

# **The California nitrogen deposition initiative: funding weed management through mitigation.**

S. B. Weiss

Creekside Center for Earth Observation

Cal-IPC Symposium

Oct 5, 2013

# The Problem

- California is being over-run with invasive weeds
- These weeds reduce environmental quality
- Biodiversity
- Reduced rangeland/agricultural productivity
- Fire
- Allergies
- **Lack of consistent resources for management**



# Weed Management Issues

- WMA funding eliminated
- Consistent multi-year funding lacking
- One-time or short-term (2-3 years) does not work!
- Project mitigation is short-term, poorly monitored
- Does not necessarily address most critical weed management needs
- Loss of management “infrastructure,” expertise, equipment, site-specific knowledge
- **Need secure flexible long-term funding!**

# N-deposition link

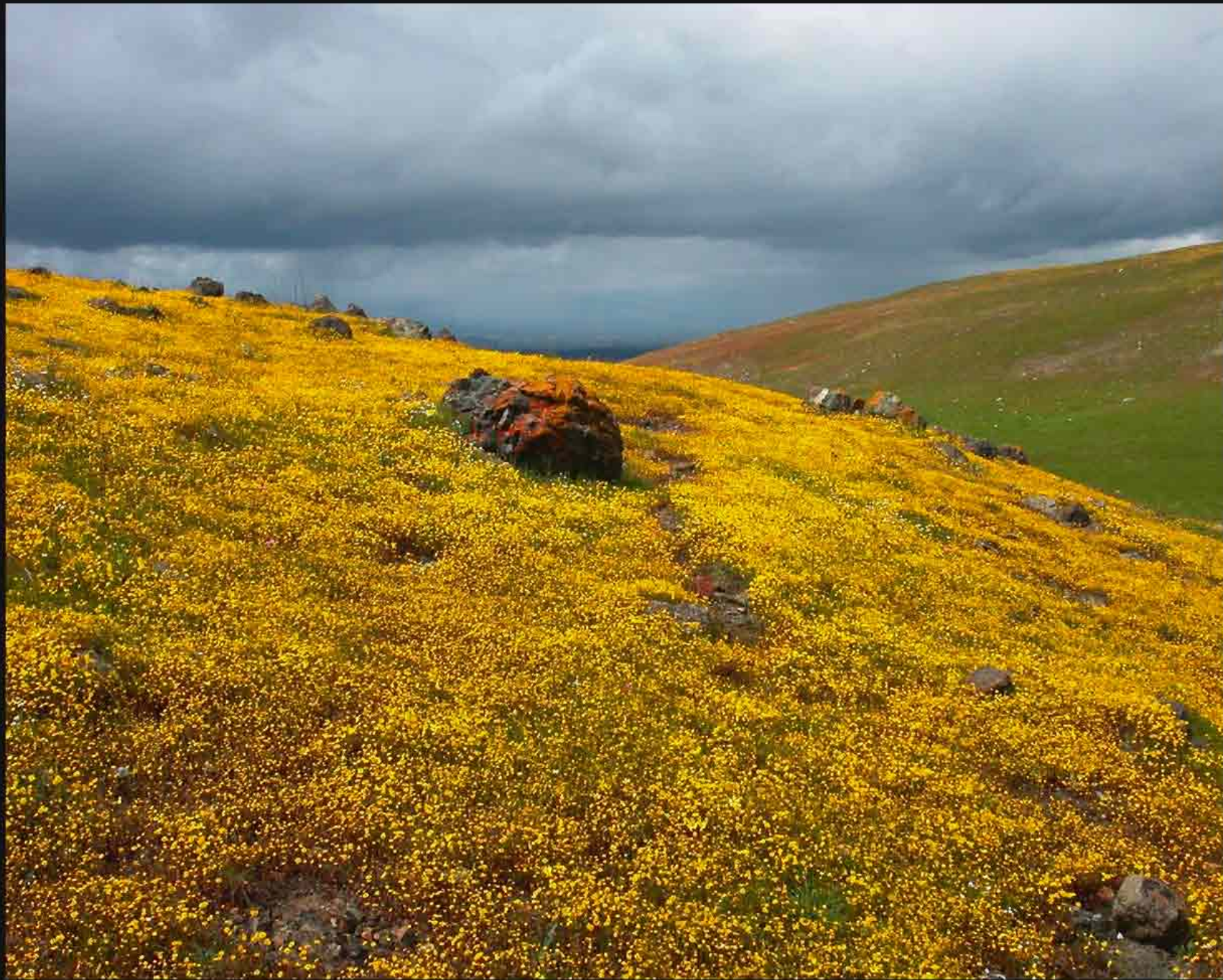
- Throwing fuel onto the fire
- Weed invasions are far worse with N-deposition























