



ENVIRONMENT DRONE KEEPING AN EYE ON ELKHORN SLOUGH

Data collection by drone makes process faster, more precise



John Haskins explains how the drone operates and monitors Elkhorn Slough from above.

By McKenzie Prillaman newsroom@montereyherald. com

Elkhorn Slough, zipping cise than ever.

take hours of labor spent in the mud. Data collection by drone, however, makes the A drone buzzes above process faster and more pre-

rate monitoring, which can



EUROPE Ukrainian: Russian invasion not imminent

By Yuras Karmanau The Associated Press

 ${\tt kyiv, ukraine} \ {\tt w} \ {\tt Ukraine's \ leaders \ sought \ Tuesday}$ to reassure the nation that an invasion from neighboring Russia was not imminent, even as they acknowledged the threat is real and received a shipment of U.S. military equipment to shore up their defenses

Moscow has denied it is planning an assault, but it has massed an estimated 100,000 troops near Ukraine in recent weeks and is holding military drills at multiple locations in Russia. That has led the United States and its NATO allies to rush to prepare for a possible war.

U.S. President Joe Biden told reporters that Russian President Vladimir Putin "continues to build forces along Ukraine's border," and an attack "would be the largest invasion since World War II. It would change the world.'

Several rounds of high stakes diplomacy have failed to yield any breakthroughs, and tensions escalated further this week. NATO said it was bolstering its deterrence in the Baltic Sea region, and the U.S. ordered 8,500 troops on higher alert for potential deployment to Europe as part of an alliance "response force" if necessary. British Prime Minister Boris Johnson also said he is prepared to send troops to protect NATO allies in Europe.

"We have no intention of putting American forces or NATO forces in Ukraine," Biden said, adding that there would be serious economic consequences for Putin, including personal sanctions, in the event of an invasion.

In a show of European unity in Berlin, German **TENSIONS » PAGE 3**

back and forth in an elongated zig-zag pattern. As Goldilocks," said John it glides through the air, it takes snapshots of the surface to monitor plant life horn Slough National Estuand ground elevation.

Surveying the land by drone is a technique being used to track Hester Marsh's delicate restoration, an ongoing project since 2017.

Historically, the marshland was diked and drained to create pastures, causing the sponge-like land to shrink. Now, scientists are piling on dirt and restoring native plants to revive the salt marsh to its former glory. They're also elevating it to counteract future sealevel rise caused by climate change.

with such a finicky ecosystem.

Ensuring the marsh is thriving and healthy re-

"The marsh itself is like Haskins, water quality monitoring specialist of the Elkarine Research Reserve and co-lead of the drone project. "It wants to be in a perfect zone of the tidal frame to be able to grow."

If the marsh is too high, it doesn't receive enough water for plant growth. But if it's too low, flooding kills the plants. The sweet spot, Haskins explained, exists within a 3-foot region inside of the 8-foot tidal frame, the full range that the ocean tides can reach on the U.S. West Coast.

Traditionally, scientists examine how vegetation is But that's a tricky feat faring by hand. Using meter sticks and tape measures, they count the number of each plant type within a small area and calculate quires frequent and accu- approximate vegetation cov- that for a restoration proj-

John Haskins points out the drone's flight path on the device's remote control.

region.

The stark-white foot-long drone, however, with its two affixed cameras, can survey the entire 35-acre area of Hester Marsh's phase II restoration in about 45 minutes. Further, a snapshot of the entire region means precise plant counts rather than estimations.

"What we discovered is

erage throughout the entire ect like this, where there's not a lot of vegetation here now, it's a really quick and easy way to monitor change through time," said Charlie Endris, research scientist and GIS specialist of the Moss Landing Marine Laboratories and co-lead of the drone project.

While flying, one of the drone's cameras captures nearly 1,000 images that are **DRONE** » PAGE 4

FINANCIAL MARKETS

Stocks end lower on Wall Street after another volatile day

By Damian J. Troise and Alex Veiga The Associated Press

Another volatile bout of trading on Wall Street ended with a broad pullback for stocks Tuesday, as investors grapple with economic red flags and uncertainty over how aggressive the Federal Reserve will be in fighting rising inflation.

Stock indexes fell sharply to start the day, then came well off their lows by late afternoon. Another burst of selling in the final hour of trading pulled them lower again. Technology stocks were the biggest drag on the market.

The S&P 500 fell 1.2% after having been down as much as 2.8%. The benchmark index has been falling steadily all month and is now down 9.2% from STOCKS » PAGE 3

PANDEMIC

Pfizer begins testing omicron-COVID shots

Pfizer and BioNTech have begun studying a COVID-19 vaccine tweaked to match to the omicron variant in adults. PAGE A6



BIG SUR

Colorado Fire containment up to 45%

Some 53 fire engines and 476 personnel at the scene as high humidity levels and fog help with the fight. PAGE B1



COVID-19

Don't know how to make a booster appointment?

