

# South Florida/Caribbean Network

National Park Service  
Inventory and Monitoring Division



## Standard Operating Procedure CR13

### *Coral Reef Video Transect Database User's Guide— Version—Version 3.0*

Please cite this as:

South Florida/Caribbean Network. 2025. Coral reef video transect database user's guide—Version 3.0. South Florida/Caribbean Network Standard Operating Procedure NPS/SFCN/SOP—CR13. South Florida/Caribbean Network, Palmetto Bay, Florida.

## Summary

This SOP provides instructions on how to enter videography analysis data into the SFCN Coral Reef Monitoring database, which is a SQL Server database with a front end accessible through the NPS Integrated Resource Management Applications (IRMA) website.

This SOP version reflects the change from entering identifications into the MS Access Coral video database to the on-line IRMA data portal. Access to IRMA requires an internet connection and valid log-in to the NPS system. Remote users may access the database through VPN Pulse Secure. Data collected via the iPad/iDive are populated into this data portal by Data Management. If data are collected via data sheets, coral disease, species list, *Diadema*, rugosity or colony count numbers need to be manually entered the IRMA data portal.

All other aspects of this SOP with respect to displaying the images, viewing the video of the transect along with the still image are the same. The database into which the data are entered is the only change.

# Revision Log

| Revision Date | Author                                                      | Changes Made                                                                                                                                                  | Reason for Change                                                                                                                                                                                                                                                                                                                                       | New Version # |
|---------------|-------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| 1999          | Jeff Miller                                                 | Data entry occurred into a MS Excel spreadsheet template with automated analyses                                                                              | Allowed data entry to occur and created basic data summary to allow initial QA/QC checks.                                                                                                                                                                                                                                                               | 1.00          |
| 2002          | Jim Petersen                                                | Coral Reef Monitoring Database created                                                                                                                        | Database allows easier long-term data management than spreadsheets.                                                                                                                                                                                                                                                                                     | 1.01          |
| 2004          | Jim Petersen                                                | Coral Reef Monitoring Database Users Guide draft created                                                                                                      | Describes how to enter data into coral reef monitoring database.                                                                                                                                                                                                                                                                                        | 1.02          |
| 2008          | Brian Witcher                                               | Ability to add 4 transect sub-sites added                                                                                                                     | Reflects additions of 4-transect subsites to protocol.                                                                                                                                                                                                                                                                                                  | 1.03          |
| 2009          | Brian Witcher                                               | Added "Create Report" step within database which created a basic site level data summary for a sampling event                                                 | Allows same basic report originally designed in excel to be easily created by database.                                                                                                                                                                                                                                                                 | 1.04          |
| 2014          | Brian Witcher                                               | New data entry column added for bleaching codes<br>New export performing many calculations needed to create transect level summaries and site level summaries | Bleaching codes previously recorded in "Notes". Putting in own column allowed restricting codes to 4 bleaching levels and avoiding typos. Steps previously done in MS Excel were added into database including many QA/QC checks, and summary calculations that then allowed relatively easy export to summary graphs of coral, gorgonians, algae, etc. | 1.05          |
| 2015          | Brian Witcher, Jeff Miller, Judd Patterson, Andrea Atkinson | SOP written to meet I & M program, organization and format requirements.                                                                                      | Tied to I & M 2.0 version of protocol.                                                                                                                                                                                                                                                                                                                  | 2.0           |

| Revision Date | Author                            | Changes Made                                                                                                                                                                                                | Reason for Change                                                                                                                                                                                              | New Version # |
|---------------|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| 2020          | Jeff Miller and<br>Judd Patterson | SOP name changed from 13 to CR13.<br>Added directions for the use of the IRMA data entry portal.<br>Added advanced database user information to guide maintenance, iPad data import, updating reports, etc. | Renamed according to regional guidance.<br>Moved from Access databases to a SQL database with a web front end.<br>A new database was completed in 2017 and none of these new steps were previously documented. | 3.0           |

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# Introduction

This SOP covers usage of the SFCN Coral Reef Monitoring web application which resides on the IRMA data portal. Access requires an internet connection, access to the NPS network, and a valid account in the NPS system. This requires remote users to connect first to the Virtual Private Network (VPN) through Pulse Secure. The URL for the production web application is:

<https://irma.nps.gov/SFCN/Coral/>

## Create a Trip

Trips are the basis for much of the organization within this database. A trip may be one or more days in length and may include visits to one or more sites. In a typical year most sites are entered as their own trip, except for trips to Dry Tortugas National Park (DRTO) and Biscayne National Park (BISC) where most active sites are visited all at once. To create a trip:

