

## **Instructions for using the Southern California Index of Biotic Integrity (IBI) Calculator**

This tool has been developed as a quick and easy way for generating IBI scores and associated metrics for batches of samples, as well as visualizing their geographic distribution. A detailed explanation of the calculations executed by this tool can be found in Ode et al. (2005). For questions specific to this tool, as well as comments and bug reporting, please contact Raphael Mazor at [raphaelm@sccwpr.org](mailto:raphaelm@sccwpr.org).

As specified in Ode et al. (2005), the IBI requires a standard sample size of 500 organisms. If larger samples are submitted, the calculator automatically creates twenty 500-count subsamples using a monte carlo simulation. Metrics are calculated for each iteration, and means are reported. For samples with 500 or fewer organisms, metrics are calculated from unsubsampled data.

This calculator produces two outputs (with exceptions described below): A map and a table. The map plots sites and color-codes them to indicate if they are above (green) or below (red) two standard deviations below the mean of reference sites. If multiple samples are collected from the same location, the points will plot on top of each other, obscuring some of the results.

The table (in csv format) provides metric results, metric scores, and the final IBI score. Scores and IBI scores are only reported if the site is located within the IBI region, but metric values will be reported for all samples. A “count flag” field indicates if sites had adequate numbers of organisms for IBI calculations; samples with fewer than 450 organisms will be flagged as having “inadequate” sample size, although all results will still be reported.

To upload your data, please follow these instructions:

1. Download the two template files from the [IBI calculator page](#). The first is named “template\_data.csv”, and the second “template\_location.csv”.
2. Open the “template\_data.csv” file. Here you should find a small spread sheet with five columns: StationCode, SampleID, FinalID, BAResult, and DistinctCode. Do not alter the names of these columns, as this would cause your data to upload unsuccessfully.

3. Delete the example data, and begin entering your own. All fields are case sensitive (e.g., Station1 and station1 would be treated as different sites). Do not use non-alphanumeric characters, except for periods (“.”) and underscores (“\_”).
4. Instructions for filling out fields in each table are described below.
  - a. **template\_location.csv** describes the station locations, and is used to determine the ecoregion in which the stations are located. Each row represents a unique station. The table contains 3 fields, and all are required.
    - i. *StationCode* is the unique identifier of the station.
    - ii. *Latitude* is the latitude of the station in decimal degrees North.
    - iii. *Longitude* is the longitude of the station in decimal degrees (East). Note that the longitude will always be negative in California.

Notes about station locations:

Coordinates are used to determine whether a station is the Mountain or Chaparral subregion of the IBI region, as defined by Ode et al. (2005), which alters metric scoring. If desired, scoring can be “forced” into an ecoregion by modifying the coordinates (e.g., 34.052, -118.243 for Chaparral, and 34.244, -116.911 for Mountains).

If a station occurs outside the IBI region, metrics will be calculated, but not scored, and the IBI will not be calculated. Although results will be included in the table output, they will not be plotted on the map.

- b. **template\_data.csv** describes the taxonomic data in each sample, and associates the samples with stations specified in `template_location.csv`. The table contains 5 fields, 4 of which are required. Each row represents a unique taxon-count in a unique sample. Combining life stages is not required.
    - i. *StationCode* is the unique identified of the station, and must match a station specified in `template_location.csv`. If a *StationCode* occurs in the data file but not the location file, or vice-versa, data associated with that site will not be processed.

- ii. *SampleID* is the unique identifier of the sample. It may take any form you wish, but we recommend a concatenation of all the unique identifiers for each sample: station code, sample date, collection method, and replicate.
  - iii. *FinalID* identifies the taxon. These names must match a name on the luOrganism table (refer to the most recent version of the organism lookup table [here](#)). Again, names are case sensitive.
  - iv. *BAResult* contains the count data for the specified taxon in the specified sample. Entering non-numeric data will cause the row to be ignored. Entering negative values will cause unpredictable behavior.
  - v. *DistinctCode* indicates if taxa are distinct. The IBI calculator automatically identifies distinct taxa for calculating richness metrics. Enter “Yes” next to each row where you wish to override these automatic determinations. If a value other than “Yes” is found, ordinary distinctness determinations will be applied for that observation.
- 5. Once you have finished entering your data into both of the templates, save. If you are working in excel, the program will prompt you with a warning about saving in csv format; make sure that the file is saved as a csv, and not xls.
- 6. Data can be submitted in one of two ways: 1) Grab and drag the data and location files and drop them on top of the web page, or 2) Click the “Browse” button to upload via exploring your file system. When a file has been staged, its name will appear beneath the “Browse” button. Once both the data and location files are staged, click “Create Map”.
- 7. If your data have been successfully submitted, you should receive two outputs. First, the map should now display points corresponding to the StationCodes in your submission. These points will be color coded according to their IBI score, and the exact score can be viewed by clicking on a point. Second, you should see a link to download a spreadsheet in the same area where your files were staged before submission. This file will contain more comprehensive results in csv format.
- 8. If no points appear on the map after submission, download the results in csv format, and check the “Ecoregion” column. Any row in the column with the value “no match” was not displayed on the interactive map. If you encounter

this problem, check the way your latitude/longitude data were entered. If they were entered in the correct format, and you would still like an SC IBI score for the sample, adjust the coordinates such that they fall within the mountain/chaparral region of southern California, and re-submit your data.

#### Cited literature

Ode., P.R., A.C. Rehn and J.T. May. 2005. A quantitative tool for assessing the integrity of southern coastal California streams. *Environmental Management* 35:493-504.