In absence of cattle grazing in South Bay, introduced annual grasses overrun habitat within several years (repeatable - too many times).

# N-side Tulare Hill 2002



# N-side Tulare Hill 2007



Dry Nitrogen Deposition  
Smog is slow release N-fertilizer





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## Cars, Cows, and Checkerspot Butterflies: Nitrogen Deposition and Management of Nutrient-Poor Grasslands for a Threatened Species

STUART B. WEISS

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**Abstract:** *Nutrient-poor, serpentinitic soils in the San Francisco Bay area sustain a native grassland that supports many rare species, including the Bay checkerspot butterfly (*Euphydryas editha bayensis*). Nitrogen (N) deposition from air pollution threatens biodiversity in these grasslands because N is the primary limiting nutrient for plant growth on serpentinitic soils. I investigated the role of N deposition through surveys of butterfly and plant populations across different grazing regimes, by literature review, and with estimates of N deposition in the region. Several populations of the butterfly in south San Jose crashed following the cessation of cattle grazing. Nearby populations under continued grazing did not suffer similar declines. The immediate cause of the population crashes was rapid invasion by introduced annual grasses that crowded out the larval host plants of the butterfly. Ungrazed serpentinitic grasslands on the San Francisco Peninsula have largely resisted grass invasions for nearly four decades. Several lines of evidence indicate that dry N deposition from smog is responsible for the observed grass invasion. Fertilization experiments have shown that soil N limits grass invasion in serpentinitic soils. Estimated N deposition rates in south San Jose grasslands are 10–15 kg N/ba/year; Peninsula sites have lower deposition, 4–6 kg N/ba/year. Grazing cattle select grasses over forbs, and grazing leads to a net export of N as cattle are removed for slaughter. Although poorly managed cattle grazing can significantly disrupt native ecosystems, in this case moderate, well-managed grazing is essential for maintaining native biodiversity in the face of invasive species and exogenous inputs of N from nearby urban areas.*

# Metcalf Energy Center, Tulare Hill

Large point source,  
but incremental  
effects in an already  
polluted region

*Precedent setting  
mitigation:*

131 acres + \$1.4  
million endowment  
+ 30-year operating  
expenses





## **Los Esteros Critical Energy Facility**

40 acres + \$400,000 endowment + 30-year  
operating expenses

## **Silicon Valley Power (City of Santa Clara)**

40 acres + \$270,000 endowment + 30-year  
operating expenses

Far away (20 miles), small cumulative  
impacts

**Two more powerplants in San Diego  
County**

# Widening Highway 101 – 540 acres mitigation + commitment to Habitat Conservation Plan



# **Santa Clara County Habitat Conservation Plan / Natural Communities Conservation Plan**

- Systematic conservation planning
- Partners: Santa Clara County, San Jose, Morgan Hill, Gilroy, Santa Clara Valley Water District, Valley Transportation Authority
- 6-year planning process, start 2005
- Final Approval January 2013
- Signing ceremony Oct. 3 2013
- *[www.scv-habitatplan.org](http://www.scv-habitatplan.org)*

