Developing an Integrated Pest Management Plan

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Photo Credit: Ed Wiljams

IPM is an ecosystem-based strategy that focuses on long-term prevention of pests or their damage through a combination of techniques such as biological control, habitat manipulation, modification of cultural practices, and use of resistant varieties.

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Pesticides are used only after monitoring indicates they are needed according to established guidelines, and treatments are made with the goal of removing only the target organism. Pest control materials are selected and applied in a manner that minimizes risks to human health, beneficial and nontarget organisms, and the environment.

However?

- When it comes to rodent management it is not always possibly to lead with the least toxic measures
  - Structural damage
  - Health and safety issues

- **I**ntegrated: a focus on interactions
  - Pests
  - The environment
  - Management tactics
- **P**est: an organism that conflicts with profit, health, or convenience
- **M**anagement: a way to keep pests below the levels where they can cause economic damage. *This does not always mean eradication*

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Why practice IPM?

- IPM helps to keep a balanced ecosystem
- Pesticides can be ineffective (especially if not used correctly)
- IPM can save money
- IPM promotes a healthy environment
- IPM maintains a good public service image

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Components of an IPM Program

1. Identifying and monitoring pest problems
2. Selecting the best management tactics
3. Record keeping and evaluating the program

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Identify and monitor pests

- You can’t manage what you can’t measure!
- Never classify a pest or treat it as a pest until it is clearly determined to be one
- Scouting should be conducted often and on a regular basis
  - Detection of problems early
    - Better chance of avoiding economic loss

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Effective identification and monitoring

- **Know**
  - What's normal
- **Identify**
  - What is causing the damage?
  - Difficulty identifying?
- **Determine**
  - Any biological factors that may assist with management
- **Decide**
  - Is the problem increasing or decreasing

- **Map**
  - Where are the problem areas

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Identification

- Is damage caused by identified pest?
- Identification and management choice are directly related

Pest symptoms and signs

- Several examples for commensal rodents
  - Burrows and mounds
  - Gnaw
  - Feeding
  - Feces
  - Sightings

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Selecting the best management tactics

- Pest management tactics should be
  - Effective
  - Practical
  - Economical
  - Environmentally sound
- To achieve this……
  - Understand pest biology
  - Is the pest causing an economic loss or has health and safety issues associated with it?
  - Compare the cost and efficacy of tactics
  - Plan for the future

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To achieve this…..

- Understand pest biology
- Is the pest causing an economic loss or has potential to spread disease?
- Compare the cost and efficacy of management tactics
- Plan for the future
  - IPM plans should be long-lived processes

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Economic Damage (ED)

Economic damage occurs when the cost of preventable damage exceeds the cost of control

