

MONTEREY PENINSULA

**Val Stough**  
CYPRESS COAST  
AUTOMOTIVE GROUP

Ford LINCOLN HONDA SUBARU

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TRANSPORT  
**MST**  
receives  
fed grant  
for study  
Local » B1

WARRIORS  
Timeline for  
Draymond's  
return  
unclear  
Sports » A2

EDUCATION  
Concern  
about  
Hartnell's  
return  
Local » B1

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# MONTEREY HERALD

Mostly sunny  
H: 65 L: 43  
PAGE B8

Wednesday, January 26, 2022 \$1.50 FACEBOOK.COM/MONTEREYHERALD TWITTER.COM/MONTEREYHERALD

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## ENVIRONMENT

# DRONE KEEPING AN EYE ON ELKHORN SLOUGH

### Data collection by drone makes process faster, more precise



PHOTOS BY MCKENZIE PRILLAMAN — HERALD CORRESPONDENT

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

**By McKenzie Prillaman**  
newsroom@montereyherald.com

A drone buzzes above Elkhorn Slough, zipping back and forth in an elongated zig-zag pattern. As it glides through the air, it takes snapshots of the surface to monitor plant life and 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 sea-level rise caused by climate change.

But that's a tricky feat with such a finicky ecosystem.

Ensuring the marsh is thriving and healthy requires frequent and accu-

rate monitoring, which can take hours of labor spent in the mud. Data collection by drone, however, makes the process faster and more precise than ever.

"The marsh itself is like Goldilocks," said John Haskins, water quality monitoring specialist of the Elkhorn Slough National Estuarine 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 faring by hand. Using meter sticks and tape measures, they count the number of each plant type within a small area and calculate approximate vegetation cov-



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

erage throughout the entire 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 that for a restoration proj-

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**

## EUROPE

# Ukrainian: Russian invasion not imminent

**By Yuras Karmanau**  
The Associated Press

**KYIV, UKRAINE** » 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**

## 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**

## BUSINESS

**Dow Jones**  
34,297.73. (-66.77)

**S&P 500**  
4,356.45. (-53.68)

**Nasdaq**  
13,539.29. (-) -315.83

## 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.

INDEX Sports.....A2 | Local News.....B1 | News.....A5 | Opinion.....A6 | Weather.....B6 | Classified.....B5 | Volume 100, Issue 246 | MediaNews Group 7 39918 100150 1

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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. Sportscaster-actor Bob Uecker is 88. Activist Angela Davis is 78. Alt-country singer-songwriter 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

THE LOST COAST

State redwood forest returned to native tribal group

By Brian Melley  
The Associated Press

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 Te'ih-Léh-Dũñ, 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 council when it transferred a 164-acre (66-hectare) plot nearby to the group in 2012.



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 paid \$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 eventually open it up to the public.

Opening access to the public is not a priority on 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.

Steep hills rise and fall to a tributary of the Eel River that has steelhead trout and Coho salmon. The property was last logged about 30

years ago and still has a large number of old-growth redwoods, as well as second-growth trees.

"This is a property where you can almost tangibly feel that it is healing, that it is recovering," Hodder said. "You walk through the forest and, even as you see 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 redwoods that are sprouting from those stumps."

The league purchased the land two years ago for \$3.5 million funded by Pacific Gas & Electric Co. to provide habitat for endangered northern spotted owl and

marbled murrelet to mitigate 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.

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 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 miniature airplane. Haskins's drone takes off 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 finished and the drone is back at 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 looking for a way to upload



PHOTOS BY MCKENZIE PRILLAMAN — HERALD CORRESPONDENT

Drone landing after flying over the phase II area of Hester Marsh's restoration.

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

The final result is a three-dimensional elevation model with centimeter-level precision categorized 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 use this model to examine 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 this technique in the now complete restoration of the 65-acre area of phase



Charlie Endris (left) and John Haskins (right) holding a drone used to survey Elkhorn Slough.

I, they implemented the same method in the ongoing phase II region.

Building on their successful drone-monitoring methodology, Haskins and Endris are now trying to start a nationwide drone program across the 30 coastal sites that comprise the National Estuarine Research Reserve System, a network that includes Elkhorn Slough. "The (drone) has just exploded the number of possibilities you can do," Haskins said. "And hopefully, in a couple of years, the (National Oceanic and Atmospheric Administration) that's funding the Research Reserve will bring this in as another program."

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**Publisher**  
Jim Gleim.....707-453-8189  
jgleim@bayareanewsgroup.com  
**Managing Editor**  
Dave Kellogg..... 726-4351  
dkellogg@montereyherald.com  
**Circulation Director**  
Mardi Browning.....706-3265  
mbrowning@montereyherald.com

**CIRCULATION SERVICES**  
646-1808  
circservices@montereyherald.com

**NEWSROOM**  
News..... 726-4351  
mhcity@montereyherald.com  
**Sports**..... 726-4351  
sports@montereyherald.com  
**Business**..... 726-4351  
mhbusiness@montereyherald.com  
**Letters to the editor** . 726-4351  
mheditor@montereyherald.com  
**Website**  
online@montereyherald.com

**Write to us** .....2555 Garden Road, Suite J. Monterey, CA 93940  
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JUMBLE

Unscramble these Jumbles, one letter to each square, to form four ordinary words.

WHSIS  
ODMME  
RZLDIA  
EGRALR

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Answer here:

THAT SCRAMBLED WORD GAME

By David L. Hoyt and Jeff Knurek

Now arrange the circled letters to form the surprise answer, as suggested by the above cartoon.

(Answers tomorrow)

Yesterday's Jumbles: FRAME GOING FUSION CREAMY  
Answer: The chronic complainer was up early drinking his — "MOANING" COFFEE

A XYDLBAAXR 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.

1-26 CRYPTOQUOTE

G S V H G F K R W M V R G S V I  
U L I T R E V M L I U L I T V G ; G S V  
M Z R E V U L I T R E V Z M W  
U L I T V G ; G S V D R H V U L I T R E V  
Y F G W L M L G U L I T V G. — G S L N Z H

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