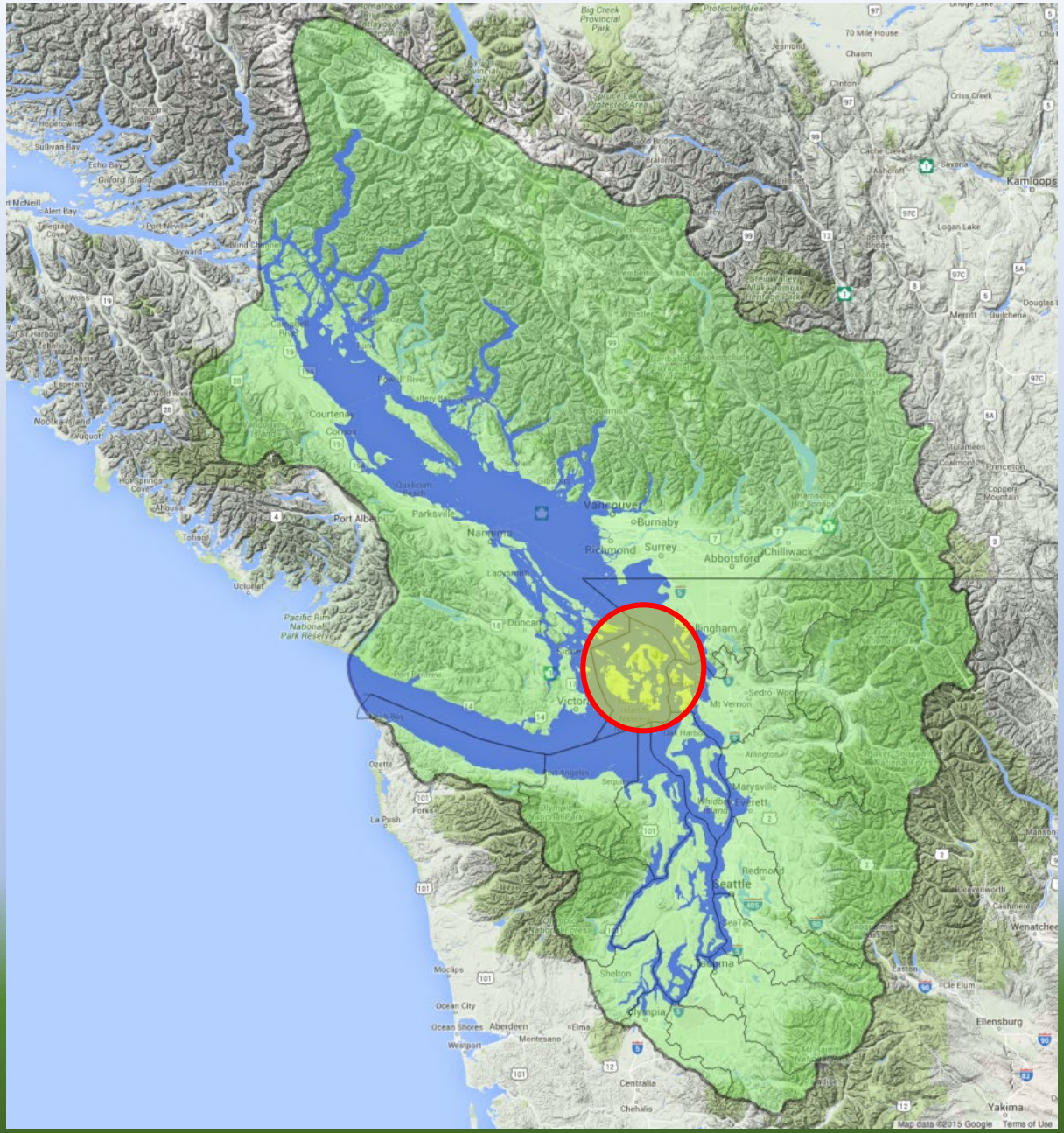
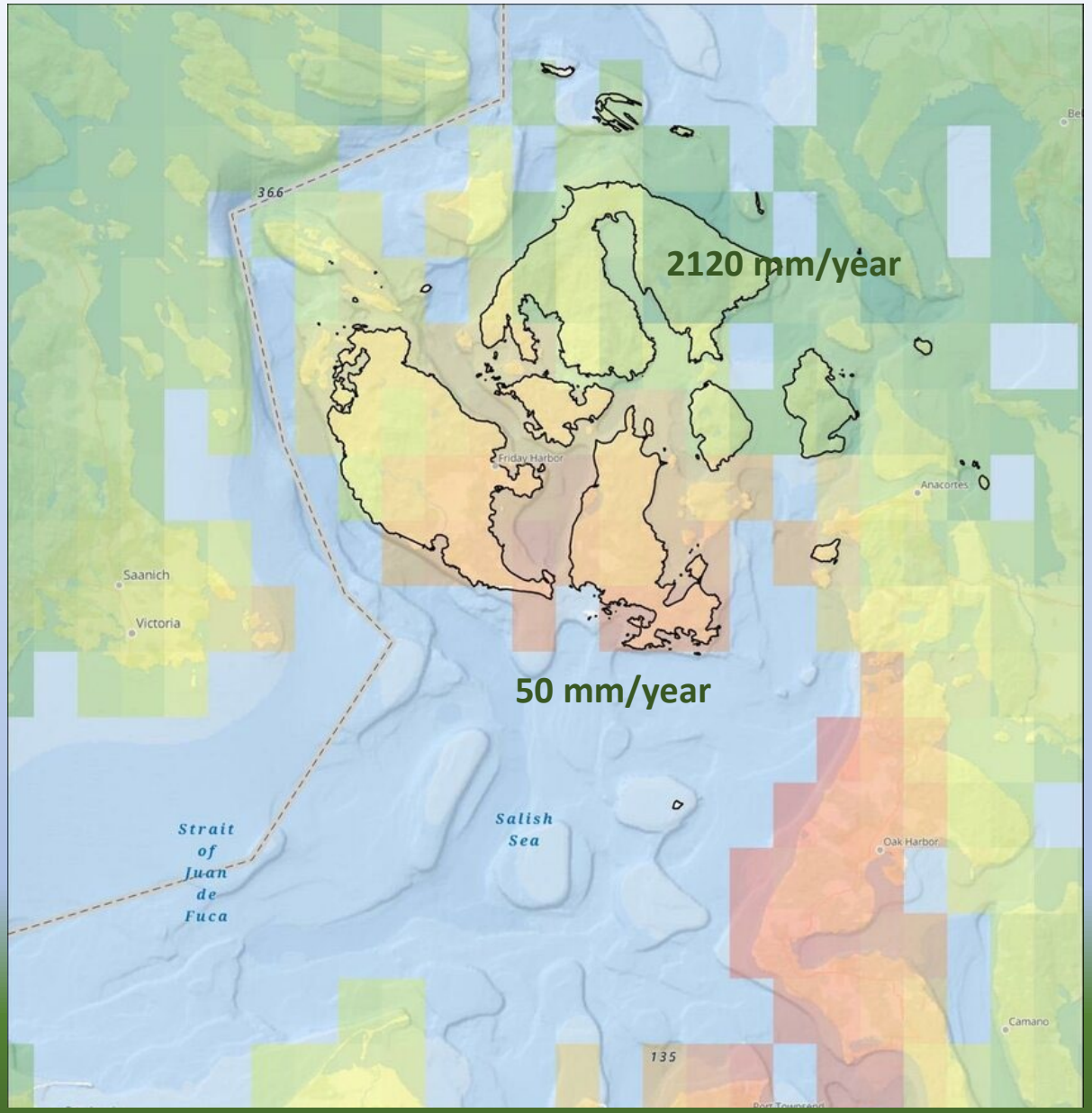
Isolated native Coastal Cutthroat populations in the San Juan Islands, WA, threatened by the effects of residential development and climate change on instream flow regimes

