United States Environmental Protection Agency

Office of Water

Washington, DC

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National Coastal Condition Assessment 2020 Site Evaluation Guidelines

May 11, 2020

NOTICE

The National Coastal Condition Assessment (NCCA) 2020 Site Evaluation Guidelines (SEG) and related documents are based on the previous Environmental Monitoring and Assessment Program's (EMAP) National Coastal Assessment (NCA) conducted in 1999 – 2006 as well as the National Coastal Condition Assessments conducted in 2010 and 2015.

The goal of the National Coastal Condition Assessment (NCCA) is to provide a comprehensive assessment of the condition of the Nation's coastal waters. Specifically, the NCCA assesses all estuarine waters of the United States from the head-of-salt to confluence with ocean, and the nearshore waters of the Great Lakes. Details of the project and specific methods for field sampling, sample handling, and sample processing can be found in one of the following documents:

- *National Coastal Condition Assessment: Quality Assurance Project Plan (EPA 841-F-19-003)*
- *National Coastal Condition Assessment: Field Operations Manual (EPA 841-F-19-005)*
- *National Coastal Condition Assessment: Laboratory Operations Manual (EPA 841-F-19-004)*
- *National Coastal Condition Assessment: Site Evaluation Guidelines (EPA 841-B-20-001)*

This Site Evaluation Guidelines (SEG) document contains an overview of the process involved in locating a sampling site, evaluating the site, and selecting appropriate alternate sites when necessary. All Project Cooperators must follow these guidelines in selecting sites for the NCCA.

The suggested citation for this document is:

USEPA. 2020. *National Coastal Condition Assessment: Site Evaluation Guidelines*. U.S. Environmental Protection Agency, Washington, DC. EPA-841-B-20-001.

VERSION HISTORY

Version	Date	Changes Made
1.0	April 9, 2020	n/a
1.1	May 11, 2020	Clarified definition of “estuarine” in Section 2.

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ABBREVIATIONS

Abbreviation	Definition
GPS	Global Positioning System
GRTS	Generalized Random Tessellation Stratified survey design was used to select the X-sites for the 2020 NCCA.
km	kilometers
m	meters
mi	miles
NARS	National Aquatic Resource Surveys
NCCA	National Coastal Condition Assessment
ORD	Office of Research and Development
OST	Office of Science and Technology
OWOW	Office of Wetlands, Oceans and Watersheds
psu (ppt)	practical salinity units or parts per thousand
QA	Quality Assurance
SCECAP	South Carolina Estuary and Coastal Assessment Program
SEG	Site Evaluation Guidelines
X-site	Location, identified by GPS coordinates, for a site selected for field sampling.
WRAPD	Watershed Restoration and Protection Division

ROLES AND CONTACT INFORMATION

Field crews should contact the NCCA Project Leader or the appropriate Regional Coordinator with any questions about site selection.

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1 INTRODUCTION

The objective of the National Coastal Condition Assessment 2020 (NCCA) is to monitor and assess all estuarine and Great Lakes nearshore waters of the contiguous 48 States. In 2020, American Samoa, Guam and the Central and Northern Mariana Island territories will also use NCCA protocols in monitoring their coastal waters.

Major steps in site evaluation:

- Review the Target Population Definition (**Section 2**) and Survey Design (**Section 3**).
- Interpret the Site Evaluation Spreadsheet (**Section 4**).
- Conduct Desktop Reconnaissance to:
    - Locate and verify that the selected site, or X-site, is part of the Target Population;
    - Determine whether it meets the definition of sampleable (**Section 5**)
- Seek permission to sample, if necessary (**Section 6**).
- Conduct Final Site Verification at the Location (**Section 7**).
- (If necessary) Drop and replace sites according to guidelines in this document.
- Submission of Site Evaluation/Verification Forms (**Section 8**).

EPA developed a site evaluation spreadsheet for each state to use in evaluating the sites and planning its sampling activities (**Section 4**). The spreadsheet includes location information for each site and asks the evaluator to record whether the site meets the target definition (**Section 2)**; determine its sampleability, (**Section 5**); and whether landowner permission is necessary (**Section 6**). *The site evaluation spreadsheet must be completed and submitted to the contract field logistics coordinator prior to field season. During the field season, revisions must be submitted to the field logistics contractor when sites are dropped and replaced during the onsite verification process.*

Field crews must assemble an official site packet containing important locational and access information for each site they are scheduled to visit (**Section 8**). The packet must contain the appropriate maps, contact information, copies of permission letters (if applicable), and access instructions.

2 DEFINING THE TARGET POPULATION

This section describes the target populations for the estuarine and the Great Lakes nearshore regions for the 2020 NCCA. Estuarine special studies and intensifications such as the Pacific Territories, Long Island Sound intensification and the Pensacola-Perdido Estuary Program intensification will be addressed in **Appendix A**. Great Lakes intensifications and enhancements, including the Lake Erie enhancement study, and intensifications in Green Bay, National Parks and Great Lakes Island sites will be addressed in **Appendix B**.

Each statistically selected sampling location is referred to as the "X-site" and defines where sampling activities are targeted. Before collecting water, sediment, and other samples at any site, it is imperative that the field crew correctly assess whether the site is part of the target population.

The target population for the NCCA components are defined as follows:

1. *Estuarine*: The target population for the estuarine resources consists of all estuarine waters of the conterminous United States from the head-of-salt to confluence with the ocean, including inland waterways, tidal rivers and creeks, lagoons, fjords, bays, and major embayments. Head-of-salt is generally defined as 0.5 parts per thousand (ppt). For the purposes of NCCA, the head-of-salt represents the landward or upstream boundary. The seaward boundary extends out to where an imaginary straight-line intersecting two land features would fully enclose a body of coastal water (see **Figure 2.1** for examples). All waters within the enclosed intracoastal waterway area with salinities greater than or equal to 0.5 ppt are defined as estuarine, regardless of depth.
2. *Great Lakes Nearshore*: The target population is waters within a fringing, shallow nearshore band that is heavily used by humans and most vulnerable to human activities within adjacent coastal watersheds. More specifically, the target population is limited to waters along the shoreline buffer within 5 kilometers (km) from shore or up to 30 meters (m) in depth, whichever is reached first. The nearshore uniquely "coastal" land-water interface zone includes: open and semi-enclosed bays and embayments with greater than a 200 m wide connection to open water, and the more open waters adjacent to shorelines. It does not include the connecting channels of the Great Lakes (i.e., between the Lakes and the St. Lawrence River outlet). **Figure 2.2** demonstrates where target sites may be located within a hypothetical Great Lakes nearshore region. See Appendix B for a discussion of the Lake Erie enhancement study, the Green Bay Intensification, and the National Parks and Islands intensification.

Target vs Non-Target Areas in Estuarine Sampling Frame.

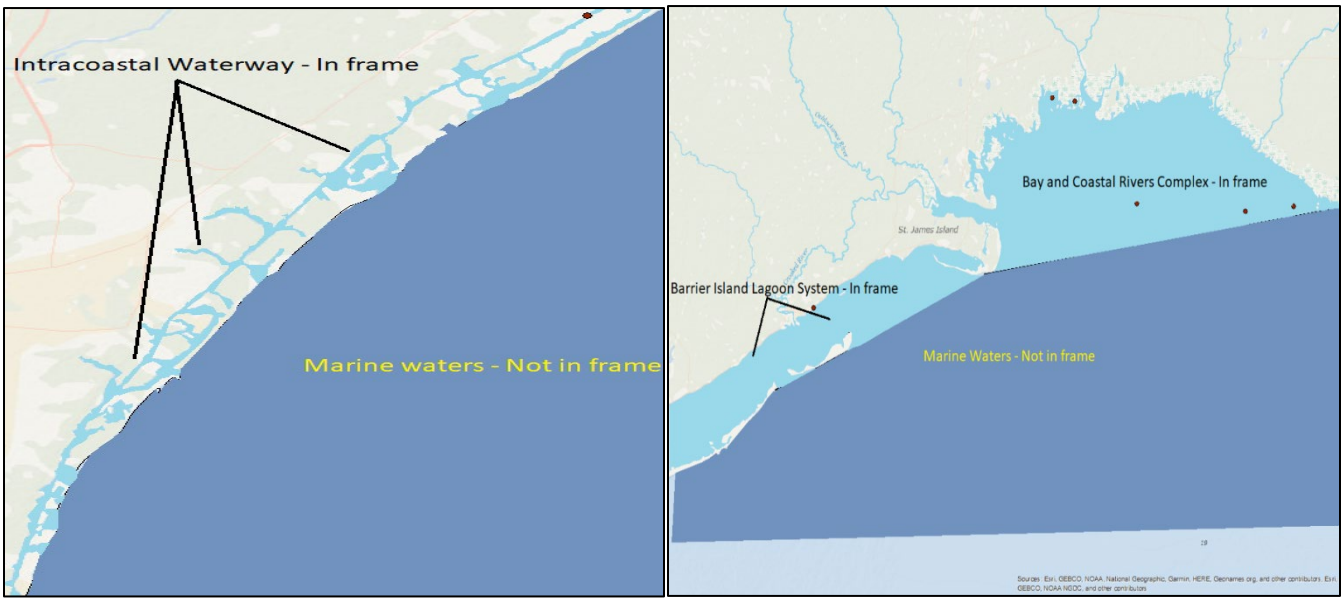


Figure 2.1 Examples of estuarine systems (lighter blue area) and nearshore or offshore marine waters (dark blue area, not in frame). All waters within the enclosed light blue intracoastal waterway area are defined as estuarine and therefore considered in frame regardless of depth or salinity.

Target vs Non-Target Areas in Great Lakes Sampling Frame.

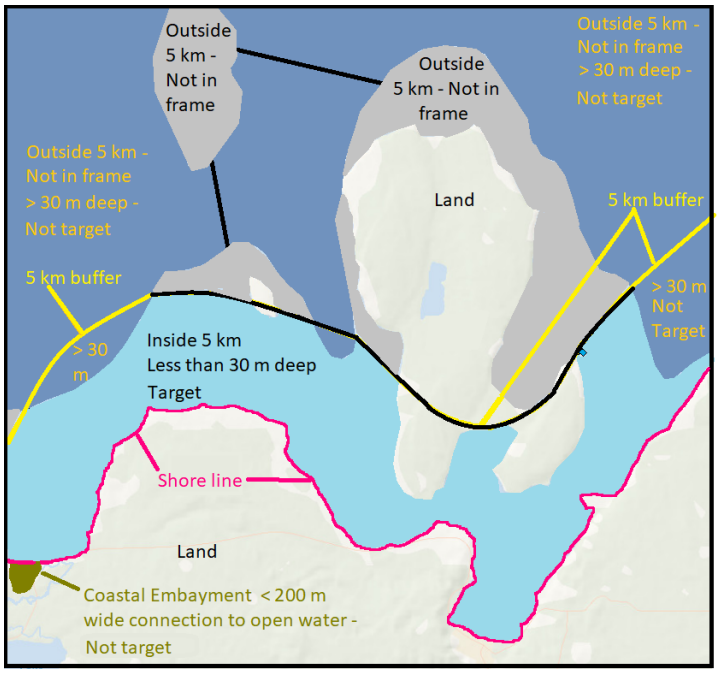


Figure 2.2 Hypothetical Great Lakes Nearshore target population. Area within the 5 km buffer and 30 m or less in depth (light blue) is in frame and target. Any areas outside of the 5 km buffer are not in the frame regardless of depth. Areas deeper than 30 m (dark blue) are not target, regardless of whether they are in the frame. Coastal embayments or other features with connections to open water less than 200 m wide (olive green) are not target.

The Lake Erie Special Study, Green Bay, and the National Park Service/Great Lakes Island intensification frames are detailed in Appendix B.

3 NCCA 2020 DESIGN, PANELS AND STRATA

EPA classified sites by strata and panels before statistically selecting the sites using a Generalized Random Tessellation Stratified (GRTS) survey design for an area resource. **Section 3.1** describes the stratification and panels used to classify estuarine sites before selection. **Section 3.2** presents the same information for the Great Lakes nearshore sites.

