

Pesticides, Toxicity and Stewardship in Urban Creeks

By

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Presented through the participation
and support of:

- Armand Ruby Consulting
- ADH Environmental
- Coastal Watershed Council
- EcoLayers
- CASQA
- Santa Cruz County volunteers

Five Decades Later, It's *Silent Spring* All Over Again

- Rachel Carson began working on *Silent Spring* in 1958 – 50 years ago
- Research into environmental effects of pesticides well under way in 1950's
- Organochlorines and organophosphates shown to be widely harmful

THE FUNDAMENTAL ISSUE

“Pesticides don’t kill bugs, people kill bugs”



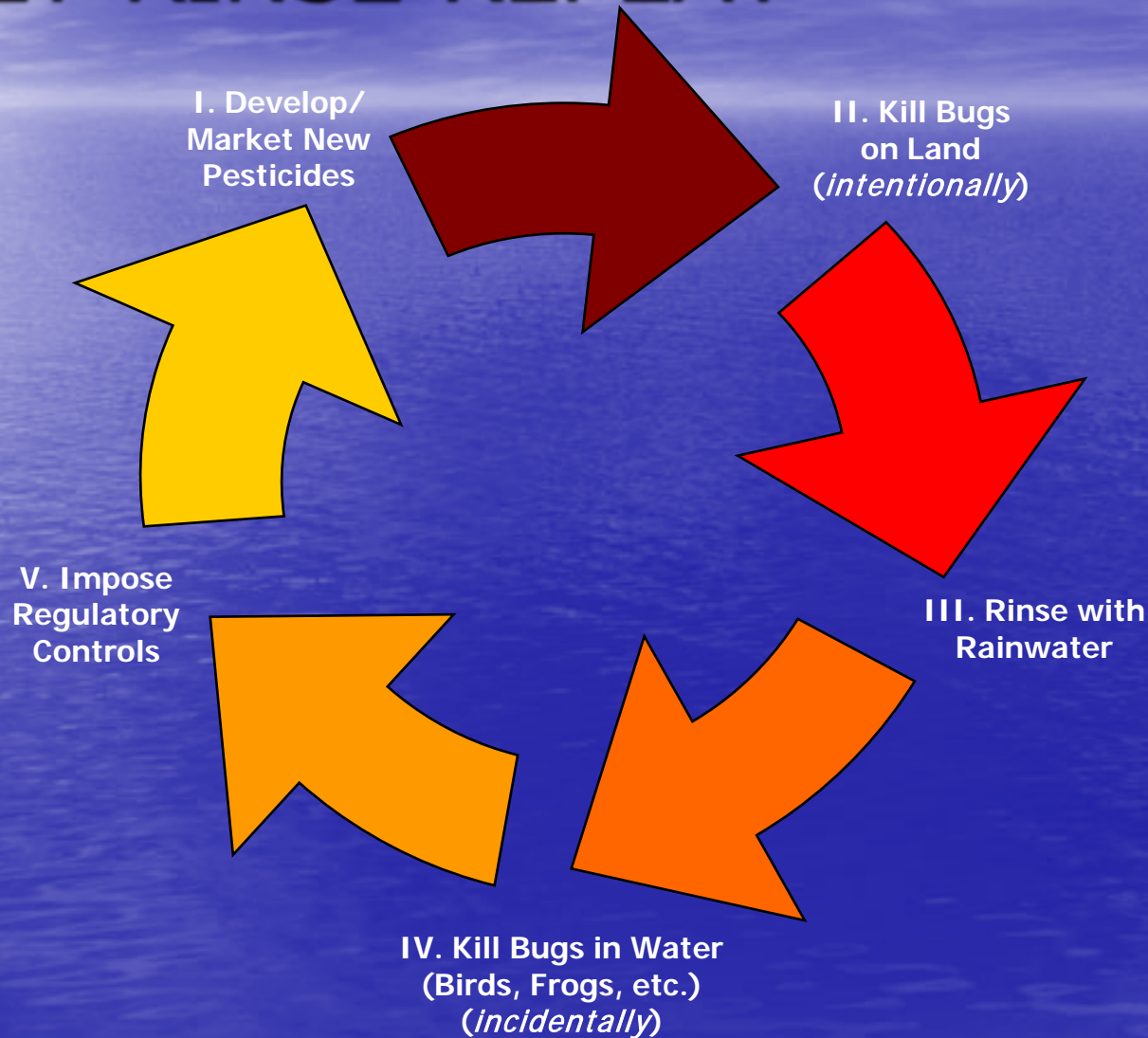
- People don't like bugs
- Chemical companies make pesticides and sell them to...
- People, who use pesticides to kill bugs

