

# BAY AREA MONITOR

 A Publication of the League of Women Voters of the Bay Area

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## Autonomous Vehicles Gain Momentum



Freeing up Fish • Cap-and-Trade Consequences • Shoring up Birds

## Planning for the Future

On Saturday, October 21, the League of Women Voters of the Bay Area will host a special forum about the North Bay's Highway 37. The 21-mile state route runs through Marin, Sonoma, and Solano counties, connecting U.S. 101 with I-80 and traversing wetlands that provide habitat for a wide range of plant and animal species. This key regional asset has taken on increasing traffic, and is highly vulnerable to the damaging effects of sea-level rise as our climate changes.

Key decisionmakers and planners will discuss these and other related issues at the October 21 event, which the public is invited to attend. It will be held from 9:30 a.m. to 1:00 p.m. in Novato City Council Chambers at 901 Sherman Avenue.

To register online, visit [www.eventbrite.com](http://www.eventbrite.com) and enter "HWY 37" in the search box, which should turn up the registration page (whose web address is too unwieldy to list here). Please email any questions to Veda Florez at [communications@lwvbayarea.org](mailto:communications@lwvbayarea.org), or visit [www.lwvbayarea.org](http://www.lwvbayarea.org) for more information. The League expects the forum will yield many robust and engaging conversations that should help refine strategies for protecting and enhancing the Highway 37 corridor.

Views of the route are on display in this edition of the *Bay Area Monitor*. Our back cover offers a westward vantage of Cougar Mountain from the Tubbs Island Trailhead beside Tolay Creek, and the photo above right shows where the highway crosses east into Solano County over Sonoma Creek in the San Pablo Bay National Wildlife Refuge.

This vital refuge is also highlighted in our article on conserving habitat for migrating shorebirds on page 10. We consider other migrating wildlife on page 6, where we explore



**Highway 37 rises over Sonoma Creek at the border of Sonoma and Solano counties.**

photo by Alec MacDonald

the ways ecologists are eliminating barriers to fish that swim upstream to spawn. Barriers of the legal variety are the focus of our page 8 article on local regulation of greenhouse gas emissions. And our cover story (EZ10 photo courtesy of the Contra Costa Transportation Authority) that starts on the next page looks at the emergence of a technology that seeks to reduce those emissions, among many other potential benefits. There's plenty here for you to dig into before we see you on October 21.

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## Autonomous Vehicles Gain Momentum

By Cecily O'Connor

Excitement is building about fully autonomous vehicles — cars and trucks that detect surroundings and run without a human behind the wheel. This holds especially true in the Bay Area, where one local testing site is going full throttle to help change the way people will eventually travel and move goods and services.

GoMentum Station, located at the former Concord Naval Weapons Station, is one of ten U.S. Department of Transportation (DOT) “proving grounds” for autonomous vehicles. Led by the Contra Costa Transportation Authority (CCTA), GoMentum Station is an incubator that partners with automakers like Honda and countries such as the Netherlands, as well as with auto suppliers, tech companies, and public agencies to develop self-driving technologies. It was officially launched in 2015.

They’re testing connected vehicle applications that enable cars to talk with each other and the road, as well as technologies that make it possible for cars to operate safely through radar, lidar, sensors, cameras, GPS, and a mix of hardware and software working together.

The station fits with the Bay Area’s creative culture, and comes at a time when autonomous vehicle projects are being developed in the region’s public and private sectors, from ride-hailing company Lyft to the Livermore Amador Valley Transit Authority (LAVTA).

Many experts anticipate an eventual global shift to self-driving vehicles that will be transformative. Autonomous cars, trucks, and buses will help cities meet transportation demands while decreasing traffic and pollution, preventing injuries, and helping save lives. More than 30,000 Americans die each year due to vehicle-related crashes.

Despite the promise of safety, the technology is so new that most people wonder, “Why would I give up driving my car?” A Gartner survey released in August found 55 percent of respondents would not consider riding in a fully autonomous vehicle. Top concerns included equipment failure, system security, and the possibility that vehicles might be confused by unexpected situations.

