
*SO CAL BMI
Inter Tribal Stream
Team
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La Jolla Band of
Luiseno Indians

* BENTHIC MACROINVERTIBRATES (BMI) WHAT ARE THEY?
* SO CAL INTER TRIBAL STREAM TEAM
  - WHO ARE THEY ?
  - WHAT DO THEY DO?
  - HOW CAN THIS HELP YOUR PROGRAM
* SOURCE WATER AMBIENT MONITORING PROGRAM (SWAMP)
* TRAINING

GOT MACROS ?

* By looking at the macros in streams, rivers, ponds, and lakes we can determine the health of that water source. Specifically we can look at the Benthic-Macro Invertebrates (BMIs) as indicators:
* Benthic = Bottom-Dwelling
* Macro = Visible to the Naked Eye
* Invertebrate = Without a Backbone

*

GOT MACROS ?

* BMIs are great indicators of the health of a stream. If we examine what types of macros and how many of each kind are present in the water we can determine the health of the stream. Macros are gauges of the health of the stream for several reasons:
* They do not roam very far so we can use them as indicators of the health of a particular point in the water body (ie. In the stream, river, or lake)
* Various macros have different tolerances to water contamination so the types that are present are indicative to the quality of the water

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* There are lots of BMI's!
* They are easy to catch (and it's cheap)
* They can indicate both long and short term effects to water quality
* Bio-Monitoring essentially means counting the macros in the water to determine the water quality, but there are specific protocols to collecting the macros which we need to follow to make the study accurate

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BMI Tolerance Levels

* Less tolerant species can only survive in water of high quality
* Moderately tolerant species can survive in water that is of high quality or slightly impaired
* More tolerant species can survive in almost all water but thrive in water of low quality, most likely polluted or contaminated.

Macroinvertebrates
Sensitive Benthos

- Stoneflies
- Water Penny Beetles
- Mayflies
- Dobsonflies
- Alderflies
- Snipeflies
- Mussels
- Riffle Beetles

*Less Tolerant Species

Megaloptera

- Habitat
  Megaloptera larvae live in diverse aquatic habitats including in streams, rivers, lakes, ponds, and swamps. They can survive in both still or quickly flowing waters.
- They are benthic dwelling and can be found burrowed in soft mud or sand, or may take shelter under stones or in crevices.
- Most need aquatic environments that have high amounts of oxygen in the water in order to breathe.
- Some species can survive in low oxygen concentrations by using special appendages called 'caudal respiratory tubes'. These tubes work like snorkels, allowing the larvae to access oxygen from above the surface of the water.

* Alderfly

* Only in the larval stage do Megalopterans live in the water; all other life stages are terrestrial, staying close to aquatic habitats

