Documentation for the NERRS SWMP Annual National-Level Reporting Template

Prepared for:

NOAA and the NERRS Science Collaborative

May 22, 2018

LimnoTech

Water Environment | Scientists Engineers

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1 Introduction

The annual national-level reporting template is intended to provide a simple, system-wide synthesis of data trends for all reserves within the National Estuarine Research Reserve System (NERRS) that can be used to answer the question, "How is estuary water quality doing throughout the entire NERR system?" on an annual basis. This documentation provides a guide on how to use R, Excel, and PowerPoint to generate a national-level annual report as a PDF that can be distributed electronically or printed.

There are two sets of automated scripts, written in R, involved in producing an annual national-level report. The first set of scripts use results from individual reserve trend analyses to create a summary of regional trends and several trend maps. The analyses are intended to familiarize the user with the trend results from across the system and allow the user to evaluate whether or not water quality trends are changing over time throughout the system on a parameter-by-parameter basis. The second set of scripts are used to populate a pre-formatted, empty PowerPoint template with plots, trend results, text, and imagery.

The national-level template and data trend summary are customizable. To limit user interaction with the R programming language, and ease the report generation process, two Excel templates have been included to help users set custom settings: 1. National_Level_Plotting_Variables.xlsx and 2. National_Level_Template_Text_Entry.xlsx. Instead of having the user modify the R scripts directly, the user can simply update these two Excel templates from year-to-year and re-run the plot and report generation scripts.

This documentation outlines all of the steps necessary to generate a national-level data summary and plots, create an unformatted (raw) national-level template, and format the raw template into a final national-level report suitable for distribution either electronically or in print. It also provides reference information that users may find helpful, including:

- Descriptions of all files within a national-level report folder
- Methodologies for each type of data analysis
- Detailed information on working with National_Level_Plotting_Variables.xlsx and National_Level_Template_Text_Entry.xlsx

2 Quick Start Guides,Workflow Diagrams and System Requirements

The quick start guides and workflow diagrams are intended to give the user a brief introduction to and overview of the steps necessary to create a national-level annual report. This section includes two "quick start" guides that outline the minimum number of steps the user must take to create a national-level report. Two workflow diagrams that outline the relationships between the automated scripts are included, and a brief summary of system requirements is also provided.

2.1 Quick Start Guides

There are two major tasks associated with generating an annual national-level report: 1. producing a national-level data trend summary and plots; and 2. generating a raw national-level template. There are two quick start guides that break these two tasks down into sub-steps that the user must execute to develop a final report:

- Generating a national-level data summary and plots
- Generating a raw national-level template

2.1.1 Generating National-Level Data Summary and Plots

1. Populate variables and settings in National_Level_Plotting_Variables.xlsx (Figure 1). Additional details on modifying this file can be found in section 5.