1. From the top menu bar, choose Trips, and then click 'Create New Trip.'
  - a. Select the appropriate 'Park' from the drop-down list
  - b. Select the 'Start Date' from the calendar. This is the first day of monitoring.
  - c. Select the 'End Date' from the calendar. This the last day of monitoring.
  - d. Select the appropriate 'Project.' CoralVideo is the typical choice.
  - e. Select the appropriate 'Purpose.' Annual or Episodic are the most common.
  - f. Select the 'Video Type' that was used.
  - g. Select the 'Protocol' version that was used for monitoring.
  - h. Put a checkmark in front of each site that was visited on that trip. Note: the site list is refreshed each time the Park field from step 1a is adjusted.
2. Add any additional notes about the trip.
3. Click 'Save & Select Objectives' to move to the next page.
  - a. Review the first several entries that were entered on the previous page and adjust as necessary.
  - b. From the 'Site Objectives,' put a checkmark in any metric that was collected at that site (e.g., rugosity is not measured on every visit). Use the 'Mark All' options at the top of columns if that metric was collected for all sites.
  - c. Trip Report: enter the appropriate file name for the trip report that is stored on the server.

- d. The Video, Disease, Species, and CDR Cert Levels are the Data Processing Levels (DPL) and default to 'Raw,' the lowest level. These can be edited at a future point as data QA/QC proceeds.
- e. Click Save. The trip is now ready for data entry.

## Data Entry

Open the web application in one monitor. On a secondary monitor, the user should open Adobe Photoshop and browse to and select the transect images that will be analyzed. See SOP CR12 *Conducting analysis of HD images—Version 2.1* (SFCN 2025a) for details on analyzing data images.

The “Home” screen opens that allows the user to select the Year, Park and Site (Figure 1)

The screenshot shows the SFCN Coral Reef Monitoring web application. The header includes the URL [irma.nps.gov/SFCNCoral/](http://irma.nps.gov/SFCNCoral/) and a navigation bar with links: Getting Started, Personal, Weather, Google News, Latest Headlines, Work, Start up, OW\_swim, DAN, and purchasing links. The main header displays "SFCN Coral Reef Monitoring" and "South Florida\Caribbean Network". The National Park Service logo and "U.S. Department of the Interior" are also present. The navigation menu includes Home, Trips, Observations, and Reports. The main content area features a "Welcome" message and a "Welcome to SFCN Coral Reef Monitoring" banner. Below the banner, there are dropdown menus for "Year" (set to 2019) and "Park" (set to -- Select Park --). A table displays the "Year Summary" for 2019, listing various sites and their corresponding data.

| Park (Site)                                | Trips to Site | Transects | Video | Disease | Species | CDR |
|--------------------------------------------|---------------|-----------|-------|---------|---------|-----|
| Buck Island Reef National Monument (BAR01) | 1             | 4         | 4     | 4       | 4       | 4   |
| Buck Island Reef National Monument (BAR02) | 1             | 4         | 4     | 4       | 4       | 4   |
| Buck Island Reef National Monument (BAR03) | 1             | 4         | 4     | 4       | 4       | 4   |
| Buck Island Reef National Monument (BAR04) | 1             | 4         | 4     | 4       | 4       | 4   |
| Buck Island Reef National Monument (SFR)   | 1             | 20        | 20    | 20      | 20      | 20  |

**Figure 1.** Screen capture showing main year summary screen.

1. Along the left side, select the site into which the data are going to be entered. This opens a “Trips” tab (Figure 2). The name is displayed which contains the date sampling began, the park code, and the camera type. Other information is provided under discrete headers.
2. Under the column header, Actions, select “Go to Transects.”

