



Research & Resource Management at Cypress Grove Preserve

Audubon Canyon Ranch, Winter 1994

WORLD HEADQUARTERS ON TOMALES BAY?

Ecology of a Rare Salt Marsh Plant

Each July, the tiny white and purplish red flowers of Point Reyes bird's beak emerge slightly above the sparkling edges of its salt-encrusted, purple-tinged bracts. Since 1989, John Kelly and Grant Fletcher, assisted by several ACR Field Observers, have been studying the ecology of this rare and subtly beautiful salt marsh plant related to owl's clover and paint brush. Extirpated from Alameda, San Mateo, and Santa Clara Counties, it is currently confined to remnant populations in Marin, Sonoma, and Humboldt Counties, and listed as endangered in Oregon.

When suitable habitat becomes endangered or severely fragmented, a specialized "niche" can become a death sentence. *Cordylanthus maritimus* ssp. *palustris*, Point Reyes bird's beak (Scrophulariaceae), is an annual salt marsh plant that requires fresh water for spring germination, nearby populations of suitable insect pollinators, reduced light competition (low canopy of pickleweed, *Salicornia virginica*), upper marsh habitat to avoid prolonged tidal inundation, and parasitic connections to host plants that may provide crucial nutrients and water in late spring and early summer. Because of its narrow range of requirements and very limited (tidal) seed dispersal, *Cordylanthus* has an extremely limited distribution... until you look at Tomales Bay.

Tomales Bay salt marshes support 52 *Cordylanthus* "colonies" distributed among 14 isolated populations. These populations occur in discrete delta salt marshes at creek mouths along the east and west

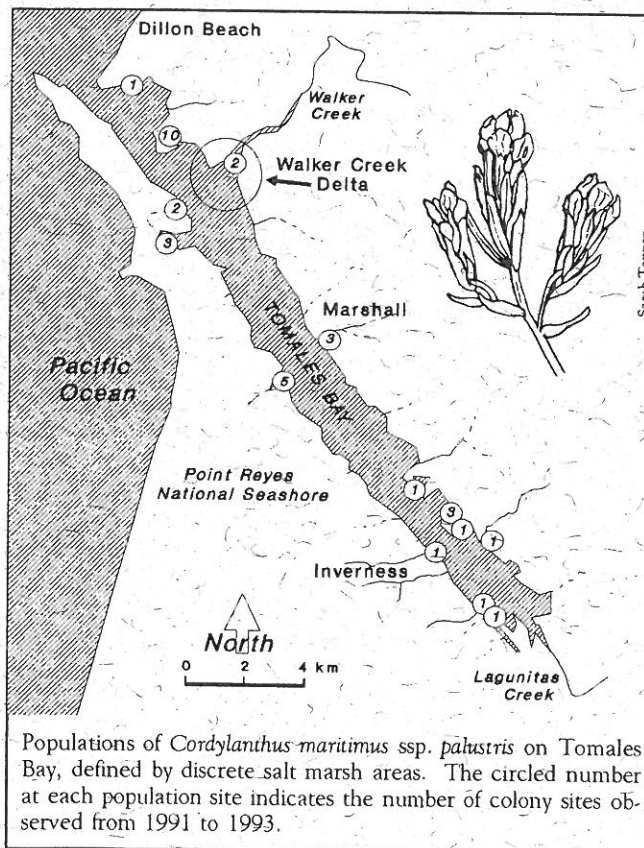
shores of the bay, with very limited dispersal among habitat patches. Consequently, Tomales Bay supports a metapopulation of disjunct groups, and an unusual opportunity to study the ecology of this species.

Cordylanthus colonies typically fail to germinate in some years, followed by a reappearance after a year or two. Our results suggest that the stability of colonies is mostly influenced by colony size and *Cordylanthus* density (and underlying factors related to reproduction and survival), rather than by dispersal from other nearby colonies or populations. If true,

recolonization probabilities may be too low to buffer the potential impacts of local disturbances. The loss of some sites as sources for recolonization -- even with low dispersal rates -- would further destabilize *Cordylanthus* in the area.

We used field data on Tomales Bay to develop a model for predicting the presence of suitable *Cordylanthus* habitat. The results were based on presence/absence patterns in a bay-wide survey of salt marshes, and on plant species co-occurrences at ACR's Walker Creek Delta, which supports Tomales Bay's (perhaps the world's?) largest population of *Cordylanthus*. The model predicted a 94% chance of *Cordylanthus* occurring if both arrow grass (*Triglochin concinna*) and sea lavender (*Limonium californicum*) are present, and a 74%

(Please turn to page 3.)