# Habitat Plan Elements

- 50-year “Permit with mitigation”
- 19 species covered
- Serpentine grasslands a major target
- Red-legged frogs and CA tiger salamanders, other non-serpentine species
- Representative Natural Communities
- \$665,000,000 over 50 years (\$13 million/year) – development fees + grants + ongoing efforts
- Acquire and manage ~46,000 acres for covered species

# Nitrogen Deposition Fee

- Address cumulative impacts of development, urban infill
- Number of vehicle trips generated
- Small one-time fee per vehicle trip, totals \$34/housing unit (price of a doorknob!)
- Generate ~\$10,000,000 over life of plan
- Precedent setting, apply to projects outside Habitat Plan Area (Apple, Facebook, Google)



# Apple Spaceship ~\$200,000 N-deposition Fee





Antioch Dunes NWR (55 acres):  
Lange's Metalmark butterfly, Contra Costa  
wallflower, Antioch Dunes evening primrose



Currently ~7 kg-N/ha/year  
4 new gas-fired powerplants near NWR in  
addition to 6 already there

Lange's Metalmark Hostplant  
*Eriogonum nudum*



# Dunes?

## Heavily invaded by grasses



# Wild Equity Lawsuit Brings Millions of Dollars to Antioch's Communities, Endangered Species

07/08/2013 00:10:38

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**WILD** Equity  
INSTITUTE



Oakley \$2,000,000  
settlement  
One down, three to go?

## Lawsuit Launched to Protect Endangered Butterfly and Local Communities

07/24/2013 11:20:25

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**WILD** Equity  
INSTITUTE





Review

Nitrogen critical loads and management alternatives for N-impacted ecosystems in California

M.E. Fenn<sup>a,\*</sup>, E.B. Allen<sup>b,c</sup>, S.B. Weiss<sup>d</sup>, S. Jovan<sup>e</sup>, L.H. Geiser<sup>f</sup>, G.S. Tonnesen<sup>g</sup>, R.F. Johnson<sup>b,c</sup>, L.E. Rao<sup>b</sup>, B.S. Gimeno<sup>h</sup>, F. Yuan<sup>i</sup>, T. Meixner<sup>j</sup>, A. Bytnerowicz<sup>a</sup>

# California Nitrogen Deposition Initiative

\$\$\$\$\$\$\$\$... for Weed  
Management

# Activism

- Develop standard language for CEQA and ESA consultations that can be entered as public comments on documents
- Integrate mitigation into CEQA projects with large traffic increases and large point sources
- Road projects (Caltrans) – disturbance and fertilization = more weeds
- Integrate mitigation into Regional Habitat Conservation Plans and NCCPs such as in Butte County.
- **CNPS Chapters**



# Education

- Develop materials (web pages, brochures, presentations, and workshops).
- Present to regulators (USFWS, CDFW, CEC), elected officials, staff, other NGOs, activists, consultants, and public.
- **Cal-IPC, Creekside**

## Atmospheric nitrogen pollution in Santa Clara Valley

A threat to our  
land, air, and water

Sources, impacts, and  
management solutions



Loma Prieta Resource Conservation District  
[www.LomaPrietaRCD.org](http://www.LomaPrietaRCD.org)

Creekside Center for Earth Observation  
[www.CreeksideScience.com](http://www.CreeksideScience.com)

# Legal and policy research

- Document legal and policy precedents
- Identify governmental mechanisms and chart a route through them, CEQA, ESA
- Legislation needed?
- Assess how much money can be generated, find the sweet spot
- Funding goes to WMAs or other stewardship groups, build endowments?
- Critical loads and cumulative impacts
- Ammonia is not regulated
- **CNPS State, Wild Equity Institute**

