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Fall 1997 Newsletter of the Coyote Creek Riparian Station Volume12, No.4

Riparian Ecology in the Urban Environment

by Steve Rottenborn, Board Member

Exploring the impacts of urbanization on the Santa Clara Valley's riparian bird communities

Some of the most prominent natural features of the Santa Clara Valley landscape are the meandering ribbons of riparian vegetation along streams. Here the tall canopy trees and dense understory vegetation, as well as the myriad animals that these plants support, are the biotic manifestation of the water that is so critical to life. Conservation of these important habitats and the water that gives them life requires an understanding of the ways in which humans impact these resources.

Little is known about the historical condition of riparian plant and animal communities in the Santa Clara Valley or of the manner in which these communities have been affected by anthropogenic alteration of the valley. There is some evidence that the riparian corridors along some South Bay streams were once broader and more structurally diverse than they are currently. Since European settlement of the area, clearing of vegetation for agricultural land, introduction of exotic plant species, alteration of hydrologic regimes through damming and groundwater withdrawal, and other factors have taken their toll on these riparian habitats, reducing their extent, fragmenting remaining patches, and altering the structural architecture of the vegetation. This alteration of South Bay riparian habitats has also contributed to the extirpation of several riparian-obligate bird species, such as the Yellow-billed Cuckoo and Willow Flycatcher, and caused population declines in species such as Wilson's Warbler, Swainson's Thrush, and Yellow-breasted Chat.

Despite the large number of factors conspiring to reduce the quality of riparian habitats along South Bay streams, many reaches of these streams still support quality riparian habitat and large numbers of bird species. It is clear that the urbanization of the Santa Clara Valley has not entirely robbed these habitats of their value to biodiversity, and conservation of these systems is crucial. Still, several questions need to be answered before efforts to conserve these habitats can be successful. First, how important are riparian woodlands to the maintenance of high bird diversity along streams in the Santa Clara Valley, and in the valley as a whole? Second, how do the many facets of urbanization impact riparian bird communities?

In order to shed some light on these questions, I conducted a series of studies of the riparian bird communities in the Santa Clara Valley. The first study was designed to determine the importance of mature riparian woodlands along Coyote Creek, the Guadalupe River, and Los Gatos Creek to the avifauna of the entire valley. This study compared the avian assemblages on plots of mature,

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Director's Report

by Neil Pelkey, Station Manager

Wow, what a year for CCRS. What a load of topics we could possibly undertake for the last director's letter of 1997-El Nino, the state of the station, future directions, etc.. I struggled for several days, before settling on a topic. We asked for set of question last year. We asked, and we received-a lot of questions. Yet in the barrage of questions, three primary issues stood out. The first was why are riparian habitats so important? The second was, 'how can we tell how much of our natural habitat has been lost and what impact is this having on our current way of life?' And finally what are we doing about it?

Why are riparian habitats so important?

Steve Rottenborn's article started off this issue, with the importance of riparian habitat to birds. The following are just a few more reasons riparian habitats are so important.

1. They are the most diverse habitats in all the world. The CCRS Species list contains 273 birds, 29 mammals, 15 reptiles and amphibians, and 48 dragon and damselflies. We have not yet included the fish, plants, and insects, and crustaceans.

2. They are the best buffer against pollution and sedimentation form non-point source runoff. The sedimentation in the bay not only destroy the tidal ecosystems, it is also a substantial public expense to clear sediment damaged flow areas.

3. They protect against flooding. Intact riparian systems do help protect against flooding

4. They keep waters cool for cold water fishes such as trout and salmon. The California salmon industry revenues have now exceeded 3 billion dollars. When the appropriate economic multipliers are used, the net worth to California from the salmon industry is over nine billion dollars.

How much riparian habitat has been lost?

Statistics such as 90%, 85%, etc have been listed. I am not sure how these figures were arrived at, but one thing is certain-riparian habitats in the lowland areas of the Santa Clara Valley are almost gone.