LANDS, NOT ISLANDS

Sanctuary Management and the Ecological Landscape

A Draft Audubon Canyon Ranch Research and Resource Management Plan will soon be available for review. The final plan, once adopted, will provide an important tool for protecting the plants and wildlife of ACR's Bolinas Lagoon Preserve, Bouverie Audubon Preserve, and Tomales Bay properties.

In the last sunset light of each evening, from April to September, as many as 35 Great Egrets sail in to roost in the tall trees at Cypress Grove Preserve. These birds are probably associated with the large nesting colony at the north end of Tomales Bay -- near but not on ACR's Tom's Point property. In late winter, a handful of rare "fragrant fritillaries" bloom just inside the CGP fence, marking the edge of a large population on adjacent State Park land. Resources like these, that enrich ACR sanctuaries but depend on other nearby habitat, are common; shorebirds that pepper the shoreline, bobcats, and overwintering monarch butterflies are just a few. That Audubon Canyon Ranch sanctuaries are ecologically imbedded in the surrounding landscape is a key consideration in current efforts to draft an ACR Research and Resource Management Plan.

Recognizing the importance of local area conservation, the Research and Resource Management Plan underscores Audubon Canyon Ranch's multifaceted approach to stewardship -- one that involves ACR in the socio-ecological landscape of science, education, and advocacy, in addition to preserve management. A few recent examples: The pivotal question in a feasibility study to introduce Bald Eagles into the Point Reyes National Seashore, given that historic breeding records were lacking, was ACR's concern about possible disturbance to heronries; the plan was abandoned in 1990. ACR research on the effects of matriculture on shorebirds resulted from negotiations with the State Fish and Game Commission regarding possible impacts of redeveloping several lease areas on Tomales Bay. ACR's Heron/Egret Project determined the regional importance of West Marin Island to herons and egrets, helping to establish a National Wildlife Refuge in 1991; we continue to monitor annual reproductive success on the island. Efforts to protect properties near our sanctuaries have included state and federal acquisitions of lands adjacent to CGP, and current support of the Park Protection Bill, which promises to establish federal agricultural/conservation easements on over 30,000 acres of the Tomales Bay watershed. On another front, ACR education clearly inspires local appreciation of natural areas. In short, the Research and Resource Management Plan affirms ACR's broad involvement in conservation.

Much of the Research and Resource Management Plan is devoted to an overview of natural resources at ACR's three preserves, including the vicinities surrounding the preserves. The plan discusses conditions of habitats and cites occurrence

es of 37 rare, endangered, or "special concern" species on or adjacent to ACR lands. Indicators of ecosystem stability or diversity are suggested, including species or groups such as herons and egrets, eel grass, California voles, and butterflies. The most serious threats to our sanctuaries stem from expanding populations of exotic plants, such as poison hemlock and German ivy. Invasive aliens enter from adjacent lands to compete with natives, reduce biodiversity, and degrade the quality of habitats. ACR marshes are threatened by sediment from distant watershed erosion. Upstream diversions of freshwater put estuarine habitats on Tomales Bay at risk. Although most of the plan deals directly with ACR lands, there is a sharpened focus on appropriate spatial scales in conservation biology and resource management; consequently, political boundaries often blur.

Over 90 active and recommended projects are evaluated in the plan. Each project is prioritized according to benefits to preserve management, influence on area management, and educational value. Projects range from simple tasks, such as monitoring water levels in Livermore Marsh, to more complex objectives such as restoring coastal prairie. Long-term monitoring of herons, waterbirds, and vegetation, is balanced by investigations that



Lands . . . (from page 2)

target the foraging "niche" of the Common Yellowthroat and environmental influences on prey availability in shorebirds.

ACR may never be able to conduct some of the recommended subjects, but by including them in the plan we hope to encourage research by advanced students or others. Here's an interesting example: What is the expected recovery period in the event of a catastrophic disturbance to inner (southern) Tomales Bay waters? The answer may depend on how the extremely slow water exchange with coastal waters outside the bay -- *four months* during dry periods -- affects planktonic recruitment of larval invertebrates. Such a study is beyond the predicted scope of ACR research, but we might inspire others with this question.

The geography of local resource management has expanded to include multiple jurisdictions. The escalation of regional and global threats to biodiversity have carried resource ecologists into a new arena, where effective action depends on strong collegial relationships among conservation, scientific, and educational groups. Fortunately, ACR's new Research and Resource Management Plan embraces what has become obvious: stewardship extends beyond ownership.



World Headquarters . . .

(from page 1)

and 65% chance if either arrow grass or sea lavender, respectively, are present. The strength of these patterns suggest that arrow grass may be an important host species for *Cordylanthus*. Sea lavender seems to indicate the presence of suitable habitat, but occurs at densities too low to serve as an important host species.

