Assessment of Creek Conditions in San Mateo County Watersheds

SMCWPPP CII Workshop

June 28, 2022

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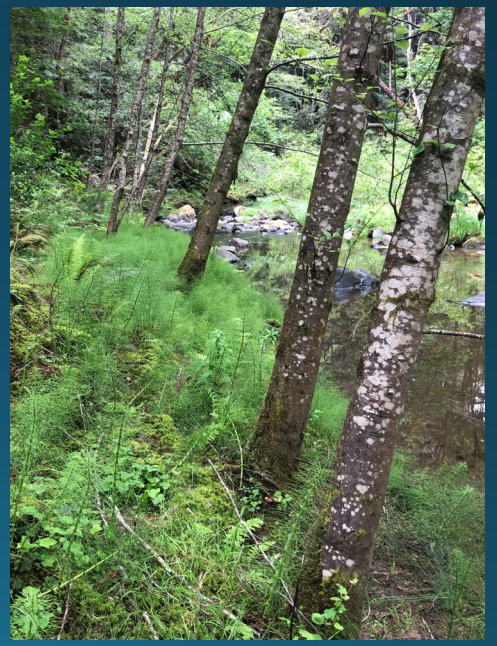
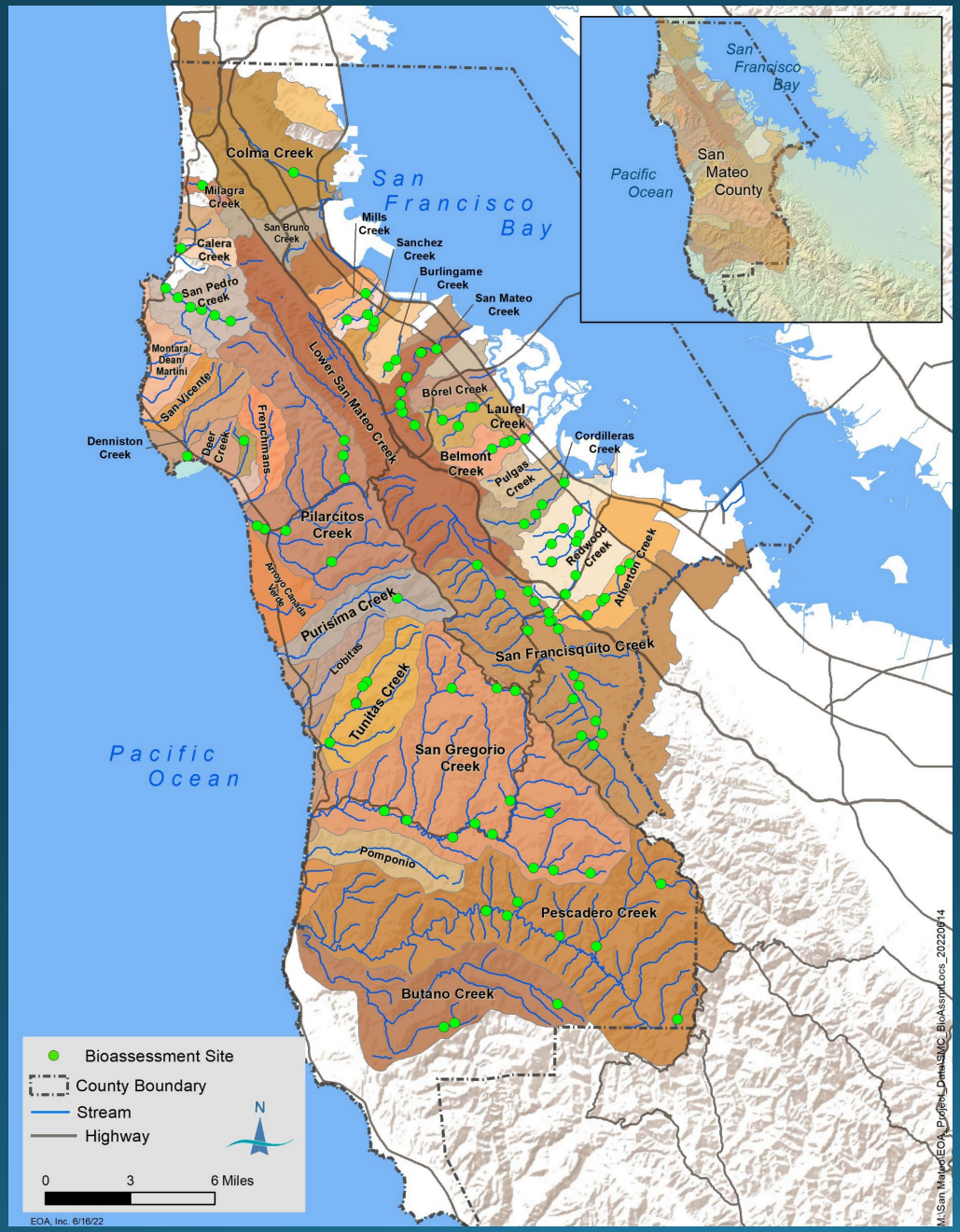
Creek Status Monitoring

