EXPANDING THE USE OF PHOTO-IDENTIFICATION TECHNOLOGY TO INCLUDE TINY, FLIGHT, AND EPHEMERAL SPECIES

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POOR RESEARCHERS

WHY STUDYING BUTTERFLIES IS SO HARD

FRAGILE AND IMPERILED

Adopted a hard core no-touch no-impact policy.

LOCALLY ABUNDANT

Typically, multiple individuals present in any given location.

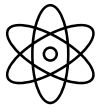
ERRATIC, FAST MOTION

Darty little buggers that are difficult to track in the best of conditions.

SMALL FEATURES

Makes it hard to SEE differences.

FUNDAMENTAL GAPS IN ISLAND MARBLE KNOWLEDGE



CONNECTIVITY

Are patches of habitat connected? How easily are males and females accessing new patches?

HOST PLANT SPECIFICITY

Are females loyal to just one (of the three known species) of the host plants, or will they use whatever is available?

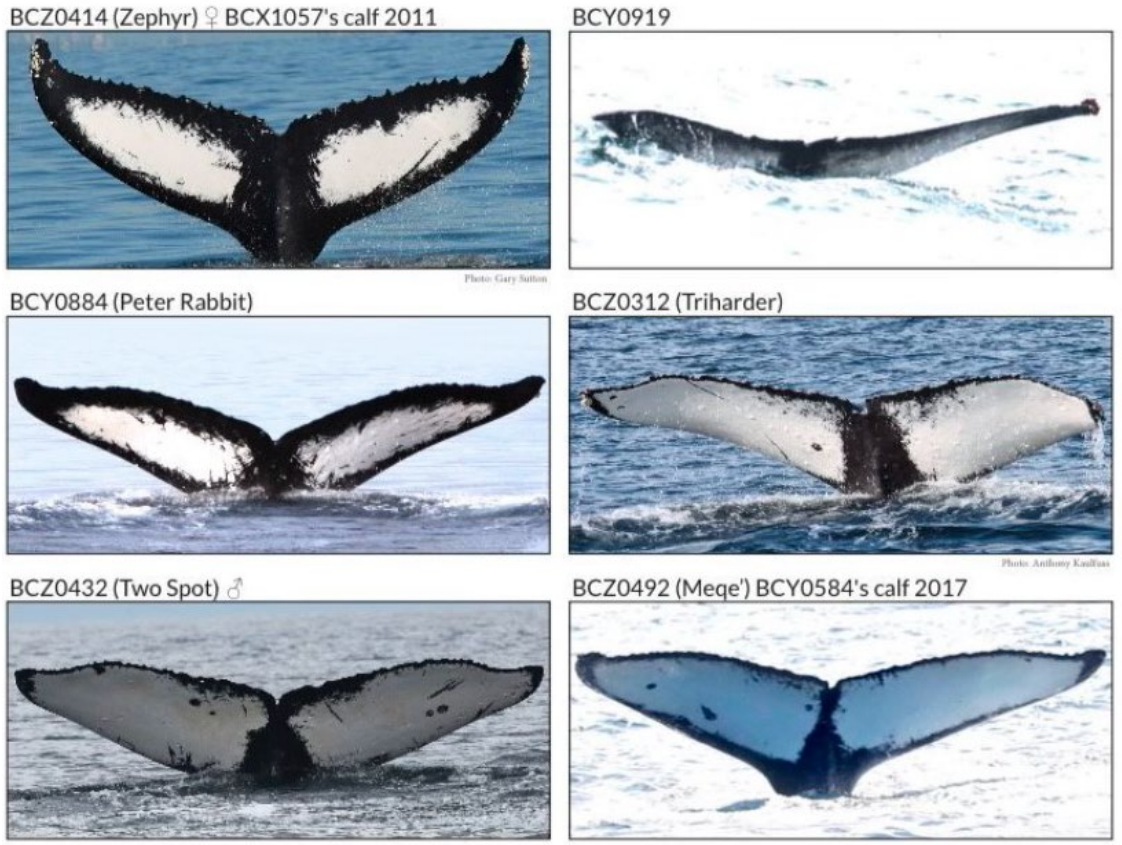
LONGEVITY

How long do adult butterflies survive in the wild? Does their expected lifetime change from the beginning to the end of the season?

CENSUS INTEGRITY

How many butterflies actually exist? Is the number of wild butterflies increasing through conservation actions?

WHY CAN'T BUTTERFLIES BE LIKE WHALES?



