Conservation Science
and Stewardship at
Audubon Canyon Ranch

acr

THE ARDEID

2020

Celebrating The Ardeid

A directory of all the issues over the past 30 years

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

THE ARDEID

In Celebration of *The Ardeid*

The Ardeid—ACR's annual journal of Conservation Science and Stewardship—was published between 1990–2018. It summarized current news from ACR's science and stewardship—reporting on our preserves and serving as a record of the region's ecology.

Celebrating 30 years of *The Ardeid,* we're issuing this special edition directory of all its articles. This Ardeid Collection is accessible to all at https://egret.org/ardeid.

As you'll glean from excerpts featured in this Collection, ACR's scientific work has grown in scope and geography, from Bolinas Lagoon, Tomales and San Francisco bays to California's Northern Coast Ranges, the Central Valley and points east of the Sierra Nevada.

To meet the demands, our science staff includes wildlife biologists, fire scientists, and GIS (mapping) specialists, assisted by countless volunteers. Together, we work on conservation issues at a landscape scale, finding science-based solutions with lasting results.

Because our rapidly changing world calls on us to engage in more collaborative, responsive ways, we have ceased publishing this annual journal in favor of more timely, in-progress updates and in-depth scientific review published directly on our website, in our daily social media, and integrated into our bi-annual Conservation in Action bulletin.

Let us know other ways we can make our conservation and stewardship results timely, relevant, and accessible to you.

Nils Warnock, Ph.D.
Director of Conservation Science

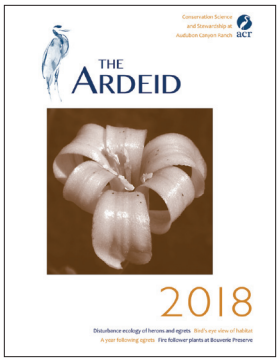
In this issue

Cover: Cypress Grove Research Center on Tomales Bay has been ACR's avian research hub since 1992. Photo: Carlos Porrata.

Ardeid masthead: Great Blue Heron ink wash painting by Claudia Chapline.

Managing Editors: Wendy Coy and Nils Warnock
Layout design: Claire Peaslee

egret.org



The Ardeid 2018

Cover: Redwood lily *(Lilium rubescens)* is one of the 'post-fire opportunist' wildflowers that bloomed this year at Bouverie Preserve. *Photo by Tom Hilton/ Creative Commons.*

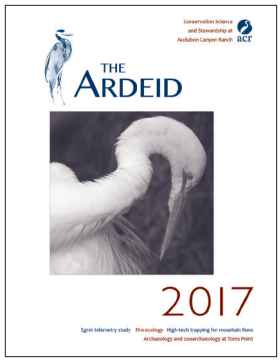
Slow Local Recovery: Disturbance ecology of herons and egrets, *by John P. Kelly*

Habitat From a Bird's Eye View: Toward highly detailed predictive maps of bird-habitat relationships, *by Scott Jennings*

A Year Following Egrets: Insights from birds with GPS tags, *by David Lumpkin*

Chaparral Rediscovered: Following the "fire followers" at Bouverie Preserve, *by Jennifer Potts and Jeanne Wirka*

♦ **Read an excerpt below.**



The Ardeid 2017

Cover: Great Egret preening. *Creative Commons photo.*

The Movement Ecology of Egrets: Studying top predators to understand landscape habitat linkages, *by Scott Jennings*

The Foundation: California fire ecology, *by Sasha Berleman.*

♦ **Read an excerpt on page 4.**

Toms Point Archaeology: Investigating Native American history at Tomales Bay, *by Tsim D. Schneider and Lee M. Panich*

Toms Point Zooarchaeology: Archaeological faunas shed light on the diets of past Toms Point residents, *by Anneke Janzen, Amanda Hill, and Tsim D. Schneider*

Walk Through to a New Era: Electronic walk-through cage for mountain lions, *by Quinton Martins and Neil Martin*

2018

Chaparral Rediscovered

The Bouverie Preserve is blanketed by chamise-dominated chaparral on the hot, rocky southwest slopes of the Mayacamas Mountain range. At first introduction, chaparral is an impenetrable shrubby tangle that resists exploration by even the most intrepid field biologists. But looked at closely, chaparral hosts an extensive suite of plants and animals found in no other habitat of California. Of the 4,846 native vascular plant species found in the state, 24% occur in chaparral and 44% of these are considered rare or endangered. What are the secrets behind this diversity? Periodic fire and specialized plant adaptations are two keys to the botanical treasure chest.

• • •

As scientists, we are excited to be part of this rare time in history when we can capture a strong pulse on the landscape. Fire and disturbance are nature's tools for maintaining equilibrium and resiliency, and we have special opportunity to watch the recovery process unfold. ACR will continue to share new findings with our supporters as we delve deeper into the ecological wonders of fire.

Rare post-fire understory annuals, like this redwood lily, burst from the ashes and last for only a few years, their seeds sequestered in the soil until the next fire. Photo: Jared Jacobs

2017

The Foundation: California fire ecology

Fire is a keystone ecological process, and most of California's ecosystems have evolved to depend on it as a dynamic process that maintains ecological resiliency.

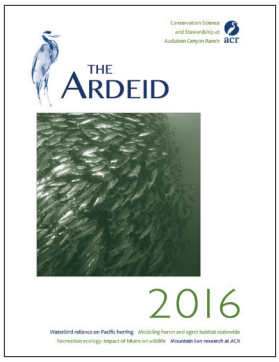
…

With the arrival of non-native peoples in California in the 1800s came a rapid depopulation of Native Americans and a Euro-American culture that actively declared the use of fire illegal. Whereas Native American tribes had managed lands for open meadows, big trees, high diversity, and resilience against dramatic sudden change, our meadows and open woodlands became encroached with native and non-native invaders alike—trees and shrubs and grasses that do not benefit from fire but whose populations increase and encroach rapidly in the absence of fire. This change in ecosystem structure—from fewer, larger trees and open space to large trees with an understory of densely populated and unhealthy smaller trees and heavy accumulated fuel loads—led to increased ecosystem stress.