# Operation Flower Power: The Ultimate Grassroots Lobbying

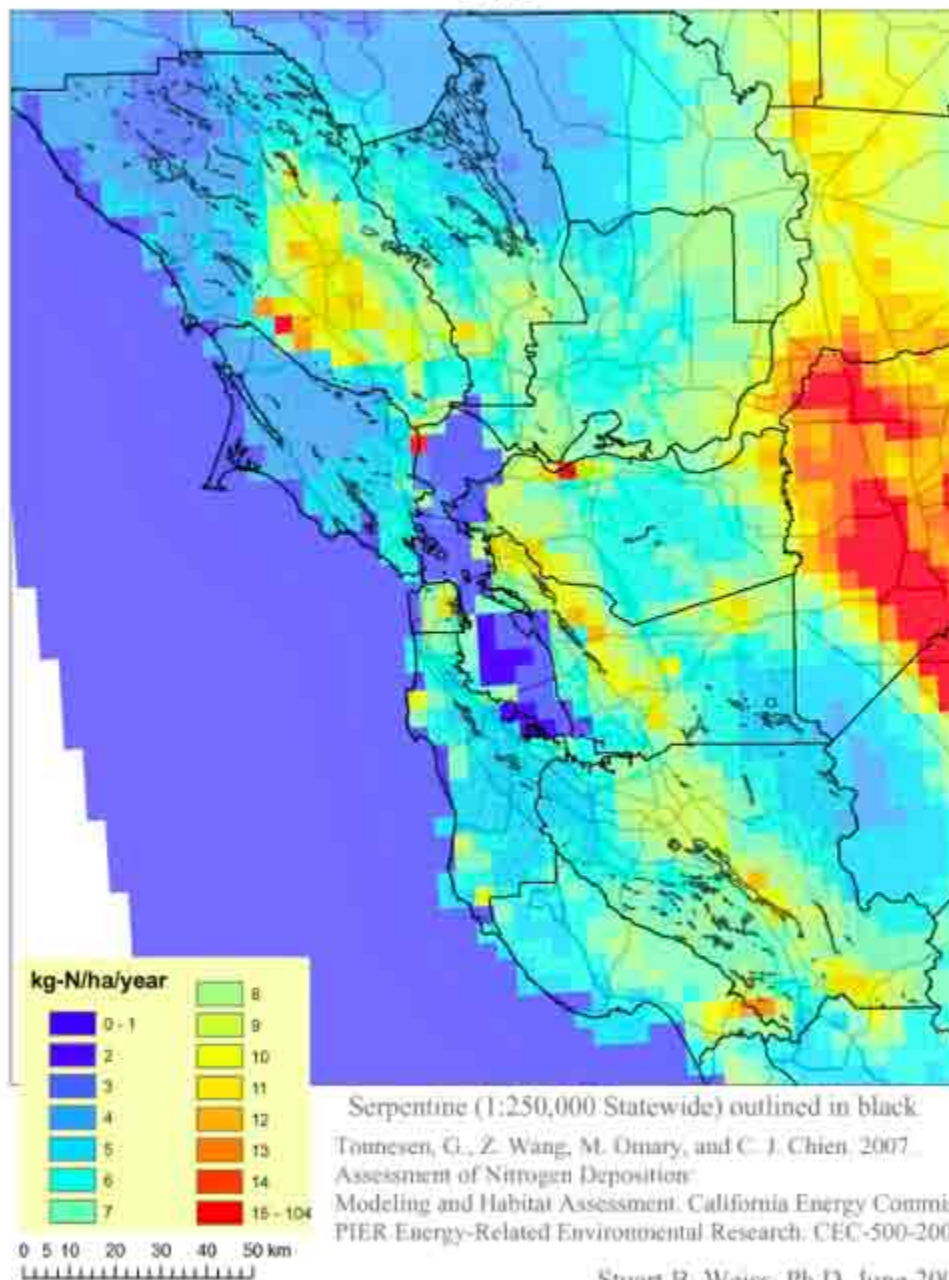


Docents led  
2000+ people  
on tours  
2001-2012

# Impact research

- Assess which species and habitats are potentially affected.
- A GIS combination of CNDDDB, Calflora, and existing N-deposition maps, built off analyses done by Weiss (2006) and Fenn (2010).
- Develop tools to identify species and habitats at risk – Critical Loads at work
- Inject initial analyses into CEQA and ESA through comments
- **Creekside, CNPS, Cal-IPC**