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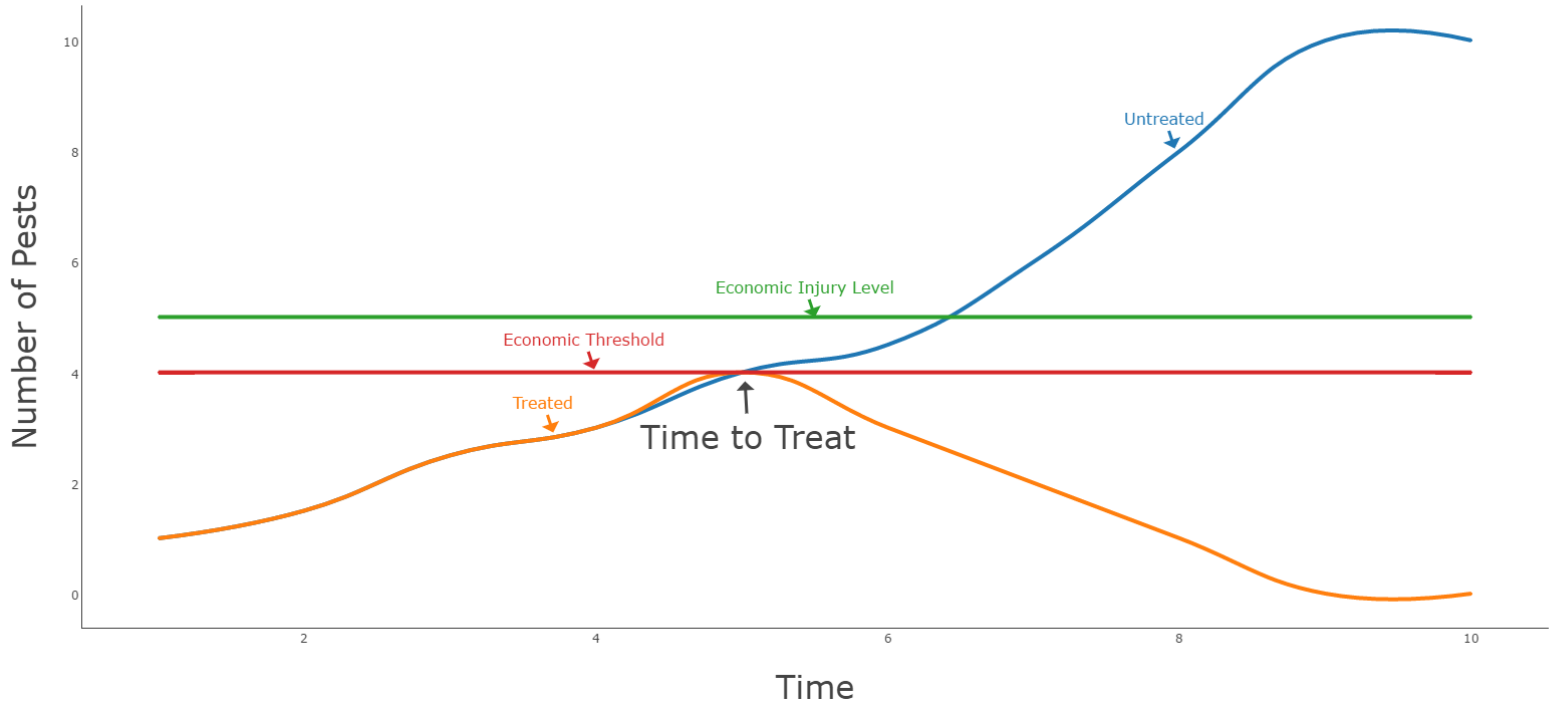
Economic Injury Level (EIL)

This is the lowest pest population that will cause economic damage. For many pests it is important to use control measures before this is reached