- Required in the MRP since 2012
- Data collected to evaluate support of Beneficial Uses in San Mateo County watersheds
  - Aquatic Life Uses
    - COLD and WARM Freshwater Habitat
    - Fish Spawning/Migration
    - Endangered/Rare Species
  - Contact/Non-Contact Recreation
  - Municipal Water Supply





SMCWPPP Bioassessment sites sampled between 2012 and 2021

Cold Freshwater Habitat

- Anadromous fish used as indicator for COLD, migration and spawning Beneficial Uses
- Require good water quality and habitat conditions to support multiple life stages
- Steelhead range in San Mateo County
  - Two SF Bay watersheds
    - Lower San Mateo Cr and Upper San Francisquito Cr
  - Overlaps with urban area; modified channels
  - Majority of Coastal streams
    - Incl. San Pedro Cr (Pacifica), Pillarcitos Cr (Half Moon Bay)
- Coho Salmon
  - San Gregorio and Pescadero Creek

Steelhead/rainbow trout

"Photo source: John McMillian/Trout Unlimited"

Coho salmon

"Photo source: NOAA Fisheries"

"Map source: http://www.cemar.org/estuarystreamsreport/sanmateoandsf.html"

Warm Freshwater Habitat

California roach

"Photo source: Carl Page, ARS Consulting (https://calfish.ucdavis.edu)"

Sacramento sucker

"Photo source: Dave Giordano (https://calfish.ucdavis.edu)"