…

As a culture, we are finally beginning to understand our role in managing our landscapes. Across the state, all agencies have agreed that we need more fire on the ground, specifically in the forms of prescribed fire and managed wildfire.

ACR's founder and emeritus director L. Martin Griffin lights the test fire for a controlled burn of understory in a Douglas fir forest on Martin Griffin Preserve, October 2019. Photo: Richard James



The Ardeid 2016

Cover: Huge schools of Pacific herring enter estuarine waters each winter to spawn, providing important food for waterbirds. *Photo © Paul Nicklen /National Geographic*

Echoes of Ecological Dependence: Waterbird reliance on Pacific herring, *by John P. Kelly*

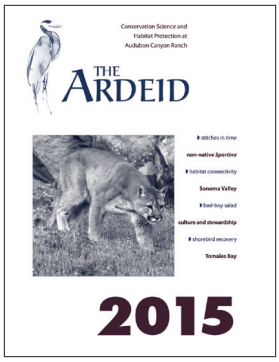
♦ **Read an excerpt on page 5.**

Ardeid Landscapes: Using statewide data to model the habitat needs of nesting herons and egrets, *by Emiko Condeso*

Recreation Ecology: The impact of hikers on wildlife, *by Michelle Reilly and Sherry Adams*

The Role of Top Predators in Ecosystems: Mountain lion research at ACR, *by Quinton Martins*

♦ **Read an excerpt on page 13.**



The Ardeid 2015

Cover: Mountain lion is one of many species that benefit from wildlife corridors. *Photo by Phillip Colla*

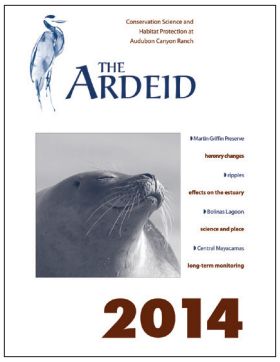
Careful Stitches: Acting beyond property boundaries to hold back a non-native *Spartina* invasion, *by Emiko Condeso and Ingrid Hogle*

Staying Connected: ACR's regional habitat corridor partnerships in the Sonoma Valley, *by Jeanne Wirka*

Bad-boy Salad: Phenology, culture, and software for stewardship, education, and research, *by Dave Self*

Shorebird Recovery in Tomales Bay: Restoration of the Giacomini Wetlands stimulates winter population growth, *by John P. Kelly*

♦ **Read an excerpt on page 6.**



The Ardeid 2014

Cover: Bolinas Lagoon is an important harbor seal resting, pupping, and molting site. *Photo by Phillip Colla*

Where Have All the Egrets Gone? Recent events at the Martin Griffin Preserve heronry, *by Sarah Millus*

Remembrance: Helen Pratt, *by John P. Kelly*

Ripples in the Pool: Local shifts, indefinite cycles, and the future of herons and egrets in Bolinas Lagoon, *by John P. Kelly*

Bolinas Lagoon: Incorporating science and sense of place in a changing world, *by Gwen Heistand*

Branching Out: ACR launches a new long-term monitoring survey on Pine Flat Road, *by Emiko Condeso*

2016

Echoes of Ecological Dependence: Waterbird reliance on Pacific herring

Pacific herring *(Clupea pallasii),* which spawn by the tens of millions each winter, from December to March, in the vast, subtidal eelgrass meadows of Tomales Bay, are a potentially critical source of food for the hordes of waterbirds that winter there. Because herring, or herring roe, also provide food for numerous fishes, crabs, and pinnipeds, the seasonal availability of herring has potentially huge ecosystem importance.

…

Consider the spectacular return of up to 35,000 or more waterbirds to Tomales Bay each winter. Here nearly 60 species of loons, grebes, cormorants, ducks, and other waterbirds, in addition to numerous species of shorebirds and gulls, exhibit complex patterns of growth and decline that are complicated enough to seem mysterious. A current focus of conservation research at ACR is to determine the importance of Pacific herring to the remarkable masses of waterbirds that occupy our estuaries in winter.

…

After accounting for normal variation and underlying trends in both waterbirds and herring, we were able to determine how waterbirds respond over time to the annual incursions of herring into Tomales Bay. Overall, the baywide abundance of wintering waterbirds known to consume herring or herring roe (42 species, combined) was found to increase significantly in response to any unexpected increase in herring biomass. The responses were strong, providing evidence that wintering populations of most of the individual waterbird species exhibited significant, positive growth over multiple years in response to impulses of herring spawning activity in the bay.

Pacific herring in eelgrass. Photo: Getty Images

2015

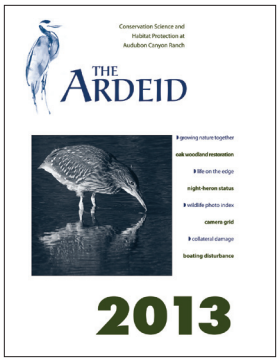
Shorebird Recovery in Tomales Bay: Restoration of the Giacomini Wetlands stimulates winter population growth

On 30 October, 2008, ecologists at the Point Reyes National Seashore allowed the waters of Tomales Bay to flow into more than 550 acres of previously diked pastures on the Giacomini Ranch, at the extreme southern end of the bay—after nearly six decades of isolation from tidal action. Tidal forces reshaped the new wetlands. In some areas, unvegetated tide flats began to develop. In others, pickleweed *(Salicornia virginica),* marsh jaumea *(Jaumea carnosa),* and other saltmarsh vegetation began to take hold. Gradually, undulating flocks of shorebirds arrived from elsewhere in the bay, sweeping in and out of the evolving restoration site with changes in tidal exposure. It was exciting to see birds using the new wetland, but whether the restoration might stimulate any actual growth of surrounding shorebird populations remained unknown.

. . .

Biologists and volunteers at ACR (a key partner in the restoration effort) were hopeful that 25 years of Tomales Bay-wide shorebird monitoring would lead to important evidence of cascading regional benefits to winter shorebird populations. To look for broader responses to the restoration, we examined baywide shorebird counts gathered before and after the restoration by devoted birders working with ACR. Six years after tidal reintroduction, it became clear that the restoration effort was not just revitalizing an historic wetland—it was stimulating the growth of the surrounding winter shorebird populations in Tomales Bay.

