Audubon Canyon Ranch, Fall 1995

The Ardeid

Research & Resource Management at Cypress Grove Preserve

Ane Kovella

WHAT IS PREFERRED... DEPENDS ON WHEN

The foraging niche of the Common Yellowthroat

Audubon Canyon Ranch's Olema Marsh is heaven for Common Yellowthroats (*Geothlypis trichas*). Each spring, these strikingly beautiful warblers of our coastal marshes establish as many as 12 breeding territories at Olema Marsh.

In *The Distribution of the Birds of California*, Grinnell and Miller (1944) cited Tomales Bay as the northern coastal limit of the subspecies known as the San Francisco Yellowthroat (*G. t. sinuosa*). The subspecies is currently a "C2" candidate for federal endangered species listing, requiring additional data to substantiate federal protection and recovery efforts. To identify habitat preferences that could be used to guide future management of coastal marshes for Yellowthroats, we (John Kelly and Chris Wood) investigated the foraging behavior of Common Yellowthroats at Olema Marsh from 1990 to 1993. Jules Evens, Terry Nordbye, and Rich Stallcup provided additional expertise in the field.

During the field study, we searched for yellowthroats then visually followed each individual encountered until a foraging maneuver was observed. To increase the visibility of birds in dense marsh vegetation, most observations were conducted from portable ladders. To assess the array of habitat features available to foraging birds, we augmented the foraging data with intensive vegetation analysis.

Studies of avian foraging behavior have generally treated observations collected at different times of the day or nesting season as a single (pooled) group of data, thus disregarding the possibility that birds might alter their foraging behaviors to better exploit resources that become more or less available at different times. In Olema Marsh, as in other freshwater marshes along the central California coast, water levels decline gradually through spring and summer, and vegetation structure changes with the seasonal growth of annual and perennial plant species. Such habitat changes are linked to dramatic changes in the abundance and distribution of terrestrial and aquatic-emergent insect prey. If Common Yellowthroats must forage efficiently to maximize their reproductive success, they could be expected to vary their habitat preferences in response to changing conditions in the marsh. Therefore, we decided to search for intraseasonal and diurnal patterns of foraging behavior in Common Yellowthroats. And that is just what we found.

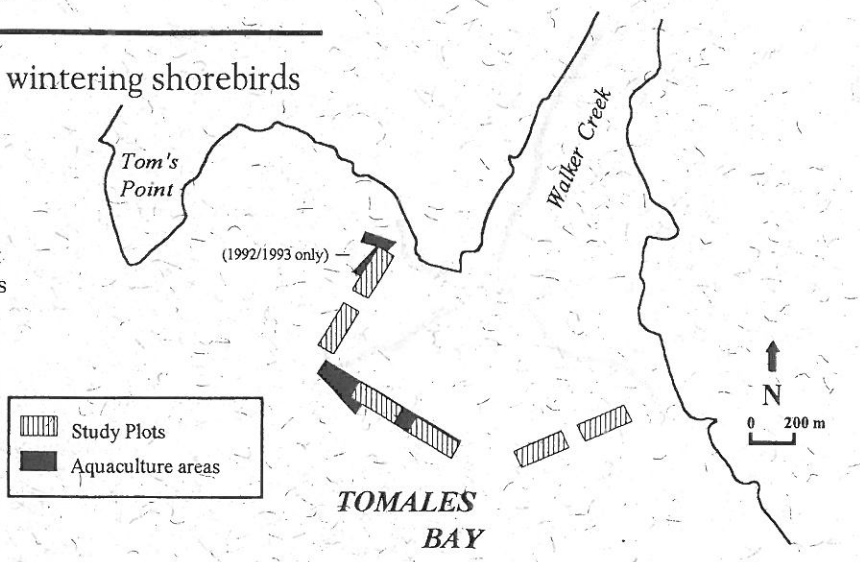
As the cool, misty, early-morning marsh gave way to more sultry midday conditions, yellowthroats increased their use of cattail/bulrush and foraging sites that were low (below one meter) and high (above three meters) in the vegetation. We hypothesized that this pattern reflected improved foraging opportunities in or near the upper canopies of willows as midday temperatures and insect activity increased and adult (stationary or flying) insects concentrated at greater heights in or above the vegetation. The availability of prey can also be influenced by the daily emergence patterns of aquatic insects. For example, some aquatic insects emerge in late morning after the rapid rise in ambient temperature that allows metamorphosis into the flying adult stage to occur more rapidly, thus minimizing their vulnerability to predation. Others emerge at dawn or dusk. Our results suggested that yellowthroats target foraging sites low in cattail/bulrush in midday, possibly to take advantage of increasing numbers of emerging aquatic insects.