Randy Iwasaki, CCTA’s executive director, said uncertainty is “natural” and he’s optimistic attitudes will change —



**GoMentum Station is an autonomous vehicle testing facility located at the former Concord Naval Weapons Station.**

photo courtesy of the Contra Costa Transportation Authority

especially in the Bay Area, as people realize the nation’s largest secure testing facility for this kind of technology is in their backyard.

GoMentum Station is “30 miles north of Silicon Valley, where every auto manufacturer has a research center,” Iwasaki said.

### Driving in Circuits

GoMentum Station has 20 miles of paved roads, both curved and straight, many delineated by worn-out lines and weeds between cracks. Landmarks unique to the old weapons station include “Bunker City,” a grid of more than 100 old bunkers, and an old “mini city” inhabited by the base exchange, gym, barracks, and mess hall. There also are twin 1,400-foot-long tunnels under State Route 4 where GPS signals are often lost. Other features include bridges, buildings, curb gutters, and sidewalks, as well as parking lots with space for skid testing to gauge performance.

Yet for all of its capacity, Iwasaki explained that “on a typical day, we see nothing” at GoMentum Station. Three companies are testing at any given time, while much development and refinement is occurring behind closed doors.

“Every now and again, you’ll see trucks going back and forth, or Honda in Bunker City driving in circuits, testing their vehicle-to-infrastructure technology,” Iwasaki said.

### CCTA’s Inside Track

How autonomous vehicles handle GoMentum Station’s  
*continued on page 4*

## Autonomous Vehicles Gain Momentum (from page 3)

true street conditions tips off planners and policymakers about infrastructure changes that will be vital to supporting this technology. Clearly marked roads, for example, will be a necessity for cities going forward, Iwasaki said.

CCTA is keenly aware of safe deployment requirements because it's testing autonomous vehicles itself, as part of a partnership with French-based shuttle maker EasyMile. It got the green light when Assembly Bill 1592 (Bonilla) was signed in 2016. The "EZ10" shuttles, which run without steering wheels, brake pedals, or a human driver, are now being tested at San Ramon's Bishop Ranch business park after initial run-throughs at GoMentum Station.

A similar measure, Assembly Bill 1444 (Baker), would clear the way for LAVTA to test driverless shuttles in Dublin with an eye toward providing first-and-last-mile connections to its rapid transit buses and to BART. LAVTA's project will build on CCTA and its partners' success, and contribute to more industry advancements, said Michael Tree, LAVTA's executive director, in an email statement.

"Anticipating that the Governor will sign AB 1444 in the near future, LAVTA hopes to begin testing SAVs" — shared autonomous vehicles — "on public roadways in the spring of 2018," Tree wrote on September 10.

### Charting a Partner Course

Partnerships are the bread and butter of GoMentum Station, which receives two to three inquiry calls a week. Being a DOT proving ground "helps us attract companies that want to deploy their technology in Contra Costa County," Iwasaki said.



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Recently announced deals speak to the range of testing opportunities. For example, this summer GoMentum Station unveiled a partnership with the Netherlands' Coast-to-Coast e-Mobility program, a collaboration between the U.S. and Dutch governments, universities, and private companies. The partners have agreed to share information and conduct testing at the Concord site for Amber, a Dutch autonomous car-sharing startup. They also will look for opportunities for GoMentum Station to launch projects in the Netherlands.

More partnerships are to come, including agreements with a roadside equipment company, an insurance corporation, and two auto manufacturers, Iwasaki said. A data analysis collaboration with a university also is likely.

The non-profit GoMentum Station relies on state funding and was recently dealt \$3.5 million to support this growth. Its partners also pay undisclosed amounts to test at the site.

### Autonomous Vehicle Outcomes

The potential of these technology partnerships is improved safety by reducing human error. Humans are a factor in 90 percent of motor vehicle crashes, due to speeding and drunk or distracted driving. Fully autonomous vehicles that can see more and respond faster than humans could curb the incidence of crashes.

"By eliminating the driver from the vehicle, we have the potential to make roads 90 percent safer," said Lauren Isaac, director of business initiatives for the North American operation of EasyMile.

There are a myriad of other benefits, too, including better mobility for the disabled and the elderly, reduced pollution, and even smarter land usage when fewer parking lots are necessary.