Russel Barsh
Madrona Murphy



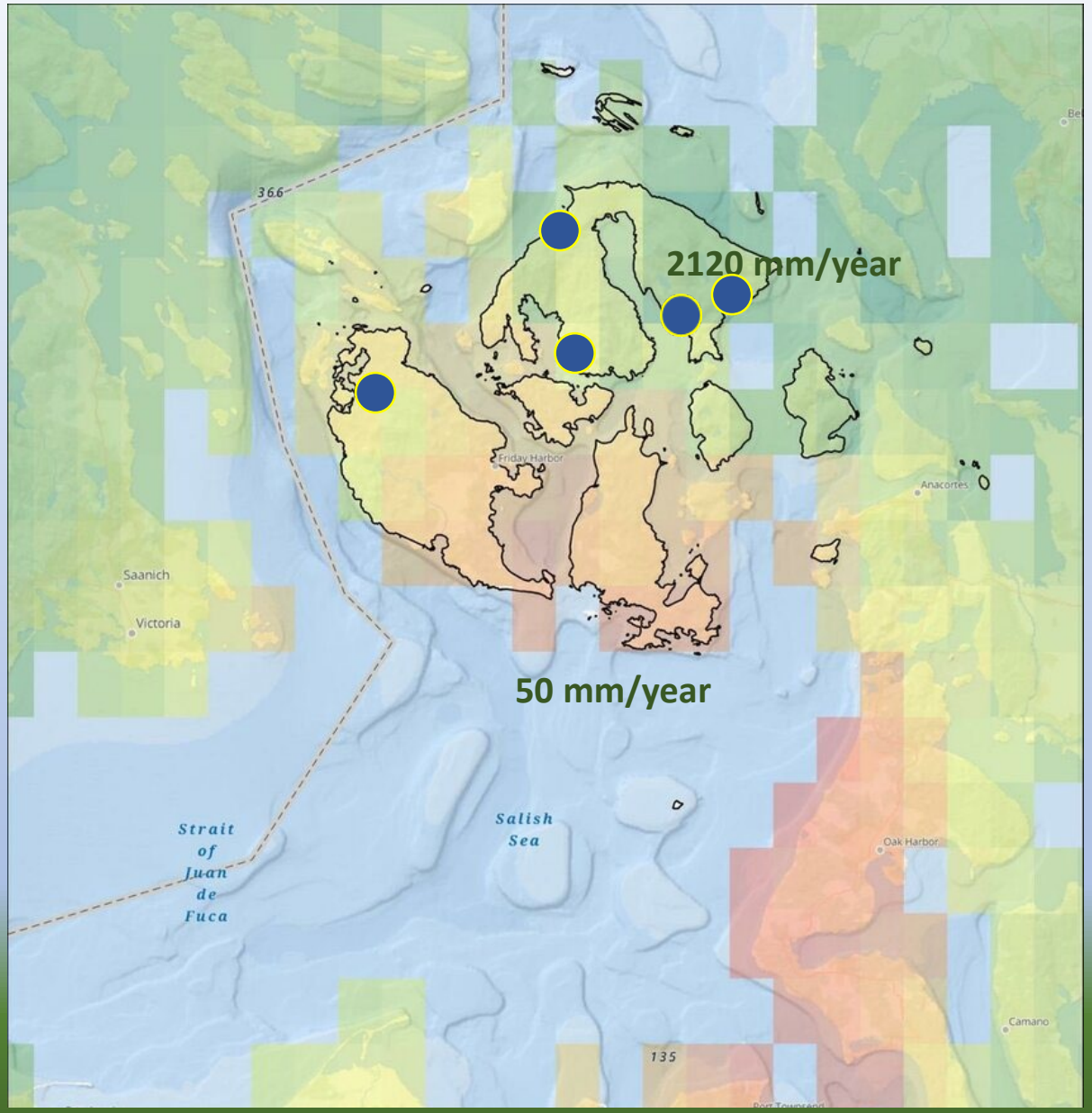
This project is located in the San Juan Islands, WA



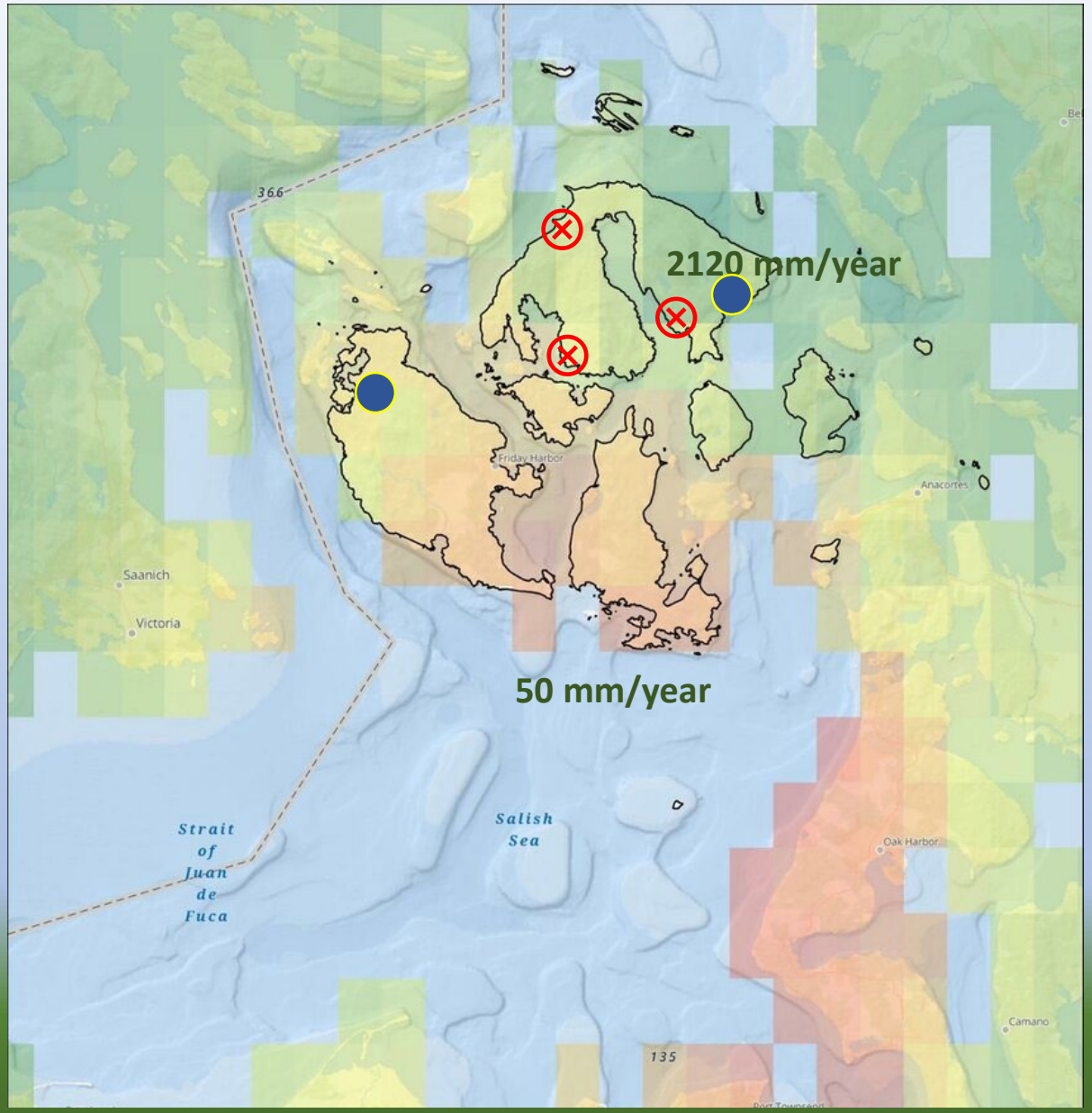
Map by R. Adam Martin 2022

The Olympic rain shadow and lack of snow accumulation means most island streams cease flow in late summer