# CMAQ 4 km Total Nitrogen Deposition 2002



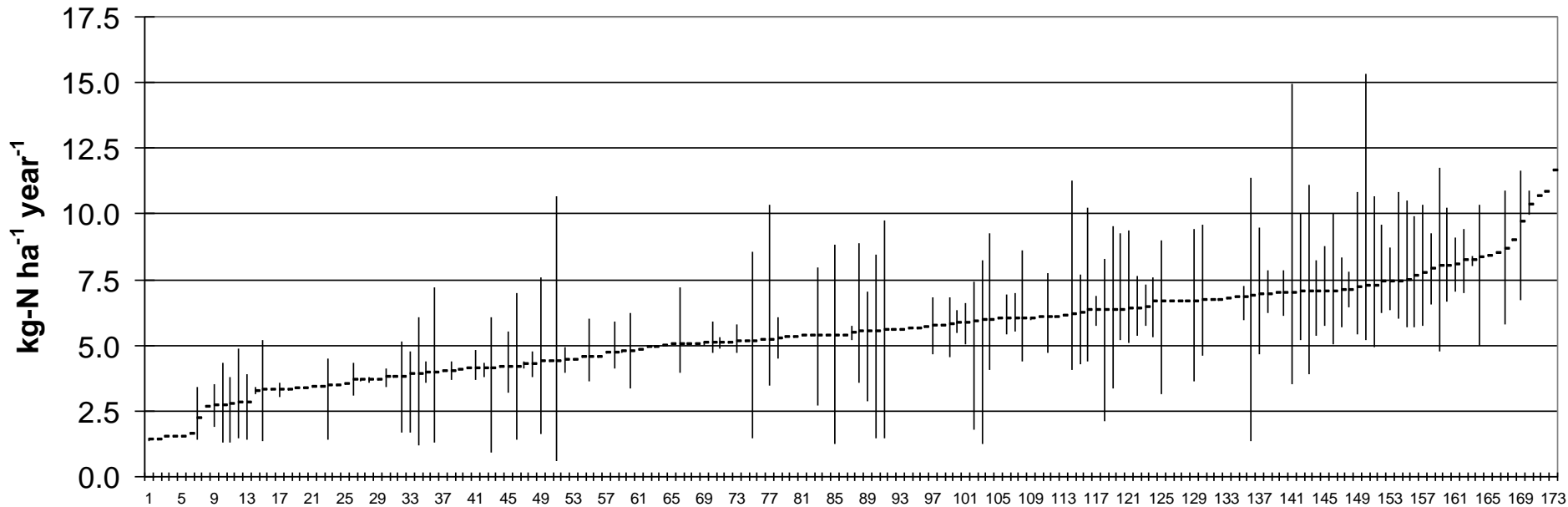
Serpentine (1:250,000 Statewide) outlined in black

Touvesen, G., Z. Wang, M. Omary, and C. J. Chien, 2007.  
Assessment of Nitrogen Deposition:  
Modeling and Habitat Assessment. California Energy Commission,  
PIER Energy-Related Environmental Research. CEC-500-2005-032.

Stuart B. Weiss, Ph.D. June 2007

# Exposure of 173 CNDDDB Plant Taxa (R,T,& E) in SF Bay Area

110 > 5 kg-N ha<sup>-1</sup> yr<sup>-1</sup>



Conservation Land Network  
[www.bayarealands.org](http://www.bayarealands.org)