Labor market outcomes, on the other hand, are getting mixed reactions. For example, "on-the-job" drivers that trek to work sites for construction or home care are likely to benefit from greater productivity and better working conditions offered by autonomous vehicles, according to a U.S. Commerce Department report from August. However, the same report noted that "motor vehicle operators" — who represented 3.8 million jobs in the transportation and warehousing sectors in 2015 — could stand to lose employment.

Bill Aboudi, president of AB Trucking at the Port of Oakland, said there are too many "variables" to remove a driver entirely, especially at the port, where they are essential to perform technical duties like hooking up chassis and landing gear.

"The technology is moving fast, but no way can you replace a human," Aboudi said.

However, this is all speculative until fully autonomous

vehicles are brought to market, an event at least several years away. Audi plans to debut its first autonomous car in 2020. Ford will have a fully autonomous vehicle in commercial operation by 2021. It's unclear whether those dates reflect partial or full automation, and if the vehicles will truly be available to the general public.

To become fully autonomous, vehicles must progress through five levels of automation, as defined by the Society of Automotive Engineers. Most cars today are at level zero or one. Some new models are equipped with automated assistance technologies like blind-spot detection, a level-one feature. Level five is considered full automation, or the "full-time performance" of all driving tasks by an automated system.

EasyMile's Isaac said she used to show a 30-year graphic about autonomous vehicle arrivals during presentations. She's since changed her approach because dates and automaker hype is frequently shifting.

"It's to the point now that I have taken out that slide and put a big question mark over it," said Isaac.

One hitch on the road to developing autonomous vehicles is regulation. State laws — California is one of 21 states that have passed relevant legislation — enacted in recent years have created a patchwork of self-driving regulations that's hard to navigate. To help address this, the U.S. House of Representatives passed the SELF DRIVE (Safely Ensuring Lives Future Deployment and Research In Vehicle Evolution) Act in early September, putting the National Highway Traffic Safety Administration in charge of crafting rules for autonomous vehicle technology and safety, and clarifying state regulatory roles.

Not long after, the DOT provided new guidelines for companies developing self-driving cars in a September report called "Vision for Safety 2.0."

### 'Not a Jetsons Idea'

While policymaking is ongoing, residents should be catching glimpses of autonomous vehicle development throughout the region. San Francisco-based Lyft said in September it's

launching a pilot fleet of self-driving cars. Caltrans, meanwhile, is installing short-range radio communication equipment for transmissions between cars, traffic lights, and other traffic systems on a stretch of El Camino Real in Palo Alto. Further south, Mineta San Jose International Airport is exploring ways to move passengers and employees within parking lots and between terminals following a demonstration in August.

For residents to truly understand the technology, however, it needs to be pervasive "so it's not a Jetsons idea — it's actually a reality," Isaac said.

To that end, GoMentum Station officials hope autonomous vehicle testing will have a permanent home in Concord, contributing to local growth as major redevelopment of the former Naval facility takes shape.

GoMentum Station has been operating at the site thanks to an annual license from the Navy, but the Navy is gradually transferring land to the City of Concord for transformation into housing and commercial space. The East Bay Regional Park District will also receive land to create a large regional park.

GoMentum Station officials are working with the City of Concord on a "longer-term or permanent" agreement to continue autonomous vehicle testing as the site develops, said Jack Hall, the program manager for the station, in an email.

Some land will be initially transferred late next year, based on the Concord Reuse Project Area Plan.

The property transfer "should be beneficial to GoMentum Station by allowing both agencies to make their own use decisions concerning [autonomous and connected vehicle] testing without needing approval from the Navy," Hall wrote. "The Navy has been great to work with, but it is another layer of approval needed."

According to Guy Bjerke, the city's director of community reuse planning, Concord is supportive of "trying to figure out if there is a spot on the base for a permanent testing facility" although the answer to that question remains "unknown at this time." 

*Cecily O'Connor covers transportation for the Monitor.*



## Freeing up Fish: The Effort to Remove Barriers to Spawning Sites

By Robin Meadows

As a child growing up in the East Bay, Jeff Miller loved seeing salmon in Lagunitas Creek when he visited Point Reyes. "I was inspired to restore migratory fish in the Bay Area," he recalled. Miller ultimately chose Alameda Creek, which is the biggest local tributary to the San Francisco Bay and once had both salmon and steelhead trout.