Least Sandpipers responded strongly to the restoration, with regional population growth that began soon after tidal reintroduction.
Photo: Scott Jennings



The Ardeid 2013

Cover: A juvenile Black-crowned Night-Heron. *Photo by Tom Grey*

Growing Nature Back Together: Restoring oak woodland habitat at Bouverie Preserve, *by Jennifer Potts*

Life on the Edge: The status of Black-crowned Night-Herons in the northern San Francisco Bay area, *by Emiko Condeso*

Using Cameras to Understand Wildlife: Photo Index at Modini Ingalls Ecological Preserve and Mayacamas Mountains Sanctuary, *by Sherry Adams and Susan Townsend*

Collateral Damage: A brief review of boating disturbance to waterbirds in California estuaries, *by John P. Kelly and Jules G. Evens*

Seeing Nature First: Remembering Rich Stallcup, *by John P. Kelly*

The Ardeid 2012

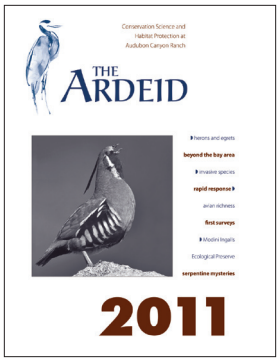
Cover: The Short-eared Owl is a Species of Local Interest in the Tomales Bay watershed. *Photo by Tom Grey*

Outcasts on the Wing: Modeling the regional effects of disturbance at heron and egret colonies, *by Sarah Millus*

Through the Lens of Ecosystem Services: Mayacamas Mountains Sanctuary, ACR's newest preserve, *by Sherry Adams*

Species of Local Interest: Fine-tuning conservation in the Tomales Bay watershed, *by John P. Kelly*

Bouverie Preserve: Stitching the seam of a frayed landscape, *by Theo Michaels and Jennifer Potts*



The Ardeid 2011

Cover: Mountain Quail—an iconic bird species found at Modini Ingalls Ecological Preserve. *Photo by Brian Small*

Beyond the Bay Area: Mapping heronries in coastal California, *by Emiko Condeso*

Early Detection and Rapid Response: Medical models point the way to effective invasive species treatment, *by Matthew Danielcyzk*

First Surveys: Documenting the avian richness of the Modini Ingalls Ecological Preserve, *by John P. Kelly*

Serpentine Mysteries: Investigations of a special habitat at Modini Ingalls Ecological Preserve, *by Sherry Adams*

♦ **Read an excerpt at right.**

The Ardeid 2010

Cover: Western toad, one of the amphibian species at Modini Ingalls Ecological Preserve. *Photo by Leah Grunzke / Flickr Creative Commons*

Herons in the Mist: How will heron and egret populations respond to regional climate change? *by John P. Kelly*

Preparing for Stewardship: Natural resource management planning for the Modini Ingalls Ecological Preserve, *by Sherry Adams*

Loss and Redemption: Lessons from the rediscovery of the Franciscan manzanita, *by Dan Gluesenkamp*

Return of the Tide: Shorebird use in the evolving Giacomini Wetlands, *by Emiko Condeso*

2011

Serpentine Mysteries: Investigations of a special habitat at Modini Ingalls Ecological Preserve

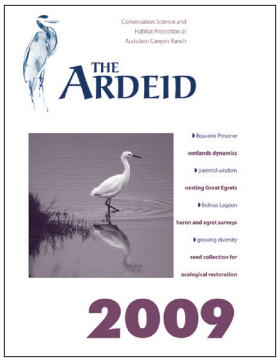
In 2010, with assistance from volunteers and other ACR staff, I initiated an inventory of the plants of the serpentine outcrops at MIEP. We began by using high-resolution aerial photography to identify possible serpentine outcrops, followed by field work to validate and revise the results.

We are targeting the serpentine outcrops because it is an efficient way to find many of the rare plants of MIEP. If we consider a list of the species of a given place, a few are abundant, but most are uncommon. In other words, these uncommon species, including many of the plants on MIEP's serpentine outcrops, are the backbone of biodiversity. Further, the persistence of a species that is limited to a few isolated patches is naturally precarious, because an event that eliminates the plants on a patch may significantly reduce the genetic diversity of the species. Keeping an eye on these uncommon plants is a way for us to monitor the most sensitive elements of biodiversity.

• • •

While our inventory is not complete, a few things are already clear. Serpentine outcrops are a storehouse and refuge for native plants at the Modini Ingalls Ecological Preserve. Of the 179 species so far found on these outcrops, 149 are native, and they are the plants that dominate these patches. Over 40 of them are documented in the scientific literature to be associated specifically with serpentine soils. This includes some that are strict endemics, meaning they are only found on serpentine outcrops. Quite a few are also regional endemics, only found in the North Coast Ranges of California.

Serpentine outcropping. Photo: Wendy Coy



The Ardeid 2009

Cover: A Snowy Egret "foot stirring" to find prey. The number of foraging Snowies in Bolinas Lagoon increases during fall and winter. *Photo by Philip Loring Greene*

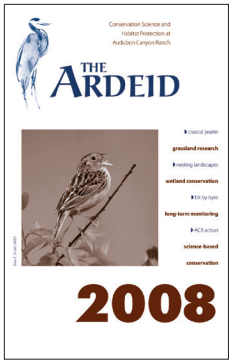
Fountain of Fountains: Exploring the dynamics of seasonal wetlands at the Bouverie Preserve, *by Sherry Adams and Arthur Dawson*

♦ **Read an excerpt at right.**

The Ecology of Parental Wisdom: Strategic nest attendance by Great Egrets, *by John P. Kelly*

Local Values: A fine scale census of herons and egrets on Bolinas Lagoon, *by Emiko Condeso*

Growing Diversity: How seed collection influences genetic diversity in ecological restoration, *by Hillary Sardiñas*



The Ardeid 2008

Cover: Grasshopper Sparrow, a denizen of California coastal prairie grasslands. *Photo by Brian E. Small /VIREO*