Site IDs have been assigned to each site in the following format: PREFIX_STATE-ID where:

- PREFIX indicates the study design:
  - NCA20 – Marine probabilistic sites
  - NGL20 – Great Lakes nearshore probabilistic sites
  - GBA20 – Green Bay Enhancement
  - NPA20 – Great Lakes National Park sites
  - ISA20 – Great Lakes Island sites
  - LEA20 – Lake Erie Enhancement sites
  - PPBEP- Pensacola- Perdido Bay Estuary sites
- STATE/TERRITORY is the two-letter abbreviation for the state or territory in which the site occurs
- ID is a five-digit number specific to the site. Note that these number repeat in each state and are not unique to any one site. When referring to a site, the entire site ID including the prefix and state identifier is essential.

Probabilistic sites are divided by state and by panel whereas intensifications may have special design dictated in the design descriptions in **Appendices A and B**. Panel identifiers contain the following information:

- BASE or OVERSAMPLE DESIGNATION and SURVEY YEAR
  - Base20 - NCCA 2020 Base site
  - Over20 – NCCA 2020 Oversample (replacement) site
- PANEL YEAR
  - 10RVT – Resample sites sampled in a previous year (E.g. Base20_10RVT)
  - 20RVT – New sites that will be a revisit site in 2020 (E.g. Base20_20RVT2)
  - 20 – New sites not previously sampled (E.g. Base20_20)
- REVISIST STATUS
  - The number 2 following RVT indicates the site is a Revisit site and is to be sampled twice in the same season (E.g. Base20_10RVT2)

With some exceptions, oversample replacement sites must be selected from the same panel-year and stratum as the original site (See **Section 5)**.

3.1 ESTUARINE DESIGN, STRATA AND PANELS

3.1.1 ESTUARINE DESIGN

A total of 725 NCCA 2020 estuarine sites will be sampled in 2020; of those, 42 sites will be sampled twice (revisit sites). The sites were drawn using a stratified probability survey design that is constructed from two independent designs.

- The first design consists of sites sampled in 2010 and again in 2015 (resample sites) (Base20_10). It also includes 2010 sampled sites that were evaluated in 2015 but could not be sampled due to safety, too shallow or other reasons. A total of 300 sites (264 to be sampled once in 2020 and 36 sites to be sampled twice in 2020) are planned to be sampled from this design.
- The second design selects new sites (Base20_20 and consists of 425 sites planned to be sampled (419 to be sampled once in 2020 and 6 to be sampled twice in 2020). A Generalized Random Tessellation Stratified (GRTS) survey design for an area resource was used for the second design.

3.1.2 STRATIFICATION

For the e*stuarine design,* all coastal states but Massachusetts, South Carolina, Texas, and Florida, are stratified first by the state and then by large or small estuaries within the state. (See **Table 3.1).**

- Massachusetts and Texas designs are stratified by state-designated regions and then by large or small estuaries within each region.
- South Carolina combines 10 revisit sites from previous NCCA surveys with 11 tidal creek sites and 10 open water estuarine sites from the South Carolina Estuarine and Coastal Assessment Program (SCECAP, a state-level yearly probabilistic monitoring program).
- Florida is first stratified into Southeast and Gulf Coast regions, and then further stratified by large or small estuary within those regions.

Table 3.1 Number of Estuarine sites by stratum, state and state-designated Region (if applicable)State Name	Large Estuary Strata Number of Sites	Small Estuary Strata Number of Sites	Total Number of Sites per State	Total Number of Sampling Events per State
Alabama	8	9	17	19
California	25	26	51	53
Connecticut	7	8	15	17
Delaware	7	8	15	17
Florida Southeast Coast	11	6	84	86
Florida Gulf Coast	31	36		
Georgia*	0	15	15	17
Louisiana	39	39	78	80
Massachusetts	0	7	7	50

Region 1*				
Massachusetts Region 2*	0	9	9	
Massachusetts Region 3*	0	5	5	
Massachusetts Region 4	7	2	9	
Massachusetts Region 5	7	2	9	
Massachusetts Region 6	8	1	9	
Maryland	14	15	19	21
Maine	18	18	36	38
Mississippi	9	8	17	18
North Carolina	20	22	42	44
New Hampshire*	0	15	15	16
New Jersey	11	12	23	25
New York	13	14	27	29
Oregon	7	17	24	26
Rhode Island	6	9	15	17
South Carolina NCCA Revisit **	31	XX	40	42
South Carolina SCECAP **	9	XX		
Texas Lower	10	10	20	62
Texas Middle	10	10	20	
Texas Upper	10	10	20	
Virginia	15	14	29	31
Washington	27	27	54	56

*States or state-defined regions that do not have any large estuaries; no large estuary strata sites could be selected.

** South Carolina's design is not defined as large/small estuaries due to their individual, state enhanced design.

3.1.3 Panels and Number of Visits

Table 3.2 Estuarine Panels and Visits

Panel-year Name	Number of Visits in 2020
Base20_10RVT2	2
Base20_10RVT	1
Base20_20	1
Base20_20RVT2	2
Base20_20_MA	1

Base20_20_SC	1
Base20_20_TX	1
Over20_10RVT	TBD
Over20_20	TBD

For each estuarine stratum, EPA selected base sites and oversample sites within different panel-years. Base sites are evaluated first, and replaced, as necessary, from the oversample sites. The panel-year names provide information about the number and type of visits (See **Table 3.2**).

1. Base20_10RVT2: Sites from NCCA 2010 and 2015 that will be sampled twice in 2020.
2. Base20_10RVT: Sites from NCCA 2010 that will be sampled once in 2020.
3. Base20_20: New sites that will be sampled once in 2020.
4. Base20_20RVT2: New sites that will be sampled twice in 2020.
5. Base20_20_MA: Massachusetts state level design intensification panel
6. Base20_20_DEHC: South Carolina state level design intensification panel. These sites are in addition to the combined Base20_20_NCCA_DHEC sites which will be used for both the probabilistic design and South Carolina's intensification.
7. Base20_20_TX: Texas state level design intensification panel
8. Over20_10RVT: Sites from NCCA 2010 that are oversample sites that will only be used if any Base20_10_RVT or Base20_10RVT2 sites cannot be sampled in 2020.
9. Over20_20: New sites that are oversample sites that will only be used if any Base20_20RVT2 or Base20_20 site cannot be sampled in 2020, or if all Over20_10RVT sites are expended in a stratum.

In addition to serving as replacement sites for any dropped base sites (See **Section 5** for replacement site selection information), oversample sites can also be used to supplement the NCCA site draw for potential state-wide or other geographic assessments or enhancements. Please contact the NCCA Lead for help with designing any enhancements using oversample panel-year sites.

3.2 Great Lakes Nearshore Design, Strata and Panels

3.2.1 Design

The Great Lakes nearshore survey design consists of two independent designs.

- The first design contains resamples sites sampled during NCCA 2015 Great Lakes assessment, which were also sampled in 2010.
- The second design selects new sites using the same survey design used for NCCA 2015. Both designs use a Generalized Random Tessellation Stratified (GRTS) survey design for an area resource.

3.2.2 Stratification

EPA stratified the *Great Lakes Nearshore* component by state within each of the Great Lakes. **Table 3.3** lists the strata for each state in the Great Lakes assessment.

Table 3.3 Great Lakes states probabilistic sites per stratum.

	Great Lakes Nearshore Strata and Number of Sites					Total Number of Great Lake Sites per State
State Name	**Lake_Erie_NearShore _USA**	**Lake_Huron_NearShore_USA**	**Lake_Michigan_NearShore_USA**	**Lake_Ontario_NearShore_USA**	**Lake_Superior_NearShore_USA**	
Illinois			1			**1**
Indiana			2			**2**
Michigan	6	45	28		31	**110**
Minnesota					8	**8**
New York	11			45		**56**
Ohio	26					**26**
Pennsylvania	2					**2**
Wisconsin			14		6	**20**

3.2.3 PANELS AND NUMBER OF VISITS

For each Great Lakes stratum, EPA selected base sites and oversample sites within different panel-years. Base sites are evaluated first, and replaced, as necessary, from the oversample sites. For the base sites, the panel-year names provide information about the number and type of visits. For Great Lakes sites, all oversample sites are from the 2020 panel-year.

Table 3.4 Great Lake Panels and Visits

Panel-year Name	**Number of Visits in 2020**
Base20_10RVT2	2
Base20_10RVT	1

Base20_20	1
Over20_20	TBD

1. Base20_10RVT2: Sites from NCCA 2010 that will be re-sampled twice in 2020.
2. Base20_10RVT: Sites from NCCA 2010 that will be re-sampled once in 2020.
3. Base20_20: New sites that will be sampled once in 2020.
4. Over20_20: New sites that are used to replace, Base20_10RVT2, Base20_10RVT, or Base20_20 sites that cannot be sampled.

4 INTERPRETING THE SITE EVALUATION SPREADSHEET AND DESKTOP EVALUATION

This section describes the Site Evaluation Spreadsheet that each state received from EPA. The spreadsheet provides the base sites and oversample sites drawn for the strata within each state. It is important that states and field crews understand each portion of the spreadsheet and how to use it when evaluating NCCA 2020 sample locations.

The Site Evaluation Spreadsheets are available on the NARS SharePoint site and can be emailed to crews by EPA if needed (contact the Contractor Field Logistics Coordinator). The NCCA 2020 Site Evaluation page of the NARS SharePoint site can be accessed at: https://usepa.sharepoint.com/sites/OW_Community/nars/NCCA/Forms/AllItems.aspx?id=%2Fsites%2FOW%5FCommunity%2Fnars%2FNCCA%2FNCCA%202020%2FSite%20Evaluation

4.1 SITE EVALUATION SPREADSHEETS

Although they are similar, there are slight differences between the estuarine and Great Lakes Site Evaluation Spreadsheets. Section 4.1 explains the parts of the site evaluation spreadsheets and their similarities and differences.

4.1.1 ESTUARINE SITE EVALUATION SPREADSHEETS

In general, *estuarine* site evaluation spreadsheets look very similar from one state to another. They all contain a "Metadata Electronic Reconn" tab and one or more "Stratum" tabs named for the strata within the state. Most states will have two tabs, one for the "Small" estuary stratum within the state and another for the "Large" estuary stratum within the state.

Estuarine state exceptions to this are:

- Massachusetts and Texas designs are stratified by state-designated regions and then by large or small estuaries within each region.
- South Carolina combines 10 resample sites from previous NCCA surveys with 11 tidal creek sites and 10 open water estuarine sites from the South Carolina Estuarine and Coastal Assessment Program (SCECAP),
- Florida is first stratified into Southeast and Gulf Coast NCCA regions, and then further stratified by large or small estuary within those regions.

4.1.2 GREAT LAKES SITE EVALUATION SPREADSHEETS

Similar to the estuarine site evaluation spreadsheets, the Great Lakes site evaluation spreadsheets are also broken down into state pages. Each State spreadsheets contain one individual tab that contains the site information for each Great Lake sampled (different lakes are separated by a brown row as a reminder to not select oversample sites from outside of the current Great Lake).

4.2 EPA-Supplied Location and Design Information

Note that there is slightly different location information for estuarine and Great Lakes sites. However, both contain Panel and Stratum columns, which are used in selecting oversample sites.