# Vernal Pools: grass invasion in absence of grazing (Jaymee Marty TNC)



# 23 T&E, 22 Rare in Vernal Pools



*Blennosperma bakeri*



*Orcuttia pilosa*



*Pogogyne abramsii*



*Limnanthes vinculans*



*Limnanthes gracilis  
parishii*



*Lasthenia conjugens*

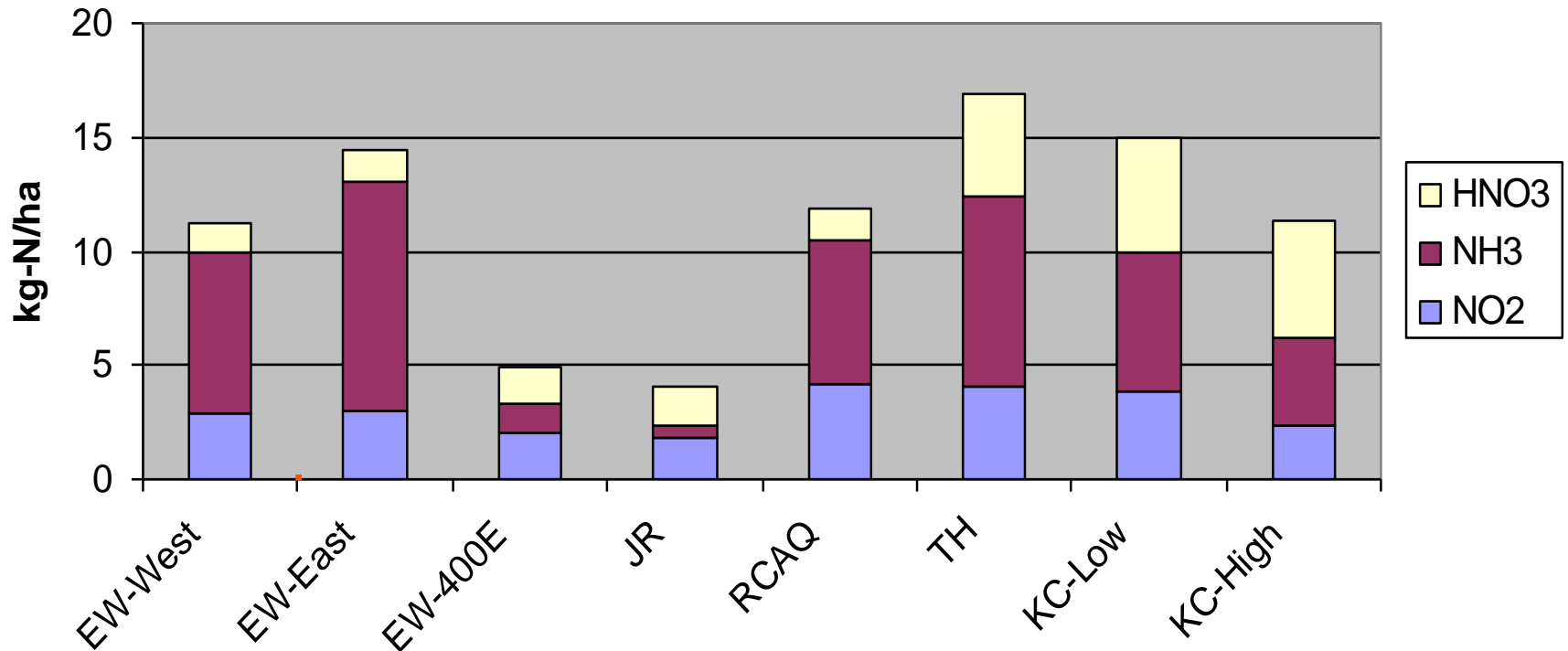
+Fairy Shrimp, CTS, CLRF



# Passive Sampler Estimates

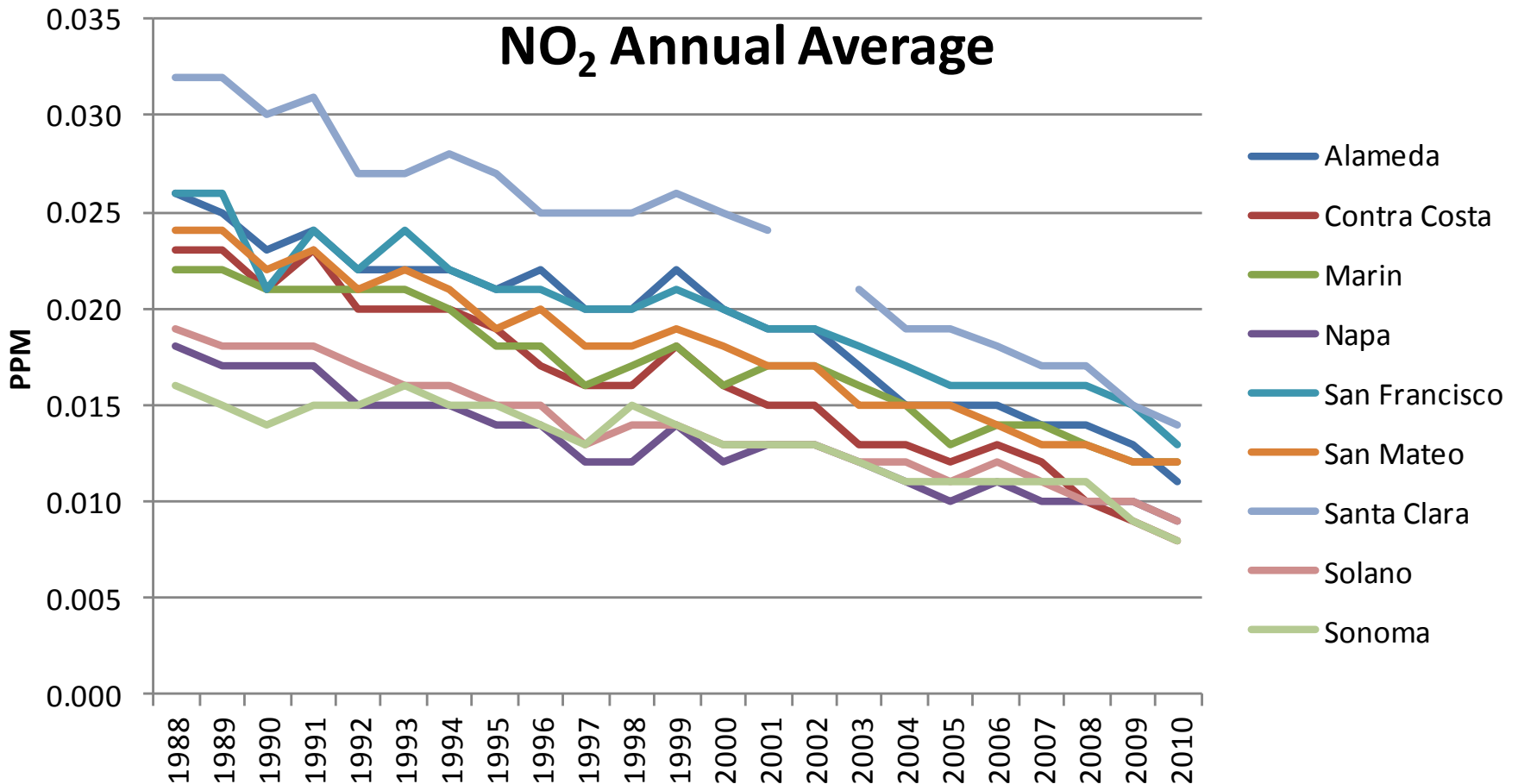
July 9 2002 - Jul 1 2003

I-280



# Air Pollution Regulations Work!

Primary standards based on human health



# Media Outreach



- Get nitrogen in the media, compile previous media, develop hooks and compelling stories
- **Creekside**



# Coalition Building

- Find other organizations to join
- Environmental groups
- California Rangeland Conservation Coalition
- Public health - allergies
- **Creekside, Cal-IPC, and CNPS**

# Keystone Species: Ranchers



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~\$700,000,000 paper

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How much more  
statewide?

# Occupy the Regulatory Environment!

Science, existing laws, advocacy, and passion