Conserving and Restoring California Coastal Prairie Grasslands: Grasslands research at ACR's Toms Point, *by Jeffrey D. Corbin*

The Protection of Nesting Landscapes: Wetland conservation and the health of heronries, *by John P. Kelly*

Bit by Byte: The growth of ACR's long-term monitoring programs, *by Emiko Condeso*

Implications, Influence, Action: Science-based conservation at Audubon Canyon Ranch, *by John P. Kelly*

2009

Fountain of Fountains: Exploring the dynamics of seasonal wetlands at the Bouverie Preserve

Every day, 15,000 cars pass within view of an especially valuable area of habitat at ACR's Bouverie Preserve in Sonoma Valley, yet the area is rarely visited, since no trail leads to it. This habitat fluctuates wildly through the course of the year. During the winter rains, plants germinate and insects and other tiny invertebrates enter into the aquatic phase of their lives. In spring these spots slowly dry out, wildflowers bloom, grasses grow, and frogs hop off on new legs. This is followed by complete desiccation, with a handful of specially adapted plants, such as the aromatic vinegar weed *(Trichostema lanceolatum),* growing and flowering in the heat of summer. This dynamic habitat is the wetlands of Lower Field of the Bouverie Preserve.

…

We found two types of wetlands in the Lower Field of the Bouverie Preserve. One type quickly fills when it is raining, and the water level drops between precipitation events. This is consistent with the explanation that these wetlands have a mostly impermeable clay hardpan bottom (as with vernal pools). The second type of wetland never holds much water (less than 10 cm), and the water level rises only slightly in response to rain events, dropping slowly afterwards.

…

We think that the main ways our wetlands have changed are in the reduction of their extent, the loss of hydrologic connectivity, and, possibly, a reduction in the number of days of inundation each year. They may have once been one small part of a large complex of wetlands in Sonoma Valley.

Sonoma sunshine *(Blennosperma bakeri)* is a California endemic in the sunflower family that blooms from February through April.
Photo: Sasha Berleman

The Ardeid 2007

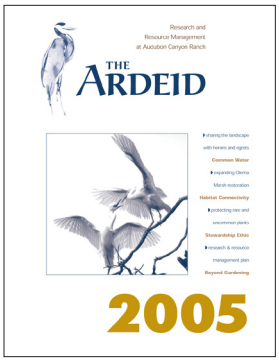
Cover: Surf Scoter on cresting wavelet. *Photo by R. Crossley/VIREO*

Saving Sonoma's Sunshine: Vernal pool restoration at Bouverie Preserve, *by Sherry Adams, Jeanne Wirka, and Daniel Gluesenkamp*

Energy Footprints on Tomales Bay: The importance of ephemeral food abundance, *by Wesley W. Weathers and John P. Kelly*

Foraging Horizons: How broadly do herons and egrets search the landscape to find food? *by John P. Kelly and Mark McCaustland*

Pathogen with Tremendous Impact: Landscape perspectives in conservation, *by Emiko Condeso*



The Ardeid 2005

Cover: Snowy Egret siblings. *Photo by Philip Greene*

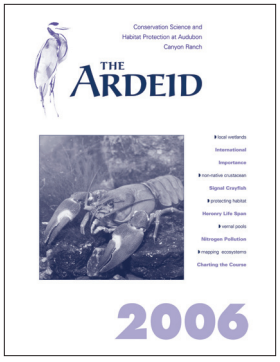
Common Water: Sharing the landscape with herons and egrets, *by John P. Kelly*

Habitat Connectivity: Expanding options for Olema Marsh restoration, *by Katie Etienne*

Stewardship Ethic: Protecting rare and uncommon plants at ACR, *by Daniel Gluesenkamp*

Beyond Gardening: An updated plan for research and resource management at ACR, *by John P. Kelly*

♦ **Read an excerpt on page 10.**



The Ardeid 2006

Cover: Invasive, non-native signal crayfish can measure up to 16 cm long. *Photo by Mike Lane / Alamy*

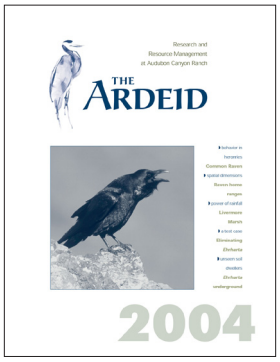
International Importance: Habitat protection on Bolinas Lagoon and Tomales Bay, *by John P. Kelly*

Signal Crayfish in Stuart Creek: Controlling *Pacifastucus lenistulus* at Bouverie Preserve, *by Jeanne Wirka*

What's the Life Span of a Heronry? Habitat protection and nesting colonies, *by John P. Kelly*

Sonoma Valley Vernal Pools: Is nitrogen pollution harming fragile ecosystems? *by Daniel Gluesenkamp and Jeanne Wirka*

Charting the Course: The importance of mapping in the protection of native ecosystems, *by Jennifer Jordan*



The Ardeid 2004

Cover: Common Raven. *Photo by Peter LaTourrette*

Vague Consequences of Omnipresence: Common Raven behavior in heronries, *by John P. Kelly*

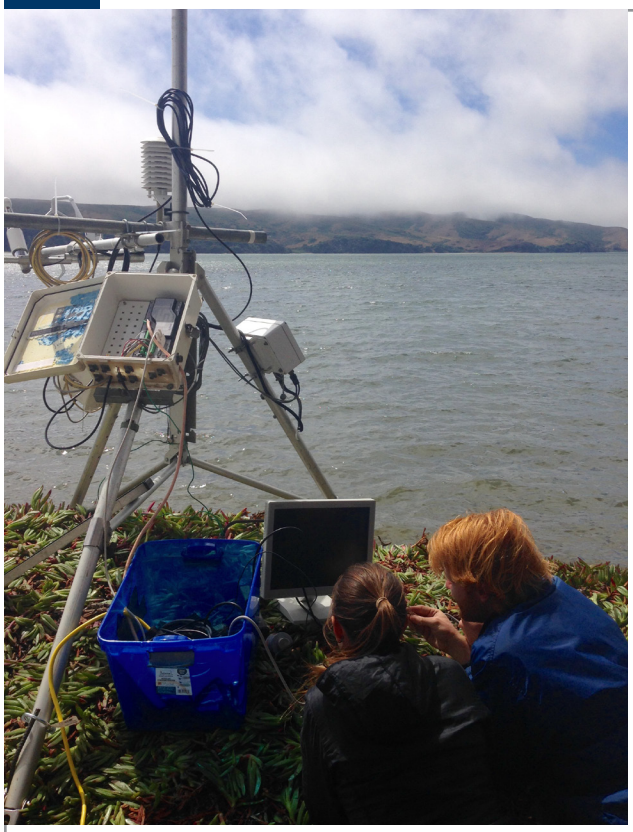
The Spatial Dimensions of Raven Life: Home-range dynamics in western Marin County, *by Jennifer Roth*