UNFORTUNATELY:

- After application, pesticides wash into storm drains, and then surface waters, where they harm aquatic life
- Pesticides are good at killing bugs in receiving waters, too! (duh)



CURRENT REGULATORY SCHEME: APPLY-RINSE-REPEAT



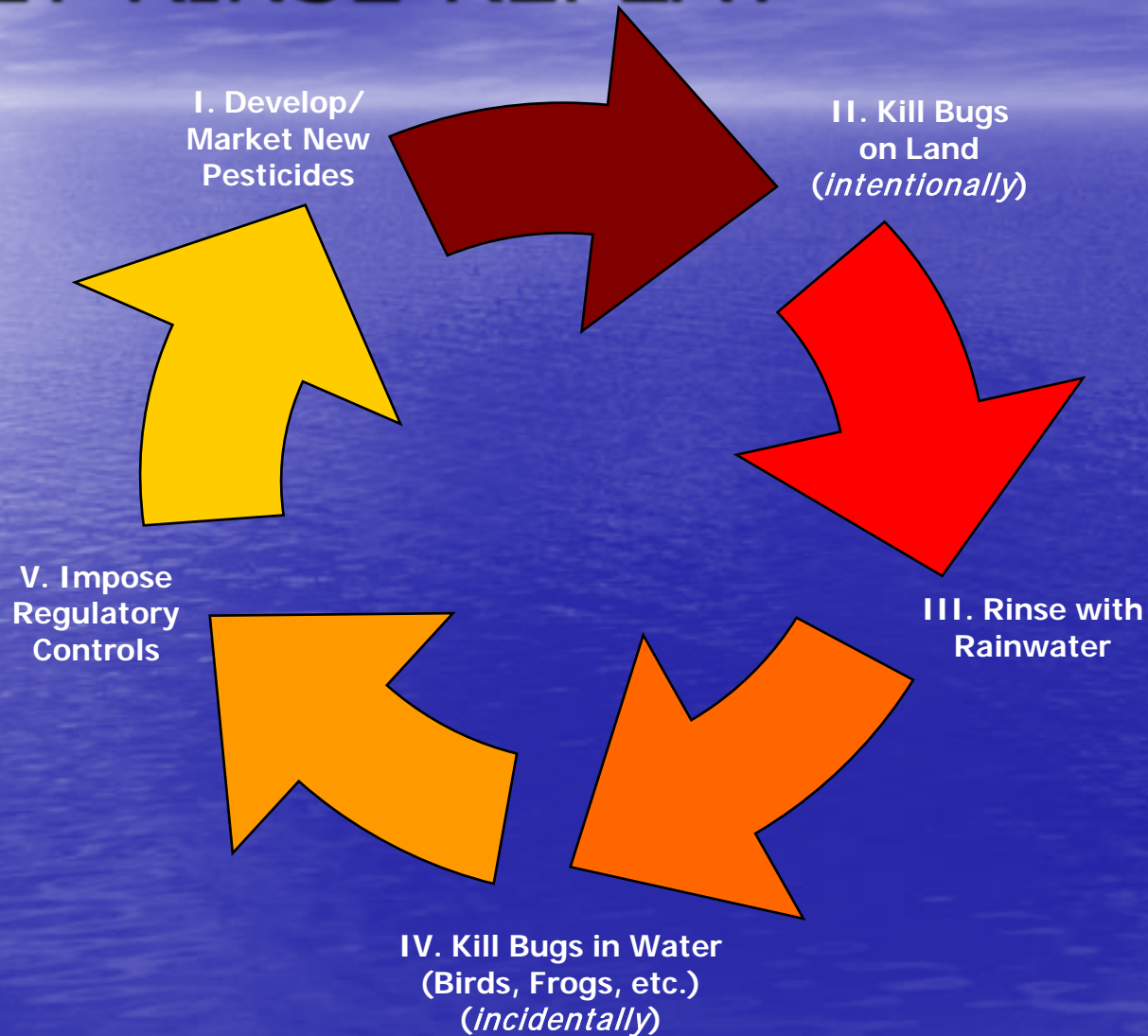
PESTICIDE INDUSTRY RESPONSE - RECENT CASE