The drought gap will lengthen as regional weather warms

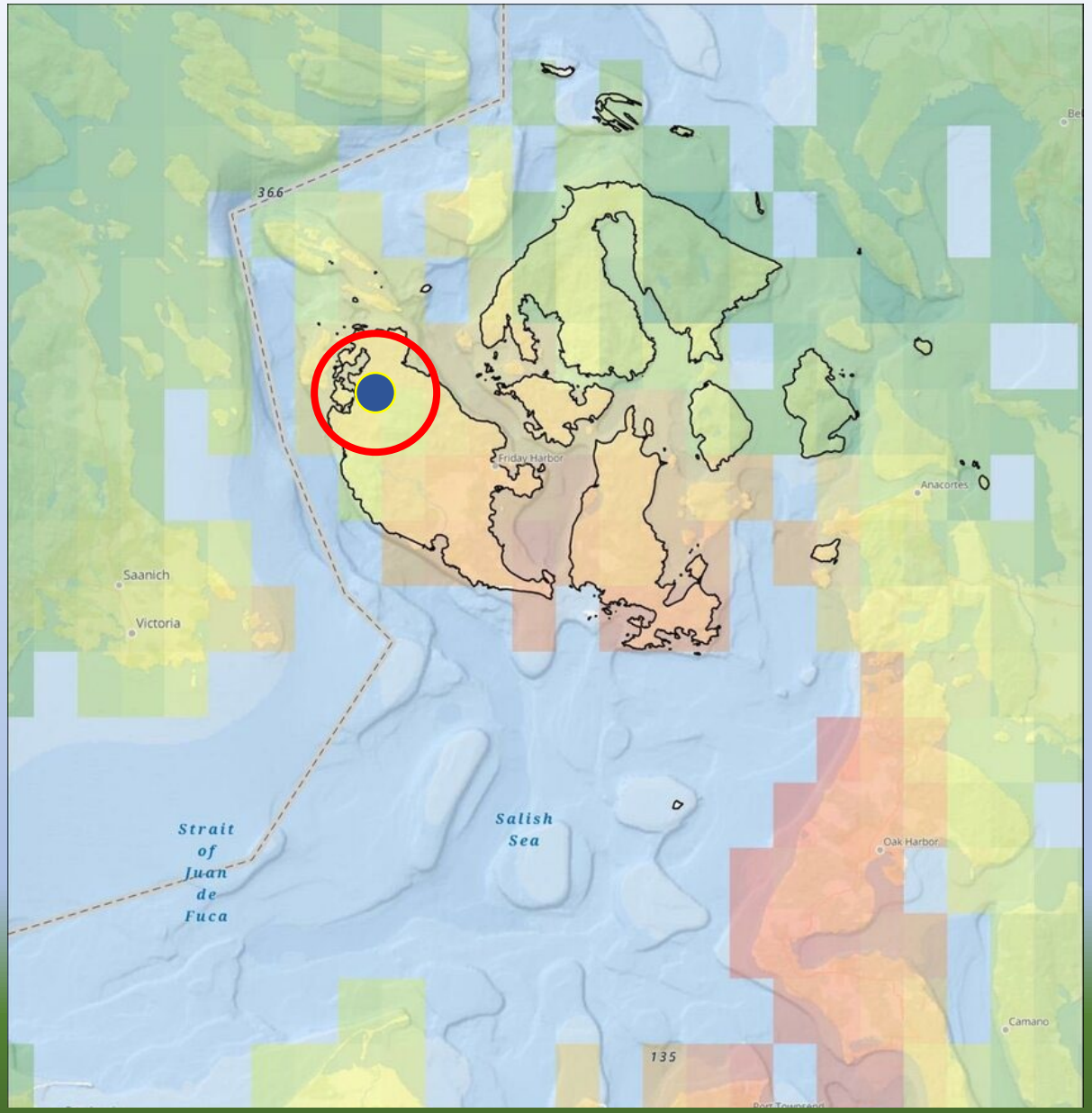


Nonetheless... five native trout populations were identified in 2004-2008 stream typing surveys conducts by the Wild Fish Conservancy and Kwiaht



Fish stocking and habitat modification extirpated 3 stocks by the early 2010s

The surviving two stocks are Coastal Cutthroat, distinct genetically from mainland stocks



The Garrison Creek CCT population on San Juan Island is the largest and the focus of this project

Garrison Creek rises from protected wetlands, then flows through a mosaic of homes and pastures...

Garrison Creek rises from protected wetlands, then flows through a mosaic of homes and pastures...

Coastal Cutthroat spawn and rear 1.5 km upstream on property that has been a farm since the 1880s

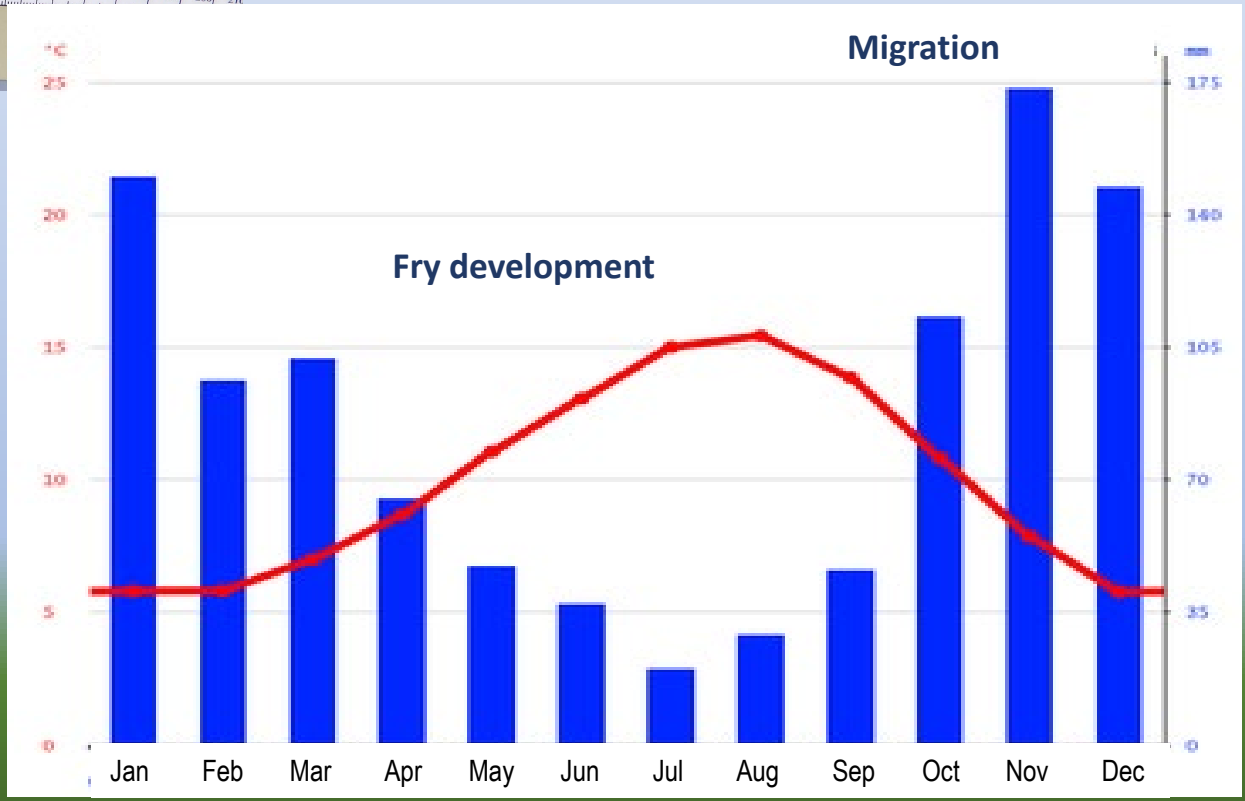
A closer look at the target trout-stream reach and its environs...

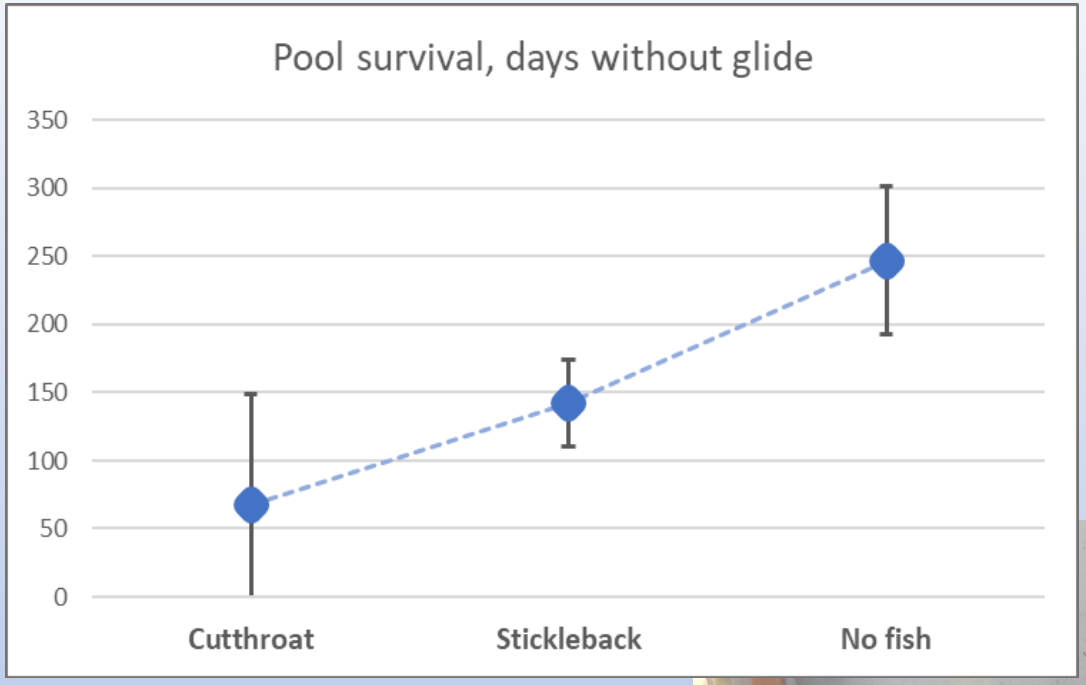

Conditions 2010s
Surface 1° – 14° Celsius
Flow 0.2 – 5 cfs

*Glasgow, J., De Groot, J.D. and Small, M.P., 2020. Genetic composition and conservation status of coastal cutthroat trout (*Oncorhynchus clarki clarki*) in the San Juan Islands, Washington. Conservation genetics, 21(1), pp.181-186.