Collectively known as salmonids, salmon and steelhead are born in freshwater, spend much of their lives in the ocean, and then return to freshwater to spawn. Because they depend on marine as well as inland environments, healthy populations of salmonids reflect healthy coastal ecosystems.

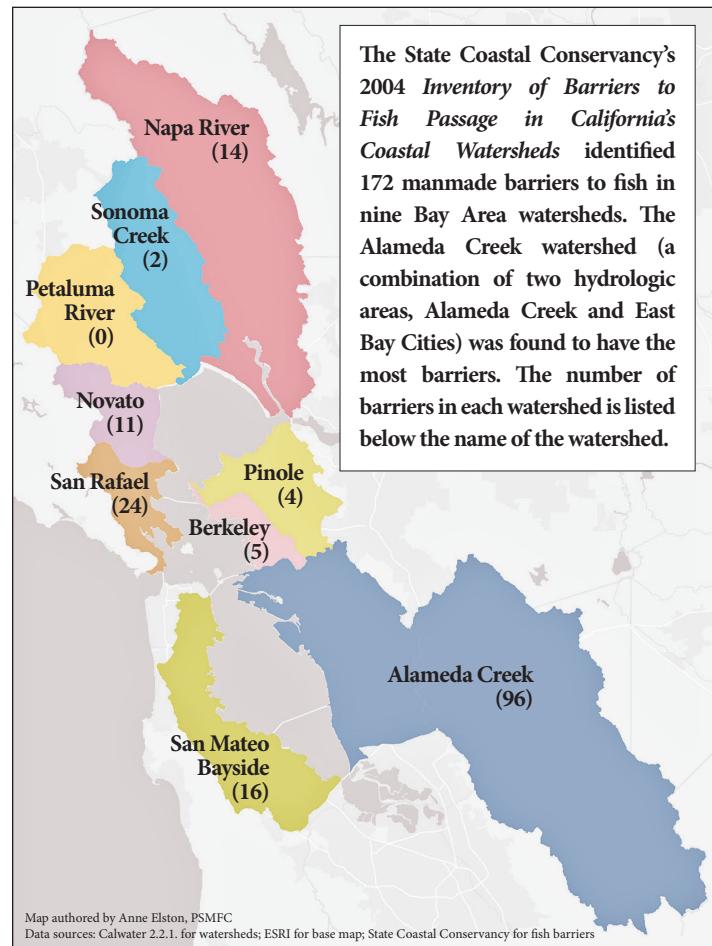
Moreover, these migratory fish also benefit coastal inland environments, where nutrients can be relatively scarce. Salmonids grow up in the nutrient-rich sea and, when they swim back up coastal waterways, transfer nitrogen and phosphorous inland in the form of their bodies. Salmonids feed eagles, river otters, and other predators, and also fertilize plants growing along streams.

When Bay Area steelhead were listed as threatened under the federal Endangered Species Act in 1997, Miller suddenly had a lot of help realizing his dream of restoring migratory fish in the Bay Area. "It was the catalyst to restoring Alameda Creek," said Miller, executive director of the Alameda Creek Alliance, a Fremont-based nonprofit dedicated to bringing salmon and steelhead trout back to Alameda Creek.

Since then, local, state, and federal agencies and organizations have collaborated on restoring steelhead in Alameda Creek. And now, 20 years later, the creek's biggest barrier to fish migration — a massive flood control structure in Fremont called the BART weir — is finally poised to be retrofitted with a fish ladder.

Historically, steelhead flourished in many creeks that flow into the Bay. But over the last 150 years, people built dams, stream crossings for roads and utilities, and other barriers that keep fish from migrating upstream. A 2004 State Coastal Conservancy (SCC) report identified 172 manmade barriers to fish in the Bay Area; Alameda Creek's watershed, which includes the creek as well as all the streams that flow into it, had the most by far at 96.

"A lot of the infrastructure was built in a world when there was no regard for wildlife, but there's no reason you can't have both," said Michael Bowen, an SCC project manager and chair of the California Fish Passage Forum, an association of public, private, and government organizations dedicated to removing barriers to fish migration in California. Fish-friendly designs are readily available these days, he added, and the National Oceanic and Atmospheric Administration has engineers who are "delighted to advise municipalities" on how to incorporate fish passages.



