^3/sec)	0.009	0.002	0.00004	0.2
Storm runoff (hectare-mm)	13.0	8.1	0.0002	72.8
Management				
Size (hectare)	1.8	0.4	0.04	32.4
Stock number	50.7	30	5	390
Animal conc. (#/hectare)	83.8	46.6	0.7	308.9
Ground cover (%)	39.7	30.0	0	99.0
Buffer length (m)*	30.4	21	6	152.4

*Statistics describe conditions for the water quality improving management practices below 17 of the 35 studied lots.

transport of manure and FCB. The practices follow closely the USDA Natural Resources Conservation Service's (NRCS) critical area planting practice (NRCS 2004), and capitalizing upon documented reductions in raindrop impact and interrill erosion (Singer *et al.* 1981) and maintenance of infiltration rate (Singer & Blackard 1978) generated from straw cover of bare soil surfaces. Prior to first rains, a layer of straw is spread to provide cover during early winter storms. At the same time, the area is sown with grass seeding to provide ground cover during later winter storms after the straw has decomposed (Lennox *et al.* 2007). This treatment occurred in October of each study year on 11 of the 34 studied high use areas.

Annual barley grass (*Hordeum vulgare*) and Annual rye grass (*Lolium multiflorum*) were seeded due to their ability to tolerate compacted and marginal soils, and to provide soil cover for an extended period. Annual barley grass germinates and establishes quickly with minimal moisture and cool temperatures, thus providing soil surface cover during January and February. Annual rye grass established more slowly, providing soil surface cover from March to May. We spread straw at a rate of 5.4 metric tons/hectare and broadcast seeded 112 kg/hectare of annual barley and 28 kg/hectare rye grass across treated areas (Lennox *et al.* 2007). Soil surface measurement of percent bare ground, straw cover, annual barely grass cover, and annual rye grass cover were made once a month using a step point method (BLM 1996) in all 35 studied high use areas.

Livestock use and removal

In addition to seeding and straw application, we evaluated the ability of winter exclusion of cattle (26 areas) and scraping (removal) of manure prior to winter (28 areas), along with runoff treatments of vegetative buffer strips (14 areas), grassed waterways (2 areas), or impoundments (1 areas) to reduce FCB concentration and load.

Storm event sampling

It has been determined that excessive FCB loading to Tomales Bay is rainfall dependent (O'Connell *et al.* 2000; Lewis *et al.* 2005). This is consistent with findings from other systems along the Pacific Coast of North America (Shanks *et al.* 2006) and elsewhere (Kay *et al.* 2005) in which precipitation and storm runoff drive increased indicator bacteria values in tributary rivers and receiving bays. The California Department of Public Health uses 24-hour cumulative precipitation from a local precipitation station, Tomasini Point, to regulate harvest closures of winter shellfish growing leases in the Bay. Accordingly, we conducted storm-based water sampling and analysis of storm runoff for FCB below each study area.

Sample collection sites were identified for each high use are that captured all the runoff from a recruited high use area. Water samples for FCB concentration determination were collected via grab sampling. Samples were collected from each ranch and respective sample location during selected storms (2 to 6) across the entire season. Generally, the relatively flashy nature of runoff from these areas prevented collection of a series of samples during each storm via grab sampling. In a few instances this was achieved. At each sample collection site for each water sample collection event, instantaneous runoff was measured using either the area-velocity method (velocity × channel width × channel depth × 0.85 to account for surface flow) (Mosley & McKercher 1993) with a Global Waters flow meter (Global Waters Inc., Gold River, California, USA) or the time to fill a container of known volume. Method used was dependent upon have a cross-sectional area of the running water sufficient to accommodate the flow meter.

Fecal coliform bacteria enumeration

Each sample was collected in sterile sample bottle and shipped overnight at 4 to 10°C to the School of Veterinary Medicine, University of California, Davis, California. Given the uncertainty in expected FCB concentration, a range of three to five 10 or 100-fold serial dilutions were constructed and analyzed from each sample. For each dilution, 50 ml was filtered through a 47 mm, 0.45 μm pore sterile filter (Millipore, Billerica, MA), incubated on mFC agar (Difco agar by Becton Dixon Company, Sparks, MD) at 44.5°C, and enumerated for FCB after 24 hours (APHA 1995).

Storm-based sampling resulted in different holding-time between sample collection and processing. As a consequence, significant variation was potentially introduced to the overall dataset due to variable holding times within and

between storm events. In order to adjust FCB enumerations to a standard 24-hour holding time, we conducted a FCB decay curve analysis (Tate *et al.* 2006). Twenty-two water samples were collected from different sources (control watershed, upstream and downstream of different locals dairies, runoff from pastures or lots, and from waste management system) and at different times, with FC concentration determined daily for six days. These 122 data points were $\log_{10}$-transformed and a linear mixed-effects model was fitted to the data, with time (hr) and water source as the fixed effects, water sample ID the group variable, and a power variance function used to control unequal variance (Pinheiro & Bates 2000).

In order to adjust the FCB concentration in each water sample tested x hours ($t = x$) after initial time of collection ($t = 0$) to a single 24-hour standard ($t = 24$), we first assumed the following basic model (Tate *et al.* 2006),

$$\log_{10}(\text{Fecal coliform}_{t=x}) = \log_{10}(\text{Fecal coliform}_{t=0}) + \beta(t = x) \quad (1)$$

whereby $\log_{10}(\text{fecal coliform}_{t=x})$ is the observed $\log_{10}$ concentration of FCB determined x hours ($t = x$) after initial time of collection, $\log_{10}(\text{fecal coliform}_{t=0})$ is the modeled $\log_{10}$ concentration of FCB at the initial time of collection ($t = 0$), and $\beta(t = x)$ is the fitted decay coefficient(s) generated by the linear mixed effects model described above. $\beta(t = x)$ is allowed to be a univariate or polynomial term depending on whether the raw data signifies a first or second-order time-dependent decay process for the FCB concentration in our source water. The decay process is for water samples held at approximately 4°C. Once $\beta(t = x)$ is obtained, Equation (2) is used to adjust each sample to a single 24-hour standard ($t = 24$), which is derived as follows,

$$\text{Fecal coliform}_{t=24} = (\text{Fecal coliform}_{t=x})10^{\beta(24-x)} \quad (2)$$

whereby fecal $\text{coliform}_{t=24}$ is the fitted or expected concentration of FCB at a 24-hour standard, fecal $\text{coliform}_{t=x}$ is the observed concentration of FCB determined x hours ($t = x$) after initial time of collection, and $10^{\beta(24-x)}$ is the expected decay coefficient adjustment factor raised to the power of 10 which allows us to model concentrations of FCB directly instead of $\log_{10}$ concentration values.

The $\log_{10}$ concentration of FCB followed a first order decay process, such that $\beta(t) = -0.0022$ with units of time set in hours (95% CI, -0.003, -0.0014). This decay coefficient did not vary significantly across the different sources of water (P-value > 0.05 for an interaction term between time and water source), indicating that a single decay coefficient can be used for adjusting FCB concentrations at $t = x$ to a 24-hour standard ($t = 24$).

Instantaneous load calculation

Using FCB concentration and instantaneous runoff rate for each sample event, we calculated instantaneous load of FCB for each loading unit, defined as:

$$\text{instantaneous load(cfu/sec/hectare)} = \frac{(\text{cfu/100 ml})(10^6\text{ml/m}^3)(\text{m}^3\text{/sec})}{(\text{total surface area of loading unit in hectares})} \quad (3)$$

where (cfu/100 ml) is the FCB concentration in the water sample and (m^3/s) is the instantaneous runoff rate associated with that water sample. This calculation is necessary in order to compare between study areas on a standardized basis of per unit time and per unit area.

Statistical analysis

Linear mixed effects regression was used to test for differences in FCB concentration and instantaneous load for high use areas with differing combinations of management measures (Pinheiro & Bates 2000). Unique models were developed for FCB concentration and instantaneous FCB load. FCB concentration and instantaneous load were set as the outcome variables, with each high use area set as a group effect to adjust the p-values for repeated sampling at the same sites. A forward stepping approach was used to develop the multivariate regression model, with $P \leq 0.05$ set as the criterion for inclusion of the variable in the final model.

RESULTS AND DISCUSSION

A total of 351 samples were collected from various high use areas, including 194 during 2002–2003 and 157 during 2003–2004 water years. Geometric mean FCB concentration for the entire dataset was 7.3e + 06/100 ml and ranged from 1,351 to 5.48e + 017 cfu/100 ml. Geometric mean FCB instantaneous load for the entire dataset was 4.1e + 0.08, ranging from 177 to 1.93e + 019 cfu/hectare/sec.

The relationship between both climatic and management factors and FCB results were highly variable. In the case of cumulative precipitation, FCB concentrations ranged from 1.00E + 03 to 1.00E + 18 at lower values of rainfall (Figure 1). This variability reduces, evidenced by the smaller ranges in FCB concentration associated with cumulative precipitation of greater than approximately 300 mm. In a similar manner, the range and variability in FCB concentration decreases relative to percent ground cover increases (Figure 2).

Modeling results document that both FCB concentration and instantaneous load were significantly related to 24-hour and annual cumulative precipitation, percent slope, the practices of scraping and winter use, site mulching and seeding, and vegetative buffer strip length. Factors not found to be significant were size of the high use area, stocking number, curve number and hydrologic group (SCS 1985). Animal age was found to be significant, but it was also multicollinear with winter use of lots given the fact that

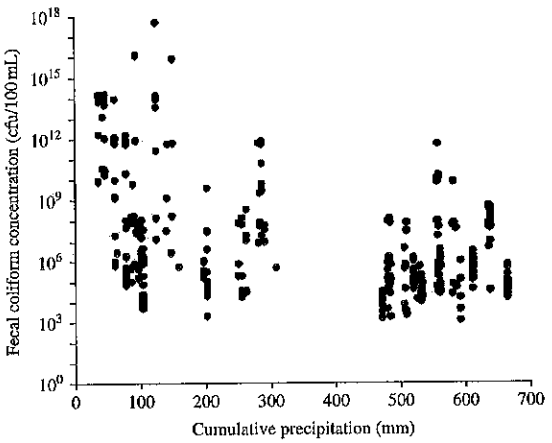


Figure 1 | Individual sample results for fecal coliform concentration as a function of cumulative precipitation.

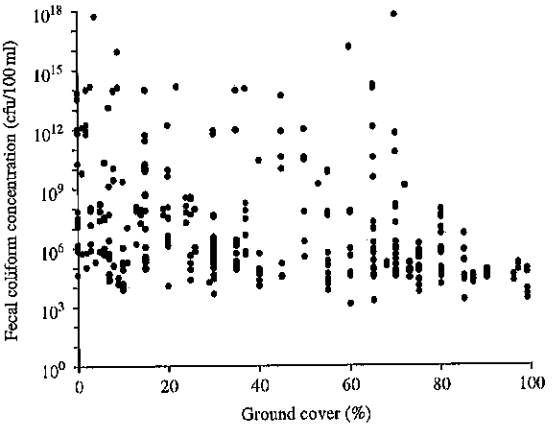


Figure 2 | Individual sample results for fecal coliform concentration as a function of percent ground cover.

calves are not provided access to open lots regardless of season. Hence, all calves were coded as no winter lot use which created the multicollinearity condition, making it difficult to statistically separate these two collinear effects on FCB concentration and instantaneous load.

The baseline water quality conditions, modeled as the constant coefficients (or intercept term) for FCB concentration and load in high use area runoff from our regression models, were approximately 61,700 cfu/100 ml (Table 2) and 478,630 cfu/hectare/sec (Table 3), respectively. Using our data derived models to generate predictions, these constants for FCB concentration and instantaneous load represent the baseline referent conditions that are then potentially influenced or modified by climatic factors, site conditions, and management practices. To demonstrate, at a median value of 20 mm for 24-hour cumulative and 481 mm of annual cumulative precipitation, the model predicts that FCB concentration and instantaneous load in runoff would be 10,378 cfu/100 ml and 273,771 cfu/hectare/sec, respectively.

The concentration and load of FCB in storm runoff from the studied high use areas had complex associations with precipitation. On a storm or 24-hour basis, increasing precipitation was associated with an increased FCB concentration and load. This is represented by the respective positive coefficients for 24-hour precipitation in the concentration (Table 2) and load (Table 3) models. There was also a smaller negative quadratic coefficient in each model for the relationship with 24-hour precipitation and FCB. For example, as 24-hour cumulative precipitation was

Table 2 | Linear mixed effect regression model for the associations of management practices, slope, and rainfall with fecal coliform concentration (log_{10} value) in surface runoff from dairy lots during storm conditions, 2002–2004, Tomales Bay, California

Factor	Coefficient	95% CI*	*P*-value*
Constant or intercept term for the model	4.79	(2.90, 6.67)	<0.0001
24-hour precipitation (mm)	0.19	(0.12, 0.26)	<0.0001
24-hour precipitation^2 (mm)^2	−0.003	(−0.004, −0.002)	<0.0001
Cumulative precipitation (mm)	−0.015	(−0.02, −0.009)	<0.0001
Cumulative precipitation^2 (mm)^2	0.00002	(0.00, 0.00)	0.0016
Slope (%)	0.067	(0.003, 0.13)	0.04
Scraped	1.75	(0.67, 2.84)	0.0017
Winter use	2.24	(1.42, 3.08)	<0.0001
Length of vegetated buffer (m)	−0.022	(−0.04, −0.003)	0.0238
Percent ground cover (%)	−0.014	(−0.03, −0.003)	0.0105

*Adjusted for potential lack of independence due to repeated sampling of lots across storms.

Table 3 | Linear mixed effects regression model for the associations of management practices, slope, and rainfall with fecal coliform load (log_{10} value) in surface runoff from dairy lots during storm conditions, 2002–2004, Tomales Bay, California

Factor	Coefficient	95% CI*	p-value*
Constant or intercept term for the model	5.68	(3.77, 7.61)	<0.0001
24-hour precipitation (mm)	0.22	(0.15, 0.29)	<0.0001
24-hour precipitation^2 (mm)^2	−0.003	(−0.005, −0.002)	<0.0001
Cumulative precipitation (mm)	−0.013	(−0.02, −0.006)	0.0001
Cumulative precipitation^2 (mm)^2	0.000012	(0.00, 0.00)	0.0094
Slope (%)	0.08	(0.01, 0.15)	0.0181
Scraped	1.83	(0.72, 2.94)	0.0013
Winter use	1.99	(1.42, 3.08)	<0.0001
Length of vegetated buffer (m)	−0.029	(−0.05, −0.009)	0.0042
Percent ground cover (%)	−0.015	(−0.03, −0.004)	0.0089

*Adjusted for potential lack of independence due to repeated sampling of lots across storms.

increased from 0 to ~32 mm, FCB concentration and load likewise increased, but once 24-hour cumulative precipitation exceeded 32 mm, further increases in precipitation amounts were associated with reductions in FCB concentration and load (Figure 3).

Model results also indicate that increases in cumulative precipitation were associated with decreases in FCB concentration (Table 2) and load (Table 3 and Figure 4). However, because of the positive quadratic coefficient for annual cumulative precipitation in both the concentration and load models, observed decreases reverse and begin to increase once annual cumulative precipitation exceeded 525 mm of precipitation.

Increases in microbial pollutant recovery associated with increases in precipitation have been document previously (Trask *et al.* 2004; Tate *et al.* 2006). Our observations of increases in loads and concentrations up to the point of ~32 mm in 24-hours, with decreasing FCB values thereafter, is indicative of storm flushing or the increased transport of available FCB until that source is removed. Similarly, the continued decrease in concentration and load with increases of annual cumulative precipitation up to 525 mm suggests annual flushing or transport of fecal bacteria from a source that is not constant. We documented similar flushing relationships with annual and 24-hour cumulative precipitation for *Giardia*

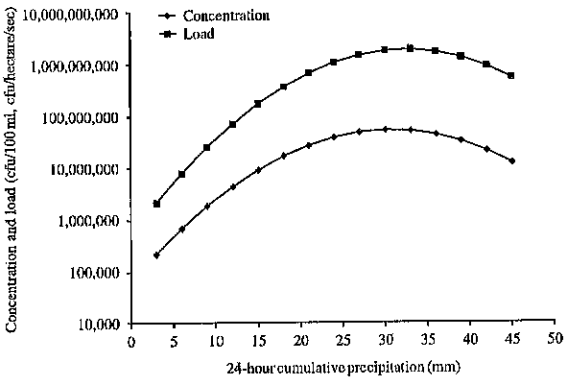


Figure 3 | Modeled relationship of fecal coliform concentration and instantaneous load as a function of 24-hour cumulative precipitation.

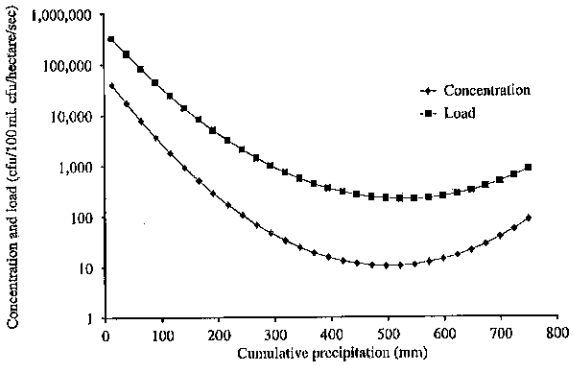


Figure 4 | Modeled relationship of fecal coliform concentration and instantaneous load as a function of cumulative precipitation.

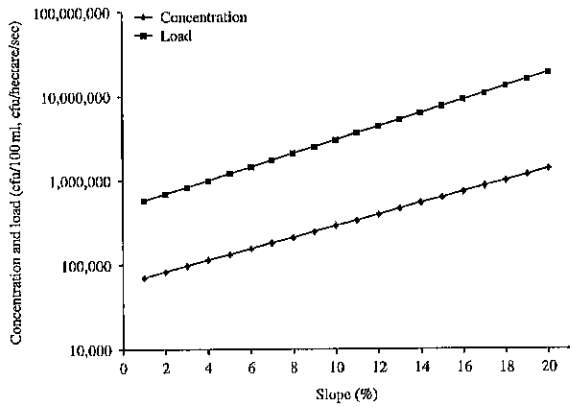


Figure 5 | Modeled relationship of fecal coliform concentration and instantaneous load as a function of high use area slope.

duodenalis (Miller *et al.* 2007) and *Cryptosporidium* spp. (Miller *et al.* 2008) concentrations and loads at these same sites.

Increases in percent slope were associated with increases in storm runoff FCB concentration and load (Figure 5). For each one percent increase in site slope, there was an associated increase of FCB concentrations and load of 14,000 cfu/100 ml and 140,000 cfu/hectare/sec, respectively. This result is similar to those documented in earlier studies (Trask *et al.* 2004; Tate *et al.* 2006) and also consistent with established soil erosion models such as the Modified Universal Soil Loss Equation (Renard *et al.* 1994). Increased slope reduces the volume of water infiltrated into the soil and increase the volume of water in runoff thus increasing the entrainment and transport potential for sediment and manure. It is uncommon for a farmer to select a high use area location with a slope approaching or greater than 10 percent because these are not conducive to livestock management objectives. Conversely, the hilly topography of the study area precludes finding sites with zero slope. However, our results indicate that careful site selection to reduce the site grade by even one or two percent may generate marked improvements to water quality. Interestingly, we did not find a similar relationship for slope and the concentration or load of *Giardia duodenalis* (Miller *et al.* 2007) or *Cryptosporidium* spp. at similar study locations (Miller *et al.* 2008). In contrast, using soil boxes dosed with predetermined pathogen amounts to simulate in-field vegetated buffer strips, similar flushing effects were documented for *Cryptosporidium* spp. (Tate *et al.* 2006). This comparison between our observational management scale study and other controlled, experimental studies highlights the increased variability in the timing and location of FCB and fecal pathogen sources on working farms.

Studied management practices had varying positive and negative associations with storm runoff FCB concentration (Table 2) and load (Table 3). Winter use compared with no winter use was associated with a large amount of FCB discharging in the runoff from these sites. Using our regression models to generate water quality predictions and setting 24-hour and cumulative precipitation to levels of 20 and 482 mm, respectively, predicted FCB concentration would be 1,815,574 cfu/100 ml and FCB load would be 27,032,051 cfu/hectare/sec from areas with winter use.

These values represent differences of more than two orders of magnitude in comparison to no winter use. Mankin *et al.* (2006) documented similar improvements to water quality when cattle were not present on feedlots. A milking dairy cow is estimated to deposit 68 Kg/day wet weight manure (ASAE 2005), with a typical FCB concentration of 10^6 cfu/g (Kouznetsova *et al.* 2007). The result is a total daily deposit of 68 billon bacteria per cow. Multiple that by 100 cows, accessing a high use area, and the total daily load surpasses six trillion. If only five percent of this load is eroded and transported during a single storm, the result is 340 billon. While FCB fate and transport is much more complex than this calculation, it demonstrates the potential FCB available for transport and how no winter use is associated with reduced FCB concentration and load. It is important to point out for planning and implementation purposes that reducing winter use on the studied high use areas requires an available loafing barn and manure management system to capture waste during the winter months. To make such improvements, a correspondingly significant capital investment is needed to either expand existing infrastructure or to design and build anew.

The practice of scraping had a positive association with FCB concentration and load. Model results indicated that FCB concentration and load in runoff from a scraped high use area, under the median 24-hour and annual cumulative precipitation conditions, might approach 155,367 cfu/100 ml and 18,540,695 cfu/hectare/sec, respectively. This is counter intuitive given the practice removes the upper centimeters of manure that have accumulated during the previous dry season. Until we can verify the causal mechanisms associated with scraping and elevated bacterial counts from these lots, we are uncomfortable making the recommendation to cease scraping of these high use areas. One consideration is that annual surface scrapping has removed topsoil and any remaining groundcover to reveal loosely unconsolidated subsoil laden with indicator bacteria. Soil mean fecal coliform concentration in the top 10 cm of these areas was 4,316 cfu/g (SE = 1,880, $n = 12$) compared with 62 cfu/g (SE = 37, $n = 13$) from 10 to 30 cm below the surface. We did not anticipate this result and as a consequence we did not design the study to fully evaluate scraping verse no-scraping separate from the other practices.

Length of vegetative buffer was negatively associated with FCB concentration and load (Tables 2 and 3). The result is a relationship wherein concentration and load decrease as buffer length increases (Figure 6). Each additional meter of buffer was associated with a reduction in FCB concentration and load of more than 2,900 cfu/100 ml and 29,000 cfu/hectare/sec, respectively. These reductions are consistent with those we documented for *Giardia duodenalis* (Miller *et al.* 2007) and *Cryptosporidium* spp. (Miller *et al.* 2008).

The benefits of vegetative buffer strips to reduce microbial pollution in surface runoff have been demonstrated in other dairy and livestock agriculture production systems (Bedard-Haughn *et al.* 2005; Tate *et al.* 2006; Sullivan *et al.* 2007). However, there is limited research on their efficacy to improve water quality below animal feeding areas (Koelsch *et al.* 2006). Examples of research include investigations of benefits below manure piles (Fajardo *et al.* 2001) and pastures (Lim *et al.* 1997; Sullivan *et al.* 2007).

The FCB concentration and load reductions associated with these practices in application on working farms were less than those observed using idealized soil box and runoff plot simulations (Fajardo *et al.* 2001; Tate *et al.* 2006; Sullivan *et al.* 2007). This is most likely due to the lack of infiltration and sedimentation because of channelized flow typical of these small drainage canals or ditches at these dairy locations. Both slope and length are driving factors for buffer efficacy and design (Koelsch *et al.* 2006), and the complex slopes in the study area reduce the number of locations where strips can be installed and also restrict their

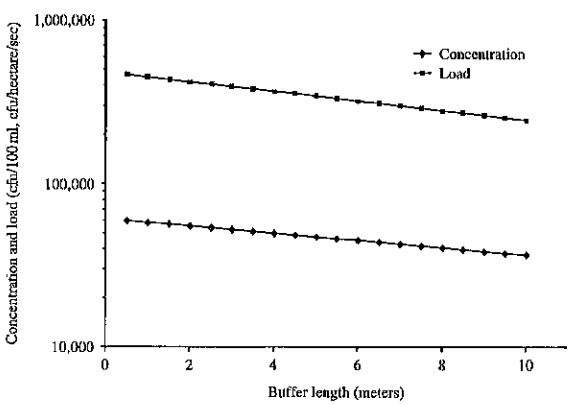


Figure 6 | Modeled relationship of fecal coliform concentration and instantaneous load as a function of vegetative buffer length below a given high use area.

length. The vegetation management required to maintain a strip's annual growth cycle, and therein its ability to improve runoff through sedimentation and infiltration (Bedard-Haughn *et al.* 2005; Koelsch *et al.* 2006), may not always be the highest priority for the farmer. It is because of these considerations that many of the vegetated treatment systems we studied were vegetated channels or ditches lacking the sheet flow most desired for maximum reduction of pollutants in runoff (Koelsch *et al.* 2006).

The combination of straw mulch and grass seeding resulted in over 75 percent ground cover of treated areas from November through March (Lennox *et al.* 2007). In the first two months the straw mulch provided the greatest cover. As it decomposed and the grasses grew, the greatest ground cover was provided by barley grass in December and January and then by the rye grass in February and March. The resulting relationship to water quality is that increases in ground cover were associated with decreasing FCB concentration (Table 2 and Figure 7) and load (Table 3 and Figure 7). For example, for every 10 percent increase in ground cover, FCB concentration and load were reduced by more than 12,000 cfu/100 ml and 99,000 cfu/hectare/sec, respectively.

Seeding and mulching high use areas on an annual basis has additional labor and materials costs for the farmer. Perhaps this cost is not prohibitive considering that the high use areas studied occupied on average 1.2 hectares. However, a few select sites had areas of 10, 12, and even 32 total hectares on one farm. Additionally, there is the potential for competition of labor from other farm activities at the appropriate time to treat these high use areas. Care should be given to avoid potentially blocking storm drains, downstream of these areas, caused by storm runoff transport of straw during storms. With these precautions in mind, the practice of critical area planting provided a protective groundcover, preventing raindrop impact and associated mobilization, leading to reductions in not only FCB concentration and load, but also *Cryptosporidium* spp. (Miller *et al.* 2008). Interestingly, we did not document reductions for *Giardia duodenalis* concentration or load (Miller *et al.* 2007) associated with ground cover. This may have resulted because of pathogen specific fate and transport dynamics (Berry *et al.* 2007) or the fact that most of the on-farm environmental loading of *Cryptosporidium* spp. was limited to runoff from calf hutches which were typically located on concrete surfaces and not soil surfaces conducive to straw mulching and seeding.

To demonstrate how the climatic and site conditions were integrated with implementation of the studied management practices, we used our regression model to predict FCB runoff concentration scenarios (Figure 8). One worst case scenario based upon our model would be the first storm of the year with 24-hour value of 12.5 mm. This amount was selected because it is the 24-hour cumulative value that triggers closure of shellfish harvesting leases in Tomales Bay (Commandatore 2007).

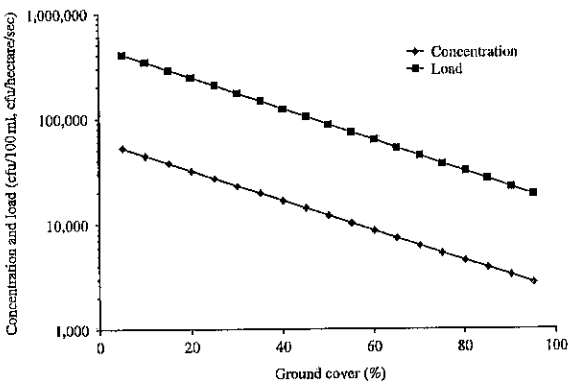


Figure 7 | Modeled relationship of fecal coliform concentration and instantaneous load as a function of the percent ground cover resulting from seeding and mulching a high use area.

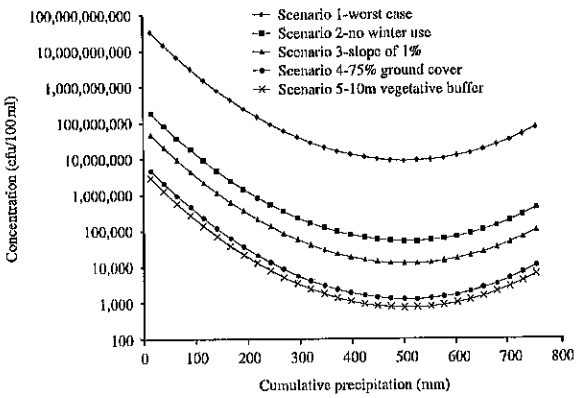


Figure 8 | Modeled fecal coliform concentration as a function of cumulative precipitation for management practice scenarios with 24-hour cumulative precipitation held constant at 12.5 mm. The worst case scenario is for a high use area that includes winter use, is on an area with a 10% slope, has only minimal ground cover of 5%, and has no vegetative buffer strip below it. Management practice implementation for each successive scenario is additive and indicated by the legend. For example, Scenario 3 represents a high use area with a slope of 1% and no winter use.

This worst-case scenario is also a high use area that was scraped, used in the winter, had a 10% slope, ground cover of 5%, and no vegetative buffer strip. Subsequent scenarios of improved water quality would be no winter use in Scenario 2, locating the area on a low (1%) slope in Scenario 3, providing 75% ground cover in Scenario 4, and implementation of a 10-meter vegetative buffer in Scenario 5. Removal of winter use was predicted to be associated with a >99% reduction or >33 billon cfu/100 ml from a high use area under worst case scenario conditions. With all studied management practices implemented, the resulting FCB concentration was reduced to 2.9 million cfu/100 ml. While the predicted percent reduction in concentration was only 0.5% when the slope of a lot was reduced from 10% to 1%, the potential total reduction was >145 million cfu/100 ml. Similarly, increasing ground cover to 75% is predicted to result in a 0.1 percent change from worst case scenario and a reduction of >43 million cfu/100 ml. Implementation of a 10 meter vegetative buffer strip reduced FCB concentration by only 0.006% from worst case conditions, but results in total potential reduction of >0.9 millon cfu/100 ml.

CONCLUSIONS

Reducing FCB in runoff from dairy and ranch high use areas is a complex decision that needs to take into account the role that climate, site characteristics, and management practices have in influencing bacterial concentrations and loads. Our results indicate that there are storm and annual flushing dynamics in association with precipitation. This is indicative of a source that is not constant on either a storm or annual basis. Therefore, management and implementation of practices that improve water quality and reduce the transport of FCB need to address the potential for FCB transport during early and large storm events.

The highest storm runoff FCB concentrations tended to occur during early season storms and in November and December. These FCB waterborne concentrations were likely higher than levels found in fresh bovine feces (Kouznetsova *et al.* 2007), suggesting suggests that one or more of the species that comprise the FCB group, such as *Klebsiella* sp., may have grown in the fecal-soil surface prior to the runoff event. Late fall or early winter wetting of surface soils followed by midday warming likely stimulates growth for many of these bacterial indicator species.

Results from our regression models for FCB concentration and load in high use area runoff indicate that improvements to water quality can be obtained through multiple management measures. The values in Scenario 5 (Figure 6) represent the greatest or "optimal" benefits to water quality that can be gained from combining studied management practices, assuming that these beneficial management practice function independently from each in generating their water quality benefits. The greatest reduction to both concentration and load was predicted to occur by a reduction in winter use, followed by placement of these areas on relatively level ground. Additional gains can be made by seeding and covering areas in advance of winter, and by installing vegetated filter strips. Though these "optimal" benefits are dairy and site specific because each farm is a unique agricultural system, our results offer realistic management alternatives for conservation planning. However, as discussed, each of the studied practices is not without other impacts and trade-offs to the functionality and profitability of the farming system which should be taken into consideration.

Controlled experiments have documented the benefits of the studied practices to reduce microbial pollution in surface run-off from livestock agriculture (Koelsch *et al.* 2006; Tate *et al.* 2006; Sullivan *et al.* 2007). Combining our management scale study results for FCB, *Giardia duodenalis* (Miller *et al.* 2007), and *Cryptosporidium* spp. (Miller *et al.* 2008), we document the influences that studied practices have on water quality under working farming operations and uncontrolled climatic conditions. This has practical significance to the regulated and regulatory communities striving to safeguard human health from fecal-borne pathogens and implement solutions for complying with water quality criteria based upon indicator bacteria.

ACKNOWLEDGEMENTS

We thank the members of the Tomales Bay Agricultural Group whose members were cooperators in this study.

We also want to recognize the contributions of Jon Gustafson, USDA Natural Resources Conservation Service California State Range Conservationist, and Range Conservationist for the NRCS Petaluma, California office at the time of this study for his contributions and direction on the implementation of critical area planting. This research was supported by an award from the California Sea Grant Program.

REFERENCES

ABAG 1995 *Erosion & Sediment Control Measures: A Comprehensive Field Guide for Controlling Soil Erosion in California*. 2nd edition. Association of Bay Area Governments, Oakland, California.

ANZECC 2000 Australian and New Zealand guidelines for fresh and marine water quality. Australian and New Zealand Environment and Conservation Council (ANZECC), Agriculture and Resource Management of Council of Australia and New Zealand Series 628.161'0994-dc21.

APHA 1995 9222 D. Fecal Coliform Membrane Filter Procedure In: *Standard Methods for the Examination of Water and Wastewater*. American Public Health Association (APHA), Washington, DC.

ASAE 2005 Manure production and characteristics. ASAE D384.2 MAR2005. American Society of Agricultural Engineers (ASAE). St. Joseph, Michigan. pp. 20.

Bedard-Haughn, A., Tate, K. W. & van Kessel, C. 2005 Quantifying the impact of regular cutting on vegetative buffer efficacy for nitrogen-15 sequestration. *J. Environ. Qual.* **34**, 1651–1664.

Berry, E. D., Woodbury, B. L., Nienaber, J. A., Eigenberg, R. A., Thurston, J. A. & Wells, J. E. 2007 Incidence and persistence of zoonotic bacterial and protozoan pathogens in a beef cattle feedlot runoff control-vegetative treatment system. *J. Environ. Qual.* **36**, 1873–1882.

BLM 1996 Sampling vegetation attributes. Interagency technical reference. Cooperative Extension Service, U.S. Department of Agriculture, Forest Service, Natural Resources Conservation Service, and Grazing Land Technology Institute, and U.S. Department of the Interior, Bureau of Land Management (BLM). BLM/RS/ST-96/002 + 1730.

CEC 2000 Council Directive 2000/60/EC of the European Parliament and the council of 23 October 2000 establishing a framework for community action in the field of water policy. *Official J. Eur. Union* **L327**, 1–72.

CEC 2006 Council Directive 2006/7/EC of the European Parliament and the council of 15 February 2006 concerning the management of bathing water quality and repealing Directive 76/160/EEC. *Official J. Eur. Union* **L64**, 37–51.

Commandatore, A. M. 2007 Annual sanitary survey update report: 2006–2007. Shellfish growing area classifications for Tomales Bay, California. California Department of Public Health, Division of Drinking Water and Environmental Management, Environmental Management Branch. Sacaramento, California. Technical Report No. 07-18.

CRWQCB 2005 Pathogens in Tomales Bay Total Maximum Daily Load: Basin Plan Amendment. California Regional Water Quality Control Board (CRWQCB), San Francisco Bay Region, Oakaland, California.

CRWQCB 2008 Conditional waiver of waste discharge requirements for grazing operations in the Tomales Bay Watershed (Tomales Bay, Lagunitas Creek, Walker Creek, and Olema Creek) in the San Francisco Bay Region. Resolution Number R2-2008. California Regional Water Quality Control Board (CRWQCB), San Francisco Bay Region, Oakaland, California.

Edwards, A. C., Kay, D., McDonald, A. T., Francis, C., Watkins, J., Wilkinson, J. R. & Wyer, M. D. 2008 Farmyards, an overlooked source for highly contaminated runoff. *J. Environ. Manage.* **87**, 51–59.

Fajardo, J. J., Bauder, J. W. & Cash, S. D. 2001 Managing nitrate and bacteria in runoff from livestock confinement areas with vegetative filter strips. *J. Soil Water Conserv.* **56**(3), 185–191.

Fischer, D. T., Smith, S. V. & Churchill, R. R. 1996 Simulation of a century of runoff across the Tomales Bay watershed, Marin County, California. *J. Hydrol.* **186**, 253–273.

Kay, D., Wyer, M. D., Crother, J., Wilkinson, J., Stapletion, C. & Glass, P. 2005 Sustainable reduction in the flux of microbial compliance parameters from urban and arable land to coastal bathing waters by a wetland ecosystem produced by a marine flood defense structure. *Water Res.* **39**, 3320–3332.

Koelsch, R. K., Lorimor, J. C. & Mankin, K. R. 2006 Vegetative treatment systems for management of open lot runoff: review of literature. *Appl. Eng. Agric.* **22**(1), 141–153.

Kouznetsova, M. Y., Roodsarib, R., Pachepskyc, Y. A., Shelton, D. R., Sadeghid, A. M., Shirmohammadib, A. & Starr, J. L. 2007 Modeling manure-borne bromide and fecal coliform transport with runoff and infiltration at a hillslope. *J. Environ. Manage.* **84**, 336–346.

Lennox, M. S., Lewis, D. J., Gustafson, J., Tate, K. W. & Atwill, E. R. 2007 Water quality treatment for livestock feeding and exercise areas on California coastal dairy farms and ranches. University of California Division of Agriculture and Natural Resources, Oakland, California. Publication 8210.

Lewis, D. J., Atwill, E. R., Lennox, M. S., Hous, L., Karle, B. & Tate, K. W. 2005 Linking on-farm dairy management practices to storm-flow fecal coliform loading for California coastal watersheds. *J. Environ. Monit. Assess.* **107**, 407–425.

Lim, T. T., Edwards, D. R., Workmand, S. R. & Larson, B. T. 1997 Vegetated filter strip length effects on quality of runoff from grazed pastures. ASAE Paper No. 972060. St. Joseph, Michigan. ASAE.

Mankin, K. R., Barnes, P. L., Harner, J. P., Kalita, P. K. & Boyer, J. E. 2006 Field evaluation of vegetative filter effectiveness and runoff quality from unstocked feedlots. *J. Soil Water Conserv.* **61**(4), 2009–2217.

Miller, W. A., Lewis, D. J., Lennox, M., Pereira, M. D. G., Conrad, P. A., Tate, K. W. & Atwill, E. R. 2007 Climate and on-farm risk factors associated with *Giardia duodenalis* cysts in storm runoff from California dairies. *Appl. Environ. Microbiol.* **73**(21), 6972–6979.

Miller, W. A., Lewis, D. J., Pereira, M. D. G., Lennox, M., Conrad, P. A., Tate, K. W. & Atwill, E. R. 1882 Farm factors associated with reducing *Cryptosporidium* loading in storm runoff from dairies. *J. Environ. Qual.* **37**, 1875–1882.

Mosley, M. P. & McKercher, A. I. 1993 Streamflow. In: Maidment, D. R. (ed.) *Handbook of Hydrology*. McGraw Hill, Inc., New York, pp. 8.1–8.39.

NRCS 2004 Standards and specifications 342A. US Department of Agriculture Natural Resources Conservation Service (USDA NRCS) field office technical guide. Washington, DC: USDA NRCS.

O'Connell, L., Langlois, G. & Hopkins, D. 2000 Tomales Bay technical advisory committee final report: Investigation of nonpoint pollution sources impacting shellfish growing areas in Tomales Bay, 1995–1996, California State Water Resources Control Board, Department of Health Services and San Francisco Bay Regional Water Quality Control Board.

Pinheiro, J. C. & Bates, D. M. 2000 *Mixed-effects Models in S and S-plus, Statistics and computing series*. Springer Verlag, New York.

Raskin, L., DePaoli, A. & Singer, M. J. 2005 Erosion control materials used on construction sites in California. *J. Soil Water Conserv.* **60**(4), 187–192.

Renard, K. G., Laflen, J. M., Foster, G. R. & McCool, D. K. 1994 The revised universal soil loss equation. In: Lal, R. (ed.) *Soil Erosion Research Methods*, 2nd edition. Soil and Water Conservation Society, Ankeny, IA.

SCS 1985 Hydrology, Section 4. In: *Soil Conservation Service (SCS) National Engineering Handbook*. U.S. Department of Agriculture (USDA), Washington, DC.

Shanks, O. C., Nietch, C., Simonich, M., Younger, M., Reynolds, D. & Field, K. G. 2006 Basin-wide analysis of the dynamics of fecal contamination and fecal source identification in Tillamook Bay, Oregon. *Appl. Environ. Microbiol.* **72**(8), 5537–5546.

Singer, M. J. & Blackard, J. 1978 Effect of mulching on sediment in runoff from simulated rainfall. *Soil Sci. Soc. Am. J.* **42**, 481–486.

Singer, M. J., Matsuda, Y. & Blackard, J. 1981 Effect of mulch rate on soil loss by raindrop splash. *Soil Sci. Soc. Am. J.* **45**, 107–110.

Sullivan, T. J., Moore, J. A., Thomas, D. R., Mallery, E., Snyder, K. U., Wustenberg, M., Wustenberg, J., Mackey, S. D. & Moore, D. L. 2007 Efficacy of vegetated buffers in preventing transport of fecal coliform bacteria from pasturelands. *Environ. Manage.* **40**, 958–965.

Tate, K. W., Atwill, E. R., Bartolome, J. W. & Nader, G. 2006 Significant *Escherichia coli* attenuation by vegetative buffers on annual grasslands. *J. Environ. Qual.* **35**, 795–805.

Trask, J. R., Kalita, P. K., Kuhlenschemidt, M. S., Smith, R. D. & Funk, T. L. 2004 Overland and near-surface transport of *Cryptosporidium parvum* from vegetated and nonvegetated surfaces. *J. Environ. Qual.* **33**, 984–993.