Intraseasonal trends were also evident. As the nesting season progressed, yellowthroats foraged more often above three meters or in broad-leaved herbaceous plants such as

(Please turn to page 3.)

COMMON GROUND

The effects of oyster culture on wintering shorebirds



The swarms of wintering shorebirds that grace our coastal marshes, tide flats, and beaches generally concentrate where feeding efficiency is greatest. Feeding efficiency can in turn be influenced by habitat changes that alter the density or accessibility of their invertebrate prey. For example, shorebird densities can be affected by changes in water level, freshwater runoff, tidal circulation, available nutrients, microclimates, sediment characteristics, human interference, or disturbance by predators (falcons). The number of shorebirds that can use a particular area is also influenced by social behaviors such as winter territoriality, competitive interference, and flocking. Commercial operations for growing Pacific oysters (*Crassostrea gigas*) and other shellfish alter habitat structure by introducing shellfish, racks, stakes, culture bags, marker poles, and other equipment onto open tidal flats. In 1988, when the California Department of Fish and Game decided to reallocate several abandoned aquaculture leases in Tomales Bay, ACR asked the obvious question: does aquaculture have any adverse impacts on natural resources in the bay? At that time, no one had any answers.

In the fall of 1989, ACR began to investigate. John Kelly, Jules Evens, Rich Stallcup, and David Wimpfheimer, with excellent assistance by several other observers and financial support from the Department of Fish and Game, began a five-year investigation of the possible effects of aquaculture (oyster culture) on the use of intertidal mud flats by wintering shorebirds. The study area was located at Walker Creek Delta, near the north end of Tomales Bay (see figure).

The low winter tides suitable for field work generally coincided with spectacular sunsets, and inspiring twilight treks across the salt marsh became routine (see Rich Stallcup's personal account in *The Ardeid*, Summer 1994). The research required a team of three observers to measure abundances of shorebird species simultaneously on two aquaculture plots and four undeveloped control plots. Each estimate was based on three sequential counts conducted as the ebbing tide crossed the study plots — foraging shorebirds concentrate along the water's edge. One control plot was partly developed for aquaculture during the winter of 1992/93, providing a partial temporal control.

Each afternoon, hordes of wintering gulls funneled down from the Sonoma County landfill in Cotati in an enormous current, swirling down through the coastal valleys above Walker Creek to roost overnight on Tomales Bay. Most of them were California Gulls, but all gull species normally found along our coast were represented. The arriving gulls congregated at Walker Creek Delta, forming wide "snow fields" of several thousand birds. We discovered that the daily profusion of gulls was inversely related to abundances of several shorebird species, suggesting that gulls displaced shorebirds in otherwise suitable shorebird habitat. Therefore, we statistically removed the effects of wintering gulls from the shorebird data before searching for the effects of oyster growing operations. (The indirect effects of landfill gulls on estuaries is probably another topic worth investigating.)

The results of the study were revealing. The two most abundant shorebird species in Tomales Bay, Western Sandpipers and Dunlins, significantly avoided aquaculture areas. Willets were attracted to aquaculture plots. Evidence of underlying (pre-existing) habitat conditions, based on previous studies of marine invertebrates and sediment characteristics, did not explain these patterns. Four other species, Sanderling, Black-bellied Plover, Least Sandpiper, and Marbled Godwit showed no preferences for control or aquaculture plots.

When habitats change, the foraging styles of shorebirds may or may not continue to provide adequate amounts of food. On numerous occasions, we observed Least Sandpipers foraging on top of oyster bags and on sediments below elevated oyster bags. The Least's emphasis on visual searching and surface feeding may allow them to exploit the surfaces of oyster bags and racks, and could account for the absence of aquaculture effects on their abundances. In contrast, Dunlins and Western Sandpipers forage more often by probing into substrates, and were generally restricted to sites under or between rows of oyster bags; they may therefore be less suited for feeding in oyster culture areas. Willets are generalist feeders that are able to forage successfully on mudflats, salt marshes, sandy ocean beaches, rocky intertidal areas, and apparently, among oyster racks.