The San Francisco Estuary Institute (SFEI) has done the initial work on the losses in tidal and lowlands habitat. This map can be seen at CCRS or on SFEI's web page. The losses are disheartening. The riparian corridors in the upper watersheds are in much better shape, but these are currently under assault from commercial forestry, hobby farms, housing development, golf courses, and the occasional quarry. The EPA's watershed health indicator gives the South Bay a pretty mediocre grade.

What are we doing about it?

We are going to be working with SFEI over the next year to determine where the losses have been most severe in the South Bay. We will also be working more substantially on Permanente and San Francisquito Creeks to determine the historical changes in riparian habitats. We are also going to be modeling the impacts of these land use changes on water quality. These models and the information we collect will assist in determining the best areas to target for protection, regeneration, and restoration.

We are also working to get all of our data up on the web. This includes maps and loca tions of pollution discharge violations that have been documented. On the positive side, we will be attempting to put up the location of our creek clean-ups and restoration efforts. This will help by providing access to data about the condition of our creeks. This will be available to anyone with access to the web. It will also make it easier for us to gather data from our network of volunteers who will help keep us, and now the world, updated on the changing conditions of our creeks. ✿

Riparian Ecology in the Urban Environment

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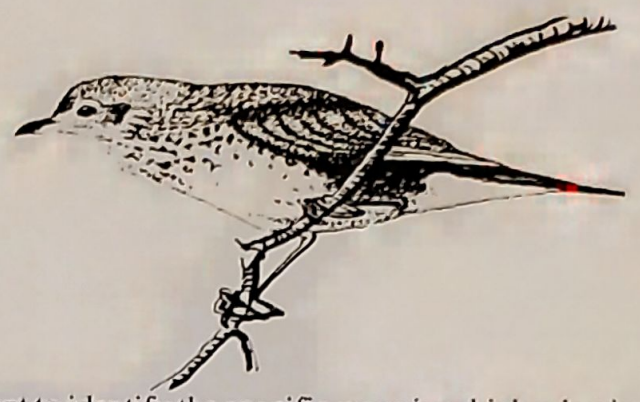
relatively undisturbed riparian woodland, highly disturbed riparian zones dominated by ruderal vegetation, and nonriparian habitats (e.g., residential, industrial, and agricultural lands) in the surrounding urban/suburban matrix. This study found that 84 of the 107 bird species recorded on all plots were recorded in the mature riparian woodlands, compared to only 46 and 58 species on the disturbed riparian and the nonriparian plots, respectively. The abundance of birds in the riparian woodlands was significantly higher than in the other two habitat types, indicating that these narrow strips of riparian vegetation supported very high numbers of birds as well. In fact, 51 of the 107 species recorded in this study were either unique to the cottonwood/willow-dominated riparian forests on the valley floor or occurred in significantly higher densities in these habitats than in the disturbed riparian and the nonriparian habitats. Therefore, riparian woodlands are necessary for the maintenance of local populations of nearly half of the bird species on the Santa Clara Valley floor. Neotropical migrants and other insectivores seemed most dependent on riparian woodlands, while resident and overwintering seed-eaters dominated the bird communities present in the other habitat types.

This study confirmed that the riparian habitats of the Santa Clara Valley still support highly diverse bird communities and are therefore of great local importance in the maintenance of bird diversity. However, some of the species historically present in the valley, such as Yellow-billed Cuckoo, Willow Flycatcher, Swainson's Thrush, and Wilson's Warbler, were either absent or very rare in these valley floor riparian habitats, suggesting that urbanization and land-use change may have impacted these riparian bird communities. In an attempt to determine how land use might affect these birds, another study compared the birds present in mature riparian woodlands adjacent to agricultural, residential, and industrial lands. Plots in riparian habitats adjacent to agricultural land supported more bird species (76) and higher densities of birds than residential-adjacent plots (62 species), with the fewest species (55) and individuals found adjacent to industrial lands. The 15 species unique to agricultural-adjacent plots included raptors that require open space for foraging and low-nesting species (such as California Quail and California Thrasher) that might be susceptible to cat predation, whereas most of the species unique to riparian habitats adjacent to residential and industrial areas were urban-adapted species such as Rock Dove and House Sparrow.