Vinten, A. J. A., Sym, G., Avid, K., Crawford, C., Duncan, A. & Merrilees, D. W. 2008 Faecal indicator pollution from a dairy farm in Ayreshire, Scotland: source apportionment, risk assessment and potential of mitigation measures. *Water Res.* **42**, 997–1012.

Management of Microbial Contamination in Storm Runoff from California Coastal Dairy Pastures

David J. Lewis* University of California Cooperative Extension Marin
Edward R. Atwill University of California-Davis
Michael S. Lennox University of California Cooperative Extension
Maria D.G. Pereira, Woutrina A. Miller, Patricia A. Conrad, and Kenneth W. Tate University of California-Davis

A survey of storm runoff fecal coliform bacteria (FCB) from working farm and ranch pastures is presented in conjunction with a survey of FCB in manure management systems (MMS). The cross-sectional survey of pasture runoff was conducted on 34 pastures on five different dairies over 2 yr under varying conditions of precipitation, slope, manure management, and use of conservation practices such as vegetative filter strips. The MMS cross-sectional survey consisted of samples collected during 1 yr on nine different dairies from six loafing barns, nine primary lagoons, 12 secondary lagoons, and six irrigation sample points. Pasture runoff samples were additionally analyzed for *Cryptosporidium* sp. and *Giardia duodenalis*, whereby detectable concentrations occurred sporadically at higher FCB concentrations resulting in poor correlations with FCB. Prevalence of both parasites was lower relative to high-use areas studied simultaneously on these same farms. Application of manure to pastures more than 2 wk in advance of storm-associated runoff was related to a ≥80% reduction in FCB concentration and load compared to applications within 2 wk before a runoff event. For every 10 m of buffer length, a 24% reduction in FCB concentration was documented. A one-half (75%), one (90%), and two (99%) log10 reduction in manure FCB concentration was observed for manure holding times in MMS of approximately 20, 66, and 133 d, respectively. These results suggest that there are several management and conservation practices for working farms that may result in reduced FCB fluxes from agricultural operations.

Regulations and policies have been enacted worldwide to reduce the impacts microbial pollution has on coastal watersheds. Programs such as the European Union's Water Framework Directive (CEC, 2000; CEC, 2006) and Australia's National Water Quality management Strategy, including fresh and marine water quality guidelines (ANZECC, 2000), are setting water quality criteria and directing water body assessment and mitigation. In the United States, similar action is being taken through total maximum daily loads (TMDL). For example, the San Francisco Region of the California Regional Water Quality Control Board (CRWQCB) implemented a pathogen TMDL for Tomales Bay in 2005 (CRWQCB, 2005) and is now implementing a conditional waiver program for grazing lands on livestock agricultural operations within the same watershed (CRWQCB, 2008). These policies establish ambient water quality standards for FCB to protect beneficial uses of shellfish harvesting and contact and noncontact recreation in the watershed. Standards are geometric means of 75 and 14 most probable number/100 mL in tributary streams and shellfish leases in the Bay, respectively. The TMDL and conditional waiver also direct managers of FCB sources, including livestock agriculture operations, to implement management measures that will reduce FCB concentrations in stormwater runoff.

Dairy farms and grazing livestock ranches in the watershed use pastures for on-farm feed production and grazing. These are critical management units because they reduce the need for and cost of imported feed. They range in size from tens to hundreds of hectares, in which calves and adult animals graze. In some cases, manure from loafing barns is spread and irrigated on these pastures for irrigation and fertilization of grasses and feed crops. Relative to more extensively grazed farm management units and

J. Environ. Qual. 39:1782–1789 (2010)
doi:10.2134/jeq2009.0464
Published online 3 Aug. 2010.
Received 21 Nov. 2009.
*Corresponding author (djllewis@ucdavis.edu).

5585 Guilford Rd., Madison, WI 53711 USA

D.J. Lewis, Univ. of California Cooperative Extension Marin, 1682 Novato Blvd., Suite 150B, Novato, CA 94947; E.R. Atwill, Western Institute for Food Safety and Security, School of Veterinary Medicine, Room 2009, Haring Hall, Univ. of California-Davis, 1 Shields Ave., Davis, CA 95616-8734; M.S. Lennox, Univ. of California Cooperative Extension, 133 Aviation Blvd., Suite 109, Santa Rosa, CA 95403; M.D.G. Pereira, School of Veterinary Medicine, Room 2009, Haring Hall, Univ. of California-Davis, 1 Shields Ave., Davis, CA 95616-8734; W.A. Miller and P.A. Conrad, Dep. of Pathology, Microbiology, and Immunology, School of Veterinary Medicine, Univ. of California-Davis, 1 Shields Ave., Davis, CA 95616; K.W. Tate, Dep. of Plant Sciences, Mail Stop 1, Univ. of California-Davis, 1 Shields Ave., Davis, CA 95616-8780. Assigned to Associate Editor Dror Minz.

Abbreviations: CFU, colony forming units; CRWQCB, California Regional Water Quality Control Board; FCB, fecal coliform bacteria; MMS, manure management system; TMDL, total maximum daily load; VTS, vegetative treatment system.

25

lands without grazing, these manure-applied pastures can generate runoff with FCB concentrations and loads that are one to two orders of magnitude higher, or 10^2 to 10^3 compared with 10^4 to 10^6 cfu/100 mL (Lewis et al., 2005). This is consistent with observations of elevated nutrient values in surface water from watersheds with pastures receiving manure applications (Rothenberger et al., 2009)

The resulting management challenge is how to maintain the vital production role these pastures provide while reducing FCB in storm runoff that can impact the Bay's aquatic resources. Improvements to water quality that can be realized by the containment of dairy waste and converting its use to land irrigation, similar to those documented in New Zealand by Wilcock et al. (2009), were realized in the Tomales Bay in the 1970s. Current steps taken on the studied farms to do this include application of manure from August through November, in advance of the winter storm season and any resulting surface runoff. It is anticipated that this advance application of manure affords time for the manure to desiccate and be incorporated into pasture soils, reducing the level of FCB available for transport and delivery to surface waters. Typically, the manure that farmers apply has been stored for a period of time (weeks to months) as liquid in lagoons and in some cases as solids in stockpiles. Reduction of microbial pollution in this stored manure is anticipated as a result of numerous conditions that take place in manure storage systems including temperature changes, aerobic conditions, and predation (Hill, 2005). Additionally, some producers have fenced streams and riparian areas to prevent livestock grazing and resulting manure deposition in or near surface waters, a common water quality management practice for grazing livestock operations.

Investigation of microbial pollution and management from livestock pasture systems has been conducted in other climates (Kay et al., 2005; Shanks et al., 2007), in groundwater (Close et al., 2010), and through the use of controlled runoff plots and rainfall simulation (Lim et al., 1997; Collins et al., 2004; Collins et al., 2005; Meals and Braun, 2006; Ferguson et al., 2007; Sullivan et al., 2007). Results from these and other investigations offer confirmation that vegetative treatment systems (VTS), as described by Koelsch et al. (2006), generate varying reductions of microbial concentrations and loads in pasture runoff. These reductions are functions of VTS design and maintenance, as well as the physical and chemical properties of the indicator bacteria or microbial water-borne pathogen studied (Ferguson et al., 2007). The capacity of VTS to reduce microbial pollution can be surpassed by extreme precipitation and runoff events and resulting channel flow and erosion (Collins et al., 2004; Collins et al., 2005).

There are also comprehensive reviews and additional studies on the role that manure storage and handling technology (Hill, 2005 Atwill et al., 2009) and field application approaches (Li et al., 2005; Meals and Braun, 2006; Sistani et al., 2010), including pasture rest (Knox et al., 2008), have in reducing microbial pollutant loading and availability for transport to surface and subsurface waters. In these cases, microbial pollutant levels in manure are reduced before storm runoff events as a result of environmental conditions that decrease the survival and persistence of indicator bacteria and microbial waterborne pathogens.

To better understand the risk and management of microbial pollution from pastures in Tomales Bay, we conducted a two-component study. First, we sampled and analyzed runoff from dairies and ranches in the watershed. We hypothesized that the currently used management practices, specifically duration in time since manure application, combined with VTS would reduce concentrations and loads for FCB, *Cryptosporidium* sp., and *G. duodenalis*. In conjunction, we documented additional farm factors, such as animal age group and numbers, site characteristics, and climatic factors that influence microbial pollution fate and transport from these pastures. Second, we conducted a sampling survey within cooperating farm manure management systems (MMS) to enumerate FCB concentration. In this survey, we investigated the impacts existing MMS have on FCB levels. In sampling manure from point-of-origin loafing barns to irrigation on the studied pastures, we hypothesized that FCB concentration is indirectly related to manure holding time.

The results presented in this paper complement our earlier findings for the management of microbial pollution in runoff from lots and corrals on these same dairies and ranches (Miller et al., 2007; Miller et al., 2008; Lewis et al., 2009) by providing the results from the pasture management units on the cooperating farms and ranches. This management-scale study also parallels soil box and runoff plot scale, as well as rainfall simulation research of microbial pollution impacts, by investigating the effectiveness of recommended conservation practices to water quality on working dairies and ranches. Accordingly, the presented research is unique in its practical significance for documenting on-farm results and providing direction on compliance with indicator bacteria water quality regulations and criteria.

Materials and Methods

Study Area

A detailed description of the study area, including climate and agricultural production history in the Tomales Bay watershed, is available in Lewis et al. (2009). Briefly, the watershed is characterized by the prevailing Mediterranean climate and livestock agriculture, including dairy production that began in approximately 1850. Additionally, there are records as far back as 1890 of a native oyster fishery. Current commercial oyster production occurs on approximately 280 ha of leased Bay tidal lands.

Five dairy farms and grazing ranches were selected for the pasture component. Nine dairies were selected for the MMS survey based on voluntary participation and their location within the Tomales Bay watershed. Thirty-four pastures were enrolled as specific study sites in the pasture component. Nine MMS were studied, composed of 33 different MMS units ranging from loafing barn effluent to irrigation sprinkler effluent.

Study Design

This was an observational longitudinal study of a large cross section of pastures (n = 34) experiencing management scale implementation of measures designed to reduce FCB levels in stormwater discharge. Studied pastures varied in size and slope (Table 1). Each studied pasture had one or more of the following management measures implemented during the study period: no management measures (control), duration of

time since manure application, and channeling pasture runoff through vegetative filter strip or grassed waterway (0–61 m in length). FCB concentration, stormwater runoff rate, and FCB instantaneous load, as well as *Cryptosporidium* sp. and *G. duodenalis* concentrations, were determined for samples from the 34 study sites over 2 yr (2002–2003 and 2003–2004). Multivariate analysis was used to determine associations between FCB levels discharged from pastures, site factors, and management practices. The size, slope, stocking rate, animal age, curve number and hydrologic group used to model and describe rainfall and runoff relationships (SCS, 1985), and precipitation variables (24-h and cumulative-to-date) were treated as covariates to account for site-specific differences between pastures and inherent variation among storms.

Table 1. Rainfall, discharge, and management conditions of 34 dairy and ranch pastures from which runoff samples were collected and analyzed during the 2002–2003 and 2003–2004 winter storm seasons.

Pasture characteristic	Mean	Median	Min.	Max.
Precipitation and discharge				
24-h cumulative precip. (mm)	18.7	15.2	1.0	75.2
Annual cumulative precip. (mm)	434	510	78	665
Slope (°)	15	13	2	30
Discharge (m^3/s)	0.017	0.004	0.0002	0.19
Storm runoff (m^3)	260	70	0.007	2421
Management				
Size (ha)	7.2	6.1	0.6	32
Stock number	39	18	0	100
Animal concentration (no./ha)	12	5	0	62
Pasture ground cover (%)	88	92	2	99
Buffer length (m)†	5.6	0	0	61.0

† Statistics describe conditions for the water quality improving management practices below 11 of the 34 studied pastures.

We conducted the cross-sectional survey of MMS from June 2000 to June 2001. The nine dairies cooperating in this survey ranged from approximately 100 to 450 milking cows. MMS material sampled included nascent loafing barn manure and manure in successive storage lagoons within the respective farm MMS. Studied lagoons consisted of open-air, earthen-berm structures engineered with clay liners to minimize percolation into the ground. Typically, barn effluent was scraped and flushed daily into a primary lagoon. Primary lagoon material was pumped to secondary lagoons for storage on an infrequent basis. Irrigation with stored manure occurred in late spring and early summer, and again in fall. Samples were collected from six loafing barns, nine primary lagoons, 12 secondary lagoons, and six irrigation sample points. Sampling was conducted at the effluent point for each respective MMS unit studied. For example, primary lagoon samples were collected from the effluent pipe taking manure from the primary lagoon to a secondary lagoon. For each MMS sample collected, we documented from which unit the sample was collected, if a solid separator was part of the MMS, and estimated the holding time or age of the manure sampled. Manure holding time was estimated with the following equation:

$$\text{Manure holding time (d)} = \frac{(\text{MMS volume in m}^3)(168\ \text{h/wk})(0.0000115\ \text{d/s})}{(\text{discharge in m}^3/\text{s})(\text{system operation in h/wk})}$$

where MMS volume (m^3) was based on MMS construction records, discharge (m^3/s) was measured as described in the sample collection section, and system operation (hr/wk) was estimated by dairy producer responses during seasonal interviews.

Pasture Management Measure Implementation

Manure Application Duration

Solid manure distribution is performed by spreader trucks. In some cases, irrigation systems are used to distribute liquid material before the predominantly solid material is loaded onto trucks. The timing of application is dependent on the availability of equipment and labor to distribute manure across each pasture. In this applied study, manure application date was documented for each studied pasture, occurring from late August to early November. The time duration since manure application was calculated for each respective sample event, dictated by precipitation and storm events that generated runoff from each respective pasture. Duration times were lumped into four broad duration groups: <2.0 wk, 2 to 4 wk, 1 to 12 mo, and greater than 12 mo before sample collection.

Vegetative Treatment System

We used existing conservation practices (vegetative buffers, grassed waterways) maintained for 11 of the studied pastures to improve the quality of storm runoff after exiting the pasture. In these instances, runoff was directed from the pasture through one of three best management practices: vegetative buffer strips (five pastures), grassed waterways (four pastures), or impoundments (two pastures). These studied conservation practices were "as built" and managed on these working farms in accordance with the NRCS Technical Field Guide (NRCS, 2004). Vegetation consisted primarily of annual grasses, with some associated forbs and perennial grasses that comprise California's coastal rangelands. For the vegetative buffer strips and grassed waterways, the plant height and cover on these sites were dictated by the life cycle of these primarily annual plants, rainfall patterns, and sample collection timing with these life cycles. Germination took place with the first rains in October and November of each year, followed by moderate growth through the colder temperatures of December, January, and February, ending with increased growth to senescence in April, May, and June. As a result, cover was dominated by thatch and residual dry matter during early season storms, grass seedlings up to approximately 15 cm during the middle of winter, and fully grown grasses approximately 45 cm or taller in the spring. The two impoundments enlisted in this study were cement basins approximately 3 m wide, 10 m long, and sloped to 1 m of maximum depth. They were designed to facilitate solids settling.

Sample Collection

It has been established that excessive FCB loading to Tomales Bay is rainfall dependent (O'Connell et al., 2000; Lewis et al.,

27

2005). This is consistent with findings from other systems along the Pacific Coast of North America (Shanks et al., 2006) and elsewhere (Kay et al., 2005), in which precipitation and storm runoff drive increased indicator bacteria values in tributary rivers or streams, and receiving bays. The California Department of Public Health uses 24-h cumulative precipitation from a local precipitation station, Tomasini Point, to regulate harvest closures of winter shellfish growing leases in the Bay. Accordingly, we conducted storm-based water sampling and analysis of storm runoff for FCB below each studied pasture.

Sample collection sites were identified that functioned as the downstream point of the microcatchment for each studied pasture. These downstream microcatchment sampling locations only have surface runoff during and immediately following storm events. Water samples for FCB concentration determination in pasture runoff and MMS were collected via grab sampling. Pasture samples were collected from each dairy or ranch, and respective sample locations during storms (two to six), when runoff was generated, across the entire season. In a few instances we collected a series of samples during each storm to directly characterize hydrograph position for collected samples.

MMS samples were collected from each studied MMS and respective barn, manure storage lagoon, or irrigation stage via grab sampling. Sample collection sites included respective effluent plumbing that provided access to manure moving through studied systems.

Instantaneous runoff was measured for each water sample collected using either the area-velocity method (velocity × channel width × channel depth × 0.85 to account for surface flow) (Mosley and McKercher, 1993) with a Global Waters flow meter (Global Waters Inc., Gold River, California, USA) or the time to fill a container of known volume. The method used was dependent on having a cross-sectional area of the running water sufficient to accommodate the flow meter.

Microbial Enumeration

Enumeration of FCB concentrations was performed as described in Lewis et al. (2009), including the use of three to five 10- to 100-fold serial dilutions and adjustments for variable sample holding times and log10 FCB concentration decay that resulted from the storm-based sampling.

The $\log_{10}$ concentration of FCB followed a first-order decay process, such that $\beta(t) = -0.0022$ with units of time set in hours (95% CI, −0.003, −0.0014). This decay coefficient did not vary significantly across the different sources of water (p value > 0.05 for an interaction term between time and water source), indicating that a single decay coefficient can be used for adjusting FCB concentrations at $t = x$ to a 24-h standard ($t = 24$).

Enumeration method for *G. duodenalis* was performed as described in Miller et al. (2007), which used quantitative immunofluorescent microscopy with a percent recovery of 27.6%. Enumeration method for *Cryptosporidium* sp. was performed as described in Miller et al. (2008), which used quantitative immunofluorescent microscopy with a 21% recovery for water samples that had residual pellets of 50 µL or less volume. For water samples that had residual pellets in excess of 50 µL, quantitative immunofluorescent microscopy was preceded by immunomagnetic separation that resulted in 47% recovery (Miller et al., 2008).

Instantaneous Load Calculation

Using FCB concentration and instantaneous runoff rate for each sample event, we calculated instantaneous load of FCB for each sample event at each pasture, defined as:

$$\text{instantaneous load (cfu / s / ha)} = \frac{(\text{cfu / 100 mL})(10^6\,\text{mL / m}^3)(\text{m}^3\text{ / s})}{(\text{total surface area of loading unit in ha})}$$

where (cfu/100 mL) is the FCB concentration in the water sample and (m^3/s) is the instantaneous runoff rate associated with that water sample. This calculation is necessary to compare between study areas on a standardized basis of per unit time and per unit area.

Statistical Analysis

Linear mixed effects regression was used to test for differences in log10 transformed FCB concentration and instantaneous load in pasture runoff as functions of site characteristics and management measure combinations (Pinheiro and Bates, 2000). Unique models were developed for FCB concentration and instantaneous FCB load. FCB concentration and instantaneous load were set as the outcome variables, with each pasture and MMS sample site set as a group effect to adjust the p values for repeated sampling at the same sites. A forward stepping approach was used to develop the multivariate regression models, with $P \leq 0.1$ set as the criterion for inclusion of the variable in the final model. Our ability to develop multivariate regression models for *Cryptosporidium* sp. and *G. duodenalis*, as was done for FCB, was not possible given the small number of water samples that contained detectable levels of these protozoal parasites.

Results and Discussion

Pasture Storm Runoff

A total of 211 storm runoff samples were collected from the 34 studied pastures, including 86 in 2002–2003 and 125 in 2003–2004. Geometric mean FCB concentration for the entire dataset was 10,045 cfu/100 mL, ranging from 1 to 7.6 × 10^7 cfu/100 mL. Geometric mean FCB instantaneous load for the entire dataset was 9.1 × 10^4 cfu/ha/s, ranging from 1 to 2.04 × 10^9 cfu/ha/s. Analogous geometric mean FCB concentration and load values in runoff from high-use areas on the same dairies and ranches were two to four orders of magnitude greater, or FCB concentration of 10^4 to 10^5 cfu compared with 10^6 cfu and more (Lewis et al., 2005; Lewis et al., 2009). The lower intensity use pastures studied in this investigation, however, represent one to two orders of magnitude more surface area than do the high-use areas. The result is that 1 ha of high-use area and 100 ha of pasture could present the same level of FCB loading to the watershed.

Of the 211 samples analyzed for protozoa, 8% (n = 17) had detectable levels of *Cryptosporidium* sp. oocysts and 4% (n = 8) had detectable levels for *G. duodenalis* cysts (Fig. 1). Mean *Cryptosporidium* sp. concentration for the 17 positive samples

28

was 77 oocysts/L, ranging from 2 to 716 oocysts/L. Mean *G. duodenalis* concentration for the eight positive samples was 10 cysts/L, ranging from 3 to 29 cysts/L. By comparison, the prevalence and concentration of these two protozoa were substantially higher in runoff from high-use areas with calf use on these same dairies and ranches. Specifically, *Cryptosporidium* sp. oocysts were found in 21% of the high-use area runoff samples, with a mean concentration of 642 oocysts/L and range of 2 to 1,818 oocysts/L (Miller et al., 2008). *G. duodenalis* was detected in 16% of the high-use area runoff samples, with a mean of 821 and range of 1 to 13,928 cysts/L (Miller et al., 2007). This difference in the prevalence and concentration of protozoa parasites in runoff from pastures compared to high animal use areas is likely the result of reduced animal density, manure deposition, and therein pathogen loading. It could also be explained by the observation that young calves (0 to 3 mo) are not allowed access to pastures, yet this younger population is the high-risk group for infection with *Cryptosporidium* sp. and *G. duodenalis,* resulting in higher levels of protozoa in runoff from calf high-use areas compared to locations dominated by older animals (e.g., pastures). Results presented for pastures in this paper (Fig. 1) and for high-use areas in Miller et al. (2007 and 2008) indicate that detection of *Cryptosporidium* sp. and *G. duodenalis* in dairy runoff only occurred for runoff samples with FCB concentrations in excess of 1×10^3 cfu/100 mL.

With regard to precipitation, FCB concentration (Table 2) and instantaneous load (Table 3) in pasture runoff are significantly related to 24-h and cumulative precipitation at the time of sampling. Similar to results for high cattle use areas (Lewis et al., 2009), there are flushing dynamics of FCB concentration and load from pastures in relation to 24-h cumulative precipitation. This flushing is additionally related to cumulative precipitation at the date and time of sampling. There is an increase in FCB concentration up to approximately 40 mm of rainfall during a 24-h period (Fig. 2). Using the coefficients in Table 3, a threshold for maximum FCB instantaneous load is reached at approximately 500 mm of cumulative precipitation on the sampling date. The implication from these model coefficients is that FCB on these pastures is supply limited and subject to flushing and dilution during individual storms and as the storm season progresses.

Statistical model results indicate that directing pasture runoff through a vegetative treatment system and increasing the duration of time between manure application and storm-related runoff are both associated with reductions in FCB concentrations (Table 2) and instantaneous load (Table 3). With respect to FCB concentration and vegetative treatment systems, the model coefficient is negative, which indicates that as the length of the vegetative treatment increases, there is an associated decrease in the FCB concentration in pasture runoff (Table 2 and Fig. 3). Specifically, for every meter of VTS there is approximately a 2.7% reduction in FCB concentration or cumulative reduction of 24% for every 10 m of VTS. This is consistent with previous work in which reductions in microbial pollution levels were documented as a function of VTS length in rainfall simulation, soil box (Davies et al., 2004;

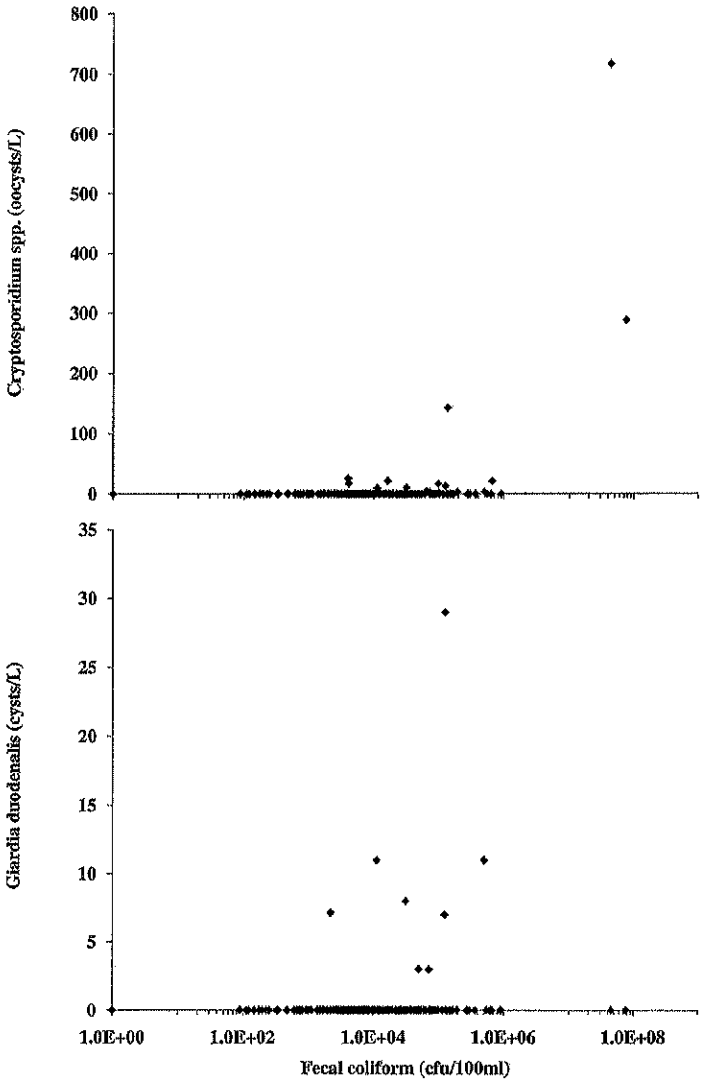


Fig. 1. Prevalence of *Cryptosporidium* spp. (top) and *Giardia duodenalis* (bottom) as a function of fecal coliform concentration in pasture storm runoff samples.

Table 2. Linear mixed effects model for the associations of management practices and rainfall with fecal coliform concentration (log10 value) in surface runoff from dairy and ranch pastures during storm conditions, 2002–2004, Tomales Bay, California.

Factor	Coefficient	95% CI†	*P*-value†
Constant or intercept term for the model	4.11	(3.67, 4.55)	<0.0001
24-h precipitation (mm)	0.07	(0.05, 0.09)	<0.0001
24-h precipitation^2 (mm)	−0.0009	(−0.001, −0.0006)	<0.0001
Manure application duration			
≤2 wk‡	0.0	–	–
2 to 4 wk	−0.80	(−1.20, −0.49)	0.0002
1 to 12 mo	−1.02	(−1.30, −0.69)	<0.0001
>12 mo	−1.46	(−1.91, −1.02)	<0.0001
Length of vegetated buffer (m)	−0.012	(−0.026,-0.001)	0.0738

† Adjusted for potential lack of independence due to repeated sampling of pastures across storms.

‡ Referent condition is manure application 2 wk or less before storm runoff generation and sampling.

29

Table 3. Linear mixed effects model for the associations of management practices and rainfall with fecal coliform load (log10 value) in surface runoff from dairy and ranch pastures during storm conditions, 2002–2004, Tomales Bay, California.

Factor	Coefficient	95% CI†	*P*-value†
Constant or intercept term for the model	2.21	(1.26, 3.17)	<0.0001
24-h precipitation (mm)	0.14	(0.11, 0.16)	<0.0001
24-h precipitation² (mm)	−0.0017	(−0.0021,-0.0012)	<0.0001
Cumulative precipitation (mm)	0.01	(0.01, 0.02)	<0.0001
Cumulative precipitation² (mm)	−0.00001	(−0.00002, 0.000006)	0.0001
Manure application duration			
≤2 wk‡	0.0	–	–
2 to 4 wk	−0.84	(−1.41, −0.27)	<0.0002
1 to 12 mo	−0.99	(−1.54, −0.44)	<0.0001
>12 mo	−1.27	(−1.89, −0.64)	<0.0001

† Adjusted for potential lack of independence due to repeated sampling of pastures across storms.

‡ Referent condition is manure application 2 wk or less before storm runoff generation and sampling.

Ferguson et al., 2007), or runoff plot studies under natural rainfall (Tate et al., 2006; Sullivan et al., 2007). The magnitude of reduction resulting from VTS use on these hillside pastures is significantly lower, only 0.01 log10 reduction per meter of VTS compared to one or more log10 reduction indicated in controlled studies. Statistically significant differences in FCB concentrations and loads among the three different studied practices were not detected. Our study unit size (five vegetative buffer strips, four grassed waterways, and two impoundments) may have limited the ability to make this comparison, pointing to the need for a modified study design.

The association between FCB instantaneous load in pasture runoff and VTS length was not statistically significant ($p > 0.1$). The relatively larger scale of these pastures is an environment in which load is dictated by precipitation and resulting runoff, which can overburden the ability of VTS to increase infiltration and therein reduce discharge and the resulting FCB load. These dairies and ranches, and the respective studied pastures, are on hillsides with relatively greater slopes (Table 1) than studied elsewhere (Kay et al., 2005; Shanks et al., 2006). These steeper slopes increase the amount of runoff generated from rainfall relative to less-steep regions, contributing to the decreased ability of studied VTS to reduce FCB loads through infiltration and decreased discharge. Additionally, these conditions add to the difficulty of designing, implementing, and maintaining conservation practices that consistently approximate sheet flow as originally intended. Similar VTS limitations have been documented for *Escherichia coli* (Tate et al., 2006), *Cryptosporidium* sp. (Davies et al., 2004), and are explained by Atwill et al. (2009).

Both slope and length are driving factors for buffer efficacy and design (Koelsch et al., 2006), and the complex slopes in the study area restrict total VTS length and reduce the number of locations where VTS can be installed. The vegetation management required to maintain VTS effectiveness over an annual growth cycle, and therein its ability to improve runoff through sedimentation and infiltration (Bedard-Haughn et al., 2005; Koelsch et al., 2006), may not always be the highest priority for the farmer. It is because of these considerations and realities that many of the VTS we studied were vegetated channels or ditches lacking the sheet flow most desired for maximum reduction of pollutants in runoff (Koelsch et al., 2006; Knox et al., 2008).

Increasing the duration of time between manure application and storm-related runoff was negatively associated with both FCB concentration (Table 2) and instantaneous load (Table 3). This is evident by the increasingly negative coefficients as the duration is increased from less than 2 wk, 2 to 4 wk, up to 52 wk, and greater than 1 yr (Tables 2 and 3). Because we log10 transformed the data before statistical modeling, the numerical values for these coefficients for duration are direct estimates of the mean log10 reduction associated with these time durations. The longer the duration, the more negative the coefficient and the greater the decrease in FCB concentration and load in the pasture runoff. Figure 3 demonstrates how each respective application duration group is associated with a subsequent reduction in FCB concentration. Relative to applying manure to a pasture less than 2 wk in advance of a runoff-generating storm event, waiting just a week or two more (i.e., 2 to 4 wk in advance of a runoff-generating storm event) was associated with a nearly 1-log reduction (~90% reduction) of FCB concentration and load. Further FCB concentration and load reductions were associated with even longer duration time between manure application and storm runoff, but at a diminishing rate of return. The reduction observed is similar to those documented by Meals and Braun (2006). In that study, *E. coli* levels in runoff from plots with 3-d old manure was 50% lower than for plots with fresh manure. Similarly, Li et al. (2005) documented how exposing fecal material to several days of ambient temperature typical for spring through fall conditions on California rangeland significantly reduced levels of *Cryptosporidium parvum*

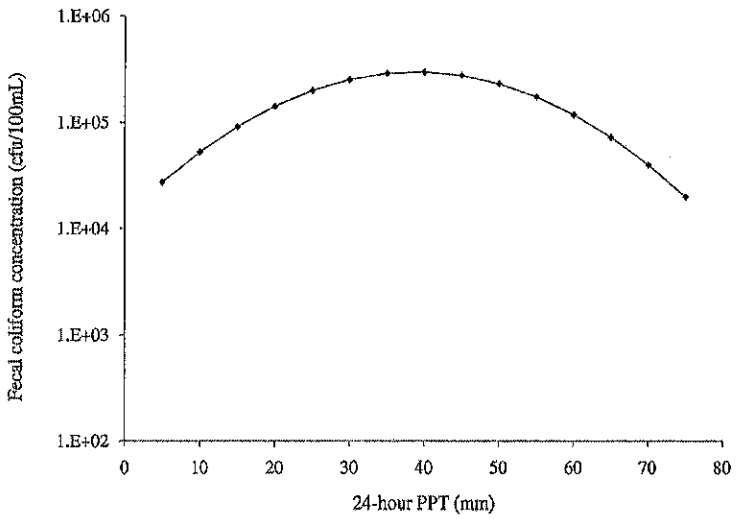


Fig. 2. Results from data-driven linear mixed effects model of fecal coliform concentration as influenced by 24-h cumulative precipitation. Manure application duration was <2 wk, or the model referent. The vegetated buffer length was set to zero.

30

oocysts in the manure. By taking advantage of a "treatment period" following manure application in advance of runoff-generating storms, producers are leveraging a combination of processes (e.g., desiccation, thermal stress, and predation) that reduce microbial pollutants (Atwill et al., 2009).

Manure Management System Survey

A total of 115 samples were collected from cooperating farms with MMS. The geometric mean for the entire data set was 4.6×10^5 cfu/100 mL and ranged from 70 to 4.5×10^8 cfu/100 mL. The different MMS units, as well as the presence or absence of a solids separator, did not have significant associations ($p > 0.1$) with FCB concentrations. However, the geometric mean and ranges for these units were not similar to each other. Barn effluent geometric mean FCB concentration was 6.4×10^6 cfu/100 mL, ranging from 4.1×10^5 to 4.4×10^8 cfu/100 mL. Primary manure storage lagoon geometric mean was 2.5×10^6 cfu/100 mL, ranging from 224 to 4.5×10^8 cfu/100 mL. Secondary manure storage lagoon geometric mean was 4.9×10^4 cfu/100 mL, ranging from 70 to 2.6×10^7 cfu/100 mL. Irrigated manure geometric mean was 2.6×10^4 cfu/100 mL, ranging from 1.4×10^3 to 1.7×10^6 cfu/100 mL.

Model results indicated that manure holding time or age of manure and FCB concentration are directly related in the studied MMS (Fig. 4). The material with the shortest holding time was barn effluent, with holding time increasing as manure effluent is moved from primary to secondary storage lagoons. The model's log10 constant value was 6.51 cfu ($p < 0.001$; 95% CI 6.16, 6.86), meaning that at a manure holding time of zero days the concentration of FCB in manure effluent was $10^{6.51}$, or about 3.23×10^6 cfu/100 mL. Based on log10 transformed FCB concentration data, the first-order coefficients for manure holding time in days was −0.015 cfu/100 mL/d ($p < 0.0001$; 95% CI −0.019, −0.011). This first-order die-off relationship is similar to previously documented modeling results for indicator bacteria (Crane and Moore, 1985; Moore et al., 1989). It is also interesting to note that Smith et al. (2009) found "longer storage times" of manure were associated with decreases of the pathogen *E. coli* 0157 on cattle farms.

These results predict FCB concentration reductions of one-half log 10 (75% reduction) for 20 d, one log10 (90%) for 66 d, two log10 reductions (99%) for 133 d, and three log10 reductions (99.9%) for 199 d of holding time. This negative association between holding time and FCB concentration was also evident in effluent samples being held for irrigation, indicating the important role that management of liquid manure can have on reducing FCB levels deposited on pastures (Fig. 4). Manure holding time for the collected samples ranged from <1 to 290 d. The studied farms have variable MMS infrastructure, with some lacking the resources to expand the infrastructure needed for increasing manure holding times. For these reasons, it is not typically feasible for producers to hold liquid manure for periods approaching 200 or more days. However, facilitating manure holding times to between 60 d or 2 mo to 120 d or 4 mo before irrigation will significantly reduce the FCB concentration in the applied manure and therein reduce the FCB load on recipient pastures. It is important to point out that holding time, as a management practice to reduce FCB values before pasture application, can be compromised by the reinoculation of aged manure with fresh manure.

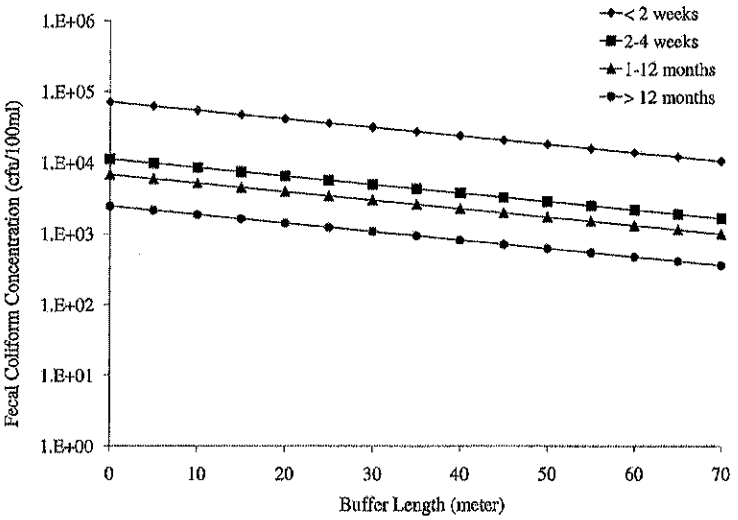


Fig. 3. Results from data-driven model of fecal coliform concentration as influenced by manure application duration and buffer strip length. The 24-h cumulative precipitation was held constant at 12.7 mm.

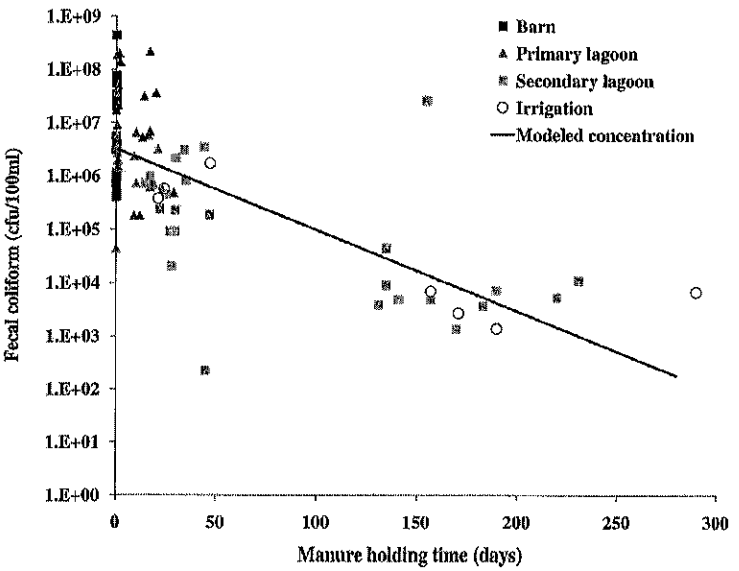


Fig. 4. Measured fecal coliform concentration values in manure management system effluent samples and data-driven model concentration as functions of manure holding time.

Conclusions

Understanding and enhancing the ability of currently implemented conservation practices to reduce the risk of microbial pollution in runoff from agricultural sources to coastal waters is critical to meeting the dual objectives of viable agricultural production systems and water quality that maintains beneficial

31

uses downstream. Our management-scale study of grazed pastures receiving manure applications documents that reductions in FCB concentration and load are being realized from a combination of practices.

In the case of the studied pastures receiving applied manure, practices that manage the microbial levels in the applied material should be the first point of intervention. This includes practices that increase manure holding times to 1 mo or more and achieve a minimum 2- to 4-wk delay between manure application and potential microbial transportation during storm runoff events. With reductions in FCB and water-borne pathogens realized from those practices, use of VTS should be considered to facilitate additional improvements to water quality.

Acknowledgments

We thank the Tomales Bay Agricultural Group whose members were cooperators in this study. This research was supported by awards from the California Sea Grant Program and Marin Community Foundation.

References

ANZECC. 2000. Australian and New Zealand guidelines for fresh and marine water quality. Australian and New Zealand Environ. and Conserv. Counc. (ANZECC), Agric. and Resour. Manage. of Counc. of Australia and New Zealand. Series 628.161'0994-dc21.

Atwill, E.R., X. Li, C. Xiao, B. Karle, L.E. Kiger, and R. Bond. 2009. An introduction to waterborne pathogens in agricultural watersheds. USDA–NRCS. Davis, CA. (In press.)

Bedard-Haughn, A., K.W. Tate, and C. van Kessel. 2005. Quantifying the impact of regular cutting on vegetative buffer efficacy for nitrogen-15 sequestration. J. Environ. Qual. 34:1651–1664.

CEC. 2000. Council of the European Communities (CEC). Council Directive 2000/60/EC of the European Parliament and the council of 23 October 2000, establishing a framework for community action in the field of water policy. Official J. Eur. Union L327:1–72.

CEC. 2006. Council of the European Communities (CEC). Council Directive 2006/7/EC of the European Parliament and the council of 15 February 2006, concerning the management of bathing water quality and repealing Directive 76/160/EEC. Official J. Eur. Union L64:37–51.

Close, M., M. Noonan, R. Hector, and J. Bright. 2010. Microbial transport from dairying under two spray-irrigation systems. J. Appl. Microbiol. 39:824–833.

Collins, R., A. Donnison, C. Ross, and M. McLeod. 2004. Attenuation of effluent-derived faecal microbes in grass buffer strips. N. Z. J. Agric. Res. 47:565–574.

Collins, R., S. Elliott, and R. Adams. 2005. Overland flow delivery of fecal bacteria to a headwater pastoral stream. J. Appl. Microbiol. 99:126–132.

Crane, S.R., and J.A. Moore. 1985. Modeling enteric bacterial die-off: A review. Water Air Soil Pollut. 27:411–439.