Economic Threshold (ET)

This is the pest population level at which a control tactic should be started to the pest population from reaching the EIL



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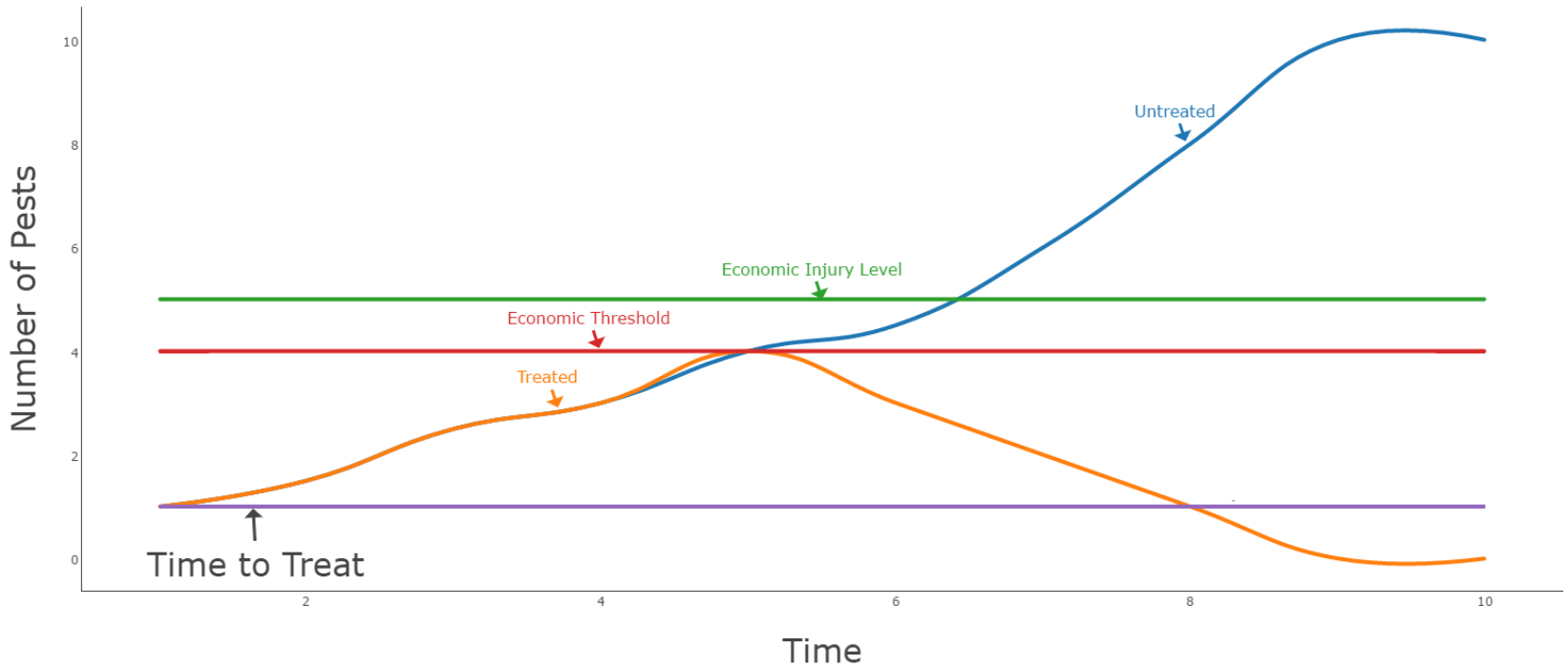