We plan to continue monitoring *Cordylanthus* colonies on Tomales Bay to learn more about the degree of reproductive isolation among colonies, and the minimum viable colony size required for long-term stability. A better understanding of the ecology of *Cordylanthus* could help in protecting valuable salt marsh habitats throughout California and other species that depend on them.

I N P R O G R E S S

PLANT WARS

We are continuing to remove African ice plant from ACR's Tom's Point, using black plastic sheeting (shading) for 4-6 month periods. Native plants such as Vancouver wild-rye and *Juncus* (rush) now dominate the treated areas.

TOMALES BAY PLANT SPECIES INVENTORY

We are continuing to enter plant species field data, and are using a standard classification system (Holland 1986) to map plant communities around Tomales Bay.

COASTAL PRAIRIE

California vole populations have continued to increase since the big crash in December 1990. We will be planting native grass seedlings on Saturday, January 15th. *Please call CGP if you can help (415/663-8203).*

HARBOR SEALS

We need Field Observers to help monitor disturbance behaviors of harbor seals near ACR's Tom's Point. The study also tracks pupping success and haul-out abundances. *Harbor Seal Alert* fliers, which are distributed to visitors at Lawson's Landing, have resulted in some success in reducing the number of disturbances. *Please call Mary Ellen King at 707/537-1546.*

SHOREBIRDS

Experienced birders are needed to help census shorebird populations on Tomales Bay. A devoted group of shorebird watchers are providing the first in-depth assessment of Tomales Bay shorebirds populations. Each winter since 1989-90, late-winter declines of shorebirds on south bay tide flats have been greater than in the north bay.

LIVERMORE MARSH

Four checkdams were installed in the creek that feeds Livermore Marsh. Raising the main creek channel and water table will increase the duration of winter soil saturation and restore upper marsh habitat. In the lower marsh, cattails are increasing dramatically; active removal will soon be needed to maintain habitat diversity.

COMMON YELLOWTHROATS

ACR Field Biologists have completed field work on a three-year study of Salt Marsh Common Yellowthroat foraging "niche." Results will help guide management of Livermore and Olema Marshes, and contribute to our knowledge of this "species of special concern."

NORTH BAY COUNTIES HERON/EGRET PROJECT

Reproductive success during the 1993 nesting season was apparently near normal throughout the northern San Francisco Bay area. Decreases in the number of nesting Snowy Egrets at West Marin Island coincided with increases at several other sites. Additional Field Observers are needed to monitor heron/egret colonies in 1994.

WINTER WATERBIRDS

Will waterbird numbers on Tomales Bay rebound if the spawning population of Pacific Herring continue to recover? *Experienced birders are needed to help census winter waterbirds by boat.*

AQUACULTURE

We are now in the final year of a five-year study of possible effects of oyster farming on the use of intertidal habitat by wintering shorebirds. Stay tuned...

HERON/EGRET VOCAL AGEING

Philip Greene is recording vocalizations of known-age chicks. We hope to develop methods for ageing chicks and comparing reproductive timing at other colonies in the region.

BLACK RAILS

Chris Wood is studying vocalizations of California Black Rails (listed as Threatened in CA) at Olema Marsh, and has discovered some undescribed calls.

The Ardeid

Ardeid (Ar-DEE-id), n., refers to any member of the family Ardeidae, which includes herons, egrets, and bitterns.

The Ardeid is published twice yearly by Audubon Canyon Ranch as an offering to Field Observers, volunteers, and supporters of Cypress Grove Preserve. To receive *The Ardeid*, please call or write to Cypress Grove Preserve. Subscriptions are available free of charge; however, contributions are gratefully accepted.

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T H E W A T C H

The following Field Observers have contributed to CGP projects since the last newsletter:

- A = Aquaculture Project
- D = Harbor Seal study
- G = CGP gardens
- H = Heron/Egret Project
- I = TB Plant Spp. Inventory
- M = Marsh Monitor. Project
- P = Coastal Prairie
- S = TB Shorebird Project
- V = Heron vocal ageing
- W = TB Waterbird Census
- O = Other activities

- Debbie Ablin (H)
- Dan Abraham (P)
- Nancy Adess (H)
- Russ Agnew (S)
- Sarah Allen (SD)
- Andy and Lee Angel (H)
- Nancy Angelesco (W)
- Bob Baez (SW)
- Norah & Hugh Bain (SH)
- Nancy Barbour (H)
- Sue Baty (IO)
- Tom Baty (W)
- Rosilyn Bazaruto (W)
- Gay Bishop (HSW)
- Patti Blumin (H)
- Janet Bosshard (HP)
- John Boyd (H)
- Tom Bradner (HW)
- Alise Brewster (IP)
- Mary Brezner (H)
- Tom Byron (H)
- Marianne Caratti (H)
- Diane Carpenter (IO)
- Nancy Conzet (H)
- Walt Creber (P)
- George Curth (W)
- Eric Davis (H)
- Mark Dean (S)
- Abel DeHaan (H)
- Roberta Downey (P)
- Dick and Jenny Downing (H)