CRWQCB. 2005. Pathogens in Tomales Bay total maximum daily load: Basin plan amendment. California Regional Water Quality Control Board, San Francisco Bay Region, Oakland.

CRWQCB. 2008. Conditional waiver of waste discharge requirements for grazing operations in the Tomales Bay Watershed (Tomales Bay, Lagunitas Creek, Walker Creek, and Olema Creek) in the San Francisco Bay Region. Resolution R2–2008. California Regional Water Quality Control Board, San Francisco Bay Region, Oakland.

Davies, C.M., C.M. Ferguson, C. Kaucner, M. Krogh, N. Altavilla, D.A. Deere, and N.J. Ashbolt. 2004. Dispersion and transport of Cryptosporidium oocysts from fecal pats under simulated rainfall events. Appl. Environ. Microbiol. 20:1151–1159.

Ferguson, C.M., C.M. Davies, C. Kaucner, M. Krogh, J. Rodehutskors, D.A. Deere, and N.J. Ashbolt. 2007. Field scale quantification of microbial transport from bovine feces under simulated rainfall events. J. Water Health 5:83–95.

Hill, V.R. 2005. Prospects for pathogen reductions in livestock wastewaters: A review. Crit. Rev. Environ. Sci. Technol. 30:187–235.

Kay, D., M.D. Wyer, J. Crother, J. Wilkinson, C. Stapleton, and P. Glass. 2005. Sustainable reduction in the flux of microbial compliance parameters from urban and arable land to coastal bathing waters by a wetland ecosystem produced by a marine flood defense structure. Water Res. 39:3320–3332.

Knox, A.K., R.A. Dahlgren, K.W. Tate, and A.R. Atwill. 2008. Efficacy of natural wetlands to retain nutrient, sediment, and microbial pollutants. J. Environ. Qual. 37:1837–1846.

Koelsch, R.K., J.C. Lorimor, and K.R. Mankin. 2006. Vegetative treatment systems for management of open lot runoff: Review of literature. Appl. Eng. Agric. 22:141–153.

Lewis, D.J., E.R. Atwill, M.S. Lennox, M.D.G. Pereira, W.A. Miller, P.A. Conrad, and K.W. Tate. 2009. Reducing microbial contamination in storm runoff from high use areas on California coastal dairies. Water Sci. Technol. 60:1731–1743.

Lewis, D.J., E.R. Atwill, M.S. Lennox, L. Hous, B. Karle, and K.W. Tate. 2005. Linking on-farm dairy management practices to storm-flow fecal coliform loading for California coastal watersheds. Environ. Monit. Assess. 107:407–425.

Li, X., E.R. Atwill, L.A. Dunbar, T. Jones, J. Hook, and K.W. Tate. 2005. Seasonal temperature fluctuations induce rapid inactivation of *Cryptosporidium parvum*. Environ. Sci. Technol. 39:4484–4489.

Lim, T.T., D.R. Edwards, S.R. Workmand, and B.T. Larson. 1997. Vegetated filter strip length effects on quality of runoff from grazed pastures. ASAE Paper 972060. ASAE, St. Joseph, MI.

Meals, D.W., and D.C. Braun. 2006. Demonstration of methods to reduce *E. coli* runoff from dairy manure application sites. J. Environ. Qual. 35:1088–1100.

Miller, W.A., D.J. Lewis, M. Lennox, M.D.G. Pereira, P.A. Conrad, K.W. Tate, and E.R. Atwill. 2007. Climate and on-farm risk factors associated with *Giardia duodenalis* cysts in storm runoff from California dairies. Appl. Environ. Microbiol. 73:6972–6979.

Miller, W.A., D.J. Lewis, M. Lennox, M.D.G. Pereira, P.A. Conrad, K.W. Tate, and E.R. Atwill. 2008. Farm factors associated with reducing Cryptosporidium loading in storm runoff from dairies. J. Environ. Qual. 37:1875–1882.

Moore, J.A., J.D. Smyth, E.S. Baker, J.R. Miner, and D.C. Moffitt. 1989. Modeling bacteria movement in livestock manure systems. Trans. ASAE 32:1049–1053.

Mosley, M.P., and A.I. McKercher. 1993. Streamflow. p. 8.1–8.39. *In* D.R. Maidment (ed.) Handbook of hydrology. McGraw-Hill, New York.

NRCS. 2004. Standards and specifications 342A: USDA–NRCS field office technical guide. USDA–NRCS, Washington, DC.

O'Connell, L., G. Langlois, and D. Hopkins. 2000. Tomales Bay technical advisory committee final report: Investigation of nonpoint pollution sources impacting shellfish growing areas in Tomales Bay, 1995–1996, California State Water Resources Control Board, Dep. of Health Serv. and San Francisco Bay Regional Water Quality Control Board, Oakland.

Pinheiro, J.C., and D.M. Bates. 2000. Mixed-effects models in S and S-plus. Statistics and computing series. Springer, New York.

Rothenberger, M.B., J.M. Burkholder, and C. Brownie. 2009. Long-term effect of changing land uses on surface water quality in a coastal river and lagoonal estuary. Environ. Manage. 44:505–523.

SCS. 1985. Hydrology. Section 4. *In* Soil conservation service national engineering handbook. USDA, Washington, DC.

Shanks, O.C., C. Nietch, M. Simonich, M. Younger, D. Reynolds, and K.G. Field. 2006. Basin-wide analysis of the dynamics of fecal contamination and fecal source identification in Tillamook Bay, Oregon. Appl. Environ. Microbiol. 72:5537–5546.

Sistani, K.R., C.H. Bolster, T.R. Way, H.A. Tobert, D.H. Pote, and D.B. Watts. 2010. Influence of poultry litter application methods on the longevity of nutrient and *E. coli* in runoff from tall fescue pasture. Water Air Soil Pollut. 206:3–12.

Smith, R.P., R.P. Ellis-Iversen, E.L. Snary, F.A. Clifton-Hadley, and G.A. Paiba. 2009. Factors influencing the presence and concentration of *E. coli* 0157 and *E. coli* in farm waste on six cattle farms in North-West England. J. Appl. Microbiol. 16:613–623.

Sullivan, T.J., J.A. Moore, D.R. Thomas, E. Mallery, K.U. Snyder, M. Wustenberg, J. Wustenberg, S.D. Mackey, and D.L. Moore. 2007. Efficacy of vegetated buffers in preventing transport of fecal coliform bacteria from pasturelands. Environ. Manage. 40:958–965.

Tate, K.W., E.R. Atwill, J.W. Bartolome, and G. Nader. 2006. Significant *Escherichia coli* attenuation by vegetative buffers on annual grasslands. J. Environ. Qual. 35:795–805.

Wilcock, R.J., K. Betteridge, D. Shearman, C.R. Fowles, M.R. Scarsbrook, B.S. Thorrold, and D. Costall. 2009. Riparian protection and on-farm best management practices for restoration of a lowland stream in an intensive dairy farming catchment: A case study. N. Z. J. Mar. Freshwater Res. 43:803–818.

Restoration Ecology
THE JOURNAL OF THE SOCIETY FOR ECOLOGICAL RESTORATION INTERNATIONAL

RESEARCH ARTICLE

Development of Vegetation and Aquatic Habitat in Restored Riparian Sites of California's North Coast Rangelands

Michael S. Lennox,[1,2] David J. Lewis,[1] Randall D. Jackson,[3] John Harper,[4] Stephanie Larson,[1] and Kenneth W. Tate[5]

Abstract

The preponderance of short-term objectives and lack of systematic monitoring of restoration projects limits opportunities to learn from past experience and improve future restoration efforts. We conducted a retrospective, cross-sectional survey of 89 riparian revegetation sites and 13 nonrestored sites. We evaluated 36 restoration metrics at each site and used project age (0–39 years) to quantify plant community and aquatic habitat trajectories with a maximum likelihood model selection approach to compare linear and polynomial relationships. We found significant correlations with project age for 16 of 21 riparian vegetation, and 11 of 15 aquatic habitat attributes. Our results indicated improvements in multiple ecosystem services and watershed functions such as diversity, sedimentation, carbon sequestration, and available habitat. Ten riparian vegetation metrics, including native tree and exotic shrub density, increased nonlinearly with project age, while litter and native shrub density increased linearly. Species richness and cover of annual plants declined over time. Improvements in aquatic habitat metrics, such as increasing pool depth and decreasing bankfull width-to-depth ratio, indicated potentially improved anadromous fish habitats at restored sites. We hypothesize that certain instream metrics did not improve because of spatial and/or temporal limitations of riparian vegetation to affect aquatic habitat. Restoration managers should be prepared to maintain or enhance understory diversity by controlling exotic shrubs or planting shade-tolerant native species as much as 10 years after revegetation.

Key words: site-specific riparian revegetation, trajectory analysis, restoration monitoring, regional assessment, post-project appraisal.

Introduction

Revegetation is a common tool to restore riparian areas for many reasons, often by excluding livestock and/or planting native trees. The number of river and stream restoration projects in the United States has steadily increased since the 1980s from 100 to over 4,000 projects per year (Bernhardt et al. 2005; Palmer et al. 2007). In California, over $2 billion was spent on river restoration since 1980 with riparian management the most common project type (Kondolf et al. 2007), but there has been limited systematic documentation of project effectiveness to provide quality habitat and watershed functions (Kondolf et al. 2007; Miller & Hobbs 2007; Palmer et al. 2007).

Evaluation of previously restored sites has provided valuable feedback for understanding riparian habitat response to various stream rehabilitation practices (Frissell & Nawa 1992; Opperman & Merenlender 2004; Tompkins & Kondolf 2007). Numerous studies quantified riparian vegetation recovery (Platts 1981; Kauffman et al. 1997; Opperman & Merenlender 2000) and indirect recovery of aquatic habitat has followed woody riparian vegetation establishment (Hupp & Osterkamp 1996; Opperman & Merenlender 2004; Corenblit et al. 2007). Restored project sites offer opportunities to learn about resulting community structure and ecosystem processes beyond static endpoints provided by reference sites (Parker 1997); however, long-term research over multiple decades has been limited to case studies unable to quantify regional variability or unintended consequences in a holistic evaluation.

Some have used the amount of time since project implementation in various forms of trajectory analysis to provide timelines for achieving specific objectives (Zedler & Callaway 1999; Golet et al. 2008). Watershed management carries the

[1] University of California Cooperative Extension, Sonoma County, 133 Aviation Boulevard, 109, Santa Rosa, CA 95403, U.S.A.
[2] Address correspondence to M. Lennox, email mslennox@comcast.net
[3] Department of Agronomy, University of Wisconsin-Madison, 1575 Linden Drive, Madison, WI 53706-1597, U.S.A.
[4] University of California Cooperative Extension, Mendocino County, 890 N. Bush Street, Ukiah, CA 95482, U.S.A.
[5] Department of Plant Sciences, University of California, Davis, Mail Stop 1, One Shields Avenue, Davis, CA 95616-8780, U.S.A.

doi: 10.1111/j.1526-100X.2009.00558.x

expectation that certain important societal objectives will be achieved over time as a result of vegetation interacting with physical processes (e.g., stochastic flood events transporting sediment and pollutants). Examples of these objectives include diversity (Hobbs 1993; Hupp & Osterkamp 1996), pollination (Kremen et al. 2004), sedimentation (Hupp & Osterkamp 1996; Corenblit et al. 2007), trophic dynamics (Baxter et al. 2005; Muotka & Syrjanen 2007), carbon storage (USDA 2000; Bush 2008), nutrient cycling (Kauffman et al. 2004; Sheibley et al. 2006; Bush 2008), water quality (Phillips 1989; Peterson et al. 2001; Houlahan & Findlay 2004), infiltration (Kauffman et al. 2004), flood retention (Hupp & Osterkamp 1996; Corenblit et al. 2007), available habitat (Dobkin et al. 1998; Opperman & Merenlender 2004), and habitat use (Dobkin et al. 1998; Golet et al. 2008). However, the trajectory analysis has not been applied to watershed management in a holistic approach using numerous attributes to assess the recovery of multiple ecosystem services (Kremen 2005).

We conducted a retrospective, cross-sectional survey (i.e., chronosequence) of site-specific riparian revegetation projects in three northern California coastal counties. Riparian vegetation and aquatic habitat response to stream rehabilitation was quantified in a trajectory analysis using regression relationships with project age for 36 restoration metrics at 102 sites to provide a holistic regional evaluation of long-term success over multiple decades. We used these trajectories to infer changes in ecosystem services and watershed functions (Black 1997) provided by riparian restoration.

Methods

Project Identification

Riparian revegetation sites were located in the mixed oak woodland and annual grassland of California's north coast. The region has a Mediterranean climate with cool wet winters and hot dry summers. However, this coastal region of California is cooler with more moderate rainfall than most hardwood rangelands. During the study period, mean annual precipitation in the study area was 1,019 mm (range = 679 – 1, 629 mm) and mean annual temperatures were 13.7°C (range = 12.0 – 15.1°C). Streams and rivers in the region are dominated by varying degrees of channel incision (Darby & Simon 1999) and are located in watersheds with an average area of 23.5 km^2 (range = 0.2 – 133.1 km^2), elevation of 145.3 m asl (range = 3.7 – 656.4 m asl), and 21.9% forested (range = 0 – 100%).

We surveyed 102 sites in Marin, Mendocino, and Sonoma Counties (Fig. 1). Sites were selected in collaboration with consultants, agencies, and landowners, whose permission was solicited for access to conduct surveys. Project cooperators identified both "successful" and "unsuccessful" projects to be included in the study. Site selection focused on projects with documented implementation dates in alluvial stream reaches of willow and mixed oak woodland vegetation with few trees present prior to project installation (e.g., Fig. 2a). Surveyed project sites were primarily on second- and third-order streams with a range in project age from 4 to 39 years since restoration.

Revegetation design at surveyed projects ($n = 89$) was site-specific and focused on establishing *Salix* species to "jump start" recovery of riparian forests to control erosion and sustain multiple watershed functions (Kauffman et al.

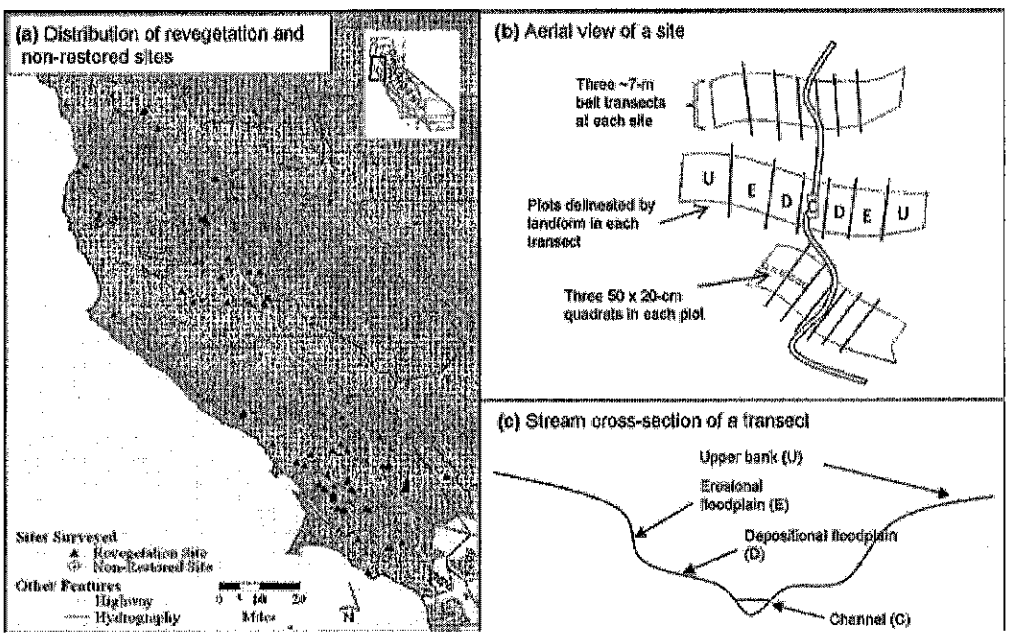


Figure 1. The three county study areas north of San Francisco Bay including locations of restored and nonrestored survey sites (image courtesy of Sonoma County GIS Central) a). Aerial view of an idealized survey site depicting belt transects, plots delineated by landform, and herbaceous quadrats b). Stream channel cross-section showing landforms along a transect c).

34

Figure 2. Photographic time-series of an example project site on a tributary to Walker Creek in Marin County, documenting vegetation response at 0 a), 2 b), 8 c), and 12 years d) since restoration occurred (images courtesy of Marin Resource Conservation District).

1997). The methods utilized were often implemented as combinations of practices including tree or shrub planting with dormant willow posts or container plants (Johnson 2003), biotechnical bank stabilization (Johnson 2003; Flosi et al. 2004), and passive restoration (Kauffman et al. 1997) using large herbivore management (e.g., removal, reduced stocking rate, or exclusionary fencing for livestock and/or deer). Nonrestored sites were surveyed ($n = 13$) where local experts indicated that a particular stream reach had vegetation similar in structure to the project site before revegetation occurred.

Site Characterization

We characterized riparian forest and aquatic habitats at riparian restoration project sites using 36 ecological attributes collected at 5 nested spatial scales: (1) site ($n = 102$, Fig. 1a), (2) belt transect ($n = 3$ per site, Fig. 1b), (3) landform class ($n = 4$ per transect, Fig. 1c), (4) plot ($n = 2+$ per landform), and (5) quadrat ($n = 3$ per plot, Fig. 1b). Landform classes were delineated by channel morphology and depositional or erosional features adapted from Harris (1987, 1999). Specifically, we used the lowest observed bankfull location and flood-prone elevation (2 × bankfull depth) described by Rosgen (1996) to delineate plots in the active floodplain. The final plot sampled on each bank extended from the top of the bank to the fence or field edge, and included alluvial valley, terrace, or upland hillside geomorphic features. This landform-based approach to collecting vegetation data allowed for comparable results to be analyzed from various types of stream channels.

At the site scale, data collected included *small woody debris* (diameter < 12 in), *large woody debris* (diameter > 12 in), and *aggregate woody debris* (debris jam clumps of 4 or more pieces) counted within the bankfull channel (Flosi et al. 2004). Pool characteristics assessed were *mean pool depth*, *maximum pool depth*, *pool frequency* and percent *pool habitat type* (Flosi et al. 2004). We collected stream substrate data at each site and calculated percent *fine sediment* and *embeddedness* (Flosi et al. 2004). The linear distance of riparian shade over the thalweg was recorded at intervals with a hip chain as *linear channel canopy*.

We placed three cross-sections and transects perpendicular to the channel stratified within each site at fast-water riffle locations. Stream width and depth were measured and documented as *bankfull width-to-depth ratio* (Rosgen 1996). *Streambank stability* was assessed for both banks at each cross-section according to Platts et al. (1987) and *bank angle* was measured using a clinometer. *Canopy density* was measured with a spherical densiometer following California Department of Fish and Game protocols (Flosi et al. 2004) and solar radiation was measured with a solar pathfinder by using the month of August to standardize values before calculating *intercepted*

solar radiation (Platts et al. 1987). Both measurements were taken from the thalweg at each cross-section.

Data gathered within each plot included *woody vegetation density* (trees > 1 m) and *canopy cover*. Species identification followed Hickman (1993). Herbaceous vegetation cover was estimated using a modified Daubenmire Frame (20 × 50 cm) to stratify quadrats equidistant in each plot perpendicular to the stream channel (BLM 1996). The metric *ground cover* included the sum of litter, vegetation, and stone cover (BLM 1996). Relative cover was calculated for six herbaceous functional groups. Documenting survival was not possible because of the lack of consistent record keeping on specific numbers of plant species installed during the restoration project and difficulty finding individual plantings in the field at the oldest restored sites.

Data Analysis

We focused our analysis on detecting relationships between project age and riparian forest and aquatic habitat metrics. Plot and stream cross-section data were summarized into one mean value of each metric by site for analysis to avoid pseudoreplication (Hurlbert 1984). We then tested each metric for curvilinear or linear fits. Models were constructed with the generalized least squares function in S-Plus version 8 (Insightful Corp., Seattle, WA). Polynomial, linear, and null (intercept only) models were compared with likelihood ratio tests. If the models were significantly different ($P < 0.05$), we chose the model with the lowest Akaike Information Criteria (AIC; Akaike 1974), otherwise the model with fewer parameters was selected. If a linear model was better than the polynomial model, we compared the linear model to a model with no slope parameter using the same approach. Once best fits were determined, the same parameters were estimated with least squares regression to extract multiple R^2 values as an assessment of goodness-of-fit.

Results

Riparian Vegetation

Sixteen of 21 riparian vegetation metrics were significantly related to project age, including 12 positive and 4 negative trajectories (Table 1). The considerable increase over time in total woody vegetation (Fig. 3), native tree, and exotic shrub/vine densities were best characterized by polynomial relationships with project age, but only total woody vegetation had a relatively good fit. Exotic tree density did not demonstrate a significant trajectory while the best fit for native shrub/vine density was linear, but the fit was poor (Table 1).

Total canopy cover, native tree canopy cover, ground cover, and exposed root cover increased curvilinearly as a

Table 1. Riparian vegetation parameter estimates for best fits determined by likelihood ratio tests ($P < 0.05$) comparing polynomial, linear, and null models using generalized least squares.

		Parameter Estimates			
Restoration Metric	*Best Fit*	*y-intercept*	*x*	x^2	R^2
Density (individuals ha^{-1})					
Total woody vegetation	polynomial	459.8	329.9	−7.6	0.39
Native tree	polynomial	145.5	60.6	−1.5	0.16
Native shrub/vine	linear	204.8	25.1	—	0.08
Exotic tree	n.s.	4.6	—	—	—
Exotic shrub/vine	polynomial	32.3	92.2	−1.9	0.13
Absolute cover (%)		—	—	—	—
Total canopy	polynomial	11.6	4.9	−0.09	0.56
Native tree canopy	polynomial	10.7	4.7	−0.09	0.54
Ground cover	polynomial	81.9	0.4	−0.01	0.04
Exposed root	polynomial	−0.3	0.5	−0.01	0.26
Total vegetation	linear	43.2	−0.3	—	0.05
Litter	linear	19.9	0.4	—	0.21
Relative cover (%)		—	—	—	—
Native perennial grass	n.s.	4.5	—	—	—
Native perennial forb	n.s.	2.5	—	—	—
Exotic perennial grass	n.s.	2.9	—	—	—
Exotic perennial forb	n.s.	1.8	—	—	—
Annual grass	polynomial	15.3	−0.8	0.01	0.28
Annual forb	polynomial	10.3	−0.6	0.008	0.30
Species richness (spp. $plot^{-1}$)		—	—	—	—
Tree	polynomial	0.6	0.16	−0.004	0.27
Shrub/vine	polynomial	0.4	0.1	−0.002	0.24
Perennial herbaceous	polynomial	1.9	0.1	−0.004	0.14
Annual herbaceous	linear	4.4	−0.1	—	0.21

Correlation coefficient (R^2) determined with ordinary least squares regression.

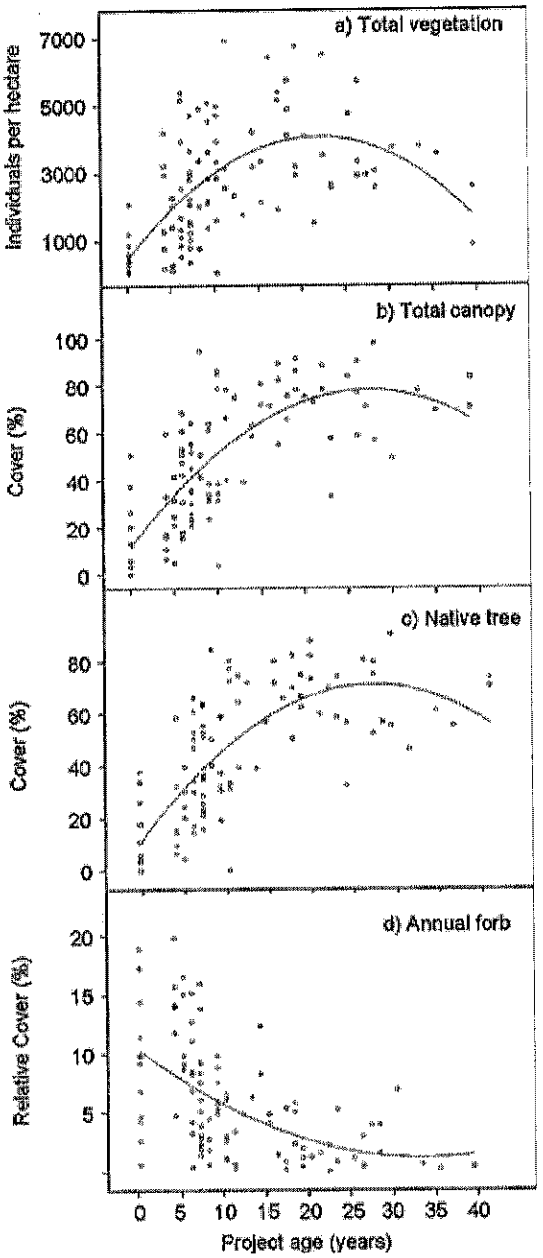


Figure 3. Vegetation attributes as a function of project age ($n = 102$) for total woody density a), total canopy cover b), native tree cover c), and annual forbs relative cover d).

function of project age, while litter cover increased in a linear positive manner and total vegetation cover decreased linearly. Native and exotic perennial grass and forb results were highly variable and no significant relationships with project age were found. Relative cover of annual forbs (Fig. 3) and grasses had negative curvilinear trajectories. Species richness metrics had positive curvilinear relationships to project age for the tree, shrub/vine, and perennial herbaceous functional groups. Annual species richness decreased linearly as project age increased. Of all these significant relationships, the best fits were total canopy cover and native tree canopy cover (Fig. 3).

Aquatic Habitat

Significant relationships with project age were observed for 11 of 15 aquatic habitat metrics, including eight positive and three negative trajectories (Table 2). Stream channel morphology results had significant trajectories for five of the six attributes. The width-to-depth ratio of the bankfull channel had a negative linear relationship with project age. Streambank stability had a positive curvilinear relationship with project age and no relationship was found for bank slope angle. The three woody debris frequency metrics increased over time (Fig. 4). Small and large wood frequencies were best described by curvilinear relationships with project age, while aggregate debris jams of wood were best described by a linear relationship.

Water column attributes had significant trajectories for six of the nine investigated. Stream shade metrics, including intercepted solar radiation, canopy density, and linear channel canopy all increased curvilinearly over time (Fig. 4). Fine sediment and embeddedness showed no significant trajectory. Pool habitat metrics that had curvilinear relationships with project age were maximum and mean pool depth as well as pool habitat type. Pool frequency was not significantly related to project age (Table 2).

Discussion

Riparian Vegetation

While many significant polynomial and linear relationships with project age were detected, most were relatively weak as indicated by the R^2 values. However, we expected high variability given the complex biophysical settings inherent to riparian ecosystems specifically and Mediterranean climate in general. The fact that we detected trajectories at all indicates their broad application and importance to understand fundamental changes following restoration.

Site-specific revegetation strategies accomplished the main objectives of increasing woody species abundance and diversity. Native tree establishment was the focus of revegetation efforts, so the large increases in tree density and cover were expected (Fig. 2). Overall, an indirect plant community response was predicted to follow a successional shift over time from exotic annual herbaceous species to woody vegetation composed of overstory trees with a mosaic of native shrubs and herbaceous perennials (Parker 1997; Dobkin et al. 1998). We detected this basic sequence, although native perennial grasses and forbs did not show any long-term directional trend, and shrubs colonized faster than has been observed at more xeric inland riparian areas (Dobkin et al. 1998). Tree density peaked 15–25 years after restoration. Canopy cover increase was relatively rapid indicating improved terrestrial habitat for birds (Dobkin et al. 1998; White et al. 2005; Golet et al. 2008), amphibians (USFWS 2002; Bulger et al. 2003), and various wildlife species (Golet et al. 2008). In addition,

Table 2. Aquatic habitat parameter estimates for best fits as determined by likelihood ratio tests ($P < 0.05$) comparing polynomial, linear, and null models using generalized least squares.

		Parameter Estimates			
Restoration Metric	*Best Fit*	*y-intercept*	*x*	x^2	R^2
Stream channel morphology					
Bankfull width:depth ratio	linear	35.5	−0.6	—	0.10
Bank stability (%)	polynomial	67.6	2.5	−0.06	0.26
Bank slope (degrees)	n.s.	15.2	—	—	—
Small woody debris (count $100m^{-1}$)	polynomial	−0.4	0.5	−0.007	0.48
Large woody debris (count $100m^{-1}$)	polynomial	−0.2	0.1	−0.002	0.32
Aggregate woody debris (count $100m^{-1}$)	linear	0.003	0.07	—	0.34
Water column					
Intercepted solar radiation (%)	polynomial	19.1	4.8	−0.08	0.52
Canopy density (%)	polynomial	12.3	5.0	−0.08	0.49
Linear channel canopy (%)	polynomial	−0.5	5.8	−0.1	0.49
Fine sediment (%)	n.s.	15.3	—	—	—
Embeddedness (%)	n.s.	41.2	—	—	—
Pool habitat (%)	polynomial	28.7	1.8	−0.04	0.10
Pool frequency (count $100m^{-1}$)	n.s.	3.3	—	—	—
Maximum pool depth (m)	polynomial	0.6	0.04	−0.0009	0.19
Mean pool depth (m)	polynomial	0.4	0.03	−0.0007	0.18

Correlation coefficient (R^2) determined with ordinary least squares regression.

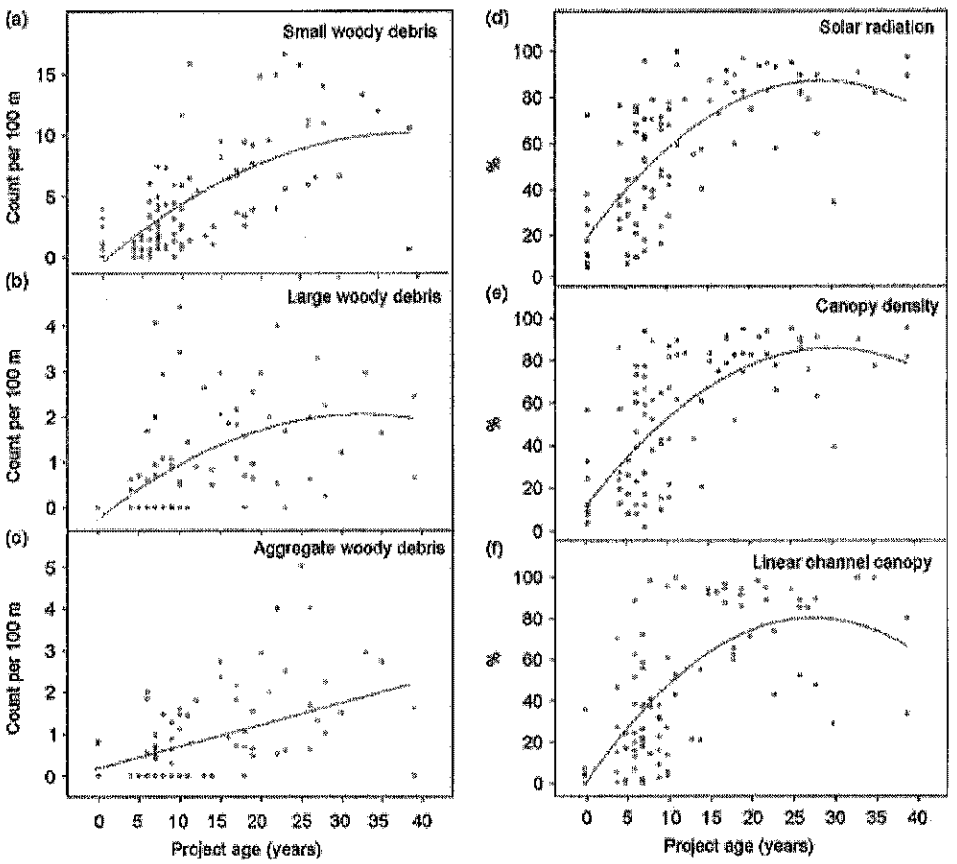


Figure 4. Aquatic habitat attributes as a function of project age ($n = 102$) for small woody debris a), large woody debris b), aggregate woody debris jams c), intercepted solar radiation d), canopy density e), and linear channel canopy f).

38

riparian vegetation changes at restored sites indicated improvements in ecosystem services such as carbon storage via greater tree abundance (USDA 2000). Other ecosystem services that may be improved under these trajectories include diversity (Hupp & Osterkamp 1996; Hobbs 1993), pollination (Kremen et al. 2004), sedimentation (Hupp & Osterkamp 1996; Corenblit et al. 2007), nutrient cycling (Peterson et al. 2001; Kauffman et al. 2004; Sheibley et al. 2006), and trophic dynamics (Baxter et al. 2005; Muotka & Syrjanen 2007).

The increase in exotic shrub density over time was unintended and undesirable. This phenomenon has been noted in past work (Borgmann & Rodewald 2005; Badano et al. 2007). Exotic tree abundance did not correlate with project age, but these taxa were occasionally present at restored sites from previous plantings. In contrast, the most common exotic shrub, Himalayan blackberry (*Rubus discolor*), dominated many older restored sites (greater than 20 years old) by establishing homogeneous patches, which is similar to observations by Lambrecht-McDowell and Radosevich (2005). The rapid trajectory of exotic shrub abundance reduces options for management in the riparian corridor. Consideration of exotic vegetation should focus on the trade-offs that exotic species present for achieving management goals over multiple decades (Parker 1997). For example, White et al. (2005) found juvenile Swainson's Thrush (*Catharus ustulatus*) used Himalayan blackberry for cover and food, so removing this vegetation from recently restored sites may affect wildlife populations negatively. However, delaying active control of exotic shrubs past the initial 20 years of restoration may eliminate chances for adaptive management and cost effective solutions, as explained by Zavaleta (2000).

It was not surprising that perennial herbaceous species did not respond to restoration since the focus of revegetation was woody species. Holl and Crone (2004) made similar observations. Annual vegetation was clearly reduced over time, but resurgence of native perennial grasses and forbs is not likely without significant propagule supply (Bartolome et al. 2004) from flood inundation (Hupp & Osterkamp 1996) and less competition from exotic (Holl & Crone 2004) or shrub species (Brown & Archer 1999).

Aquatic Habitat

A primary purpose for establishing native trees, in particular *Salix* species, was to stabilize streambanks (Johnson 2003) because forested vegetation contains the greatest fine root density for erosion resistance (Wynn et al. 2004) and tree density increases channel roughness increasing sedimentation and retention of flood water (Hupp & Osterkamp 1996; Corenblit et al. 2007). Therefore, the changes we found in stream channel morphology and streambank stability were expected and should result in improved water quality with less chronic sediment delivery to streams from restored sites (NCRWQCB 1998; Corenblit et al. 2007). Decreasing the bankfull channel width-to-depth ratio was also an expected response from revegetation because stream channels tend to deepen and narrow as sedimentation on floodplains increases following tree establishment (Hupp & Osterkamp 1996; Opperman & Merenlender 2004; Corenblit et al. 2007). This process was enhanced by live wood interacting with woody debris forming persistent instream structure, as explained by Opperman and Merenlender (2007). The accumulation of large wood and debris jams provides greater complexity of instream habitat such as deeper pools (Beechie & Sibley 1997) and cover (Cederholm et al. 1997)

Improved pool habitat and depth indicate greater abundance and diversity of aquatic fauna may be able to use habitat at restored sites as complexity within the water column increased over time. Pools provide cover that protect prey from predators, create slower flow niches during winter storms, and contribute to temperature stratification for thermal refugia in summer (Ebersole et al. 2001). The large increase of stream shade attributes over time was an expected outcome and indicates water temperature may be reduced following riparian revegetation (Brown 1969; Opperman & Merenlender 2004). Aquatic habitat metrics that did not improve over time offer further insight into biogeomorphic processes in the riparian zone (Corenblit et al. 2007). Fine sediment and embeddedness of stream channel substrate did not change indicating that these metrics may be linked to watershed processes operating at spatial scales larger than those of the typical revegetation project site (Houlahan & Findlay 2004; Opperman et al. 2005). Moreover, the temporal range of our survey may not have been sufficient to encompass change in these parameters.

While long-term monitoring of individual sites would have produced a clearer understanding of riparian vegetation and aquatic habitat trajectories following restoration, the substitution of space-for-time in our chronosequence comparisons provided useful insights that inform regional restoration efforts. This cross-sectional survey approach also offers an effective option for systematic, objective assessment of completed projects and postproject appraisals (Kondolf et al. 2007; Tompkins & Kondolf 2007). We suggest that stream restoration research further investigate the impact of establishing woody species on stream channel morphology, nutrient cycling, and overall plant diversity. This will prepare the restoration partnership to manage numerous objectives and ecosystem services over multiple decades.

Implications for Practice

- Site-specific riparian revegetation strategies were successful in maintaining native tree and shrub density, cover, and richness over multiple decades.
- Shrub control may be important for maintaining understory diversity at restored riparian sites, since the trajectory for exotic shrub abundance and variability in native herbaceous species indicated a need for vegetation management 10–20 years postrestoration.
- Although aquatic habitat improved following revegetation (e.g., more shade, more woody debris, and deeper pools), other important instream attributes such as fines

and embeddedness did not recover over multiple decades and may be controlled by watershed factors.

- Monitoring of riparian revegetation projects should include bank stability, woody debris, channel width-to-depth ratio, and pool depth where appropriate, in addition to plant diversity and cover over time.

Acknowledgments

We are grateful to the cooperative group of natural resource managers whose contributions are the reason the project was possible. We want to recognize the assistance provided by Thomas Schott, Paul Sheffer, Gale Ranch, Paul Martin, Jeff Opperman, and Lisa Bush as well as the Marin County Resource Conservation District (RCD), Mendocino County RCD, Southern Sonoma RCD, Natural Resources Conservation Service, Prunuske Chatham, Inc., Bay Institute's Students & Teachers Restoring A Watershed (STRAW), Bioengineering Associates, and many more. Funding was provided by California Coastal Conservancy, National Oceanographic and Atmospheric Administration's Restoration Center, and University of California Division of Agriculture and Natural Resources.

LITERATURE CITED

Akaike, H. 1974. A new look at the statistical model identification IEEE Transactions on Automatic Control AC **19**:716–723.

Badano, E. I., E. Villarroel, R. O. Bustamante, P. A. Marquet, and L. A. Cavieres. 2007. Ecosystem engineering facilitates invasions by exotic plants in high-Andean ecosystems. Journal of Ecology **95**:682–688.

Bartolome, J. W., J. S. Fehmi, R. D. Jackson, and B. Alen-Diaz. 2004. Response of a native perennial grass stand to disturbance in California's coast range grassland. Restoration Ecology **12**:279–289.

Baxter, C. V., K. D. Fausch, and W. C. Saunders. 2005. Tangled webs: Reciprocal flows of invertebrate prey link streams and riparian zones. Freshwater Biology **50**:201–220.

Beechie, T. J., and T. H. Sibley. 1997. Relationships between channel characteristics, woody debris, and fish habitat in northwestern Washington streams. Transactions of the American Fisheries Society **126**:217–219.

Bernhardt, E. S., M. A. Palmer, J. D. Allan, G. Alexander, K. Barnas, S. Brooks, et al. 2005. Synthesizing U.S. river restoration efforts. Science **308**:636–637.

Black, P. E. 1997. Watershed functions. Journal of the American Water Resources Association **33**:1–11.

BLM (Bureau of Land Management). 1996. Sampling vegetation attributes. BLM National Applied Resources Center. BLM Technical Reference. 4400–4404. Denver, Colorado.

Borgmann, K. L., and A. D. Rodewald. 2005. Forest restoration in urbanizing landscapes: interactions between land use and exotic shrubs. Restoration Ecology **13**:334–340.

Brown, G. W. 1969. Predicting temperatures of small streams. Water Resources Research **5**:68–75.

Brown, J. R., and S. Archer. 1999. Shrub invasion of grassland: recruitment is continuous and not regulated by herbaceous biomass or density. Ecology **80**:2385–2396.

Bush, J. K. 2008. Soil nitrogen and carbon after twenty years of riparian forest development. Soil Science Society of America Journal **72**:815–822.

Bulger, J. B., N. J. Scott, and R. B. Seymour. 2003. Terrestrial activity and conservation of adult California red-legged frogs *Rana draytonii* in coastal forests and grasslands. Biological Conservation **110**:85–95.

Cederholm, C. J., R. E. Bilby, P. A. Bisson, T. W Bumstead, B. R. Fransen, W. J. Scarlett, and J. W. Ward. 1997. Response of juvenile coho salmon and steelhead to placement of large woody debris in a coastal Washington stream. North American Journal of Fisheries Management **17**:947–963.

Corenblit, D., E. Tabacchi, J. Steiger, and A. M. Gurnell. 2007. Reciprocal interactions and adjustments between fluvial landforms and vegetation dynamics in river corridors: a review of complementary approaches. Earth-Science Reviews **84**:56–86.

Darby, S. E., and A. Simon, editors. 1999. Incised river channels. John Wiley & Sons, Ltd., West Sussex, England.

Dobkin, D. S., A. C. Rich, and W. H. Pyles. 1998. Habitat and avifaunal recovery from livestock grazing in a riparian meadow system of the northwest Great Basin. Conservation Biology **12**:209–221.

Ebersole, J. L., W. J. Liss, and C. A. Frissel. 2001. Relationship between stream temperature, thermal refugia and rainbow trout *Onchorhynchus mykiss* abundance in arid-land streams in the northwestern United States. Ecology of Freshwater Fish **10**:1–10.

Flosi, G., S. Downie, J. Hopelain, M. Bird, R. Coey, and B. Collins. 2004. California salmonid stream habitat restoration manual. California Department of Fish and Game. 3rd edition. Inland Fisheries Division, Sacramento, California.