This second study indicated that riparian bird communities became more depauperate along a gradient of urbanization from more rural areas to more heavily urbanized areas. In an



attempt to identify the specific ways in which urbanization affects riparian bird communities, a final study investigated the relationships between a number of urbanization-associated variables and riparian bird communities on a large number of additional plots along South Bay streams. Using multivariate statistical techniques, the variables most closely related to patterns of bird distribution were identified.

Some of the variables that were closely related to riparian bird community structure measured characteristics of the riparian vegetation that are influenced by urbanization. The abundance of exotic vegetation in riparian corridors was higher in more heavily urbanized areas than in rural areas, and bird diversity and density generally decreased as the amount of exotic vegetation in the riparian corridor increased. Riparian corridor width, which generally decreased with urbanization due to encroachment of developed and landscaped areas into riparian zones, was positively related to bird species richness and abundance. Bird community parameters also varied closely with variables directly associated with urbanization. Bird species richness and abundance generally declined with closer proximity to bridges, buildings, and roads and with greater percent cover by artificial surfaces around the plot. These relationships indicate that urbanization has important and measurable impacts on riparian bird communities, even if the riparian vegetation itself is impacted little by urbanization. Although the precise mechanisms for these relationships have yet to be determined, these studies suggest several factors (e.g., habitat fragmentation, predation by cats, aversion to noise and human activity, exotic vegetation, and others) that are worthy of further study.

These studies confirmed what CCRS members have suspected for years — riparian woodlands are very important to the maintenance of bird diversity in the South Bay, but urbanization affects the value of these riparian habitats to birds. In the face of a growing human population and possible global climate change, the future of water resources and water management in the Santa Clara Valley is uncertain. What is certain is that these riparian systems are extremely important to the preservation of biodiversity in the valley, and that anthropogenic alteration of the processes that sustain these systems may have severe consequences for biodiversity. Only through a more thorough understanding of the manner in which humans influence riparian ecosystems can we ensure that these riparian habitats will continue to play their important ecological roles. ✿

NOTES FROM THE FIELD

Sparrow Stories.
by Alvaro Jaramillo

Its definitely fall now. The air is cool and crisp in the mornings, the clouds are beginning to linger more than usual but most significant of all - the sparrows are back. Now, let me clarify. There are always sparrows at CCRS but the species composition and abundance changes through the seasons. In summer, we only see the Song and the Savannah sparrows, unless you count the California Towhee which in fact is an overgrown sparrow. However, once the fall is here we are invaded by sparrows coming down from the north. The list includes the Golden-crowned, White-crowned, Fox, Lincoln's and some rarer species of sparrow. It is these species that are abundant at CCRS now and they will stay with us until the spring. What I find perplexing is that the arrival of the sparrows is not welcomed with cheers and smiles, but rather it is largely overlooked or met with the groans of birders trying to figure out which one of these is which . Sparrows take a back seat to the warblers, they are not colourful and bright or quick and acrobatic. Rather they tend to be mainly brown, lumbering and hang out on the ground, how undignified! They also signal that winter is coming, not that spring is here. Another point against them. But you know, they are an acquired taste and one that builds as you get to know them better. To give a taste of what can be gained by looking at and studying sparrows I will concentrate on one of the most common species, the White-crowned Sparrow.