Eliminating *Ehrharta:* Bolinas Lagoon Preserve as a test area for regional conservation, *by Daniel Gluesenkamp*

***Ehrharta* Underground,** *by Gwen Heistand*

The Power of Rainfall: Influences on the hydro-geomorphology of Livermore Marsh, *by Katie Etienne*

2005



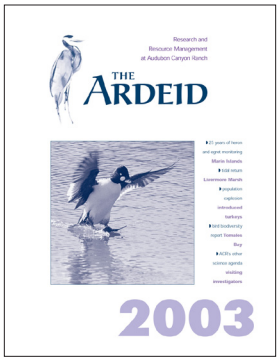
Beyond Gardening: An updated plan for research and resource management at ACR

Natural resources agencies often use the results of ACR research to assess and manage heronries, coastal lagoons and marshes, recreation areas, and other natural areas beyond our boundaries. In fact, the protection (or loss) of natural resources in other parts of the landscape probably influences the life in our sanctuaries more dramatically than many of our on-site stewardship activities do. Because of such influences, ACR biologists address regional conservation issues and maintain active roles in watershed management councils, conservation planning teams, and technical advisory groups.

One increasingly valuable use of protected lands is to provide natural laboratories for conservation research. Advanced students and visiting scientists are showing a growing interest in the undisturbed natural areas of ACR (Ardeid 2003). We generally host 10-30 active field studies, addressing topics ranging from coastal prairie restoration ecology, to indicators of estuarine health, to the effects of vineyards on habitat values for birds.

Above: Melissa Ward and Walker Calhoun, of the Bodega Marine Lab, are measuring the ability for the seagrass meadow beneath the estuarine surface to drawdown atmospheric carbon dioxide. Photo: Melissa Ward

Right: On Cypress Grove Preserve, Ron Taylor from The Institute for Bird Populations records data about this Pacific-slope Flycatcher prior to banding and release. Photo: Steven Albert



The Ardeid 2003

Cover: Common Goldeneye. *Photo by Kenneth W. Gardiner*

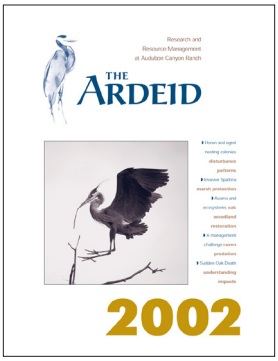
A Tale of Two Islands: 25 years of heron and egret monitoring at the Marin Islands, *by John P. Kelly*

The Return of Tidal Circulation: Breeding and winter bird use in Livermore Marsh, *by Katie Etienne*

Introduced Turkeys: California's latest population explosion, *by Daniel Gluesenkamp*

Bird Alphabet Soup: A report on the All Taxa Biodiversity Inventory of Tomales Bay, *by John P. Kelly*

The Other Scientific Agenda: Visiting investigators on ACR lands, *by John P. Kelly*



The Ardeid 2002

Cover: Great Blue Heron. *Photo by Philip L. Greene*

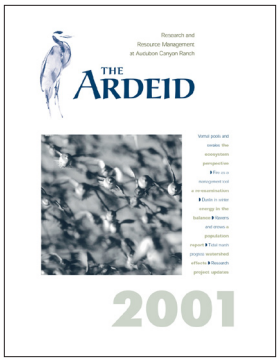
A Safe Place to Nest: Disturbance patterns in heronries, *by John P. Kelly*

Invasive *Spartina:* The challenging changeling, *by Katie Etienne*

Acorns and Ecosystems: Fourteen years of oak woodland restoration at the Bouverie Preserve, *by Rebecca Anderson-Jones*

Resistible Forces? Raven predation in heronries, *by John P. Kelly*

Sudden Oak Death: Understanding the impact of a new epidemic on our forests and woodlands, *by Daniel Gluesenkamp*



The Ardeid 2001

Cover: Dunlin flock. *Photo by T. Fitzharris/VIREO*

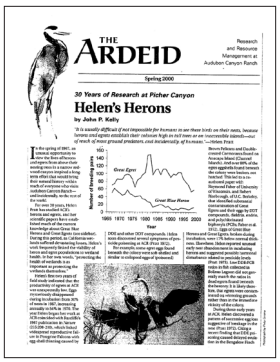
Vernal Pools and Swales at the Bouverie Preserve: Developing an ecosystem perspective for seasonal wetland management, *by Rebecca Anderson-Jones*

Balancing Acts: Energy conservation in wintering Dunlin, *by John P. Kelly*

Marsh Revival: Monitoring the return of tidal influence on a coastal wetland, *by Katie Etienne*

'The Birds': Abundance and distribution of Common Raven and American Crow in the San Francisco Bay area, *by John P. Kelly*

Must We Have Fire? The ecological history and role of fire in ACR management, *by Greg deNevers*



The Ardeid 2000

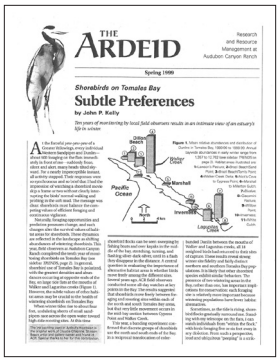
Helen's Herons: 30 years of research at Picher Canyon, *by John P. Kelly*