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Thresholds

- Very important to consider
- A few pests may be tolerated
- Action is required when you reach that threshold
- Thresholds may be site specific
  - A few rodents in a landscape may be tolerated
  - Rodents in schools should not be tolerated

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Pest Management Goals

- Prevention
  - Sanitation
  - Moisture management
  - Cultural controls
- Suppression
  - Reduce pest population levels
  - Tolerable level
  - Below economic injury level

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Pest Management Goals

- Eradication
  - Total elimination from designated area
  - Expensive
  - Limited success

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Pest Management Methods

- Biological controls
- Mechanical controls
  - Cultivation
  - Exclusion
  - Trapping
- Cultural Controls
  - Sanitation
- Chemical Controls
  - Fumigants
  - Rodenticides
  - Repellents

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Endangered Species Considerations

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Endangered species considerations

- These must always be considered
- PRESCRIBE

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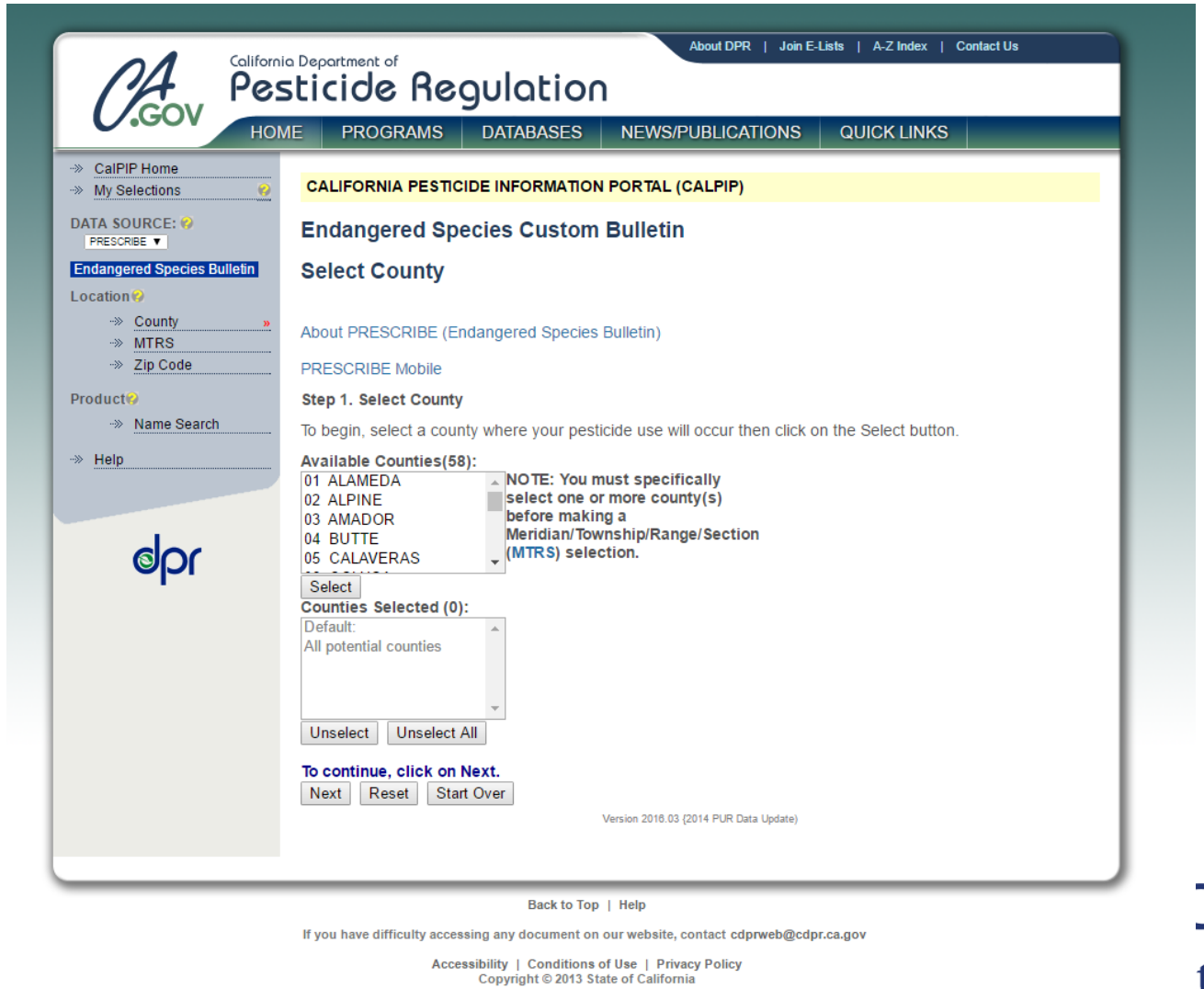
DPR-PRESCRIBE