- Several years ago, USEPA banned urban uses of diazinon, chlorpyrifos (OPs)
- Manufacturers replaced OPs with different active ingredients *approved by USEPA* (pyrethroids)
- Urban customers continued buying products, and using them

KEY MOMENTS IN RECENT CA HISTORY:

- *Mid-late 1990's:* OP pesticides (esp. diazinon) cause toxicity in urban streams
- *Early 2000's:* USEPA limits urban uses of diazinon and chlorpyrifos due to *human health concerns*; manufacturers switch to pyrethroids
- *Early-mid-2000's:* first 303(d) Listings, TMDLs for OP pesticides (Central Valley, SF Bay Area)
- *Mid-2000's:* Research documents toxicity due to pyrethroids *in sediments* of streams receiving urban and agricultural runoff

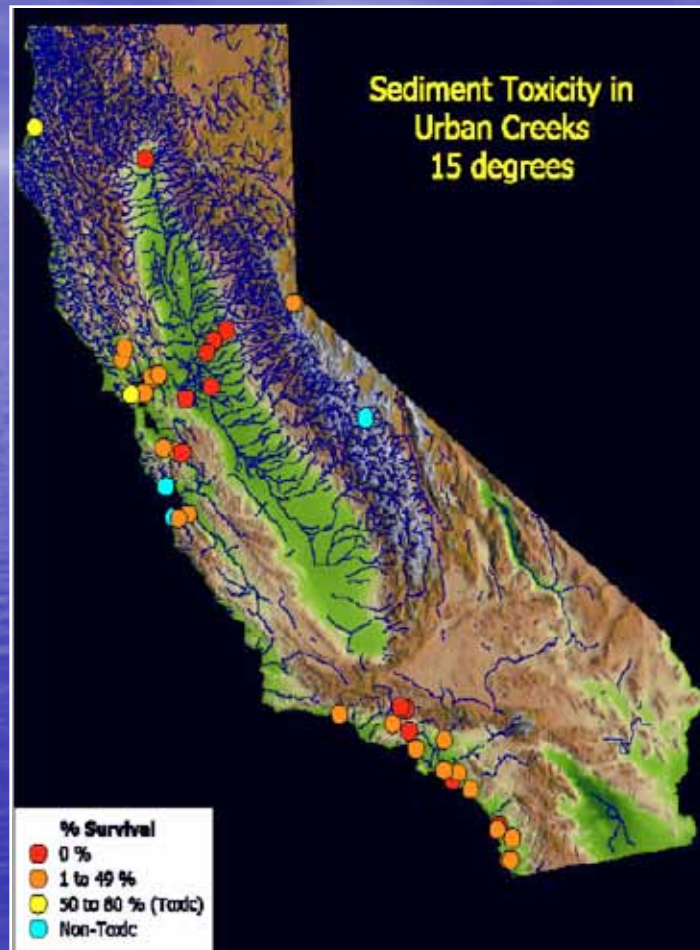
CURRENT REGULATORY SCHEME: APPLY-RINSE-REPEAT



Pyrethroids are:

- Synthetic versions of naturally-occurring pyrethrins
- More toxic and longer-lasting when released into the environment
- More likely to bind to particles (and persist in sediments) than OP pesticides