A number of fish passage projects are in place or under way in the Bay Area, and many local creeks have the potential to help rebuild steelhead along the Central Coast. That said, Alameda Creek has the largest watershed in the Bay Area — and the bigger the watershed, the greater the chances of restoring steelhead. And those chances look good. Compared to salmon, which typically return to their natal streams to spawn, steelhead are much more flexible. "If one stream doesn't work, they'll just try another," Bowen said.

Alameda Creek used to have so many steelhead that the population was self-sustaining. But a decade ago, it was down to a single spawning pair called Bonnie and Clyde. "There were so few we were literally naming fish," recalled Joshua Fuller of the National Marine Fisheries Service, which is charged with restoring federally endangered marine species.

Even today, the Alameda watershed still has a scattering of steelhead. Some are captured below barriers and transported upstream by biologists; others are landlocked behind the dam in Calaveras Reservoir, which is in the hills east of Fremont and stores water for San Francisco. Another cause

for optimism is that while the lower stretch of Alameda Creek is urban and channelized, the upper reaches still offer what steelhead need: gravel to spawn in, riparian canopy that shades the water and keeps it from getting too hot, and deep pools to live in when stream flow is low and temperatures are high. "There's some amazing habitat left," Fuller said.

The combination of remnant fish and suitable habitat boosts the likelihood of restoring steelhead. For that to happen, though, the fish need to be able to get into Alameda Creek in the first place — something they haven't been able to do since 1972, when the BART weir was built to protect the train tracks' creek crossing. "The BART weir is the main barrier to adult steelhead returning to spawn," said the Alameda Creek Alliance's Miller.

Steelhead are prodigious leapers, jumping several times their body length of roughly two feet. But the fish are no match for the BART weir. "It's a sloping cement apron and has a 12-foot drop," Miller said. Videos show steelhead struggling to ascend the weir, only to fall back into the water below it. And just upstream of the BART weir lies another hurdle in the steelheads' obstacle course: a pair of rubber dams that divert water from Alameda Creek for the Alameda County Water District.

About 15 fish passage projects have been built in the Alameda Creek watershed so far, Miller said, and projects for the BART weir and rubber dams are almost ready to go. The funding is in place — \$1,000,000 each from the National Fish and Wildlife Foundation and from the California Department of Fish and Wildlife — and construction is scheduled to start next year.

"It will reopen the entire watershed for the first time in almost 50 years," Miller said, adding, "Once those fish ladders go in and fish can make it to Sunol Regional Wilderness, it's going to be a game-changer."

His work isn't done yet, though. The lower stretch of Alameda Creek is a 12-mile flood control channel and is about as far from natural as possible. "It's a gauntlet for small fish," Miller said. As young steelhead make their way to the sea, the wide, shallow channel exposes them to predators. "Birds and invasive fish like bass are waiting to pick them off," he explained.

And young steelhead that do make it past this gauntlet face yet another challenge when they reach the Bay. "They need a place to grow big before going out to the ocean to avoid predation," Miller said. He hopes that the salt pond restoration at Eden Landing, which is near the mouth of Alameda Creek, will help give young steelhead this transitional habitat.

Projects to restore steelhead will also benefit salmon.



**The BART weir is a major barrier across Alameda Creek that will soon be retrofitted with a fish ladder.**

photo courtesy Alameda Creek Alliance

"Chinook will do really well," Miller predicted, adding that because salmon are so big, they're likely to be more noticeable than steelhead.

Bringing migratory fish back into city-dwellers' lives also motivates the National Marine Fisheries Service's Fuller, who, like Miller, was inspired to work with migratory fish after seeing them in streams as a youth. "They're the essence of wild, spending part of their lives in the ocean," said Fuller, adding, "Hopefully we can bring them back for future generations." 

*Robin Meadows covers water for the Monitor.*

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## Sorting out Air Quality Regulations After Cap-and-Trade's Renewal



Communities for a Better Environment's Andrés Soto (in red shirt) speaks at the Bay Area Air Quality Management District's board of directors meeting on September 20. A large number of stakeholders attended to participate in a lively discussion about emissions regulation.

photo by Alec MacDonald

By Leslie Stewart

Now that the dust is settling from the legislative tumult surrounding renewal of California's cap-and-trade program, participants are taking stock of the changed landscape for air quality regulation, both statewide and regionally. Legislation passed this summer sets a more ambitious goal for greenhouse gas reductions through cap-and-trade, while also shifting some duties for regional air districts. Under the new laws, these local agencies will see a reduced role in greenhouse gas regulation, but an added responsibility for implementing a statewide community-focused air quality monitoring and enforcement program.