- Joe Drennan (W)
- Cynthia Dresser (P)
- Low Edmonson (S)
- Ted Elliot (H)
- Steve Engel (W)
- Gayanne Enquist (W)
- Tom Evans (H)
- Jules Evens (ASM)
- Carol Foley (H)
- Dave Ferrera (W)
- Binny Fischer (H)
- Virginia Fletcher (SHIPO)
- Grant Fletcher (SWHIPO)
- Carol Foley (H)
- Carol Fraker (H)
- Keith Fraser (H)
- Nicole Gallagher (P)
- Patrick Garmy (PMW)
- Rich Gibson (P)
- Margaret Greene (H)
- Philip Greene (HV)
- Gayle Greeley (S)
- Madelon Halpern (H)
- Kirk Hastings (HSWPMO)
- Bruce Hamilton (HW)
- Daphne Hatch (W)
- Catherine Hickey (H)
- Edna Hickok (H)
- Bill Hildreth (H)
- Maggie Hynes (HIPW)
- Tim Jenkins (H)
- Lynnette Kahn (S)
- Gerald Karr (H)
- Mary Ellen King (DHW)
- Richard Kirschman (SW)
- Jonquil Kohls (P)
- Carol Kuelper (SP)
- Judith Lamoure (G)
- Laura Leek (W)
- Robin Leong (H)
- Michele Liapes (WP)
- Karen Long (P)
- Flora Maclise (MHO)
- Jo Maillard (H)
- Dallas Manwaring (G)
- Aspen Mayers (W)
- John McDonagh (S)

- Harmony Mercedes (P)
- Jane Merryman (H)
- Maggie Metcalf (H)
- Jean Miller (H)
- Shelly Monte (H)
- Faith Morgan (H)
- June Morgan (H)
- Dan Murphy (SW)
- Terry Nordbye (ADHMWS)
- Joan Paddor (H)
- Ray Paula (H)
- Karen Paull (D)
- John Petersen (H)
- Emeigh Poindexter (G)
- Myrlee Potosnak (H)
- Grace Pratt (H)
- Helen Pratt (HV)
- Linda Reichel (H)
- Erich Reineker (W)
- Ellen Sabine (WHS)
- Barbara Salzman (H)
- Karen and Dan Sandri (H)
- Fran Scarlett (H)
- Craig Scott (D)
- Elaine Senf (HP)
- Lorie Silver (H)
- Joe Smith (P)

- Anne Spencer (HSWP)
- Rich Stallcup (ASM)
- Jean Starkweather (H)
- Robert Stewart (P)
- Susan Stingle (P)
- Judy Temko (HSP)
- Don Tiernan (H)
- Janet Thiessen (HW)
- Forest Tomlinson (HWA)
- Bill Van Schaick (S)
- Wendy Walker (HI)
- Tanis Walters (S)
- Penny Watson (W)
- Ralph and Rosalie Webb (H)
- Tom White (W)
- Adeline Whitmore (H)
- Diane Williams (S)
- David Wimpfheimer (AWS)
- Chris Wood (HMO)
- Brett Woods (H)

- Chris Wood
- Research Associates
- Sarah Allen
- Faith Duncan
- Jules Evens
- Grant Fletcher
- Philip Greene
- Mary Ellen King
- Flora Maclise
- Helen Pratt
- Rich Stallcup
- Chris Wood
- CGP Intern
- Wendy Walker
- CGP Staff
- Resident Biologist
- John Kelly
- Land Steward
- Patrick Garmy
- Administrator
- Sarah Tappen
- The Ardeid
- John Kelly

- Field Biologists
- Jules Evens
- Terry Nordbye
- Rich Stallcup
- Forest Tomlinson
- David Wimpfheimer

IN THE FIELD

- December 18 Tomales Bay Waterbird Census
- January 15 **Native Grass Seedling Planting, CGP @ 9:00 AM**
(Please call CGP @ 663-8203 for information)
- 16 Tomales Bay Waterbird Census
- 29 Tomales Bay Waterbird Census
- 31 Tomales Bay Shorebird Census
- February 2 **1994 Heron/Egret Project Preseason/Orientation Meeting**
(Please call CGP @ 663-8203 for information)
- 12 Tomales Bay Waterbird Census
- 15 Tomales Bay Shorebird Census
- 28 Tomales Bay Shorebird Census
- March 25 **Evening "Seminar for Ourselves" at BLP:**
ACR's North Bay Counties Heron/Egret Project
(Please call ACR @ 868-9244 for information)



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