Three-spine stickleback

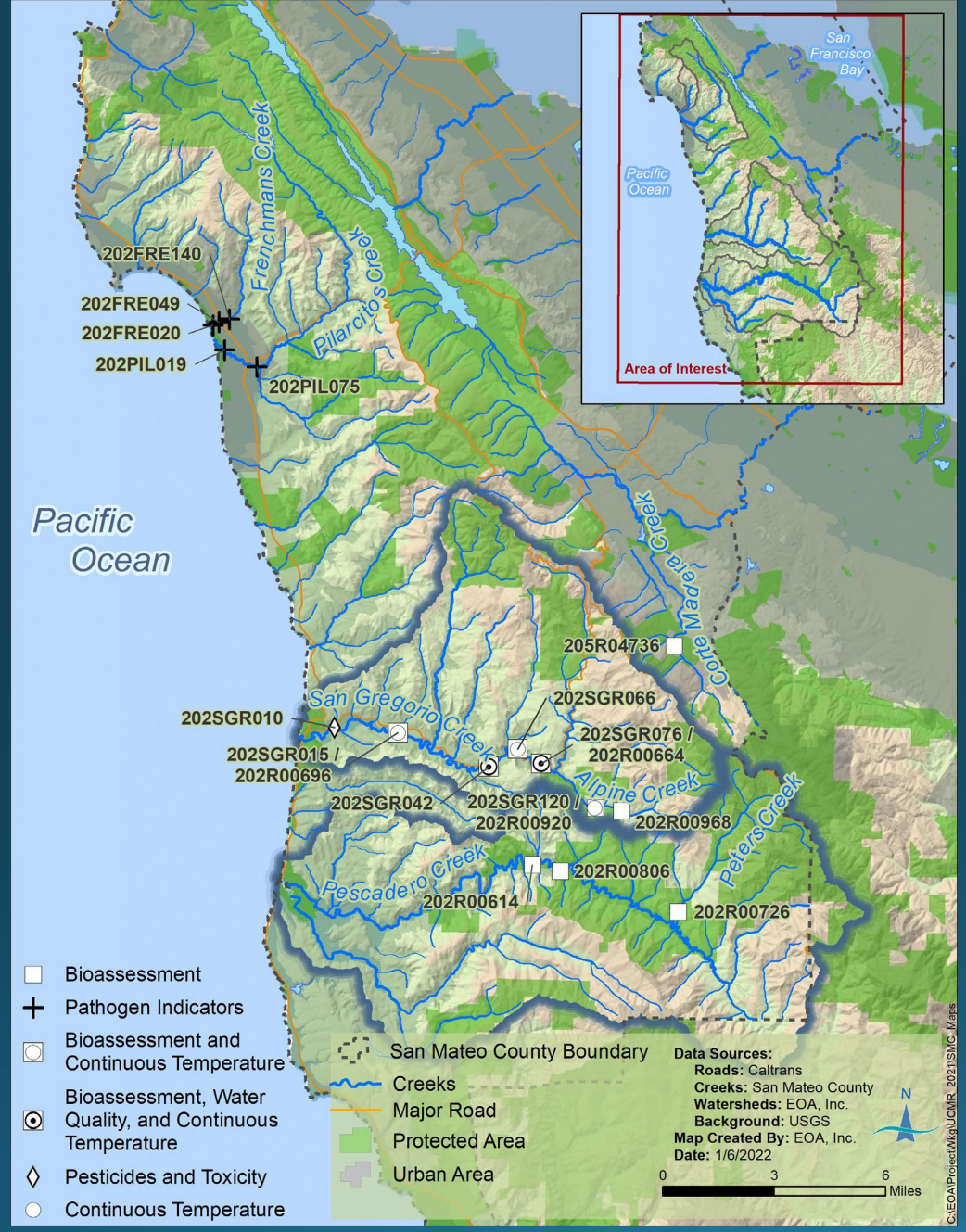
"Photo source: Carl Page, ARS Consulting (https://calfish.ucdavis.edu)"

Prickly sculpin

"Photo source: Dave Giordano (https://calfish.ucdavis.edu)"