Visit Monterey County Health Department webpage at https://bit.ly/3qtjYUO for links to schedules and registration.

MediaNews Group INDEX

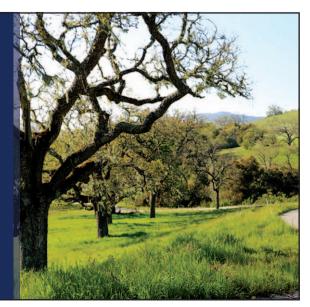
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TODAY IN HISTORY 1861

Louisiana passed an Ordinance of Secession, becoming the sixth state to break free from the United States.

1915

President Woodrow Wilson signed the Rocky Mountain National Park Act. which created America's 10th national park.

1962

The United States launched Ranger 3 to land scientific instruments on the moon. (The probe ended up missing its target by more than 22,000 miles.)

1998

President Bill Clinton forcefully denied having an affair with a former White House intern, telling reporters, "I did not have sexual relations with that woman, Miss Lewinsky.'

2020

The U.S. consulate in the Chinese city of Wuhan, the epicenter of the coronavirus epidemic, said it would evacuate its personnel and some private citizens aboard a charter flight. Five cases of the new coronavirus were now confirmed in the United States, including new cases in California and Arizona; all involved people who had traveled to Wuhan.

Birthdays

Cartoonist Jules Feiffer is 93. Sportscasteractor Bob Uecker is 88. Activist Angela Davis is 78. Alt-country singersongwriter Lucinda Williams is 69. Hockey Hall of Famer Wayne Gretzky is 61. Actor Nate Mooney is 50. Retired NBA player Vince Carter is 45. Actor Colin O'Donoghue is 41.

Star report

Peter Dinklage slams 'Snow White' remake

Actor Peter Dinklage noted in a new interview, Disney seemed excited for casting Latina actress Rachel Zegler as Snow White in its planned live-action remake, but has been silent on the casting of the other central characters. "There's a lot of hypocrisy going on," Dinklage said in an interview. "Literally no offense to anyone, but I was a little taken aback when they were very proud to cast a Latina actress as Snow White. But you're still telling the story of 'Snow White and the Seven Dwarfs.' Take a step back and look at what you're doing there. It makes no sense to me.'

– Bay Area News Group

LOTTERY MONDAY'S

WINNING NUMBERS Daily 3 Afternoon: 2, 6, 0 Daily 3 Evening: 8, 5, 6 Daily 4: 3, 6, 1, 6 Fantasy 5:

2, 3, 4, 6, 15 DAILY DERBY

1st: 12, Lucky Charms 2nd: 9. Winning Spirit 3rd: 5, California Classic Race time: 1:43.44

SUPER LOTTO PLUS Saturday's drawing: 25, 36, 43, 44, 46

Mega number: 2 Wednesday's estimated jackpot: \$11 million

MEGA MILLIONS Friday's drawing: 38, 45, 46, 55, 67 Mega Number: 18 Tuesday's estimated

jackpot: \$396 million POWERBALL

Monday's drawing: 11, 29, 30, 47, 53 Powerball: 16 Wednesday's estimated jackpot: \$91 million

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State redwood forest returned to native tribal group **By Brian Melley**

The Associated Press

THE LOST COAST

The descendants of Native American tribes on the Northern California coast are reclaiming a bit of their heritage that includes ancient redwoods.

Save the Redwoods League planned to announce Tuesday that it is transferring more than 500 acres on the Lost Coast to the InterTribal Sinkyone Wilderness Council.

The group of 10 tribes that have inhabited the area for thousands of years will be responsible for protecting the land dubbed Tc'ih-Léh-Dûñ, or "Fish Run Place," in the Sinkyone language.

Priscilla Hunter, chairwoman of the Sinkyone Council, said it's fitting they will be caretakers of the land where her people were removed or forced to flee before the forest was largely stripped for timber.

"It's a real blessing," said Hunter, of the Coyote Valley Band of Pomo Indians. "It's like a healing for our ancestors. I know our ancestors are happy. This was given to us to protect."

The transfer marks a step in the growing Land Back movement to return Indigenous homelands to the descendants of those who lived there for millennia before European settlers arrived.

The league first worked with the Sinkyone coun-

Drone

FROM PAGE 1

later stitched together to create a three-dimensional elevation map of the entire region. The other takes pictures with two wavelengths of light invisible to the human eye that help identify specific plant varieties in the marsh.

In the comfort of his office, Haskins plugs in an aerial map of Hester Marsh into an app. He then draws out a flight path for the drone, where it sweeps back and forth across the land, ensuring that the images will overlap so they can be pieced together later.