COVID- INSPIRED IDEA
A PERFECT STORM

1

1 butterfly that shows obvious wing pattern differences between individuals.

+

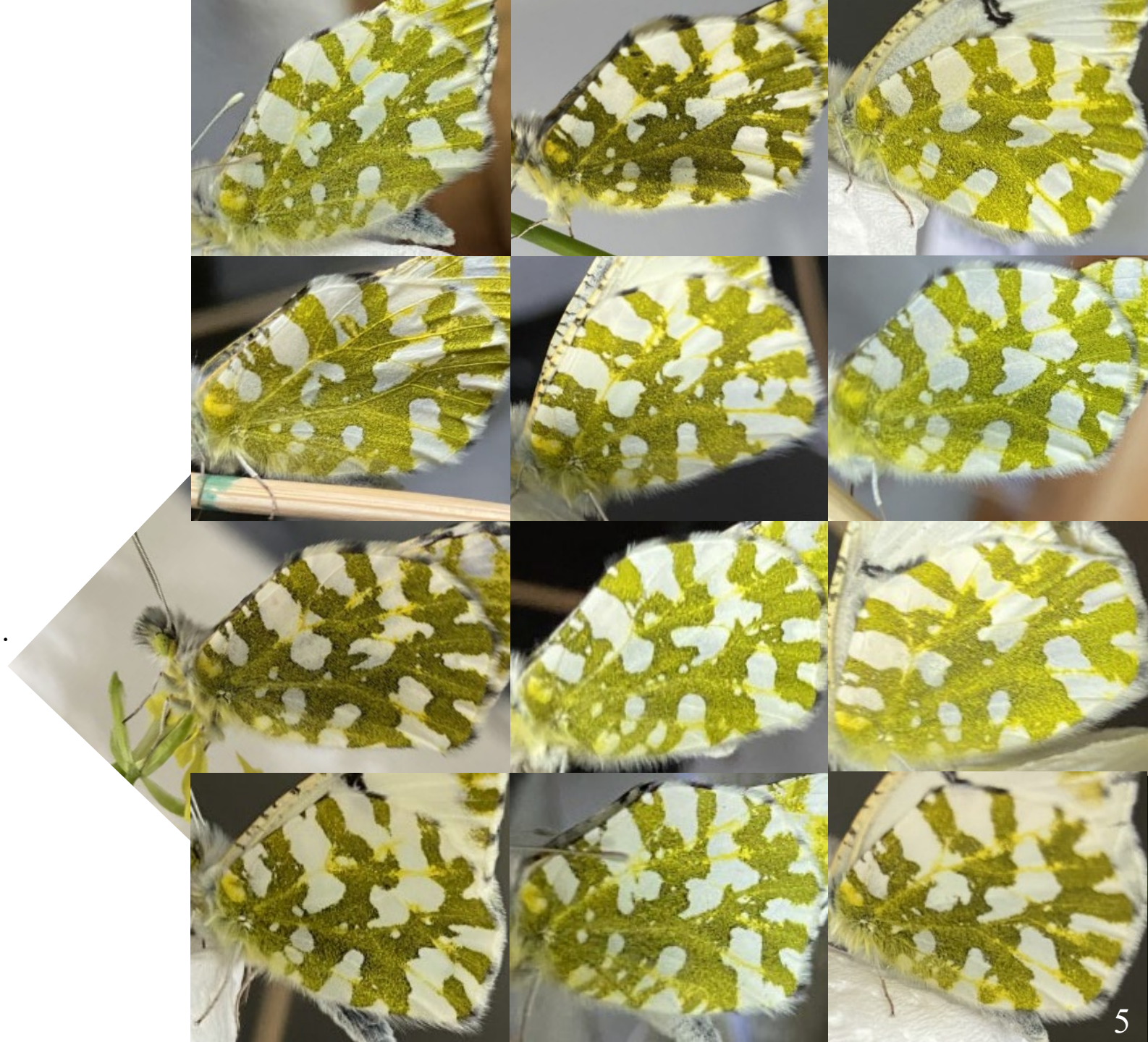
1

1 unemployed whale watch captain/boyfriend who loves science and taking beautiful pictures.