4.2.1 Stratum (or Great Lakes State) Tabs

The "Stratum" (or Great Lakes State) tabs each have two main parts:

- EPA-Supplied LOCATION and DESIGN INFORMATION has column headings that are highlighted in yellow (**Figure 4.1**). This part of the spreadsheet provides information about the site. This part of the spreadsheet is locked and cannot be edited.
    - Each spreadsheet has rows of base sites (blue rows) and oversample sites (white rows). The number of base sites and oversample sites differ for each state.
    - The count of "Total Target Sites", on the upper left of the site evaluation spreadsheet represents the total number of base sites per state. Please note, base sites labeled with the suffix "RVT2" will need to be sampled twice. The second visit of a revisit site is not included in the "Total Target Sites" number.
    - The left-hand side of the spreadsheet provides the following information about each site:
        - ***2020 Site ID***: Identification code for the site which NCCA2020 will use to track sites and samples
        - ***Site ID from NCCA 2015***: Identification code for the site if it was sampled in 2015. For example, the 2015 site ID can be used to review site assessment records from the previous survey. Note that this field will be blank for many sites.
        - ***State***.
        - ***Site Name (Estuary SES only) or Great Lake Name (Great Lakes SES only)***. If the site name is incorrect, please correct it in the comments field in the right-hand part of the spreadsheet (described in **Section 4.3** below).
        - ***NCA Region (Estuary SES only***. National Coastal Assessment regional designation used for earlier coastal surveys.
        - ***Province (Estuary SES only)***.
        - ***Longitude***. Decimal degrees (NAD 1983).
        - ***Latitude***. Decimal degrees (NAD 1983).
        - ***Base/Oversample panel***. See **Section 3.1.3** and **Section 3.2.3** for descriptions of panels used in estuarine and Great Lakes nearshore draws, respectively.
        - ***Stratum***. See **Section 3.1.2** and **Section 3.2.2** for descriptions of estuarine and Great Lakes nearshore strata, respectively.

A. Example of EPA-Supplied Information for Estuarine Site Evaluation Spreadsheet

Total sampled sites = 84

EPA-Supplied LOCATION and DESIGN INFORMATION

LOCATION INFORMATION								DESIGN INFORMATION *(Consider both columns in selecting replacements)*	
2020 Site ID	Site ID from NCCA 2015	State	Site Name	NCA Region	Province	Latitude	Longitude	Base/ Oversample Panel	Stratum
NCA20_FL-10002	NCCA15-1178	FL	Newfound_Harbor	East_Coast	Carolinian Province	-80.679483409107400	28.345180821732600	Base20_10RVT2	FL_Small
NCA20_FL-10027	NCCA15-1187	FL	Nassau_Sound	East_Coast	Carolinian Province	-81.434823049625300	30.508759056522300	Base20_10RVT	FL_Small
NCA20_FL-10028	NCCA15-1193	FL	Nassau_River_System	East_Coast	Carolinian Province	-81.494255233072700	30.549		
NCA20_FL-10036	NCCA15-1649	FL	Miami_River	East_Coast	West Indian Provinc	-80.226641302072800	25.786		
NCA20_FL-10090	NCCA15-1197	FL	Matanzas_River	East_Coast	Carolinian Province	-81.272407691035500	29.778835791558200	Over20_10RVT	FL_Small
NCA20_FL-10078		FL	Card Sound	East_Coast	West Indian Provinc	-80.314878553140000	25.303742297515600	Base20_20	FL_Small
NCA20_FL-10080		FL	Pablo Creek	East_Coast	Carolinian Province	-81.442480729496			
NCA20_FL-10119		FL	Little Card Sound	East_Coast	West Indian Provinc	-80.3793386970010			
NCA20_FL-10125		FL	Pablo Creek	East_Coast	Carolinian Province	-81.430867709743			

These three columns are not included in the Great Lakes Site Evaluation Spreadsheets.

Yellow Rows Separate Different Panel/Stratum Combinations

Blue Rows are Base Sites

White Rows are Oversample Sites

B. Example of EPA-Supplied Information for Great Lakes Site Evaluation Spreadsheet

Please note: Brown lines indicate a different Great Lake. You may not select oversample sites from another Great Lake.

Total sampled sites= 110

EPA-Supplied LOCATION and DESIGN INFORMATION

LOCATION INFORMATION						DESIGN INFORMATION *(Consider both columns in selecting replacements)*	
2020 Site ID	Site ID from NCCA 2015	State	Great Lake	Latitude	Longitude	Base/ Oversample Panel	Stratum
GL20_MI-10001	GLNS15-1156	MI	Lake Erie	41.855487890060700	-83.371810820083600	Base20_10RVT2	Lake_Erie_NearShore_USA
GL20_MI-10002	GLNS15-1164	MI	Lake Erie	41.978389100062200	-83.226068260084700	Base20_10RVT	Lake_Erie_NearShore_USA
GL20_MI-10003	GLNS15-1169	MI	Lake Erie	41.775408080059800	-83.424598030083200	Base20_10RVT	Lake_Erie_NearShore_USA
GL20_MI-10004		MI	Lake Erie	41.928531497986600	-83.250993555937000		
GL20_MI-10005		MI	Lake Erie	41.920233120730500	-83.297046952814700		
GL20_MI-10006		MI	Lake Erie	41.739698224800500	-83.421713656299900	Base20_20	Lake_Erie_NearShore_USA

This column is not included in the estuary site evaluation spreadsheets.

Yellow Rows Separate Different Panel/Stratum Combinations

Blue Rows are Base Sites

Figure 4.1 Example EPA- Supplied Design Info included in Site Evaluation Spreadsheets for Estuaries (A) and Great Lakes (B).

The following two sections describe each part of the spreadsheet.

4.2.2 Meanings of Different Row Colors

- Sites from different panel-year/stratum combinations are separated by a row shaded in yellow.

- The blue rows identify the base sites for each stratum.
- Immediately below the blue rows are unshaded (white) rows identifying replacements, or oversample sites, for each stratum.
- Estuarine states in which samples are drawn from different state-designated regions (e.g., Massachusetts), or Great Lakes states with sites in more than one lake (e.g., Michigan) have brown rows that separate the lakes or regions. *It is important that replacement sites be drawn from oversample sites in the same state-designated region or Great Lake as the dropped sites. Don't cross brown rows to select oversample sites.*

4.3 Documentation and Desktop Evaluation

4.3.1 Desktop Evaluation Documentation Sections

The right-hand side of the site evaluation spreadsheet (see **Figure 4.2**) provides space for evaluators or field crews to complete the desktop and in-field assessments described in **Section 5**. The following information is collected in the right-hand side of the spreadsheet:

a. ***Contact Information***. Provide the name, phone number, and email address of the person most knowledgeable about the desktop review and in-field reconnaissance.

b. ***Desktop and On-Site Evaluations:*** Use the dropdown menus to respond to each of the following questions. For EPA's survey weight calculations, it is important that all questions have answers for all evaluated sites.

As crews work through the site evaluation process described in **Section 4**, any site which receives the following answers:

- Yes responses for all three questions (including N/A for required landowner permission): Must be sampled.
- No for any question, the site would not be sampled (see example categories in **Figure 4.4**).
- Maybe for any question: Must have an on-site evaluation or subsequent planned sampling visit.

c. ***Comments (required only if dropping a site, otherwise optional)***: Use the space to provide any information that might be useful for EPA's review such as:

a. Reasons for dropping a site;

b. comments about target determination;

c. other additional information related to the three questions;

d. corrections to a site name.

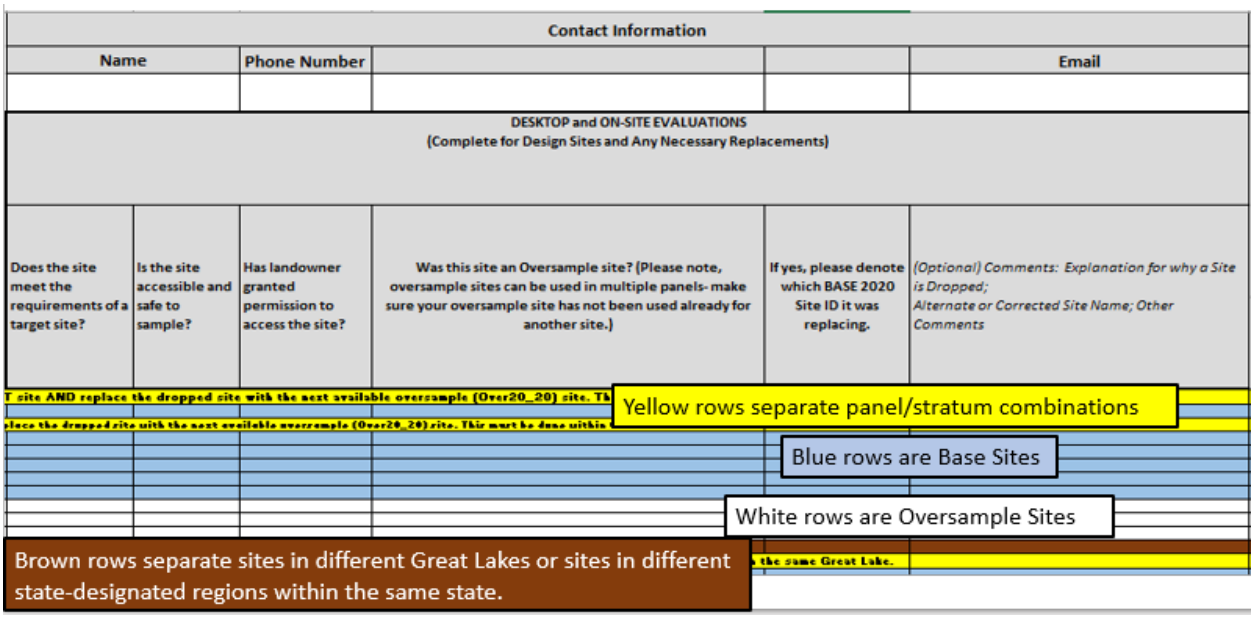


Figure 4.2 Site Evaluation Spreadsheet: Fields to be completed by evaluator or field crew: Evaluator's contact information (top); Desktop and On-Site Evaluation information (bottom).

4.3.2 CONDUCTING THE DESKTOP EVALUATION

The objective of the desktop evaluation is to eliminate sites that are clearly not part of the target population or cannot be sampled. By using data that are easily obtainable and verifiable, the desktop evaluation locates the site and determines if the selected site is, or likely will be, in the target population and sampleable during the 2020 field sampling season. If information obtained during the desktop evaluation is not conclusive, then a field visit is required.

In order to achieve the most robust results possible with the probabilistic sampling design, every effort must be made to sample the base sites that were generated. Some sites may be accessed easily while others may require more lengthy or time-consuming trips. It is very important to not reject a site based on inconvenience, inaccessibility or in an attempt to sample a specific location of interest.

4.3.2.1 Steps in Desktop Evaluation

Before starting the desktop evaluation, the field crew should obtain as much information as possible for each site.

Figure 4.3 summarizes the steps to locate and evaluate the eligibility and sampleability of selected field sites. The desktop process consists of the following steps:

1. **Study the Site Evaluation Spreadsheet** described in **Section 1.1**.
2. **Gather information about the site.** A number of sources of information are available, including aerial images, topographic maps, state, county, or tribal coastal data, the National Hydrography Dataset (NHD), personal and local knowledge, literature and scientific reports, land ownership records, and the internet.

3. **Locate the X-site.** Use the most recent aerial imagery that can be obtained. Using this imagery and any supplemental sources of information, determine if the X-site is within 37 m of a coastal estuary or the Great Lakes nearshore.

4. **Determine if X-site is within the target population.** If the site appears to be outside of an estuarine area (for marine sites); or for Great Lakes sites, greater than 5 km from shore, greater than 30 m in depth, or in an embayment with a connection to open water that is less than 200 m in width, drop the site and replace it with an alternative site. Notify the Contractor Field Logistics Coordinator (Contact Information is provided on **page vii**.) or submit an updated version of the site evaluation spreadsheet. Select a replacement site following the protocol described in **Section 5**.

5. **Determine if a site is safe to access and sample.**

    1. Review maps, other collected information, or enlist the assistance of someone with personal knowledge of the location of the X-site to determine if it is physically accessible by field crews and safe to sample.

    2. Using definitions in **Section 4.3** determine if the site meets various sampleable/non-sampleable characteristics that are to be used in completing the site evaluation spreadsheet.

6. **Examine nearby area**. Review maps and other sources of information to determine if a sampleable site exists within a radius of 37 m around the X-site. If a sampleable site does not exist within this radius, then follow the procedures for selecting an alternate site in the **Section 5**.

7. **Document findings in the Site Evaluation Spreadsheet.** If the maps and other sources of information indicate **conclusively** that the site **is not** accessible, (if the site is in a shipping channel, for example):

    1. note the reason(s) why it is not accessible and

    2. note whether the X-site is part of the target population (from Step 4 above).