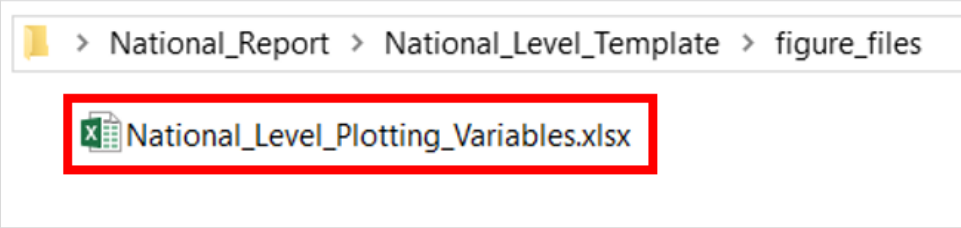


Figure 1. Screenshot of the National-Level_Plotting_Variables.xlsx File

2. Put handoff files from all reserve data trend analyses into the "handoff_files" folder (Figure 2).

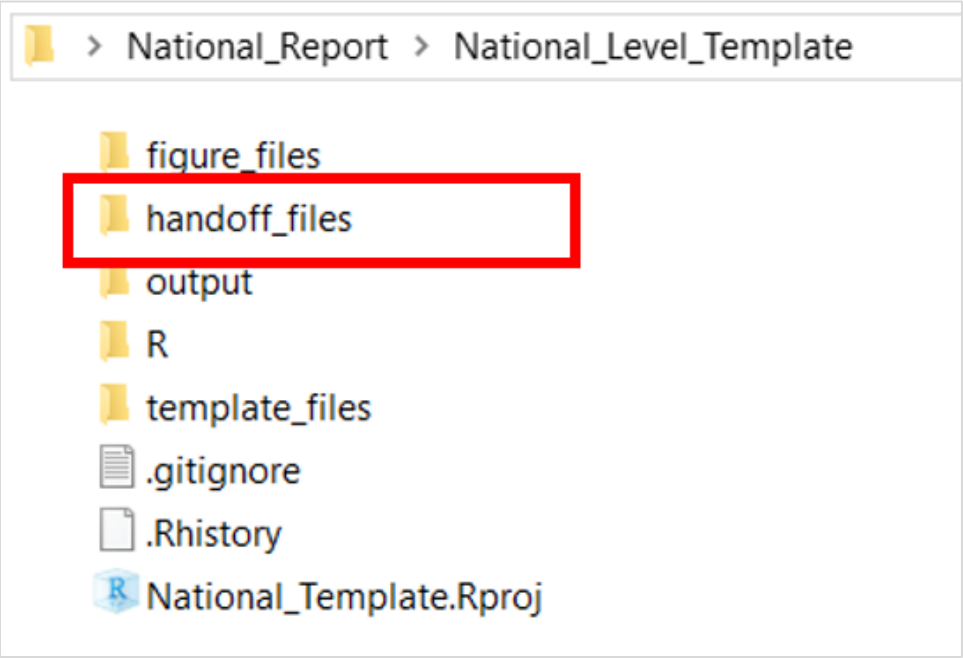


Figure 2. Screenshot of the "handoff_files" Subfolder

3. Double click on National_Template.Rproj to launch RStudio (Figure 3).

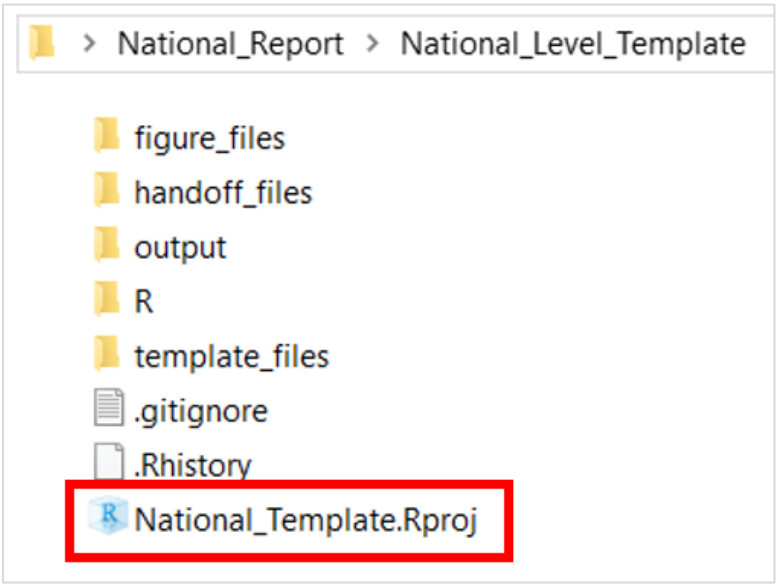