White-crowned Sparrows come in different flavors. If you thought that bird identification ends at the species, well there is a whole new aspect that the White-crown will reveal to you, the concept of the subspecies. A subspecies, or race, is a sub-population of a species that has two characteristics. One of them is that it breeds in geographic range different from the other subspecies and the other is that individuals of this population are identifiable from most of those of the other populations. So if a species has two populations, each at the top of a mountain and one has blue eyes and the other white eyes one could consider them two separate subspecies. However, its seldom as clear as this. There are good subspecies and bad subspecies. Good ones clearly fit the rules, but the bad ones do not. A 'bad' subspecies may include a species with a large range where individuals from the west are visibly different from those in the east, but where there are lots and lots of in-between looking individuals in the center. The White-crowned Sparrow has both good subspecies and bad ones. Two different races of the White-crowned Sparrow commonly visit CCRS, one is the Gambell's White-crowned Sparrow and the other is the Puget Sound White-crowned Sparrow. The two subspecies differ in their bill colour, bill size, wing length, body colour, and underwing colour. Our banders have no huge difficulty in identifying a netted White-crowned Sparrow to subspecies. In fact, the visible differences between these two races are greater than that of some species! With a good look, these races are identifiable through binoculars. As well, the differences extend to other parts of their lives. In the summer, your best bet at finding a Gambell's White-crown would be to go to the tree line, way up north or up high in the mountains of Canada and Alaska. Here they live along side ptarmigans, Fox Sparrows, American Pipits and Grizzly Bears. The Puget Sound White-crowned Sparrow, as its name implies is coastal and restricted to the Pacific Northwest (Cascadia). You may find this species in the shrubbery in downtown Seattle, or perhaps in a stunted Shore Pine stand within sight of Marbled Murrelets, Killer Whales and Northwestern Crows. That's pretty different.

Well, how about the songs? The White-crowned Sparrows has taught us more about bird song than almost any other bird. Early experiments both in the field and in the lab, as well as more current work has allowed us to understand that White-crowns learn their songs by copying those of nearby birds. They need to do this learning during a specific period early in their lives and then once learned the song style tends to crystallize to a large extent. As well, it appears that apart from learning their songs White-crowned Sparrows are born with a basic 'hardwired' template of their song so they really do not learn everything from scratch, its more of a type of song modification and perfection. They need to hear themselves sing in order to learn to sing, they actually practice. As well, we now know that sparrows have culture! Yes, they have regional song dialects and since birds pass on these dialects to the next generation this is akin to cultural transmission, much in the same way that history and old stories get passed on between people. Like in humans, the transmission is not perfect so each year the culture of the birds changes somewhat as time goes on. So if song is so variable, then surely the two types of White-crowned Sparrows sing a different song. In fact this is the case and the differences are quite striking. At CCRS it is not all that difficult, with a bit of practice, to identify the two subspecies by the songs they sing. This implies that the song differences between the subspecies are quite fundamental, not just variations on the same theme. What is even more intriguing is that the single 'chip' notes of these two sparrows also appear to differ.

By now you may be asking yourself, if these two birds are so different why are they not two different species. I ask myself the same question. The answer has to do with politics and philosophy as much as it does with science. There is a camp of biologists who would not hesitate to split these two forms as different species, and another camp that would not do it unless they could show that the two would not interbreed if they came into contact. The annoying thing is that they do not come into contact when breeding, so the latter group can't test their theory. The first group doesn't care if they do or not, they believe that interbreeding has nothing