    Information provided in this spreadsheet is critical to the statistical analyses of data from the survey. Complete the spreadsheet (see **Figure 4.4** Site Evaluation Spreadsheet: Questions and Dropdown Answers) to provide EPA with as much information as possible in its data analysis. Three aspects are especially important and must be completed for all evaluated sites. (See **Section 4.3** for drop-down choices). Provide the findings of whether the site:

    a. Meets the target population definition. Even if the site isn't safe to be sampled, provide your best assessment for whether the site is in the target population.

    b. Is accessible and safe to sample. If the site will require extreme resources and/or considerable time to sample, contact the NCCA Project Leader for approval before dropping the site (see contact information on **page vii**). Consider only physical accessibility here, and not permission for access or

sampling (i.e. answer this question with the assumption that permission would be granted).

c. Has landowner approved access to the site (if necessary) (see **Section 6**).

If appropriate, EPA will remove sites from the sample frame for future NCCAs.

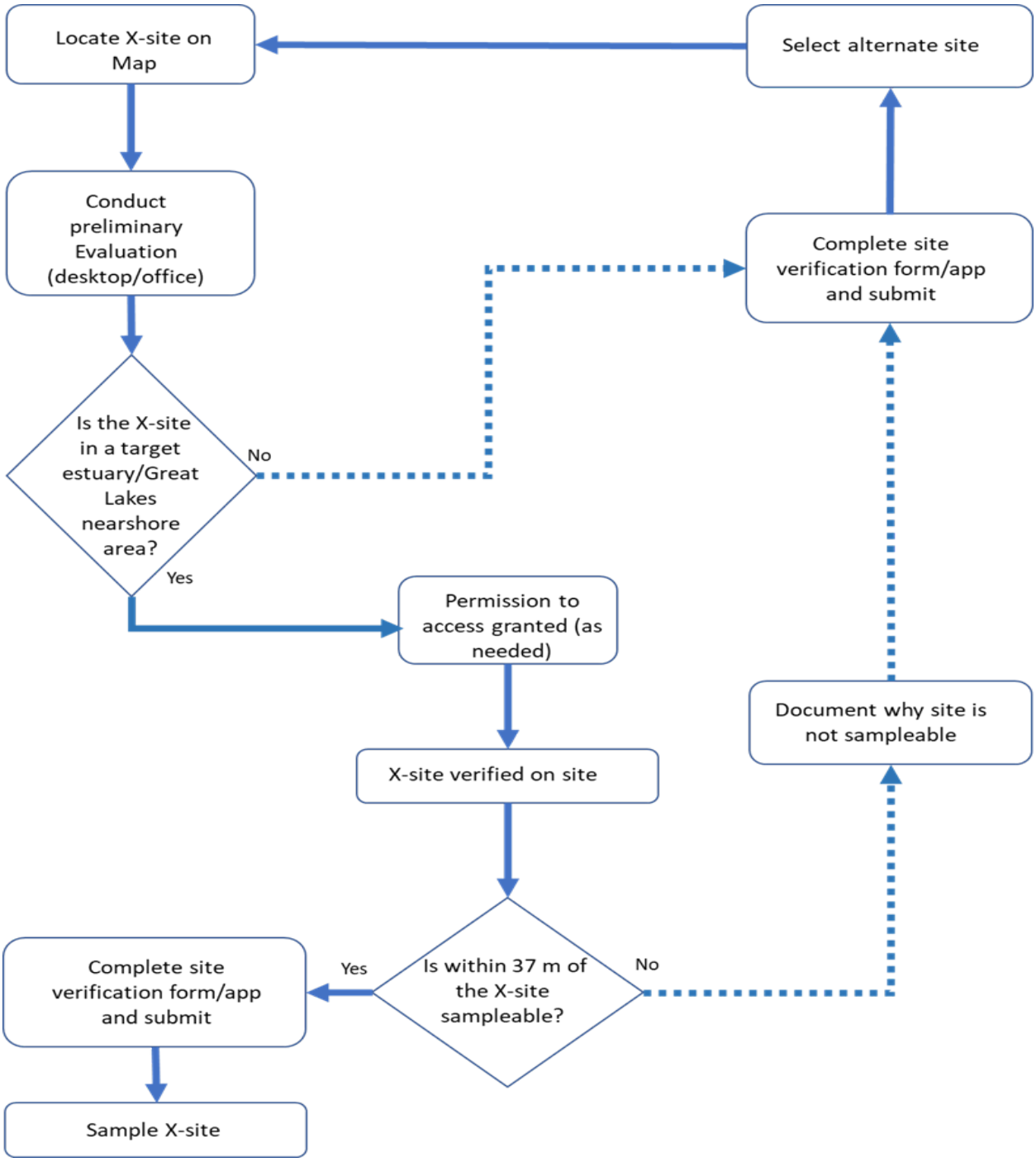


Figure 4.3 Flowchart of site evaluation process

Question 1: Does the site meet the requirements of a target site?

1. Yes, Target
2. Maybe, requires on-site evaluation
3. Maybe, tide too low (return at appropriate time in tidal cycle)
4. Maybe, mudflat at certain times (return at appropriate time in tidal cycle)
5. Unable to access site, but clearly is target (e.g., in shipping channel)
6. Unable to access site, but probably target (e.g., site map indicates target)
7. Unable to access site, and unable to determine if target
8. No, Dry
9. No, Mudflat (permanent)
10. No, Wetland
11. No, Estuarine site is outside the imaginary line connecting two land features at the seaward boundary
12. No, Marine site has salinity <.5 PPT (freshwater is out of scope except within Great Lakes) *
13. No, Map Error (X-site is clearly not target, for example: parking lot)
14. No, Great Lakes Site is deeper than 30 m.
15. No, Great Lakes Site is greater than 5 km from shore.
16. No, Great Lakes Site is in a connecting channel or river.
17. No, Other (explain in comments)

Question 2: Is the site accessible and safe to sample?

Note that responses to the second question reference whether the site would be sampleable if landowner permission is granted.

1. Yes, Sampleable
2. Maybe, temporarily inaccessible (try again later)
3. Maybe, Unable to access site; available sources are insufficient to determine if target
4. No, Equipment related unsampleable (e.g., less than 1 meter in depth).
5. No, permanently inaccessible (unable/unsafe to reach site)
6. No, EPA concurred that site could be dropped because access would require extreme efforts

Question 3: Has landowner granted permission to access the site?

1. N/A. Public access available.
2. Yes. Landowner granted permission
3. No. Landowner denied permission

Question 4: Is this an oversample site?

1. Yes. (Be sure to note which site it is replacing in the next column.)
2. No.

** If an unusual weather event causes measured salinity to be below 0.5 ppt at a site where historical salinity values are greater than or equal to 0.5 ppt, and the site is otherwise within the estuarine target population, sample the site or make plans to revisit the site and sample under representative conditions. Document the severe weather event in the comments for that site. If in doubt, contact the NCCA Field Logistics Coordinator.*

Figure 4.4 Site Evaluation Spreadsheet: Questions and Dropdown Answers

4.4 SAMPLEABLE VS NON-SAMPLEABLE SITES

After you confirm the location of the X-site, evaluate area surrounding the X-site and classify the site as target (sampleable), target (temporary non-sampleable), no access or non-target (not sampleable). These definitions below describe the choices from the dropdown menu listed in **Figure 4.4.**

Non-Sampleable Temporary Category

- The site could not be sampled on that particular day but is still a target site. Examples might include a recent precipitation event that has caused unrepresentative conditions. The site should be revisited.

No Access to Site Categories

- *Access Permission Denied*--You are denied access to the site by the landowners.
- *Permanently Inaccessible*--Site is unlikely to be sampled by anyone due to physical barriers that prevent access to the site (e.g., major shipping lane).
- *Temporarily Inaccessible*--Site cannot be reached at the present time due to barriers that may not be present at some future date (e.g. high water, extreme weather event) but are expected to exist throughout the index period.
- *Equipment-related inaccessibility: site <1m deep* – The site could not be sampled because it is less than 1 meter deep and the draft of the boat did not allow access. No suitable depth could be found within 37 m from the X-site. This site is still part of the target population and if the crew can sample a site that is less than 1 meter deep, they should do so.
- *Equipment-related inaccessibility: site >1 m deep* – The site was deeper than 1 meter but could not be sampled due to the draft on the boat being used. No suitable depth could be found within 37 m from the X-site. Before dropping this target site, every attempt should be made to bring a boat of suitable draft for the location.

Non-Target (Non-Sampleable) Categories

- *Dry site*--There is no coastal water anywhere within a 37-m radius centered on the X-site. Please denote in the comments if the site was dry at time of sampling visit or if site was determined to be dry from another source and/or field visit prior to actual sampling visit.
- *Mudflat* – There is no standing water, but site is clearly a permanent mudflat. If site is likely to be covered with water at other times during the index period, the site should be sampled on another day.
- *Wetland*– There is standing water present, but site is in a wetland.
- *Not estuarine*—site is outside of the imaginary straight-line intersecting two land features that would fully enclose a body of water.
- *Estuarine, salinity <0.5 ppt* freshwater is out of scope except with the Great Lakes.
- *Map Error* – No evidence that the X-site represents coastal waters (x-site is inland, significantly up-stream in a stream/river, etc.)
- *Great Lakes, not nearshore (i.e., beyond 5 km from shore),* or in non-target embayment with connection to open water of < 200 m in width.
- *Great Lakes,* too deep (i.e., water depth at site is greater than 30 m.)
- *Other* – The site is non-target for reasons other than those above. Please describe in detail and verify with your NCCA Project Lead before replacing a site based on this category (see contact information on **page vii**).

5 SITE REPLACEMENT

EPA requires that crews replace sites following a specific protocol to maintain the statistical integrity of the NCCA survey design. Oversamples sites may only be selected as described. Direct questions about site replacement to the NCCA Contractor Field Logistics Coordinator and/or the NCCA Lead.

Select replacement sites by following EPA's protocol. Site Evaluation Spreadsheets organize base (primary panel-year) and oversample (replacement panel-year) sites by state and stratum. The sites are listed on the spreadsheet in the order in which they were randomly selected. Each site was assigned a Site ID reflecting that numerical order. All primary (base) sites must be evaluated for sampling and should be sampled unless they are determined to be non-target, non-sampleable, or non-accessible. If a primary site is rejected because it is non-sampleable or not accessible, then it will be replaced by the next alternate (oversample) site within the same panel-year and stratum[1].

IMPORTANT: Sites are organized to be evaluated in **SiteID** order and when necessary, may only be replaced by oversample sites within **same Panel-year** and **Stratum** or Great Lake (i.e., the stratum) from the site evaluation spreadsheet. Two important rules to follow in the replacements:

- If a site is evaluated and it is determined that it cannot be sampled, then it is to be replaced by the next oversample site in order on the list within the same **Panel-year** and **Stratum**.
- If the panel of the dropped site is *Base20_10RVT2*, then its **replacement, which will be a base site,** takes on the RVT2 assignment. That is, the site must be **visited twice** in 2020. This replacement base site must then be replaced using the oversample site list as there is no net loss of total target sites. Follow the flowchart in **Figure 5.1** to see how to replace sites and refer to **Section 5.1** for detailed examples.

Site Replacement - Key Points to Remember:

- If a site is evaluated and it is determined that it cannot be sampled, then it is to be replaced by the next available oversample site in order on the list within the 1) panel-year; and 2) stratum defined as large or small estuaries or Great Lake.

- If you drop a revisit (Base20_10RVT2) site, it should be replaced according to the hierarchy described in the flowchart in **Figure 5.1**.