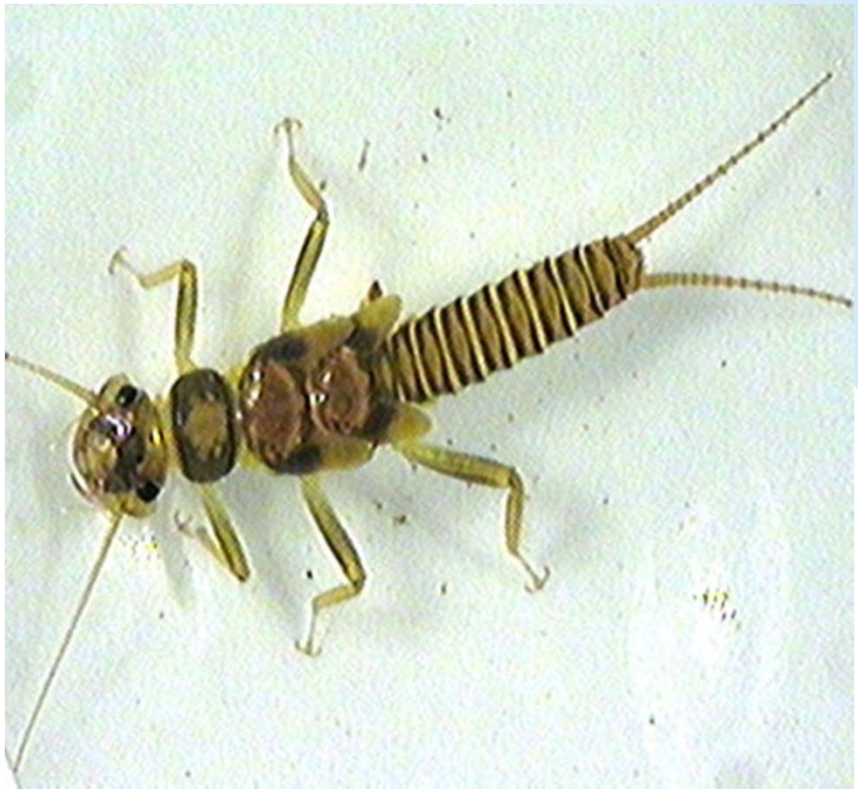
Ephemeroptera

* Habitat
  Mayfly nymphs are always aquatic, but their specific habitat depends on the species. Each species survives best in an environment with a specific substrate, depth, oxygen level and amount of wave action.
* Generally, mayfly nymphs tend to live in streams, but some can also be found in still water.
* They are most common in waters that are cool, clean and shallow, such as shallow streams and at the edges of lakes near the shore.
* They like to burrow into the substrate in areas with sediment deposits, and may have a specific preference of substrate particle size or aquatic plant depending on the species

*Mayfly

*Plecoptera

- Habitat
  As nymphs, stoneflies live in aquatic habitats, mainly in cool, clean, flowing waters with relatively high oxygen concentrations.
  They prefer streams with a significant current, on rocky, stony, or gravel substrate, although there are some species that live in sandy areas.
- They may also be found in cold ponds and lakes in the north and at higher latitudes.
- Nymphs live along the bottom of aquatic habitats (benthic dwelling).
- Adults are terrestrial and can be found near aquatic habitats with running water, resting on rocks, debris, and vegetation



*Stonefly

Moderately Tolerant Benthos

- Damselflies
- Dragonflies
- Crayfish
- Amphipods
- Blackflies
- Caddisflies
- Isopods
- Craneflies

*Moderately Tolerant Species

*Trichoptera
*(Caddisflies)

* LARVAE
* Often found in cases (do not count empty cases)
* Dorsal thorasic plates sclerotized
* Anal prolegs with hooks
* Movement: slowly crawls
* Colour: cream coloured abdomen
* Size: 2 to 50 mm
* Tolerance Value: 4

*Caddisflies

Habitat

* Habitat
  Caddisfly larvae are most diverse in cool, flowing water, but have invaded a wide range of habitats. They are known to construct cases out of silk and various other materials, for shelter.
  Most caddisfly larvae can be found in benthic habitats in temperate lakes, streams, and ponds. They can tolerate low oxygen concentrations.
* Habitats can include streams, both cool and warm, lakes, marshes, and ponds.

Trichoptera

Habitat

* Each species of caddisfly has larvae that are adapted to specific water temperatures and speeds, mineral and pollutant concentrations, and sunlight exposure.
* Due to the specific habitat preferences of different species, many species can co-exist in a single stream or river.
* Larvae can construct cases out of silk woven with sand grains, fragments of wood, and other materials from their surroundings. The silk is produced by the larvae through a special gland called the 'labium'.
* Adult caddisflies are terrestrial. They tend to be most active at night, hiding in cool, moist habitats (such as riparian vegetation) during daytime

Trichoptera

*Caddisfly

* **Simuliidae**
* **(Black Flies)**
* LARVAE
* Often with pair of labral fans
* Fattened posterior with attachment organ
* Movement: like an inch-worm
* Colour: greyish, brown
* Size: 3 to 15 mm
* Tolerance Value: 6