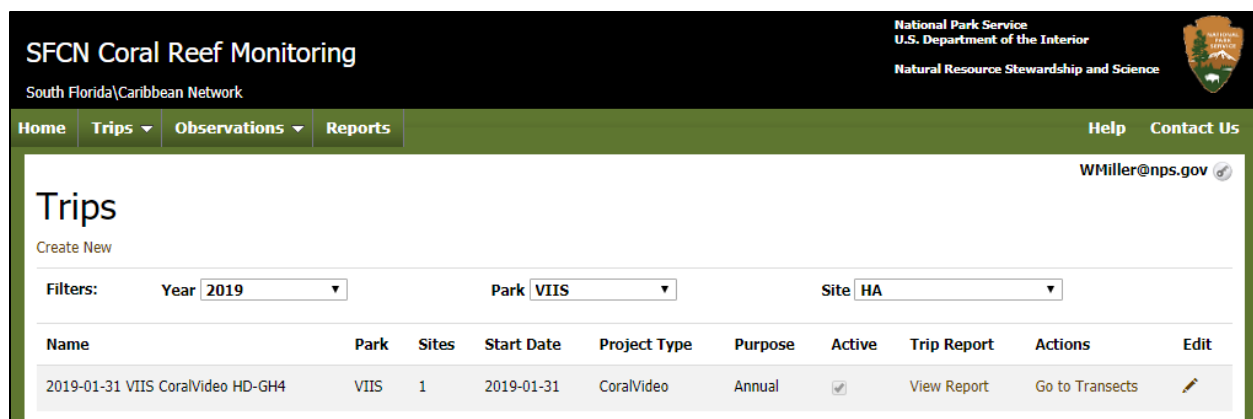


**Figure 2.** Screen capture showing Trips screen.

3. A “Trip Transects” screen (Figure 3) opens with details regarding each transect at that monitoring site. Note that filters and options are available at the top of this screen that allow the user to go to different Years, Trips, Sites and QA/QC.

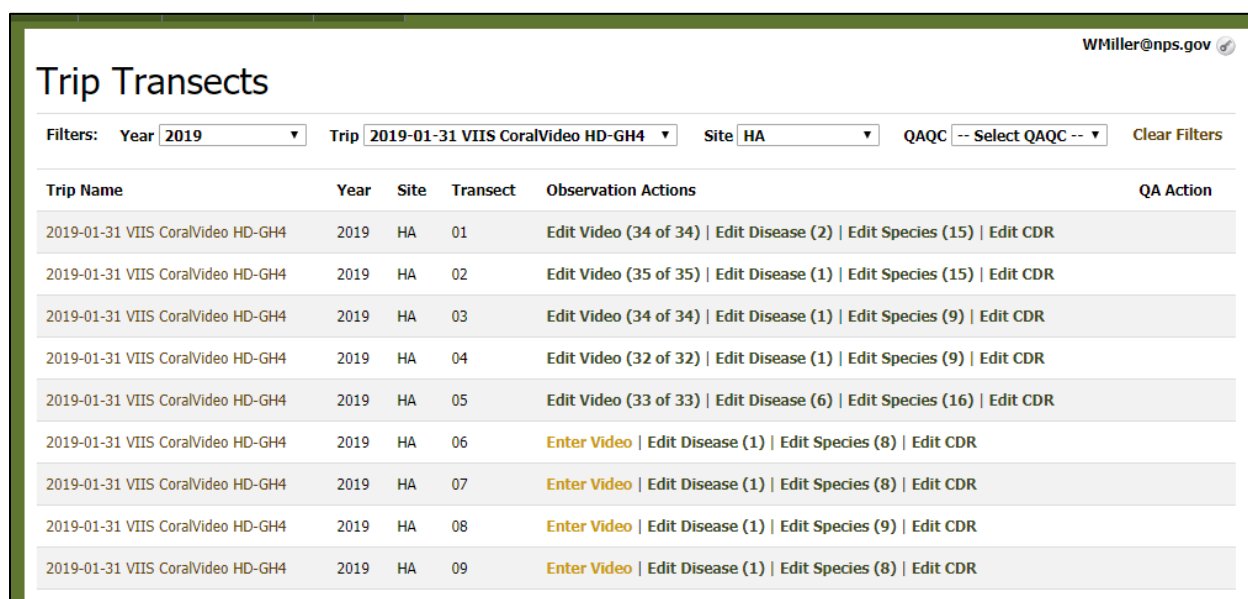


**Figure 3.** Screen capture showing Trip Transect screen.

4. The user selects the transect for which they are going to enter data. This is known as “Create Video Observation” (Figure 4).

**Figure 4.** Screen capture showing Create Video Observation screen.

5. Users check the header information for accuracy:
  - a. Trip name
  - b. Site
  - c. Transect number
6. Enter the appropriate information where necessary:
  - a. Observed Date – the date the monitoring began at this site
  - b. Videographer – enter name or select current user button
  - c. Analyzer – enter name or select current user button
  - d. Number of frames – enter the number of frames in this transect that have been captured and dotted for analysis. It is important that the accurate number be entered here. Verify this number before entering it. For example, for a 10-meter (32.8 feet [ft]) transect, this number is typically 25–45.
  - e. Press “Create Video Observation” button when all data have been accurately entered.
7. This adds a screen to ADD FRAME into which the benthic code under the dot is entered (Figure 5).