Frissell, C. A., and R. K. Nawa. 1992. Incidences and causes of physical failure of artificial habitat structures in stream of western Oregon and Washington. North American Journal of Fisheries Management **12**:182–197.

Golet, G. H., T. Gardali, C. A. Howell, J. Hunt, R. A. Luster, W. Rainey, M. D. Roberts, J. Silveira, H. Swagerty, and N. Williams. 2008. Wildlife response to riparian restoration on the Sacramento river. San Francisco Estuary and Watershed Science **6**:1–26.

Harris, R. R. 1987. Occurrence of vegetation on geomorphic surfaces in the active floodplain of a California alluvial stream. American Midland Naturalist **118**:393–405.

Harris, R. R. 1999. Defining reference conditions for restoration of riparian plant communities: examples from California, USA. Environmental Management **24**:55–63.

Hickman, fnmJ. C., editor. 1993. The Jepson manual to higher plants of California. University of California Press, Berkeley.

Hobbs, R. J. 1993. Can revegetation assist in the conservation of biodiversity in agricultural landscapes? Pacific Conservation Biology **1**:29–38.

Holl, K. D., and E. E. Crone. 2004. Applicability of landscape and island biogeography theory to restoration of riparian understorey plants. Journal of Applied Ecology **41**:922–933.

Houlahan, J. E., and C. S. Findlay. 2004. Estimating the critical distance at which adjacent land-use degrades wetland water and sediment quality. Landscape Ecology **19**:677–690.

Hupp, C., and W. Osterkamp. 1996. Riparian vegetation and fluvial geomorphic processes. Geomorphology **14**:277–295.

Hurlbert, S. H. 1984. Pseudoreplication and the design of ecological field experiments. Ecological Monographs **54**:187–211.

Johnson, C. 2003. Five low-cost methods for slowing streambank erosion. Journal of Soil and Water Conservation **58**:12–17.

Kauffman, J. B., R. L. Beschta, N. Otting, and D. Lytjen. 1997. An ecological perspective of riparian and stream restoration in the Western United States. Fisheries **22**:12–24.

Kauffman, J. B., A. S. Thorpe, and E. N. J. Brookshire. 2004. Livestock exclusion and below ground ecosystem response in riparian meadows of eastern Oregon. Ecological Applications **14**:1671–1679.

Kondolf, G. M., S. Anderson, R. Lave, L. Pagano, A. Merenlender, and E. S. Bernhardt. 2007. Two decades of river restoration in California: what can we learn? Restoration Ecology **15**:516–523.

Kremen, C., N. M. Williams, R. L., Bugg, J. P. Fay, and R. W. Thorp. 2004. The area requirements of an ecosystem service: crop pollination by native bee communities in California. Ecology Letters **7**:1109–1119.

Kremen, C. 2005. Managing ecosystem services: what do we need to know about their ecology? Ecology Letters **8**:468–479.

Lambrecht-McDowell, S. C., and S. R. Radosevich. 2005. Population demographics and tradeoffs to reproduction of an invasive and noninvasive species of *Rubus*. Biological Invasions **7**:281–295.

Miller, J. R., and R. J. Hobbs. 2007. Habitat restoration-do we know what we're doing? Restoration Ecology **15**:282–390.

Muotka, T., and J. Syrjanen. 2007. Changes in habitat structure, benthic macroinvertebrate diversity, trout populations and ecosystem processes in restored forest streams: a boreal perspective. Freshwater Biology **52**:724–737.

NCRWQCB (North Coast Regional Water Quality Control Board). 1998. Water-quality attainment strategy (total maximum daily load) for sediment for the Garcia River watershed. Santa Rosa, California.

Opperman, J., and A. Merenlender. 2000. Deer herbivory as an ecological constraint to restoration of degraded riparian corridors. Restoration Ecology **8**:41–47.

Opperman, J. J., and A. M. Merenlender. 2004. The effectiveness of riparian restoration for improving instream fish habitat in four hardwood-dominated California streams. North American Journal of Fisheries Management **24**:822–834.

Opperman, J. J., K. O. Lohse, C. Brooks, N. M. Kelly, and A. M. Merenlender. 2005. Influence of land use on fine sediment in salmonid spawning gravels within the Russian River Basin, California. Canadian Journal of Fishery Aquatic Science **62**:2740–2751.

Opperman, J. J., and A. M. Merenlender. 2007. Living trees provide stable large wood in streams. Earth Surface Processes and Landforms **32**:1229–1238.

Palmer, M., J. D. Allan, J. Meyer, and E. S. Bernhardt. 2007. River restoration in the twenty-first century: data and experiential knowledge to inform future efforts. Restoration Ecology **15**:472–481.

Parker, V. T. 1997. The scale of successional models and restoration objectives. Restoration Ecology **5**:301–306.

Peterson, B. J., W. M. Wollheim, P. J. Mulholland, J. R. Webster, J. L. Meyer, J. L. Tank, et al. 2001. Control of nitrogen export from watersheds by headwater streams. Science **292**:86–90.

Phillips, J. D. 1989. Nonpoint source pollution control effectiveness of riparian forests along a coastal plain river. Journal of Hydrology **110**:221–238.

Platts, W. S. 1981. Sheep and streams. Rangelands **3**:158–160.

Platts W. S., C. Armour, G. D. Booth, M. Bryant, J. L. Bufford, P. Culpin, *et al.* 1987. Methods for evaluating riparian habitats with applications to management. USDA Forest Service. General Technical Report INT-221. Ogden, Utah. 177 p.

Rosgen, D. 1996. Applied river morphology. Wildland Hydrology, Pagosa Springs, Colorado.

Sheibley, R. W., D. S. Ahearn, and R. A. Dahlgren. 2006. Nitrate loss from a restored floodplain in the lower Cosumnes River, California. Hydrobiologia **571**:261–272.

Tompkins, M. R., and G. M. Kondolf. 2007. Systematic postproject appraisals to maximize lessons learned from river restoration projects: case study of compound channel restoration projects in northern California. Restoration Ecology **15**:524–537.

USDA (U.S. Department of Agriculture). 2000. Growing carbon: a new crop that helps agricultural producers and the climate too. Natural Resources Conservation Service, Washington, DC.

USFWS (U.S. Fish and Wildlife Service). 2002. Recovery plan for the California red-legged frog (*Rana aurora draytonii*). Pages viii + 173. U.S. Fish and Wildlife Service, Portland, Oregon.

White, J. D., T. Gardali, F. R. Thompson, and J. Faaborg. 2005. Resource selection by juvenile Swainson's Thrushes during the postfledging period. The Condor **107**:388–401.

Wynn, T. M., S. Mostaghimi, J. A. Burger, A. A. Harpold, M. B. Henderson, and L. A. Henry. 2004. Ecosystem restoration: variation in root density along stream banks. Journal of Environmental Quality **33**:2030–2039.

Zavaleta, E. 2000. The economic value of controlling an invasive shrub. Ambio **29**:462–467.

Zedler, J. B., and J. C. Callaway. 1999. Tracking wetland trajectory: do mitigation sites follow desired trajectories? Restoration Ecology **7**:69–73.

University of California
Agriculture and Natural Resources

Cooperative Extension, Marin County

1682 Novato Blvd., Suite 150B
Novato, California 94947
(415) 473-4204 office
(415) 473-4209 fax
http://cemarin.ucdavis.edu

May 2, 2013

W3

UC CE

California Coastal Commission
45 Fremont Street, Suite 2000
San Francisco, CA 94105
ATTN: Elizabeth Fuchs

Dear California Coastal Commission Commissioners and Staff,

We have worked on issues related to rangeland ecology and agricultural production and sustainability in Marin County for a combined total of number 35 years. During this time we have gained an intimate knowledge of coastal Marin's ecology and the farmers and ranchers who steward this land and produce world-class food. Although this letter specifically references Marin County, the same issues face all coastal California counties.

Over the past 40 years, Marin has developed a national reputation for leadership in protecting agricultural land from fragmentation and development. At the foundation of this successful land preservation movement is a powerful public-private partnership that acknowledges farmers and ranchers as keystone members, who are essential to the continued protection and environmental stewardship of Marin's rural lands.

Agriculture preserves many of the open vistas and natural resources that characterize California's coastal landscape. This landscape is thus dependent on maintaining agriculture's economic viability, which allows coastal farmers and ranchers to continue making their living while providing the public with these visual and ecological benefits.

The California Coastal Commission Workshop on Agriculture on May 8, 2013 offers the opportunity to further engage coastal farmers and ranchers statewide as fundamental partners in natural resource stewardship and conservation and the building of vibrant and viable coastal economies. Additionally, the California Coastal Commission can seize upon this moment to embrace and integrate with existing conservation programs, policies, and regulations that support biological resource conservation. In doing so, the California Coastal Commission will avoid the inefficiency of duplication and redundancy, as well as, the promulgation of policy for which the Commission has limited resources to implement.

Agriculture Must Be Able to Adapt to Changing Times

Farmers and ranchers manage their lands to produce agricultural products in the most cost effective manner for the current year and into the future. Fundamental to agricultural producers averting risk and remaining viable is their flexibility in cropping choices and cultural practices and their ability to diversify. The ability of Marin's farmers and ranchers in the Coastal Zone to move between crops and cultural practices as well as diversify and add value will be halted outright if the current policies and language as well as direction from Coastal Commission staff is promulgated.

Coastal Commission staff has indicated that only the current cropping use on agricultural lands will be considered exempt and that any change from the current crop to another crop will require a Coastal Development Permit. This proposed removal of flexibility in and regulation of cropping choices will be

precedent setting in its rendering of coastal farms and ranches as inoperable agricultural operations. Preparation of the Coastal Development Permit application, payment of associated fees, and participation in the review and approval process will all be obstacles which many farmers will simply choose not to overcome and therein halt their ability to respond to opportunities to increase forage production, change grazing patterns, and selectively diversify crop production.

Farm diversification has become increasingly important both globally and locally, especially for marginally profitable farms that might not otherwise be able to survive the price fluctuations and income seasonality typical to many farm enterprises. Agricultural diversification has been directly responsible for allowing many of the younger generation of Marin farmers and ranchers to stay on their family farms and keep them in business.

Flexibility and the ability to diversify agricultural operations are essential to the continued economic sustainability of farming and ranching. Changing crops as needed, adapting to new market trends, processing raw harvests into value added products, and developing new marketing strategies have allowed generations of Marin County farmers and ranchers to stay in business for over 150 years.

Cropping Changes. Agriculture is as dynamic and vibrant as weather, climate, and the natural resources, to which it is inextricably linked. Agriculture is always changing, day to day, intra-annually and inter-annually, from decade to decade and century to century.

Although many of the same agricultural products that were common in the mid-1800s are still produced in coastal California today, California agriculture has had to constantly diversify in these 150 years to keep up with consumer demands and economic realities.

Beef production is still the predominant agricultural land use in Marin County with cattle numbers just slightly higher than they were 150 years ago. The present day number of sheep in Marin is also similar to that of 1860, but this number has fluctuated greatly during the past one and one –half centuries as livestock producers adjusted to market fluctuations, predation by coyotes and other factors that affected their businesses. In 1850 Marin ranches supported 500 sheep, but by 1860 there were almost 10,000 and by 1950 there were over 24,000 (Surveyor General of California 1869; Burcham 1957).

During this time dairy, hay, and fruit and vegetable production has declined greatly. Although 87 percent fewer acres were cultivated in 2011 as compared with 1867[1] (Marin County Department of Agriculture Weights and Measures 2011; Surveyor General of California 1869), the acreage in fruit, nut, and vegetable production began an upward trend from a low point in the late 1970s, and has increased from 40 acres to 300 acres by 2011. The beet, carrot, and pea seed crops and 800 acres of artichokes that were produced in the late 1930s and early 1940s have been replaced with other crops. Hog, mohair, walnut, turnip and chinchilla production is down from the mid 1900s, but grass-fed beef, farmstead cheese, and oyster production are up (Marin County Department of Agriculture Weights and Measures 1936 to 2011). Over the past 150 years, these, and many other crops have helped feed Marin and Bay Area residents and have preserved the coastal landscape.

These statistics illustrate how farmers and ranchers have been able to stay in business by constantly adapting to new trends and opportunities. Without this flexibility in changing crops, and the ability to convert raw product into a saleable form, most of the areas farmers and ranchers would have been out of business years ago and coastal Marin would be a very different place.

Agricultural Cultivation is Not Grading. Using the right tools and equipment in farming and ranching helps to make it efficient and economically sustainable. Cultivation equipment, including plows, discs, and

[1] 387,000 acres in Marin County were cultivated in 1867 and only 4,500 were cultivated in 2001.

harrows, are used for cultivation of fields for vegetable, silage, hay and other crops. These pieces of equipment are used for incorporating crop residue into the soil, preparing the seedbed, and planting seed. Cultivation equipment is not used for grading, as it would not be effective or efficient.

Grading equipment, including excavators, bulldozers, and graders are used for construction of pipelines, roads, building pads and other activities that require movement of large volumes of soil for construction. Grading equipment is also used for constructing terraces. Grading equipment is not used for cultivation, as it is inappropriately designed and would not function for this purpose.

Agricultural Processing. Processing raw agricultural products to preserve them or to enhance their value has always been an integral part of farm operations. Over 1.5 million pounds of butter and 380,000 pounds of cheese were produced in Marin County in 1867 (Surveyor General of California 1869). Processing of fluid milk was essential then, as refrigerated shipping was not available. Seven artisanal, farmstead[2] cheese operations, two of which are in the Coastal Zone, have begun production in Marin in the past several years, allowing long-time dairy families to stay in business. After a downturn for many decades, Marin cheese production now exceeds what it was in the mid-1800s, and contributes significantly to our local food system and the economic stability of the local dairy industry. This and other types of on-farm processing makes both economic and environmental sense, by making use of the land assets of family farmers and reducing the impacts of transporting raw products to off-site processing facilities.

Retail Sales of Agricultural Products. On-farm sales provide the same benefits to farmers and the community as on-farm processing does. Keeping products local reduces transportation costs, and impacts; allowing farmers and ranchers to market directly to the consumer while staying on the farm maximizes their efficiency and output. On-farm sales have historically been an integral part of family farming and should continue to be an option without requiring costly permitting that consumes much of the sales profit.

Beneficial Grazing

Coastal prairie, an Environmentally Sensitive Habitat Area (ESHA), exists in extensive stands on private agricultural lands in Marin County and in many other parts of coastal California thanks to the long-term management by generations-old ranching families. The co-occurrence of a severe drought and exceptionally high livestock numbers in the 1800s, introduction and establishment of myriad non-native weeds (Bartolome et al. 2007), and conversion of grassland to other land types has dramatically and permanently altered California's grasslands. Many of the native grasses that once were dominant species are now uncommon throughout much of the State.

Along the coast, however, native prairie still exists in many areas. Higher precipitation and coastal fog have perhaps been the strongest influences in preserving native perennial grasses on the coast, but grazing and other agricultural practices have clearly been compatible with coastal prairie preservation along much of the coast as evidenced by the remaining stands. In fact, historic and current grazing management as practiced by livestock ranchers is responsible for preserving coastal prairie and its associated native plant and animal species by preventing vegetation type conversion to shrublands. This is the primary ecological reason that agricultural landowners should continue to be the decision makers regarding how and why they manage livestock grazing on their ranches.

Despite the lay public's aversion to the idea of livestock grazing in wetlands and adjacent to riparian corridors, an increasing body of scientific evidence shows that in some circumstances, livestock grazing can benefit certain wetlands and riparian areas, primarily by helping to manage non-native, invasive plants. Prohibiting grazing in these habitats should be viewed for what it is: prohibition of the most

[2] Farmstead refers to products that are processed on the site where they were produced.

practical and effective weed management tool available. The wetlands and riparian areas that are nested within these grasslands often support a host of non-native plants that can effectively smother native plant species, detrimentally alter native animal habitats, and can negatively affect wetland hydrology when grazing is removed or excluded.

Research studies point out the benefits of livestock grazing in California wetland and riparian systems to native plant species (Marty, 2005), hydrology (Pyke and Marty, 2005), and special status species (Barry, 2011). Grazing can also have detrimental effects, however, the complete removal of grazing can be as deleterious to wetland resources and functions as improper grazing management (Allen-Diaz et al. 2004).

Integration and Coordination with Other Agencies

Regulation by the Coastal Commission or local governments under Commission approved Local Coastal Plans of activities that are currently regulated by other state agencies is an unnecessary duplication of efforts, drain on Commission staff time, and may result in regulation/review by persons who lack the specialized training of the primary regulatory agency. For example, per Article 2 of the California Coastal Act, the State Department of Fish and Wildlife and the Fish and Game Commission are the principal state agencies responsible for the establishment and implementation of wildlife and fishery management programs and "the Commission shall not establish or impose any controls with respect thereto that duplicate or exceed regulatory controls established by these agencies pursuant to specific statutory requirements or authorization." Similarly, the State Water Resources Control Board and Regional Boards have primary authority over issues involving water rights and water quality. Lastly, the US Army Corps of Engineers and Regional Boards regulate wetland impacts.

State and Local Agency Environmental and Agricultural Regulation

Water Quality. Marin's farmers and ranchers have responded to state and national precedent setting water quality regulations. Currently, the CRWQCB is enforcing two Conditional Waivers of Waste Discharge for agriculture:

- Conditional waiver of waste discharge requirements for grazing operations in the Tomales Bay Watershed (CRWQCB, 2008);
- Renewal of Waiver of Waste Discharge Requirements for Confined Animal Facilities (CRWQCB, 2003).

In addition to these policies, the San Francisco and North Coast CRWQCB are collaborating on a new basin plan amendment to protect stream and wetland functions (CRWQCB, 2007). Through these existing and pending regulations Marin's farmers and ranchers must identify ranch specific water quality, stream and wetland management concerns and develop and implement plans to address these concerns.

A Conditional Waiver is the authority used by CRWQCB in lieu of individual Waste Discharge Permits. In the case of these two agricultural Conditional Waivers, Marin dairy farms and grazing livestock operations are require to develop and implement ranch water quality plans. This farm planning and implementation is carried out through the use of several tools and assistance programs. The template for grazing land ranch plans was developed by a nine-member organization partnership.[3] General assistance for developing these plans includes the California Dairy Quality Assurance Program[4] and Western United Dairymen Environmental Division.[5] Lastly, the previously mentioned conservation partnership continues to provide technical and financial assistance to implement these plans including the United States

[3] http://www.swrcb.ca.gov/sanfranciscobay/water_issues/programs/TMDLs/tomalespathogens/FInalModelWQRanchPlan2009.pdf

[4] http://www.cdqa.org/environmental.asp

[5] http://www.westernuniteddairymen.com/environmental-mainmenu-34

Department of Agriculture Environmental Quality Incentives Program (EQIP)[6] and the Wetlands Reserve Program (WRP)[7] among others.

Water Quantity. With regard to water quantity and regulation, the SWRCB is implementing the:

- Water Rights: Statement of Water Diversion and Use Program (SWRCB, 2012)[8].

This program requires all water diversions to be documented and have corresponding approved water rights. Currently more than 80 Marin ranchers and farmers have been notified of their requirement to comply with California Water Code 5101, through reporting of diverted surface water or pumped groundwater from a known subterranean stream.

Pesticide Use. In California, the CDPR and CDFA coordinate regulatory roles including licensing and reporting of pesticide use[9]. Marin's farmers and ranchers are required to comply with all state and local regulations for any potential use.

Regulation versus Voluntary Implementation. Despite these and other regulatory programs, the most effective improvements to wetland and riparian conditions in Marin have come about through voluntary implementation of appropriate management measures by private landowners. Cooperation between agricultural landowners and support agencies has been much more effective in preserving and enhancing these important coastal resources than has regulation.

In Marin County, the Marin Resource Conservation District (MRCD), Natural Resources Conservation Service (NRCS), University of California Cooperative Extension (UCCE), and US Fish and Wildlife Service, to name a few, are among the agencies that have cooperated with Marin landowners to effect positive changes to riparian and wetland management by providing funding, technical support and permits to support beneficial management (Lewis et al. 2011).

For more than 50 years the MRCD and its partners, including the County of Marin, Marin Agricultural Land Trust (MALT), NRCS, Students and Teachers Restoring our Watershed (STRAW), UCCE and others have implemented on-farm conservation practices to improve wildlife habitat, protect water quality, and restore and enhance the function of Marin's streams (Lewis et al. 2011). From 1959 to 2009 more than 330 ranchers and farmers have participated in cost-share programs, implemented conservation practices, and accessed technical assistance. A few of the partnership's accomplishments include:

- Improving riparian and wetland function (Lennox et al. 2011 and George et al. 2011) by fencing of over 43 miles of streams, protecting 15 miles of streams from bank erosion and revegetating 25 miles of streams;
- Preventing delivery of nearly 670,000 cubic yards of sediment to Marin County streams;
- Improving wildlife diversity including a 300 percent increase in neomigratory bird species (Gardali et al, 2006); and
- Improving instream water quality (Lewis et al. 2008 and Jarvis et al. 1978) through manure and livestock management.

---

[6] http://www.nrcs.usda.gov/wps/portal/nrcs/main/?ss=16&navid=100120310000000&pnavid=100120000000000&position=SUBNAVIGATION&ttype=main&navtype=SUBNAVIGATION&pname=Environmental%20Quality%20Incentives%20Program

[7] ftp://ftp-fc.sc.egov.usda.gov/CA/programs/WRP/2011/2011_WRP_Grazing_Reserve_Factsheet_1-6-11.pdf

[8] http://www.waterboards.ca.gov/waterrights/water_issues/programs/diversion_use/

[9] http://www.cdpr.ca.gov/docs/county/comenu.htm

Supporting these partnerships rather than duplicating regulation by other State agencies will continue to have the greatest beneficial effect on sensitive coastal resources into the future.

Thank you for your consideration.

Sincerely,

David Lewis,
County Director

Lisa Bush, Marin County Agricultural Ombudsman
California Certified Rangeland Manager License # 18

References

Allen-Diaz, B. R.D. Jackson, J.W. Bartolome, K.W. Tate, and L.G. Oates. 2004. Long-term grazing study in spring-fed wetlands reveals management tradeoffs. California Agriculture. V48(N3):144-148. http://www.carangeland.org/images/Long-Term_Grazing_Study_in_Spring-Fed_Wetlands_Reveals_Management_Tradeoffs.pdf.

Barry, S. 2011. Current findings on grazing impacts of California's special status species. In Keeping Landscapes Working *A Newsletter for Managers of Bay Area Rangelands.* V7(I1).

Bartolome, J.W., W.J. Barry, T. Griggs, and P. Hopkinson. 2007. Valley Grassland. Pp. 367–393 In: Barbour, M.G, T. Keeler-Wolf, and A.A. Schoenherr. (eds) Terrestrial Vegetation of California, 3d Ed. Univ. Calif. Press.

Burcham, L.T. 1957. California range land: an historico-ecological study of the range resources of California. Sacramento, CA: Division of Forestry, Dept. of Natural Resources, State of California.

CRWQCB. 2003. Renewal of waiver of waste discharge requirements for confined animal facilities. Resolution No. R2-2003-094. California Regional Water Quality Control Board. San Francisco Bay Region, Oakland. http://www.swrcb.ca.gov/rwqcb2/board_decisions/adopted_orders/2003/R2-2003-0094.pdf

CRWQCB. 2005. Pathogens in Tomales Bay total maximum daily load: Basin plan amendment. California Regional Water Quality Control Board, San Francisco Bay Region, Oakland.

CRWQCB 2007. Development of a stream and wetland systems protection policy – Status report. California Regional Water Quality Control Board, San Francisco Bay Region, Oakland. http://www.swrcb.ca.gov/sanfranciscobay/water_issues/programs/streamandwetlands.shtml

CRWQCB. 2008. Conditional waiver of waste discharge requirements for grazing operations in the Tomales Bay Watershed (Tomales Bay, Lagunitas Creek, Walker Creek, and Olema Creek) in the San Francisco Bay Region. Resolution R2–2008. California Regional Water Quality Control Board, San Francisco Bay Region, Oakland. http://www.swrcb.ca.gov/sanfranciscobay/board_decisions/adopted_orders/2008/R2-2008-0054.pdf

Gardali, T., A. L. Holmes, S. L. Small, N. Nur, G. R. Geupel and G. H. Gulet. 2006. Abundance patterns of landbirds in restored and remnant riparian forests on the Sacramento River, California, U.S.A. *Restoration Ecology* 14: 3.

George, M.R., R.D. Jackson, C.S. Boyd, and K.W. Tate. 2011 A scientific assessment of the effectiveness of riparian management practices. Chapter 5 In: Briske, D.D., editor. Conservation benefits of rangeland practices: Assessment, recommendations, and knowledge gaps. United States Department of Agriculture, Natural Resources Conservation Service.

Jarvis, F. C. N., M. Ammann, and M. Yee. 1978. Tomales Bay and Watershed Water Quality Surveys during 1976-77 & 1977-78. San Francisco Bay Regional Water Quality Control Board, Oakland CA. 33 p.

Lennox, M.S., D.J. Lewis, R.D. Jackson, J. Harper, S. Larson and K.W. Tate. 2011. Development of vegetation and aquatic habitat in restored riparian sites of California's north coast rangelands. *Restoration Ecology* 19: (In Press, doi: 10.1111/j.1526-100X.2009.00558.x)

Lewis, D., M. Lennox, N. Scolari, L. Prunuske, and C. Epifanio. 2011. A Half Century of Stewardship: a

programmatic review of conservation by Marin RCD & partner organizations (1959-2009). Prepared for Marin Resource Conservation District by U.C. Cooperative Extension, Novato CA. 99 p.

Lewis, D.J., K.W. Tate, M.S. Lennox, M.Huerta, B. Huang, H. Brown, and R. Dahlgren. 2008. Stemple Creek Water Quality Analysis. Prepared for US Department of Agriculture Natural Resources Conservation Service Conservation Effectiveness Assessment Program. University of California Davis, Land, Air, and Water Resources and Plant Sciences Department and University of California Cooperative Extension, County of Sonoma. Santa Rosa, California. 48 pgs.

Marin County Department of Agriculture Weights and Measures. 1936 to 2011. Annual Crop Reports.

Marty, J.T. 2005. Effects of cattle grazing on diversity in ephemeral wetlands. Conservation Biology, V19(N5):1626-1632. http://www.vernalpools.org/documents/Marty Cons Bio.pdf

Pyke, C.R. and J.T. Marty. 2005. Cattle grazing mediates climate change impacts on ephemeral wetlands. Conservation Biology V19(N5):1619–1625.

Surveyor General of California. 1869. Report of the Surveyor General of California November 1, 1867 to November 1, 1869. 73 pp.

SWRCB. 2012. Water Rights: Statement of Water Diversion and Use Program. State Water Resources Control Board Division of Water Rights. Sacramento, California.

W3

Ralph Faust
Consulting Attorney
P. O. Box 135
Bayside, CA 95524
707-825-9347

May 2, 2013

Mary Shallenberger, Chair
California Coastal Commission
45 Fremont Street, Suite 2000
San Francisco, CA 94105

Re: Comments for the Workshop on Agriculture in the Coastal Zone

Dear Chair Shallenberger and Commissioners:

I write to suggest some issues to consider and to provide some thoughts regarding the Commission's regulation and preservation of agriculture in the coastal zone. As most of you are aware I have spent almost thirty years thinking about land use and land use regulation in the coastal zone of California, more than twenty of those as the Commission's Chief Counsel. I have also served as the County Counsel for Humboldt County, and as a member and Chair of the Humboldt County Planning Commission. In addition I serve on the Board of the Jacoby Creek Land Trust, a Humboldt County non-profit that has both ownership of and easement interests in agricultural lands, and whose mission includes conservation and management of agriculture in conjunction with the preservation of habitat. So I write with some experience but also with humility, because I have seen both my views and those of the Commission and its staff evolve over time, and because it is difficult to fix with any certainty the proper place of agriculture in the coastal zone within the hierarchy of uses and resources protected by the Coastal Act.

As you know, I also represented applicants (Carissa Brader and Tony Magee before the Commission at its April 2013 meeting in Santa Barbara) who received approval for an agricultural operation in West Marin County. I want to be absolutely clear here that I am not speaking for them in this letter. They appreciate the Commission's favorable treatment of their proposal and they accepted all of the conditions imposed by the County and by the Commission. Although my views have been shaped to some extent by the experience of representing them, and although I will suggest some ways in which I think the Commission can benefit from considering how it dealt with their proposal, I do not present any claims or opinions on their behalf. The views expressed herein are entirely my own. Further, I do not

want these views to be understood as either explicit or implicit criticism of staff. The recommendation in Brader/Magee reflected the assumptions, interpretation and previous decisions of the Commission. I played a role in the development of those assumptions, interpretations and decisions and I accept responsibility for that. What I hope that the Commission and its staff will do now is reflect upon those assumptions and decisions and consider how the Coastal Act ought to be interpreted and implemented under current conditions with respect to agriculture in the coastal zone.

I. To what extent is agriculture a priority use under the Coastal Act? To what extent is agriculture a coastal resource pursuant to Chapter 3 of the Coastal Act?

Much of the interpretation of the relative priorities of uses in the coastal zone comes from inference drawn by the Commission from reading together multiple sections of the Coastal Act. With respect to agriculture the provisions of Section 30241 protect prime agricultural lands. Other lands suitable for agricultural use are protected from conversion under section 30242. However, neither of these provisions places agriculture as a use within the hierarchy of Coastal Act uses. For that the Commission has relied upon section 30222, a provision in the "Recreation" Article of the Act that builds a hierarchy of uses around "private lands suitable for visitor-serving commercial recreational facilities". These facilities, designed to enhance public opportunities for coastal recreation, are declared to have "priority over private residential, general industrial, or general commercial development, but not over agriculture or coastal-dependent industry". From this the Commission has concluded that agriculture is a priority use. But unlike the treatment of coastal dependent industrial facilities, which are given an "over-ride" provision in section 30260 that allows for approval of such development that is otherwise inconsistent with Coastal Act policies, there is no similar "over-ride" provision in the Act for agricultural development. Implementation of this priority has been left to the Commission's case-by-case interpretation.

Among the issues left to the Commission's interpretation is whether the "priority" of agriculture should play a role in "conflict resolution". As you know, pursuant to sections 30007.5 and 30200, when the Commission faces a decision where a conflict exists between one or more policies of the Act, it can resolve that conflict based upon what it finds to be most protective of significant coastal resources. The Commission most commonly has used conflict resolution to allow development that had a significant but unavoidable and immitigable impact upon habitat resources. For example, the replacement of a bridge that necessarily impacts

riparian habitat has been justified based upon the asserted benefit to access to and along the coast, despite those habitat impacts.

Is the preservation and nurturance of agriculture a coastal resource of sufficient magnitude that, even where the Commission decides to assert regulation, it might approve the loss of habitat to an agricultural use? This is a policy question; and one perhaps better saved for decision on a particular set of facts. But the Commission so far has not seemed open even to considering the question. In the one case of which I am aware that utilized conflict resolution in the context of an agricultural operation (O'Neil Dairy in Humboldt County), the conflict resolved was between fill of wetlands (for a barn) and the protection of the biological productivity of coastal waters (from better manure management). That this was an agricultural operation was only incidental to the decision. The hypothetical question here is: should the barn have been allowed even if it didn't provide the clear benefit of better manure management? And if it wouldn't, how does anyone ever (legally) build a new barn in the Eel River bottomlands where both wetlands and dairy operations are literally everywhere? To grapple with this question the Commission must directly address whether agriculture itself is a protected resource under the Coastal Act, or whether the law only protects agriculture lands, with agricultural use subject to regulation and, as suggested in Section IV of the staff report, subordinate to the other coastal resources identified in Chapter 3 of the Act.

Another issue related to the priority of agriculture in relation to habitat is whether there are any circumstances in which the loss of agricultural land is not mitigated. Generally the Commission has required mitigation for the loss of agricultural lands (in Caltrans projects for example). But frequently the land for mitigation is simply not available in the coastal zone. Any land suitable for agriculture that has not already been converted to a more developed use probably already is being used for agriculture.

Suppose you have a large parcel in an urban area that is zoned for public utility use and has been owned for some time by a public utility, and while not being used for utility functions is leased to an agricultural operator who is using it for a successful strawberry operation. If the utility, which originally bought the land because it might be necessary for a proper utility function decides to use the land for that function (e.g. a power plant), can they convert these lands to that use? If so, must they mitigate for the loss of that agricultural land? Suppose instead that the utility decides that they no longer need the land for a proper utility function so they instead sell the land to a private developer. May this developer convert the land to a non-agricultural use? If so, must this developer mitigate for the loss of the agricultural land that would result from its development proposal?

While conversion might be allowable if the statutory tests were met, with respect to mitigation I would guess that while some Commissioners would say yes in both instances, and others say no, a sub-group of Commissioners would say no in the first instance and yes in the second. But if this is true, what might be the basis for the distinction between these two circumstances? If mitigation was not required in the first instance I would guess that it would be on a rationale of fairness, because the utility was perceived to be allowing the strawberry operation solely as a temporary use while it waited to see if its intended use was necessary. But even if this chronological explanation was advanced, doesn't the very existence of a successful strawberry operation on this parcel demonstrate that these are "lands suitable for agricultural use", as contemplated in section 30242?

The issue of time frame reference used by the Commission in a decision such as this can be very complicated. In Humboldt County much land around Humboldt Bay was diked and converted from tidelands to agricultural use in the 19th century. Some environmentalists and the City of Arcata wanted to breach the dikes on some parcels to the north of Arcata Bay to provide for restoration of these tidelands, but the Commission effectively prevented the project from going forward by requiring that the loss of these agricultural lands be mitigated (a project cost for which there were no funds). The Commission effectively said that even though we can see that the history was different, our focus is upon the present moment. These lands were most recently used for agriculture; therefore mitigation is required. If this is the principle being followed by the Commission, then it suggests the conclusion that preservation of agricultural lands is more important than habitat. But Brader/Magee and other principles and precedents cited in the staff report suggest on the other hand that habitat and other coastal resources are more important than agricultural uses and operations.

If these premises are correct, that the Commission is protecting agricultural lands but not agricultural uses and operations, then the Commission is well on the way to preserving agriculture in the coastal zone as a museum exhibit, frozen in time and increasingly unsustainable, rather than as a way of life and a dynamic economic interaction with the land. At the time of passage of the Coastal Act it was still possible to envision coastal zone agriculture as principally grazing. But the Commission now has substantial evidence, some of it recited in the staff report, that this particular use is losing its economic viability in the face of both trends in real estate prices and trends in agricultural economics. With these two trends conjoined the pressure on an agricultural family struggling to survive to sell into a rising market can be irresistible.

Although I do not recommend it, there is an alternative vision for these lands that is consistent with prior interpretation of the Coastal Act. As I noted in my presentation in Brader/Magee, some in the environmental community see the preservation of rural lands such as those in West

Marin as best accomplished by allowing estate residential development along with the preservation in an undeveloped state of the remainder of the property (secured by either a deed restriction or an easement). This would provide an economic use for purchasers of these properties, but also preserve the maximum amount of land in habitat. This was not the vision of the drafters of the LCP in West Marin, nor in many other counties in the State, but I think it is the direction in which we are heading if more is not done to preserve and nurture not just agricultural land but also agricultural use and operation. If agriculture is to have more than a "paper" meaning in the coastal zone, the Commission must engage in the difficult but necessary task of integrating habitat protection with a working agricultural landscape. Carissa Brader and Tony Magee attempted in good faith to do this, but their efforts were constrained to such an extent that, as Tony put it afterwards to the Marin Independent Journal, "if I didn't have a really good job in town, it would have been game over..."

I think that the Commission should engage in a straightforward manner the policy issues of the extent to which agriculture is a priority use within the coastal zone, and what that means in its decision-making, and the extent to which agriculture is a coastal resource entitled to protection in the same manner as other coastal resources under Chapter 3 of the Act.

II. Is there such a thing as agriculture? Or are there only agricultural uses?

Agriculture is not defined in the Coastal Act. This leaves open one of the key interpretive questions that the Commission must consider: does it regulate solely physical development (e.g. barns and other structures) or does it also regulate among possible agricultural uses? Industrial, commercial and residential uses can generally be analyzed based upon their physical effect upon the environment, and once that analysis is complete, impacts have been identified, mitigation has been imposed, etc., the regulation is complete and the Commission's role finished unless or until a substantial change is proposed in the physical environment. In other words, the use and the physical impacts are generally all of a piece. In a factory, once approved, the Commission does not reconsider when the product may change from, e.g., wire to rolled steel; in a shopping mall, once approved, the Commission does not reconsider whether stores are selling shoes, or toys or hardware.

But this description does not provide a clear match with agriculture, which by its nature involves an ongoing relationship with the land that must then be constantly adapted to economic survival. It is the need for regulation of this necessary adaptive management that the Commission should carefully consider. If a farmer must change crops, or agricultural products, does this require Commission approval? Or, if the land is zoned agriculture, and it is used for

agriculture, is that sufficient? Does agriculture consist solely of animal or plant production or does it also include a wide variety of potential specialty products that may be made from those animals or plants? Other than the impacts of any necessary structures, physical development upon the physical environment, what is the Commission interest in asserting a regulatory role? Again this is a policy question. That is, even if a technical argument for the Commission's regulatory jurisdiction can be asserted (change of intensity of use, for example), it is not at all clear (to me) that either the Commission's ongoing mission or the preservation of agriculture benefit from that assertion of regulatory jurisdiction in every case. Thus one potential issue for the Commission to consider regarding agriculture in the coastal zone is the Commission's regulatory role with respect to the specific details of agriculture. Unfortunately, that issue is not explicit in the Commission's workshop agenda.

It is interesting in this light to examine the staff's recitation of the exercise of Commission jurisdiction regarding agriculture. In the staff report prepared for the Commission workshop (all references are to the Commission Staff Report dated April 26, 2013), the history of Commission assertion of jurisdiction over agriculture is recited. The first (in 1981) and primary assertion of jurisdiction regarded "agricultural operations comprising riparian and wetland vegetation removal" (p.22). The Commissions was concerned about the intrusion of new or expanded agricultural operations into riparian or wetland habitats. The Commission has found that "the strong resources protection policies contained in Section 30233 and 30240 would be thwarted if wetland and other sensitive habitats could be destroyed for expanding agricultural uses." Thus at least in traditional interpretation the assertion of jurisdiction was primarily intended to prevent the expansion of agriculture into sensitive habitat. The staff report elsewhere notes, when discussing changes in crop patterns that "such crop changes are not defined as new development requiring coastal permits" (at p. 19).

In this context, consider grazing, the default existing agricultural use in most areas of the coastal zone, and in West Marin County. In the Brader/Magee Agricultural Plan approved by Marin County, an expansion of the small existing hop cultivation yard was contemplated and approved. [Hops, it should be noted, do not require either plowing or grading; they can be grown out of mounds of soil, compost and mulch, but they do require trellises to climb on.] Commission staff eliminated this expansion in their recommendation, (and of course their suggestion was accepted by the applicant; I am not re-arguing this) on the basis that this expansion potentially would be harmful to native grasses in the area. However, grazing is still allowed in this area of the parcel. From this we might conclude that the Commission position is that grazing in grassland areas with a scattering of native grasses is permissible, but that conversion of such an area to production of a crop is not permissible. Such a conclusion is within the Commission's historic interpretation of the Act if the Commission could find that the

hop cultivation yard physically displaced native grassland ESHA. But is it wise, or perhaps better: is it wise in every case? If agriculture is indeed a coastal resource, and if the native grasses affected are minimal (a small patch rather than an extensive swatch), should not conflict resolution that would make the entire agricultural use of the property more economically viable at least be considered?

But even this seemingly well-founded conclusion is not consistent with the rest of the Commission's action on that permit as it related to grazing. In the extensive areas preserved as buffers to the delineated habitat areas on the Brader/Magee property grazing is prohibited. The Commission required the placement of livestock fencing not merely outside of the habitat areas but outside of the buffers for the habitat areas. No reason is advanced for this restriction, but I might suggest one: a confusion of physical development with agricultural use. While it is entirely appropriate to keep physical development such as structures separated from critical habitat by an appropriate buffer, the basis for keeping herbivores out of the buffer area is somewhat mysterious. The certified LCP states that "development shall not be located within the stream buffer area", but I have never heard it suggested that grazing is development. Perhaps there was a misunderstanding. The staff report for this workshop characterizes the Brader/Magee permit as requiring "that wetlands and ESHA be buffered from the development envelope containing new agricultural development" (at p. 28). The Commission has never, to my knowledge, previously found that grazing was new development; nor in my opinion is there any basis for such a finding. In addition, all of the evidence in the record of historic agricultural use on the property is of grazing.

Nor does there seem to me to be any particular ecological sense in this exclusion. All of the evidence of which I am aware suggests that the elimination of grazing from these areas will prove harmful to the habitat in the long run. These areas have been grazed by herbivores for centuries. The prohibition of grazing (as well as any other type of management of vegetation in these areas) will inevitably lead to a change in the type of vegetation predominant in the area, including the shading out and loss of some of the native plants that may be in these areas that the Commission should presumably want to protect. The confusion of restricting physical development in the buffer areas with agricultural use such as grazing in those areas works not only to unnecessarily constrain agricultural use, but also to the detriment of habitat.

Returning to the issue of conversion of grasslands to hops, what is the basis for prohibiting this conversion? Again, it can only be the preservation of habitat. The implicit conclusion is that preservation of habitat is the ultimate goal of the Coastal Act, and that all else is subordinate. This is not an unfair assumption. It is consistent both with the clear language of section 30240, protecting ESHA, and with years of Commission practice. But the Commission does not uniformly act upon this premise. The Commission has somewhat routinely approved expansion

of freeways by Caltrans that were inconsistent with one or more habitat-protective policies of the Coastal Act on the basis that the project was protective of coastal access. Conflict resolution is routinely used to reach this conclusion. Without quibbling with the conclusion, one should then ask: what in the Coastal Act makes the expansion of freeways more worthy of the use of conflict resolution to approve a project than the protection of agriculture? Why shouldn't conflict resolution at least be considered as a basis to approve some agricultural uses or projects? The Commission can and should approach these issues on a case-by-case basis.