Trout congregate from September to November. Fry are observed by April and through summer.

Mean monthly precipitation (blue) & temperature (red)

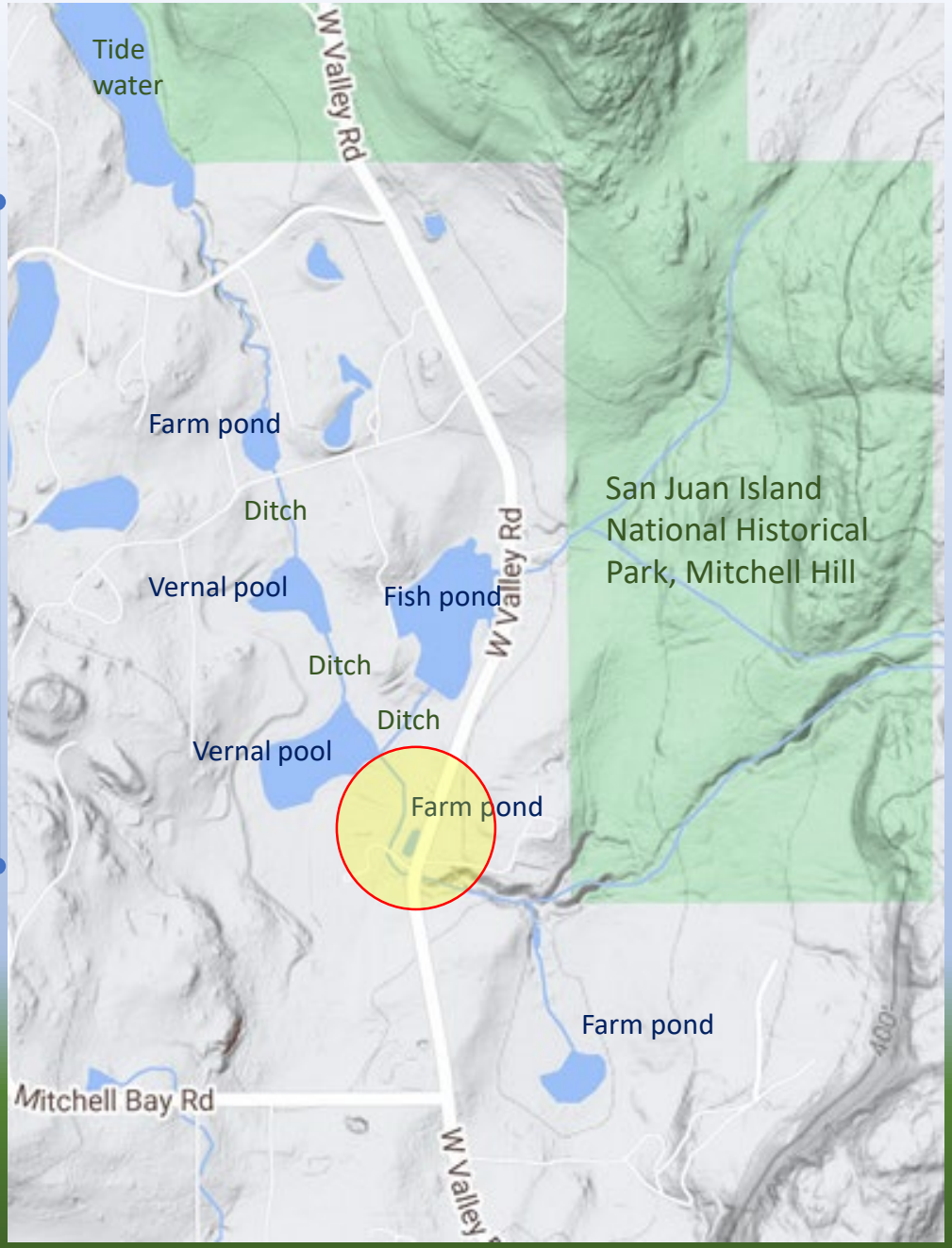




Island Cutthroat can survive two months' isolation in stream pools with <0.2 cfs*

*Barsh, R. 2010. Structural Hydrology and Limited Summer Conditions of San Juan County Fish-Bearing Streams. Kwiaht. Report to the Wild Fish Conservancy.

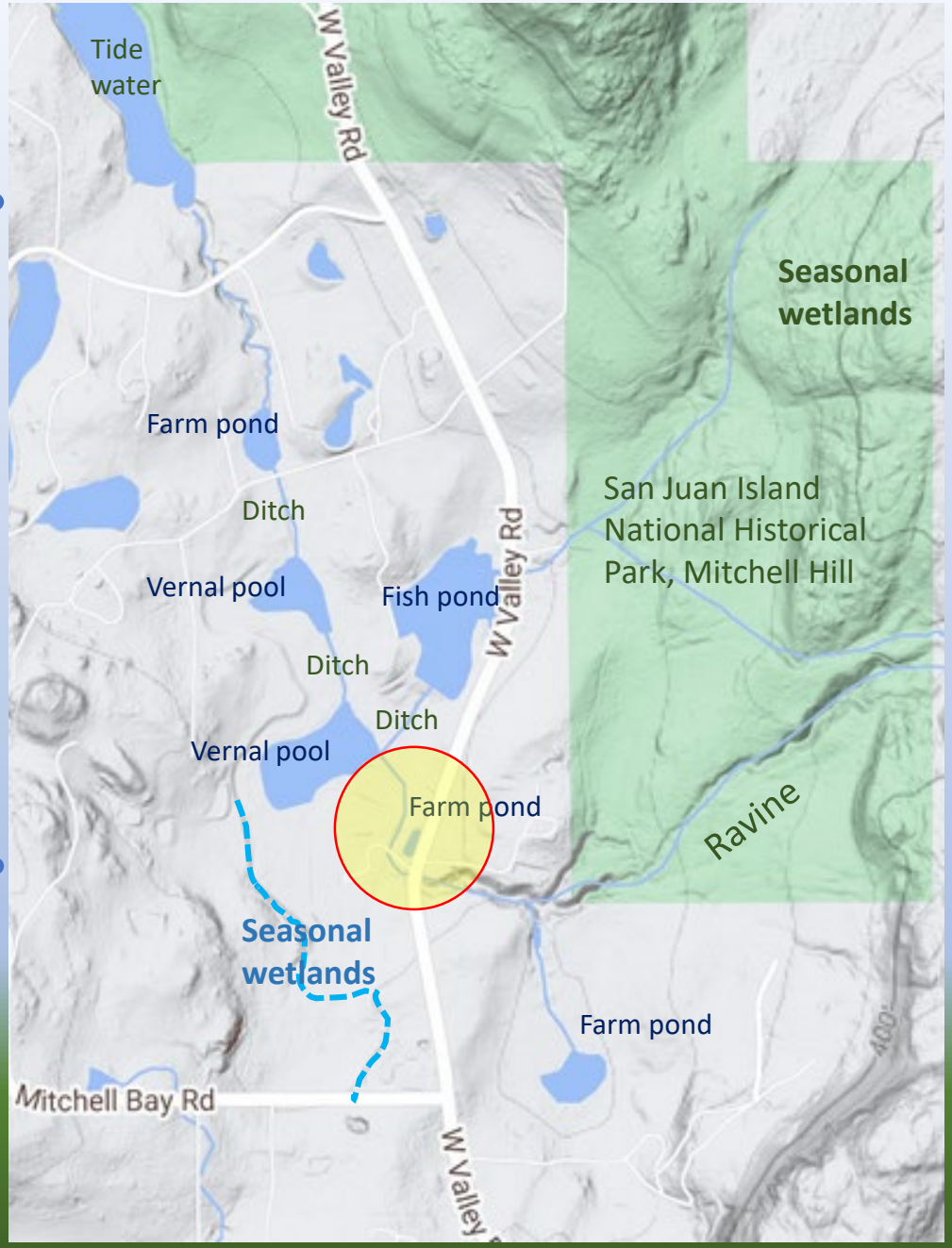
Watershed structure: perennial and seasonal open-water features