**Video Frames** Note : Video Frame data will be saved automatically when the cell is changed.

Frame:  of 0

| Point | Species Code | Bleaching | Disease | Notes |
|-------|--------------|-----------|---------|-------|
|       |              |           |         |       |

**Figure 5.** Screen capture showing the initial data point entry screen.

8. Clicking Add Frame expands this feature to allow for the data entry (Figure 6).

**SFCN Coral Reef Monitoring**  
South Florida/Caribbean Network

National Park Service  
U.S. Department of the Interior  
Natural Resource Stewardship and Science

Home Trips Observations Reports Help Contact Us

WMiller@nps.gov

**Edit Video Observation:** Trip: 2019-01-31 VIIS CoralVideo HD-GH4 Site: HA Transect: 06

Observed Date:

Videographer:

Analyzer:

Number of Frames:

**Video Frames** Note : Video Frame data will be saved automatically when the cell is changed.

Frame:  of 1

| Point | Species Code | Bleaching | Disease | Notes |
|-------|--------------|-----------|---------|-------|
| A     |              |           | No      |       |
| B     |              |           | No      |       |
| C     |              |           | No      |       |
| D     |              |           | No      |       |
| E     |              |           | No      |       |
| F     |              |           | No      |       |
| G     |              |           | No      |       |
| H     |              |           | No      |       |
| I     |              |           | No      |       |
| J     |              |           | No      |       |

**Figure 6.** Screen capture showing the typical frame (A–J) data entry screen.

9. The analyst enters the benthic code that corresponds to the frame number and dot (A–J) under the Species Code header.
  - a. Bleaching codes (BL1–BL4) are entered under the Bleaching header if observed *on stony coral species, at the center of the dot*.
  - b. Disease observed *on stony coral species, at the center of the dot* is quantified by selecting YES under the Disease header.
  - c. Notes in text form are entered under the Notes header.
  - d. When all dots (A–J) have a valid entry, the Add Frame button is active and can be selected to add the next frame.

Data entry continues until all dots in all frames have been analyzed. Upon completion, select “Back to Trip Transects” to go back to that page. If more transects need to be analyzed, go to step 4 of this SOP and proceed again.

## Advanced Features

### History

For several years one Access database was used to store video analysis, and a separate database was used in Access and ThumbsPlus to store disease data, species lists, colony counts, *Diadema*, and rugosity. This situation was further complicated with copies of these two databases on both the Palmetto Bay, FL and St. John, USVI servers, requiring periodic merges to bring everything together.

In late 2015 the South Florida/Caribbean Network began to coordinate with the IMD Central Office on a redesigned database. The kickoff meeting was held in April 2016, and the decision was made to go with a SQL backend database and a web application front-end that would be accessible from within the NPS firewall. From June 2016 to May 2017 a series of 19 development “sprints” were released and tested. A few hotfixes have been released since the initial deployment to patch bugs and add small new features.

The long-term storage is a SQL Server 2014 instance (database name: SFCN\_Coral) running on an NPS Data Center server (INP2300VIRMASQL) within the National Information Services Center (NISC). At NISC the SQL database has full, nightly backups that are stored on physical disks for 90 days, and then on tape for three years. Backup details and information on the server architecture are available to NPS users in the technical documentation (Patterson et al. 2017).

### Development Database

There is also a development version of the web application that is used to stage bug fixes for testing before they are applied to the production version. The development database is completely disconnected from the production database, so it is also a great place for users to test trip creation or

data entry without impacting production. The URL for the development version is (note the IRMADev prefix): <http://irmadev.nps.gov/SFCN/Coral>

## **User Roles**

The web application recognizes three user roles:

- Viewer – least privileged account that is essentially read-only; no changes can be made, but data and reports can be viewed
- Observer – medium privileged account that can create trips, enter data, and run reports
- Administrator – highest privileged account that can enter and import data, delete disease lesions, delete video analysis frames, exclude data, manage taxa, modify sites/transects, modify lookup lists, establish QC transects, and add users.

Divers working on this protocol are assigned the Observer role so that they can handle data entry after returning from a trip. The administrator role provides very helpful, but potentially problematic, tools, so it should be reserved for experienced users, and typically only the Data Manager, Assistant Data Manager, and Marine Ecologist.

The User list guides not only application access, but also the list of available names in drop-down lists (e.g. coral colony count observer). Users who do not need access to the database but need to be included in a drop-down list are given the ‘Viewer’ role.