The cap-and-trade program is a complicated balancing act between protecting the environment — specifically by reducing greenhouse gas emissions — and retaining industries that contribute to the state's economic base. As the limit on permitted greenhouse gas emissions decreases (the "cap"), businesses which exceed the limit must obtain allowances (the "trade"), either through state auctions or from other businesses which are under the cap and therefore have extra allowances. The state opted to give some allowances away for free, initially to ease adoption by industries and utilities, and now to reduce the financial burden on companies which may otherwise decide to relocate.

Passed in July, Assembly Bill 398 (E. Garcia) extended cap-and-trade to 2030 from the program's original sunset year of 2020. This created more certainty for industry, which was increasingly reluctant to pay for allowances, fearing these might lose value if the program ended soon. The bill also raised the bar for the state's Air Resources Board. The agency's goal for 2020 has been to decrease greenhouse gas emissions down to 1990 levels; AB 398 adds a target for 2030, requiring a 40 percent reduction below 1990 levels. Stanley

Young, ARB's director of communications, noted that "the cap has decreased by two to three percent over the previous years of the program, and will drop by four percent by 2020, but then will need to drop exponentially to achieve this goal."

Additionally, it is now up to ARB, rather than regional air districts, to regulate emissions of carbon dioxide from any source covered by cap-and-trade, whether in industry, agriculture, or elsewhere. Many environmental groups and agencies that were generally supportive of cap-and-trade renewal, including the Bay Area Air Quality Management District, opposed this aspect of AB 398. Following its passage, the Air District announced it expected to shelve a proposed regional cap on refinery emissions, Rule 12-16, which environmental groups had been working toward for five years.

"Victory snatched away at the last minute," was Andrés Soto's description of the regional air district restrictions in AB 398. Soto is a community organizer with Communities for a Better Environment, a strong proponent of Rule 12-16. However, his organization is refocusing. Soto noted that "local air districts can't touch CO<sub>2</sub> reductions, but methane and other gases can still be regulated regionally." CBE is planning a new campaign to pressure the Air District to cap non-CO<sub>2</sub> refinery emissions at current levels before permitting any new refinery infrastructure projects.

Meanwhile, Tom Addison of the Air District's Legislative Affairs division commented, "Given passage of AB 398 and its restrictions on local air districts, we are considering how best to coordinate with ARB on actions on greenhouse gases moving forward. Our climate problems are so large and pressing that it makes sense for everyone to work together to address them."

Greenhouse gases are not the only emissions from industry,

and often the attempts to curb them get intertwined with grassroots efforts to limit the local impact of other categories of air pollution. However, not everyone agrees with this approach, since greenhouse gases harm the environment on a global level, not a local one. As ARB's Young asserted, "We have an equally ambitious goal to address toxic air contaminants and criteria air pollutants, but the system works better when you do that separately [from greenhouse gases]."

That separation was the rationale for AB 398's companion bill, AB 617 (C. Garcia). The bill requires the state to set up a uniform databank, where data gathered from emission monitoring throughout California will be publicly available. The databank will inform a new ARB strategy to reduce toxic air contaminants and criteria air pollutants, including identifying the most environmentally-burdened communities and locations where additional monitoring is needed.

When the state identifies those sites, local air districts will be required to set up new monitoring there, and also create community-specific pollution reduction plans. Districts may also require individual facilities to set up monitoring at their fencelines. As Young pointed out, "there has been a technical revolution in air monitoring, so that viable, accurate, and consistent monitoring can be done at the community level."

Under AB 617, ARB will coordinate all these efforts through the newly formed Community Air Protection Program. Its director, Karen Magliano, sees the new program as "fundamentally transforming community-based planning, by bringing in the communities themselves at all levels." She explained that "we want to look at the problem at a granular level — implementation will be a shared responsibility."