Watershed structure: perennial and seasonal open-water features

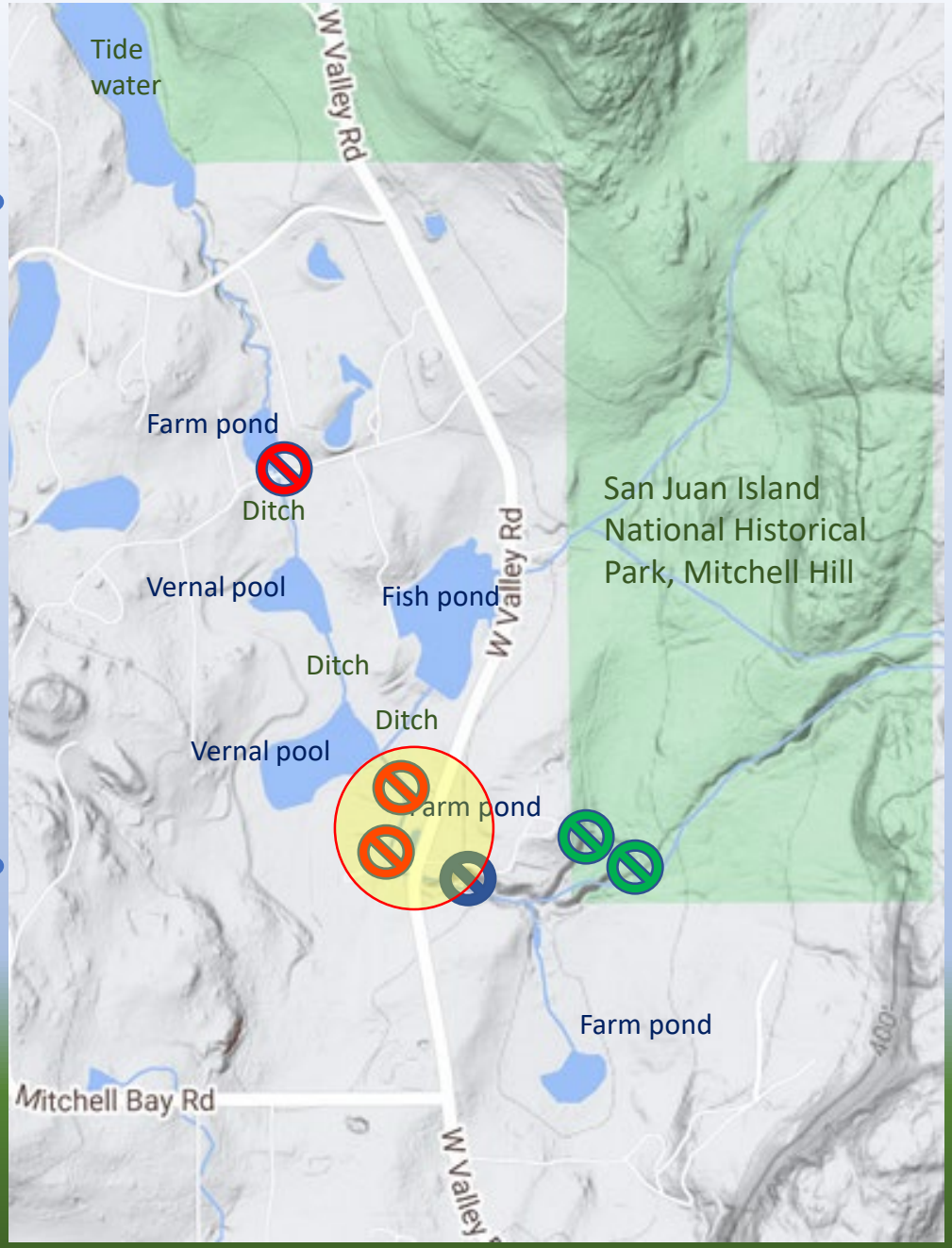
Stream flows depend on wetlands perched on top of Mitchell Hill

CCT spawning/rearing



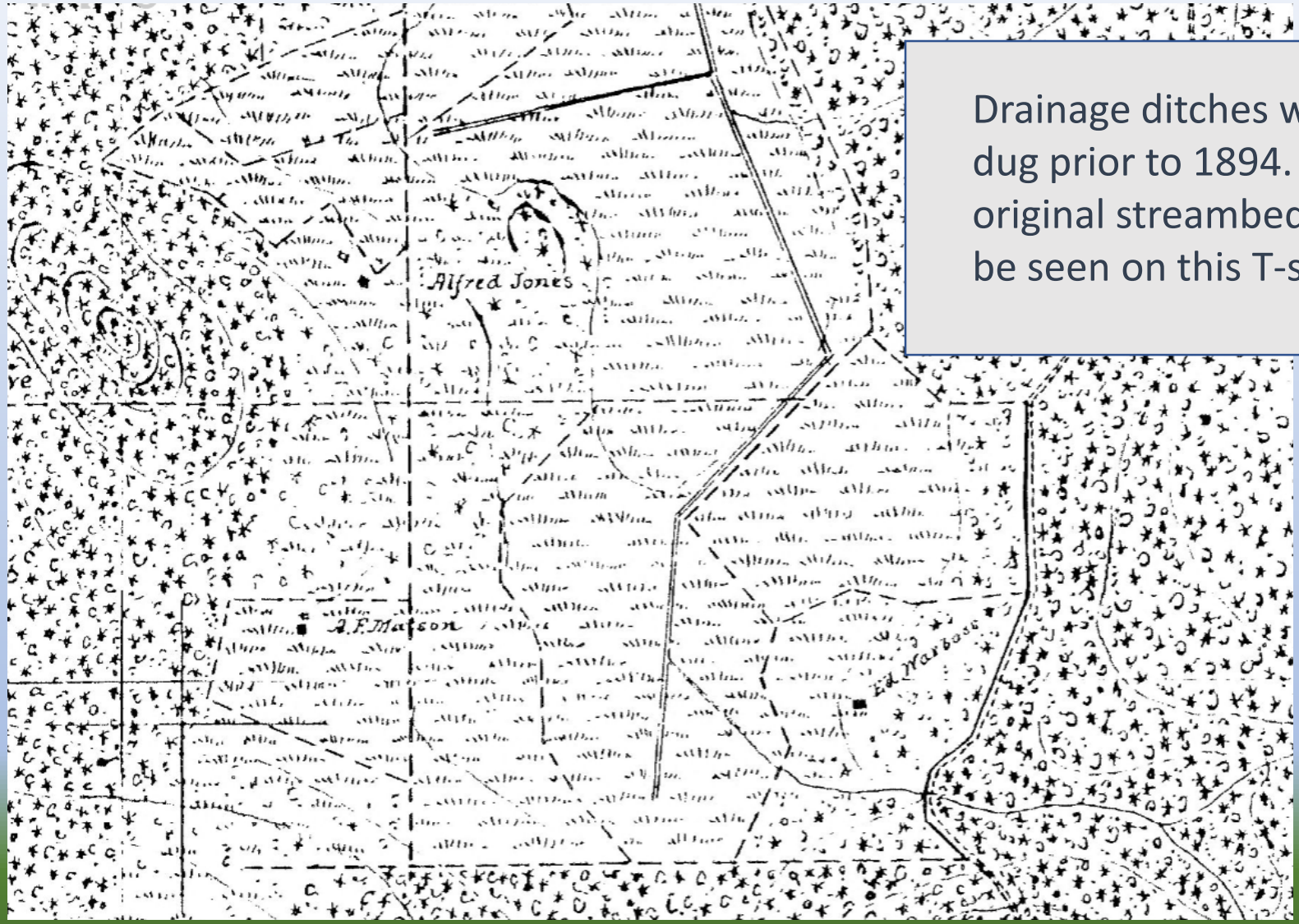
A disjunct watershed seasonally floods the downstream ponds & ditches, facilitating fish passage