### ***Creating a New User***

To create a new user:

1. Start by clicking the Manage menu and choose Users.
2. Click the ‘Create New’ link in the upper left.
3. In the new page that appears, fill in the first and last name, and choose the appropriate role.
  - a. The email is not required and is not used within the application.
  - b. The override base path is a way to display disease photos from the server and should not be modified once established unless the server location changes.
4. Click the ‘Save’ button and repeat for any additional users.

## **Managing Sites and Transects**

Within the database there are sites and those sites are made up of transects. Both levels are managed by an Administrator through the web application.

### ***Creating a New Site***

To add a site:

1. Start by clicking the Manage menu and choosing Sites.

2. Click the 'Create New' option in the upper left.
  - a. Fill in the appropriate details including:
    - i. Name – short name for the site; typically 2–3 characters long (e.g. AM)
    - ii. Description – longer name for the site (e.g. Amanda's Reef)
    - iii. Notes (optional) – additional information about the site
    - iv. Park – pick the appropriate park from the list
    - v. Site Design (optional) – an attribute that may be useful for grouping or distinguishing sites
    - vi. Management Zone (optional) – an attribute that may be useful for grouping or distinguishing sites (e.g. Inside/Outside the DRT0 RNA)
    - vii. Latitude – coordinate in decimal degrees for the general site location
    - viii. Longitude – coordinate in decimal degrees for the general site location
    - ix. DatumID – select NAD83
    - x. EstablishedDate – date that the site was first established
    - xi. EndDate (optional) – date that the site was removed from monitoring
    - xii. SortOrder (optional) – way to manipulate the sort order in lists
  - b. Click 'Create'

### ***Creating a New Transect***

To add a transect:

1. Start by clicking the Manage menu and choosing Transects.
2. Click the 'Create New' option in the upper left.
3. Fill in the appropriate details including:
  - a. Number – the transect number (between 1 and 20) with a leading zero if a single digit
  - b. Description (optional) – any other relevant details about this transect
  - c. Site – choose from the available dropdown list of Sites
  - d. Start Lat – coordinate in decimal degrees for the start pin
  - e. Start Long – coordinate in decimal degrees for the start pin

- f. End Lat (optional) – coordinate in decimal degrees for the end pin
- g. End Long (optional) – coordinate in decimal degrees for the end pin
- h. Datum – select NAD83
- i. Bearing (degrees) (optional) – if known the bearing of the direction from the start to end pins
- j. StartDepth (feet) (optional) – if known, the depth of the start of the transect

### **Managing Lists**

The database has several lookup lists that are managed by an Administrator from within the web application. These include: Parks, Management Zones, Purposes, Project Types, Protocols, Datums, Disease Types, Disease Categories, Bleaching, and Video Types. To edit any of these:

1. Start by clicking the Manage menu, click Lists, and choose the list of interest.
2. To add a new entry, click the ‘Create New’ in the upper left and fill in the appropriate details.
3. The modify or disable an existing entry, click the ‘Edit’ link to the right of the entry.
  - a. Make the necessary modifications, but keep in mind that changing existing entries will also change all entries already connected to this item.
  - b. To disable an entry so it does not appear in the list of options, uncheck the ‘IsActive’ flag and save the record. Disabling a record does not impact previous uses of that item, but will prevent future use.

### **Managing Taxa**

The TaxonCodes and their attributes are stored in the database and are editable by an Administrator via the web application. The main lookup table is Taxon, and there are several related sub-tables that provide options for each taxon. These include:

- Taxon – TaxonCode values used during video analysis
- Taxon Groups – list of possible groupings (e.g. biotic, abiotic, or unclassified)
- Taxon Properties – matrix indicating whether each code should be considered for certain analyses (e.g. Shannon Index or Species Richness) or certain categories (e.g. countable benthic code and bleachable)
- Taxon Ranks – list of possible taxonomic ranks (e.g. species, genus, family, etc.)
- Taxon Sources – list of possible sources for a taxon
- Taxon Categories – list of possible categories for each taxon

- Taxon SubCategories – list of possible subcategories for each taxon
- Functional Groups – list of possible functional groups for each taxon

To edit any of these lists:

1. Start by clicking the Manage menu and choosing Taxon and then clicking on the level of interest.
2. To add a new entry, click the ‘Create New’ in the upper left and fill in the appropriate details.
3. To modify or disable an existing entry, click the ‘Edit’ link to the right of the entry.
  - a. Make the necessary modifications, but keep in mind that changing existing entries will also change all entries already connected to this item.
  - b. To disable an entry so it does not appear in the list of options, uncheck the ‘IsActive’ flag and save the record. Disabling a record does not impact previous uses of that item, but will prevent future use.