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US Fish and Wildlife

- https://ecos.fws.gov/ipac/location/index

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IPaC Information for Planning and Consultation

U.S. Fish & Wildlife Service

LOG IN

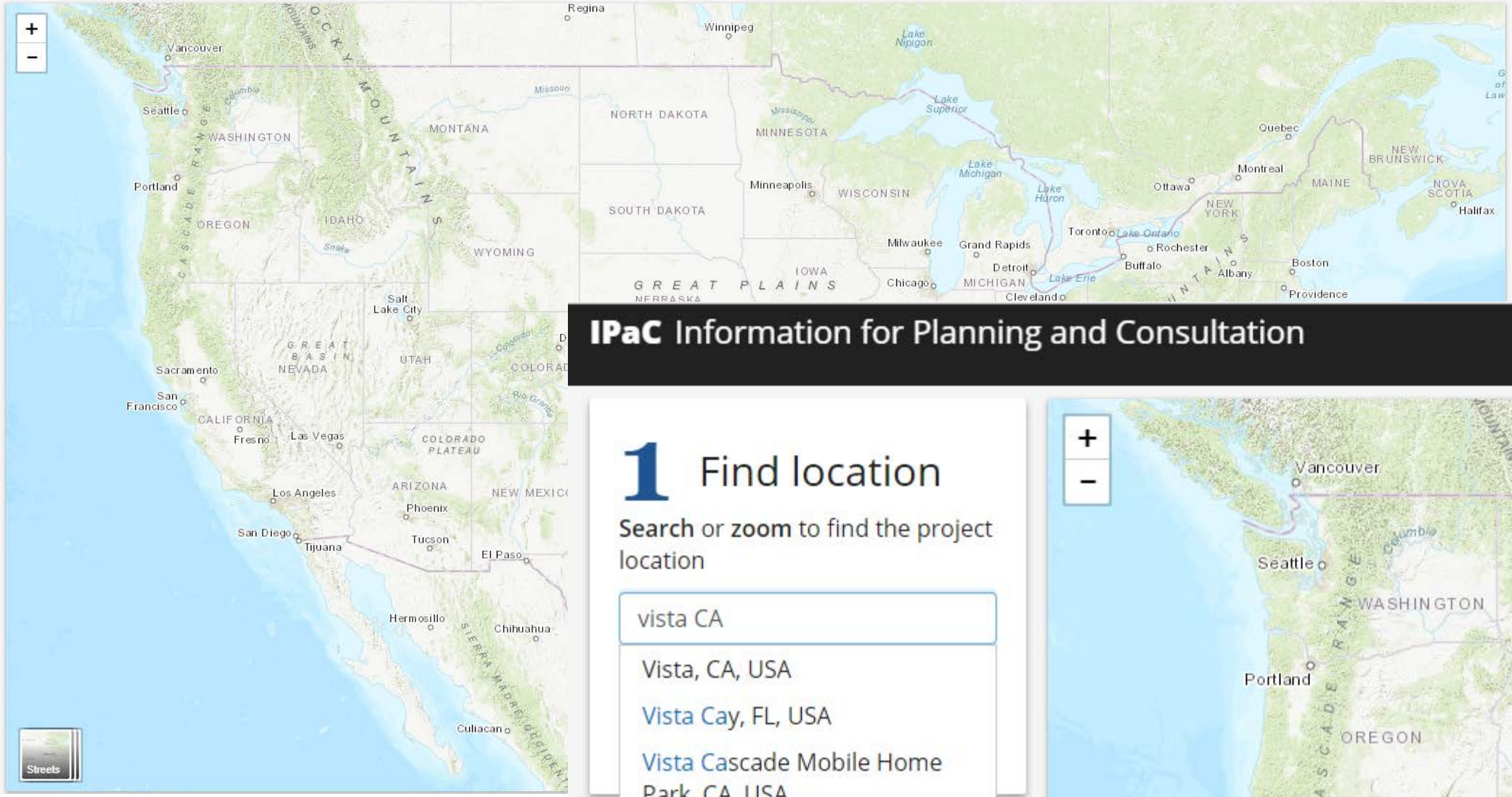
1 Find location

Search or **zoom** to find the project location

vista CA

- Vista, CA, USA
- Vista Cay, FL, USA
- Vista Cascade Mobile Home Park, CA, USA
- Vista, NC, USA
- Vista Carry Out, 233 N Upper Michigan Ave, Chicago, IL, 60601, USA

Layers ADD



IPaC Information for Planning and Consultation

1 Find location

Search or **zoom** to find the project location

vista CA

- Vista, CA, USA
- Vista Cay, FL, USA
- Vista Cascade Mobile Home Park, CA, USA
- Vista, NC, USA
- Vista Carry Out, 233 N Upper Michigan Ave, Chicago, IL, 60601, USA

Endangered

No photo available

Pacific Pocket Mouse

Perognathus longimembris pacificus

Endangered

Stephens' Kangaroo Rat

Dipodomys stephensi (incl. D. cascus)

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Endangered

California Least Tern

Sterna antillarum browni

Threatened

CH

No photo available

Coastal California Gnatcatcher

Polioptila californica californica

Endangered

CH

Least Bell's Vireo

Vireo bellii pusillus

Endangered

Light-footed Clapper Rail

Rallus longirostris levipes

Endangered

CH

Southwestern Willow Flycatcher

Empidonax traillii extimus

Threatened

CH

Western Snowy Plover

Charadrius nivosus nivosus

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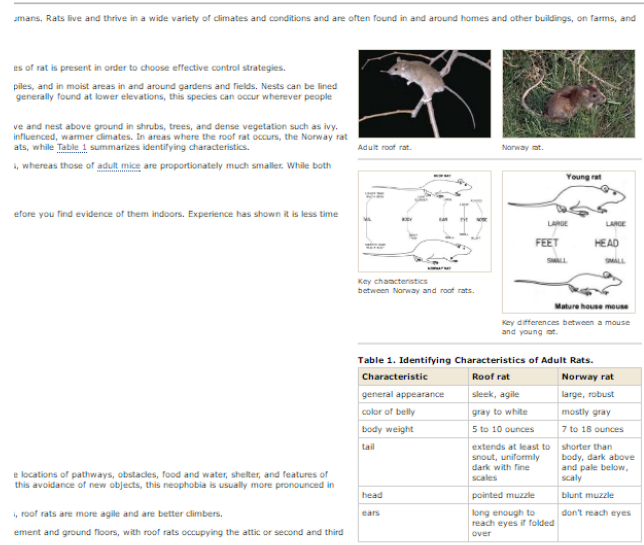
Useful UC IPM Resources