According to Addison, the Air District is concerned about some aspects of that shared responsibility, especially the financial ones. "We are very supportive of the general philosophy behind AB 617, and some pieces we're enthusiastic about," he noted. "For example, AB 617 increases the penalties for strict liability violations. However, there is no additional funding [for districts], and a host of new requirements." Air District staff subsequently noted that a budget trailer bill signed into law on September 17 contains some AB 617 implementation funding, yet it is unclear whether that funding will be adequate.

Not all of the responsibilities in AB 617 are brand-new to the Air District. Some fenceline and community monitors — measures which will be required by AB 617 in any state-identified communities — are already in place around several Bay Area facilities, because of industry-community agreements or as compliance with the Air District's Rule 12-15, passed in 2015.

Addison observed that better coordination of data reporting on emissions sources is already happening as well. "More data is always helpful, but we want to have that without being forced to divert resources from other programs," he explained.

Designing community emission reduction plans will be a new task for the Air District, and Addison is concerned that the tool is limited. However, he was quick to add, "We are committed to trying to improve public health and working to implement the bill. Cutting emissions for disproportionately impacted communities is something we have long aimed at."

Bill Magavern, policy director for the Coalition for Clean Air, is also focused on making the community plans work. "The community action plans rely a lot on implementation by air districts — it's important that they yield strong measures to help the communities in the areas most impacted by pollution," he observed. "The concern is not only identifying the problem, but moving quickly to implement solutions."

Magavern added another area which may require community watchdogs. AB 617 mandates that regional air districts require facilities to use Best Available Retrofit Technology, starting with those which have gone longest since being permitted. "We need to be sure that districts are actually requiring that equipment be updated, and not just letting them use credits," Magavern warned. Overall, however, he is "cautiously optimistic that AB 617 will yield significant improvements in air quality — but we need to be actively involved to be sure that actually happens." 

*Leslie Stewart covers air quality and energy for the Monitor.*



## Shoring up Birds: Providing Habitat for Pacific Flyway Migrants

By Aleta George

Look, up in the sky — it's a shorebird!

"I call them 'superheroes,'" said Matthew Reiter, a scientist with the nonprofit organization Point Blue Conservation Science. "The distance shorebirds travel for their size is fascinating. Research suggests that some species fly more than 6,000 miles without stopping during migration," he said, adding that some migratory birds travel 12,000 miles every year.

Western sandpipers, for example, migrate in huge flocks along the Pacific Flyway, the north-south sky route for migratory birds that stretches from Alaska to Patagonia. Western sandpipers have a wingspan of 12 inches and weigh only an ounce, and yet every year they fly from Alaska to South America or the Atlantic Coast — and back again. That's why the website for the Western Hemisphere Shorebird Reserve Network (WHSRN) describes shorebird migrations as the "endurance marathons of the natural world."

"Super athletes need to get supercharged," said Reiter, "and the San Francisco Bay hosts more migrating shorebirds than any other coastal site in the United States."

Even though 85 percent of the wetlands ringing the San Francisco Bay have been filled or developed, more than 900,000 shorebirds use the Bay and its wetlands for a rest stop or as a place to over-winter. The shorebirds' reliance on the San Francisco Bay raises the importance of restoring wetlands as sea levels rise and inundate the tidal mudflats that are vital for these migrating superheroes.

San Francisco Bay is ranked as a "Site of Hemispheric Importance" within WHSRN, a network that includes

15 countries and 36.9 million acres of shorebird habitat. Scientists started the network in the 1980s as a strategy to conserve habitat across the Americas for hemispheric migrants.

These birds on the fly have only a few estuaries where they can rest, and for the most part those places are highly urbanized, explained Andrea Jones, director of bird conservation at Audubon California, which protects birds and their habitats. As a result, the migrants contend with pollution, shipping traffic, rip rap and wetland hardening, oil spills, and invasive species that impact natural systems.

The birds also face habitat loss along their route, such as when coastal and estuarine land gives way to tourism and industry in coastal Southern Mexico and Peru. "Birds are facing stopover losses in quality and quantity from day to day, and as a result are having to fly farther for rest and fuel. That raises the importance of the San Francisco Bay being able to

continue to support birds in large numbers," said Reiter.