Simuliidae

- Habitat
  Black fly larvae thrive in water with moderate to fast currents, and attach themselves to solid, usually smooth, substrates such as rocks, vegetation, and logs; Black fly larvae require these swift currents in order to filter and collect enough food.
- The larvae tend to stay attached to the substrate in fast-flowing waters by producing a silk thread from their mouths and using it to form sticky pads that adhere to the substrate surface.
- The larvae have tiny hooks on the tips of their abdomens that they use to attach to these silk pads. Thus, a fairly clean substrate is needed to allow the larvae to stick their silk pads to it successfully.
- Lake and pond outlets tend to make very productive habitats for black fly larvae because of the high level of organic material in the water.
- The pupae are more likely to be found in the downstream sides of substrates such as on rocks, or closer to the base of aquatic vegetation where the current is slightly slower.

Pollution Tolerant Benthos

- Midgeflies
- Worms
- Leeches
- Pouch Snails

*More Tolerant Species

*Chironomidae
*(Midges)

* LARVAE
* Sometimes in tube of silt,
* segmented body
* Characteristic “J” shape
* Anterior and posterior parapods
* Movement: whip-like motion
* Colour: varies - red, white, yellow
* Size: 2 to 30 mm
* Tolerance Value: 7

*Midge

*Chironomiidae

* Habitat
  Midge larvae are able to thrive in a wide range of habitats, from pristine to polluted, fast-flowing to stagnant, and fresh water to marine. Larvae can be found in benthic regions among the debris and aquatic vegetation. They also dwell in soft sediment and on the surface of rocks.
* Many species are 'burrowers'. They burrow into the bottom substrate and build small tubes or cases out of silk below the surface of the substrate.
* Some species of midges are known as 'blood midges'. They contain the red blood pigment 'hemoglobin', which allows them to absorb oxygen from the water more readily. As a result, they can survive in habitats with very low levels of oxygen, including heavily polluted areas.
* The midge pupa stage may be found near the surface of the water or attached to submerged substrates and in benthic debris.
* As adults, midges tend to stay close to the larval habitat