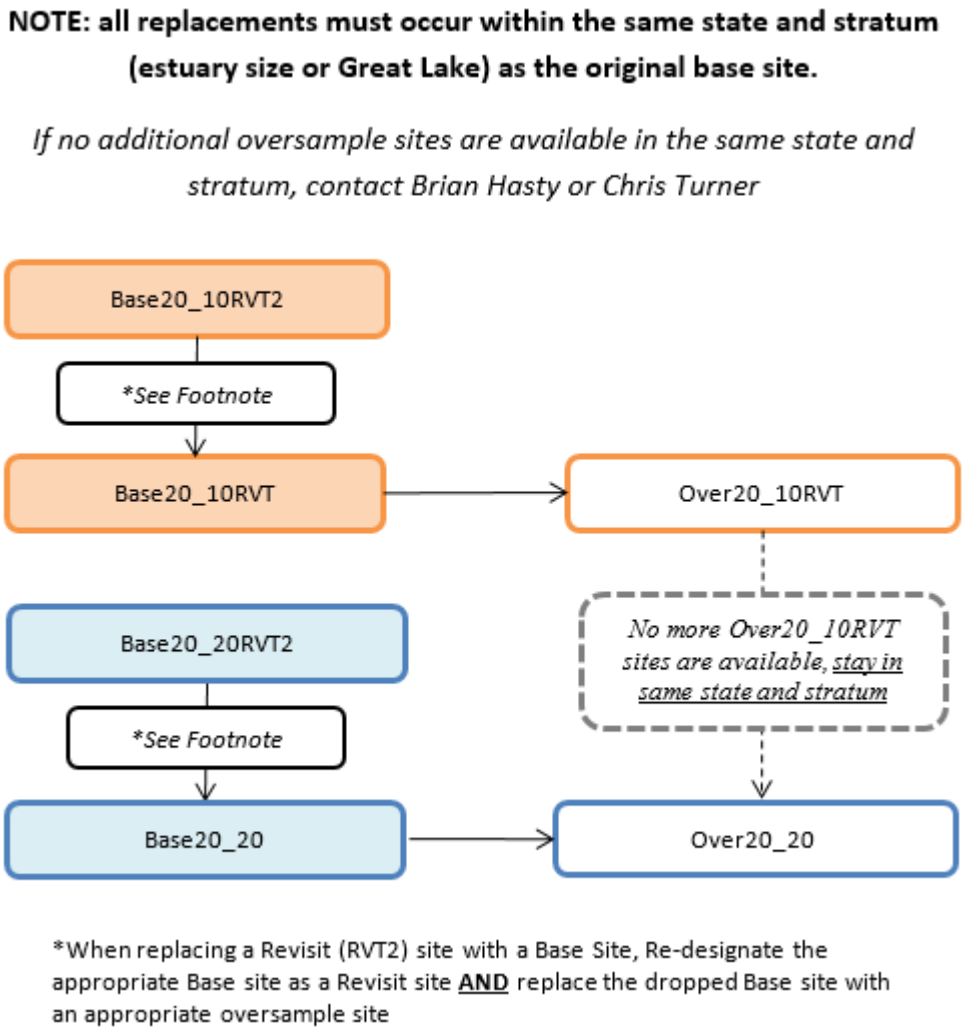


Figure 5.1 Hierarchy of replacing a dropped site.

Prepare the official site packet. The field crew should keep information and data sources used in the desktop evaluation as part of the official site packet for each site. For each site deemed sampleable or inconclusive, the site packet also should include forms, any necessary research permits (if applicable), and site access instructions. The packet also should include the appropriate maps, aerial images, contact information, and copies of landowner permission for access.

5.1 Example in Replacing Dropped Sites

5.1.1 Replacing a dropped "Base20_10RVT2" Site

For example, if a Base20_10RVT2 site is determined non-sampleable, then the desktop audit should evaluate the first listed site ID in Base20_10RVT in the same Stratum. In no instances are there any Over20_10RVT2 replacement sites. Figure 5.2 showcases this process with the base site, NCA20_CA-10002. This site should be replaced by NCA20_CA-10010 which is the first

available base site of the Base20_10RVT panel within the small estuary stratum (CA_Small). In this case, NCA20_CA-10010 is re-designated as the revisit site and will now be sampled twice in 2020. As there is no net loss of base sites, NCA20_CA-10010 must also be replaced by the first available Over20_10RVT site, NCA20_CA-10052. This site will be sampled once. If all Over20_10RVT sites have been evaluated, the next available Over20_20 site is selected in its stead. Note, site evaluation spreadsheets may look different as some columns have been hidden for ease of view.

LOCATION INFORMATION						DESIGN INFORMATION *(Consider both columns in selecting replacements)*	
2020 Site ID	**Site ID from NCCA 2015**	**State**	**Site Name**	**Latitude**	**Longitude**	**Base/ Oversample Panel**	**Stratum**
If a Revisit (Base20_10RV2) site is dropped, please reassign the Revisit status to the next available Base20_10RVT site AND replace the dropped site with the next availat							
NCA20_CA-10002	NC1015-1110	CA	Santa Clara River	34.2344	-119.2644	Base20_10RVT2	CA_Small
In the event that there are no available Over20_10RVT sites to replace dropped Base20_10RVT sites, the next available site in the Over20_20 list should be selected.							
NCA20_CA-10010	NC1015-1250	CA	Tomales Bay	38.2934	-123.0243	Base20_10RVT	CA_Small
NCA20_CA-10011	NC1015-1258	CA	Smith river (Ca)	41.9268	-124.1992	Base20_10RVT	CA_Small
NCA20_CA-10012	NC1015-2270	CA	Big Lagoon	41.1932	-124.1123	Base20_10RVT	CA_Small
NCA20_CA-10013	NCCA15-1089	CA	Mission_Bay	32.7622	-117.2405	Base20_10RVT	CA_Small
NCA20_CA-10052	NCCA15-1095	CA	Morro_Bay	35.3240	-120.8516	Over20_10RVT	CA_Small
NCA20_CA-10053	NCCA15-1096	CA	San_Diego_Bay	32.6644	-117.1387	Over20_10RVT	CA_Small
NCA20_CA-10041		CA	Morro Bay	35.3302	-120.8450	Base20_20	CA_Small
NCA20_CA-10042		CA	Tomales Bay	38.1417	-122.8926	Base20_20	CA_Small
NCA20_CA-10043		CA	Eel River	40.6394	-124.3115	Base20_20	CA_Small
NCA20_CA-10044		CA	San Diego Bay	32.6258	-117.1316	Base20_20	CA_Small
NCA20_CA-10045		CA	San Francisco Bay	37.4612	-122.0779	Base20_20	CA_Small
NCA20_CA-10046		CA	Arcata Bay	40.8361	-124.0852	Base20_20	CA_Small
NCA20_CA-10047		CA	Garcia River	38.9529	-123.7301	Base20_20	CA_Small
NCA20_CA-10048		CA	Inner Oakland Harbor	38.0252	-122.1465	Base20_20	CA_Small
NCA20_CA-10049		CA	Los Angeles Harbor	33.7171	-118.2305	Base20_20	CA_Small
NCA20_CA-10050		CA	Big Lagoon	41.1718	-124.1122	Base20_20	CA_Small
NCA20_CA-10051		CA	Los Angeles Harbor	33.7729	-118.2193	Base20_20	CA_Small
NCA20_CA-10080		CA	Morro Bay	35.3513	-120.8495	Over20_20	CA_Small
NCA20_CA-10081		CA	San Francisco Bay	37.4962	-122.1235	Over20_20	CA_Small

Figure 5.2 Example site replacement of Base20_10VT2 site with a Base20_10RVT site available.

5.1.2 Replacing a Base20_20RVT2 Site

In some states, there are Base20_20RVT2 sites in lieu of Base20_10RVT2 revisit sites. They do not have the same replacement procedure. Should a Base20_20RVT2 site need to be replaced, the first available Base20_20 site within the same stratum will be used. This site will be sampled twice. The used Base20_20 site will then be replaced with the first available Over20_20 site within the same stratum so as to not change the total number of base sites. **Figure 5.3** showcases the site replacement procedure for NCA20_DE-10005 which selects NCA20_DE-10009 as the replacement site and is sampled twice. This site is then replaced with the NCA20_DE-10031 Over20_20 site. Note, site evaluation spreadsheets may look different as some columns have been hidden for ease of view.

2020 Site ID	Site ID from NCCA 2015	State	Site Name	Latitude	Longitude	Base/ Oversample Panel	Stratum
If a Revisit (Base20_10RV2) site is dropped, please reassign the Revisit status to the next available Base20_10RVT site AND replace the dropped si							
NCA20_DE-10005		DE	Indian River Bay	38.6204	-75.0994	Base20_20RVT2	DE_Small
NCA20_DE-10009		DE	Indian River Bay	38.6061	-75.0700	Base20_20	DE_Small
NCA20_DE-10010		DE	Little Assawoman Bay	38.4790	-75.1092	Base20_20	DE_Small
NCA20_DE-10011		DE	Blackbird Creek	39.4056	-75.5994	Base20_20	DE_Small
NCA20_DE-10012		DE	Indian River Bay	38.5975	-75.1336	Base20_20	DE_Small
NCA20_DE-10013		DE	Rehobeth Bay	38.6844	-75.0758	Base20_20	DE_Small
NCA20_DE-10014		DE	Rehobeth Bay	38.6952	-75.1541	Base20_20	DE_Small
NCA20_DE-10015		DE	Leipsic River	39.2443	-75.4546	Base20_20	DE_Small
NCA20_DE-10031		DE	Deleware Bay	39.3133	-75.4778	Over20_20	DE_Small
NCA20_DE-10032		DE	Little Assawoman Bay	38.4721	-75.0722	Over20_20	DE_Small
NCA20_DE-10033		DE	Indian River Bay	38.5957	-75.0944	Over20_20	DE_Small
NCA20_DE-10034		DE	Rehobeth Bay	38.6298	-75.0877	Over20_20	DE_Small
NCA20_DE-10035		DE	Indian River Bay	38.5876	-75.1081	Over20_20	DE_Small

Figure 5.3 Site replacement procedure for a Base20_20RVT2 site. The replacement site will be visited twice and that site will be replaced by an Over20_20 site within the same stratum.

5.1.3 REPLACING A BASE20_10RVT SITE

In general, Base20_10RVT sites will be replaced by the first available Over20_10RVT site. However, in some scenarios, there may not be any Over20_10RVT sites available in the draw. **Figure 5.4** showcases how to replace a Base20_10RVT site when there is no Over20_10RVT site available. The Base20_10RVT site, NCA20_AL-10003, is replaced by the first available Over20_20 site, NCA20_AL-10018, within that stratum, AL_Large. This site will be sampled once. Note, site evaluation spreadsheets may look different as some columns have been hidden for ease of view.

2020 Site ID	Site ID from NCCA 2015	State	Site Name	Latitude	Longitude	Base/ Oversample Panel	Stratum
If a Revisit (Base20_10RV2) site is dropped, please reassign the Revisit status to the next available Ba				e20_10RVT site AND replace the dropped site with the next available oversample (			
NCA20_AL-10001	NCCA15-1420	AL	Mobile_Bay	30.3893	-88.0007	Base20_10RVT2	AL_Large
In the event that there are no available Over20_10RVT sites to replace dropped Base20_10RVT sites, t				he next available site in the Over20_20 list should be selected.			
NCA20_AL-10003	NCCA15-1421	AL	Mobile_Bay	30.3293	-87.9728	Base20_10RVT	AL_Large
NCA20_AL-10004	NCCA15-1423	AL	Mobile_Bay	30.6492	-87.9489	Base20_10RVT	AL_Large
NCA20_AL-10005	NCCA15-1424	AL	Mobile_Bay	30.3933	-87.9022	Base20_10RVT	AL_Large
NCA20_AL-10006	NCCA15-1425	AL	Mobile_Bay	30.2838	-88.0270	Base20_10RVT	AL_Large
NCA20_AL-10008		AL	Mississippi Sound	30.2580	-88.3536	Base20_20	AL_Large
NCA20_AL-10009		AL	Mississippi Sound	30.2818	-88.1578	Base20_20	AL_Large
NCA20_AL-10010		AL	Mobile Bay	30.5736	-88.0508	Base20_20	AL_Large
NCA20_AL-10018		AL	Mobile Bay	30.5475	-87.9080	Over20_20	AL_Large
NCA20_AL-10019		AL	Mobile Bay	30.5171	-88.0543	Over20_20	AL_Large
NCA20_AL-10020		AL	Mobile Bay	30.2896	-87.8596	Over20_20	AL_Large
NCA20_AL-10021		AL	Mobile Bay	30.2419	-88.0481	Over20_20	AL_Large
NCA20_AL-10022		AL	Mobile Bay	30.4338	-88.0385	Over20_20	AL_Large
NCA20_AL-10023		AL	Mobile Bay	30.3716	-87.8908	Over20_20	AL_Large

Figure 5.4 Replacement of a Base20_10RVT site in the absence of Over20_10RVT sites.