CCT spawning/rearing

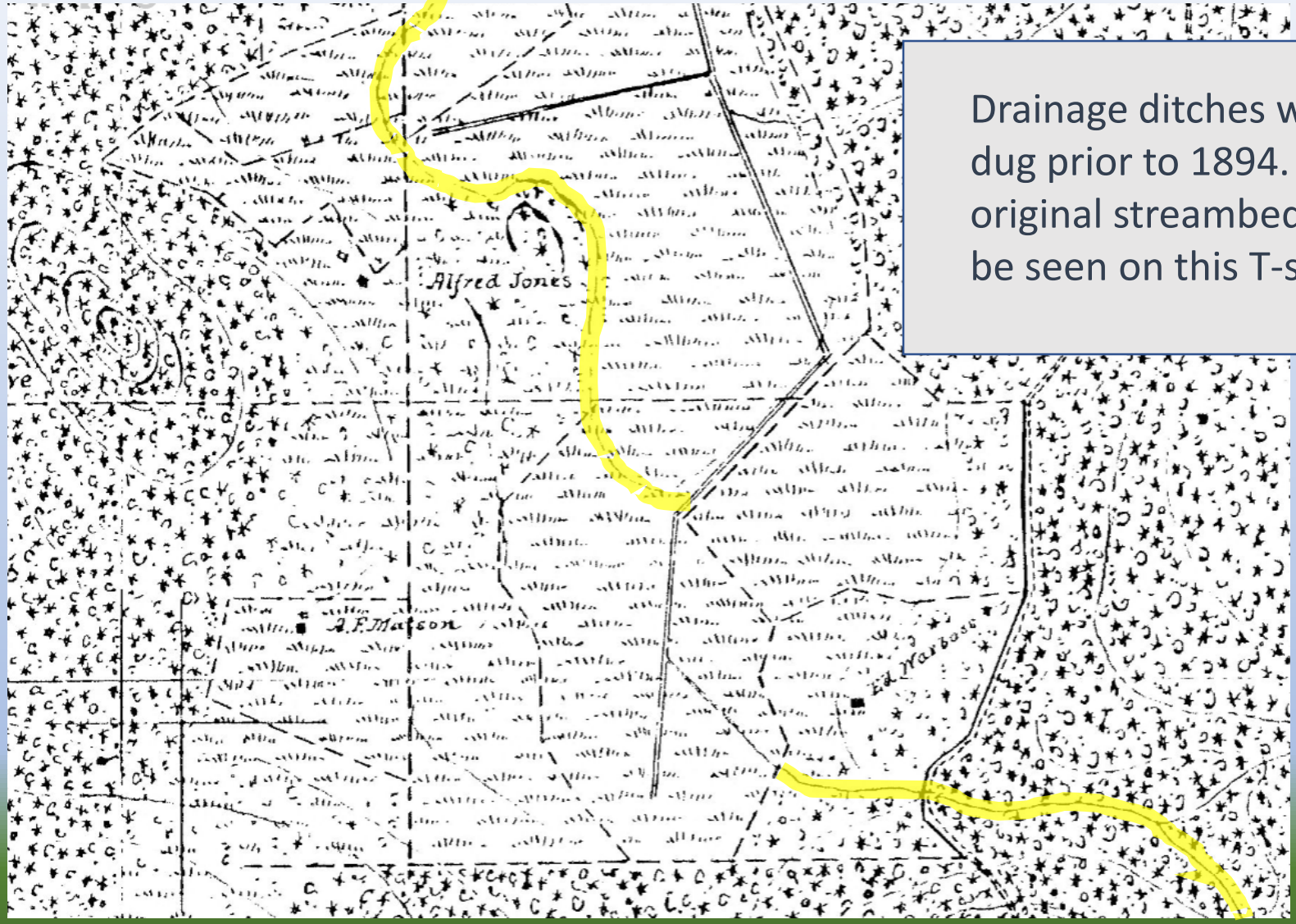


Undersized/perched culverts limit access to the sea to the wettest months of the year

- **Culvert: limited passage**
- **Dam: one-way passage**
- **Waterfall: natural barrier**



Drainage ditches were dug prior to 1894. The original streambed can be seen on this T-sheet



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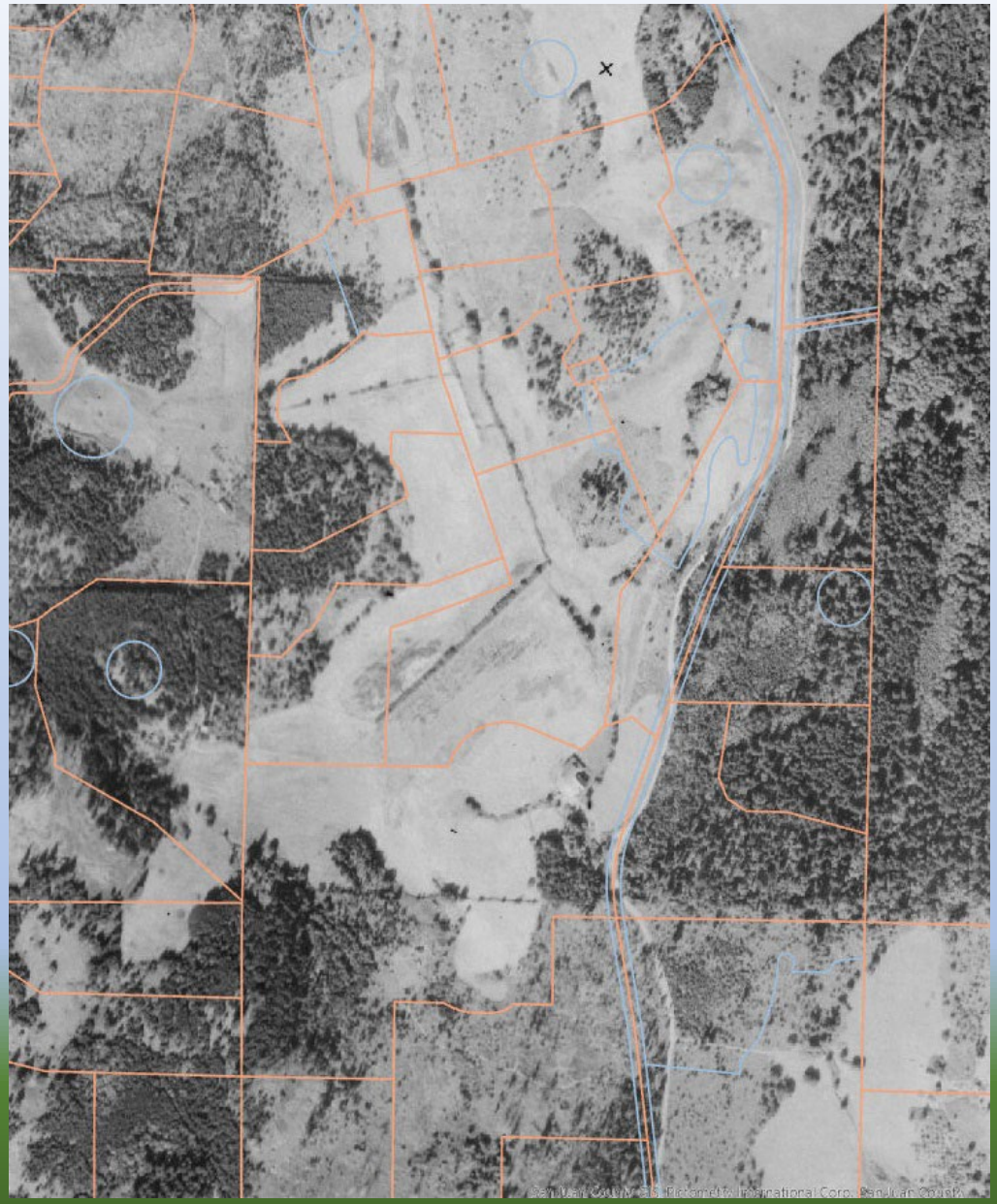
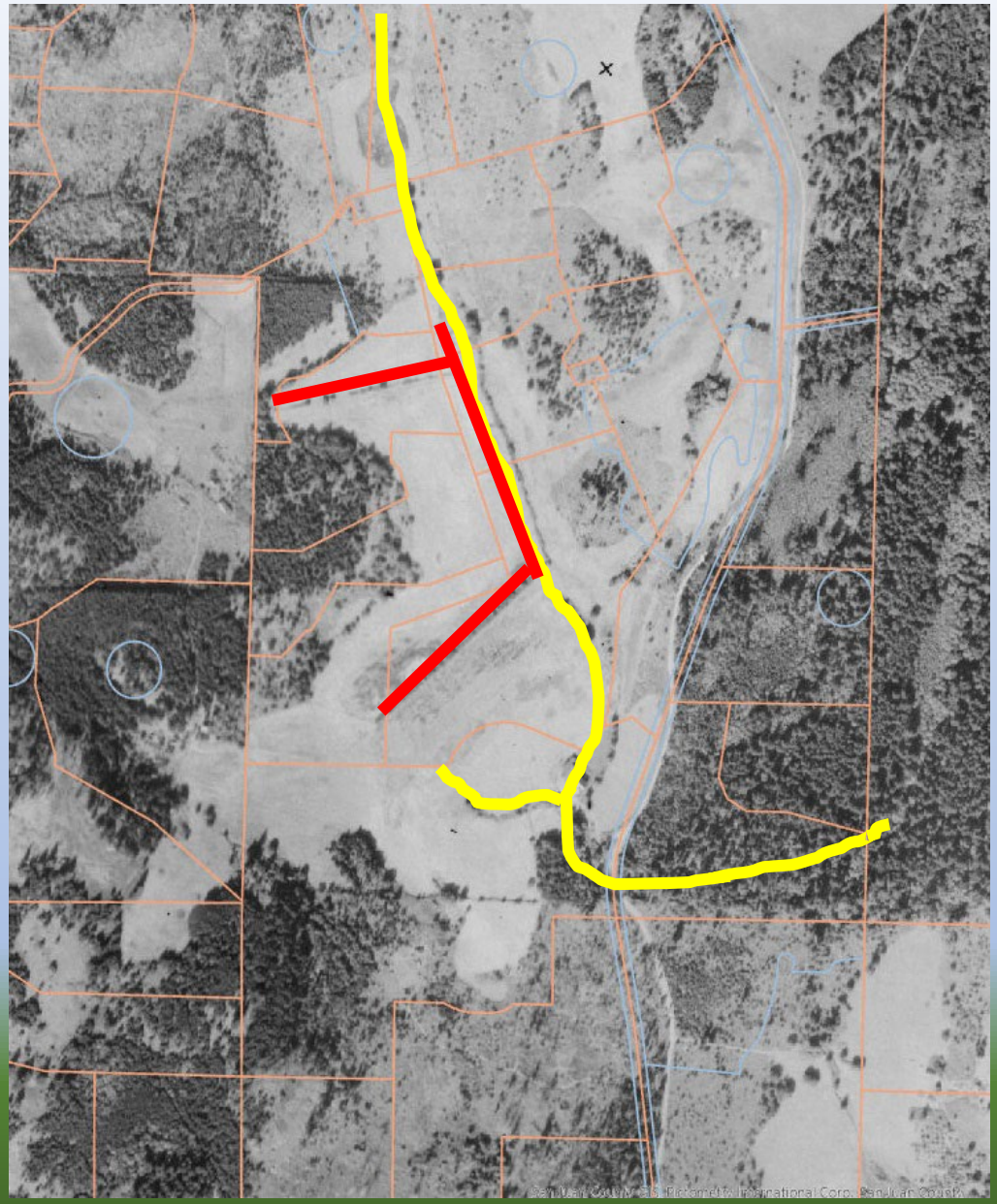