UC IPM

Vertebrate pests: Birds, mammals, and reptiles

- Bats
- California Ground Squirrel QT
- Cliff Swallows
- Deer QT
- Deer Mouse
- Gophers QT
- House Mouse QT
- Lizards
- Mice
  - Deer Mouse
  - House QT
  - Voles (Meadow Mice)
- Moles
- Opossum
- Pocket Gophers | QT
- Rabbits
- Raccoons
- Rattlesnakes
- Rats | QT
- Skunks
- Squirrels
  - California Ground QT
  - Tree
- Tree Squirrels (REVISED)
- Voles (Meadow Mice)
- Woodpeckers



…mans. Rats live and thrive in a wide variety of climates and conditions and are often found in and around homes and other buildings, on farms, and

…es of rat is present in order to choose effective control strategies.

…piles, and in moist areas in and around gardens and fields. Nests can be lined … generally found at lower elevations, this species can occur wherever people

…ve and nest above ground in shrubs, trees, and dense vegetation such as ivy, … influenced, warmer climates. In areas where the roof rat occurs, the Norway rat … ats, while Table 1 summarizes identifying characteristics.

…, whereas those of adult mice are proportionately much smaller. While both

…efore you find evidence of them indoors. Experience has shown it is less time

Adult roof rat.

Norway rat.

Key characteristics between Norway and roof rats.

Key differences between a mouse and young rat.

…e locations of pathways, obstacles, food and water, shelter, and features of … this avoidance of new objects, this neophobia is usually more pronounced in

…, roof rats are more agile and are better climbers.

…ement and ground floors, with roof rats occupying the attic or second and third

Table 1. Identifying Characteristics of Adult Rats.

Characteristic	Roof rat	Norway rat
general appearance	sleek, agile	large, robust
color of belly	gray to white	mostly gray
body weight	5 to 10 ounces	7 to 18 ounces
tail	extends at least to snout, uniformly dark with fine scales	shorter than body, dark above and pale below, scaly
head	pointed muzzle	blunt muzzle
ears	long enough to reach eyes if folded over	don't reach eyes

Norway rats eat a wide variety of foods but mostly prefer cereal grains, meats, fish, nuts, and some fruits. When searching for food and water, Norway rats usually travel an area of about 100 to 150 feet in diameter; seldom do they travel any further than 300 feet from their burrows or nests. The average female Norway rat has 4 to 6 litters per year and can successfully wean 20 or more offspring annually.

Roof Rats

Like Norway rats, roof rats eat a wide variety of foods, but they prefer fruits, nuts, berries, slugs, and snails. Roof rats are especially fond of avocados and citrus, and they often eat fruit that is still on the tree. When feeding on a mature orange, they make a small hole through which they completely remove the contents of the fruit, leaving only the hollowed-out rind hanging on the tree. They'll often eat the rind of a lemon, leaving the flesh of the sour fruit still hanging. Their favorite habitats are attics, trees, and overgrown shrubbery or vines. Residential or industrial areas with mature landscaping provide good habitat as does riparian vegetation of riverbanks and streams. Roof rats prefer to nest in locations off the ground and rarely dig burrows for living quarters if off-the-ground sites exist.

Roof rats routinely travel up to 300 feet for food. They can live in the landscaping of one residence and feed at another. They often can be seen at night running along overhead utility lines or fence tops. They have an excellent sense of balance and use their long tails to steady themselves while traveling along overhead utility lines. They move faster than Norway rats and are very agile climbers, which enables them to quickly escape predators. They can live in trees or in attics and climb down to a food source. The average number of litters a female roof rat has per year depends on many factors, but generally it is 3 to 5 with 5 to 8 young in each litter.

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RATS

Integrated Pest Management for Home Gardeners and Landscape Professionals

Rats are some of the most troublesome and damaging rodents in the United States. They eat and contaminate food, damage structures and property, and transmit parasites and diseases to other animals and humans. Rats live and thrive in a wide variety of climates and conditions and are often found in and around homes and other buildings, on farms, and in gardens and open fields.

Figure 1. Adult roof rat.

Figure 2. Norway rat.

IDENTIFICATION

People don't often see rats, but signs of their presence are easy to detect. (See the sidebar How to Spot a Rat Infestation.) In California, the most troublesome rats are two introduced species, the roof rat (Fig. 1) and the Norway rat (Fig. 2). It's important to know which species of rat is present in order to choose effective control strategies.

