

Plate photos Analysis

Plate photos are analyzed the same way than settlement tiles. Several options are possible: quantification of the grey areas to get a measure of percent cover – annotation of functional groups – annotation at the lower taxonomic levels. The following guidelines are only provided to help you design your plate photo analysis. Depending on the specific question, protocols can be modified by the user.

Materials:

- Plate photos (17 photos per ARMS – the bottom of plate 1 is not analyzed because it is never colonized)
- Photo editor (e.g. Adobe Photoshop)
- [CPCe \(Coral Point Count with Excel extensions\) program for windows](#)
- [CoralNet web-based program](#)

Procedure:

1. The first step, if you want to work on higher resolution photos to access higher taxonomic resolution is to stitch the plate images together. Whether you have taken 4 or more photos per plate side, you will need to stitch them back together and make sure that their final size is compatible with the annotation program you will be using (CPCe or CoralNet).
2. We use a stratified random point generation method with a minimum of 50 points per plate (ex: 2 rows, 5 columns and 5 points per cell).
3. Annotation categories used by NOAA CRED program are already available in CoralNet, and you can upload these labels into your own project.
4. The following annotations are for identifications at the functional level, you can modify the list below to better match your project

CORALNET Label Names	CORALNET Labels	CORALNet Functional Group	CORALNET Description
ARMS-CRED-CCA	_CCA	Algae	Commonly grows in patches on hard substrates, forming hard pink patches. Hard substrates range from pavement flats to basalt formation to bare carbonate (i.e. coral skeleton) structures
ARMS-CRED-Blue-green macroalga	_BGMA	Algae	Cyanobacteria (blue-green macroalgae). Often form deep purple to black filamentous tufts or mats that may stretch for multiple centimeters in length, and therefore look different from turf algae. They may also form mucilaginous masses that are white or pale yellow in color.
ARMS-CRED-Brown encrusting macroalgae	_BREN	Algae	Unidentified brown encrusting macroalgae

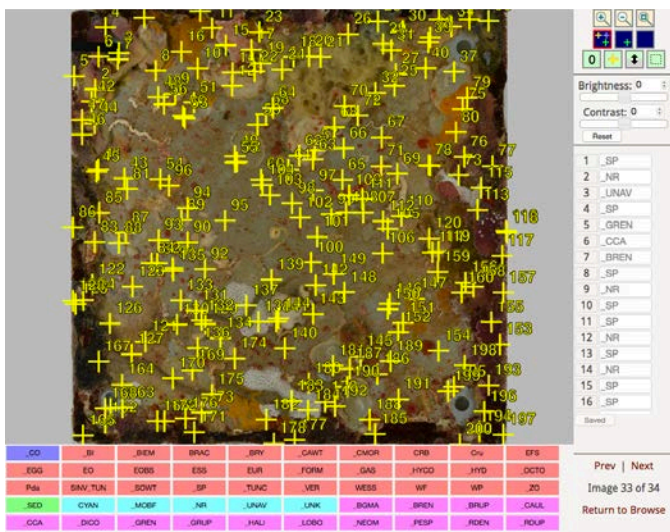
CORALNET Label Names	CORALNET Labels	CORALNet Functional Group	CORALNET Description
ARMS-CRED-Brown upright macroalgae	_BRUP	Algae	Unidentified brown upright macroalgae
ARMS-CRED-Caulerpa	_CAUL	Algae	Caulerpa species
ARMS-CRED-Dictyopteris/Dictyota	_DICO	Algae	Dictyopteris or Dictyota species
ARMS-CRED-Green encrusting macroalgae	_GREN	Algae	Unidentified green encrusting macroalgae
ARMS-CRED-Green upright macroalgae	_GRUP	Algae	Unidentified green upright macroalgae
ARMS-CRED-Halimeda spp	_HALI	Algae	Halimeda species
ARMS-CRED-Lobophora spp	_LOBO	Algae	Lobophora species
ARMS-CRED-Neomeris spp	_NEOM	Algae	Neomeris species
ARMS-CRED-Peyssonnelia spp	_PESP	Algae	Peyssonnelia species
ARMS-CRED-Red encrusting macroalgae	_RDEN	Algae	Unidentified red encrusting macroalgae
ARMS-CRED-Red upright macroalgae	_RDUP	Algae	Unidentified red upright macroalgae
ARMS-CRED-Coral	_CO	Hard coral	Stony corals or hard corals of Order Scleractinia.
ARMS-CRED-No Recruitment	_NR	Other	No recruitment has taken place.
ARMS-CRED-Unavailable	_UNAV	Other	The survey point is located on an area of the plate that is unavailable for recruitment due to position of cross bar or hardware.
ARMS-CRED-Mobile fauna	_MOBF	Other	This category is appropriate when the point falls on fauna that are not permanently affixed to a single location on the sea floor (e.g. sea cucumbers, seastars, sea urchins, fish, marine mammals). Effort should be made to discern what the benthic classification is under the point, if that is not possible, this category should be used.
ARMS-CRED-Calcareous Worm Tube	_CAW	Other invertebrates	Annelids that secrete tubes of calcium carbonate. Includes the following families: Serpulidae, Sabellidae, etc
ARMS-CRED-Eggs	_EGG	Other invertebrates	Egg masses from mobile fauna that are deposited on hard substrate
ARMS-CRED-Foraminifera	_FORM	Other invertebrates	Single-cell protists with shells or test. Shell or test may have many shapes. Can be white to hot pink in color. Often seen on plates is Homotrema sp. (Bright pink/red spikey branches).
ARMS-CRED-Gastropoda	_GAS	Other invertebrates	The Gastropoda or gastropods, more commonly known as snails and slugs, are a large taxonomic class within the phylum Mollusca. The class Gastropoda includes snails and slugs of all kinds and all sizes from microscopic to large.
ARMS-CRED-Hydrozoa	_HYD	Other invertebrates	Animals of the class Hydrozoa. The majority of hydroids are colonial
ARMS-CRED-Soft Worm Tube	_SOW	Other invertebrates	Annelids that secrete soft non-calcified tubes. Includes the following genera: Chaetopterus sp. Etc
ARMS-CRED-Tunicate Colonial	_TUNC	Other invertebrates	Colonial tunicate
ARMS-CRED-Tunicate Solitary	_TUNS	Other invertebrates	Solitary tunicate
ARMS-CRED-Vermetidae	_VER	Other invertebrates	Family Vermetidae is small to medium sized gastropod that secretes irregularly shaped shells that often cemented on hard substrate. Often known by common names worm snails and worm shells. Many individuals can be cemented together forming colonies.