5.1.4 Replacing a Base 20_20 Site

Base20_20 sites should be replaced with the first available Over20_20 site from the same stratum. For example, as shown in **Figure 5.5,** if Base20_20 site, NCA20_RI-10009, cannot be sampled, the first available unused Over20_20 site within the RI_Small stratum, NCA20_RI-10032, should be sampled once. Note, site evaluation spreadsheets may look different as some columns have been hidden for ease of view.

2020 Site ID	Site ID from NCCA 2015	State	Site Name	Latitude	Longitude	Base/ Oversample Panel	Stratum
If a Revisit (Base20_10RV2) site is dropped, please reassign the Revisit status to the next available Base20_10RVT site AND replace the dropped site with the next availa							
NCA20_RI-10002	NCCA15-1589	RI	Providence_River	41.7503	-71.3652	Base20_10RVT2	RI_Small
If a Revisit (Base20_10RV2) site is dropped, please reassign the Revisit status to the next available Base20_10RVT site AND replace the dropped site with the next availa							
NCA20_RI-10007	NCCA15-1591	RI	Sakonnet_River	41.6138	-71.2161	Base20_10RVT	RI_Small
NCA20_RI-10016	NCCA15-1592	RI	Mt_Hope_Bay	41.7044	-71.2286	Over20_10RVT	RI_Small
In the event that there are no available Over20_10RVT sites to replace dropped Base20_10RVT sites, the next available site in the Over20_20 list should be selected.							
NCA20_RI-10009		RI	Point Judith Pond	41.3781	-71.5371	Base20_20	RI_Small
NCA20_RI-10010		RI	Greenwich Bay	41.6845	-71.4373	Base20_20	RI_Small
NCA20_RI-10011		RI	Sakonnet River	41.6156	-71.2365	Base20_20	RI_Small
NCA20_RI-10012		RI	Sakonnet River	41.4858	-71.2348	Base20_20	RI_Small
NCA20_RI-10013		RI	Providence River	41.7432	-71.3561	Base20_20	RI_Small
NCA20_RI-10014		RI	Mt. Hope Bay	41.6818	-71.2257	Base20_20	RI_Small
NCA20_RI-10015		RI	Sakonnet River	41.5399	-71.2058	Base20_20	RI_Small
NCA20_RI-10032		RI	Point Judith Pond	41.3845	-71.5045	Over20_20	RI_Small
NCA20_RI-10033		RI	Sakonnet River	41.5529	-71.2217	Over20_20	RI_Small
NCA20_RI-10034		RI	Sakonnet River	41.4672	-71.2060	Over20_20	RI_Small
NCA20_RI-10035		RI	Providence River	41.7487	-71.3685	Over20_20	RI_Small

Figure 5.5 Site replacement of a Base20_20 site with first available, unused Over20_20 site.

6 OBTAINING LANDOWNER PERMISSION (WHEN APPLICABLE)

It is important to obtain landowner permission prior to sampling, when necessary. NCCA sites are generally accessible by boat from the open waterway. To access the waterway, the field crew should first determine if a public dock will provide suitable access for the boat. If a private dock is more convenient, then the field crew must obtain landowner permission before using the dock. In addition, field crews must comply with any special conditions and requirements for accessing and sampling on state, tribal or federal lands/waters.

Each field crew is responsible for obtaining permission to access their sampling sites. Landowner information can be obtained from the county tax assessor office. Tax assessor maps will display landowner boundaries, addresses and, oftentimes, phone numbers. This information enables the field crew to contact landowners before the sampling day, and identifies which landowner owns which portions of the shoreline. The provision of county maps for the field crews will help clarify access to the targeted sampling site.

EPA recommends that each field crew obtain permission prior to the sampling day to minimize loss of time during field sampling. The field crew can contact the landowner either through an in-person reconnaissance visit or through mailing permission request letters to the landowner, such as a letter signed by the Regional Monitoring Coordinator with a permission slip for the landowner to return. Crews should also consider requesting landowner permission for oversample sites in case of dropped base sites. **Figure 6.1** provides a sample letter and permission form that your program or organization can modify as appropriate. In either case, a signed permission slip, such as the one shown in **Figure 6.1** can be used as documentation on the day of sampling.

Field crews should work with appropriate state, tribal and federal agencies to determine any permits or special conditions that apply to the access points and the coastal waters. As needed, EPA will assist field crews in coordinating efforts with tribes and other federal agencies. Field crews should work with the appropriate state agencies to determine any permits or special conditions that apply to state lands.

Some crews will choose to deal with access issues on the day of the sampling event. This method is usually adequate if a desk-top reconnaissance shows that the area around the site includes enough public land to gain access to the waterway. If the site is in an area that is largely privately-owned land, waiting until the day of sampling could pose unnecessary delays and access issues that should have been resolved prior to the scheduled sampling day.

(Date)
Dear Landowner:

The US Environmental Protection Agency, in cooperation with State agencies, is conducting an environmental assessment of coastal waters (estuaries and Great Lakes) across the United States. Approximately 725 coastal sites and 225 Great Lakes sites were statistically selected for sampling in 2020. Water quality chemistry, aquatic life, and habitat will be evaluated at each site. The findings of the survey will not be used for enforcement or regulatory purposes.

We are contacting you prior to the site visit to obtain permission (form enclosed) to access the sampling site. We have enclosed a copy of a map(s) with the site(s) identified by an "X" at the specific point to be sampled. We realize that working on your property is a privilege and we will respect your rights and wishes at all times.

Please return the completed Access Permission Form in the enclosed envelope by (date). If you have any questions concerning this request, please contact me (phone number). We are looking forward to hearing from you.

Sincerely,

(Name)

I grant permission to the biological field crew from (state agency, Cooperator, or contractor) to access the coastal target site located on my property as part of the EPA's National Coastal Condition Assessment.

_____ Do grant permission

_____ Do grant permission but with the following restrictions:

_____ Do not grant permission

Landowner Name (Please print): _____

Landowner Signature: _____

Date: _____

Phone Number: _____

Address: _____

_____

*If the operator is different than the landowner, please list the name and phone number below so that we may contact the operator before the site visit.

Figure 6.1 Landowner Letter and Permission Form

7 FINAL SITE VERIFICATION AT THE LOCATION

The final step is to visit the site, usually as part of reconnaissance or the actual field sampling visit. Complete the Site Verification information on the NCCA App for each site visited with the intent to sample (regardless of whether it is sampled), following the procedures described below.

Equipment:

- Sampling permit and landowner access (if required)
- Field Operations Manual and/or laminated quick reference guide
- Site dossier, including access information, site spreadsheet with map coordinates, street and/or topographic maps with "X-site" marked
- NCCA Fact Sheets
- GPS unit (preferably one capable of recording waypoints) with manual, reference card, extra battery pack

Figure 7.1 Equipment for In-Field Verification

1. **Record directions.** While traveling from a base location to a site, the field crew provides a detailed description of the route taken on the Site Verification Form (**Figure 7.2**) in the NCCA App. The directions will allow others to find the site again if it is selected for a repeat visit in the future.

2. **Confirm location.** Upon reaching the target site, confirm that the field crew is located at the same latitude and longitude identified in spreadsheet for the X-site. Sampling site verification is based on map coordinates and locational data from the GPS.

    a. ***Navigate to the* X-site**. Navigate the sampling vessel as close as possible to the target X-site using GPS (you must be no more than 0.02 nautical miles (nm) or 37 meters from the target X-site). Compare the target X-site coordinates with the GPS coordinates displayed at the sampling site.

    b. ***Record, in the Site Verification Form, the actual coordinates*** of the vessel after anchorage, not the initial intended coordinates, on the Verification Form in the App. Make sure the GPS unit is set to reference the NAD83 geospatial data set and for decimal degrees (not degrees, minutes, seconds). This new location is where sampling will begin and is called the Y-location.

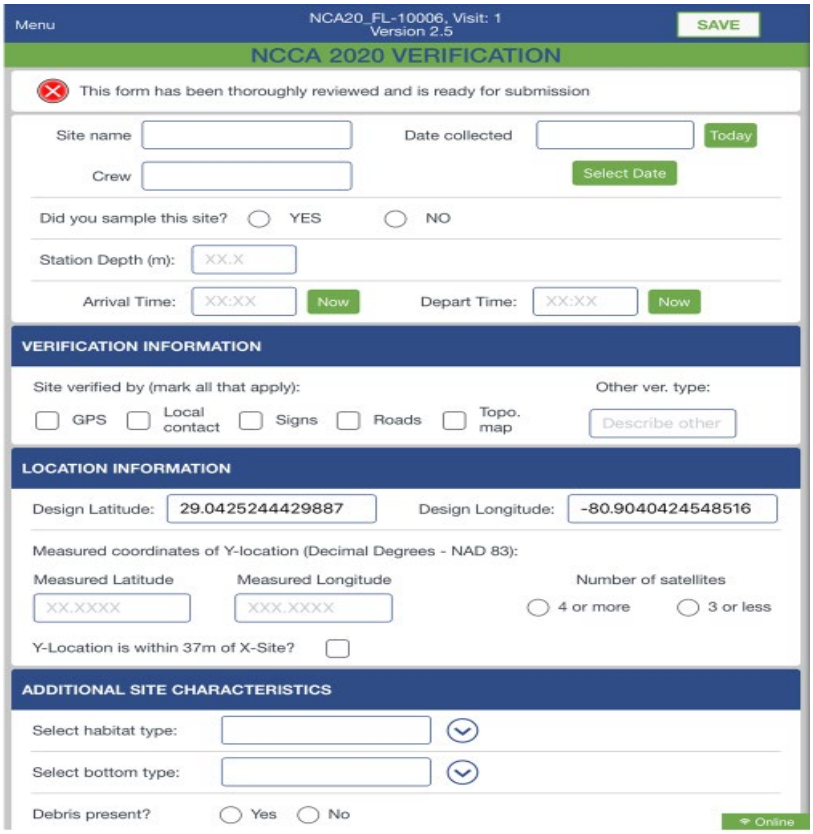
    c. ***Record the type of satellite fix*** (≤3 or ≥4) for QA purposes in the Site Verification Form in the App.

3. **Assess sampleability** as described in **Section 2** and **Section 5**. In addition, verify that the water is deep enough so that samples can be collected from the boat, otherwise, the site is non-sampleable. Questions about wading to sample shallow water should be directed to the Contractor Field Logistics Coordinator.

4. **Assess relocations** if the X-site itself is not sampleable. Every attempt should be made to relocate to a sampleable area within a 37 m radius of the intended location. In searching for a suitable relocation site, the field crew leader should choose a specific compass heading (e.g., north, south, east, west) and slowly motor the vessel in that direction for approximately 15-20 m. Assess the potential relocated site as described in **Section 4.** Should the relocated site fail to meet the operational definition sampleable, then this process may be continued using the same heading out to the 37

m mark or using a new heading until an acceptable sampling location is found. If after a sufficient amount of effort is expended and no suitable site is found, then the determination may be made that the site is non-sampleable.

5. Mark the appropriate bubble on the Site Verification Form (**Figure 7.2**). Do not sample non-target or "Non-sampleable" or "No Access" sites. Fill in the "NO" bubble for "Did you sample this site?" and fill in the appropriate bubble in the "Non-Sampleable-Permanent" or "Non-Sampleable-Temporary" section of the Verification Form in the App; provide detailed explanation in comments section. In the site evaluation spreadsheet of base and oversample sites (**Figure 4.4**), provide comments in the last column.