How we evaluate creek conditions

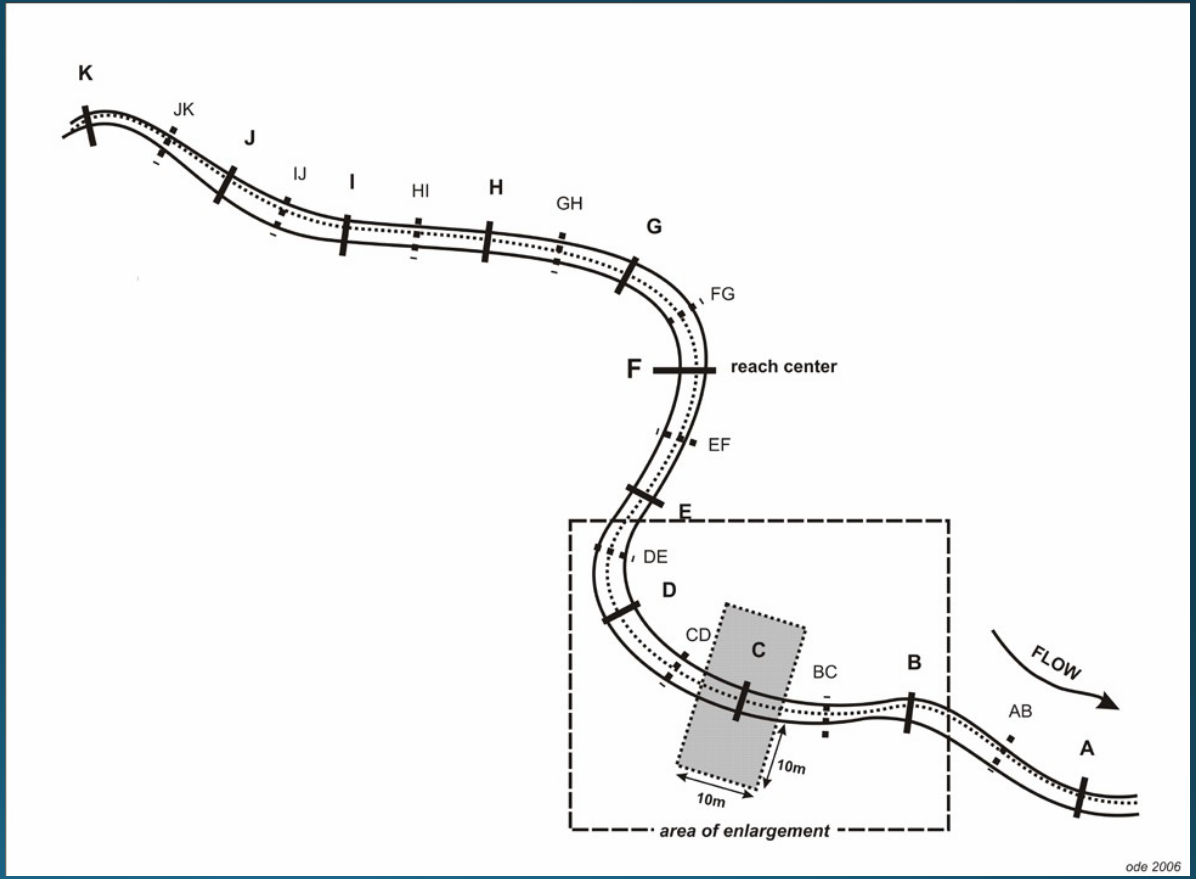
- Biological Assessments
  - Sites are randomly selected throughout the county
- Continuous Temperature and Water Quality
  - Focus on creeks that support cold water fish
- Pathogen Indicators
  - Sites that appear to support recreation uses (e.g., parks)
- Pesticides and Toxicity
  - Assess changes over time at bottom of watershed



Creek Status Monitoring Sites in 2021

Biological Assessment

- Survey types and numbers of organisms present in the creek
- Results are compared to established benchmarks of biological health developed for streams in California
- Biota sampled include benthic (bottom dwelling) macro-invertebrates (BMI) and benthic algae
- Samples are collected at 11 transects evenly spaced within a 150-meter stream reach



Biological and Physical Habitat Assessment

- BMI collected using D-net

- Habitat measurements include pebble counts, canopy cover

- Benthic algae collected using variety of methods depending on size of substrate

- Water tested for nutrients, chlorine, pH, dissolved oxygen

Biological Assessment - Benthic Macro-invertebrates

- Many BMI taxa have unique response to water chemistry and habitat conditions
- Some are very sensitive to poor conditions, others very tolerant
- Some have short life spans, others are longer lived
- Abundance and diversity of BMI organisms provides an overall indicator of stream health

Odonata cordulegastridae
"Spiketail Dragonfly"

Megaloptera corydalidae
"Dobsonflies"

Ephemeroptera ephemerellidae
"Spiny Crawler Mayflies"

Trichoptera limnephilidae
"Northern Caddisflies"

Diptera ceratopogonidae
"Biting Midges"

Coleoptera psephenidae
"Water Penny Beetle"

Source: http://www.dfg.ca.gov/abl/Reference/California/CA_digital_ref_familylevel_home.asp

Benthic Macro-invertebrate Response to Disturbance

Good Water and Habitat Quality

Anthropogenic Disturbance

Poor Water and Habitat Quality

Intolerant Taxa

Stonefly (Perlidae)

Caddisfly (Lepidostomatidae)

Mayfly (Drunella)

Semi-Tolerant Taxa

Beetle (Psephenidae)

Mayfly (Baetis)

Dragonfly (Gomphidae)