Some lines need to be drawn. Perhaps the Commission should articulate certain types of habitat, such as that protected by sections 30240 and 30233, as beyond the scope of agricultural activity. But it should then also embrace flexibility of implementation of the policies beyond this point of ESHA and wetland protection. I would suggest that no other coastal act policies should take precedence over agriculture. Further, where the delineated habitat is small and scattered, the Commission should consider the use of conflict resolution to keep from breaking up an agricultural operation into such small operational units as to make it infeasible.

Finally, the Commission must be willing to embrace or at least accept flexibility in agricultural management. It is one thing to require that land be preserved in agriculture. It is quite another to micro-manage particular agricultural uses over the long term, requiring a coastal development permit or an amendment (as was required in Brader/Magee) for an agricultural operator to switch from one to another agricultural use. While there may be coastal policy reasons to be wary of and watchful over certain agricultural uses, which, if particularly identified and based upon evidence might be specifically limited, once development is permanently barred from the delineated habitat areas, there is no further reason nor any basis in the Coastal Act for a blanket requirement for a full coastal development permit process. Doing so, as was done in the case of Brader/Magee, is a source of unnecessary work for both the agricultural operator and the Commission. The cure is worse than the disease.

III. Imposition of Conditions, the Commission's Mission, and Agency Credibility

This leads to my final point regarding the imposition of conditions to a project. Just because the Commission can impose a condition does not mean that it should do so. Just because the applicant is willing to acquiesce in a condition does not mean that it should be imposed. Again, keeping in mind that Brader/Magee willingly agreed to all of the conditions imposed by the Commission, allow me, as an individual with significant Commission experience to raise the question of whether all of these conditions were a good idea.

Consider for example the category of a condition imposed by the local government. Marin County imposed conditions that limited the hours of operation and the type of visitor use of the proposed brandy barn, and further prohibited the importation of grapes harvested off-site for the brandy operation. Let's assume that the County had good reasons, within the exercise of its broad police power, to impose those conditions. Under a specific Commission condition the application of all the local conditions to the project, including these, was retained in full force and effect. What possible reason does the Commission have, within the exercise of its coastal regulatory power, to impose its own identical conditions?

It was suggested to me at one point that the limitation on the importation of grapes might be based upon coastal access impacts, perhaps in a bow to the neighbor's complaints about increased truck traffic in the area. But as I stated at the hearing, 1500 gallons, the amount of liquid necessary to run the brandy operation at the approved capacity for one year, could be brought in on one trip on the back of one heavy-duty pickup truck; and even importation of the grapes still on the vine would not take much more. One rightly asks: what access impact? Are we next going to limit UPS and FEDEX deliveries to coastal residents who shop on-line or from catalogs? The applicants could have proposed a house and then grazing on the remainder of their property, and the Commission would never have seen the project at all. This use would have required stock truck trips to bring steers on and off the property, producing a traffic impact far greater than that prevented by the "no grape or juice importation" condition imposed by the Commission. It appears that Brader and Magee, in developing their own Agricultural Management Plan, were hoisted upon their own good intentions.

The Commission had no Coastal Act basis to impose that condition; and if it was only backstopping the proper imposition of the condition by the local government, what interest is served if the Commission adds this condition. It either has no effect, or it forces the applicant to seek and the Commission staff to process an amendment to the coastal development permit in order to accommodate a change made by the local government for non-coastal reasons. This condition makes adaptive management extraordinarily difficult. Conditions without a clear Coastal Act basis should not be imposed.

Nor should agriculture be put on a regulatory treadmill. Conditions in Brader/Magee require that the applicant come back for Commission review of any change in the precise uses specified in the agricultural plan and specifically approved in the CDP, as well as for any repair and maintenance activities. As stated in the previous section, if the Commission has specified broad areas of habitat protection, for example, intrusion into these areas warrants Commission examination of the newly proposed use. But what possible basis could exist for the regulatory overkill of a blanket CDP requirement? This is not nurturing agriculture it is hounding it. But,

as stated earlier, the staff recommends conditions such as these because it thinks that is what the Commission wants.

We live in a period of recognition of the limits of government regulation, at a time when budget cuts threaten the normal operation of environmental regulatory agencies, when the Commission itself faces a significant backlog both in its regulatory and its enforcement work. In the face of this should the Commission be asking its staff to review every jot and tittle, and parse every nuance of an agricultural operation? Should the staff, in its recommendations, pretend that this is the proper role of a staff beleaguered by its workload? At a time when the Commission necessarily is letting some things go, shouldn't one of the things "let go" be the minutia of the operation of a priority coastal use?

In conclusion, I suggest that the Commission consider a number of issues relating to its implementation of the Coastal Act policies regarding the preservation and nurturance of agricultural use in the coastal zone.

First, the Commission should consider the meaning or emphasis that it gives to agriculture as a priority use within the coastal zone. Does the priority of agriculture exist only to preserve land used in agriculture from conversion to lower priority development? Or does it exist such that the uses of agriculture can be conserved and protected? Beyond this, is agriculture itself a coastal resource worthy of the same protection and nurturance as other coastal resources?

Second, assuming that ESHA preservation has a higher priority under the Coastal Act than agriculture (an entirely reasonable assumption under the language and prior Commission interpretation of the Coastal Act) does protection of this habitat always prevail? If habitat is always to prevail, then on what basis does the Commission require mitigation of the loss of agricultural lands resulting from the restoration of previously existing habitat, as in the salt marsh restoration along Arcata Bay in Humboldt County? Or instead are there circumstances where the use of conflict resolution is appropriate to help preserve and protect an agricultural use even though it would result in the loss of a small amount of isolated habitat?

Third, will the Commission recognize agriculture as a priority use, and allow it to evolve as an economically viable use in the coastal zone? The Commission's present interpretation of the Coastal Act appears to envision regulation that picks and chooses among agricultural uses. This is not necessary. It is possible to regulate the physical development of agriculture (to locate and mitigate physical impacts in order to protect critical habitat) while still allowing agriculture as a use to evolve along with land prices and the economy of agricultural products and operations in a working agricultural landscape. For the Commission to assume that each type of use should be separately regulated is to assume that agriculture is not a priority but rather is subordinate to the various other coastal resource policies against which it is reviewed. Lumping

together physical development and grazing as both equally harmful in a buffer area is an example of a situation where the Commission might reconsider its policies in this respect.

Finally, the Commission should consider the extraordinarily rigid application of its permit conditions where they affect ongoing agricultural operations. Requiring a coastal development permit (or amendment) for a change in type of agricultural use, or for simple repair and maintenance of such ongoing agricultural necessities as fencing is unduly burdensome to both agricultural operators and to the Commission's staff. Similarly, "backstopping" local government, or another State regulatory agency, when there is no independent evidentiary basis for Commission imposition of a condition to a CDP creates unnecessary work at the Commission level when the actual regulation that occurs is based completely upon that performed by the other government agency. There is no need for a second process of regulatory review that is outside the scope of the Coastal Act.

Thank you for taking the time to consider the role of the Commission in the regulation of agriculture in the coastal zone, and thank you for considering my views on this topic.

Sincerely,

[Original signed by]

Ralph Faust

west marin environmental action committee

W3

May 2, 2013

California Coastal Commission
Dr. Charles Lester, Executive Director
Ms. Mary Shallenberger, Chair
Via email: Elizabeth.Fuchs@coastal.ca.gov

Dear Dr. Lester, Chair Shallenberger, and Coastal Commissioners,

The Environmental Action Committee of West Marin (EAC) appreciates the opportunity to provide comments for the Coastal Commission's workshop on agriculture in the coastal zone. EAC has been intimately involved in the Marin County Local Coastal Program update the past four years, and has initiated three meetings with the Marin agriculture community to discuss proposed revisions to Marin's LCP. **EAC is a strong supporter of maintaining local agriculture and West Marin's rural character of West Marin**. EAC has advocated for expedited permit review in certain agricultural circumstances, and that the County cover at least 50% of permit and planning expenses to lessen the financial burden on the family farmers of essential coastal permit review. **EAC has been and remains committed to finding the right balance to maintain strong coastal resource protections and support continued family farm success**. However, a number of policy changes in Marin's proposed LCP Amendment represent a wholesale shift that go too far.

It is important to note that agriculture in Marin County, particularly West Marin, is thriving. The Marin Agriculture Commissioner reported 2011 agriculture sales of over $70 million, a 25% increase in the total value of Marin County agricultural products. We anticipate that the 2012 report will also show an increase in gross sales of agriculture products. Additionally, 2012 was one of the best years in recent history for local beef producers.

It is also important to note that agriculture as a land use is not entirely benign. Tomales Bay in West Marin is an "impaired" water body under Sec. 303(d) of the Clean Water Act in part due to nutrient loading and sedimentation from agricultural operations on the East Shore of the Bay. All livestock owners are participating in a voluntary waiver program with the Regional Water Quality Control Board, but so far this program has not yielded significant water quality improvements to change the Bay's impaired status.

EAC is very concerned about coastal zone agricultural policy changes that would have the effect of allowing significant amounts of non-agricultural development in the agricultural protection zone. Little, if any, of the agricultural production zone lands in Marin's coastal zone are "prime" agriculture lands, and that fact should not support the proposed policy changes highlighted below. When measured against Marin's existing Certified LCP, the County's proposed LCP

Cd

Amendment, which incorporates these changes, would unquestionably weaken protections for agriculturally productive lands.

Some of the more troubling agricultural land use policy proposals being advocated by Marin County, the Marin County Farm Bureau, the California Cattlemen's Association, UC Cooperative Extension, and Pacific Legal Foundation include the following:

1. **Definition of "development" proposed to exclude "change in the density or intensity of the use of land" in direct conflict with the Coastal Act.** The Coastal Act definition of "development" (PRC Sec. 30106) as it applies to agricultural production is important for maintaining coastal resource protections. Proposed changes to Marin's LCP would exempt certain agricultural developments (e.g., grading equivalent up to 15 dump truck loads of earthen material, change in the density or intensity of use of the land or water, and removal of major vegetation) so that such developments are no longer considered "development."

The fact is that few, if any, permits for a "change in the intensity of use of land" have been applied for in recent years. Agriculture interests want to remove a regulatory step that has yet to burden the farmers and ranchers, but that does ensure coastal resource review and protection. ***The reality is that development is development, no matter where it happens or in what zoning category it occurs***. Agricultural practices such as expanding row crops and vineyards, converting grazing lands to orchards, vineyards, and other more intensive agricultural uses, as well as constructing or expanding agricultural processing facilities, while important to the financial bottom line of agricultural producers, typically cause adverse impacts to coastal resources, including impacts to scenic views (PRC Sec. 30251), water quality (PRC Secs. 30230 and 30231), wetlands (PRC Sec. 30233), ESHA (PRC Sec. 30240) and archeological resources (PRC Sec. 30244). Intensification of water use, such as expanding well use, new irrigation on or near coastal bluffs, or construction of new impoundments, may also exacerbate coastal erosion and geological instability. This proposed policy change, if certified, would very likely result in significant individual and cumulative adverse environmental impacts in the coastal zone, and it should be rejected.

2. **Current status of categorical exemption for agriculture uses should not change.** At a recent public hearing on the Marin LCP Amendment, agriculture interests raised the argument that there is a disparity in how the categorical exemption is applied for development of certain accessory agricultural structures in the coastal zone. There has been discussion that perhaps the Coastal Act should be amended to remove the language that prohibits the categorical exclusion from applying throughout the Marin, and perhaps entire, coastal zone. EAC strongly believes that the only way to mitigate development is to require a permit for it. Removing the requirement that agricultural development secure a coastal development permit prior to construction has the potential to create numerous individual and cumulative impacts that would not have the benefit of permit review and conditioning. EAC would support an expedited permit review process for accessory agriculture buildings like barns and storage sheds, but would not support an outright exemption of this development from its existing level of coastal permit review and conditioning.

3. **Protections for ESHA Buffers significantly weakened.** Marin's LCP Amendment proposes to open up existing protections for Environmentally Sensitive Habitat Areas and

coastal streams to allow discretionary reductions and modifications with insufficient standards to guide agency discretion. The Proposed LCP Amendment would also allow non-Principal Permitted Uses to request and receive buffer reductions. The effect of this change is that buffer widths could be *cut in half* the currently required 100-feet -- to a minimum 50-foot buffer. As the Marin Farm Bureau recently wrote to Marin County, "Please don't forget our opposition to the 50 foot minimum. If the site assessment shows that a lesser minimum is necessary, that should be allowed." This statement exemplifies our concern – that the proposed new ESHA Buffer standard would enable an applicant to hire a biologist to argue that the lesser ESHA buffer standard is all that is "necessary" and the County, without a wetlands biologist on staff, would be inclined to defer to that hired opinion. Such a process and loophole does not adequately protect needed ESHA buffers.

4. **Residential development is not an "agricultural" use**. The Farm Bureau is advocating that owners of coastal agricultural production zone property [C-APZ 60] be allowed to apply for one (1) residential unit, not including inter-generational housing and farm worker housing, for each 60 acres of agricultural land up to the maximum density as a conditional use. This is essentially a request to maximize residential development up to its fullest density without a subdivision. Even opening the door to this possibility as a conditional use on the most protected agricultural lands directly conflicts with the Coastal Act's requirement to preserve agricultural lands for production rather than housing.

Additionally, the Farm Bureau advocates that C-APZ-60 owners, in addition to one farm house, an agricultural home-stay or a bed-and-breakfast, and farm worker housing, should be allowed guest housing and second units as a Permitted Use, and two inter-generational homes for family members not engaged in agriculture on the property as a Principal Permitted Use. This housing would constitute non-residential development that conflict with the Coastal Act's mandate to protect agricultural lands for production, and should be categorized as non-agricultural. Otherwise, these changes would, in essence, undo the 60-acre zoning protection.

5. **Deleting "master plan" requirement diminishes review of and conditions for development on agricultural lands**. Marin's existing Certified LCP requires a "master plan" for all development on agricultural production lands. A master plan encompasses the entire property, including multiple parcels and requires conceptual plans for all significant future development. It identifies ESHAs and necessary buffers, establishes building envelopes, and provides conceptual direction for roads, utilities, and clustering of development. The proposed LCP Amendment would remove a master plan in almost all instances, and instead require only a coastal permit. Such a permit would not require the comprehensive look at the contiguous properties and cannot be viewed as an adequate substitute for the stringent requirements of a master plan. In the fall of 2012, EAC proposed a compromise that was acceptable to some members of the agriculture community, but the County would not agree to the change.

6. **Lack of oversight of cattle grazing in wetlands**. Marin's Certified LCP states that, "no grazing or other agricultural uses shall be permitted in wetlands except in those reclaimed areas presently used for such activities." In the over thirty years since this language was approved, Marin County has not surveyed coastal wetlands, has not monitored impacts to coastal wetlands from grazing, and has not provided the public with any understanding of the

current status and condition of coastal wetlands as part of the LCP Amendment process. It's unclear whether there is any oversight of impacts to wetlands from cattle grazing by the County. EAC readily admits that neither it nor the County are in the business of wetlands or grazing management. However, the County has a responsibility under the Coastal Act to protect this environmentally sensitive habitat and it appears that this duty is not being met.

7. **Clustering Requirements Weakened.** Marin's Certified LCP requires that "all development shall be clustered to retain the maximum amount of land in agricultural production or available for agricultural use. (Emphasis added). Development, including all land converted from agricultural use such as roads and residential support facilities, shall be clustered on no more than five percent of the gross acreage, to the extent feasible, with the remaining acreage to be left in agricultural production and/or open space." Marin's proposed LCP Amendment loosens this requirement by allowing development on agricultural lands to be clustered "in one or more groups, to the extent feasible." Strict standards for grouping are essential to achieve the goal of retaining land for agricultural use. The language permitting "one or more" groups "to the extent feasible" is an unconstrained standard and there is no guidance in the proposed development code changes to guide decision-making on clustering development.

8. **Scenic resource protections for East Shore of Tomales Bay should remain.** Marin's Certified LCP states that, "Tomales Bay and adjacent lands in the Unit II coastal zone form a scenic panorama of unusual beauty and contrast. The magnificent visual character of the Unit II lands is a major attraction to the many tourists who visit the area, as well as to people who live there. New development in sensitive visual areas, such as along the shoreline of Tomales Bay and on the open rolling grasslands east of the Bay, has the potential for significant adverse visual impacts unless very carefully sited and designed." The proposed LCP Amendment removed all references to this descriptive language that puts these scenic resources in context. The Farm Bureau has advocated that, "A person's view of our ranch should not be allowed to prevent us from building where we need to. A view-shed should not take precedence over ag viability, and sometimes the placement of non-agricultural structures in a "scenic area" could reflect a best management practice for ag viability."

EAC agrees that best management practices may dictate encroaching on the scenic view-shed on occasion. However, the fact is that the West Shore of Tomales Bay has dozens of public access points and public beaches that look toward the East Shore of the Bay from which scenic views are protected, theoretically, under the Coastal Act. That Marin County was unwilling to retain language to "protect scenic resources and the magnificent visual character of Tomales Bay," in the proposed LCP Amendment concerns EAC tremendously. We believe that we can find a solution that will provide needed scenic resource protections and give the farming community the comfort they need, but we are not there yet.

9. **Grading up to 150 cubic yards exempt from coastal permit.** Without explanation, Marin County proposed in the LCP Amendment that grading up to 150 cubic yards – approximately 15 dump truck loads of earthen material – should be exempt from a coastal permit. However, recent certified LCPs have included a coastal permit requirement for 20 cubic yard or more of earthen material. Unless some kind of other county or coastal permit is required, 15 dump truck loads can be excavated, filled, or moved without requirement of

mitigation measures for water quality. EAC strongly believes that an expedited permit for grading that exceeds 20 cubic yards could be required that would enable the county to require best management practices and require mitigation measures for likely sedimentation.

10. **Pacific Legal Foundation's Constitutional takings analysis is simply incorrect.** In a letter to Marin County dated March 18, 2013, the Pacific Legal Foundation asserted that when the county seeks to impose permit conditions on a property owner's proposed land use, it must make the Constitutional "nexus" finding between the proposed land use and the permit condition. This is simply incorrect. Takings jurisprudence is applicable only to the extent that government takes an interest in property. Conditioning a permit in the absence of an easement or something similar, does not take an interest in property; so the Constitutional takings analyses under the U.S. Supreme Court's rulings in *Nollan* and *Dolan* do not apply.

Despite its significant involvement in and commitment to ensuring that Marin's LCP Amendment maintains existing protections for ESHA and agricultural lands, EAC concluded in an April 16th letter to the Marin Board of Supervisors that it would be preferable to keep the existing Certified LCP rather than adopt the proposed LCP Amendment. Some of the reasons why are highlighted in EAC's two-page letter, attached hereto.

In conclusion, EAC strongly believes that a balance can exist that maintains existing strong protections for ESHA and agricultural lands while allowing Marin's family farms to continue to thrive. Unlike the existing Certified LCP, however, the proposed LCP Amendment falls far short of this balance and would result in agricultural policies that would open up protected agricultural lands to development in direct conflict with Coastal Act protections.

Thank you very much for your consideration of our comments, and for your work to protect our priceless coastal resources.

Respectfully submitted,

Amy Trainer

Amy Trainer, Executive Director

west marin environmental action committee

April 16, 2013

Marin County Board of Supervisors
Via Hand Delivery

Dear Supervisors,

For the past four years the Environmental Action Committee of West Marin (EAC) has participated in every public workshop and public hearing throughout the LCP Amendment process. We have spent hundreds of hours driving to and from hearings, sitting through hearings, and reviewing and commenting on the approximately 5,000 pages of draft policy and code language. EAC estimates that during this period the County has spent nearly $1 million on the process. Unfortunately, the document before you today rolls back many environmental and agricultural protections that have been in place for over thirty years and that have achieved a high degree of protection for coastal resources. Therefore, despite the fact that it improves resource protections in some dimensions, EAC does not support the proposed LCP Amendment before you, and we strongly urge you to not to approve this document.

EAC has documented our concerns in detail both to your Board and the Planning Commission, yet many of our questions have gone unanswered. We have repeatedly requested that you and your staff respond to the numerous, detailed comments from the Coastal Commission staff, yet in many instances the public has been afforded no response. Last fall, EAC came to the table in a spirit of compromise regarding certain agricultural provisions, but in the end the county would not relax its position on revising the definition of "agriculture" despite five letters from the Coastal Commission stating such a position was untenable. EAC believes that there is a balance to be found to maintain a high level of marine and coastal resource protections while affording family farms the flexibility they need. However, this document does not achieve that balance.

We were not expecting to love every aspect of the LCP Amendment, but we also expected that our steady engagement would have yielded substantive consideration for more than a very small fraction of our concerns. Some of the many reasons that EAC does not support the LCP Amendment before you include that:

1. The certified LCP clearly lists a hierarchy of protection, beginning with Environmentally Sensitive Habitat Areas (ESHA), then agricultural lands, and then scenic resources. This hierarchy language has been removed.

2. Important biological information and informative text are eliminated completely from the LCP Amendment, leaving the public with a sterile, uninformed policy document lacking any context, and giving review authorities scant basis for assessing county-issued coastal permits.
3. Protections for ESHA and stream buffers would be opened up to discretionary reductions and modifications with insufficient standards to guide agency discretion, and would allow non-Principal Permitted Uses to receive buffer reductions. The effect of this change is that buffer widths would be *cut in half* of what is currently required.
4. Protections for visual and scenic resources are weakened.
5. Despite at least six letters from the Coastal Commission staff stating that the County's proposal is untenable, the LCP Amendment would expand the definition of "agriculture" to include inter-generational housing for family members that are not engaged in agricultural operations. This is non-agricultural development, not agriculture.
6. Clustering requirements on agricultural protection zone lands are weakened from mandatory clustering and would allow "one or more groups" of development without any standards to guide approval or siting of a new cluster.
7. Agricultural processing facilities up to 5,000 square feet would be a Principal Permitted Use when currently this is a Conditional Use. The 300-foot setback from property lines and the design review requirement are removed.
8. The existing master plan requirement to consider all contiguous properties under common ownership in the agricultural zone is removed and would only be a discretionary consideration in developing agricultural land.
9. Viticulture was arbitrarily placed back under the Principal Permitted Use category after both the Planning Commission and your Board had approved its designation as a Permitted Use. The LCPA lacks sufficient standards to protect coastal resources when grazing land is converted to viticulture; the county's weak viticulture ordinance is a poor model and should not be applied to the Coastal Zone.
10. Contrary to Coastal Act requirements, the LCPA largely excludes from the definition of development activities that constitute changes in the intensity of use of land and water, for example in the conversion of grazing land to row cropping, viticulture, or orchards.

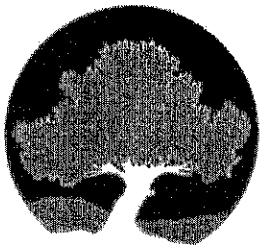
If we must choose between the LCP Amendment before you and the existing certified LCP, there is no question that EAC would choose to keep Marin's certified LCP. We thank the staff for their hard work, but in our view the direction given to them has resulted in this impasse.

Thank you very much for your consideration of our comments.

Respectfully submitted,

Amy Trainer, Executive Director

Environmental Action Committee of West Marin
PO Box 609 Point Reyes, California 94956
www.eacmarin.org 415.663.9312



environmental
DEFENSE CENTER

W3

May 2, 2013

California Coastal Commission
45 Fremont Street
Suite 2000
San Francisco, CA 94105-2219

Re: Agriculture Workshop: Protecting Agricultural Lands while Protecting Coastal Resources; May 8, 2013 Agenda Item 3

Dear Chair Shallenberger and Commissioners:

This letter is submitted by the Environmental Defense Center ("EDC") regarding the Commission's May 8, 2013 Agriculture Workshop. EDC is a non-profit public-interest environmental law firm which protects and enhances the California Central Coast environment through education, advocacy and legal action. We have a rich, 36-year tradition of effectively preserving agricultural lands; promoting habitat conservation, restoration and endangered species management; securing coastal access; protecting the public's shoreline and ocean, and safeguarding clean water. EDC urges you to support continued agricultural operations in the Coastal Zone and to ensure agricultural development is compatible with protection of habitats, water quality and other coastal resources.

EDC's Support for Agriculture

EDC works hard to support agriculture. We were a leader in the broad-based 1997 effort to protect Hearst Ranch from the development of hotels, golf courses, homes, commercial facilities and a dude ranch on important agricultural land. Today, the Ranch is preserved under a permanent conservation easement which ensures continuation of agriculture on 80,000 acres and provides for public access and natural resource protection.

EDC is currently engaged in litigation on behalf of the Santa Barbara Chapter of the Surfrider Foundation, among other partners, against Santa Barbara County and developers over the Naples agricultural land subdivision in Gaviota. EDC's Open Space and Environmental Education Network Program (OPEN) proactively dialogues with Santa Barbara County farmers and ranchers to protect agricultural lands and environmental resources. One of OPEN's successes is the County's newly adopted Agricultural Buffer Ordinance, instigated by EDC and supported by agriculturalists. EDC was a founding member of the Ventura and Santa Barbara County Agricultural Future

906 Garden Street Santa Barbara, CA 93101 Phone (805) 963-1622 FAX (805) 962-3152
www.edcnet.org

Alliances. We recognize that through collaboration with growers and ranchers, we have an opportunity to achieve long-term protection of farms and cattle ranching operations, while simultaneously advancing environmental stewardship.

We are currently representing Camarillo Sustainable Growth opposing a project that would place 2,500 homes and over a million square feet of commercial and industrial development on 750 acres on some the best prime farmland in the State, located in Ventra County. This project would also channelize two creeks which support numerous rare species.

EDC has worked for years to ensure that the Central Coast Regional Water Quality Control Board adopts suitable regulations that protect coastal waters from polluted runoff from irrigated agricultural lands. We are working with an avocado farmer in Santa Barbara County to recover an endangered steelhead population by removing barriers to steelhead migration. EDC understands that our goal of protecting agriculture is consistent with conserving and restoring natural landscapes.

Agriculture is Thriving in Santa Barbara and San Luis Obispo Counties

New figures released last week demonstrate that agriculture continues to thrive in Santa Barbara County. "Agriculture continues to be the county's major producing industry with a gross production value of almost $1.3 billion in 2012. This is an increase of $96 million, or approximately 8.1 percent, when compared with the 2011 figure."[1] In San Luis Obispo County, "The total gross for crops in 2012 was a record breaking amount of more than $860 million, an 18% increase from 2011."[2]

The Coastal Act effectively protects Agriculture and Natural Resources

EDC and the communities we serve cannot effectively protect our future generations' natural and agricultural heritage in the Coastal Zone without the Coastal Act. The Act provides a framework for protection of agricultural lands, environmentally sensitive habitats, water quality and public access. Sometimes these important goals may conflict; agriculture is not always conducive to public access, generates sediment which can harm streams, and, if not regulated, can convert wetlands and ESHA. However, the Act already sets forth rules that help decision-makers further multiple goals. For instance, the Act protects agricultural lands[3], preserves ESHA, creeks, rivers, wetlands and coastal ecosystems,[4] seeks to maintain water quality in coastal waters[5] and promotes recreation and public access where it does not conflict with ESHA, national security and private

[1] KEYT News reporting on Santa Barbara County Agricultural Commission's 2012 Agricultural Production Report. April 15, 2013. http://www.keyt.com/news/SB-County-s-Agriculture-Production-Surpasses-1-Billion-in-2012/-/17671600/19762512/-/11j4fmd/-/index.html
[2] KSBY News. April 2, 2013. http://www.ksby.com/news/san-luis-obispo-county-releases-agriculture-report/#
[3] PRC sections 30241, 30241.5 and 30242
[4] PRC sections 30240, 30236, 30230 and 30233
[5] PRC section 30231

property.[6] By prioritizing protection of coastal resources, the Coastal Act fulfills the wishes of Californians to protect their only coast, clean water, public access, scenic views, agricultural and recreation.

Environmental Effects of Agriculture

Local agriculture – when products are sold locally – reduces our communities' carbon footprints compared to importing food from elsewhere in the state, nation and world. In doing so, purchasing local farm produce helps lessen climate change. Some agricultural operations provide habitat for wildlife.

On the other hand, certain agricultural operations can result in increased water use and water pollution,[7] and may contribute to loss of habitat of sensitive and rare species. The Coastal Act provides a mechanism to promote agricultural operations while also protecting other important coastal resources.

Agricultural Development: Ensuring Mitigation for the Impacts of Agriculture

EDC supports the Coastal Act definition of "development"[8] which includes intensification of the use of land or water. Agricultural activities should be promoted and at the same time appropriately regulated as development to minimize and mitigate impacts to coastal resources. If agricultural developments (e.g., grading, change in the density or intensity of use of the land or water, and removal of major vegetation other than harvesting of crops) were no longer regulated as "development" as a result of changing policies and/or interpretations by the Commission, and subsequently by local agencies, significant environmental impacts in the Coastal Zone would result. Such impacts include hillside erosion and resulting sedimentation of streams, reduced stream and river flows and fisheries, loss of habitat for rare species, and loss of woodlands and other natural landscapes. These impacts of agricultural development, if no longer regulated through the permitting process, would go unmitigated. Retaining the current definition of development and ensuring reasonable regulation of agricultural land uses will not prevent agricultural development or intensification, but will require full consideration of impacts and ensure mitigation of impacts to coastal resources.

The Problems with Exempting Agricultural Development

Some agriculturalists support exempting agricultural development from coastal permitting as a means of promoting agriculture. Often this is couched in economic terms; reduced permit fees means more money to plant crops. While this makes economic sense, it runs afoul of the Act's resource protection policies; agricultural exemptions would

[6] PRC sections 30220 - 30224
[7] KSBY News. April 2, 2013. http://www.ksby.com/news/san-luis-obispo-county-releases-agriculture-report/#
[8] PRC section 30106

result in substantial harm to coastal resources, undermining the intent of the voters and legislature in passing the Coastal Act.

We believe that permits should be required for agricultural development, so that mitigation is imposed to lessen impacts on coastal resources. Instead of exempting agricultural development from permitting, reduced local permit fees may be appropriate. With reduced permit fees farmers can potentially apply the savings to producing crops.

Santa Barbara County already exempts significant agricultural development from permitting requirements, in conflict with the Coastal Act. One of many examples is the recent violation at Bixby-Cojo Ranch on Santa Barbara County's undeveloped Gaviota Coast. The County determined that removing federally endangered tar plant specimens and habitat which had been restored as mitigation for the impacts of a past oil development was for agriculture and therefore was not development and was exempt. The Coastal Commission staff disagreed with the County's determination that no permit was required to remove endangered species and ESHA, and issued a notice of violation.

Santa Barbara County also attempted to exempt agricultural development as part of its recently adopted Land Use Development Code ("LUDC"). The Coastal Commission recommended Suggested Modifications to address this conflict with the Coastal Act, but the County refused to accept the recommendations. As a result, the LUDC remains uncertified in the coastal zone. The County's draft Gaviota Coast Plan, which you heard about in April, is emerging as another forum for some to promote exempting agricultural development. EDC urges the Commission to join us in supporting agriculture while not exempting agricultural developments which may affect coastal resources.

Currently, our only backstop to ensure consideration and mitigation of the impacts of agricultural development is often the Coastal Act. If the Commission were to exempt agricultural development, then unmitigated habitat loss would become more prevalent, as was the situation pre-Coastal Act. If the Commission were to re-interpret agricultural "development" and exempt grading, grubbing, clearing and converting land in order to promote agriculture, then our communities would lose the backstop, and experience substantial statewide degradation of coastal resources.

Agricultural practices such as expanding row crops, vineyards and grazing, converting grazing lands to orchards and other more intensive agricultural uses, more intensive use of water for irrigation, and constructing or expanding agricultural processing facilities causes adverse impacts to coastal resources including views, water quality, wetlands, ESHA and archeological resources. Intensification of water use, such as new irrigation on or near coastal bluffs, may exacerbate coastal erosion and geological instability, which can threaten safe access, water quality, archeological resources and wildlife habitats.

By continuing to permit agricultural development through the existing Coastal Act process, and perhaps by easing local permit fees for small scale agricultural

development, we can support agriculture while ensuring protection for our important coastal resources.

Non-Agricultural Land Uses in Agricultural Zones Lands

A recent trend in Santa Barbara County and other coastal counties is to expand the types of land uses allowed in agricultural zone districts under the auspices that such uses are incidental to agriculture. This is a growing concern. While certain uses are clearly linked to and support agriculture, such as small-scale processing facilities, others, such as increased allowances for non-ag residential development, wedding venues, and "agri-tainment" facilities and uses, may displace rather than support actual agricultural uses. EDC urges the Commission to continue to support uses which compliment agriculture and to carefully evaluate proposals and LCP amendments which may allow non-agricultural uses on these precious lands.

Conclusion

In closing we urge the Commission to continue supporting agriculture in the Coastal Zone and to protect our irreplaceable coastal resources, wildlife populations, and clean water. The Commission should continue to support only agricultural-related developments in agricultural zone districts. Continued dialogues between conservation and agricultural interests will yield new ways to support Californians' goals of enhancing farming and ranching and the coast's bountiful natural resources. Reducing local permit fees for small-scale agricultural developments - without exempting agricultural development from the Coastal Act - could enable coastal agriculture to continue to flourish in California's coastal counties while still affording reasonable and necessary protection for the public's natural coastal resources.

Sincerely,

Brian Trautwein

Brian Trautwein,
Environmental Analyst / Watershed Program Coordinator

SAN LUIS OBISPO COUNTY FARM BUREAU
651 TANK FARM ROAD • SAN LUIS OBISPO, CA 93401-7062
PHONE (805) 543-3654 • FAX (805) 543-3697 • www.slofarmbureau.org

April 30, 2013

Attn: Elizabeth Fuchs
California Coastal Commission
45 Fremont Street, Suite 2000
San Francisco, CA 94105

Re: Agriculture in the Coastal Zone: Public Workshop

Dear Commissioners:

Although unable to attend the May 8th workshop, I would like to address various issues relating to the workshop and the Coastal Commission actions regarding agriculture.

The Workshop:
I appreciate the fact that the Commission is holding a workshop, but I am extremely disappointed that a 660 acre dairy is the only production agricultural representative on the proposed panel for the May 8th workshop. Dairies are only one part of well over 3 million acres of agricultural production land in the coastal zone, of which a significant majority of the land is grazing land (as acknowledged on page 6 of the "Written Background Document").

I truly respect and acknowledge that Dr. Ford is an excellent grazing resource with his over 34 years working in consulting with both private and public grazing management and conservation. His input is truly valued, but I believe that a representative making a living in livestock and other agricultural production should have also been part of the panel.

There was a very open and free flowing meeting in Pismo Beach in San Luis Obispo County on April 19 with over a dozen agriculturalists and two Commissioners present. This meeting demonstrated that there can be true discussion with education and understanding on both sides of the agricultural issue. Unfortunately, this does not appear to be the case with the May 8th workshop where only 60 minutes is given to non-panel "public comments".

Lastly on this issue, receiving an e-mail with a extremely limited opportunity for written comments (e-mail sent 6:50 p.m. April 26, with a deadline for receipt of those comments on May 2) effectively allowing only three days for comments, is seriously inadequate, especially for production agricultural people who cannot just drop everything to dedicate time to draft an instant communication.

It is my hope that the Coastal Commission will consider other workshops (more in line with the workshop held in Pismo Beach) incorporating far more production agriculture representation and input and located in many more areas of the coast, so that a clearer picture of production agriculture can be seen with understanding and education for all.

Agriculture on the Coast:
As Legislative Analyst for the San Luis Obispo County Farm Bureau for over 20 years and a member in production agriculture, I have reviewed many proposed agricultural amendments to the San Luis Obispo County LCP and ordinances along with the Commission's responses. With this in mind, I would like to outline a number of the issues I have reviewed.

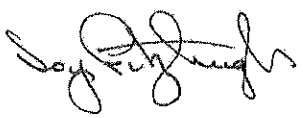
1) The Coastal Commission interpretation of "development" from Section 30106 is taking the section sentence out of context. The Coastal Commission has determined that a change from say grazing to orchards or other farming is a development requiring a CDP. In fact, the sentence taken as a whole

says that a "change in density or intensity of the use of land, including, but not limited to subdivision puruant to the Subdivision Map Act and any other division of land..." relates to land division not a change in agricultural practices or uses. The Coastal Commission interpretation has led to many unfortunate decisions in the past such as a denial of a grower to pull his own citrus orchard.

2) Looking at the recent recommendations from the Coastal Commission relating to the San Luis Obispo County grading ordinance I find many areas of concern. An example of some are:
    a. Vegetation removal: The County had addressed the issue relating to mechanical removal of native vegetation. The Commission removed "mechanical" from the discussion, thus potentially creating a CDP requirement for control burns of over one-half acre. (page 6, SLO-1-10).
    b. The Commission recommended land not farmed for 5 years would require a CDP: As an example, the elder generation no longer had the energy to continue the farming part of the agricultural operation and the land was only grazed for more than 5 years. Now the younger generation has returned to farming with absolutely no impacts and the operation is successfully producing their own hay once again. Yet the Commission recommendation would have made a time consuming/costly CDP necessary. (Page 6, SLO-1-10)
    c. 5 year non-use requiring a CDP includes grazing: This limitation completely ignores that managed grazing is a positive practice in protecting land as opposed to non-use which allows invasive plant growth to overtake the land. (Page 7, SLO-1-10)
    d. 2010 Coastal Commission recommendations replace "blue-line streams" with the undefined "watercourse": The Webster Dictionary definition of watercourse is "a natural or artificial channel through which water flows". The Coastal Commission change now has the potential to impact irrigation channels or ditches. (Pages 18 and 42, SLO-1-10)
    e. ESHA as "all ESHA" as opposed to "mapped ESHA": This leaves the field wide open for anyone's interpretation or appeal of any agricultural activity they don't agree with, just claim it's an ESHA. (Page 18, SLO-1-10)
    f. Vegetation removal: The Commission has expanded the requirement of minimizing vegetation removal and other landforms alterations beyond the County's proposal that it apply only to collector or arterial roads. The Commission places this requirement on all "public view corridors". Thus a county dirt road in the back country where only a couple of landowers drive would be faced this "vegetation removal" minimization requirement. (Page 17 and 43, SLO-1-10)

These are but a few of the examples of issues facing agriculture that need more discussion. For this reason I hope that Commission will support more Pismo Beach style workshops.

Sincerely,



Joy Fitzhugh
Legislative Analyst

COMMITTEE FOR
GREEN FOOTHILLS

W3

May 2, 2013

Mary Shallenberger, Chair and
Members of the California Coastal Commission
45 Fremont Street, Suite 2000
San Francisco, CA 94105

Re: Item W3: Workshop on Agriculture in the Coastal Zone: Implementation of Coastal Act Provisions Related to Agriculture

Dear Chair Shallenberger and Commissioners,

Thank you for holding this workshop to familiarize the Commission and members of the public with current topics regarding agricultural protection policies in the Coastal Act and Local Coastal Programs (LCPs) and how they are being implemented.

Committee for Green Foothills (CGF) has worked for many years to help maintain and foster our coastal agricultural lands, beginning with participation in the adoption and certification of the County LCP in 1980, and subsequently working to qualify and pass the first ever citizen initiative, Measure A, for the ballot in 1986, which passed by an overwhelming 64% yes vote.

Measure A locked in key agricultural and resource protection policies of the certified County LCP, and provided that these policies cannot be weakened or discarded without a County wide vote.

The Staff Report (pages 19 and 20) touches upon the emerging issue of agri-tourism as a means to supplement farm income. Examples include activities that make use of the harvest such as tastings and farm dinners and uses that can generate additional income by taking advantage of the farmland setting for farmstays, corn mazes, and similar agriculturally related recreational and educational attractions.

San Mateo County has several farms (Cozzollino, Lemos, Repetto, Pastorino) that have instituted farm-related seasonal theme activities and uses during the Halloween harvest season. These seasonal activities (haunted houses, farm animal petting zoos, pony rides, hay rides, etc.) augment sales of flowers, vegetables and seasonal pumpkins, are located on small areas of each farm property, and are customarily limited to the 4-6 weeks prior to Halloween.

The County has determined that these limited "agri-tainment" uses are subordinate to the year-round agricultural uses of the property, and has issued CDP's that regulate the type, intensity, and location of the "agri-tainment" activities on each parcel. When one farm (Cozzolino) proposed to add exotic animals such as zebras and elephant rides to their Halloween activities, the Board of Supervisors denied those uses, finding them to be inconsistent with the Planned Agricultural District zoning regulations.

There is one notable "agri-tainment" venue where the non-agricultural, entertainment uses have become the dominant, rather than supportive or subordinate, use of the property. This is at the

COMMITTEE FOR
GREEN FOOTHILLS
3921 E. Bayshore Road
Palo Alto, CA 94303
650.968.7243 PHONE
650.968.8431 FAX
info@GreenFoothills.org
www.GreenFoothills.org

Arata Farm, a small 8.37-acre farm along Cabrillo Highway south of Half Moon Bay that historically sold pumpkins during the fall harvest season. About ten years ago, the owner leased the property to Chris Gounalakis, a Half Moon Bay restaurant owner, who established variety of non-agricultural activities including a straw-bale maze/labyrinth/coliseum, jousting events, a haunted barn, petting zoo, pony rides, train rides, and a children's play area that included a mini-maze, bounce house, and sale of prepared foods, all without benefit of County review and approval. These activities ran from May through December and essentially transformed the site into a commercial entertainment venue. It took San Mateo County several years to address the unpermitted activities.