SEDIMENT TOXICITY IN CA



From: California's
Surface Water
Ambient
Monitoring
Program
(SWAMP;
R. Holmes/ UPC
7/19/07)

- Pyrethroids are principal cause of toxicity, per final report, ES&T 2008

Urban Use and Toxicity

- Permethrin and cypermethrin most widely used in California urban areas
- But pyrethroid toxicity varies...
- Cypermethrin and bifenthrin account for most "toxicity equivalents"

Source: TDC Environmental, 2008: "Urban Pesticides Use Trends Annual Report 2008"

Re-evaluation (DPR)

- CA Dept. of Pesticide Regulation (DPR) has initiated regulatory process known as "re-evaluation" for pyrethroid products
- Due to discovery and publication of toxic effects of pyrethroids in California
- Allowable uses may be adjusted and mitigation measures required

CASQA's Role

- CASQA: CA Stormwater Quality Association
- Pesticides Subcommittee is tracking pyrethroids re-evaluation process
- Providing data and participating in discussions with DPR, USEPA
- Retained Armand Ruby Consulting to investigate and compile available monitoring information

Pyrethroids Data Compilation Project

- Purpose: compile all available data to document presence and effects of pyrethroids in *urban surface waters* in California

Pyrethroids Monitoring Data Compilation- Results

- I. Expanding diversity of pesticides research
- II. Shift in research from agricultural to urban areas
- III. Pyrethroids are present – and toxic – *in both water and sediment*
- IV. Evidence widely distributed throughout CA
- V. Effects on aquatic organisms are widespread throughout aquatic biosphere
- VI. Shift in toxic effect from water flea (*Ceriodaphnia dubia*) to amphipods (*Hyalella azteca*)
- VII. Analytical detection issues understate the extent of the problem

Rachel Carson, *Silent Spring*, 1962:

“...we have allowed these chemicals to be used with little or no advance investigation of their effect on soil, water, wildlife... Future generations are unlikely to condone our lack of prudent concern for the integrity of the natural world...”

The issues are real...

- and the behaviors and attitudes of the public are important factors

Accentuating the Positive

- There is a largely-untapped resource available to improve urban runoff quality through public education/outreach - by encouraging people to be good stewards

Accentuating the Positive – A New Approach

- This approach represents a 180° shift in thinking in two key ways:
 - the focus is on facilitating *positive* behaviors and actions that can be undertaken voluntarily by individual citizens
 - the communication flow is two ways – with equal emphasis on getting feedback and information from public participants

Good Progress/Examples from the Pesticides/IPM Sector

- Green Gardener Program
 - <http://www.greengardener.org/> (Santa Barbara)
 - <http://www.green-gardener.org/> (Monterey Bay)
- Our Water/Our World
 - <http://www.ourwaterourworld.org/>
- Bay-Friendly Landscaping and Gardening
 - <http://www.bayfriendlycoalition.com/index.shtml>

Coastal Watershed Council – Stewardship Initiative

- CWC's Mission: *to preserve and protect coastal watersheds through monitoring, education, and **stewardship***
- Foster stewardship by individual citizens by promoting measures to:
 - Reduce Runoff Quantity, and/or
 - Improve Runoff Quality

Coastal Watershed Council – Stewardship Initiative

- Step 1: create Stewardship ToolKit – on-line resource for citizens

http://www.coastal-watershed.org/CWC_Library/Reduce_Impact/Impact.htm

- Step 2: create on-line data portal for public entry of stewardship sites using EcoLayers software (www.EcoLayers.com)
- Step 3: publicize ToolKit and data portal; foster neighbor-to-neighbor education/outreach
- Step 4: summarize information for MS4s

CWC's Stewardship ToolKit – Rain Gardens example

◇ Rain Gardens

Rain gardens serve as colorful stormwater detention areas, which help to reduce the quantity of runoff during peak flow events and treat infiltrating water.