♦ **Read an excerpt at right.**

The Futures of Bolinas Lagoon: Developing a management plan for a changing wetland, *by Greg de Nevers*

Raven is Near: The behaviors of birds and biologists, *by Mark McCaustland*

It's Not a Campground! Temporary enclosures placed by UC Berkeley researchers to study native insect population



The Ardeid 1999

Subtle Preferences: Shorebirds on Tomales Bay, *by John P. Kelly*

Out of Place: Managing pest plants on ACR properties, *by Rebecca Anderson-Jones*

Changing Perspectives: Livermore Marsh: Rearranged by natural processes, *by Katie Etienne*

2000

Helen's Herons: 30 years of research at Picher Canyon

In the spring of 1967, an unusual opportunity to view the lives of herons and egrets from above their nesting trees in a narrow redwood canyon inspired a long-term effort that would bring their natural history within reach of everyone who visits Audubon Canyon Ranch—and incidentally, to the rest of the world.

Helen Pratt. Photo: James Sullivan

• • •

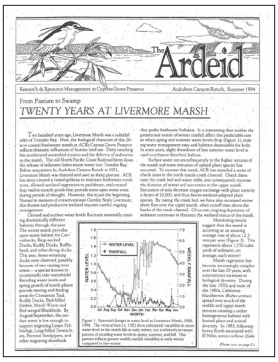
For over 30 years, Helen Pratt has studied ACR's herons and egrets, and her scientific papers have established much of the current knowledge about Great Blue Herons and Great Egrets. During this period, as California wetlands suffered devastating losses, Helen's work frequently linked the viability of heron and egret populations to wetland health. In her own words, "protecting the health of wetlands is as important as protecting the wetlands themselves."

• • •

One conclusion from Helen's work has had particular influence on our current thinking about the conservation of herons and egrets: changes in colony size were not correlated with measures of reproductive success. This finding was consistent with her suggestion that fluctuations in colony size could be explained by predation pressure and movements of individuals among breeding sites. Although we cannot measure nest initiations in the region as precisely as Helen did at Picher Canyon, we recognize the processes she identified: late initiations can signal regional nest failure or movements of birds from other (possibly disturbed) sites.

The Ardeid 1997

Beneath the Surface: Waterbirds on Tomales Bay, *by John P. Kelly and Sarah Tappen*



The Ardeid Summer 1994

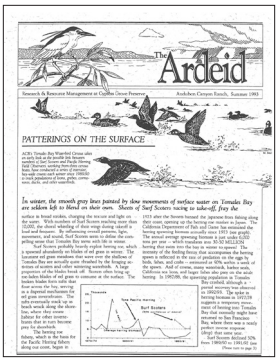
From Pasture to Swamp: Twenty years at Livermore Marsh

From the Bottom of the Creek: Five years on the Walker Creek Delta Flats, *by Rich Stallcup*

The Ardeid Fall 1995

What is Preferred Depends on When: Foraging niche of the Common Yellowthroat, *by John P. Kelly and Chris Wood*

Common Ground: The effects of oyster culture on wintering shorebirds



The Ardeid Summer 1993

Patterings on the Surface: Tomales Bay Waterbird Census

Protecting Local Heronries: HEP field observers fight quiet destruction of nesting colonies

The Ardeid Winter 1995

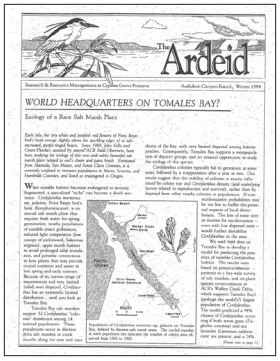
Snowy Drift: The exodus of Snowy Egrets from West Marin Island, *by John P. Kelly*

Cypress Grove Preserve: A brief history, *by Clerin Zumwalt*

The Ardeid Fall 1992

Counting Cows on the Hillside: The census data we count on

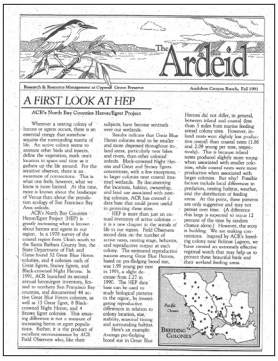
Tomales Bay Harbor Seals: A colony at risk? *by Sarah Allen and Mary Ellen King*



The Ardeid Winter 1994

World Headquarters on Tomales Bay? Ecology of a rare salt marsh plant, *by John P. Kelly*

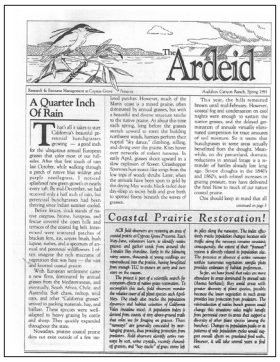
Lands, Not Islands: Sanctuary management and the ecological landscape



The Ardeid Fall 1991

A First Look at HEP: ACR's North Bay Counties Heron/Egret Project

Some Thoughts on Resource Management at ACR, *by John P. Kelly*


The Ardeid

A Quarter Inch Of Rain

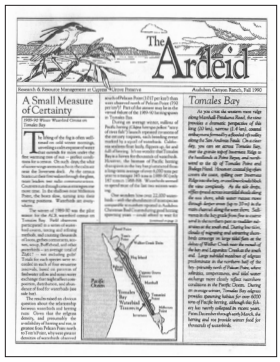
Coastal Prairie Restoration!

The Ardeid Spring 1991

A Quarter Inch of Rain: California's beautiful perennial bunchgrasses

Coastal Prairie Restoration!

Dunlin on the Move


The Ardeid

A Small Measure of Certainty

Tomales Bay

The Ardeid Fall 1990

A Small Measure of Certainty: 1989-90 Winter Waterbird Census on Tomales Bay

Dueling for Gruel: The adaptive value of heron/egret sibling aggression

2016

The Role of Top Predators in Ecosystems

Over the past 500 years, human activities have led to at least a quarter of the known extinctions or extinction threats to the world's mammals. The elimination of the world's megafauna includes the past and present loss of most of the large predators. Over recent decades, ecologists have become increasingly concerned about these losses, intensifying scientific efforts to understand the essential roles of large predators in healthy ecosystems.