Tolerant Taxa

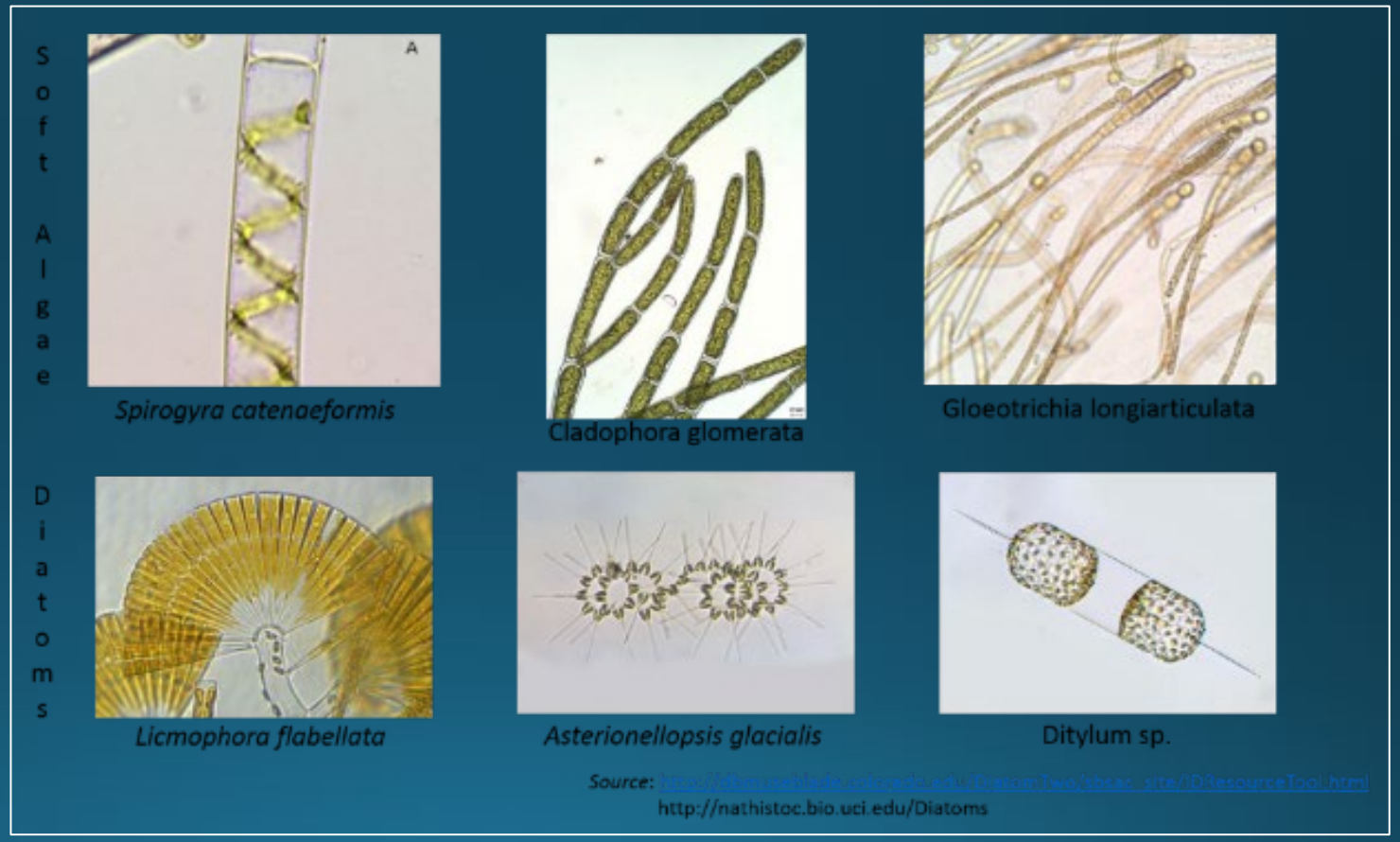
Black Fly (Simuliidae)

Midge (Chironomidae)