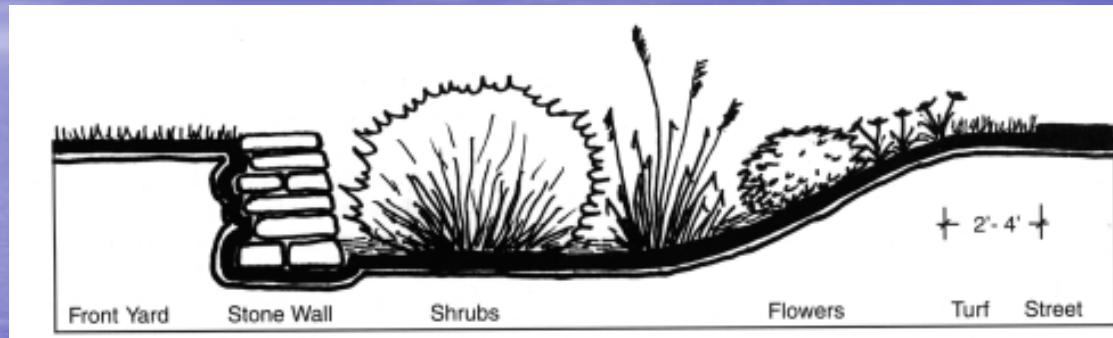


CWC's Stewardship ToolKit – Rain Gardens example, cont'd

Ø Benefits:

- Reduces the volume of runoff from a single-family property where space is limited but runoff management is desired
- Provides some water treatment by removing suspended solids, metals, and nutrients
- Provides an aesthetic amenity to a property
- Supports groundwater recharge
- Flowering plants and grasses appeal to beneficial insects such as bees and butterflies
- An effective and less costly means to stormwater management compared to some of the more sophisticated devices

CWC's Stewardship ToolKit – Rain Gardens example, cont'd



Installation/ characteristics:

- Determine the size and shape of the garden based on the surface area of impervious surface draining to the garden (for gardens within 30 feet of a building, most runoff will be coming from downspouts; each downspout contributes about 25% of a buildings runoff; calculate the draining surface area by finding the length and width of the bottom of the house to approximate the roof area and then multiply this number by 25% to find the volume of runoff coming from one downspout)
- The slope of the lawn or ground on which the garden is to be built should be between 3-10%
- For clay soils which drain slowly, the area of the garden should be 60% of the draining surface area (surface area of the roof)

Stewardship Data Portal

- Developed using EcoLayers software
- Allows two-way communication between the public and agencies
- Provides means for citizens to inspire and inform each other
- Allows agency to compile information on citizen runoff-reduction and pollutant-reduction efforts

CWC's Homepage

ABOUT CWC OUR PROGRAMS VOLUNTEER EVENTS SUPPORT CWC CONTACT LIBRARY

Coastal Watershed Council *Working to preserve and protect watersheds through community stewardship, education, and monitoring*

PROGRAMS	EVENTS	VOLUNTEER
 <p>New! Watershed Stewardship → Protecting watersheds through actions at home! Click here for our new Watershed Stewardship Toolkit</p>  <p>New! CWC Data Portal → Now you can access all of CWC's data on the watersheds of the central coast, plus add your own!</p>  <p>Snapshot Day → An annual event that monitors water quality in the Monterey Bay National Marine Sanctuary.</p>  <p>Urban Watch → Find out what's coming out of storm drains in the Monterey Bay area.</p>	 <p>Events Calendar → View current and upcoming Coastal Watershed events on our calendar.</p>  <p>Upcoming Events → Find out details about what is happening with the Coastal Watershed Council.</p> <div style="border: 1px solid black; padding: 5px; text-align: center;"><p>Seeking Volunteers for the First Flush Program Fall 2009 - Currently Recruiting!</p><p>Sign up Here!</p></div> <p>Join us on:</p> <div style="background-color: #336699; color: white; padding: 5px; text-align: center; font-weight: bold; font-size: 1.2em;">facebook</div>	 <p>Tales From the Field → Find out what it's like to volunteer and help preserve and protect our local watersheds.</p>  <p>How You Can Help → Various ways you can positively affect the health of our local streams and watershed.</p>  <p>Volunteer Options → Want to get your feet wet or help out around the office? Internship and volunteer opportunities.</p>  <p>Support CWC → Help support our volunteers, programs, and organization by making a donation now!</p>  <p>Coastal Watershed Council presented by For Watersheds</p> <p>The Fall 2009 Watershed Council Newsletter is now available! Click here to view the newsletter.</p>

CWC's Water Quality Data Portal

- Could also be applied to SPCWC data...