Menu
NCA20_FL-10006, Visit: 1
Version 2.5
SAVE
NCCA 2020 VERIFICATION
This form has been thoroughly reviewed and is ready for submission
Site name
Date collected
Today
Crew
Select Date
Did you sample this site?
YES
NO
Station Depth (m):
XX.X
Arrival Time:
XX:XX
Now
Depart Time:
XX:XX
Now
VERIFICATION INFORMATION
Site verified by (mark all that apply):
Other ver. type:
GPS
Local contact
Signs
Roads
Topo. map
Describe other
LOCATION INFORMATION
Design Latitude:
29.0425244429887
Design Longitude:
-80.9040424548516
Measured coordinates of Y-location (Decimal Degrees - NAD 83):
Measured Latitude
Measured Longitude
Number of satellites
XX.XXXX
XXX.XXXX
4 or more
3 or less
Y-Location is within 37m of X-Site?
ADDITIONAL SITE CHARACTERISTICS
Select habitat type:
Select bottom type:
Debris present?
Yes
No
Online

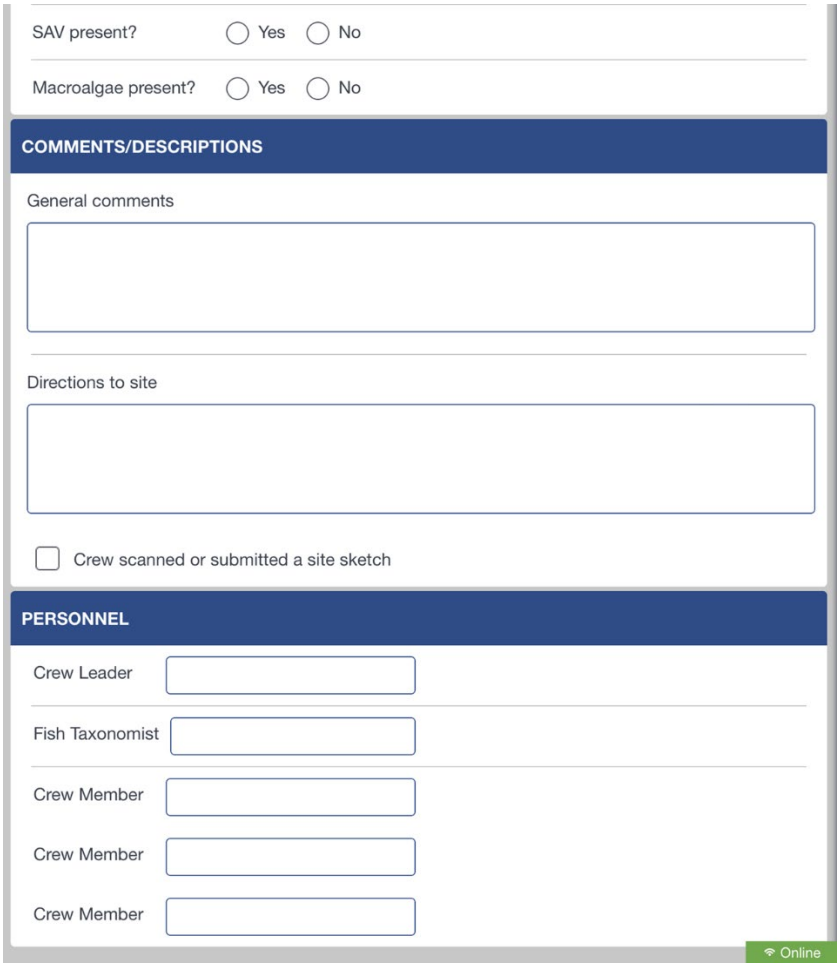


Figure 7.2 Site Verification Form

8 SUBMISSION OF SITE EVALUATION/VERIFICATION FORMS

The final step is to provide EPA with the necessary documentation. For all base sites and all oversample sites evaluated and/or selected as replacements (sampled and non-sampleable), the field crew must provide the two documents identified below. The information is critical for the statistical evaluations for the final report.

8.1 SITE EVALUATION SPREADSHEET

For information collected prior to the start of the 2020 sampling index period, please upload your Site Evaluation Spreadsheet to the EPA SharePoint site under NCCA 2020/Site Evaluation/Crew Submitted Site Evaluation Spreadsheets. The SharePoint site can be accessed at:
https://usepa.sharepoint.com/sites/OW_Community/nars/_layouts/15/start.aspx#/SitePages/Home.aspx

If you need access to the SharePoint site, please send an email to Brian Hasty (hasty.brian@epa.gov), Kendra Forde (forde.kendra@epa.gov) and cc: Hugh Sullivan (sullivan.hugh@epa.gov). If you are having trouble with the SharePoint site, you may email interim and final spreadsheets to the Contractor Field Logistics Coordinator and your Regional Coordinator (see **page vii** for contact information). After the start of the **field season, please email any updates to the spreadsheet every two weeks.** Reminders will be sent out from the Contractor Field Logistics Coordinator as needed. This process will help to ensure that all appropriate base and replacement sites are sampled.

At the conclusion of sampling, final completed site evaluation spreadsheets must be submitted to EPA via the SharePoint as described above (or by email if necessary) **no later than October 31, 2020.** Crews should strive to submit the final completed site evaluation within 2 weeks of sampling the last site. The Contractor Field Logistics Coordinator will contact each crew to verify information and ensure that all required information is completed.

8.2 Site Verification Forms (App form for each site visited with the intent to sample)

Site verification forms will be completed with the use of the EPA provided iPads when the site has been sampled (or not sampled). Submitting the site verification form will create a database record for that sampling event. If a site is not sampled, fill in the appropriate fields for why the site wasn't sampled. If a site is sampled, fill out all information on the verification form.

9 REFERENCES

Olsen, Tony. 2019. “American Samoa Reef Flat 2020 Survey Design” Internal Working Document created on September 26, 2019.

Olsen, Tony. 2019. “CNMI Reef Flat 2020 Survey Design” Internal Working Document created on September 26, 2019.

Olsen, Tony. 2019. “Guam Reef Flat 2020 Survey Design” Internal Working Document created on September 26, 2019.

Olsen, Tony. 2019. “National Coastal Condition Assessment 2020 Coastal Estuarine Survey Design.” Internal Working Document created on February 26, 2020.

Olsen, Tony. 2020. “NARS Great Lakes Assessment 2020 Survey Design” Internal Working Document revised on February 12, 2020.

APPENDIX A: ESTUARINE SPECIAL STUDY DESIGN DESCRIPTIONS

AMERICAN SAMOA REEF FLAT SURVEY

Target Population: The target population is all reef flats in coastal waters of American Samoa.

Sample Frame: American Samoa reef flat sample frame was obtained from NOAA coastal habitat GIS layer.

Survey Design: The survey design incorporates sites sampled from the prior study in 2010 and new sites selected in 2020. Both designs use the same stratification and multi-density categories. For 2020 50% (25 sites) of the sites are from 2010 to be resampled in 2020 and 50% (25 sites) are new sites.

Stratification: Stratification by Tutuilla island.

Multi-density Categories: Multi-density categories based on polygon sizes of reef flats

Panels: The combined designs for American Samoa have the following panels:

1. Base10: Sites from 2010 reef flat study that will be re-sampled once in 2020
2. Base20: New sites that will be sampled once in 2020
3. Over10: Sites from 2010 that are over sample sites that will only be used if any Base10 sites cannot be sampled in 2020
4. Over20: New sites that are over sample sites that will only be used if any Base20 site cannot be sampled in 2020.

Sample Size: The expected sample size is 50 sites for Tutuilla with over sample sites available to replace 2010 or 2020 sites. Note that 25 sites are from 2010 and 25 sites are new sites.

SITE USE: When a "base" site cannot be sampled for any reason; the site must be replaced using the following rules:

1. Base10: When a site in this category cannot be sampled it should be replaced by the next available site in the Over10 list. Note that the 25 Base10 sites includes four sites that could not be sampled in 2010. They should be evaluated again to determine if they can be sampled in 2020.
2. Base20: When a site in this category cannot be sampled it should be replaced by the next available site in the Over20 list within the same stratum.

COMMONWEALTH OF NORTHERN MARIANA ISLANDS REEF FLAT SURVEY

Target Population: The target population is all reef flats in coastal waters of Commonwealth of Northern Marianas (CNMI).

Sample Frame: CNMI reef flat sample frame was obtained from NOAA coastal habitat GIS layer.

Survey Design: The survey design incorporates sites sampled from the prior study in 2010 and new sites selected in 2020. Both designs use the same stratification and multi-density categories. For 2020 50% (25 sites) of the sites are from 2010 to be resampled in 2020 and 50% (25 sites) are new sites.

Stratification: Stratification by Saipan, Tinian and Rota islands.

Multi-density Categories: Multi-density categories based on polygon sizes of reef flats.

Panels: The combined designs for CNMI have the following panels:

1. Base10: Sites from 2010 reef flat study that will be re-sampled once in 2020
2. Base20: New sites that will be sampled once in 2020
3. Over10: Sites from 2010 that are over sample sites that will only be used if any Base10 sites cannot be sampled in 2020
4. Over20: New sites that are over sample sites that will only be used if any Base20 site cannot be sampled in 2020.

Sample Size: The expected sample size is 50 sites total. The over sample is 100% of base sample for use if sites must be replaced.

SITE USE: When a "base" site cannot be sampled for any reason; the site must be replaced using the following rules:

1. Base10: When a site in this category cannot be sampled it should be replaced by the next available site in the Over10 list. Note that the 25 Base10 sites includes four sites that could not be sampled in 2010. They should be evaluated again to determine if they can be sampled in 2020.
2. Base20: When a site in this category cannot be sampled it should be replaced by the next available site in the Over20 list within the same stratum.

GUAM REEF FLAT SURVEY

Target Population: The target population is defined as all reef flats in coastal waters of Guam.

Sample Frame: The sample frame is an integrated GIS layer that includes reef flats, estuaries, near shore and off shore regions of Guam. Only the portion associated with

reef flats was used for the survey design. See documentation for NCCA 2010 Guam reef flat design for process of constructing the GIS layer.

Survey Design: The survey design incorporates sites sampled from the prior study in 2010 and new sites selected in 2020. Both designs use the same stratification and multi-density categories. For 2020 50% (25 sites) of the sites are from 2010 to be resampled in 2020 and 50% (25 sites) are new sites.

Stratification: Stratification by Achang, Pati, Piti, Tumon reserve regions and Other regions.

Multi-density Categories: None. Equal probability within strata.

Panels: The combined designs for Guam have the following panels:

1. Base10: Sites from 2010 reef flat study that will be re-sampled once in 2020
2. Base20: New sites that will be sampled once in 2020
3. Over10: Sites from 2010 that are over sample sites that will only be used if any Base10 sites cannot be sampled in 2020
4. Over20: New sites that are over sample sites that will only be used if any Base20 site cannot be sampled in 2020.

Sample Size: The total expected sample size is 50 sites within all reef flats. Each reserve region will have 4 total sites and other region stratum will have 34 sites. In each case 50% of sites are from 2010 and 50% are new sites.

Site Use: When a "base" site cannot be sampled for any reason, the site must be replaced using the following rules:

1. Base10: When a site in this category cannot be sampled it should be replaced by the next available site in the Over10 list. Note that the 25 Base10 sites includes four sites that could not be sampled in 2010. They should be evaluated again to determine if they can be sampled in 2020.
2. Base20: When a site in this category cannot be sampled it should be replaced by the next available site in the Over20 list within the same stratum.

PENSACOLA- PERDIDO BAY ESTUARY PROGRAM

Target Population: The marine coastal waters are defined as those from the head-of-salt (i.e., the landward extent of saltwater incursions) to the confluence with the open ocean. This unique coastal land-water interface zone includes inland waterways, river mouths, open and semi-enclosed estuaries, bays, embayments, and the more open shallow waters within the Pensacola-Perdido bays in Alabama and Mississippi.

Sample Frame: In practice the sample frame defines the target population as it is the only way to determine the specific waters included in the target population. The sample frame was derived from prior National Coastal Assessment sample frame developed by ORD Gulf Breeze Ecology Division. The prior GED sample frame was

enhanced as part of the National Coastal Monitoring Network design by including information from NOAA's Coastal Assessment Framework, boundaries of National Estuary Programs and identification of major coastal systems.