In terms of the numbers of individuals, avoidance of aquaculture areas by Western Sandpipers and Dunlins was much greater than selection of these areas by Willets. Therefore, we concluded that mud flats developed for aquaculture may exhibit a net decrease in total shorebird abundance. Further, we suggested that the extent of open tidal flats used for aquaculture should be limited to avoid decreases in winter shorebird populations.

WHAT IS PREFERRED...
(from page 1)

silverweed (*Potentilla anserina*) and American oenanthe (*Oenanthe sarmentosa*), and less often in cattail/bulrush; they also gleaned less often while perching, using aerial gleaning more frequently. These observations are consistent with an hypothesis that foraging yellowthroats respond to intraseasonal increases in broad-leaved herbaceous plants and the availability of flying insects.

It is interesing that diurnal patterns of yellowthroat behavior were generally consistent through the nesting season, and intraseasonal patterns were consistent regardless of the time of day. Willows provided the most consistently used foraging sites, actively selected by Common Yellowthroats during all diurnal and intraseasonal periods.

In separate analyses of intersexual differences in foraging behavior, we found that male Common Yellowthroats foraged at greater heights, on average, than females. Singing males occurred at greater heights, on average, that either foraging males or females. Males were also more likely, on average, to choose flycatching over gleaning than were females. These differences are probably a consequence of foraging near centers of activity which differ in the breeding season: males forage near song perches, and females forage near nests. Yellowthroat morphology reflects these foraging styles: female yellowthroats have shorter wings, which are better suited for shorter flights in low, dense vegetation near the nest site; males have longer wings suited for longer rapid flights in more open habitat at heights used for singing and territorial defense. Apparently, male yellowthroats are better adapted to exploit increases in the numbers of flying adult insects in midday and late spring.

The foraging behaviors of yellowthroats clearly reflect the dynamic habitats they depend on. ACR's work on common Yellowthroats provides an important caveat for future work: studies of songbirds in freshwater marshes should account for such behavioral changes to avoid misleading interpretations of habitat preferences, and ultimately, ineffective habitat management strategies.

IN PROGRESS

TOMALES BAY PLANT SPECIES DATABASE
Grant Fletcher has developed a database for monitoring rare plant populations and plant communities around Tomales Bay. He has also completed baywide surveys of two rare salt marsh species, *Castelleja ambigua* subsp. *humboldtensis* and *Cordylanthus maritimus* subsp. *palustris.*

COASTAL PRAIRIE
We have planted approximately 30,000 native grass seedlings in an experimental area at Cypress Grove Preserve. As the young perennial grasses grow larger, we will continue to control exotic annual grasses by mowing in spring. We will also continue to monitor plant species cover and the California vole population in restored and control areas. After a gradual four-year increase, the California vole population crashed nearly to zero during the winter of 1994-1995.

HARBOR SEALS
At a meeting with several interested agencies, Mary Ellen King presented five years of harbor seal data indicating that human disturbances have not subsided. Subsequently, The Gulf of the Farallones National Marine Sanctuary has indicated a commitment to develop a docent program to provide on-sight education regarding Harbor Seals in Tomales Bay. *Volunteers will be sought for the spring 1996 pupping season.*

SHOREBIRDS
ACR has begun its seventh year of monitoring shorebird populations on Tomales Bay. Each of eight baywide counts each year requires 15-20 qualified shorebird observers, most of whom have contributed to the project for several years. The project is generating valuable information on habitat use, population variation, and seasonal timing of shorebirds.

WINTER WATERBIRDS
John Kelly and Sarah Tappen are preparing a paper on the value of Tomales Bay to wintering waterbirds. The paper summarizes six years of monitoring data. We plan to continue with this monitoring program—*experienced birders are needed to help census winter waterbirds by boat.*

COMMON YELLOWTHROATS
John Kelly and Chris Wood have completed their study of the foraging niche of the Common Yellowthroat at ACR's Olema Marsh (see article on page one).

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.

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.