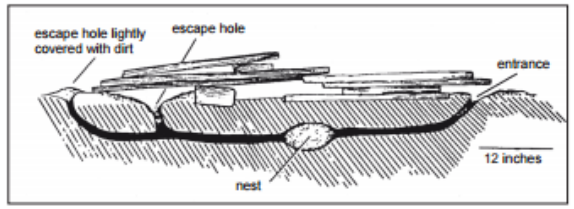

Figure 3. Norway rat burrow beneath a pile of boards.

Norway rats, *Rattus norvegicus*, sometimes called brown or sewer rats, are stocky burrowing rodents that are larger than roof rats. Their burrows are found along building foundations, beneath rubbish or woodpiles, and in moist areas in and around gardens and fields (Fig. 3). Nests can be lined with shredded paper, cloth, or other fibrous material. When Norway rats invade buildings, they usually remain in the basement or ground floor. Norway rats live throughout the 48 contiguous United States. While generally found at lower elevations, this species can occur wherever people live.

Roof rats, *R. rattus*, sometimes called black rats, are slightly smaller than Norway rats. Unlike Norway rats, their tails are longer than their heads and bodies combined. Roof rats are agile climbers and usually live and nest above ground in shrubs, trees, and dense vegetation such as ivy. In buildings, they are most often found

HOW TO SPOT A RAT INFESTATION

Because rats are active throughout the year, periodically check for signs of their presence. Once rats have invaded your garden or landscape, unless your house is truly rodent proof, it is only a matter of time before you find evidence of them indoors. Experience has shown it's less time consuming to control rodents before their numbers get too high, and fewer traps and less bait will be required if control is started early.

Inspect your yard and home thoroughly. If the answer to any of the following questions is yes, you might have a rat problem.

- Do you find rat droppings around dog or cat dishes or pet food storage containers?
- Do you hear noises coming from the attic just after dusk?
- Have you found remnants of rat nests when dismantling your firewood stack?
- Does your dog or cat bring home dead rat carcasses?
- Is there evidence rodents are feeding on fruit or nuts that are in or falling from the trees in your yard?
- Do you see burrows among plants or damaged vegetables when working in the garden?
- Do you see rats traveling along utility lines or on the tops of fences at dusk or soon after?
- Have you found rat nests behind boxes or in drawers in the garage?
- Are there smudge marks caused by the rats rubbing their fur against beams, rafters, pipes, or walls?
- Do you see burrows beneath your compost pile or beneath the garbage can?
- Are there rat or mouse droppings in your recycle bins?
- Have you ever had to remove a drowned rat from your swimming pool or hot tub?
- Do you see evidence of something digging under your garden tool shed or doghouse?

PEST NOTES Publication 74106

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Statewide Integrated Pest Management Program

September 2011

Quick tips

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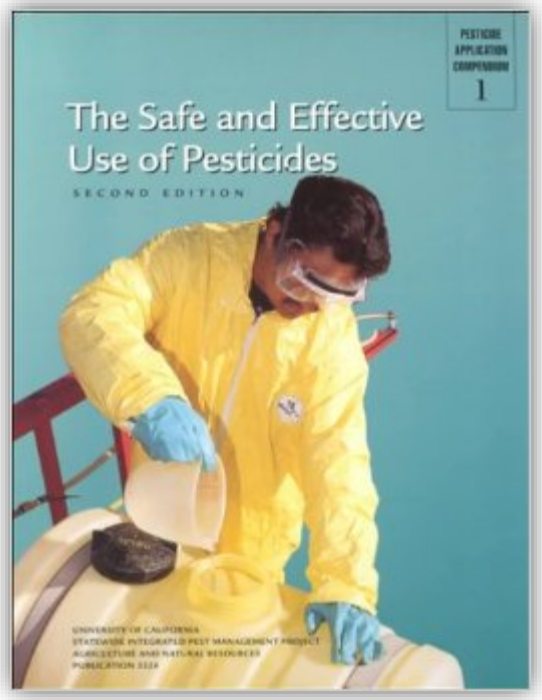
The safe and effective use of pesticide