+

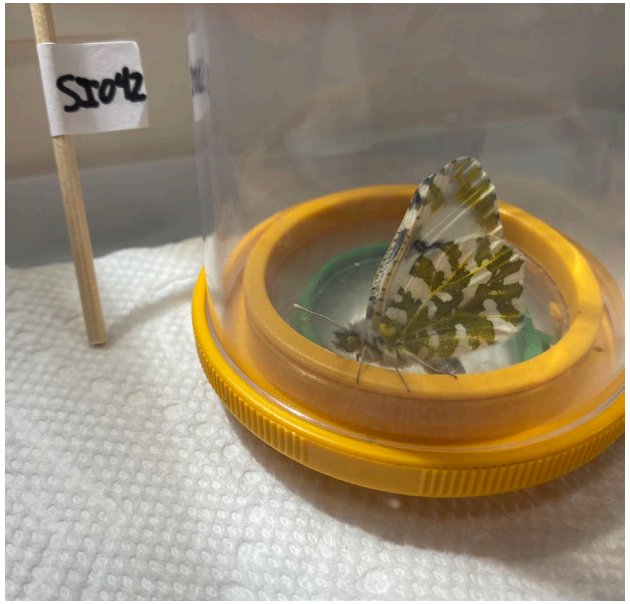
1

1 frustrated lab technician who craves answers to basic butterfly biology questions.

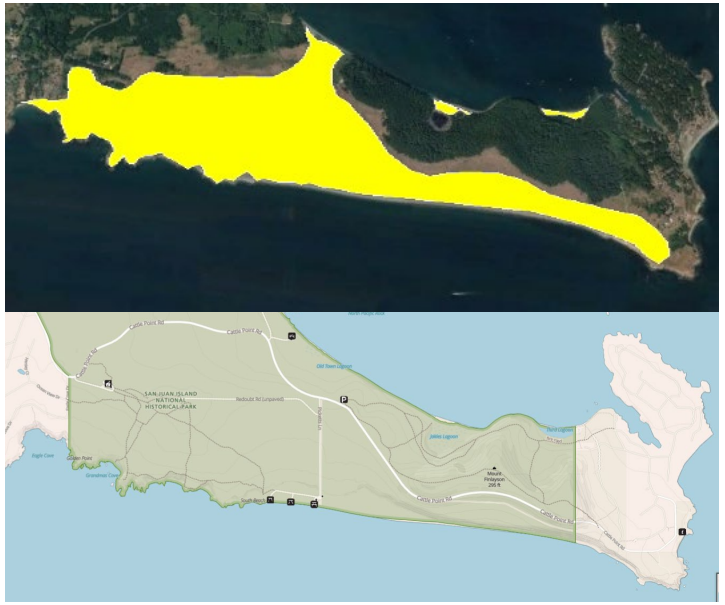


WHY ISLAND MARBLES ARE SO "PERFECT"

Easily distinguishable wing patterns



Active propagation program



Few individuals with easy access
(no harm to butterflies)

BUT OTHER ORGANISMS WILL BE TOO!

HYPOTHETICAL EXAMPLE OF SIMPLE "RESEARCH"

May 15, 2023
22SI041 (female)
Released

May 17, 2023
22SI041
Photo match

8

SOFTWARE ASSISTED PHOTO- IDENTIFICATION (E.G. I3S PATTERN)

CREATE A REFERENCE LIBRARY

Our initial reference library will be compiled with relative ease with photos procured in the lab.

ANNOTATE PHOTOS

All photos must be “annotated” which includes providing reference points and identifying the quality portion of the photo.

COLLECT MORE PHOTOS

Both dedicated staff, trained volunteers, and visitors to the park can contribute photos of butterflies seen in the wild.

RUN THE ALGORITHM

The software will identify all possible matches in the order of highest to lowest correlation. A value is ascribed to each possibility.