…

The effects of predator reintroductions demonstrate the importance of predators and that the extirpation or local decline of large carnivores perturbs the biological communities in which they live. The extent of these declining predator populations may alter the entire ecology of extensive landscapes. Thus, the conservation of large carnivores is of global importance, as they serve as umbrella species across habitats, ensuring the broader conservation of wildlife and ecosystems wherever they live.

…

Mountain lion research at ACR is an exciting technical investigation and community-based outreach program, designed to increase both scientific and public understanding of mountain lions. Mountain lions are one of the most iconic and charismatic species, inspiring awe, curiosity, and sometimes fear in a way that few other animals do. Focusing on the powerful charisma of lions and their ecological role in ecosystems, the project works to increase our knowledge and appreciation of mountain lion behavior, population size, feeding habits, home range, and movements—to help ensure their conservation and the protection of habitat critical for their survival.

ACR's trail camera captured first-time mom mountain lion P16 and her two-week-old kittens near Kenwood, Sonoma County, in February 2020.

Conservation Science achievements in 2019

Monitoring

- 53rd year of monitoring all heron and egret nesting attempts in Bolinas Lagoon.
- 30th year of monitoring the status of wintering waterbirds in Tomales Bay.
- 30th year of monitoring the use of Tomales Bay by wintering and migrating shorebirds.
- 30th consecutive year of monitoring the status of nesting herons and egrets—at all known colony sites in the northern San Francisco Bay Area.
- Contributed data to the Pacific Flyway Shorebird Survey (Point Blue Conservation Science).

Research

- Heron & Egret Telemetry Project finished its second year, by tagging one additional Great Egret.
- In collaboration with the Canadian Wildlife Service, we radio-tagged 20 Western Sandpipers in San Francisco Bay during April 2019. Sixteen were subsequently detected in Washington and British Columbia as they migrated toward Alaska to breed.
- We continue to analyze LiDAR data for comparison to our bird survey data collected in the Mayacamas Mountains.
- Using 6 years of pre-fire landbird monitoring data at Modini Preserve and along Pine Flat Rd, we are beginning to document response of the breeding bird community to the Kincade Fire.
- Mountain lion trapping and collaring completed its fourth year, with a total of 19 lions tagged for the Living with Lions study at the end of 2019. Conflict between lions and humans by way of predation on backyard livestock continues to be a focal point of the program's outreach effort.
- Data from trail cameras on our preserves are contributing to the North Bay Bear Collaborative's regional effort to map the range of North Bay black bears and to better understand their dispersal patterns.

Publications

- Adams, S.N., S. Jennings, and N. Warnock. "Does invasive removal benefit native species?" Plant Ecology and Diversity (submitted).
- Rauzon, M.J., M.L. Elliott, P.J. Capitolo, L.M. Tarjan, G.J. McChesney, J.P. Kelly, and H.R. Carter, 2019. "Changes in abundance and distribution of nesting Double-crested Cormorants *Phalacrocorax auritus* in the San Francisco Bay area, 1975-2017." Marine Ornithology 47: 127-138.
- Shuford, D.W., J.P. Kelly, T.E Condeso, D.S. Cooper, K.C. Molina, and D. Jongsomjit. "Distribution and abundance of colonial-nesting herons, egrets, and night-herons in California, 2009–2012." Western Birds (in review).
- Warnock, N. 2019. "Species accounts for Pectoral Sandpiper, Sharp-tailed Sandpiper, Solitary Sandpiper, Western Sandpiper, Short-billed Dowitcher, and Ruddy Turnstone." In Alaska Shorebird Conservation Plan. Version III. Alaska Shorebird Group, Anchorage, AK.
- Beebe, G., S. Kirks, T.E. Condeso, T. McCuller, B. Parmeter, D. Freid, and A. Wight. 2019. "Birds of Doran Regional Park." Madrone Audubon Society for Sonoma County Regional Parks.
- Dellinger, J.A., B. Cristescu, J. Ewanyk, D.J. Gammons, D. Garcelon, P. Johnston, Q. Martins, C. Thompson, T.W. Vickers, C.C. Wilmers, H.U. Wittmer, S.G. Torres, 2019. "Using mountain lion habitat selection in management." The Journal of Wildlife Management.
- Hettena, A. 2019. "Prey composition and kill rates of mountain lions in California's San Francisco Bay Area." M. S. thesis. Pace University, Pleasantville, NY.
- Jansen, C., A.J. Leslie, B. Cristescu, K.J. Teichman and Q. Martins. 2019. "Determining the diet of an African mesocarnivore, the caracal: scat or GPS cluster?" Wildlife Biology 2019 (1).
- Multiple technical reports on heron and egret nesting status were produced for various partners and stakeholders.

Policy work

- Submitted comments to the California Coastal Commission on coastal development permits for aquaculture (mainly oysters) operations in Tomales Bay as well as to the California Fish and Game Commission on the Draft California Pacific Herring Fishery Management Plan.

Collaborations

- Hosted 6 graduate students/visiting scientists from different universities/organizations on our preserves to conduct investigations in conservation science.
- Collaborated with Tomales Bay landowners to detect and control invasive Perennial Pepperweed.
- Collaborated with the Invasive *Spartina* Project to monitor and control known Tomales Bay *Spartina densiflora* hotspots.
- Worked with Madrone Audubon Chapter and ACR education staff to organize Lincoln Elementary Bird Festival—an educational event centered around the "urban" heronry located on W. 9th Street in Santa Rosa.
- Collaborated with Dr. John Brzorad and others for a comparative analysis of Great Egret movement in different parts of the country.
- Collaborating with the Intermountain Bird Observatory, the Smithsonian Migratory Bird Center, and the Coastal Bend Bays & Estuaries Program, Inc. on a Long-billed Curlew migration study.