The screenshot displays the CWC Data Portal interface. At the top, the Coastal Watershed Council logo is on the left, and contact information (PO Box 1459, Santa Cruz, CA 95061, (831) 464-9200, www.coastalwatershed.com) is on the right. The main title "CWC Data Portal" is centered. Below the title, there are navigation links: "Instructions", "About", "Learn More", and "Terms of Use Street View". A blue banner contains the text "Click (+) to see Interactive Map and Sites of Interest". The central part of the page is a Google Maps interface showing a topographic map of the coastal watershed area. The map is bounded by a red line and contains numerous colored pins (purple, yellow, green) representing data points. A scale bar at the bottom left indicates 2 miles and 5 kilometers. At the bottom, there is a search bar labeled "Add Stewardship Sites" with a "Go!" button. Below the search bar, a small text prompt reads: "Enter Place of Personal Interest (river, creek, garden, street address, etc.). Then press the Enter key or click the 'Go!' button." A "Print map" link is visible in the bottom right corner of the map area.

CWC's Stewardship Data Portal – Data Entry Form

Coastal Watershed Council
CWC Data Portal
Coastal Watershed Council
PO Box 1429, Santa Cruz, CA 95061
(831) 464-9200
www.coastal-watershed.org

Individuals | About | Learn More | Terms of Use | Street View

Click (+) to see Interactive Map and Sites of Interest

Select County: Santa Cruz

Select Watershed: Sequel/Arana, Waddell

Select Programs: Snap Shot Day, Urban Watch

Stewardship Sites: Stormwater Runoff Quantity Reduction, Stormwater Runoff Quality Improvement, Runoff Quantity Reduction and Quality Improvement, Integrated Stormwater Management

To create your site, click the link below to complete a short form about this site.
[Click to open form](#)
To Create Site = Complete form and click Save.
Lat: 37.000907671138754 Long: -122.03922271728516

Watershed Stewardship Site Information
Please fill out a separate Site Information form for each device/measure implemented. Note: no personal information except address will be visible to public (name, telephone number and e-mail address are for CWC use for verification purposes only, and will not be shown or distributed).

Name:

Street Address:

City:

Zip Code:

Telephone Number: XXX-XXX-XXXX

Email Address:

Device/Measure Category:

Specific Device/Measure:

Description:

Dimensions:

Run Off: Roof, Driveway/Sidewalk, Lawn/Garden, Other/Describe

Comments:

Photo 1:

Photo 2:

Note: Phone and email are optional entries to help CWC contact you.

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CWC Stewardship Portal - example site

CWC Data Portal

Coastal Watershed Council
PO Box 1429, Santa Cruz, CA 95061
(831) 464-9200
www.coastal-watershed.org

Introduction | About | Learn More | Terms of Use | Street View

Click [+] to see Interactive Map and Sites of Interest

Select County: Santa Cruz

Select Watershed:

- Soquel/Arava
- Waddell

Select Programs:

- Snap Shot Day
- Urban Watch

Stewardship Sites:

- Stormwater Runoff Quantity Reduction
- Stormwater Runoff Quality Improvement
- Runoff Quantity Reduction and Quality Improvement
- Integrated Stormwater Management

Map showing Santa Cruz area with a callout for a site at 4705 Jewel St.

Specific Device/Measure: IPM Pollution Prevention
Address: 4705 Jewel St.