Finally, on September 13, 2011, the Board of Supervisors approved an after-the-fact CDP and Planned Agricultural District (PAD) permit to legalize most of the commercial entertainment activities and uses, finding that they were "ancillary to agriculture". The CDP was limited to just the fall season of 2011. Some of the Supervisors stated that they would likely not approve continuation beyond 2011. CGF pointed out that the LCP defines uses that are ancillary to agriculture as: ***"agricultural grading equipment supplies, agricultural rental supplies, topsoil stockpiling, and other similar uses determined to be appropriate by the Planning Director",*** and clearly the Greek theme park commercial entertainment uses did not fit this definition.

CGF and one of the owners of the property appealed the CDP to the Coastal Commission. On October 14, 2011, the Commission issued a letter to Mr. Gounalakis, the applicant, advising that the County's decision had been stayed pending Commission action on the appeal. Mr. Gounalakis ignored the Commission's letter and in fact continued his operation throughout the Fall of 2011. The fact that this was a one year permit limited the Commission's ability to address the Appeal.

There were additional issues with this property, as it had a Williamson Act Contract that only allowed agricultural production. The State Department of Conservation had advised in a letter to the Board of Supervisors (September 9, 2011) that even if the Williamson Act Contract allowed non-agricultural uses of the land, these uses could not significantly displace or impair current or reasonably foreseeable agricultural operations on that land. Further, because the entertainment activities would be operated throughout the summer and fall growing season, the entertainment uses would indeed displace the agricultural use of that part of the land. Finally, the letter stated, by inviting people, land would be set aside for the entertainment uses, for parking, for fire lanes, and for toilet facilities, and all of these uses displace agricultural operations on the subject land.

On August 28, 2012, the Board of Supervisors (with Supervisor Groom voting "no") approved an amended Williamson Act Contract (but not a CDP) for the property that allowed most of the non-agricultural uses on three acres of the eight- acre site.

At that point, CGF expected that the Planning Department would next schedule a hearing on the issuance of a CDP. But this did not happen. Instead, on October 2, 2012, the Planning Staff issued a "Certificate of Exemption for an Agritourism Event at the Arata Pumpkin Farm" for the Fall, 2012 season. The Exemption was based upon newly drafted "Agritourism Guidelines" that were developed in consultation with the County's Agricultural Advisory Committee. These Guidelines have never been brought to the Planning Commission and the Board of Supervisors for

consideration as an Amendment to the LCP. CGF believes that the Guidelines are impermissible exceptions and exemptions from the LCP agricultural policies, and even if they were permissible, the uses on the Arata Farm are far more extensive in time and place than the Guidelines would allow.

Upon learning of the issuance of the Certificate of Exemption, CGF wrote a letter to the Planning Director and Deputy Director objecting to granting of the Exemption and stated that the project requires a CDP and Planned Agricultural District (PAD) permit. CGF further requested that the County submit the issue of this Exemption to the Coastal Commission under the Dispute Resolution provisions of Section 13569 of the Commission's Administrative Regulations.

To my knowledge, this was never done. Mr. Gounalakis continued operating the commercial entertainment facilities during the Fall of 2012. CGF has now been informed by Planning Staff that Mr. Gounalakis did not comply with the limits on duration, location and uses of the Exemption. Now it is May of 2013, and Mr. Gounalakis has not yet applied in a timely fashion for a Coastal Development Permit for the Fall of 2013. Early application is important because it takes an extensive period of time to construct the straw bale maze and coliseum. One news article quoted Mr. Gounalakis as saying it takes 12,000 bales of straw to construct the maze. Planning Staff has stated that if Mr. Gounalakis intends to apply for an Exemption this year, his straw bale maze must be significantly reduced in size in order to comply with the County Guidelines.

CGF remains very concerned that this operation is simply inappropriate for this small parcel in the heart of the county rural agricultural area. A straw maze and associated activities could perhaps be located on a shopping center parking lot, or at the County Fairgrounds or the Cow Palace, but this particular operation, in this location, is not consistent with the Coastal Act, the LCP, or the Williamson Act.

The Arata Farm is a precautionary example of the challenges one Coastal County has had in addressing "Agri-Tourism" activities. There are others, such as allowing weddings on farms, and converting historic barns into venues for catered corporate or large group lunches and dinners. While allowing limited numbers of special events may be justifiable, the key issue is maintaining production agriculture as the primary use of the property.

I sincerely hope that the Commission, working with local governments, can address these challenges.

Sincerely,

Lennie Roberts

Lennie Roberts, San Mateo County Legislative Advocate
Committee for Green Foothills

Peter J. Martinelli

Fresh Run Farm

Bolinas, Ca. 94924

W3

Signature on File

May 1, 2013

The Survival of Agriculture in the California Coastal Zone

Recently, a Coastal Commission staffer was quoted as saying that "The greatest threat to agriculture in the Coastal Zone is *development.*" As the operator of a diverse (animals and crops) organic farm in the coastal zone who has worked on the Marin County LCP over the past four years, let me correctly state that the greatest threat to agriculture in the Coastal Zone is the continual effort by local and regional environmental groups *to restrict, control and reduce coastal agriculture into a highly regulated set of conditional and grandfathered uses.*

Over fifty years of intense environmental activism has manifested an ever tightening web of government regulations, designed to protect habitats and sensitive species. Coastal California is arguably one of the most well regulated and monitored places on Earth. From the farmer's perspective, the unending push for more regulation spells disaster for future generations of family farmers in the Coastal Zone. If we continue to allow the lexicon of coastal agriculture to be distorted, increasingly viewed and valued as "environmental impacts" and "development", two hundred years of farming and ranching in Coastal California is doomed to diminish into a fossilized set of grandfathered uses that only those of great wealth can maintain.

For example, neighboring farmers and I are engaged in the Pine Gulch Watershed Enhancement Project. It is a win-win project supported by environmentalists that is designed to provide farms with irrigation water and maintain optimal creek flows for endangered salmon and steelhead trout. Trouble is, it has taken more than 13 years of planning and involves eleven agencies. Nearly a quarter million dollars has been spent dealing with regulation and nothing has been built! Heralded as a "model" for watershed management in California, the project remains a regulatory nightmare and is fast becoming an example of what Coastal farmers and ranchers can expect when they try to make any improvement to their operations.

What Can the California Coastal Commission Do to help Agriculture?

All we ask is that the agency embrace and understand agriculture with the same depth and compassion it has for its other responsibilities, such as public access to the coast and habitat enhancement. The Commission and staff must understand that the agricultural language in the Coastal Act reflects rather rigid and perfunctory approach to a very complicated and diverse subject. Farming varies county to county and ranch to ranch. The large industrialized agriculture of Monterey County bears no resemblance to the few dozen small family farms on the Marin Coast, yet we're working with *one size fits all* language in the Coastal Act. Local Coastal Plans must be more flexible, reflecting the ethos and regional character of that County's agriculture.

Specifically, when a county such as Marin explores some new ideas to support its unique agriculture, it would be helpful if the Coastal Commission and Staff were somewhat receptive and open to a genuine discussion. In my recent experience, our suggestions such as permitting inter- generational homes on farms, balancing the creation of ESHA zones on farmland, and calls to modify the rule that declares "changes in the intensity of agricultural use" (CDP section 30106) as development, have been flatly rejected by Commission Staff as being out of compliance with the boiler plate of the Coastal Act. A letter by Coastal Planner Kevin Kahn to the Marin County Board of Supervisors, dated November 9, 2012 is a clear example of this disappointing pattern. **What is the point of an LCP Update if our suggestions are so flatly rejected?**

Trends in agriculture change all the time. These days, the cutting edge sustainable operations are farms that are very diverse with layered systems of animals and crops. The Commission should recognize and promote farm diversification, not declare efforts to diversify as a form of development. The business of farm diversification is best left to the farmer and must not become the object of review and criticism by those groups strictly interested in creating wildlife habitat.

In this regard, section 30106 of the Coastal Act is one area that must change. To strictly define a *"change in the intensity of agricultural use"* as a form of *"development"* is a barrier to diversification. Diverse agriculture is a key to success. It should be encouraged, not penalized.

Another area of concern is the imposition of ESHAs (environmentally sensitive habitat areas) on farmland. Generally speaking, the wetland and creek side areas are the rich bottom soils that are the most productive for farming. These are the same areas where a Coastal permit would impose buffer zones. While we recognize the value of wildlife buffer zones, we feel that buffers should be determined on a site by site basis, not a one size fits all. It is also essential that the Natural Systems language of LCPs recognizes existing and historic farmland and maintains that usage going forward instead of converting usable farmland into ESHA when a property is involved in a Coastal permit.

The ultimate shared goal of farmers and the Coastal Commission must be to insure that agriculture remains viable and thrives on the California Coast for generations to come. To accomplish this we must balance habitat needs with those of farmers. New farmers of modest means must continue to be able to "scratch around" and experiment without burdensome regulations and processes that only people of great wealth can wrestle with. Established farms must be able to change and adapt their land use without being buried in permit processes and regulations.

W3

IONE CONLAN POBOX 412 VALLEY FORD, 94972 AGRICULTURAL WORKSHOP

ITEM # 3 MAY 8, 2013

HONORABLE COMMISSIONERS & STAFF By FAX & US Mail April 27, 2013

Thank you for an opportunity to provide the *"Commission the benefit of hearing information and concerns outside of its regulatory decision –making agenda"* as aptly stated by good Dr. Charles Lester, Executive Director.

I am a widow, with the next generation carrying on the family farmland which has been in the same family in agriculture since 1867, and the beneficiary of the California 125 year Heritage Award, annually feted at the California State Fair. I consider myself a responsible *"passing through steward of the land."* Last year the land was nominated for the Leopold Land Conservation Award. Our family preservations of these lands have not been without enormous personal sacrifices, overcoming extraordinary difficulties

I want to be sure, that on my watch, I did not stand by idly, while the value of our lands diminished without compensation, constitutional rights abrogated, with rules and regulations formulated by well meaning people *without knowledge and experience in agriculture.*

We have purchased our land repeatedly with inheritance taxes, which amount now exceeds its market value. Some land owners have sold their lands for development, others have received handsome cash awards selling their "development rights" to Land Conservation Banks, all the while, my land development rights are being legislatively removed without compensation, while our representation ignored by well meaning Appointed Officials who have arrived in California, just in time to enjoy what we have preserved over all these many years.

Our lands are Certified Organic, our livestock Animal Welfare Approved Certified, our Grass Fed Beef and farm animals organically produced without antibiotics and hormones, our crops are drip irrigated to save water and we conserve water and lands for our future generations.

My late husband and I survived *ten years of bankruptcy,* drought, predators human & animal, all the vagaries that take place in a human lifetime. (all Creditors paid in full with interest)

81

I was born and reared in California, and as my beloved father would say, *"A Daughter of the Golden West"* It is disquieting for me to hear certain leaders "environmental action and protection committees" who arrived in California from elsewhere claim a superior motive for the preservation of our California beautiful lands and coastal waters, than we, native born and reared on the lands of California. In fact, it is we, who have preserved the lands which they now claim as their own, brushing aside the farmers and ranchers who have preserved these lands over which they now claim dominion and control.

Most of these well meaning, abundantly lettered, well funded, fireside sitting *"self anointed protectors of the environment"* arrived long after we, who have owned and preserved these lands for all of us to share and enjoy. What audacity to overlook and ignore the existing Stewards of the Land, who have sacrificed and preserved these lands!

This is not a case of *"we got here first & we don't want you here"* but rather *"we got here first, & saved this land for all to enjoy & share along with us for the common good of all and our future generations" Coastal Agriculture is important to California*

CA Dept of Food & AG (CDFA) reports the state's 81,500 farms & ranches produce a record $43.5 billion in gross receipts in 2011 and 2012 is not yet available. Over 400 commodities are produced in the state including nearly half of America's fruits, nuts & vegetables. A large portion of these are produced on coastal lands, artichokes, berries, brussel sprouts to name a few, not to mention the sheep and cattle grazed on coastal lands.

Now comes the LCP, under the aegis of the CCC Staff, (with all due respect subjectively interprets without Agricultural training, without Ag counsel on staff, the Coastal Act, without oversight from any independent impartial review third party committee, except for our California Commissioners)

This LCP **would prohibit, without regard to County restrictions already in place**, on our Ag lands under the jurisdiction of the CCC, & propose novel interpretations beyond the statutory language of what constitutes "development", **the proposed prohibitions**, include but not limited to:

(a) Veterinary Clinics (b) Places of worship (c) Weddings (d) Tours (e) Quantities & types of livestock and domestic animals (f) Farm stands over the size of a parking space, which would not allow for storage, refrigeration

82

of product and hygiene facilities (g) Tasting and picnic tables! (h) Additional housing for family members (i) Special Events which may include *family reunions* (j) Vineyards (h) Bed & Breakfast previously allowed, and so much more!

And impose draconian restrictions such as, but not limited to: (a) Deed restrictions (b) Mandatory merging of parcels to eliminate any opportunity for additional housing for family members (c) Extraction of conservation easements as a pre requisite for permits, (d) Clustering of all buildings without regard to hygiene requirement and family privacy (e) Total cap restriction of 7 K sq feet total allowed for all buildings. (f) Restrictions on size of farm processing facilities such as for cheese, or processing & storage of farm products (g) covenants running with the land, which means in perpetuity (h) Public trails without regard to dangers of disease such as HMD (hoof & mouth disease of foreign travelers which is carried on human breath, hats, clothing shoes and shoelaces) and so much more!

There must be some **balancing of equities** here. The landowner farmer/rancher must be allowed to **diversify to subsist** on these farms which USDA recently noted 27% are below the poverty level, and are only maintained with outside jobs to support themselves and the land.

We ask this California Coastal Commission to allow the local counties to administer the planning and permit process for agriculture. Local Counties are in the best position to know the unique local circumstances. Agriculture should be placed in the **Exclusionary Category** of the Coastal Act, as is granted on many coastal areas. The micro management of whether or not a picnic table should be allowed at a farm stand, or a Bed & Breakfast on a farm, for city folks to come out to the farm to enjoy, for a farmer to utilize his land to the best and highest use for its terroir, water supply, road traffic location, and benefit for the common good, should be left to the local jurisdiction.

We praise, salute, and we believe as noted on the web, by the Honorable Mark Stone, a former Coastal Commissioner:

"At a time when the media focus is all about state-wide crises in California, it is easy to forget that the most important decisions affecting our lives are made locally. Local issues impact our

communities, our neighborhoods, our quality of life, and even our jobs. I believe in local government and I believe that the State should support and empower local government.

I am committed to working with local counties, cities, school districts and special districts to ensure that the State of California sets appropriate standards, provides resources and then allows the local jurisdictions to perform at their best"

We agree. Bravo with Blessings. Quoting biblical writings, and President Lincoln: let us proceed with malice toward none, and charity for all, to complete this work we have begun...protecting our coastal lands and waters, continuing good farming and ranching management under the watchful eye of stakeholders, and local government coordinating with the California Coastal Commission.

Ione Conlan, Farmer Rancher CONLAN RANCHES CALIFORNIA

Director, California Beef Cattle Improvement Association (CBCIA); *Advisor* to California Secretary of Agricultural Karen Ross, on Organic Production (COPAC); *Director*, Marin County Farm Bureau; *Director* California Wagyu Breeders Assoc; *Advisor*, North American Meat Assoc (NAMA); *Pres & CEO* CRC; Legislative Committee Member, California Cattlemen's Association; Legislative Committee Member American Society of Farm Managers & Rural Appraisers (ASFMRA); Active Member North Bay Woolgrowers Assoc; Redwood Empire Holstein Assoc; American Wagyu Assoc; California Cattlemen's Association, Marin Organics, Animal Welfare Approved Assoc; American Grass Fed Assoc; Jesuit USF University of San Francisco Alumni Association; CONLAN RANCHES CALIFORNIA was inducted into the prestigious California Agricultural Heritage Club in 2007 as a family continuously in agriculture in the same location for over 125 years.

84

SANTA BARBARA COUNTY CATTLEMEN'S ASSOCIATION

P.O. Box 303, Los Alamos, CA 93440

"WORKING TO SAVE RANCHING"

May 1, 2013

Dr. Charles Lester, Executive Director
California Coastal Commission
45 Fremont Street, Suite 2000
San Francisco, CA 94105-2219

Re: May 8th Workshop on Agriculture in the Coastal Zone

Dear Dr. Lester,

We appreciate the hard work you and your staff have devoted to the upcoming workshop on agriculture in the coastal zone of California. We are pleased with the selection and diversity of speakers who will make presentations, and we look forward to engaging in a positive and meaningful discussion of the challenges and opportunities relating to agriculture in the Coastal Zone.

The Santa Barbara County Cattlemen's Association represents over 200 producers county-wide and our rancher members in the Coastal Zone represent over 67,000 acres of coastal rangeland agriculture.

We believe that with its limited timeframe, the workshop must serve to foster a long-term dialog between the various agricultural interests throughout the state, local and state agencies with regulatory involvement in coastal agriculture, and interest groups which seek to promote coastal agriculture and protection of precious natural resources.

The Commission background report for this workshop is a very useful compendium of information concerning the protection and regulation of coastal agriculture. It fails to recognize, however, some of the very real challenges facing ranchers and farmers operating along the California coast.

For example, the report rightly notes that the Coastal Commission has a "strong record of protecting agriculture" and that "it appears there has been little urban expansion into unincorporated agricultural land area since passage of the Coastal Act." The report also notes, however, that the Commission has directly, and through approval of LCPs indirectly, promulgated resource protection standards and policies to "<u>any type of new development</u>, including agricultural uses."

Many compatible land uses and agricultural practices may be captured by the extremely broad definition of *development* contained within the Coastal Act that appear to be aimed at curbing urban development. But it is counterproductive for the same resource protection standards and policies to be applied to <u>all</u> such *development,* so broadly defined, particularly agriculture, without consideration for the vast differences between agricultural and urban uses. And yet this is increasingly occurring in the coastal zone, and it is unnecessarily hurting Agriculture.

For example, in a recent case cited in the background report (Magee and Brader) the Commission required that "wetlands and ESHA be buffered from the development envelope containing new agricultural development." What the background report failed to note was that this small agricultural operation was only approved on the condition that sheep grazing be subject to annual reporting to the Commission, adaptive management strategies be practiced in perpetuity, agricultural and conservation easements be recorded, and setbacks of more than 100 feet natural resource areas be established.

Such actions are unprecedented and very harmful to the continuation of agriculture in the coastal zone. In an op-ed piece following Commission approval of this project, Mr. Magee was quoted as saying that "If [I] didn't have a really good job in town it would have been game over long ago," estimating the 5-year-long process cost him $500,000.

Farmers and ranchers – who already operate on the narrowest of margins – are being confronted with ever-increasing requirements to obtain development permits for traditional farming practices. We believe and hope that the upcoming workshop will provide a forum for common sense solutions to the challenges facing coastal agriculture.

Thank you for your consideration of these comments.

Sincerely,

Andrew Mills
President

May 3rd 2013

To: The California Coastal Commission
45 Fremont St. Suite 2000
San Francisco, CA 94105

From: Ben Werner
1611 Olive St.
Santa Barbara, CA 93101
805-308-6511
ben@monetaryecology.com

Re: Agriculture in the Coastal Zone Workshop May 8th 2013 –
Sustainable Living Research Ordinance concept

Dear Commissioner,

I am writing to you in the context of the upcoming Agriculture in the Coastal Zone Workshop, to inform you about a ***Sustainable Living Research Ordinance*** I have been developing in cooperation with jurisdictions in Santa Barbara County. The purpose of this ordinance concept is to provide a local jurisdiction with the regulatory structure to permit projects that seek to demonstrate more sustainable living and land-use models, yet that may be in conflict with current building, zoning, or health codes. Specific examples may include low-impact agricultural villages, natural building materials, and onsite wastewater treatment.

In the agricultural coastal zone of Santa Barbara County, we have witnessed the present agricultural zoning code support development projects that have very little to do with real agriculture, and moreover reduce public accessibility to the coast. A current proposed project on the Gaviota coast includes a ~10,000 sqft residence with homogenous citrus groves "for the consumption of the resident". This example exemplifies the ongoing gentrification of ag land in our region and the consummate de-prioritization of agricultural functionality. The same developer of this example project, given options allowed under the ***Sustainable Living Research Ordinance***, might build instead, a low-impact agricultural village (under provisions of an agricultural community land trust) that would attract a residential demographic eager to steward sustainable agricultural experiments coupled with community outreach, education, and natural resources protection.

Please contact me to find out more about the ***Sustainable Living Research Ordinance*** concept, and to offer me your valuable questions and feedback at this early stage in its development.

Thank you very much,

Ben Werner

CALIFORNIA CATTLEMEN'S ASSOCIATION
1221 H STREET • SACRAMENTO, CALIFORNIA • 95814-1910
SERVING THE CATTLE INDUSTRY SINCE 1917
PHONE: (916) 444-0845
FAX: (916) 444-2194
www.calcattlemen.org

W3
California Cattlemen's Association (CCA)

W3

May 5, 2013

California Coastal Commission
c/o Elizabeth Fuchs
Elizabeth.Fuchs@coastal.ca.gov

Honorable Commissioners,

The California Cattlemen's Association (CCA) appreciates the opportunity to provide comments for the Coastal Commission's Agricultural Workshop.

CCA represents over 2,000 ranchers including many who have been ranching in coastal communities for generations. As century long stewards of the land, California's farmers and ranchers' reliance on the land inherently demands respect and support of the natural resources. It is these natural resources along the coast that the Coastal Act and local governments seek to protect, and while we are encouraged that others see the value in the land our membership has been working on and caring for for centuries, it is imperative that the California Coastal Commission (CCC) and the agricultural community at large work together to ensure that California can continue to have agriculturally productive open space for generations to come.

Straying from the Intent

Within the Coastal Act (Act), there are three clear priorities; the preservation of agriculture, increased public access, and protection of resources. The Coastal Act (Act) is clear in identifying the importance of agriculture on the coast and goes to great lengths to express certain flexibilities for agriculture to ensure the continuation of open space that agriculture naturally produces as a co-benefit of the growing of food and fiber for the world.

In fact, Public Resources Code Section 30610.1 (b) prioritizes "**agricultural lands currently in production**" in equal status as "highly scenic resources of public importance" and "environmentally sensitive areas" and "**public access to or along the coast.**" Despite the clear valuation of agriculture, current interpretations of the Coastal Act misrepresent the original intent to place the preservation of agriculture, resource protection, and enhanced public access on par with each other. Instead of supporting these three tenants wholly, they have been construed to the point where many think that resource protection and agriculture are mutually exclusive, when in fact, resource protection relies on the sustainability of agriculture.

Farmers and ranchers are in the business of protecting their agricultural ground and ensuring its continued productivity. In so doing, they are likely to make decisions that promote both the health of the land, and the sustainability of their businesses. When considered from this perspective, the CCC and the

agricultural community both are desirous of the same end goal and share the same values of open space and continued agricultural production. Although both the CCC and the agricultural community share a very similar vision, many CCC-developed regulations prohibit farmers and ranchers from continuing to manage the land and provide the habitat, open space, and agricultural products that we all love. CCA suggests that the CCC consider the ramifications of these regulations on agriculture and the larger goal of open space maintenance, and perhaps put a bit of faith in these land stewards who want nothing more than to see their land thrive and their grandchildren take over the family ranch when the current generation is no longer able. We implore you to consider this partnership with agriculture when interpreting and developing policy and take the time to understand the issues important to ranchers and farmers in California's Coastal Zone and throughout the state.

Definition of Development

We were interested to read CCC staff's Background Report for the workshop on agriculture in the Coastal Zone (http://documents.coastal.ca.gov/reports/2013/5/W3-5-2013.pdf). This is an important compendium of information detailing Coastal Act requirements and Coastal Commission actions with respect to the protection of agricultural lands along the coast, uses of agricultural land, regulation of agricultural activities and protection of natural resources.

First, it cannot be understated that adaptation and diversification are the cornerstones of survival for all food producers. Many coastal counties' dairy industries are in crisis. Sheep and cattle ranchers are struggling under high input costs, increasingly frequent drought, a languishing economy, and international competition. Coastal ranchers and farmers must be able to respond quickly to these challenges, without the risk and uncertainty of going through a time-consuming permit process.

We understand that the cornerstone of the California Coastal Act, and all LCPs adopted pursuant to the Act, is the definition of *development.* This broad definition has been liberally interpreted by the Commission. And yet, more and more we are finding that application of this definition to common agricultural practices is becoming harmful to Agriculture itself, undermining the various agricultural protection policies contained in the Coastal Act.

The Coastal Act specifically recognizes the benefits of coastal agriculture, and the need to protect from urban development pressures, yet the preservation of agriculture depends upon the ability to maintain infrastructure, and vary and rotate crops to optimize land productivity and protect natural resources.

The definition of *development* includes changes in the density or intensity of land use and the use of water, which are planning concepts normally associated with urban type development. When applied to agriculture, however, this broad definition has negative impacts on traditional, sustainable, and routine agricultural activities.

The definition of *development* is also defective when applied to agriculture, since it only provides an exemption for the *harvesting* of major vegetation for agricultural purposes, but not the *planting* of major vegetation, its natural corollary. As it is currently interpreted, farmers and ranchers are required to obtain development permits to plant or change the crops that they grow, to increase or decrease the number or type of animals they graze, to re-grade a road following a storm or a slide, to repair pipes or conduits, and to put up a new fence.

While it is true that the Commission granted a limited number of categorical exclusions for agricultural practices in the 1980s, the recent trend has been in the opposite direction: heightened scrutiny of normal agricultural operations, and an expectation that ranching and farming activities be subject to coastal development permitting.

This overly broad definition of development needs to be changed to include agricultural planting along with agricultural harvesting. The Coastal Commission should not be in the business of making management decisions for farmers and ranchers.

An additional concern is that absent a permit application, normal agricultural activities could be interpreted as violations of a local LCP and the Coastal Act, if a whistleblower were to report them, resulting in potential sanctions, fines and penalties.

Agricultural Uses and Permitting

The Background Report cites various categorical exclusions the Commission approved for local jurisdictions in the 1980s, but wrongly concludes that there are no such exclusions that could apply statewide. We disagree. We believe that, consistent with the agricultural and natural resource protection policies contained in the Coastal Act, there can be statewide exemptions for a number of routine agricultural practices, including changes in cropping schemes, agricultural production operations, construction of barns and other out-buildings, and water use where water rights have been adjudicated or established by long-standing practice.

We further believe that there are specific land uses that can enhance the viability of agriculture operations without adversely affecting coastal resources, and that limited reviews under the Coastal Act should be warranted. These include the processing and sales of agricultural products, private recreation and education uses, limited residential uses, and agriculture-compatible resource and open space uses (Attachment #1, Recommendations of Agricultural Uses, provides for definitions and detailed lists of recommended allowances for various land uses).

Local Control

Coastal Commission actions must rely on local governments' expertise and knowledge about the local character of agriculture and the need for flexibility because of the differences up and down California's coast. When the Legislature mandated the preservation of agriculture, they were not simply referring to *prime agricultural land*, as there is little prime agricultural land within the Coastal Zone. Many of the State's significant crops, like grapes, thrive in *non-prime* soils.

We believe that local governments should maintain their autonomy to craft policies with respect to agriculture that will serve as the means to accomplish Coastal Act legislation. Section 30500(c) of the Coastal Act expressly states that **"[t]he precise content of each local coastal program shall be determined by the local government."** Of course, consultation with and approval by the Coastal Commission is required. *But* the Commission's role is strictly limited to ensuring that an LCP is consistent with the Coastal Act. Section 30512.2(a) of the Act clearly states: **"[T]he commission is not authorized by any provision of this division to diminish or abridge the authority of a local government to adopt and establish, by ordinance, the precise content of its land use plan."**

The reasoning behind the language in the statute is clear. Local elected officials understand, far better than the Coastal Commission or its staff, the needs of their own constituents. Local elected officials, with the input of their constituents, are charged with making those policy choices that best suit the needs of their communities, while at the same time respecting the fundamental rights of their landowning constituents. The Commission must acknowledge each county's unique differences (Please see Attachment #2 - CCA Policy regarding the Coastal Commission).

Conservation and Agricultural Easements

Ultimately, CCA wants to see Coastal Commission decisions that promote the sustainability of agriculture, while also considering the importance of property rights as protected by the Federal and State constitutions.

Agricultural conservation easements should not be required as a condition for permit approval. An agricultural easement is not necessary to sustain agricultural production, and there is nothing whatsoever in the Coastal Act requiring easements. Many farms and ranches choose to operate without an easement. Farmers and ranchers, both in and out of conservation contracts, have been excellent stewards of the lands and have protected the natural habitats and open spaces that the public and the Coastal Act value.

The Coastal Commission's ongoing determinations that permanent agricultural conservation easements and covenants should be required as a condition for development or subdivision are too broad from both a policy and legal perspective. While the objective of protecting and enhancing agricultural use is admirable, the mandatory nature of the mechanism proposed by this policy is poor policy and legally suspect. To eliminate the potential for misinterpretation and confusion, we therefore propose the following policy for clarity regarding public access, agriculture and conservation easements:

> If, and to the extent consistent with, state and federal laws requiring a proper nexus and proportionality for such requirement, permanent agricultural conservation easements may be required.

In practice, the Coastal Commission would require the imposition of a permanent agricultural easement for every *development*, including land division, in the Coastal Zone. The range of actions that would be subject to this policy is greater than those developments and subdivisions that might justify the condition of an agricultural easement.

By having a mandatory requirement that is broader than its justification, the requirement is inappropriate as a matter of policy and could run afoul of the Constitution. As a practical matter, good policy should not use any *development* as an excuse to require the imposition of a permanent agricultural conservation easement. Rather, agricultural conservation easements should only be required when the nature of the development justifies the onerous obligation of placing a permanent easement on the land.

This practical approach not only makes for good policy, but is required by the U.S. Constitution. In *Dolan v. City of Tigard*, 512 U.S. 374 (1994), a landmark case in Fifth Amendment takings jurisprudence, the Supreme Court held that there must be "some sort of individualized determination that the required dedication is related both in nature and extent to the impact of the proposed development." Recent Commission actions do not provide for this sort of individualized determination, ensuring that the requirement bears a "rough proportionality" to the development, but place a blanket requirement, with a few exceptions, on all developments within the Coastal Zone.

In order to make for better policy, CCA suggests that Coastal Commission decisions reflect case law that has been established subsequent to the certification of many Local Coastal Programs that contained a requirement for easement donation. This would not only ensure that each development or division receive individualized attention, but also that a permanent agricultural conservation easement is only required in those instances where it was justified; thus making for better policy, and one that does not run contrary to the Constitution.

Public Access Easements

Trail proposals on agricultural lands are unnecessary and unproductive. According to the California Coastal Act, "The maximum amount of prime agricultural land shall be maintained in agricultural

production to assure the protection of the areas' agricultural economy..."[1] Any trail expansion should be located first on public lands before private property is taken and used for public trails. This will ensure that coastal county farmers and ranchers can continue to be productive. Because local County officials have consistently supported policies that respect the County's agricultural heritage, economic importance and culture, the Coastal Commission should reflect this.

CCA does not agree that acquiring additional trails to complete the proposed California Coastal Trail system is appropriate where it involves agricultural land, as supported by the California Coastal Act Section 30212, exempting the requirement to provide public access where "...agriculture would be adversely affected." CCA opposes public recreational trails on agricultural lands because trails "increase the likelihood of theft, vandalism, ecoterrorism, bioterrorism and create other problems for neighboring agricultural lands;"[2]

The Coastal Conservancy concurs. In its January, 2003 report, Completing the California Coastal Trail , trail alignment principles written by California Coastal Commission staff[3] state, "The trail must be located and designed with a healthy regard for the protection of natural habitats...private property rights...and agricultural operations along the way;"[4]

ESHA and ESHA Buffers

Overly-broad designations of ESHA and ESHA buffers, including wetland and streamside setbacks, restrict agriculture activities as well as agriculture -related development. We believe there needs to be recognition, coordination, and integration with the multiple jurisdictions that already are regulating resource protection (RWQCB, CDFW, Local Governments, DPR, CDFA, USACE, and others).

We are concerned that the definition of ESHA is so vague that its designation could take up all of the available agricultural land on the California coast. A habitat could receive an ESHA designation because it is "especially valuable."

CCA recommends:

- Clear standards and guidelines must be developed for ESHA designations so that they can be applied fairly and consistently.

- Language must detail specifically how the CCC will prove that an area is environmentally sensitive habitat. Landowners who would be burdened by this designation must be involved throughout this process.

- Language must concisely define the extent of an "area," and should include language that provides concise guidance on how to map the extent of a habitat area, other than to require a "site assessment."

- There must be a map or other pre-approved designation (made in public, with hearings and science, etc.) to which the CCC can refer that designates the property as such.

---

[1] California Coastal Act of 1976, Section 30241 Prime agricultural land; maintenance in agricultural production
[2] California Farm Bureau Federation Policies 2013 – Recreation
[3] Lee Otter, Central Coast District, California Coastal Commission, and Linda Locklin, Coastal Access Program, California Coastal Commission
[4] Completing the California Coastal Trail – Coastal Conservancy, January, 2003 - Principles for Designing the Coastal Trail – "Respect," pg. 16

- Include a provision that makes clear that *only* those areas specifically designated as ESHA at the time of a County's LCP approval will be deemed ESHA.

- Include a provision that requires the government (County or CCC) to pay just compensation for areas of property designated as ESHA, as mandated by Coastal Act Section 30010.

In addition, although "existing" agricultural uses are not considered an ESHA, if land lies fallow for a period of time due to any number of circumstances, this designation could be used to prevent a farmer from replanting or reintroducing grazing on land that had been used for agriculture at an earlier time. This is important because fallowing is often used as part of routine agricultural practices. The definition of ESHA should be expanded to include historical use and the use of fallowing.

If agricultural activities are interpreted as "ground disturbance" and "alterations" to ESHAs then they become coastal "projects" that are disallowed by this policy, and will put an end to farming and grazing on the California coast. If "ground disturbance" is considered a threat to an ESHA it would eliminate all of coastal California's small row crop farmers, as well as all large animal grazing. Normal, typical, routine agriculture activities and modifications that occur in the course of agricultural operations should be specifically excluded from being considered threats to ESHA.

Family farms along the coast, and all throughout the state, help to feed the country and the world. Many of these lands have been managed by the same families for generations, and blood, sweat, and tears have undoubtedly gone into the continued preservation of California's coveted open space. What many often forget is that these open spaces created by farming and ranching have been maintained as such without the burdensome regulations we see today. The agricultural community has an inherent obligation and desire to maintain the viability and sustainability of their land, but is finding it increasingly difficult to do so as strangling regulations choke these land stewards, eventually forcing them off the land.

Our membership has identified two other very important issues affecting agricultural viability, that of housing on agricultural lands and the so-called "protection" of visual resources and ridgeline views to the detriment of best agricultural management practices. Please see our discussion in Attachment #3: Other Important Issues.

The CCC must give consideration to the long term effects of interpretation and implementation of Act policies and recognize the existing commitment to sound land management that is demonstrated by our membership.

Respectfully submitted,

Tim Koopmann

Tim Koopmann

President
California Cattlemen's Association

Cc with Attachments:

The Hon. Governor Jerry Brown
Secretary of Resources, John Laird

Senator Noreen Evans
Senator Leland Yee
Senator Loni Hancock
Senator Jerry Hill
Senator Bill Monning
Senator Hanna-Beth Jackson
Senator Fran Pavley
Assemblymember Chesbro
Assemblymember Mark Levine
Assemblymember Rich Gordon
Assemblymember Mark Stone
Assemblymember Luis Alejo
Assemblymember Katcho Achadjian
Assemblymember Das Williams
Assemblymember Jeff Gorrell
Karen Ross, Secretary of the California Department of Food and Agriculture
Sandra Schubert, Deputy Secretary of the California Department of Food and Agriculture

* * *

Attachment #1

California Cattlemen's Association Recommendations:
Definition of Agricultural Uses, and
Allowed/Principally Permitted, Permitted and Conditional Agricultural Uses
in the Coastal Zone

a. Definitions

For the purposes of the Coastal Zone, agricultural uses shall be defined as uses of land to grow and/or produce agricultural commodities for commercial purposes, including, but not limited to:

1. Livestock and poultry - cattle, sheep, poultry, goats, hogs, rabbits and horses, provided that horses are not the primary animal raised on premises
2. Livestock and poultry products – including but not limited to milk, wool, and eggs
3. Field, fruit, nut, and vegetable crops - hay grain, silage, pasture, fruits, nuts, seeds and vegetables
4. Nursery products - nursery crops, cut plants
5. Aquaculture and mariculture
6. Viticulture
7. Vermiculture
8. Forestry

b. Allowed / Principally Permitted Uses. Use allowed by right. No Coastal Development Permit (CDP) required. Certain uses may be exempt or Categorically Excluded from permit requirements.

Allowed uses in the Coastal Zone include the following:

1. Agricultural uses including commercial gardening, crop production, dairy operations, beekeeping, livestock operations (grazing), livestock operations (large animals), and livestock operations (small animals);
2. Agricultural Exclusions from Categorical Exclusion Order: "Coastal Permit Notice of Exclusion."
3. All activities customarily accessory and incidental to b.1 and b.2;
4. Agricultural accessory structures that contain no residential use, but including barns, fences, stables, corrals, coops and pens, roads and utility facilities;

5. Agricultural activities that are accessory, incidental, in support of and compatible with agricultural production;
6. Agricultural processing facilities that do not exceed Use Permit waiver criteria;
7. Agricultural retail sales facilities (farm stands) that do not exceed Use Permit waiver criteria;
8. Agricultural Intergenerational Homes;
9. Agricultural farmworker housing;
10. Agricultural homestays, 3 or fewer guest rooms;
11. Bed and breakfast inns, with three or fewer guest rooms, appurtenant to and compatible with agriculture;
12. Agricultural educational tours (non-profit or owner/operator);
13. Home occupations with no employees;

c. Permitted Uses. CDP required. Master Plan, Master Plan Waiver, Precise Development Plan and/or Design Review may be required. No Use Permit Required.

1. Raising of other food and fiber producing animals not listed under (b) above;
2. If not otherwise constrained by an existing or proposed conservation easement or a Land Conservation Contract (Williamson Act), single-family dwellings consistent with planned zoning. This would allow for primary residences for the landowner and/or ranch manager, and additional dwelling units for intergenerational housing including mobile and modular homes.
3. Veterinary clinics and animal hospitals;
4. Hunting and fishing clubs on private property;
5. Private residential recreational facilities;
6. Nature preserves;
7. Renewable energy production projects, including solar, WECs, and mini hydro-electric systems, 2 or fewer;
8. Water conservation dams and stock ponds, if consistent with State and Regional Water Quality Control Board criteria;
9. Horses, donkeys, mules, ponies,
10. Group homes, 6 or fewer residents;
11. Guest houses (only allowed where a single-family dwelling is first approved);
12. Residential accessory uses and structures;
13. Residential care facility;
14. Room rentals;
15. Child day-care – small family day-care homes;
16. Storage, accessory;
17. Pipeline and utility lines;
18. Telecommunications facilities

d. Conditional Uses. Use Permit required.

Conditional uses in the Agricultural Production Zone shall be limited to the following:

1. Land divisions;
2. Mobile homes so long as they are used exclusively for employees or family members of the owner who are actively and directly engaged in the agricultural use of the land;
3. Additional single family dwellings, consistent with planned zoning, and if not constrained by an existing or proposed conservation easement or a Land Conservation Contract (Williamson Act);
4. Fish hatcheries and rearing ponds;
5. Stabling of more than five horses on ranches where horses are the primary or only animals raised;
6. Planting, raising, or harvesting of trees for timber, fuel, or Christmas tree production;
7. Facilities for agricultural processing that exceed Use Permit waiver criteria;
8. Facilities and sales of agricultural products that exceed Use Permit waiver criteria;
9. Mineral resource extraction;
10. Commercial or public campgrounds;
11. Public parks and playgrounds;

12. Equestrian facilities;
13. Construction or alteration, of gas, electric, water, communication, or flood control facilities, unrelated to an agricultural use, as approved by the appropriate governmental agencies;
14. Waste disposal sites;
15. Water wells or septic systems to serve development on adjoining land, only if the project would meet all of the following conditions: (1) it would not permanently remove land from agricultural use, (2) it would not involve the division of agriculturally zoned land and the parcel would remain in a size large enough to sustain current and future agricultural production, (3) it would improve the economic sustainability of the agriculturally zoned land, (4) it would not reduce existing water quality, (5) it would not interfere with existing or potential agricultural operation of the property, (6) it would not adversely affect water supply for the current or future agricultural use of the property, (7) it would not be in conflict with any Land Conservation Contract (Williamson Act) over the agricultural parcel, and (8) it would serve only existing structures;
16. Fish hatcheries and game reserves;
17. Mariculture / aquaculture;
18. Renewable energy production projects, including solar, WECs, and mini hydro-electric systems, 3 or more;
19. Hunting and fishing clubs, (Public);
20. Affordable housing;
21. Group homes, 7 or more residents;
22. Child day-care centers;
23. Child day-care – Large family day-care homes;
24. Public safety/service facilities;
25. Aboveground telecommunications facilities.