Survey Design: The sites are selected using a spatially-balanced survey design with not stratification or unequal probability of selection.

Panels: The design has the following panels:

1. Base20: Sites to be sampled in 2020
2. Base21: Sites to be sampled in 2021
3. Base22: Sites to be sampled in 2022
4. Base23: Sites to be sampled in 2023
5. Base24: Sites to be sampled in 2023
6. OverSamp: Sites that are over sample sites that will only be used if any of the base site cannot be sampled.

Sample Size: The total expected sample size is 50 sites for entire five-year period. The expected margin of error (or precision) of estimates as a function of sample size is shown in the figure below when interest is in estimating a proportion. For example, may be interested in knowing what proportion of the estuarine area has a chemical contaminant in the sediment that exceeds a specific value/criteria. The precision depends on the true proportion of the area that exceeds the value. For a sample size of 30, if the true proportion is 0.25, then the precision (margin of error) is expected to be approximately 15% when use 90% confidence level. For a sample size of 10, the precision is approximately 25%. If sample 10 sites per year, then after five years, the precision would be approximately 10%. Note that estimating proportions typically requires a larger sample size than when estimating the average sediment contamination for the estuarine area – unless the variability for sediment contamination is large. Without information on the expected variability of a contaminant or other indicator of interest, it is not possible to provide information on the precision as a function of sample size.

Site Use: When a "base" site cannot be sampled for any reason, the site must be replaced using the first available OverSamp site in siteID order.

LONG ISLAND SOUND STUDY BAY ENHANCEMENT

Target Population: The marine coastal waters are defined as those from the head-of-salt (i.e., the landward extent of saltwater incursions) to the confluence with the open ocean. This unique coastal land-water interface zone includes inland waterways, river mouths, open and semi-enclosed estuaries, bays, embayments, and the more open shallow waters within the Long Island Sound Study (LISS) National Estuary Program region.

Sample Frame: In practice the sample frame defines the target population as it is the only way to determine the specific waters included in the target population. The sample frame was derived from prior National Coastal Assessment sample frame developed by ORD Gulf

Breeze Ecology Division. The prior GED sample frame was enhanced as part of the National Coastal Monitoring Network design by including information from NOAA's Coastal Assessment Framework, boundaries of National Estuary Programs and identification of major coastal systems.

The staff at LISS provided a shapefile, "CT_NY_Embayments_for_intensification_02212020" of the bays to be included in the special study for bays. The shapefile included the embayment delineations that were created by Vaudrey minus the mouths of large rivers (the Connecticut, the Thames, the Housatonic, and the East River). This shapefile and the LISS portion of the NCCA 2020 sample frame were combined to create a single shapefile for LISS. An attribute was added to designate polygons that were NCCA_Bays, NCCA_Only or Bays_Only. Ignoring minor differences in polygon lines, the three categories identify bays (NCCA_Bays and Bays_Only) and "open water" (NCCA_Only). Note that LISS added a few bays that were not included in NCCA.

Survey Design: The NCCA 2020 survey design is a stratified probability design that is constructed from two independent designs. The first design consists of sites sampled in 2010 and again to 2015. The second design selects new sites. For LISS the first design consists of eight sites. The second design selects new sites using a spatially balanced survey design with four strata: CT_Bays, CT_NonBays, NY_Bays and NY_NonBays.

Panels: The combined designs for LISS have the following panels:

1. Base20_10_RVT2: Sites from NCCA 2010 and 2015 that will be re-sampled twice in 2020.

2. Base20_10RVT: Sites from NCCA 2010 that will be re-sampled once in 2020.

3. Base20_20RVT2: New sites that will be sampled twice in 2020.

4. Base20_20: New sites that will be sampled once in 2020.

5. Over20_20: New sites that are over sample sites that will only be used if any Base20_20 site cannot be sampled in 2020.

APPENDIX B: GREAT LAKE SPECIAL STUDY DESIGN DESCRIPTIONS

GREEN BAY ENHANCEMENT

TARGET POPULATION: Nearshore and offshore waters of Green Bay in Lake Michigan. Near shore zone is defined as region from shoreline to 30m depth constrained to a maximum of 5 km from shoreline. Offshore waters are all remaining water within Green Bay.

SAMPLE FRAME: The sample frame was developed by the ORD Mid-Continent Ecology Division by Jonathon Launspach under the direction of David Bolgrien. It added polygons for Green Bay nearshore and offshore regions to the existing National Great Lakes Assessment sample frame.

SURVEY DESIGN: The survey design incorporates existing NGLA 2020 sites in Green Bay which total eight (8) sites plus approximately five (5) over sample sites. The NLGA 2020 design was supplemented with a new design for Green Bay that includes 17 additional nearshore sites (for a total of 25 sites) and 25 offshore sites.

STRATIFICATION: STRATIFICATION IS BY NEARSHORE AND OFFSHORE REGIONS OF GREEN BAY FOR THE NEW DESIGN. The NLGA 2020 nearshore design stratifies by Great Lake.

MULTI-DENSITY CATEGORIES: The NLGA 2020 nearshore design uses unequal probability categories by state within each Great Lake. The new design does not use unequal probability categories within strata.

PANELS: The combined designs have a panel

EXPECTED SAMPLE SIZE: The combined designs have 25 sites in nearshore and offshore regions. Over sample sites for offshore region are provided in new design and for nearshore in NGLA 2020 design.

SITE USE: When a "base" site cannot be sampled for any reason, the site must be replaced using an over sample site.

LAKE MICHIGAN ISLANDS ENHANCEMENT

Target Population: Nearshore waters around Islands of Lake Michigan. Near shore zone is defined as region from shoreline to 30m depth constrained to a maximum of 5 km from shoreline.

Sample Frame: The sample frame was developed by the ORD Mid-Continent Ecology Division by Jonathon Launspach under the direction of David Bolgrien. The original sample frame was developed by Jack Kelly (retired from the Midcontinent Ecology

Division in 2015) using National Ocean Atmospheric Administration (NOAA) bathymetric data. This sample frame was updated by Jonathon Launspach (General Dynamics Information Technology contractor) in 2019 under the direction of David Bolgrien at the Office of Research and Development (now GLTED Great Lakes Toxicology and Ecology Division) Mid Continent Ecology Division. The update utilizes a combined Great Lakes Aquatic Habitat Framework (GLAHF) and NOAA shoreline to improve on the original sample frame but remains comparable to the 2010 and 2015 sample frame. The improvements include having a higher resolution shoreline to more accurately estimate the 5 km distance from shore and finer interpolated NOAA data from GLAHF to determine the 30m depth contours, reducing the likelihood of dropped sites. Due to the higher resolution of the shoreline where a coastal feature whose connection to the nearshore of the Great Lakes was less than 200 meters was removed from the frame.

Survey Design: The Island design includes 12 sites and (10) over sample sites. No stratification and equal probability.

Site Selection: This design includes 12 Base sites and 10 over sample sites. Note that the NLGA Near Shore design includes five (5) sites within the Lake Michigan study region. Also, Sleeping Bear National Parks islands are included in the Island study and not the National Park study.

National Parks Service Design

Target Population: Nearshore waters of Sleeping Bear and Indiana Dunes parks in Lake Michigan. Near shore zone is defined as region from shoreline to 30m depth constrained to a maximum of 5 km from shoreline.

Sample Frame: The sample frame was developed by the ORD Mid-Continent Ecology Division by Jonathon Launspach under the direction of David Bolgrien. The original sample frame was developed by Jack Kelly (retired from the Midcontinent Ecology Division in 2015) using National Ocean Atmospheric Administration (NOAA) bathymetric data. This sample frame was updated by Jonathon Launspach (General Dynamics Information Technology contractor) in 2019 under the direction of David Bolgrien at the Office of Research and Development (now GLTED Great Lakes Toxicology and Ecology Division) Mid Continent Ecology Division. The update utilizes a combined Great Lakes Aquatic Habitat Framework (GLAHF) and NOAA shoreline to improve on the original sample frame but remains comparable to the 2010 and 2015 sample frame. The improvements include having a higher resolution shoreline to more accurately estimate the 5 km distance from shore and finer interpolated NOAA data from GLAHF to determine the 30m depth contours, reducing the likelihood of dropped sites. Due to the higher resolution of the shoreline where a coastal feature whose connection to the nearshore of the Great Lakes was less than 200 meters was removed from the frame.

The sample frame for this study are the polygons for the nearshore areas of Sleeping Bear and Indiana Dunes parks explicitly identified in the existing base frame.

Survey Design: The National Park study design includes 12 sites and (10) over sample sites. No stratification and equal probability.

Site Selection Summary: This design includes 38 Base sites and 20 over sample sites. Note that the NLGA Near Shore design includes three (3) sites within the National Park study region. Also, Sleeping Bear National Parks islands are included in the Island study and not the National Park study.

Sample Frame: The sample frame was developed by the ORD Mid-Continent Ecology Division by Jonathon Launspach under the direction of David Bolgrien. The original sample frame was developed by Jack Kelly (retired from the Midcontinent Ecology Division in 2015) using National Ocean Atmospheric Administration (NOAA) bathymetric data. This sample frame was updated by Jonathon Launspach (General Dynamics Information Technology contractor) in 2019 under the direction of David Bolgrien at the Office of Research and Development (now GLTED Great Lakes Toxicology and Ecology Division) Mid Continent Ecology Division. The update utilizes a combined Great Lakes Aquatic Habitat Framework (GLAHF) and NOAA shoreline to improve on the original sample frame but remains comparable to the 2010 and 2015 sample frame. The improvements include having a higher resolution shoreline to more accurately estimate the 5 km distance from shore and finer interpolated NOAA data from GLAHF to determine the 30m depth contours, reducing the likelihood of dropped sites. Due to the higher resolution of the shoreline where a coastal feature whose connection to the nearshore of the Great Lakes was less than 200 meters was removed from the frame.

Lake Erie Intensification

Target Population: The Lake Erie Basin study includes the nearshore waters of Lake Erie within the United States. Nearshore zone is defined as region from shoreline to 30m depth constrained to a maximum of 5 km from shoreline.

Design Description: On July 11, 2019, a Lake Erie design for 90 sites with 30 in each basin (east, central, west) was added. Existing design has 45 base sites in Lake Erie with 13 in East, 21 in Central and 11 in West basins. So new design requires 17 in East, 9 in Central and 19 in West basins. Design is stratified by basin and equal probability within basin. In addition, design has 5 over sample sites within each basin. Note that survey design weights reflect the two separate designs. Final weights for Lake Erie basin design will have to combine information from the two designs and will use the weight categories from the Near Shore design combined with the basin weight categories. That will be needed to ensure have equal probability of selection of sites within the combined weight categories.

Note that the Lake Erie enhancement sites will not collect all the NGLA indicators. Only those sites that are included in NGLA nearshore design will collect all NGLA indicators.

Site Summary: PANEL_USE has Lake Erie panels Erie20_20 which are the base sites for the 45 additional sites and Erie_OverSamp if any site in Erie20_20 panel must be replaced within that stratum.

Design was completed so that siteIDs for the original survey design do not change.

Sample Frame: The sample frame was developed by the ORD Mid-Continent Ecology Division by Jonathon Launspach under the direction of David Bolgrien. The original sample frame was developed by Jack Kelly (retired from the Midcontinent Ecology Division in 2015) using National Ocean Atmospheric Administration (NOAA) bathymetric data. This sample frame was updated by Jonathon Launspach (General Dynamics Information Technology contractor) in 2019 under the direction of David Bolgrien at the Office of Research and Development (now GLTED Great Lakes Toxicology and Ecology Division) Mid Continent Ecology Division. The update utilizes a combined Great Lakes Aquatic Habitat Framework (GLAHF) and NOAA shoreline to improve on the original sample frame but remains comparable to the 2010 and 2015 sample frame. The improvements include having a higher resolution shoreline to more accurately estimate the 5 km distance from shore and finer interpolated NOAA data from GLAHF to determine the 30m depth contours, reducing the likelihood of dropped sites. Due to the higher resolution of the shoreline where a coastal feature whose connection to the nearshore of the Great Lakes was less than 200 meters was removed from the frame.