Source: https://www.macroinvertebrates.org/

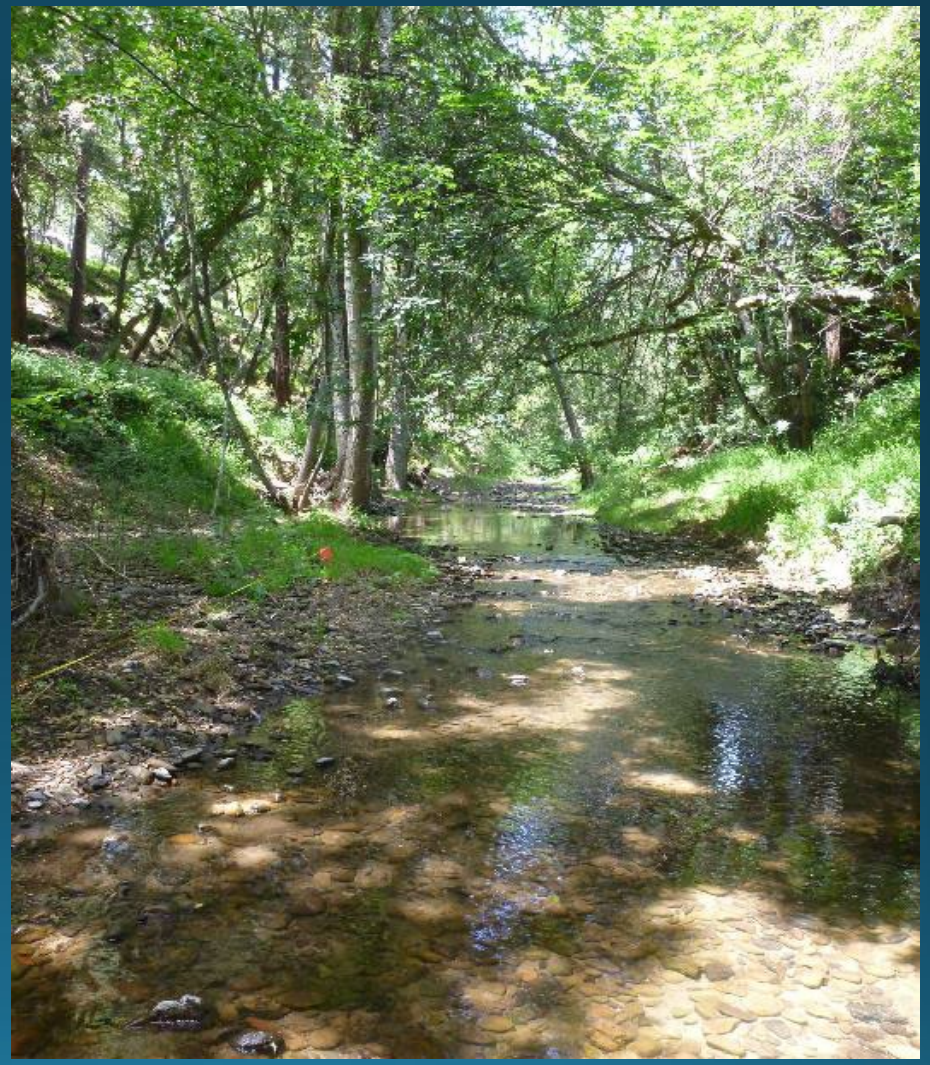
Biological Assessment - Algae

- Includes diatoms and soft-bodied algae
- Algae can respond differently compared to BMI
  - More sensitive to changes in nutrients and water chemistry
  - Shorter life spans, reflect more recent impacts
  - May be a better indicator for modified channels