* * *

Attachment #2 - CCA Policy regarding the California Coastal Commission

California Cattlemen's Association's Coastal Commission Policy

12-12 CALIFORNIA COASTAL COMMISSION

WHEREAS, according to Section 30500 of the California Coastal Act of 1976 (amended as of 2009), each local government lying, in whole or in part, within the coastal zone shall prepare a local coastal program for that portion of the coastal zone within its jurisdiction, and, the precise content of each local coastal program shall be determined by the local government, consistent with Section 30501, in full consultation with the commission and with full public participation. (Amended by Ch. 1173, Stats. 1981; Ch. 1009, Stats. 1984.), and

WHEREAS, per Section 30512.2 of the California Coastal Act of 1976 (amended as of 2009), the following provisions shall apply to the commission's decision to certify or refuse certification of a land use plan pursuant to Section 30512: (a) The commission's review of a land use plan shall be limited to its administrative determination that the land use plan submitted by the local government does, or does not, conform with the requirements of Chapter 3 (commencing with Section 30200). In making this review, the commission is not authorized by any provision of this division to diminish or abridge the authority of a local government to adopt and establish, by ordinance, the precise content of its land use plan, and

WHEREAS, local governments, with full public participation, have a greater understanding than the State of the challenges facing agriculture and what is required in order for it to be viable, and an

appreciation for the values and benefits provided by the agricultural lands in their respective communities; now

THEREFORE BE IT RESOLVED, the California Cattlemen's Association believes the authority of the California Coastal Commission relative to agriculture and agricultural practices should be rescinded and returned to local government.

* * *

Attachment #3 - Other Important Issues

Housing on Agricultural Lands

Intergenerational Homes

Agriculture along California's coast line is composed almost wholly of family farms. Unlike other occupations, farming and ranching require generations of investment of both time and money, and to continue the work done by parents, children and grandchildren frequently step in to support the aging generation. In order to support the continuation and succession of family farms and ranches, the Coastal Commission should support intergenerational housing allowances on these lands without arbitrary limitations that prohibit and discourage multiple generations from continuing to tend to the land. If the homes can be built in a manner that both provides for the continued stewardship of the land, while maintaining habitat and open space, then the homes should be permitted, within the constraints of local zoning districts, of course. These decisions should not be arbitrarily set as blanket rules, but instead, should allow for flexibility within local government policy making.

Limitations on House Size

Unreasonably restricting the size of homes on large ranches and farms is discriminatory and unfair. Farm families are often large, with multiple siblings and generations, requiring adequate living spaces. Because the business office is often within the home, additional square footage is also required. Limitations on the aggregate of all residential square footage is an additional restriction that is patently unfair, and in most cases will be inconsistent with local zoning allowances when applied to larger acreage. The Coastal Commission's Executive Summary cites the *Marin County Agricultural Economic Analysis,* Strong Associates, November 2003 as justification for such limitations. This report was found to have substantial errors and flaws in its data, for instance interchanging market and assessed land values, which greatly undermined the report's conclusions. During the public hearing process for the county's general plan update, David Strong was brought before the Planning Commission and was unable to justify the data in his report.

Farmworker Housing

Housing for farmworkers and their families should be encouraged on ranches and farms and not limited by cumbersome permitting processes.

Second Units

The state encourages development of second units to increase the availability of low income housing by reducing government regulation. Second-unit law applies to localities in the Coastal Zone and Marin's LCP cannot make an exclusion for the C-APZ-60 zone. According to Government Code 65852.2(j), second-unit law shall not supersede, alter or lessen the effect or application of the California Coastal Act

(Division 20 of the Public Resources Code), except that local governments shall not be required to hold public hearings for coastal development permit (CDP) applications for second-units. As stated in correspondence, dated January 13, 2003 from the California Coastal Commission to all coastal communities, local governments in the Coastal Zone should amend their Local Coastal Program (LCP) to not require a public hearing in the consideration of second-unit applications. Further, local appeals should be handled in an administrative manner. Source: B1866, Government Code Section 65852.2 State Second Unit Law http://www.hcd.ca.gov/hpd/hpd_memo_ab1866.pdf.

Guest Houses

Guest houses are allowed in virtually all California zoning districts. It is not only discriminatory and a violation of equal protection, but also insulting to assume that farmers and ranchers in the Coastal Zone won't ever have out-of-town guests for whom they want to provide overnight accommodations from time to time without impacting the family's private space. They should be allowed.

"Protection" of Visual Resources and Ridgeline Views

The Commission must determine whether or not it wants to protect open space to the detriment of agriculture, as some actions severely hamper farmers and ranchers from a variety of practices that are necessary to ensure the continuation of their operations. It is not always reasonable that new structures be made near existing roads, and in fact, this may frequently be deleterious to agriculture. Those raising livestock want to ensure that their animals are away from the road, and thus, this provision ensures that the construction of any related facilities would be untenable.

We object to the notion that views of our agricultural lands somehow belong to others. The Courts have rejected the argument that the Coastal Act allows the Commission to completely ban any development that in any way impacts any view in the coastal zone.

The Act pointedly explained:
"[T]he Legislature [never] intended that permits be denied for all projects which infringed in any way, no matter how minimal, on any view, no matter how limited, for anyone, from any vantage point, no matter the proximity of unlimited and expansive views" *(Farr vs. the California Coastal Commission)*.

There's a potential problem with restrictions on development on the tops of hills, spurs and ridgelines, which are often the best places to locate certain agricultural accessory structures because of their visibility from the rest of the ranch and/or their exposure to certain weather elements. For instance, a hay barn along the top of a ridgeline is a more preferable location for drying out baled hay than in a lower, less ventilated area. An arbitrary height limit would also compromise the usefulness of such a building. "Viewsheds" that are being protected are created by the stewardship of the landowner, who should be allowed the flexibility to construct structures that are compatible with the agriculture operation. The public is not entitled to prevent any development simply because they may not wish to look at it. The Commission should make exceptions for agricultural accessory structures.

May 6, 2013

California Coastal Commission
c/o Elizabeth Fuchs
Elizabeth.Fuchs@coastal.ca.gov

Subject: Workshop on Agriculture in the Coastal Zone

Honorable Commissioners:

On behalf of the undersigned coastal county cattlemen's associations, we appreciate the hard work you and your staff have devoted to the upcoming workshop on agriculture in the coastal zone of California. We are particularly impressed with the diversity of speakers who will make presentations, and we look forward to engaging in a vigorous discussion.

We hope that workshop will serve to foster a long-term dialog between the various agricultural interests throughout the state, along with local and state agencies with regulatory involvement in coastal agriculture, and interest groups who seek to promote coastal agriculture and protection of precious natural resources.

The Commission background report for this workshop is a useful collection of information concerning the protection and regulation of coastal agriculture. What it fails to recognize, however, is one of the most important components of the Coastal Act; that the Act supports agriculture and goes to great lengths to ensure its protection. Unfortunately, agriculture is being strangled by the very regulations that the Act purports to use to preserve it.

It is clear that the Commission values the open space that agriculture provides, but the policy interpretations reflect that it is the farms, not the farmers that deserve preservation. We must be clear; farms can't exist without farmers and ranchers; which means that the Commission MUST protect our ability to continue our operations.

Unlike other types of landowners, farmers and ranchers are tied to the land. They have lived and worked generations to ensure the health and productivity of the land and their operations. Not only are farmers and ranchers in agriculture for the business (trying as it may be), they are in it for the lifestyle. These are not landowners who need to be persuaded to stay on their land and maintain their property for the open space values the Commission supports. Blood, sweat and tears have gone into these coastal agricultural lands, and one of the only things threatening the extinction of these operations is the continued regulatory pressure asserted by the Coastal Commission. We do not need to be saved from ourselves. Our need to develop on our property is based almost exclusively on the necessity to survive as agriculturalists.

The background report rightly notes that the Coastal Commission has a "strong record of protecting agriculture" and that "it appears there has been little urban expansion into unincorporated agricultural land area since passage of the Coastal Act." The report also notes,

99

however, that the Commission has directly, and through approval of LCPs indirectly, promulgated resource protection standards and policies to "any type of new development, including agricultural uses." but it is incorrect for the same resource protection standards and policies to be applied to all such *development,* broadly defined, without consideration for their vast differences. Agriculture is not and should not be considered in the same context as housing projects, hotel building or any other type of large scale development, and yet this is increasingly occurring in the coastal zone, and it is unnecessarily hurting agriculture.

For example, in a recent case cited in the background report (Magee and Brader) the Commission required that "wetlands and ESHA be buffered from the development envelope containing new agricultural development." What the background report failed to note was that this small agricultural operation was only approved on the condition that sheep grazing been subject to annual reporting to the Commission, adaptive management strategies be practiced in perpetuity, agricultural and conservation easements be recorded, and setbacks of more than 100 feet natural resource areas be established.

Such actions are unprecedented and very harmful to the continuation of agriculture in the coastal zone. In an op-ed piece following Commission approval of this project, Mr. Magee was quoted as saying that "If [I] didn't have a really good job in town it would have been game over long ago," estimating the 5-year-long process cost him $500,000.

Farmers and ranchers – who already operate on the narrowest of margins – are being confronted with ever-increasing requirements to obtain development permits for traditional farming practices. We believe and hope that the upcoming workshop will provide a forum for common sense solutions to the challenges facing coastal agriculture. If we are unable to work together to provide education about agriculture, we fear that the very resources you hope to protect, and that we have been stewarding for hundreds of years, will be paved over.

Sincerely,

Mendocino County Cattlemen's Association
Monterey County Cattlemen's Association
San Mateo-San Francisco County Cattlemen's Association
Sonoma- Marin County Cattlemen's Association
San Luis Obispo County Cattlemen's Association
Ventura County Cattlemen's Association

W3

Ventura County Cattlemen's Association
PO Box 683
Somis, CA 93066
www.venturacountycattlemen.org

May 1, 2013

Dr. Charles Lester, Executive Director
California Coastal Commission
45 Fremont Street, Suite 2000
San Francisco, CA 94105-2219

Subject: Workshop on Agriculture in the Coastal Zone

Dear Dr. Lester,

We appreciate the hard work you and your staff have devoted to the upcoming workshop on agriculture in the coastal zone of California. We are particularly impressed with the diversity of speakers who will make presentations, and we look forward to engaging in a vigorous discussion.

The Ventura County Cattlemen's Association is deeply committed to supporting all efforts to pursue solutions which will meet as many of the needs as possible for all the stakeholders. As agri-businessmen we understand the importance of listening to, and trying to understand, all suggestions in order to be able to stay in business, while also protecting our most valued commodity, which is our land and natural resources.

We hope that this workshop will serve to foster a long-term dialog between the various agricultural interests throughout the state, along with local and state agencies with regulatory involvement in coastal agriculture, and interest groups who seek to promote coastal agriculture and protection of precious natural resources.

The Commission background report for this workshop is a useful collection of information concerning the protection and regulation of coastal agriculture. What it fails to recognize, however, is one of the most important components of the Coastal Act; that the Act supports agriculture and goes to great lengths to ensure its protection. Unfortunately, agriculture is being strangled by the very regulations that the Act purports to use to preserve it.

It is clear that the Commission values the open space that agriculture provides, but the policy interpretations reflect that it is the farms, not the farmers that deserve preservation. We must be clear; farms can't exist without farmers and ranchers; which means that the Commission MUST protect our ability to continue our operations.

Unlike other types of landowners, farmers and ranchers are tied to the land. They have lived and worked for generations to ensure the health and productivity of the land and their operations. Not only are farmers and ranchers in agriculture for the business (trying as it may be), they are in it for the lifestyle. These are not landowners who need to be persuaded to stay on their land and maintain their property for the open space values the Commission supports. Blood, sweat and tears have gone into these coastal agricultural lands, and one of the only things threatening the extinction of these operations is the continued regulatory pressure asserted by the Coastal Commission. We do not need to be saved from ourselves. Our need to develop on our property is based almost exclusively on the necessity to survive as agriculturalists.

The background report rightly notes that the Coastal Commission has a "strong record of protecting agriculture" and that "it appears there has been little urban expansion into unincorporated agricultural land area since passage of the Coastal Act." The report also notes, however, that the Commission has directly, and through approval of LCPs indirectly, promulgated resource protection standards and policies to "any type of new development, including agricultural uses." but it is incorrect for the same resource protection standards and policies to be applied to all such *development,* broadly defined, without consideration for their vast differences. Agriculture is not and should not be considered in the same context as housing projects, hotel building or any other type of large scale development, and yet this is increasingly occurring in the coastal zone, and it is unnecessarily hurting agriculture.

For example, in a recent case cited in the background report (Magee and Brader) the Commission required that "wetlands and ESHA be buffered from the development envelope containing new agricultural development." What the background report failed to note was that this small agricultural operation was only approved on the condition that sheep grazing be subject to annual reporting to the Commission, adaptive management strategies be practiced in perpetuity, agricultural and conservation easements be recorded, and setbacks of more than 100 feet in natural resource areas be established.

Such actions are unprecedented and very harmful to the continuation of agriculture in the coastal zone. In an op-ed piece following Commission approval of this project, Mr. Magee was quoted as saying that "If [I] didn't have a really good job in town it would have been game over long ago," estimating the 5-year-long process cost him $500,000.

Farmers and ranchers – who already operate on the narrowest of margins – are being confronted with ever-increasing requirements to obtain development permits for traditional farming practices. We believe and hope that the upcoming workshop will provide a forum for common sense solutions to the challenges facing coastal agriculture. If we are unable to work together to provide education about agriculture, we fear that the very resources you hope to protect, and that we have been stewarding for hundreds of years, will be paved over.

Sincerely,

Tom Crocker, President,
Ventura County Cattlemen's Association

W3

CALIFORNIA COASTAL COMMISSION
631 Howard Street, San Francisco 94105 — (415) 543-8555

ACTION: STAFF RECOMMENDATION, ADOPTED BY 7-1 VOTE, OF CALIFORNIA COASTAL COMMISSION MARCH 19, 1981.

TO: STATE COMMISSIONERS AND INTERESTED PARTIES

FROM: LINDA BREEDEN, STAFF COUNSEL

SUBJECT: PUBLIC HEARING, STAFF BRIEFING AND PRELIMINARY RECOMMENDATION ON JURISDICTION OVER EXPANSION OF AGRICULTURAL ACTIVITIES INTO PREVIOUSLY NON-FARMED AREAS CONTAINING MAJOR VEGETATION

I. STAFF NOTE

Staff previously presented two other briefings on this subject (Exhibit 1). All Commissioners, but particularly representatives from the South Central region, requested staff to discuss this matter further with both local and state agricultural representatives and to return with suggested compromise avenues of approach. Staff has done so and has scheduled a Public Hearing in Santa Barbara in an effort to provide more opportunity for public comment.

II. BACKGROUND

Regional Commissions and local governments have been faced with defining the nature and type of agricultural developments requiring coastal permits under a clause in Section 30106 which defines development as "...removal or harvesting of major vegetation other than for agricultural purposes...." As discussed in Exhibit 1, a 1978 Attorney General's opinion has been widely interpreted to severely restrict the Commission's permit authority. Principally, the Opinion theoretically affected two types of activities which are described below:

1) a subsequent violation proceeding shows that the activity was conducted without "agricultural intent." In this case, the major vegetation has been removed and cannot be replaced. Damages or fines are inadequate to replace the resources that have been lost.

2) a subsequent violation proceeding shows that the activity was conducted with "agricultural intent," but regulation through the permit process could have protected coastal resources and assured long-term agricultural viability. For example, conditions restricting the activity away from steep slopes would have decreased both siltation and soil erosion.

Slides shown at the previous session illustrated that the theoretical affect has now actually taken place. Large areas of riparian vegetation and native oaks with substantial habitat value have been removed without coastal permits based to some degree on the exclusion developed in the Attorney General's Opinion. Siltation and soil erosion have both been documented in the vicinities of Lake Earl, Elkhorn Slough and Morro Bay. Technical Services has documented this conclusion in Exhibit 1.

103

III. RECOMMENDED COMPROMISE APPROACHES

1. Guidelines or Exclusions

If the Commission asserts jurisdiction over such activities, it could adopt guidelines describing the conditions which would result in permit requirements. Staff had originally proposed this approach in the wetland guideline. However, regional staffs and commissioners pointed out that the activities which should be regulated are not confined to expanded farm operations located in wetlands. Thus, the guideline was an inappropriate mechanism to consider the issue in any depth. Footnote 6 of the adopted guideline only briefly discusses this issue.

The Commission has shown much responsiveness to the needs of farmers through categorical exclusions. Based on express findings that such exclusions would not adversely impact coastal resources, as required in Section 30610(e), it has excluded many types of agricultural developments otherwise requiring permits. Exclusion Order #E-79-1 (North Coast), #E-79-7 (Central Coast) and #E-79-4 (South Central Coast), #E-79-4 (South Central Coast). Agricultural activities vary widely from region to region. An activity in one region may not adversely impact coastal resources at all and therefore be excludable. The identical activity may well be inappropriate to exclude from coastal permit requirements in another region. An example will be helpful. Wells do not require coastal permits under the agricultural exclusion applicable to North Coast. In contrast, the severe water shortage in South Central Coast made its exclusion inapplicable to wells. This is in direct response to the differing water conditions with the consequent impacts on coastal resources in the two regions. Due to the differing local environmental conditions, the wide variety of agricultural activities throughout the state, and the timeline applicable to the Local Coastal Programs, staff does not believe that a Statewide approach to major vegetation for new or expanded agricultural activities is appropriate.

2. Local Coastal Programs

Staff recommends that the Commission adopt a resolution asserting jurisdiction over new or expanded agricultural activities involving the removal of major vegetation on the basis of our analysis of regional experience, development in the Coastal Act, and the environmental impacts contained in pages 2 through 5 of Exhibit I. At the same time, the resolution should urge local governments and regional executive directors to carefully balance the important needs of agriculture and protection of coastal resources. As of this date many local jurisdictions, in reliance on a broad interpretation of the Attorney General's Opinion have neglected to weigh these sometimes competing policies of the Coastal Act. Thus, for example, the San Luis Obispo County LUP applies no specific resource protection standards to agricultural activities. It requires no coastal permits. Policy 8 of its agricultural policies only provides the following general guidance:

> AGRICULTURAL PRACTICES. Proper soil conservation techniques and grazing methods should be encouraged in accordance with 208 Water Quality standards adopted by the California Regional Water Quality Control Board.

Similar positions are currently taken in many other LUP's. Specifically Del Norte County's plan states:

> 11. Pursuant to Section 30105 (sic) of the Coastal Act the removal of vegetation for agricultural purposes is defined as non-development and therefore not regulated by the provisions of this chapter.

104

The Commission in its past decisions has not endorsed an interpretation of the Coastal Act which so broadly excludes agricultural activities from the coastal permits process. For example, the certified Santa Barbara LUP required permits for agricultural activities conducted on slopes 20% or greater. A general Commission policy statement on this subject is now essential. The Commission has previously considered this issue in many varying contexts. First, it has made decisions supporting staff's recommended approach in the LUP context as noted above. Second, it has decided this issue in a permit context. Thus, on March 4, 1981, the Commission determined that the Knox appeal (14-81, 44-80;and 335-80) raised no substantial issue and thereby allowed the North Coast Regional Commission to proceed with a violation action for the removal of riparian vegetation under the alleged intent of an agricultural propose. Third, the Commission has heard requests from the public for a decision (e.g., Ruth Lansford, 2/19/81, Commission meeting in San Diego).

> Local coastal programs should recognize the possible adverse effect of the removal of major vegetation on coastal resources. While Section 30106 incorporates a limitation on the need for a permit if the removal is for an existing agricultural purpose, an expansion of operation into uncultivated areas could be made subject to review in the local program.

In making the determination of whether a permit will be required, the following tests in the order stated are appropriate:

1. Does the activity involve the "removal of major vegetation'? To make this determination, the Commission recommends the following criteria:

a. Major vegetation should not include windbreaks planted by the farmer or similar vegetation which is functionally related to the agricultural activity, even though it may incidentally provide habitat. It also does not include crop rotation or the other activities described in Exhibit I at page 2.

b. Major vegetation includes grassland, coastal scrub, and riparian vegetation. Removal of small areas of these types of vegetation adjacent to existing cultivated operations need not be considered removal of "major" vegetation. How small is "small" depends on the locality, vegetation type, relationship to adjacent habitat, and relative uniqueness, but generally areas of less than ½ acre located next to existing cultivated fields is appropriate.

2. If the activity does involve the removal of major vegetation, is it "for agricultural purposes"? If the answer is no, a permit is required. If the answer is yes, go to Item 3.

3. If the activity does involve major vegetation and is for agricultural purposes, is itrpossible adverse environmental effects such that a coastal permit is necessary to protect coastal resources?

To make this determination, the Commission recommends the following criteria:

1. Steepness of slopes and the type of farming operation generally undertaken in the area. i.e., whether the expanded agricultural operation will be undertaken on lands of a texture or slope that would contribute to soil erosion.

105

2. Adjacency of expaned farming operations to wetlands, coastal streams, and watershed. Identification of the relationship of such activities to the coastal resources;

3. Natural resource value of the area to be cultivated, wildlife habitat, including riparian communities;

4. Effect of expanded operation on water resources and supply, given the priority of agricultural operations in the coastal zone;

5. Whether Soil Conservation Service has developed a soil management plan with the landowner or an overall area plan to include the effects of the agricultural activity on erosion; and

6. Whether the agricultural operation proposed will make provision for mitigating these concerns.

IV. RELATIONSHIP OF THIS DISCUSSION TO THE OTHER PORTIONS OF SECTION 30106 AND LOCAL GOVERNMENT'S GENERAL AUTHORITY TO REQUIRE PERMITS.

Staff's previous discussions emphasized that other portions of Section 30106 may well require coastal permits for activities discribed in this memo. For example, expansion of agricultural activities into non-farmed areas may involve significant "changes in the intensity of use of land or water" and hence be a development under the Coastal Act, even if it does not involve removal of "major vegetation." Likewise, Section 30005(a) of the Coastal Act authorizes local governments to enforce additional regulations by stating:

> No provision of this division is a limitation on any of the following:
>
> (a) Except as otherwise limited by state law, on the power of a city or county or city and county to adopt and enforce additional regulations, not in conflict with this act, imposing further conditions, restrictions, or limitations with respect to any land or water use or other activity which might adversely affect the resources of the coastal zone.

These comments are intended to put the regulatory authority of the Commission and local government into perspective. Commission action on this portion of Section 30106 in no way affects the Commission's regulatory authority under other portions of that Section or local governments authority outside the Coastal Act.

Final note should be made of a document "An Assessment of the California Coastal Planning Process" prepared by Assembly Office of Research in February, 1979 after the issuance of the Attorney General's Opinion at the direction of the Assembly Committee on Resources, Land Use and Energy, the Assembly office prepared a list of recommendations for Commission action. Recommendation 28 states:

> To prevent major environmental damage, the state Commission should consider including within the definition of "development," for purposes of the permit process, first time conversion of agricultural land from native vegetation to crop production (p. 62).

Staff believes that this recommendation can be interpreted as legislative direction for the adoption of this policy statement contained in this staff report and recommendation.

106

V. PRELIMINARY STAFF RECOMMENDATION

Staff recommends that the Commission adopt the following resolution:

A. The Commission hereby asserts permit jurisdiction over new or expanded agricultural operations that involve the removal of major vegetation in the coastal zone, based on findings included in the March 2, 1981 Staff Recommendation, incorporated herein by this reference, Exhibit 1.

B. The Commission, at the same time, recognizes the vital role that agriculture plays to the economy of the coastal zone and the fact that it is a priority use of land under the Coastal Act.

C. The Commission therefore adopts a policy position that recognizes the responsibility of local government and the regional commission to carefully weigh needs of the agricultural community and need to protect coastal resources both in Local Coastal Planning and individual permit decisions.

D. The Commission has sought to provide guidance to local government and regional commissions in balancing these needs by identifying a list of concerns to be considered in local permit and planning decisions.

nc

CALIFORNIA COASTAL COMMISSION
631 Howard Street, San Francisco 94105 — (415) 543-8555

March 2, 1981

TO: COASTAL COMMISSION

FROM: ROY GORMAN, CHIEF COUNSEL AND LINDA BREEDEN, STAFF COUNSEL

SUBJECT: JURISDICTION TO REQUIRE COASTAL PERMITS FOR REMOVAL OF MAJOR VEGETATION OTHER THAN FOR AGRICULTURAL PURPOSES, SECTION 30106

In preparing the wetlands guidelines and reviewing local coastal programs, State legal staff received numerous inquiries from local governments, regional staff, and others about the nature and type of agricultural developments requiring coastal development permits. In particular, these inquiries have asked about the Commission's interpretation of the clause in Section 30106 defining development as"....the removal or harvesting of major vegetation other than for agricultural purposes..." The State Coastal Commission has not interpreted this clause in permit decisions due, in large part, to a 1978 Attorney General's Opinion that broadly defines agricultural purposes to include activities such as grading, tree-cutting, and other types of major vegetation removal if conducted with the "intent" to begin new agricultural activities or expand existing agricultural operations into areas not previously farmed (Exhibit 1). The Opinion, in effect, sets up a presumption that all such activities do not require permits. The Regional Commissions can later determine if the operations were conducted with an agricultural "intent" by bringing a violation action after the major vegetation has been removed. A decision on whether to require a coastal development permit is a jurisdictional matter, and the Attorney General's office has previously advised the Commission that such issues are within the Commission's purview (e.g., Jurisdiction to Review the Conversion of Apartments to Stock Cooperatives, October 25, 1978). Staff first asks the Commission to carefully review the Attorney General's Opinion attached in Exhibit 1 and secondly to review the analysis herein. Staff then recommends that the Commission find that agricultural development which involves the removal of major vegetation to begin or expand agricultural croplands into areas not previously farmed requires a coastal development permit. Staff recommends that the Commission state that a permit is required prior to removal of major vegetation in such natural areas. Regional Commissions and local governments should be advised to regulate such expanded or new developments through the coastal permit process, not by later violations.

Major Conclusions of the Attorney General's Opinion

The Opinion addressed two key questions:

1. What is major vegetation?

2. What type of development can be classified as removal or harvesting for an agricultural purpose?

In answering the first question, the opinion broadly defined major vegetation looking to its size, extent, uniqueness, and relation to the environment in which it is located. It noted that the absolute size of a particular type of vegetation, such as a mature tree, could alone render it major vegetation. Eucalyptus trees and coastal sage scrub were cited as types of major vegetation. The Opinion emphasized that "major vegetation should be broadly defined"...because of the

Exhibit 1

rule that individual provisions of conservation and environmental protection measures must be interpreted broadly so as to ensure attainment of the statute's objective. (Friends of Mammoth v. Board of Supervisors (1972) 8 Cal 3d 247, 259-61)"

Looking to the second question, the opinion excluded from coastal development permit requirements not only those agricultural activities involving removal of major vegetation on existing agricultural lands, but also conversion of non-agricultural lands or expansion of agricultural operations involving the removal of major vegetation (including, "major" vegetation located in riparian areas, and wetlands). This exclusion directly contradicts the Friends of Mammoth Rule, just discussed. But the Opinion, nevertheless, concluded that the following activities could be for an agricultural purpose "depending on the facts:"

1) conversion of acreage, such as eucalyptus trees, to fruit trees
2) conversion of approximataly 30 acres of walnut trees to row crops
3) thinning of native vegetation and orchard trees to promote air circulation and convert acreage to row crops
4) replacement of mature lemon trees with younger lemon stock
5) thinning of an orchard to allow more vigorous growth of the remaining trees
6) conversion of areas of native vegetation to lemon or avocado trees

In order to determine if the given project is for an agricultural purpose, the Opinion looked to the applicant's intent at the time he removed the vegetation. Thus, the Opinion suggested, that "[f]or example an unreasonable time having passed since the removal of the eucalyptus trees in the first example, and no planting of the fruit trees, would tend to show, notwithstanding the "stated intent" of the landowner, that the trees were not in fact removed for the stated purposes."

For nearly 24 years, the Regional Commissions have been requiring permits according to the guidance given in the Opinion. For the reasons set forth in detail below, staff agrees that existing agricultural operations as in Examples 2, 4, 5 above, including harvesting, planting, and tending crops and crop-type conversions (e.g., orchards to grapes or lemon trees to avocadoes) are exempt from coastal development permit requirements, but staff disagrees with the Opinion insofar as it exempts from permit requirements the activities described in Examples 1, 3, 6 as the initiation, conversion, or expansion of agricultural activities into non-agricultural areas brought about by the removal of native, riparian or other non-agricultural major vegetation. Staff does not believe that the experience over the last few years, the Act or the references cited in the Attorney General's Opinion warrant such an exemption from the definition of development.

REGIONAL EXPERIENCE

Three regions report considerable clearing of major vegetation without coastal development permits. In North Coast timbered land has been cleared for the ostensible agricultural purpose of grazing. Recently, North Coast has processed violation/permit action on land previously cleared without a coastal permit.

This particular application/violation involves contiguous three-acre parcels cleared without a permit at different times totalling 20 acres or more. Presumably, the landowner cleared riparian vegetation in 3 acre increments in order to avoid the Forest Practices Act Management Provisions, as well as the Coastal Act. Cleared timber areas are located in riparian corridors where removal of vegetation has increased erosion in the watershed, and sedimentation in the watercourse. If permits had been required, conditions could have been imposed to enforce Sections 30231 and 30242 to protect the watershed and the claimed agricultural grazing purposes. Reasonable conditions could have included limitations of vegetation removal to slopes of less than 25% and prohibitions on vegetation removal in the rainy season. Agricultural use restrictions could have been imposed on the cleared land to assure that the area was in fact used for an agricultural purpose, rather than residential construction. Cleared timberland frequently has marginal grazing value unless it is reseeded immediately upon clearing. Reseeding could have been required as a permit condition. Thus, the North Coast violation leads to the conclusion that the claimed agricultural purpose of the original clearing was dubious. If the Regional Commission had acted on a permit application, it could have assured that the adverse environmental effects of the development were mitigated and that the agricultural purposes were protected and carried out. It can do neither in a later violation action. North Coast's experience overall has been an observed need to regulate the manner in which major vegetation is removed by permit conditions which protect coastal natural resources.

Central Coast has observed large lot conversions of native oak stands to actual legitimate agricultural row crop use. In one example, 300 native oaks located along a state scenic highway were removed without local or coastal development permits. If a permit had been required, selected trees located along the scenic highway could have been retained to protect Elkhorn Slough from increased siltation caused by the increased agricultural activity. Increased soil erosion and consequent siltation of Elkhorn Slough (an Estuarine Sanctuary) has been documented due to existing agricultural practices. (Vegetation Management Report, adopted by Commission for submission to the Legislature, March 21, 1979, at p. 52) South Central's experience has been comparable to Central Coast. (Final Regional Staff Summary, Santa Barbara County Land Use Plan, April 17,1980, p. 83) The South Central Region has observed much clearing of steep slopes and planting of lemons and avocadoes. Because of soil erosion on the slopes, Soil Conservation Service employees have informally commented that trees on the slopes may not live long and the areas may be the subdivisions of the future. Permitted developments could be conditioned to mitigate the erosion and thereby protect long-term agricultural viability. Soil Conservation Service staff familiar with the South Central area also confirm the regional staff observations that the Carpinteria valley farming operations have been expanding with knowledgeable reliance upon the Attorney General's Opinion.

The Meaning of Development in the Coastal Act

In arriving at its interpretation of agricultural purposes, the Opinion first examined Section 30106. It noted that several clauses expressly define certain agricultural activities as developments. For example, it found that construction of a silo or barn is development because it is included in the phrase "construction or a structure on land." Therefore, construction of a barn requires a permit. Thus, according to the Opinion, "...the Legislature did not intend to exempt all activities with agricultural purposes from the scrutiny of the permit process." (p. 3-4, Opinion) The Opinion conveniently omits any reference to clauses of Section 30106 which define development as "grading" or "removing ...

any materials." Clearly, the discing or cutting down of trees or other major vegetation in order to clear raw-non-agricultural land is included within that phrase. Likewise, removal of contiguous areas of vegetation, such as the 300 oak trees discussed earlier, involves such changes in the use of land, as to amount to a "change in intensity of use" and thus also is a development. The amount of water required to irrigate the strawberries to be grown on lands previously covered with oaks is merely one way in which the intensity of use is changed when native vegetation is replaced with row crops. "Changes in intensity of use of water" expressly requires a permit. Likewise, the later activities such as irrigation pipes, storage sheds all require a permit. For this reason, staff concludes that examination of Section 30106 as a whole supports a broader interpretation of "agricultural purposes," than is set forth in the Opinion.

The Attorney General's Opinion also relies on contemporaneous comments received during legislative hearings from the California Farm Bureau and Senator Jerry Smith. These comments are quoted at pages 4 through 6 of Exhibit 1. Farm Bureau comments expressly refer to "any change of crop to one which would not use both the land and water with equal intensity.". Change in that context must be taken to mean rotation from one crop to another on existing agricultural lands. Senator Jerry Smith comments that the Coastal Commission would not regulate agricultural operations or management practices, which include, but are not limited to types of crops to be cultivated, harvested, or processed; types of animals or poultry to be raised or processed; cropping patterns, irrigation, cultivation, or yield techniques. None of his cited examples refers or implies expansion of agricultural practies into non-agricultural lands by removal of major vegetation. Clearly, all examples cited by both commentators refer to on-going agricultural practices. Both comments support staff's interpretation, and not the Attorney General's Opinion. Neither comment implies that expansion of agricultural activities into non-agricultural areas is exempt from the permit process.

Environmental Impacts: Relation of the Opinion to Policies of the Coastal Act

The Coastal Act and the Coastal Plan clearly recognize agriculture as a priority use in the Coastal Zone (Section 30241, 30242; Plan, pages 54-61). The opinion cites the agricultural lands preservation policies as support for its interpretation of "agricultural purposes" and the consequent exemption of such activities from the permit process. These policies are authority according to the Opinion for a "policy of hands-off at least as to on-going coastal agriculture under 30242). The Opinion fails to mention that the policies to not in any way address areas which have never been under cultivation. Furthermore, the Opinion does not recognize that the permit process can actually aid and foster the protection of agriculture in the coastal zone. For example, permit conditions can assure the long term preservation of agricultural lands. Permit conditions can assure that new agricultural activities take place in suitable areas and will not cause erosion of topsoil and similar impacts that could adversely affect the long term productivity of agriculture. Permit conditions can minimize the conflicts between agricultural uses near urban areas and thereby aid the economic feasibility of agriculture by allowing it to remain close to urban markets. (See People for Open Space, Agriculture in San Francisco Bay Area)

The Opinion fails to recognize that unregulated expansion of agricultural development by removal of major vegetation can adversely impact the coastal zone in numerous ways. (Exhibit 2) In addition to its scenic qualities, major vegetation is a basic component of an ecosystem. It holds topsoil in place

111

and provides vegetative cover which prevents or retards soil erosion. It helps to prevent degradation of wetlands, streams and estuaries. It also provides habitat for plant and animal species. Once removed, siltation and consequently diminution of water quality may occur. A recent SWRCB publication discusses these and other adverse environmental effects agriculture in considerable detail. (See Exhibit 2) As indicated earlier, expansion of agricultural activities has taken place adjacent to Lake Earl, Elkhorn Slough, Morro Bay, and Carpinteria Marsh watersheds without coastal permits. All of these areas are listed in Section 30233(c) as wetlands deserving special protection under the Coastal Act. Because the legislature has found that the coastal zone is a distinct and valuable resource existing as a delicately balanced ecosystem and that permanent protection of its natural and scenic resources is of paramount concern, any exemption from permit requirements involving the risk of the types of adverse environmental impacts noted above must be clearly expressed in the Act (Section 30001).

The Attorney General's Opinion acknowledges that certain adverse environmental effects may result from agricultural activities. For example, the Opinion specifically notes that Section 30231 requires the Commission to protect the biological productivity of coastal waters by preventing the depletion of groundwater supplies. Thus, the Commission is "...to scrutinize major changes in water consumption associated with agriculture as might result from large-scale removal of native vegetation in the conversion of undeveloped land into agricultural use." If permits are not required, it is difficult to perceive how the Commission can scrutinize the matter. Section 30231 also refers to the importance of controlling runoff and maintaining natural vegetation buffer areas that protect riparian habitats. Staff believes that all of these portions of the policy should be addressed through the permit process, and not after the fact. In addition, the Attorney General's Opinion does not take into account other important resource protection policies of the Coastal Act, such as Sections 30233, 30240, and 30243. The Commission has repeatedly applied these policies in its permit and planning decisions and is currently considering draft guidelines on the subject. (e.g., Mello Bill Properties, Carlsbad Local Coastal Plan, September 19, 1980, Schulte 215-79, Leucadia Water Dt. 159-79.) None of the resource protection policies can by implemented if permits are not required for conversion or expansion of agricultural developments involving removal of major vegetation. By refusing to apply the policies to agricultural developments, the developments are elevated to a level of priority not even accorded to coastal dependent industries (e.g., such industries must mitigate adverse environmental effect to maximum extent feasible, through the permit process). Thus, important resource areas could be destroyed under the pretext of agricultural use and later converted to non-agricultural activities under PRC 30242. This scenario has actually occurred in some regions.

Other sections of the Coastal Act expresely supports staff's recommended interpretation of development. For example, Section 30610 specifically exempts repair and maintenance activities, single-family houses, and other types of development projects from Coastal Act permit requirements provided that such developments do not involve a risk of adverse environmental effect. Clearly, projects which do involve a risk of adverse environmental effect should per se be included within the definition of development unless there is express language to the contrary. We have shown that express language of Section 30106 does not support the Attorney General's conclusion. Thus, the Attorney General's Opinion conflicts with basic declarations and findings of the Coastal Act contained in Sections 30001, several resource protection policies of Chapter 3 and the exemption from permit requirements of Section 30610. For all of the above reasons, staff recommends that the Commission determine that its permit jurisdiction applies to conversion of non-agricultural lands to agricultural uses and expansion of agricultural operations if such activities involve the removal of major vegetation.

EVELLE J. YOUNGER
ATTORNEY GENERAL

STATE OF CALIFORNIA

OFFICE OF THE ATTORNEY GENERAL
Department of Justice
555 CAPITOL MALL, SUITE 350
SACRAMENTO 95814
(916) 445-9555

April 6, 1978

Mr. Michael L. Fischer
Executive Director
California Coastal Commission
631 Howard Street
San Francisco, California 94105

Dear Mr. Fischer:

Re: Opinion No. SO 77/39 I.L.

Your predecessor, Joseph E. Bodovitz, as Executive Director of the California Coastal Commission, requested our advice concerning the meaning of that part of Public Resources Code section 30106 1/ which defines "development" to include "the removal or harvesting of major vegetation other than for agricultural purposes. . . ." You have also asked that we consider the applicability of this statutory language to eight fact situations and determine whether any or all of them involve a "development" and thus require a permit under the 1976 California Coastal Act.

We conclude that whether any particular vegetation is "major" depends on its size, extent, variety, uniqueness, and relation to the environment in which it is located. If vegetation is major, its removal or harvesting constitutes a "development" and requires a coastal permit unless done in furtherance of an "agricultural purpose."

Referring to the factual situations forwarded, the following could be included in removal or harvesting of major vegetation "for agricultural purposes": conversion of

---

1. All statutory references are to the Public Resources Codes unless otherwise indicated.

113

EXHIBIT 1

acreage to fruit trees; conversion of approximately 30 acres of walnut trees for cattle grazing and row crops; thinning of native vegetation and orchard trees to promote air circulation and convert acreage to row crops; replacement of mature lemon trees with younger lemon stock; thinning of an avocado orchard to allow more vigorous growth and production on the part of the remaining trees; and conversion of areas of native vegetation to lemons or avocado trees. Where removal or harvesting of major vegetation is "for agricultural purposes" it is not a "development" within the meaning of section 30106. Whether the particular removal or harvesting in each case is for this purpose, however, will in each instance be a question of fact.

ANALYSIS

The Legislature has enacted a clause in section 30106 of the 1976 Coastal Act that defines "development" to include "the removal or harvesting of major vegetation other than for agricultural purposes. . ." The Legislature has not, however, defined the term "major vegetation" nor has it specified what constitutes "removal or harvesting . . . for agricultural purposes." We must therefore employ the rules of statutory construction to ascertain the meaning of this language.

In analyzing any statutory language, we begin with the fundamental rule that a court should determine the intent of the Legislature so as to effectuate the purpose of the law. In doing so, the court turns first to the words themselves, giving effect to statutes according to the usual, ordinary import of the language employed in framing them. When used in a statute, words must be construed in context, keeping in mind the nature and purpose of the statute where they appear. The various parts of a statutory enactment must be harmonized by considering the particular clause or section in the context of the statutory framework as a whole. (Moyer v. Workmen's Comp. Appeals Bd. (1973) 10 Cal.3d 222, 230.) Individual provisions of conservation and environmental protection measures, such as the Coastal Act, must be interpreted broadly so as to ensure that the objective of the statute is attained, but the result must not be unreasonable. (Friends of Mammoth v. Board of Supervisors (1972) 8 Cal.3d 247, 259-61.) Legislative history can also be used as an aid in determining intent. (See Moyer v. Workmen's Comp. Appeals Bd., supra, at p. 231.)

114

EXHIBIT 1 P.2

In applying these rules of construction to the clause in question, we must first look at the whole of section 30106, the immediate statutory context in which the language is found. Section 30106 provides:

> "'Development' means, on land, in or under water, the placement or erection of any solid material or structure; discharge or disposal of any dredged material or of any gaseous, liquid, solid, or thermal waste; grading, removing, dredging, mining, or extraction of any materials; change in the density or intensity of use of land, including, but not limited to, subdivision pursuant to the Subdivision Map Act (commencing with Section 66410 of the Government Code), and any other division of land, including lot splits, except where the land division is brought about in connection with the purchase of such land by a public agency for public recreational use; change in the intensity of use of water, or of access thereto; construction, reconstruction, demolition, or alteration of the size of any structure, including any facility of any private, public, or municipal utility; and the removal or harvesting of major vegetation other than for agricultural purposes, kelp harvesting, and timber operations which are in accordance with a timber harvesting plan submitted pursuant to the provisions of the Z'berg-Nejedly Forest Practice Act of 1973 (commencing with Section 4511).
>
> "As used in this section, 'structure' includes, but is not limited to, any building, road, pipe, flume, conduit, siphon, aqueduct, telephone line, and electrical power transmission and distribution line." (Emphasis added.)