Ditches and portions of the original stream bed can also be seen in this 1932 air photo



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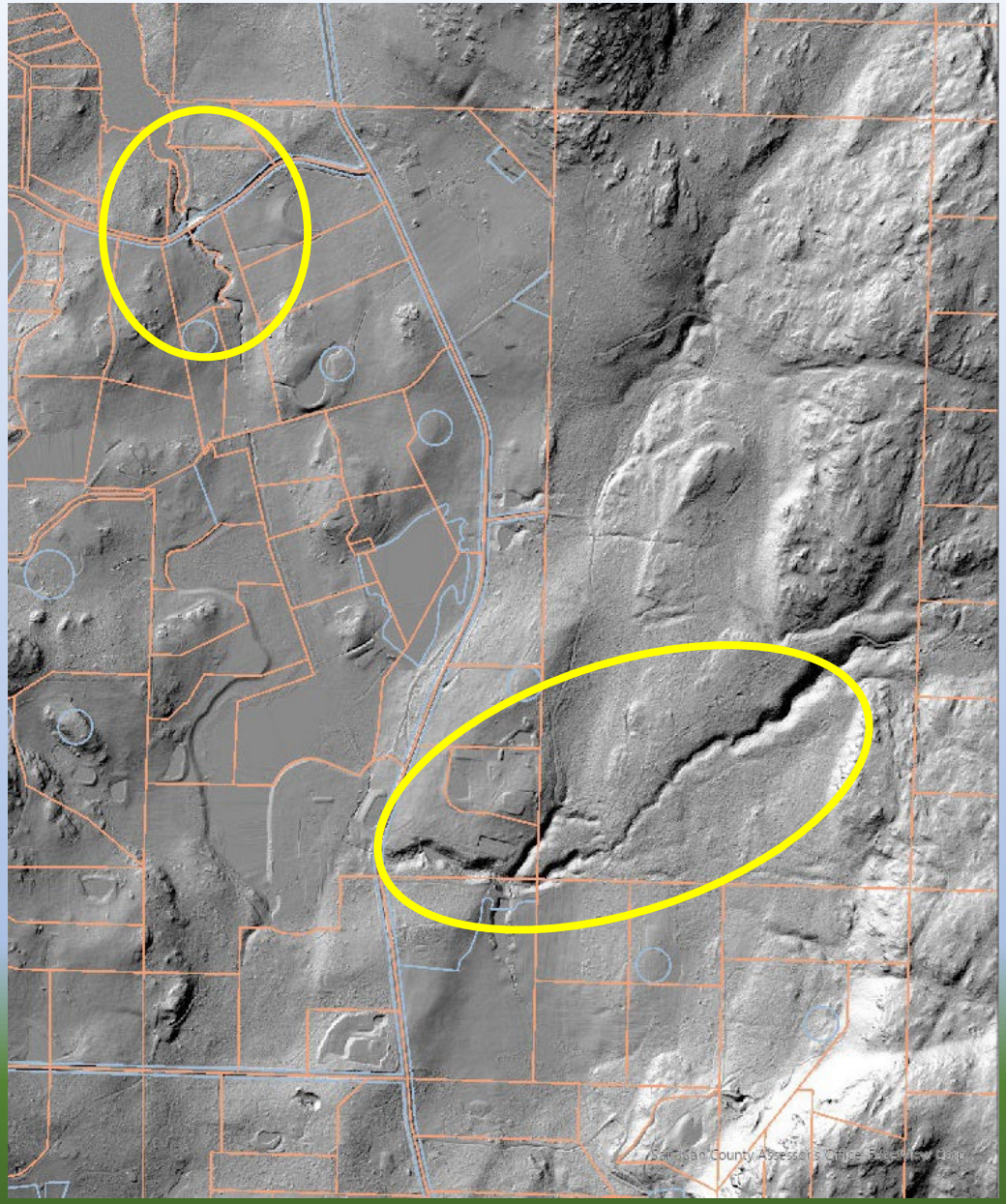
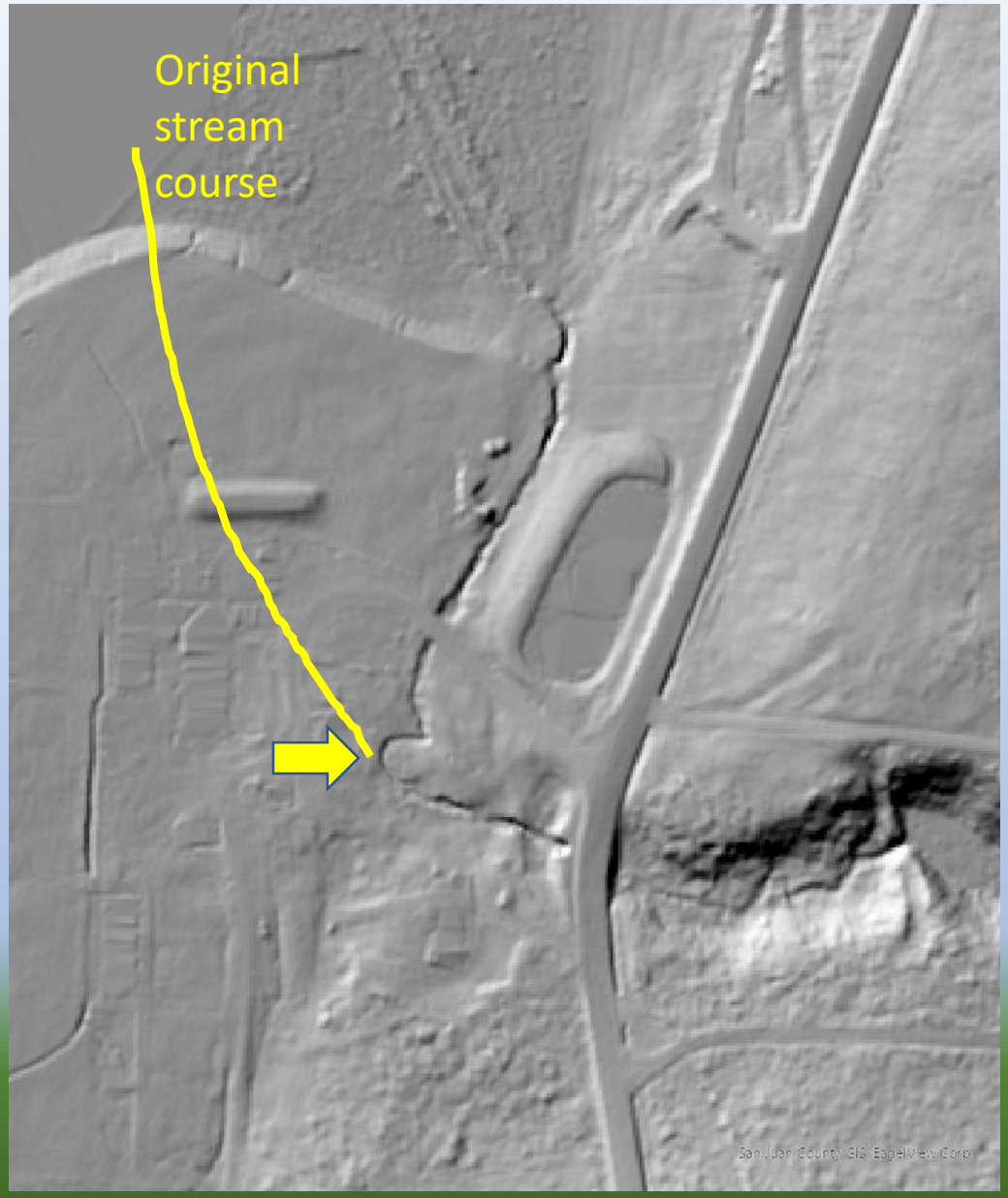