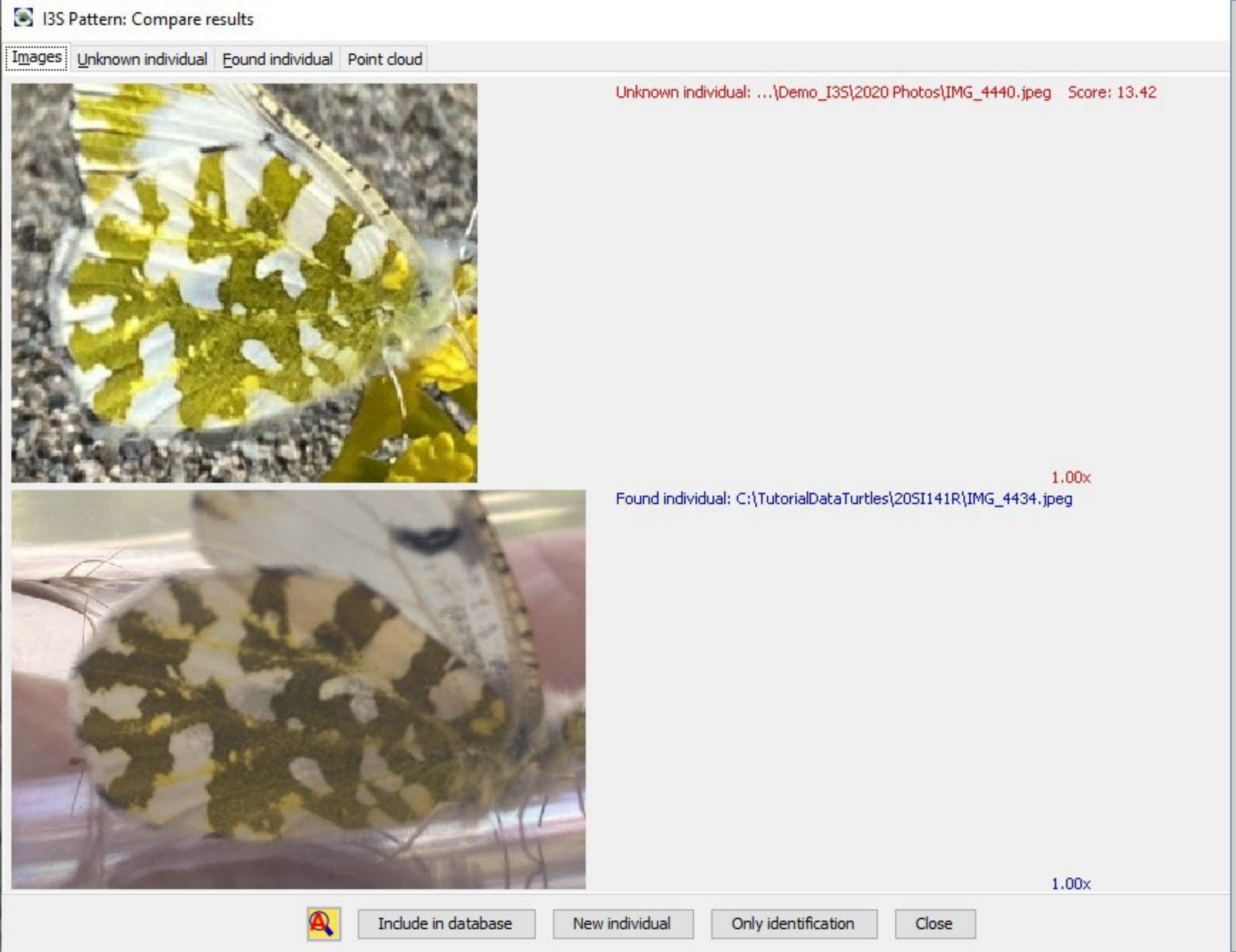
ANNOTATE AND MATCH

1. IMG_4434.jpeg

Score: 13.42

2. 20SI028R.jpeg

Score: 23.39



Visually Compare (Quality Control) Choose to Accept or Reject the Match

BENEFITS

Butterfly-safe, unbiased knowledge acquired

Added value to other conservations actions

More compelling outreach to share with public


THANK YOU!

BUTTERFLY 101 ON SAN JUAN ISLAND

HOST PLANTS

Butterflies lay their eggs on specific species of plants. IMBs use 3 species of mustards– two of which are non-native.

EGGS AND INSTARS

IMB eggs hatch 6-9 days after they are laid, and a first instar (of five) emerges. Each instar is progressively larger and more mobile than the last.

CHRYSALIS (COCOON)

Fifth instars are voracious eaters, but after several days, they walk off and form a chrysalis on adjacent vegetation.

WINGED ADULTS

After 10-11 months of waiting out violent storms, an adult pokes out of the chrysalis, its wings will fully expand in minutes.

CONSERVATION ACTIONS

Rearing Lab

Encounter Surveys

Habitat Enhancement

BRIEF BACKGROUND

- Island marble butterflies (*Euchloe ausonides insulanus*) are endemic to the SE corner of San Juan Island in Washington State.
- Their total range is a few hundred acres, considerably smaller than when the species was first detected on San Juan Island in 1998. It was
- Efforts to recover this species have been stymied by considerable information gaps.