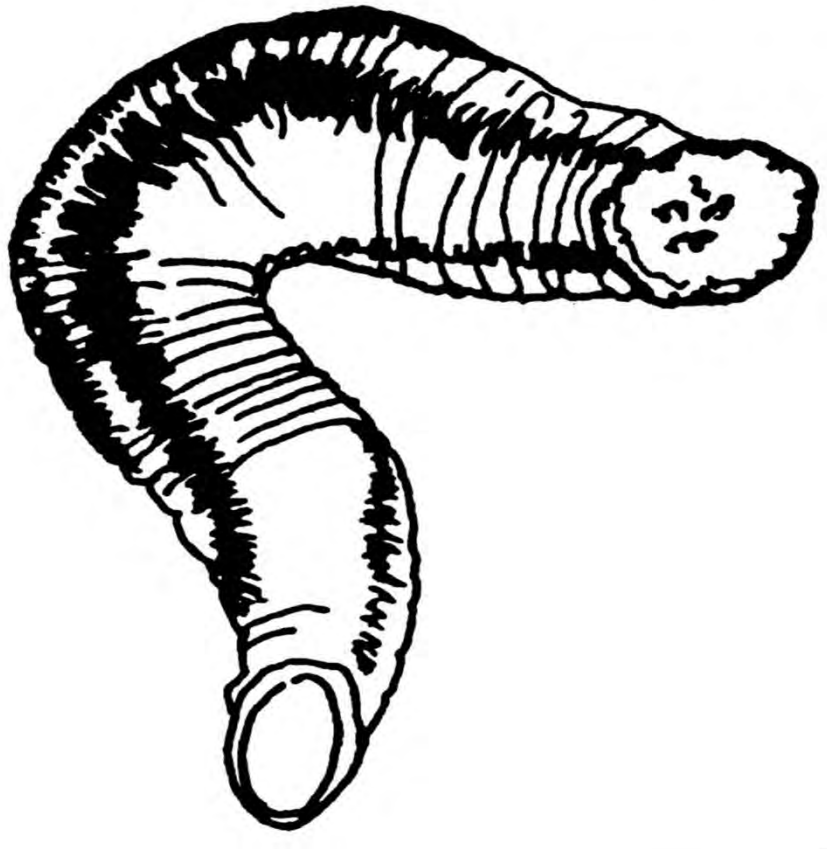
*Midge

*Hirudinea
*(Leeches)

* ADULT
* Body with 34 annulated segments, suckers on both ends
* Head often with several pairs of eyes
* Movement: uses suckers to inch along tray bottom, or swims
* Colour: varies, often patterned
* Size: 5 to 300 mm
* Tolerance Value: 8

*Hirudine

- Habitat
  Leeches live in fresh water and are mainly surface dwellers; they move overtop the river bottom rather than through it. They are most common in warm, protected shallow areas where currents are minimal and shelter is provided by plants, stones and debris.
- Free-living leeches tend to avoid light and hide under stones or other objects, among aquatic plants, or in detritus (decomposing orgainc material).
- Leeches cannot live on silted substrates because they cannot attach themselves to the bottom.
- In drought conditions, leeches can burrow into sediment and construct a mucus-lined cell, laying dormant until water returns.




*GOT A TEAM ?


*WE DO


*BMI So Cal Inter Tribal
Stream Team

BMI So Cal Inter Tribal Stream Team

- Established August 11, 2010
- Staff attending training held week before planned on collaboration
- Seven So Cal Tribes participating
- Native Environmental Protection Coalition (NAEPC) facilitating meetings, training and with posting activities

* Training influenced development of team
* 4-8 staff can complete in 4-6 hours, vs. 2 staff 8-10 hours
* More staff available will provide for efficient use of time
* Collaborative efforts are recommended by USEPA
* Seek staff that has knowledge or skills in various components of BMI sample collection and assessments

BMI So Cal Inter Tribal Stream Team

*Rincon La Jolla Oasis

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Jamul Indian Village

Jamul Indian Village

Source Water Ambient Monitoring Program

* Target Riffle Method
* Reach Wide Method
* Reach Identification
* BMI Sample Collection
* Transects Assessments
* Riparian Vegetation
* Bank Stability
* Flow Habitats
* Pebble Counts
* Flow Measurements
* Slope Determination
* Instream Habitat Complexity
* Human Influence