After driving out to the



MAX FORSTER - SAVE THE REDWOODS LEAGUE

Some of the 523 acres of redwood forestland in Mendocino County that was donated to the InterTribal Sinkyone Wilderness Council.

The league recently years ago and still has a marbled murrelet to mitipaid \$37 million for a scenic 5-mile (8-kilometer) stretch of the rugged and forbidding Lost Coast from a lumber company to protect it from logging and that it is healing, that it is eventually open it up to the public.

the property being transferred to the tribal group because it is so remote, said Sam Hodder, president and CEO of the league. But it serves an important puzzle piece wedged between other protected areas.

a tributary of the Eel River

large number of old-growth redwoods, as well as second-growth trees.

"This is a property where you can almost tangibly feel recovering," Hodder said. 'You walk through the forredwoods that are sprouting from those stumps."

gate other environmental damage by the utility.

PG&E was set to emerge Tuesday from five years of criminal probation for a 2010 explosion triggered by its natural gas lines that blew up a San Bruno neighborhood and killed eight people. It's been blamed since 2017 for sparking more than 30 wildfires that wiped out more than 23,000 homes and businesses and killed more than 100 people.

In an effort to reduce its liability and the chance of vegetation contacting power lines and sparking fires, PG&E has been criticized for destroying many large and old trees.



Opening access to the est and, even as you see public is not a priority on the kind of ghostly stumps of ancient trees that were harvested, you could also in the foggy landscape see the monsters that were left behind as well as the young

The league purchased the Steep hills rise and fall to land two years ago for \$3.5 million funded by Pacific cil when it transferred a that has steelhead trout and Gas & Electric Co. to pro-164-acre (66-hectare) plot Coho salmon. The property vide habitat for endangered nearby to the group in 2012. was last logged about 30 northern spotted owl and



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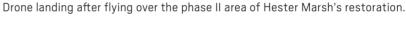
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marsh, Haskins unloads the drone, which he has a special pilot license to operate, and sends it instructions through the app. He and Endris first thought of monitoring the marsh by drone in 2015, when they came out to the slough with someone flying a fixed-wing drone, essentially a minia-

ture airplane. and automatically follows the route laid out earlier. The device glides 50 meters above the ground, taking pictures every couple of seconds all while detecting and avoiding other airborne objects, like birds. It returns to the landing pad about every 15 minutes for fresh batteries.

When the flight is finat the office, Haskins and Endris process "gigabytes and gigabytes" of data collected by the drone. It takes days to convert all of the images into a product that can be interpreted, Endris said. Sometimes he and Haskins get help from local university students, but the duo is



the data online and turn it into a community science project.

The final result is a three-dimensional elevation model with centimeter-level precision catego-Haskins's drone takes off rized into different zones, such as vegetated marsh, non-vegetated marsh and grasslands. Using this tool, scientists at Elkhorn Slough can tell how much the piled-on sediment gets compressed over time, assess the plant varieties and locations, track creek formation and development and more.

The researchers can also the results of different land management experiments. Endris explained the drone data helped them determine that firmly packing the edges of water channels with mud helps prevent erosion. After testing program across the 30 this technique in the now complete restoration of looking for a way to upload the 65-acre area of phase search Reserve System, a another program."



start a nationwide drone the National Estuarine Re-

horn Slough.

"The (drone) has just exploded the number of possibilities you can do," Haskins tional Oceanic and Atmospheric Administration) coastal sites that comprise that's funding the Research Reserve will bring this in as

AXYDLBAAXR is LONGFELLOW

One letter stands for another. In this sample, A is used for the three L's, X for the two O's, etc. Single letters, apostrophes, the length and formation of the words are all hints. Each day the code letters are different.

CRYPTOQUOTE

GSV HGFKRW MVRGSVI ULITREV MLI ULITVG; GSV MZREV ULITREV ZMW ULITVG: GSV DRHV ULITREV YFG WL MLG ULITVG. — GSLNZH

HAZHA

1-26

Yesterday's Cryptoquote: NO BUSINESS IS A SUCCESS WHICH MUST RUIN MEN TO MAKE MONEY. - ROY L. SMITH

MUBLE THAT SCRAMBLED WORD GAME By David L. Hoyt and Jeff Knurek Unscramble these Jumbles, one letter to each square, to form four ordinary words. 'ou don't flip the WHSIS ODMME RZLDIA EGRALR HER-IN-LAW HAD QUESTIONS ' HIS OUTDOOR COOKING HNIQUES, SO SHE TE(Now arrange the circled letters ©2022 Tribune Content Agency, LLC to form the surprise answer, as All Rights Reserved. suggested by the above cartoon. Answer here: (Answers tomorrow) Jumbles: FRAME GOING FUSION CREAM Yesterdav's The chronic complainer was up early drinking Answer: his — "MOANING" COFFEE

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