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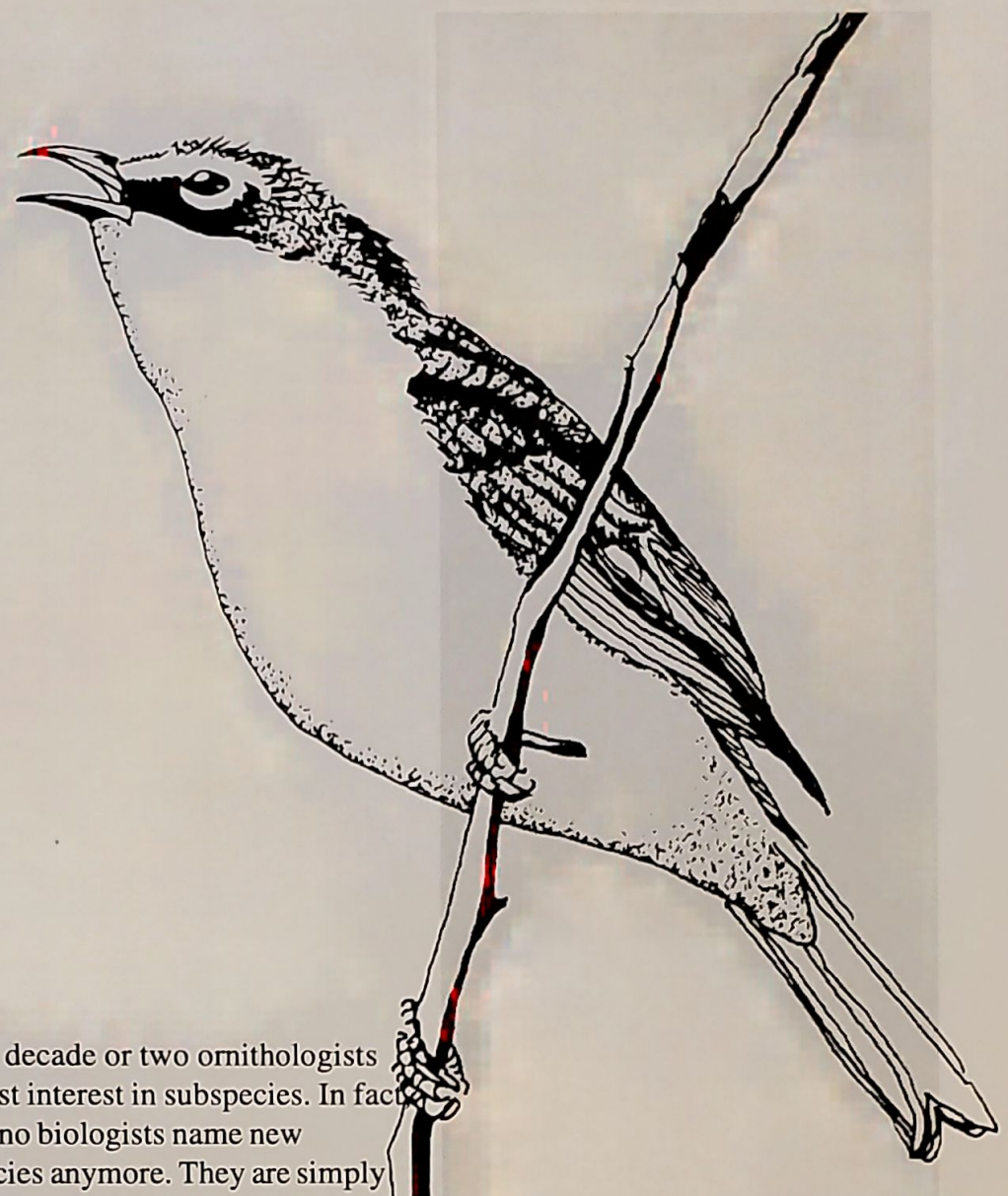
to do with whether two populations are best treated as species or not. Its a complex subject. However, if a scientist did do a genetic comparison of the two sparrows perhaps they could assess if there is ever any interbreeding between these two forms and approximately when the two populations began to diverge. This would go a long way towards settling the species versus subspecies question.

I also mentioned there were bad subspecies. If you visit the coast in the summer you will also find White-crowned Sparrows nesting in the coastal scrub. This coastal California subspecies is called the Nuttall's White-crowned Sparrow and it is a year round resident. It is also one of the only native species which you can see in downtown San Francisco, such as in Union Square. Nuttall's White-crowned Sparrows are very similar to the Puget Sound White-crowned Sparrow but differ in size and proportions mainly and the fact that Nuttall's does not migrate. The problem is that if one proceeds north along the coast Nuttall's White-crowned Sparrows change gradually and by the time you reach Oregon they have changed into Puget Sound White-crowned Sparrows. Their habitat choice remains similar and while variable their song types are similar. Thus, Nuttall's and Puget Sound White-crowned Sparrows are different, but most different at the extreme ends of their range and there are areas where it is difficult to classify birds to one or the other subspecies. Some may then consider this a 'bad' subspecies. The purpose of the subspecies is mainly to classify or categorize geographic variation in birds. Bird populations vary in colour, shape, size, ecology or what have you depending on where they breed. Sometimes this variation is great enough that naming a subspecies can help us get a handle on the differences in a specific population. However, life is not that simple. Geographic variation does not tend to me one dimensional, it is much more complex and the subspecies concept does not adequately reflect how geographic variation truly works. This is why in the last decade or two ornithologists have lost interest in subspecies. In fact almost no biologists name new subspecies anymore. They are simply not in vogue. Part of this dislike is due to the large number of 'bad' subspecies that were named in the past.