[Site Info](#)
[View Site Photos](#)
[View Data for All Sites](#)
[Submit Comments](#)
[View Comments](#)

Site Info	
Site Id	SW000004
Site Name	Armand Ruby
Address	4705 Jewel St
City	Capitola
Zip Code	95010
Telephone Number	831-477-1214
Email Address	aruby@coastalws.org
Device/Measure Category	Stormwater Runoff Quality Improvement
Specific Device/Measure	IPM Pollution Prevention
Description	Use of beneficial insects in place of pesticides
Dimensions	
Run Off	Lawn/Garden
Comments	
Latitude	36.971563059172556
Longitude	-121.95802688598633

Add Stewardship Sites

Enter Name of Regional Interest (river, creek, garden, street address, etc.). Then press the Enter key or click the "Go" button.

CWC Stewardship Portal - example site


 **CWC Data Portal** Coastal Watershed Council
PO Box 1499, Santa Cruz, CA 95061 (831) 464-9200 www.coastalwatershed.org

Instructions | About | Learn More | Terms of Use | Street View

Click (+) to see Interactive Map and Sites of Interest


Select County: Santa Cruz
Select Watershed: All, Ano Nuevo
Select Programs: All, ALBA

Stewardship Sites: All, Stormwater Runoff Quantity Reduction, Runoff Quantity Reduction and Quality Improvement, Stormwater Runoff Quality Improvement, Integrated Stormwater Management




Specific Device/Measure: IPM Pollution Prevention
Address: 4705 Jewel St
[Site Info](#)
[View Site Photos](#)
[View Data for All Sites](#)
[Submit Comments](#)
[View Comments](#)

Close
Site Id: SW000004
Site Name: Armand Ruby




Page: 1 of 1

Add Stewardship Sites
138 Calvin Place, santa cruz, ca
Enter Place of Personal Interest (river, creek, garden, street address, etc.). Then press the Enter key or click the "Go!" button.

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CWC Stewardship Portal - example site

 **CWC Data Portal** Coastal Watershed Council
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Instructions | About | Learn More | Terms of Use Street View


Click (+) to see Interactive Map and Sites of Interest

Select County: Santa Cruz

Select Watershed: All Ano Nuevo


Select Programs: All ALBA

Stewardship Sites: All Stormwater Runoff Quantity Reduction Runoff Quantity Reduction and Quality Improvement Stormwater Runoff Quality Improvement Integrated Stormwater Management



Specific Device/Measure: Other/describe below
Address: 138 Calvin Place
[Site Info](#)
[View Site Photos](#)
[View Data for All Sites](#)
[Submit Comments](#)
[View Comments](#)


Close
Site Id: SW000011
Site Name: Ole Christensen



Page: 1 of 2

Add Stewardship Sites
138 Calvin Place, santa cruz, ca
Enter Place of Personal Interest (river, creek, garden, street address, etc.). Then press the Enter key or click the "Go!" button.

Print map

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Next Steps

- Publicize Stewardship/Data Portal functions to public
- Acquire financial support for CWC's Stewardship Initiative
- Compile and summarize results for MS4s:
 - Permittees can incorporate runoff volume reductions/runoff quality improvements in annual reports to regulatory agencies
 - EcoLayers output includes plots, tables, graphs

KEY RESOURCES

- Coastal Watershed Council:
www.coastal-watershed.org/
- EcoLayers:
www.EcoLayers.com/

KEY RESOURCES

- UP3 Project: www.up3project.org/
(*sign up for UPC e-mail list*)
- PANNA – Pesticide Action Network:
www.panna.org/
 - Esp. PAN Pesticides Database:
www.pesticideinfo.org/Index.html
- Beyond Pesticides:
www.beyondpesticides.org/
 - Esp. Gateway on Pesticides Hazards:
www.beyondpesticides.org/gateway/index.htm
- CA Dept. Pesticide Regulation:
www.cdpr.ca.gov/

COMMENTS/QUESTIONS

For More Information Contact:

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e-mail:

armand@armandrubyconsulting.com

Web Site:

www.armandrubyconsulting.com

(Lots of Useful Links)