Talks/Posters/Mapping

- Jennings, S. 2019. 30 (50) years monitoring Herons and Egrets nesting in the San Francisco Bay Area. Waterbirds Society. Salisbury, MD (Nov).
- Jennings, S. 2019. Migration and habitat use of west coast Great Egrets. The Wildlife Society., NV (Sep).
- Jennings, S. 2019. Migration and habitat use of west coast Great Egrets. Waterbirds Society. Salisbury, MD (Nov).
- Lumpkin, D. C. 2019. Varied migratory strategy and habitat use by Bay Area Great Egrets. Poster Presentation, State of the Estuary Conference. Oakland, CA (Oct).

Our Community: Volunteers bring the ACR mission to life

Over 400 active volunteers—and the thousands of hours they collectively donate every year—embody ACR's mission of connecting nature, people and science in a rapidly changing world.

Join us today and start connecting with the beauty of our preserves, make new friends, and know you are helping protect the wildlands of the North Bay. Volunteer opportunities include:

- Bouverie Preserve Docents
- Heron and Egret Project (HEP) Field Observers
- Tomales Bay Shorebird and Waterbird Monitors
- Directors, Advisors & Emeritus Directors
- Habitat Protection & Restoration Stewards
- Hike Leaders
- Hosts
- Modini Preserve Stewards
- Mountain Lion Ambassadors
- Martin Griffin Preserve Docents
- Nature Guides
- Trail Camera Voluneers
- Quercus Quire Choral Singers

Each year, volunteers are recognized in our Annual Report.

Bouverie Preserve volunteer stewards regularly lend their time and talents to other ACR properties, as seen above, removing invasive ice plant at Toms Point on Tomales Bay.

Become a volunteer **egret.org/volunteer**

Conservation Science achievements, *continued*

- Warnock, N. 2019. Great Minds lecture series (one of six speakers), Bolinas Museum, Bolinas, CA (Apr).
- Warnock, N. 2019. Heron and egret monitoring in Suisun Bay. Suisun Regional Conservation District. Fairfield, CA (Sep).
- Warnock, N. 2019. Conservation science at Audubon Canyon Ranch. Golden Gate Audubon Society. San Francisco, CA (Oct).
- Warnock, N. 2019. Counting shorebirds while the world burns. Western Hemisphere Shorebird Group Meeting, Panama City, Panama (Oct).
- Warnock, N. 2020. Status and conservation of waterbirds of the North Bay. Napa-Solano Audubon Society. Fairfield, CA (Jan).
- Created customized ESRI interfaces for mapping items ranging from Perennial Pepperweed to mammoth teeth, as well as providing background layers for the architect team working on rebuilding Bouverie Preserve infrastucture.
- Compiled several datasets (elevation, vegetation, parcels, population density, roads, protected areas, and hydrology) for Living with Lions' study area, covering Mendocino, Lake, Sonoma, and Napa counties.

Training/outreach

- Staff training in GIS and creation of cartography resources for specific projects.
- First CGRC Volunteer Day for research volunteers.
- Point Reyes Birding and Nature Festival walks/talks: Birds of Cypress Grove, Herons and Egrets of Santa Rosa, and Birds of Mt. Tamalpais.
- Waterbird ID and monitoring training for research volunteers.
- Birds in the Field class for Martin Griffin Preserve docent class.
- Shorebird talk and walk for Martin Griffin Preserve .
- Conservation Science at Audubon Canyon Ranch for Martin Griffin Preserve docent class, Nature Guides, Clerin Zumwalt Legacy Group, and Garden Club of Marin.
- GIS in Conservation for Conservation Science Intensive for young women.
- Q&A session for HEP volunteers heading into the field season.

Audubon Canyon Ranch
Bouverie Preserve
Cypress Grove Research Center
Martin Griffin Preserve
Modini Preserve

4900 Shoreline Highway 1
Stinson Beach, CA 94970

THE ARDEID
Conservation Science and Stewardship at Audubon Canyon Ranch

ACR Staff

Executive Management

John Petersen, Executive Director
Julia Clothier, Chief Operating Officer
Gary Schick, Chief Financial Officer
Erika Obedzinski, Board Liaison
Jennifer Spangler, Administrative Assistant

Education, Conservation Science and Stewardship

BOUVERIE PRESERVE
Nancy Trbovich, Preserve Manager
Kurt Heffernon, Land Steward
Jared Jacobs, Land Steward
Jacqueline Levy, Education Program Manager
Jennifer Potts, Resource Ecologist

CYPRESS GROVE RESEARCH CENTER
Nils Warnock, Ph.D., Director of Conservation Science
Barbara Wechsberg, Preserve Manager
Emiko Condeso, Ecologist / GIS Specialist
David Greene, Land Steward
Scott Jennings, Avian Ecologist
David Lumpkin, Avian Ecologist

MARTIN GRIFFIN PRESERVE
Gwen Heistand, Preserve Manager and Resident Biologist
Henry Inman, Resource Ecologist
Natasha Lekach, Education Program Manager
Steve Trivelpiece, Land Steward

MODINI PRESERVE
Michelle Cooper, Preserve Manager and Resident Biologist
Julianne Bradbury, Resource Ecologist
Kyle Doron, Land Steward
Tomas Ruiz, Land Steward

FIRE FORWARD
Sasha Berleman, Ph.D., Consulting Director
Jared Childress, Prescribed Fire Specialist
Brian Peterson, Consulting Fire Ecologist

LIVING WITH LIONS
Quinton Martins, Ph.D., Director and Principal Investigator
Liz Martins, Education Coordinator
Kate Remsen, Field Technician

Development and Communications

Naomi Sultana Young, Director of Philanthropy
Susie Allen, Events Manager / M.F.K. Fisher Last House Program Coordinator
Wendy Coy, Communications Manager
Marie Fox, Grants Manager
Jennifer Newman, Associate Director of Philanthropy
Erika Obedzinski, Communications and Development Associate

Mysteries of Movement: Great Egret 10, captured for one of our movement ecology studies, gathers with other egrets on the Campini Bridge at Cypress Grove Research Center in early January 2020 after a brief foray into the Central Valley last fall. His behavior this year is very different from last winter, which he spent in Arizona.
Photo: David Lumpkin.