There is more where that came from. By concentrating on the White-crowned Sparrow we merely touched on the topics of systematics, taxonomy and song learning there is much more to sparrows than that. Sparrows can teach us about many other topics ranging from behaviour (badges of dominance for example) to genetics (colour morphs in White-throated Sparrows). To the birdwatcher the key to getting to like sparrows is to look hard, really hard, at them. Forget about the flashy colors of the tanagers or warblers and concentrate on the subtle browns, chestnuts, buffs and assorted other colours. Look at how one brown fades into another. See how crisp a grey crown stripe can look. Appreciate how streaks can be fine, wide or crisp. Before you know it, you will be a fan of the complex beauty of the sparrows. ✿

Editor's Note:

With all the many changes here at CCRS we are going to press with the RiparianNews Fall Issue later than usual. We are working diligently to get back on schedule and we should be delivering our Winter Issue on time in February. Thank you for your patience.

Off the Wall

The 1997 Summer Season

by Alvaro Jaramillo

During this last summer season we banded three days a week in June and July. A total of 806 birds were trapped (including previously banded and re-trapped individuals) belonging to 36 species. The most commonly netted species, in order of abundance, were the House Finch, Song Sparrow, Black Phoebe, Bushtit, and Bullock's Oriole. These species accounted for 65% of the birds captured this summer. In the summer of 1996 we trapped a total of 1030, thus there was a decrease of approximately 22% in the numbers banded this last season.

The Common Yellowthroat was banded (27, 3.3% of total captures) in much lower numbers than in the previous two summers (73 and 53 captures respectively). It appears that the cause for this decline was the mowing of the overflow channel during the previous fall. The habitat is coming back rather quickly and it will again be suitable as breeding habitat possibly as early as next summer. Bullock's Orioles were banded in slightly higher numbers 41 (5.1% of total birds banded) than last summer when 33 (3.2% of captures). The summer of 1996 saw a large decline in the number of banded Bullock's Orioles compare to the peak populations encountered here during 1994 and 1995. It appears that Bullock's Oriole numbers vary quite a lot from year to year, depending on the local and perhaps regional conditions at the time.

Perhaps the largest change from last year was the large decrease in the American Goldfinch . Last summer a total of 64 (6.24% of total birds captured) was much higher than this summer's 12 (1.5% of captures). American Goldfinches, like its relatives, are somewhat nomadic and numbers vary from year to year. In fact, a similar decrease was noted in numbers of Lesser Goldfinches present this summer. During the summer of 1996 a sum of 35 (3.4% of captures) and only 2 (0.2% of captures) were netted this summer. It would be interesting to identify what local conditions led to the small numbers of goldfinches present at CCRS this last summer.

Some species, such as the Swainson's Thrush and Pacific-slope Flycatcher do not typically breed at CCRS. However, both could breed in the future, and certainly did in the past. We netted 10 Pacific-slope Flycatchers this summer year, all but one were juvenile birds. These juveniles were all banded in July (beginning on the 18th) and are surely early south-bound migrants. The one adult banded on June 13 did not show any sign of breeding. All 20 Swainson's Thrushes caught this summer were banded during June (as late as the 30th) and none showed any evidence of local breeding. Contrary to the situation in the Pacific-slope Flycatcher most of these thrushes appeared to be late migrants or lingering individuals. The Swainson's Thrush is a late spring migrant.