- Great study guide
- Particularly good for new licencees

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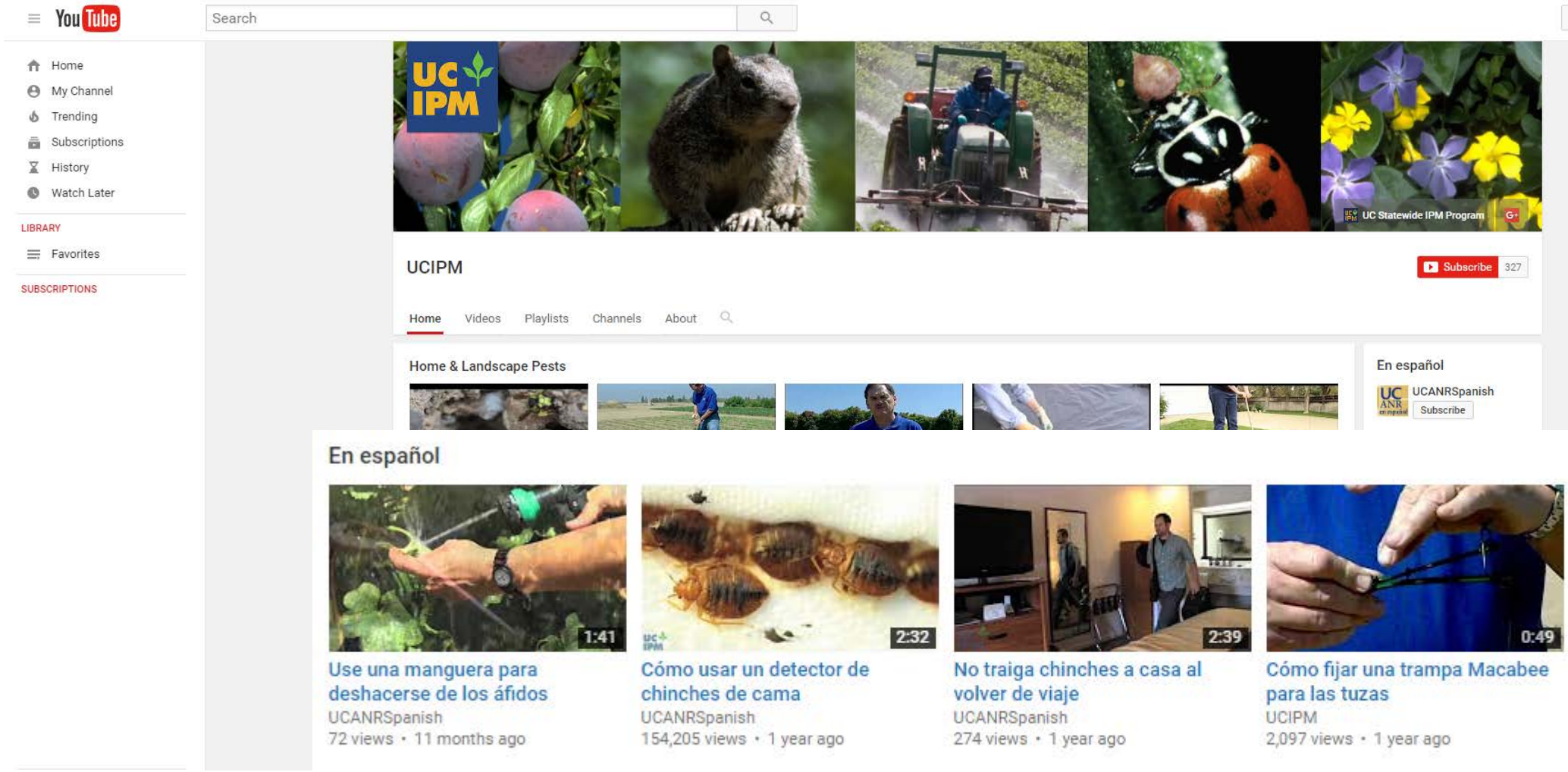

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http://ipm.ucanr.edu/training/

- Pesticide Application Equipment and Calibration
- Pesticide Resistance
- Proper Pesticide Use to Avoid Illegal Residues
- Providing IPM Services in Schools and Child Care Settings
- Urban Pesticide Runoff and Mitigation

Sign up for UC IPM Newsletters

- Green Bulletin
  - https://ucanr.edu/survey/survey.cfm?surveynumber=13531
- Retail Nursery and Garden Center IPM News
  - https://ucanr.edu/survey/survey.cfm?surveynumber=11686

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