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ARMS-CRED-Bivalve	_BI	Other invertebrates	Clams, oysters, and mussels are common examples of bivalves (Class Bivalvia). For all other non-empty bivalves, use this category.
ARMS-CRED-Bivalve-empty	_BIEM	Other invertebrates	Clams, oysters, and mussels are common examples of bivalves (Class Bivalvia). If the shells are present but empty, use this category.
ARMS-CRED-Bryozoan	_BRY	Other invertebrates	These colonial animals are early colonizers of bare surfaces in coral reefs. Most attach to solid surfaces but some live in sand. Each "member" lives in a zooid, or house, and has lophophores, which are "tentacles" that extend out of the house to filter feed. The lophophores are ciliated and very "regular" in appearance. However, unless the image is really clear, it will be hard to detect the lophophores and use them to distinguish between a tunicate or sponge. The individual zooids join to neighboring ones forming bushy, branching, fanlike, or encrusting colonies that may be rigid or flexible. Most bryozoans have a lace-like appearance and can be confused with algae or sponges. However, unlike sponges and tunicates, you will not see incurrent and excurrent openings. This is because the lophophores in bryozoans are used for feeding. In general, bryozoans will not appear smooth like a tunicate and their upright structure will appear to be "flower" and "plant"- like.
ARMS-CRED-Corallimorph	_CMOR	Other invertebrates	Corallimorphs (Order Corallimorpharia) are anemone-like animals that are found either solitary or in colonies. Their tentacles are generally much shorter than those of true anemones. They can be invasive and at this stage resemble a fuzzy carpet.
ARMS-CRED-Hydrocoral	_HYCO	Other invertebrates	Refers to non-scleractinian corals with hard skeletons, specifically, the following hydrocorals: Distichopora spp. and Stylaster spp.
ARMS-CRED-Octocoral	_OCTO	Other invertebrates	Refers to gorgonian corals, sea fans, sea whips, sea pens, and other members of Subclass Alcyonaria (octocorals), except blue coral (Order Helioporacea), which should be classified as Non-scleractinian hard coral. All members of this classification category produce skeletal elements made of protein and calcium carbonate that and give the colony sufficient soft support and the flexibility to sway with the ocean waves and currents.
ARMS-CRED-Sponge	_SP	Other invertebrates	Sponges (Phylum Porifera) have numerous species and growth morphologies, many of which can be confused with other benthic organisms. Sponges have porous tissue for filter feeding and many have large openings through which expelled water flows (excurrent openings). To help identify sponges, zoom-in with the photograph and examine the surrounding tissue. In general, sponges are more colorful than tunicates. In general, sponges are not as smooth as a tunicate, rather they are "rougher" around the edges due to a lack of a "tunic" and being composed of spicules. In general, most sponges, unlike tunicates, are not able to close their excurrent openings. In general sponges can protrude/extend upwards off the benthos from their encrusting state whereas tunicates tend to grow along the contours of the substrate underneath them.

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ARMS-CRED-Zoanthid	_ZO	Other invertebrates	Zoanthids (Order Zoanthidea) are colonial anemone-like animals having smooth, flat, broad oral disks with tentacles that radiate outward from their margins. Tentacles are found in two nearby rows, and always are in a number that is a multiple of six. The polyp's mouth has a ciliated groove at one or both ends of the mouth. Zoanthids are connected by runners (called stolons) and they lack the hard skeletons of scleractinian corals. Includes the following genera: Palythoa spp, Protospalythoa spp, Zoanthus spp
ARMS-CRED-Sediment	_SED	Soft substrate	Sediment on the plate that obscures organism or empty plate.
ARMS-CRED-Unclassified/Unknown	_UNK	Other	This category is appropriate when the point falls on an area that is obscured or blurry and cannot be identified with confidence

- The program will place the set number of random points on each plate image and the user will be able to identify each organism attributed to each point.
- Visualize annotation statistics.

Illustrations:



Example of annotation using CoralNet and 200 stratified random points