We banded two Ash-throated Flycatchers, one on June 1 and a juvenile on July 20. The former appears to have been a late migrant while the latter was an early migrant. Two Orange-crowned Warblers were netted, one in mid June and another in early July, both were young of the year. This species, particularly Juveniles, wander widely early in life. These early migrations appear to be regular taking birds from the breeding grounds to a different habitat where they will moult and stage before proper migration. This behaviour is known from the Sierra Nevada region. The last Yellow Warbler of the spring migration occurred on June 10 and the first of three July Wilson's Warblers was banded on the 9th. This latter bird was a young of the year and appears to have been wandering from the breeding grounds or perhaps was an early migrant.

There were no outstanding rare species banded this summer. However, a young Lazuli Bunting on July 13 was a surprise. One Northern Rough-winged Swallow was netted one June 3, this uncommon species is largely a riparian specialist in our region. A European Starling banded this summer was quite a rarity for the banders as we seldom catch this very common species. One Willow Flycatcher was observed in early June, but was not banded. This species is a late migrant and likely the observed individual was heading to more northerly breeding grounds.

Finally, Bill Bousman has tirelessly compiled Off The Wall for many years. His succinct and clear summaries have incorporated Bill's immense knowledge of the birds of Santa Clara County which have put our banding numbers into context and relevance. Unfortunately, Bill has had to give up his post as our Off The Wall compiler and author. Bill, thanks so much for your great work and dedication to teaching us about our birds. ✿

EL NIÑO

by Ariane Bertrand

During the month of December strange things are known to happen. The Peruvian desert becomes lush, droughts hit Australia and Africa, and the coast of California is inundated with heavy rainfall. Strange weather patterns like these have been documented every three to five years with the onslaught of El Niño, a large turbulent weather system over the Pacific ocean. But a closer look shows that the past couple of years have witnessed a series of consecutive El Niño events raising concerns in the scientific community.

Scientists are still working on the exact ocean-atmosphere interactions that create the weather systems around the globe. It is believed that in normal years, strong trade winds blow from South America towards Indonesia (east to

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west) in the Pacific Ocean. These winds drag surface waters along with them, leaving behind a depression in the east that is filled by colder, bottom ocean water swelling upward. The cooled surface water causes the air above it to be chilled. This cold, dry air often leaves South America devoid of rainfall.

In Indonesia, the exact opposite is occurring. The trade winds are bringing warm water towards the coast and warming the air above. Warm air holds a lot of moisture and rises creating a low pressure system. This results in fierce, tropical storms.

Eventually the warm air mass will migrate from Indonesia in July to Australia in January causing the famous monsoon season. The migration pattern of the air causes the air pressure across the Pacific to seesaw. When the pressure rises in the east, it falls in the west and when the pressure rises in the west it falls in the east. This phenomenon is known as the Southern Oscillation.

The El Niño Southern Oscillation, as it is officially called, occurs when the trade winds relax, dragging less warm water from east to west and creating havoc with the normal weather patterns. No one is sure why the trade winds lose their strength, but it allows warm water to surge eastward, back towards South America, increasing surface water temperatures from 1 to 5 degrees Celsius. The hot, moist air mass near Indonesia also moves eastward hovering in the middle of the Pacific ocean. A patch of water about the size of the U.S. becomes a center of a tropical storm system that affects weather patterns around the globe. Peru's desert becomes a green field while the air is sucked dry above the normally moist Asian continent, resulting in loss of crops and increased disease outbreaks.

Fortunately, El Niño has a built in shut off switch resulting from an imperfection (or perfection depending on your point of view) in the system. Air can rapidly adjust to changes in water temperature but the ocean takes a lot longer to adapt to changes in air temperature. This is because the ocean has a great memory! It is responding to both past as well as present wind patterns. The "memory" of past winds is stored deep in the ocean providing the pulse to counteract the warming of El Niño. As wind moves across the cold ocean water it creates waves. Over a period of years, these waves bring the cold bottom water back to the surface, overturning the warm layer of water sitting on top of the Pacific. El Niño releases its hold and normal global weather patterns resume.