Sea-level rise is another big challenge. A natural tidal system includes transition zones between the open water, intertidal marshes, and dry uplands. Most edges of the San Francisco Bay are hardened with buildings, roads, or rip rap. If the edges were natural, the intertidal zones could shift to the uplands during high tides, episodic storm surges, and gradually rising sea levels brought on by climate change. "There are very few places for that to happen. Mudflats get inundated and there's no place for the birds to rest and feed," said Jones.

Jones witnessed firsthand the payoff of providing habitat for shorebirds when she visited the San Pablo Bay National Wildlife Refuge along Sonoma Creek during a king tide last year. She was touring the 400 acres of recently restored tidal marsh habitat, where her organization worked with the Marin-Sonoma Mosquito and Vector Control District and the U.S. Fish and Wildlife Service to dig a network of channels to let the system "breathe" with the tides. Excavators also moved 30,000 cubic yards of soil to build gently sloping



Western sandpipers are one of many bird species that stop in the Bay Area when migrating along the Pacific Flyway.

photo by Ryan DiGaudio/Point Blue Conservation Science

### Thank You for Your Support

The *Monitor* would like to acknowledge a recent donation from Linda Craig in memory of Yvonne Koshland. Such generous financial contributions are greatly appreciated, and help this publication continue to fulfill its mission. Donations to the League of Women Voters of the Bay Area, a 501(c)3 organization, are tax deductible.

marsh transition zones known as living shorelines. These allow vegetation and wildlife to move up at high tides.

Shorebirds took to the area as soon as construction had been completed. "Living shorelines are really important to include in restoration projects so that Mother Nature can absorb sea-level rise," said Jones, whose organization also enhanced Aramburu Island in Richardson Bay with natural infrastructure. Aramburu Island is a 17-acre manmade wave break that wildlife hadn't used for years because of its cliff-like shoreline. Drawing on funding from the Cosco Busan oil spill settlement, Audubon California replaced the steep-sided edges with a gentle slope of sand, gravel, and shell substrate to provide habitat for shorebirds and harbor seals, as well as to give wildlife time to transition as sea levels rise.

The challenge of sea-level rise in natural settings is not confined to wildlife. Conservation organizations must deal with the problem, even though the parameters are unknown. A study by the National Research Council predicts that the range of sea-level rise by 2100 could be anywhere between 18 to 66 inches, a difference of four feet.

Point Blue Conservation Science approaches that

uncertainty with Climate-Smart Conservation, a concept adapted from the National Wildlife Federation that uses nature-based approaches to reduce greenhouse gasses, enhance natural systems, and improve the abilities of wildlife and people to adapt rapidly.

Climate-Smart Conservation seeks to balance the needs of natural systems, wildlife, and people. As examples, Reiter cited the South Bay Salt Pond Restoration Project, the largest tidal wetland restoration project on the West Coast. Once it has been completed, restored tidal wetlands will contribute to flood management for Silicon Valley and other low-lying urban centers, provide habitat for wildlife, and open recreational opportunities for people to view and enjoy the wildlife.

A bird's beauty and athleticism can elicit awe and appreciation. Birds also serve another function. "They provide a tangible way to talk about issues that are hard to grasp, like climate change and sea-level rise," said Jones. "If birds stop showing up somewhere, the bells should go off. They are the canaries in the coalmine." 

*Aleta George covers open space for the Monitor.*

## Expanding Public Ferry Service

- WETA began passenger ferry operations in 2011
- WETA has invested \$465 million to support ferry service expansion
- Since 2012 ridership has increased 74%; up 29% since 2015
- 2.7 million ferry riders annually from nine terminals



WETA's  
Long Range  
Strategic Plan:  
44 Vessels and  
16 Terminals  
by 2035

### Fleet Expansion

- Seven new vessels by 2019 bringing the WETA fleet to 16

### Route and Terminal Expansion

- Richmond ferry service in September 2018
- SF Ferry Terminal expansion in 2019
- Treasure Island Ferry, Mission Bay, Redwood City, Berkeley and more

### Operations and Maintenance Expansion

- North Bay Operations and Maintenance Facility – Opened 2016
- Central Bay Operations and Maintenance Facility – Opens 2018

### Emergency Response Preparedness

- Coordinate water transportation response
- Support evacuation and first responder transportation
- Provide emergency water transit service and expertise

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