NORTH BAY COUNTIES HERON/EGRET PROJECT
We are currently analyzing the fifth year of monitoring data for all known colony sites in the northern San Francisco Bay area. Preliminary results suggest that nesting herons and egrets weathered the rains of 1995 well. Snowy Egrets continued to breed primarily on Brooks and Red Rock Islands with only 16 pairs returning to breed on West Marin Island (see *The Ardeid*, Winter 1995). *More field observers are needed for the 1996 season!*

CYPRESS GROVE PRESERVE
Many projects and activities at CGP have been temporarily suspended, or reduced to a minimum, while John Kelly works on his Ph.D. at UC Davis. Programs for monitoring shorebirds, waterbirds, herons/egrets, harbor seals, and rare plants will continue—thanks to many dedicated field observers!

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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THE WATCH

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 Species Inventory
M = Marsh Monitoring 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)
Russell Agnew (S)
Sarah Allen (S)
Nancy Angelesco (W)
Bob Baez (SW)
Norah & Hugh Bain (S)
Nancy Barbour (H)
Sherry Baty (P)
Sue Baty (O)
Tom Baty (WP)
William Beal (GPM)
Gay Bishop (S)
Len Blumin (G)
Patti Blumin (H)
Richard Bohnet (H)
Janet Bosshard (H)
Maureen Bourbin(DH)
John Boyd (H)
Tom Bradner (HG)
Mary Brezner (H)
Ken Burton (WS)
Phil Burton (H)
Diane Carpenter (O)
Diana Creber (P)
Walt Creber (P)
Eric Davis (H)
Lucinda Dekker (H)
Carolyn Dixon (H)
Leslie Doughty (M)
Roberta Downey (P)
Dick Downing (H)
Jenny Downing (H)
Caroline Dutton (SPHW)
Clara Dutton (P)
Lew Edmondson (S)
Ted Elliot (H)
Jules Evens (S)
Gary Falxa (S)
Katie Fehring (S)
Binny Fischer (H)
Virginia Fletcher (SHIPO)
Grant Fletcher (SWHIPO)
Carol Foley (H)
Carol Fraker (H)
Patrick Garmy (PM)
Keith Gish (H)
Margaret Greene (H)
Philip Greene (HV)
Madelon Halpern (H)
Holly Heinzmann (W)
Catherine M. Hickey (S)
Edna Hickok (H)
Dasha Inciarte (G)
Daniel Jacobs (PG)
Jeri Jacobsen (H)
Lynnette Kahn (SH)
Susan Kelly (G)
Mary Ellen King (DHW)
Richard Kirschman (S)
Carol Kuelper (SP)
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Jim Larkin (D)
Laura Leek (W)
Robin Leong (H)
Michele Liapes (P)
Eileen Libby (H)
Flora Maclise (MHO)
Jo Maillard (H)
Daniel Marsh (P)
Chris McAuliffe (H)
Fred McCullan (H)
John McDonagh (S)
Ellen McKnight (W)
Genie McNaughton (P)
Richard Merriss (H)
Jean Miller (HG)
Morgania Moore (G)
Dan Murphy (S)
Wally Neville (H)
Terry Nordbye (DHWS)
Don Pagnac (POG)
Tony Paz (P)
John Petersen (H)
Myrlee Potoshak (H)
Grace Pratt (H)
Helen Pratt (HV)
Linda Reichel (H)
Erich Reineker (W)
Jamie Ross (WH)
Kristin Rozum (G)
Helena Russell (PW)
Ellen Sabine (H)
Jim Saraco (WS)
Phil Sary (H)
Fran Scarlett (H)
Dave Schurr (WS)
Craig Scott (DSPW)
Nikki Simpson (P)
Joe Smith (D)
Joe H. Smith (HW)
Anne Spencer (S)
Craig Spriggs (G)
Jane Spriggs (G)
Rich Stallcup (SM)
Jean Starkweather (H)
Bob Stewart(P)
Susan Stingle(P)
Sarah Tappen (PHS)
Judy Temko (HS)
Janet Thiessen (HW)
Gil Thomson (H)
Don Tiernan (H)
Forest Tomlinson (WS)
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Janet Walker (M)
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IN THE FIELD

November	11	Tomales Bay Shorebird count (early winter census)
	28	Tomales Bay Shorebird count (early winter census)
December	12	Tomales Bay Shorebird count (early winter census)
	16	Tomales Bay Waterbird count

The **Ardeid**

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