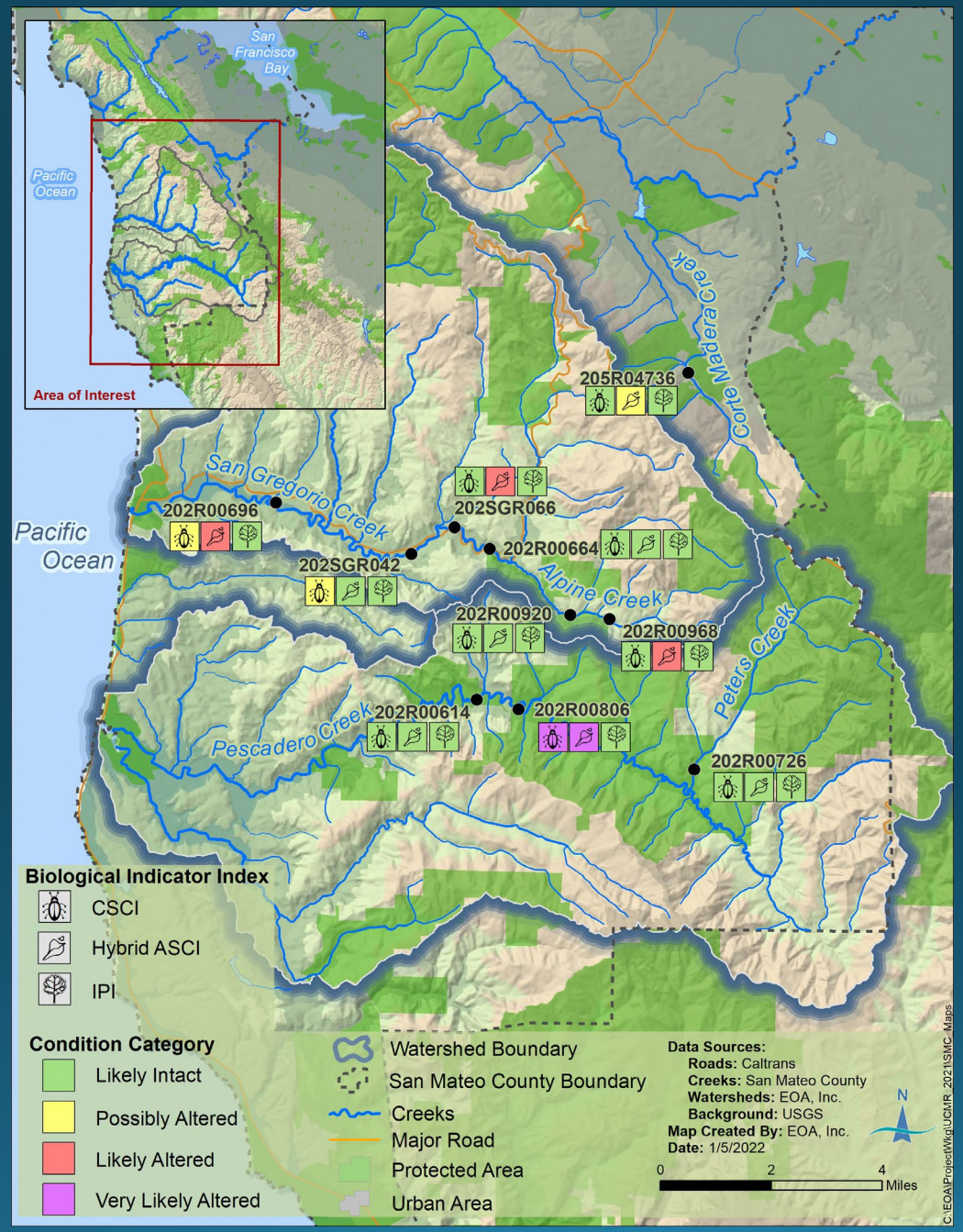
Physical Habitat Assessment

- Streambed substrate
- Channel morphology
- Habitat complexity
- Riparian vegetation cover
- Human disturbance



Biological Condition

WY 2021 Sites



What are important impacts to creek health?

- Channel/Flow Modification
- Habitat Degradation
- Water Quality
- Invasive Species
- Climate Change

Industrial, Commercial and Residential Pollution and Potential Impacts to Biological Conditions

- Sediment/erosion
- Potable water
- Concrete washout
- Oil and grease/fuel
- Paint and other hazardous materials
- Litter/waste

Sediment/Erosion

- Impacts
  - Sedimentation can fill spaces in substrate used by insect larvae, fish, and other benthic organisms
  - Clogging gills or feeding appendages
  - Reduce light penetration
  - Reduce oxygen concentrations for fish/frog eggs
  - Introduce toxic chemicals attached to soil particles

Potable Water

- Impacts
  - Chlorine/chloramine in water is toxic to fish at high concentrations
  - Damages gills/skin of fish causing hypoxic stress

Source Lea Suzuki: The Chronicle

Concrete Washout

- Impacts
  - Highly alkaline, caustic and corrosive
  - Increase pH in receiving water
  - Directly affect fish gills, skin
  - Increase toxicity of other substances (e.g., metals, ammonia, and nitrite)

Oil/grease and petroleum fuel

- Impacts
  - Floating hazard to surface dwelling organisms
  - Toxic soluble components can be toxic to water column and benthic organisms

Source: www.cleancreeks.org

Questions??

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