### **Importing iPad Data**

After using the iPad for data entry, the iPad data need to be prepared for import, and then reviewed by the diver who did the original data collection (see SOP 24 *iPad Preparation, Data Entry, and Download—Version 1.0*; SFCN 2025b). When those two components are complete the files are imported into the database:

1. On the menu choose the ‘Import/Export’ option and click on ‘Import Observations.
2. Click the ‘Create New’ link in the upper left.
3. Choose the appropriate trip for the data you are importing. Choose this option very carefully to prevent accidental data import that must be reversed with help from the Central Office. Note that trips do not include the site in the name, so pay careful attention to trip dates.
4. Type a plain text description of the import that will occur (e.g. 2019 SR disease data) for tracking purposes.
5. Choose the observation type being imported from the list.
6. Click the ‘Choose File’ button and browse to the Excel file that needs to be uploaded.
7. Once again, check all fields before proceeding, as reverting an upload is not easy and currently requires assistance from the Central Office. When satisfied that everything is correct, click ‘Save.’
8. The ‘Import Job’ page will reload and show the new job at the top (along with older imports below). You must refresh the page to see the status on the current job. After 5–10 seconds it

should say 'DatabaseUpdateSuccessful.' If not, use the 'View Errors' link to discover the problem, correct the Excel file, and use the 'Edit' option to try the import again.

9. Repeat these steps for any additional files that need to be imported (typically disease, species, and CDR are imported one after another for each trip).

### **Disease Photos in the Web Application**

When viewing disease lesions in the web application, an attempt is made to load the appropriate image (a thumbnail) and display it on the lesion page. Lesion photos are not uploaded to the database itself, but are maintained with a strict folder and file naming convention on the server. As a result, several items must be in place for the thumbnails to display properly. These include:

1. Disease photo filenames – Each disease photo must be named in exactly the way that is defined in SOP CR24 (SFCN 2025b). The web application uses the values entered in the database to attempt to discover the photo (e.g., YYYYMM\_site\_T##\_dis##\_###.jpg).
2. Web resolution photos – Showing the full resolution disease photo would be very slow, so the application tries to share a smaller thumbnail (typically about 2–5% of the original file size) instead. These thumbnails sit in a 'web' subfolder within the trip and have filenames that are identical to the full resolution images. For example, in Biscayne NP at BB in 2019 the first disease image is named:

...\disease\BISC\BB\201908\201908\_BB\_T07\_dis01a.jpg

The web resolution image is named:

...\disease\BISC\BB\201908\web\201908\_BB\_T07\_dis01a.jpg

These web resolution images can be created rather quickly in IrfanView:

- a. Open IrfanView
- b. Type the 'B' key to open the Batch conversion window
- c. Ensure the 'Output format' is JPG.
- d. Click 'Options'
  - i. Change the 'Save quality' to 50 and uncheck to 'Keep original EXIF data' and 'Keep original IPTC data.' Click Ok.
- e. Click to 'Use advanced options' and click 'Advanced.'
  - i. Click the checkbox for the 'Resize' option. Click 'Set long side to' and type in a pixel value of 500. Click Ok.
- f. Browse to the folder of disease photos that need to be resized for the web.

- g. Click the ‘Add all’ button to send them all down into the ‘Input files’ box.
    - h. In the ‘Output folder’ section click the ‘Use current (Look in) folder.’ Then manually go into the ‘Output folder’ textbox and add ‘web’ to the end so that a web subfolder is created to hold the resized files.
    - i. When everything is set click the ‘Start Batch’ and monitor the results.
3. Server share – A share named ‘CoralMonitoring’ must exist on the file server so that the web application can pull up the required disease photos.
  - a. This share provides access to the following folder:  
D:\SERO\SFCN\Vital\_Signs\Marine\_benthic\_communities\CoralMonitoring.
  - b. It also needs to provide ‘Read’ permissions to the nrpcirma user account (NPS\nrpcirma).

## Reports

The web application includes links to several reports running on a SQL Server Reporting Services (SSRS) server, including those used to create annual flat files. To access these, click the Report link from the menu, and then click the name on the report of interest. To modify these reports or to add new ones, contact the Central Office to either gain permissions to the SSRS server itself, or to work with a developer who has the necessary experience.

## Literature Cited

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