Even a cursory reading of this section indicates that it contains language other than that in question which would define certain agricultural activities as "developments." For instance, the building of a barn, silo, or windmill would be ". . . on land . . . the erection of any . . . 'structure" or "construction . . . of any structure." That some agricultural activities are defined as developments and require a coastal permit is significant because it indicates that the Legislature did not intend to exempt all activities

115

Exhibit 1-23

with agricultural purposes from the scrutiny of the permit process.

The clause in question took its present form following a Senate Committee amendment to SB 1579 on April 29, 1976. The first version of the Beilenson Bill SB 1579 (the forerunner of the Smith Bill SB 1277 that became the 1976 Coastal Act) had contained almost the identical language as the enacted section 30106 except for the clause in question, which then read "the removal or harvesting of major vegetation." On April 21, 1976, the California Farm Bureau Federation criticized section 30106, as it then existed, in a written statement to the Senate Natural Resources and Wildlife Committee:

> "30106 -- Defines 'development' so as to include the moving of any irrigation pipe or watering trough, or taking a wheelbarrow load of gravel out of the creek for making stepping stones for the garden. It is far too broad and encompassing. It even includes any change of crop to one which would not use both the land and water with exactly equal intensity. Major vegetation is not defined. Can crops be harvested without a permit?"

In apparent response to this concern, the Committee succeeded in amending SB 1579 on April 29, 1976, by adding the language below following "removal or harvesting of major vegetation":

> ". . . other than for agricultural purposes or where such harvesting is in accordance with a timber-harvesting plan submitted pursuant to the provisions of the Z'berg-Nejedly Forest Practice Act of 1973 (Chapter 8 (commencing with section 4511) of Part 2 of Division 4)."

The term "kelp harvesting" was later inserted following "agricultural purposes." This language, as amended, was enacted into law under SB 1277 except for a minor change in the citation of the Forest Practice Act.

Having the Farm Bureau statement before it, the Committee proposed no changes in any language of section 30106 other than in the clause in question. The Legislature therefore must have realized and intended that any language

116

Exhibit 1 P. 4

of section 30106, other than that in the clause in question, that had previously applied coastal permit scrutiny to certain agricultural purposes would continue to do so.

This is significant because not all removal or harvesting of major vegetation alone accomplishes an agricultural purpose. In many instances, removal or harvesting is only preliminary to an additional activity or activities necessary to accomplish the agricultural purpose. Yet those additional activities may constitute developments under section 30106.

We will thus use a two-part framework for analyzing the clause in question. We will first discuss the meaning of "major vegetation." We will then discuss "removal or harvesting" that is for an "agricultural purpose."

In all our analysis of the undefined language in the clause in question, we shall be guided by legislative intent. We have already seen that this clause was amended apparently in response to Farm Bureau criticism. In doing so, the Legislature may have believed and intended that the amendment disposed of some of the Bureau's concerns. It may have also believed and intended that the existing language of section 30106 did not apply as broadly as the Bureau feared and therefore saw no need to amend all of the language. In sum, the Legislature may have believed and intended that section 30106, as amended, did not define as a "development" the moving a wheelbarrow load of gravel, or the change from one crop to another, or the harvesting of a crop.

That this was the Legislature's belief and intent is buttressed by the statement of State Senator Jerry Smith, the author of SB 1277, in the Senate Journal of August 31, 1976:

> ". . . During the debate on SB 1277, questions were raised relative to the interpretation of several provisions in the bill. Several of these questions have been dealt with in AB 2948. By including this letter in the Senate Journal, it is my purpose to clarify my intent, as the author of SB 1277, with respect to the remaining provisions. I have made these same statements of intent before both the Senate and Assembly Committees. Speaker McCarthy made similar representations, with my

117

EXHIBIT I - P.5

full concurrance, during the debate on this bill before the full Assembly.

". . . . . .

"The use of agricultural lands: SB 1277 does not, is not intended to, and should not be construed to authorize the coastal commission to mandate, prescribe or otherwise regulate agricultural operations or management practices (including, but not limited to: types of crops to be cultivated, harvested or processed; types of animals or poultry to be raised or processed; cropping patterns; irrigation, cultivation or yield techniques). . . ." (Senate Journal 1975-76, Regular Session, Volume 9, pp. 16967-68.)

We have already considered the language of section 30106, the immediate context of the clause in question. The larger context, the 1976 Coastal Act itself, is also instructive on the question of legislative intent. Sections 30241 and 30242 express a policy of hands off at least as to ongoing coastal agricultural activities:

"The maximum amount of prime agricultural land shall be maintained in agricultural production to assure the protection of the area's agricultural economy. . . ." (Emphasis added.) (§ 30241.)

"All other lands suitable for agricultural use shall not be converted to nonagricultural use unless (1) continued or renewed agricultural use is not feasible. . . ." (Emphasis added.) (§ 30242.)

On the other hand, the Coastal Plan found that:

"Agriculture Can Have Adverse Environmental Effects that Require Control. Agricultural operations may have such adverse effects as . . . removal of large areas of native vegetative cover (common in the development of citrus and avocado orchards), and heavy drafts on surface and groundwater supplies." (Emphasis added.) (California Coastal Plan, p. 55.)

118

EXHIBIT 1 - P. 6

This finding was expressed as policy in section 30231 of the Coastal Act:

> "The biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain optimum populations of marine organisms and for the protection of human health shall be maintained, and where feasible, restored through . . . preventing depletion of ground water supplies and substantial interference with surface water flow . . . ." (Emphasis added.) (§ 30231.)

To the extent that policies may conflict, the Coastal Act provides further:

> "The Legislature further finds and recognizes that conflicts may occur between one or more policies of this division. The Legislature therefore declares that in carrying out the provisions of this division such conflicts be resolved in a manner which on balance is the most protective of significant coastal resources. . . ." (Emphasis added.) (§ 30007.5.)
>
> "This division shall be liberally construed to accomplish its purposes and objectives." (§ 30009.)

With these provisions in mind, we can recognize and give account to a legislative intent to leave hands off coastal agricultural activity, especially in ongoing agricultural use of land, but also to scrutinize major changes in water consumption associated with agriculture as might result from large-scale removal of native vegetation in the conversion of undeveloped land into agricultural use. To the extent that these intents conflict, we believe they can be resolved by reasonable statutory construction that, on balance, is most protective of significant coastal resources.

1. Major Vegetation

"Vegetation" is a broad and inclusive term. Webster's Collegiate Dictionary defines "vegetation" as "The sum of vegetable life; plants in general. . . ." The real inquiry, therefore, is as to the meaning of "major."

119

EXHIBIT 1 P7

Webster's Seventh New Collegiate Dictionary defines "major" as "adj. . . . 1. greater in dignity, rank, importance, or interest 2. greater in number, quantity, or interest. . . 4. notable or conspicuous in effect or scope. . . ." Funk and Wagnalls Standard Collegiate Dictionary defines "major" as "adj. 1. Greater in quantity, number, or extent. 2. Having primary or greater importance. . . ." Finally, Black's Law Dictionary defines it as "Greater or larger. Zenith Radio Distributing Corporation v. Mateer, 35 N.E.2d 815, 816." It is apparent, therefore, that "major" refers to the importance as well as the size of the vegetation in question.

It is impossible to define "major" so comprehensively and precisely as to resolve all questions in advance. At best, we can list factors and parameters to be considered, noting that size and importance may be either exclusive or supplementary determinants in a particular case. The absolute size of a particular form of vegetation, as a large tree or perhaps any mature tree, could alone render it major. The relative size of a particular specimen in relation to the average size of its variety might make it major on grounds of size and importance (uniqueness). The total size or extent of a number of specimens of a particular variety growing together or found in large numbers in close proximity to each other could constitute major vegetation regardless of the size of each individual specimen.

If a particular specimen or variety of vegetation were deemed important, this could buttress considerations of size and extent or could render the vegetation major even without regard to size and extent. A particular specimen or variety might be unique to a certain area, not found anywhere else. Its location in a particular area might also render it major if, for example, it was necessary part of a scenic landscape or a wildlife habitat or in some other way part of an integrated environment that depended on its presence to preserve other coastal resources.

The question of what is "major" is one of fact in each case. The term "major vegetation" also appeared in section 27103 of the 1972 Coastal Act, and we gave informal advice that eucalyptus trees were obviously included within its meaning. We also informally advised that coastal sage scrub is "major vegetation" in that it is part of a vegetative community which provides habitats for certain plant and

120

EXHIBIT 1 P.5

animal species found only in certain coastal areas of Southern California. As to whether something like brush or any native ground cover is major vegetation, one would have to know its size, extent, and uniqueness, if any, and its relation to the environment in which it is located. We conclude, however, that "major vegetation" should be broadly defined in close cases because of the rule that individual provisions of conservation and environmental protection measures must be interpreted broadly so as to ensure attainment of the statute's objective. (Friends of Mammoth v. Board of Supervisors, supra, (1972) 8 Cal.3d 247, 259-61.)

2. Removal or Harvesting for Agricultural Purposes

Only if it is factually determined that the vegetation is "major" do we reach the second question, the meaning of "removal or harvesting . . . for agricultural purposes." Webster's Seventh New Collegiate Dictionary defines "agricultural" as "of, relating to, used in, or concerned with agriculture." It then defines "agriculture" as "the science or art of cultivating the soil, producing crops, and raising livestock." Black's Law Dictionary defines "agriculture" as "The cultivation of soil for food products or any other useful or valuable growth of the field or garden; tillage, husbandry . . . breeding and rearing of stock, dairying . . . . State v. Stewart, 190 P. 129, 131." The clause in question therefore excludes from the definition of "development" and the requirement of a coastal permit any removal or harvesting done for the purpose of cultivating the soil, producing crops, or raising livestock. In each case, this will be a factual question.

We have previously informally advised that removal and harvesting, which alone accomplishes an agricultural purpose or which leads to an agricultural purpose without intervening permit-requiring activities, would not require a permit, while removal or harvesting which is preliminary only, necessitating additional permit-requiring activities to accomplish the particular agricultural purpose, would require a permit. This conclusion was based on the fact that other "development" under section 30601 for agricultural purposes are not excluded and should be considered with major vegetation removal or harvesting for agricultural purposes in order to give effect to the intent of sections 30007.5, 30009 and 30231 and the above-quoted excerpt from

121

EXHIBIT 1 P

the Coastal Plan, to afford the greatest protection to significant coastal resources, consistent with the Act.

Further study of this matter, however, leads us to a contrary conclusion.

It is true, of course, that some major vegetation removal may, by itself accomplish an agricultural purpose, as, for example, the removal of trees to open areas for grazing of cattle or removal of orchard trees or plants to encourage or permit the growth of adjacent agricultural vegetation. It is also true that some major vegetation removal may contemplate additional activities, either requiring or not requiring a Coastal Permit, such as removal of native vegetation to convert the land to orchard, or other cultivated use. This distinction, however, no longer appears valid.

Section 30106 makes no such distinction. Any conclusion requiring a permit predicated on such a distinction, based on the above policies, would be based on inference as to the legislative intent drawn from these broad policies. On the other hand, the Legislature has expressly stated its intent in section 30106, by specifically providing "development" includes the "removal or harvesting of major vegetation other than for agricultural purposes." In such cases where specific terms of a statute might appear to conflict with general provisions found elsewhere in the statute, the Legislature's specific language is controlling. (Neubald v. Brock (1939) 12 Cal.2d 662, 669.)

The Legislature's apparent intent in excluding such vegetation removal while requiring permits for other defined "development" for agricultural purposes, was to allow the agriculturist to harvest and remove vegetation for agricultural purposes free of the controls under the Act applicable to other "developments", while protecting the other significant coastal resources through the regulatory measures applicable to the agricultural activities requiring permits. Such an interpretation is supported also by Senator Smith's letter, which indicated the intent of the Act was not to regulate agricultural operations or management practices, including "types of crops to be . . . harvested . . . cropping patterns . . . yield techniques." Supra.

In the present case, therefore, section 30106, having excluded removal or harvesting of major vegetation

122

EXHIBIT 1 P.10

for agricultural purposes, leaves as a question of fact whether any specific removal or harvesting of major vegetation is for an agricultural purpose, within the meaning of the Act.

This does not, however, suggest that the intervening steps between removal or harvesting and the ultimate agricultural use are not relevant in such a factual determination. The connection between removal or harvesting of the vegetation and the accomplishment of the agricultural purpose may, indeed, be so attenuated or indefinite as to render the removal or harvesting factually not "for an agricultural purpose" within the meaning of the Act. Another factor is whether the contemplated agricultural purpose is actually accomplished within a reasonable time of the harvesting or removal. Where other activities require a coastal permit to accomplish the agricultural purpose, the responsible party would be advised to obtain preliminary issuance of such permits to avoid the risk that subsequent denial of the permit would prevent the realization of the agricultural purpose for which the major vegetation was harvested or removed in the first place.

Whether the vegetation removed in the factual situations presented in fact constitutes "major vegetation" the removal of which would otherwise require a permit would, of course depend upon the number, size, uniqueness and importance of the vegetation and the other factors discussed above.

The purpose stated in each factual situation would appear to be reasonably designed to achieve an agricultural purpose, i.e., cultivation of the soil, producing crops or raising livestock. These purposes are generally accepted agricultural purposes resulting from the removal of vegetation: converting areas containing eucalyptus trees to fruit trees; conversion of mature walnut trees for grazing and row crops; thinning of a lemon orchard and removal of adjacent trees to promote air circulation and free acreage for row crops; replacement of mature lemon trees with young lemon trees; thinning of trees in an avocado orchard to allow more vigorous growth and production on the part of the remaining trees; and conversion of native vegetation to fruit trees.

Whether the particular removal or harvesting of the vegetation in each instance would fall within the exclusion is another matter, however, and would turn on the

123

EXHIBIT 1-P.11

facts. For example, an unreasonable time having passed since the removal of the eucalyptus trees in your first example, and no planting of the fruit trees, would tend to show, notwithstanding the "stated intent" of the landowner, that the trees were not in fact removed for the stated purposes. Reasons for the delay in converting the land to fruit trees would be relevant. Whether any activities necessary for the conversion of native vegetation to row crops or other agricultural vegetation have been undertaken and whether required permits for these activities (e.g., irrigation systems, access roads, supporting facilities, etc.) have been applied for or obtained, would also be relevant. Subsequent use of the property after the harvesting or removal of the vegetation would also be pertinent. These and other matters, such as statements of the responsible party and witnesses, would be relevant to show whether the trees were, in fact, removed for the stated agricultural purpose, or were, in fact, removed or harvested for some other purpose.

Very truly yours,

EVELLE J. YOUNGER
Attorney General

R. H. CONNETT
Assistant Attorney General

RHC:ag

124

EXHIBIT 1 - P.12

CALIFORNIA COASTAL COMMISSION
631 Howard Street, San Francisco 94105 — (415) 543-8555

EXHIBIT II

TO: COASTAL COMMISSION

FROM: ERIC METZ AND JOHN ZENTNER, TECHNICAL SERVICES DIVISION

SUBJECT: IMPACTS OF VEGETATION REMOVAL AND SUBSEQUENT AGRICULTURAL USES

Introduction

This appendix further documents the environmental effects associated with vegetation removal and its replacement by agriculture. Impacts can be divided into four categories: the on-site impacts from removal of the vegetation, the off-site impacts of that removal, the impacts associated with agricultural uses on the site and the off-site impacts of the agricultural use.

Vegetation removal: on-site impacts

The immediate effects of vegetation removal are the loss of habitat and forage for resident and transient species and degradation of views across the site. The two major non-immediate effects are decreased groundwater recharge and increased erosion. Once the vegetation is removed, the infiltration of water into the ground is significantly reduced. With infiltration reduced, a higher percentage of precipitation runs off, leaving less water available for plant growth or groundwater recharge. The vegetation also holds the soil in place. Without the plant cover, much of the top soil may be lost through erosion. This problem is especially acute in Santa Barbara County where lands with slopes of 50% or more have been stripped and planted in avocados. Gullies four feet deep have been observed on these sites (State Water Resources Control Board, 1977).

Vegetation removal: off-site impacts

When the vegetation is removed, increased runoff causes more flooding, erosion and other impacts downslope. Soil carried into a watercourse causes increased turbidity (cloudiness) which, because of the heat absorbed by these particles, increases water temperature and reduces dissolved oxygen levels. Increased sediment loads have led, especially along the coast, to serious reductions in the number of trout (Hollman, 1975). The disappearance of cutthroat trout in Chorro Creek in San Luis Obispo County has been blamed on water-borne sediment (California Association of Resource Conservation Districts, 1979). Sediment will also reduce fish populations by smothering bottom-dwelling invertebrates, an important food source, and by silting over the clean gravel needed to successfully lay eggs. (EPA, 1979).

These sediment loads will also act to build up the stream bed. As sediment is deposited in the stream, the bottom, or bed, is raised and flood flows are pushed out, increasing the floodplain and endangering developments previously considered safe.

125

Sooner or later, much of the sediment eroded off the hillside ends up in a wetlands. Shenk (1971) summarized the effects of these sediments in wetlands as: destruction of nursing and spawning areas, creation of anaerobic conditions (oxygen deficit), loss of submerged vegetation, loss of some primary productivity and increased mortality rates for all organisms. Macdonald (1977) estimated that, prior to European settlement, sedimentation rates in coastal wetlands were less than 0.1 cm per year, now they are averaging 0.2 to 0.3 cm per year. Bascom (1980) and others have stated that, at the present rates of sediment depostion, many Southern California lagoons have about 40 to 50 more years of existence.

Agricultural use: on-site impacts

Agricultural uses can provide habitat and minimize soil erosion if properly sited and managed. Cover crops such as alfalfa can actually reduce soil loss and increase soil productivity. Much of the agricultural expansion which has occured in the South Central and North Regions, though, consists of native vegetation being replaced by either avocado and lemon orchards (South Central) or by grasslands for grazing (North). The orchards are usually farmed by weedfree nontillage which leaves large areas of soil exposed and, according to local Soil Conservation Service representatives, has resulted in massive soil losses in Santa Barbara and Ventura Counties.

Replacement of native vegetation with grasslands seems to inevitably lead to overgrazing and the concommitant soil loss or slope failure, encouraging gully and sheet erosion. Sheet and gully erosion in the North Coast watersheds was responsible for 5052 acre-feet of sediment loss in one year (US Department of Agriculture, 1972).

Agricultural use: off-site impacts

Once the site has been converted to agriculture, the use of fertilizers and pesticides seem unavoidable. Fertilizers are commonly made up of nitrogen compounds and other chemicals. The Department of Water Resources (1973) stated that the 81,000 acres of farmland in San Diego County were responsible, in 1970, for 136 tons of nitrates found in County waterways. These nitrates act as fertilizer in streams and wetlands, promoting algal growth which, under certain conditions, leads to rapid depletion of the dissolved oxygen (eutrophication) and results in massive fish and shellfish kills (Clark, 1977). Pesticides found in watercourses are generally suspected to be the cause of a wide variety of ecological problems, from the destruction of shorebird eggs to fish kills in wetlands (Winzler and Kelly, 1977).

Conclusion

Numerous publications document the conclusion that the coastal soils of California are highly erodable. The Department of Water Resources (1973) notad that, of the 25,001 square miles in coastal river basins, 66% have limitations for farm use because of erosion potential. Most of the coastal soils in Del Norte, Mendocino, Humboldt, Sonoma and Marin Counties were given a "severe" rating for erosion by the Resources Agency (1971). Generally, erosion is even more of a problem in Southern California where the relatively sparse vegetation, intense storms and steep slopes all combine to produce high sedimentation rates (Pendergaast, 1979). The Resources Agency (1971) rated the coastal soils of San Luis Obispo, Santa Barbara, Monterey and Ventura Counties as "very severe" for erosion. These factors, and the others discussed above, demonstrate that removal of major vegetation can cause significant impacts in the coastal zone.

EXHIBIT T - 2

126

STATE OF CALIFORNIA—THE RESOURCES AGENCY

GEORGE DEUKMEJIAN, Governor

CALIFORNIA COASTAL COMMISSION
631 HOWARD STREET, 4TH FLOOR
SAN FRANCISCO, CA 94105
(415) 543-8555
TDD ONLY (415) 896-1825

MEMORANDUM

May 1, 1987

To: Commissioners and Interested Persons

From: Ralph Faust, Chief Counsel; Mary Hudson, Staff Counsel

Subject: Interpretation of Coastal Act Agricultural Policies in Relation to Proposed Conversion of Agricultural Lands Through Amendment of Mendocino County Land Use Plan

---

I. ISSUE

Public Resources Code Section 30241.5 states a viability test for conversion of agricultural lands around the urban periphery when conversion is an issue in any local coastal program (LCP) or LCP amendment. The issue presented is whether the viability test of Section 30241.5 applies to agricultural lands other than prime agricultural lands. The issue arises because non-prime as well as prime agricultural lands in Mendocino County are proposed to be converted to non-agricultural use through amendment of the LCP.

II. CONCLUSION

By its terms, Section 30241.5 applies only to certain agricultural land conversions controlled by Section 30241(b); that is, "...conversions of agricultural lands around the periphery of urban areas,...where the viability of existing agricultural use is already severely limited by conflicts with urban uses." Because Section 30241(b) is not limited in its application to prime agricultural lands, Section 30241.5 is not so limited. Rather, Section 30241.5 applies to all agricultural lands on the urban periphery proposed to be converted through an LCP or LCP amendment.

127

ATTACHMENT II
Mendo. LUP Amend.
4g. Policy Interpretation
California Coastal Commission

III. DISCUSSION

The broad question under consideration here is whether Section 30241 of the Coastal Act applies in its entirety only to prime agricultural lands, or rather whether some elements of that section apply also to other agricultural lands, commonly called non-prime agricultural lands. Although this question has arisen in various ways over the years, the current impetus for its asking is staff's recent advice to Mendocino County that Section 30241.5, which states a viability test for conversion of agricultural lands at the urban periphery, applies to non-prime as well as prime agricultural lands.1/ At issue in Mendocino is the proposed amendment of the land use plan (LUP) to convert agricultural lands, both prime and non-prime, on the rural side of the urban-rural boundary to commercial use. Because Section 30241.5 applies only for conversions under Section 30241(b), the question of whether Section 30241.5 applies to non-prime as well as prime agricultural lands is controlled by the interpretation of Section 30241(b).

As discussed below, we conclude that Section 30241 does not apply exclusively to prime agricultural lands; that Section 30241(b) applies to conversions of all agricultural lands around the urban periphery; and that Section 30241.5 applies to all agricultural lands around the urban periphery when such lands are proposed to be converted through redesignation in an LCP. We believe these interpretations are supported by: (1) the clear wording of the sections in question, and (2) the overall sense of the sections, particularly when viewed in light of the economic and operational realities of agricultural uses.

The Coastal Act policies principally involved in this analysis are set forth below.

Section 30241:

> The maximum amount of prime agricultural land shall be maintained in agricultural production to assure the protection of the areas agricultural economy, and conflicts shall be minimized between agricultural and urban land uses through all of the following:

1/We note at the outset that of the approximately 300 acres of agricultural land proposed to be converted, of which about 15 acres is prime land. The County proposes that this small area should be treated the same as adjacent non-prime land, and that all of it should be evaluated under Section 30242. We know of no Coastal Act justification for disregarding these distinctions in all instances. However, in this instance, where conversion of lands on the urban fringe is an issue under Section 30241(b), as discussed hereinafter, the lands all should be analyzed under this same provision.

(a) By establishing stable boundaries separating urban and rural areas, including, where necessary, clearly defined buffer areas to minimize conflicts between agricultural and urban land uses.

(b) By limiting conversions of agricultural lands around the periphery of urban areas to the lands where the viability of existing agricultural use is already severely limited by conflicts with urban uses or where the conversion of the lands would complete a logical and viable neighborhood and contribute to the establishment of a stable limit to urban development.

(c) By permitting the conversion of agricultural land surrounded by urban uses where the conversion of the land would be consistent with Section 30250.

(d) By developing available lands not suited for agriculture prior to the conversion of agricultural lands.

(e) By assuring that public service and facility expansions and non-agricultural development do not impair agricultural viability, either through increased assessment costs or degraded air and water quality.

(f) By assuring that all divisions of prime agricultural lands, except those conversions approved pursuant to subdivision (b), and all development adjacent to prime agricultural lands shall not diminish the productivity of such prime agricultural lands.

Section 30241.5:

(a) If the viability of existing agricultural uses is an issue pursuant to subdivision (b) of Section 30241 as to any local coastal program or amendment to any certified local coastal program submitted for review and approval under this division, the determination of "viability" shall include, but not be limited to, consideration of an economic feasibility evaluation containing at least both of the following elements:

(1) An analysis of the gross revenue from the agricultural products grown in the area for the five years immediately preceding the date of the filing of a proposed local coastal program or an amendment to any local coastal program.

(2) An analysis of the operational expenses, excluding the cost of land, associated with the production of the agricultural products grown in the area for the five years immediately preceding the date of the filing of a proposed local coastal program or an amendment to any local coastal program.

> For purposes of this subdivision, "area" means a geographic area of sufficient size to provide an accurate evaluation of the economic feasibility of agricultural uses for those lands included in the local coastal program or in the proposed amendment to a certified local coastal program.
>
> (b) The economic feasibility evaluation required by subdivision (a) shall be submitted to the commission, by the local government, as part of its submittal of a local coastal program or an amendment to any local coastal program. If the local government determines that it does not have the staff with the necessary expertise to conduct the economic feasibility evaluation, the evaluation may be conducted under agreement with the local government by a consultant selected jointly by local government and the executive director of the commission.

Section 30242:

> All other lands suitable for agricultural use shall not be converted to non-agricultural uses unless (1) continued or renewed agricultural use is not feasible, or (2) such conversion would preserve prime agricultural land or concentrate development consistent with Section 30250. Any such permitted conversion shall be compatible with continued agricultural use of surrounding lands.

Section 30243:

> The long-term productivity of soils and timberlands shall be protected,...

a. Wording of Section 30241.

With respect to the wording of Section 30241, the term "prime agricultural land" appears in only the first clause and in one of the six subparts of the section. All other policy language refers to "agricultural land" or "agricultural uses." Specifically, the first clause provides, "the maximum amount of prime agricultural land shall be maintained in agricultural production...to assure the protection of the area's agricultural economy..." There follows a list of standards, contained in subparts (a) through (f), to be applied to conversions and other actions affecting agricultural lands. In all cases but one, these standards are not expressly limited to prime agricultural lands, but are stated as applying to "agricultural lands," "agricultural viability," or "agricultural uses." In the one exception, subpart (f), dealing with land divisions, "prime agricultural lands" are expressly addressed.

Under established rules of statutory interpretation, every word, phrase, or provision is presumed to be intended by the legislature to have meaning and perform a useful function. Bayer v. Suttle (1972) 100 Cal.Rptr. 212, 23

Cal.App.3d 361. Further, when the legislature has used differing language in several provisions of a statute, it is presumed that it did so purposefully and intended that the words be given differing meanings. Anthony v. Superior Court In & For Orange Co. (1980) 167 Cal.Rptr. 246, 109 Cal.App.3d 346.

Applying these rules to Section 30241, when the legislature used the term "prime agricultural land" in one place and "agricultural land" in another, it must be presumed that the same meaning is not to be given to the two terms. This is particularly true when within the section's six subparts referring to agricultural land, the term "prime agricultural land" is used in only one subpart, (f). If the terms were interchangeable, it would have been unnecessary for the legislature to have specified the applicability of subpart (f) to prime agricultural lands, and the word "prime" in that subpart would be excess wordage. It is a cardinal rule of construction that every word in a statute is presumably intended to have some meaning and that construction making some words surplusage is to be avoided. Watkins v. Real Estate Commissioner (1960) 6 Cal.Rptr. 191, 182 Cal.App.2d 397. Moreover, because the term "prime" appears in one subpart, it may not be inferred in the other subparts. Rich v. State Bd. of Optometry (1965) 45 Cal.Rptr. 512, 235 Cal.App.2d 591: Expression of one thing in a statute necessarily excludes things not mentioned.

Finally, and most important, the principles that require legislative enactments to be given their plain and express meaning may be abridged only when this is necessary to resolve statutory conflicts or to carry out a statute's legislative purpose. State Compensation Ins. Fund v. Industrial Acc. Commission (1961) 365 P.2d 415, 16 Cal.Rptr. 359, 56 Cal.2d 681; Santa Barbara Fed. of Teachers, Local 1081, AFL-CIO v. Santa Barbara High School Dist. (1977) 142 Cal.Rptr. 749, 76 Cal.App.3d 223. As discussed below, giving effect to the plain and express wording of Section 30241 produces a result harmonious with all sections of the Coastal Act and with its stated purposes relating to agriculture and land use.

b. Analysis of Policies' Operation.

With respect to the overall sense of the Coastal Act agricultural policies in light of the realities of agricultural uses: Sections 30241 through 30242 establish an overall scheme for protection of agricultural lands within the coastal zone. Section 30241 states the broad policy objectives, measures for implementing them, and standards to be applied to conversions of prime and non-prime lands in two specific situations: land surrounded by urban uses and land on the urban fringe. In the latter category, where the viability of agriculture is an issue, Section 30241.5 states a viability test applicable to conversion proposed through an LCP. Section 30242 states rules to be applied for conversion of "all other lands suitable for agricultural use," i.e., all conversions not addressed by the general Section 30241 policy against prime land conversions ("the maximum amount of prime agricultural land shall be maintained in agricultural production...") or the specific conversion standards of Section 30241 and 30241.5.

The basic Coastal Act program for protecting agriculture is laid out in the introductory paragraph of Section 30241, which states two primary objectives: (1) maintain the maximum amount of prime land in agricultural

production in order to maintain the maximum amount of prime land in agricultural production in order to protect the agricultural economy, and (2) minimize conflicts between agricultural and urban uses. This latter objective is applicable to all agricultural lands. Maintaining the maximum amount of prime land in agricultural use is of utmost importance in protecting the agricultural economy. The linkage between prime land production and local agricultural economy is directly stated in the first clause of Section 30241: "The maximum amount of prime agricultural land shall be maintained in agricultural production....to assure the protection of the area's agricultural economy." This precept reflects the fact that the productivity of prime land is often a key economic factor in the overall agricultural viability of an area. The relatively high economic yield of prime land attracts agricultural support services such as storage and processing facilities, maintenance and repair services, transportation, veterinarians, and labor pools, making these services available to less profitable farm operations.

The relationship is reciprocal, however, with the non-prime land operations enlarging and strengthening the market area for agricultural services and assuring their availability for all users. In addition, the non-prime lands often physically buffer the more valuable prime lands from conflicts with other uses. Thus protection of non-prime agricultural lands also serves to protect agricultural production on prime lands. Conversion and fragmentation of any agricultural land not only diminishes opportunities for economies of scale, but also increases the exposure of the remaining farm operations to conflicts with nearby urban users over such matters as noise, odor, pesticide use, smoke, and animals.

Under the Coastal Act, then, protecting prime agricultural land is not only an objective in itself, but is also the means of achieving the larger objective of protecting the agricultural economy. It is not, however, the only means to be used. The subparts of Section 30241 state several other standards which are to be applied to protect the agricultural economy and to further the other overriding objective of minimizing urban-agricultural conflicts. In terms of their sense as well as their wording, these standards - with one exception - apply to prime and non-prime lands alike.2/

2/The Coastal Act scheme for protecting agricultural lands is implemented, in part, through complementary provisions of the State Coastal Conservancy Act. (Pub.Res.Code Sections 31000 et seq.) Section 31054 of that statute charges the Conservancy with implementing "a program of agricultural protection... in the coastal zone within the policies and guidelines [of the Coastal Act]." Section 31150 empowers the Conservancy to "acquire fee title, development rights, easements, or other interests in land located in the coastal zone in order to prevent loss of agricultural land to other uses and to assemble agricultural lands into parcels of adequate size permitting continued agricultural production..." (Emphasis added.) This provision, like others in that act directed toward preserving and enhancing coastal agriculture, is not limited to prime agricultural land. Indeed, legislative

For example, subpart (a) requires establishing stable boundaries separating urban and rural areas and buffers to minimize conflicts between agricultural and urban land uses. Not only is the term "prime agricultural lands" not used, but it is obvious that this policy must have application for all agricultural lands. Stable boundaries could not be achieved by applying this standard only in those decisions involving prime lands. Moreover, prime and non-prime lands often occur in spotty patterns, so that - policy considerations aside - application of this subpart (a) to only prime lands would be highly impractical, if not impossible.

Similarly, subparts (d) and (e), neither of which uses the word "prime," can be read reasonably only to cover prime and non-prime lands. Subpart (d) requires developing lands not suited for agriculture before converting agricultural lands. Limiting this policy to prime agricultural lands would be inconsistent with the overall legislative policy of protecting agriculture, as reflected in the Coastal Act Sections 30241-3 and the State Coastal Conservancy Act (see footnote 2).3/ Subpart (e) does not deal directly with lands at all, but rather with agricultural viability, requiring that it not be impaired by non-agricultural development and, specifically, expansions of public services. Again, limiting this provision to prime lands would imply authorization of public service extensions which would impair non-prime agricultural operations. Such a result would be inconsistent with the stated agricultural protection objectives of Coastal Act Section 30241 and the

---

fn continued:

declarations in the Coastal Conservancy Act make it clear that the benefits of that statute are directed toward all agricultural land. Section 31050 provides:

> The Legislature finds and declares that the agricultural lands located within the coastal zone contribute substantially to the state and national food supply and are a vital part of the state's economy.

Section 30151 provides:

> The Legislature further finds and declares that agricultural lands located within the coastal zone should be protected from intrusion of non-agricultural uses, except where conversion to urban or other uses is in the long-term public interest.

3/ It may be noted that Section 30242 works as a complement to subpart (d) of Section 30241, providing additional standards which must be satisfied before conversion of "other lands suitable for agriculture."

Coastal Conservancy Act and would create potential conflicts with Section 30250, which limits new development to areas that are developed or have adequate public services.

In contrast, subpart (f), which deals with land divisions, is expressly addressed to "prime agricultural land." Recognizing the adverse effects of fragmentation of agricultural lands and the critical role of prime lands in the overall agricultural economy, this subsection states stringent requirements for approval of prime land divisions.

Now we come to subpart (b), which does not include use of the word "prime." This subpart is crafted for a very specific situation: Conversions of agricultural lands around the urban fringe. It limits such conversions to cases (1) where the viability of the agriculture is already severely limited by conflicts with urban uses, or (2) where conversion would complete a logical and viable neighborhood and contribute to establishment of a stable limit to urban development.[4/] This provision recognizes that in some areas at the urban boundary, conflicts with urban uses may already have impaired the viability of agriculture. For such agricultural lands, subpart (b) provides an "escape" from agricultural use. Given the Act's emphasis on protection of prime lands, and the greater probability of diminished viability for non-prime lands on the urban boundary, it would be illogical to apply this "escape hatch" policy only to prime lands. It may be argued that Section 30242 provides the "escape" for non-prime lands on the urban fringe. However, such an interpretation would be inconsistent with the objective of creating a stable urban-rural boundary, as reflected in various Coastal Act policies.[5/] This is because Section 30242 is addressed to conversions of lands suitable for agricultural use in all locations. It includes no direct requirement for considering the resulting stability of the urban limit, and in general provides a different

---

[4/] Until legislative changes in 1982, both of these tests had to be satisfied. (Chapter 43, Statutes of 1982.)

[5/] In addition to Section 30241(a), which calls for "establishing stable boundaries separating urban and rural areas...," several other sections deal with this issue. Section 30260 limits coastal-dependent industrial facilities to existing sites, except where there are overriding circumstances. Section 30250 sharply limits rural land divisions and also limits new residential, commercial, and industrial development to developed areas or, where they cannot accommodate it, to areas with adequate public services. This latter limitation indicates the perception that extending new public services to rural areas increases pressure for conversion to urban uses, thus destabilizing the urban-rural boundary. Consonantly, Section 30254 limits formation and expansion of special districts to accommodate only development needs consistent with the other policies of the Coastal Act.

standard of review than does Section 30241(b). Accordingly, control under Section 30242 of non-prime land conversions on the urban periphery could be expected to result in unstable urban boundaries.6/

It should be noted that subpart (c) of Section 30241, added in 1981 (Chapter 1066, Statutes of 1981), provides a similar "escape" for agricultural lands surrounded by urban development, provided that conversion would be consistent with specified standards. As with subsection (b), application of this subsection is not limited to prime lands.

In summary, the Coastal Act provisions on conversion of agricultural lands are as follows: Prime lands are to be maintained in production. Prime and non-prime agricultural lands either on the urban periphery or surrounded by urban uses may be converted if they satisfy standards stated in subparts (b) and (c) of Section 30241, respectively, as well as other applicable sections of the Act. All other lands suitable for agriculture may be converted only if conversion is consistent with Section 30242 and other applicable provisions of the Act. When an LCP or LCP amendment proposes conversion of any agricultural land on the urban periphery under the viability provision of Section 30241(b), the viability tests of Section 30241.5 also must be satisfied.

c. Past Application of Agricultural Policies.

Section 30241.5 did not go into effect until 1985, and we do not believe that the question of its applicability to non-prime agricultural lands has previously arisen in connection with Commission review of an LCP. However, the Commission has applied Section 30241(b) in review of a variety of LCP and permit matters over the years. These applications do not reflect a wholly consistent view of the role of Section 30241 in evaluating conversions of non-prime agricultural lands on the urban fringe. In a number of instances, the Commission has evaluated conversions of such non-prime lands under Section 30241(b), or has approved such an application indirectly through certification of LUP policies. In the Santa Barbara County LUP, for instance, the Commission approved under Section 30241 a provision that prohibits conversion of any agricultural land on the urban-rural boundary unless standards tantamount to those of Section 30241(b) are satisfied. In the LUP for Marin County Unit II, where all agricultural lands are non-prime, policies dealing with conversion to non-agricultural uses were evaluated by the Commission

6/ Notably, Section 30242 does not deal with "agricultural land," but rather with "all other lands suitable for agriculture." One of the tests for conversion of such land is that agricultural use cannot feasibly be continued or renewed. This wording indicates that the policy was intended to be broadly applied, even to land which is not in agricultural use.

under Section 30241. Similarily, San Mateo County's LUP allows conversion of non-prime lands only when a series of tests closely paralleling the elements of both Sections 30241 and 30242 can be satisfied. In particular, urban fringe conversions of all agricultural lands must satisfy the standards of Section 30241(b). The Commission evaluated these provisions in terms of both Sections 30241 and 30242.

On the other hand, in certifying some LUPs the Commission has adhered to evaluation of non-prime agricultural land conversions under Section 30242, reserving Section 30241 analysis for prime lands. Included in this group are the San Dieguito LUP and Carlsbad (Mello I). However, in these and other instances reviewed, there was no discussion of conversion of urban fringe agricultural lands and the policies that might be applicable thereto.

d. Response to Arguments of Mendocino County.

Taking exception to the conclusions stated above, the County of Mendocino argues that the California Court of Appeal concluded in Billings v. California Coastal Commission (1980) 103 Cal.App.3d 729, that Section 30241 applies only to prime lands, and that conversion of all non-prime lands is therefore controlled by Section 30242. A copy of the opinion of Mendocino County Counsel H. Peter Klein is attached to the staff report and recommendation on the County's request for resolution of the disagreement over information requirements. We believe the County misapplies the Billings decision, and that the case is inapposite to the issue at hand. The Billings landowners did not propose to convert to non-agricultural use, but only to divide the land while maintaining almost all of it in agricultural use through recorded covenants. In cases such as Billings the Act is, indeed, very clear: The application of Section 30241(f) is expressly limited to division of prime land. However, in the instant case, conversion is the issue. Further, the land in Billings was in a wholly rural area, far from the urban fringe. Thus the court was dealing with facts and questions of law different from those under consideration here. The court did not address the question of provisions applicable to urban fringe conversions. As a consequence, the view advanced here, that Section 30241(b) applies to such conversions of all agricultural lands, is not inconsistent with the statements of the court in Billings. The court's statements are not directly applicable and are not dispositive of the issue at hand.

Mendocino County further argues through the opinion of its counsel that by approving certain agricultural policies in the County's LUP, the Coastal Commission "has concurred with the County's interpretation." (Copies of the LUP policies accompany the opinion of the County Counsel.) We believe the County errs in this conclusion. Under Section 30512(c) of the Coastal Act, the Commission's review and approval of LUP amendments is controlled by Coastal Act policies, and not by the LUP. The fact that the Commission may have approved interpretations of the Coastal Act tailored for use in the context of an entire LCP through the local government permit process does not mean that those same interpretations are binding or even suitable for application by the Commission in amending the LCP.

Moreover, we disagree that the County's LUP certified policies, read together in the factual context of that plan, clearly represent the

construction of Section 30241 for which the County argues. LUP Policy 3.2-16, upon which the County relies in part, applies to conversion or division of all agricultural lands designated AG or RL. Policy 3.2-15, upon which the County also relies, applies to divisions, and not conversions of agricultural land. Neither these policies nor the other LUP agricultural policies exactly follow the patterns of the Coastal Act agricultural policies. Rather, they are adapted to local circumstances. An example of this is Policy 3.2-4, which states various standards for conversion of prime land and land under Williamson Act contract. Lands in the latter category are often non-prime lands, as is the case with much of the land involved in the disputed LUP amendment. In short, the effect of these policies can be evaluated only by reading them all together, and such a reading does not produce the conclusion that the Commission has agreed that Section 30241 applies in its entirety only to prime land.

Of dispositive importance, however, is the fact that the standard for the Commission's review of an LCP amendment cannot be the policies of the certified LCP. Rather, it must be the policies of the Coastal Act.