Remnant stream cuts are visible in LIDAR as well...

About 1 km of stream corridor was drained & leveled before 1950



The current spawning reach itself is artificial, a diversion created to protect the farmhouse and barns

Diagnosis

A significant portion of the natural Garrison Creek channel has been relocated or plowed out, limiting access to the sea to the wettest months when the valley floods; and reducing potential spawning and rearing habitat to <10 percent of what existed prior to the 1880s. Thus far, Cutthroat have adapted.

Winter 2024 saw the lowest spring streamflow in 16 years, about 2 cfs

The vernal pools that link critical habitat to the sea did not fully flood during winter 2024 - limiting the return of sea-run fish

Garrison Cutthroat are nearing thermal limits and a loss of anadromy

Prognosis:

Longer summer droughts and shrinking summer flows

Plants colonize streambeds reducing pools & glides

Rainy-season habitat connectivity disappears

Stream pools get warmer and are isolated for longer

Mitigation strategies:

Minimize water losses within core habitat (private)

Barrier removals/replacements (private, county)

Water banking in the big ravine (National Parks)

2024-2025 treatment actions

- Remove invasive shrubs from stream corridor
- Replace with manageable native shade species that require less water or are summer-dormant
- Plant a broad “food forest” at the upstream end of the core habitat area to detain winter runoff, and maintain a higher water table
- Overflow channel from irrigation pond

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Next steps...

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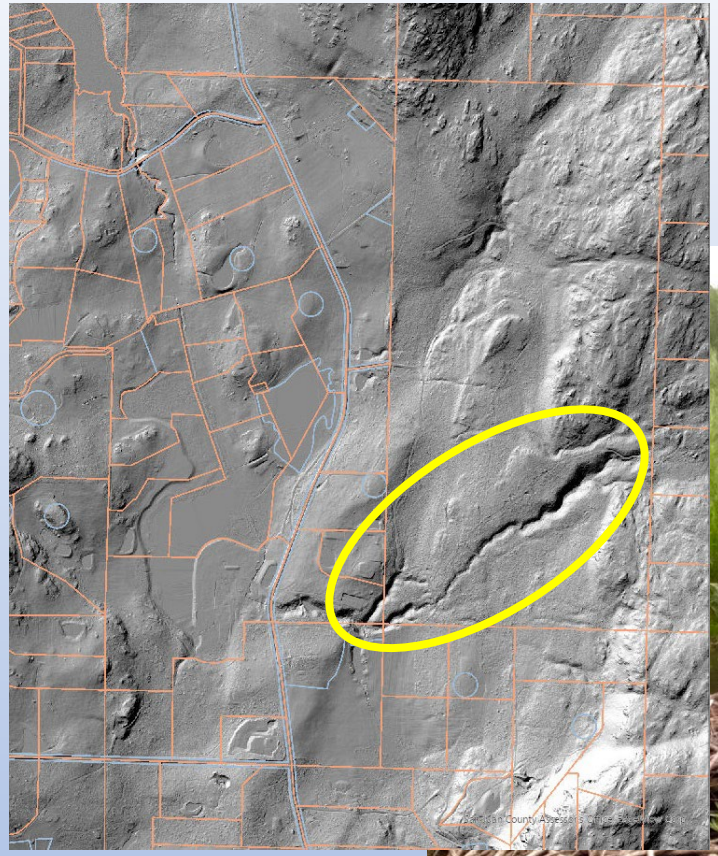

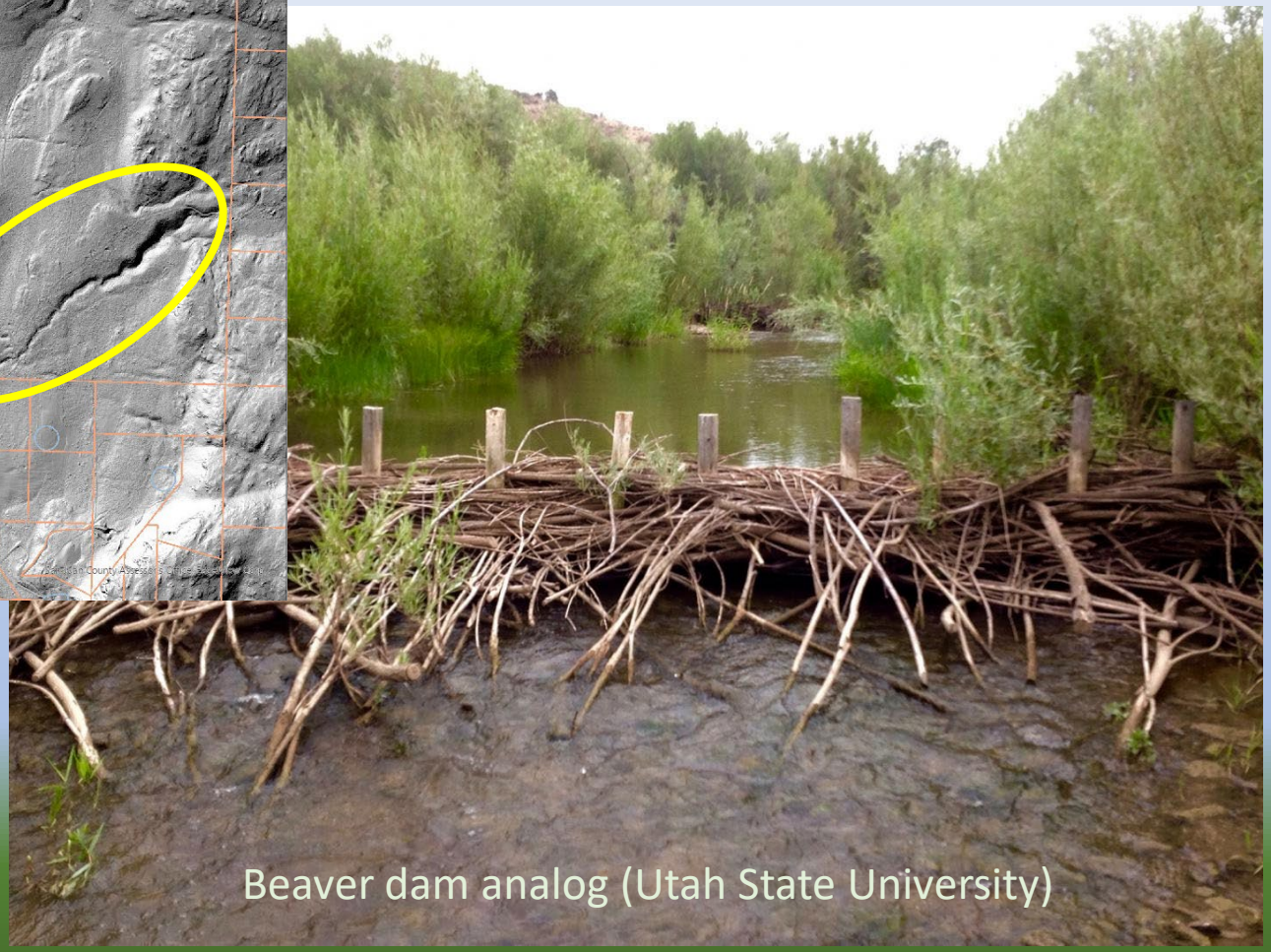

Beaver dam analog (Utah State University)

Acknowledgments

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