Transects Red

Inter Transects Blue

*Reach Identification

Rock / Cobble Cleaning

Rock / Cobble Cleaning

*BMI Sample Collection

BMI Sample Collection

BMI Sample Collection

*BMI Sample Collection

Sample Rinse

Sample Rinse

*BMI Sample Collection

Transect Substrate

Transect Substrate

*Transects Assessments

Transect Substrate

Transect Substrate

*Transects Assessments

Trees and Saplings
>5m High

All Vegetation

*Riparian Vegetation

Woody Shrubs & Saplings <5m

Barren Soil / Duff

*Riparian Vegetation

Herbs & Grasses

Bare Soil & Duff

*Riparian Vegetation

Boulders, Woody Debris

Algea, Macrophytes

*Instream Habitat Complexity

Overhanging Vegetation

Undercut Banks

*Instream Habitat Complexity

Canopy

Canopy

*Densiometer Readings

Walls, Rip Rap, Pipes

Road, Pasture, Mining

*Human Influence

Vulnerable Eroded

Stable

*Bank Stability

Rapid, Cascade Falls

Riffle

*Flow Habitats

Run

Glide

Flow Habitats

Pool

Dry

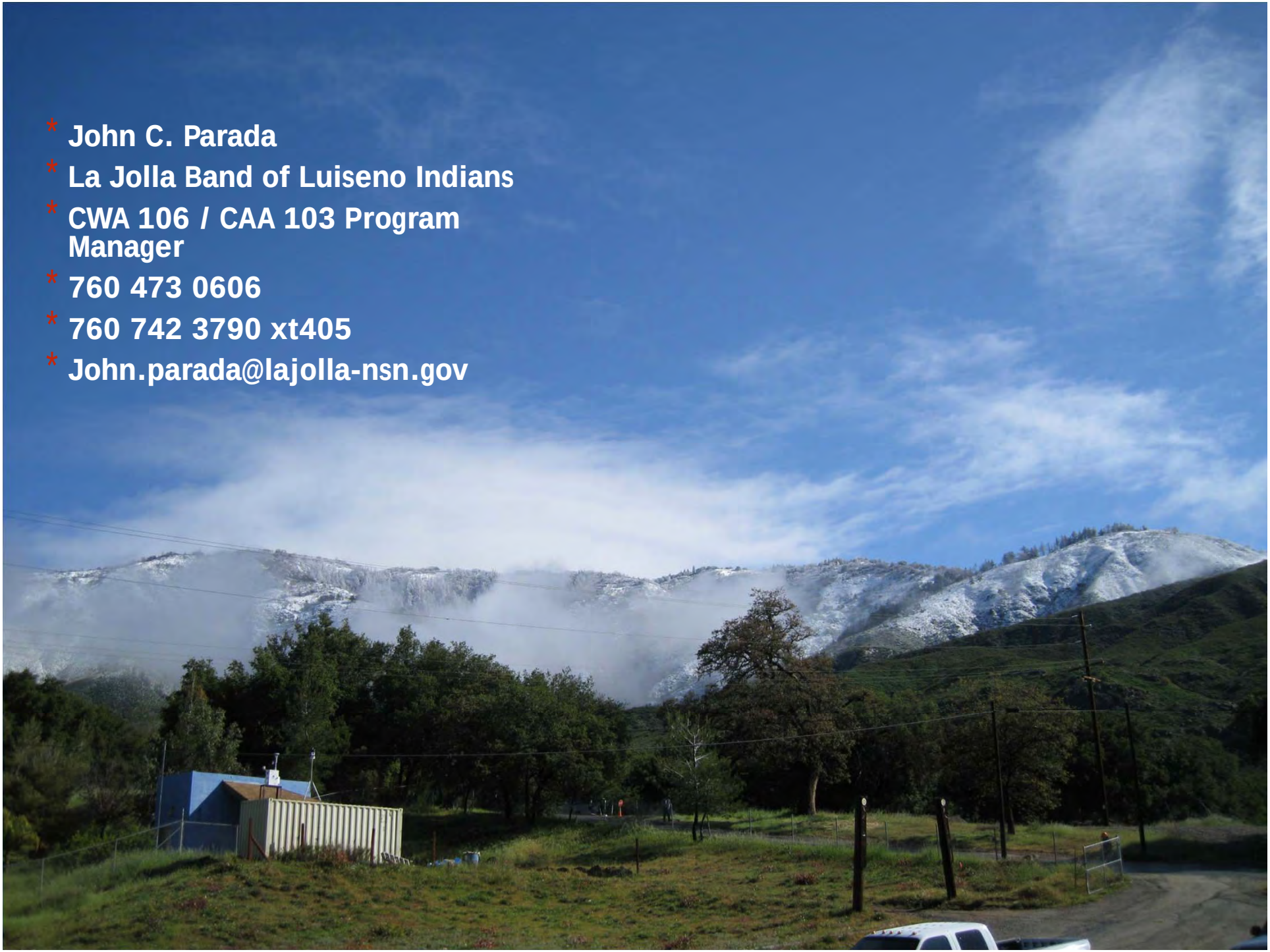
*Flow Habitats

Pebble Counts

Flow Measurements

Slope Determination

*Slope Determination



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