It appears that since 1990, the off switch has been malfunctioning. If El Niño persists for extended periods of time, the subsequent increased temperatures and heavy rainfall could have negative repercussions. The three warmest years in the historical record, 1983, 1987 and 1988 all coincided with El Niño events. Scientists are still searching for the cause of the continuous El Niño event but some speculate it may be a result of global warming. Others feel El Niño may be causing global warming. Or perhaps El Niños occur in cycles and we are smack dab in the middle of one. Needless to say, the eye of the storm is being carefully watched.

A Big Thank You

A big thank you goes out to all those who contributed to the success of this year's band-a-thon. Together, we generated over $1,000 to support the Avian Research Program. A special thank you to The Wild Bird Center of Los Gatos fortheir generous contribution of $300 to this project. Also, thanks goes to Bill Bilobran for his efforts in obtaining a $300 donation from the Hewlett-Packard Community Grant Program to the general fund.

Thank you

Well the Annual Meeting was a great success this year thanks to all of our volunteers! The kids activities were a hit thanks to Arleen Feng for organizing them and Diana Brumbaugh, John Salcowski, and Mark Agan for keeping those rug rats entertained. And if you thought the food, tables and chairs were tasty and comfortable (respectively) a 'shout out' goes to Heather Maynard, Irene Beardsley, and Elinor Spellman for all their efforts. Finally a big round of applause for all those fearless tour and demonstration leaders. Thanks for all your help. We couldn't have done it without you!!!

If you have any comments or suggestions for next year's Annual Meeting please e-mail them or call Ariane at the station. For those of you who didn't make it this year, we hope you have a chance to drop by the station in the near future.

Volunteers Needed

The Station needs to construct a walkway between the two trailers (otherwise we might lose somebody in the mud). We are looking for someone with construction experience to donate their time for this project. Please call Ariane at the Station if you can help.

Part-Time Position

CCRS is looking for a part-time bookeeper (20 hours per week). Days and times are negotiable. $7.00/hr. Experience necessary. The position is available immediatley. Please call Ariane if you are interested.

Writers

Are you interested in being published? Do you enjoy writing? The RipariaNews needs articles! If you are interested please call Ariane at (408) 262-9204.

Coyote Creek Riparian Station is a community supported non-partisan, non-profit, organization devoted to research, restoration management, and education regarding riparian habitat. With the help of many dedicated members and volunteers, the station collects biological data, analyzes, and disseminates information to local, state, and federal agencies as well as to the public. Our goals are to advance understanding of these complex ecosystems, provide a sound basis for environmental education and promote informed decision making.

The Coyote Creek Riparian Station (CCRS) began in 1982 as a field station for the study of migratory land birds and was part of the San Francisco Bay Bird Observatory. Under the direction of Dr. L. Richard Mewaldt, professor of Zoology at San Jose Sate University, the Station became a non-profit research institution in 1986. The Station gains much support both with the time and money from it's 500+ members.

CCRS operates in cooperation with the Santa Clara Valley Water District, San Jose/Santa Clara Water Pollution Control Plant, U.S. Fish and Wildlife Service, California Department of Fish and Game, and the San Francisco Bay National Wildlife Refuge.

RipariaNews is published quarterly for the information of our memberships; the personnel of the cooperating federal, state, and local agencies; and other organizations and individuals concerned with the flora and fauna
of the riparian and wetland habitats.

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Member	$25 annually
Senior or Student	$15 annually
Family	$35 annually
Supporting	$50 annually
Sustaining	$100 annually
Corporate	$500annually
Life	$600*
Patron	$3000*

*** Life and Patron categories can be single payments or 4 quarterly installments.**

Life membership payments and 10% of all other membership payments and general contributions go toward long-term support of CCRS activities. We acknowledge memorial contributions in our newsletter. We welcome bequests including those of real property.