Figure 3. Screenshot of the National_Template.Rproj File

4. Open 01_Generate_National_Summaries.R from the "Files" window (Figure 4).

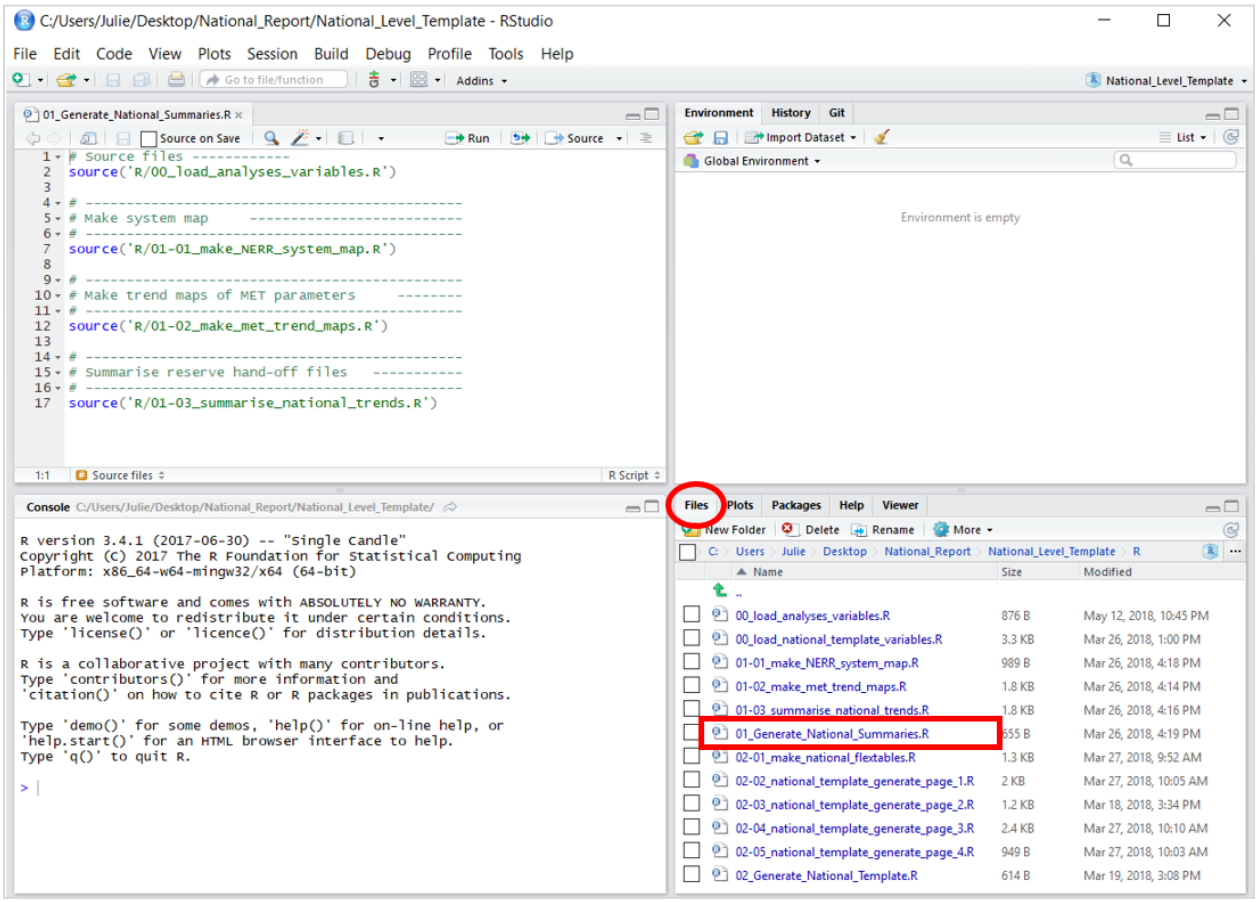


Figure 4. Screenshot of the RStudio User Interface, the Location of the File Window, and the Location of the 01_Generate_National_Summaries.R Script

5. Select all of the text within the editor window by clicking in the window and then using crtl+a on the keyboard (Figure 5).

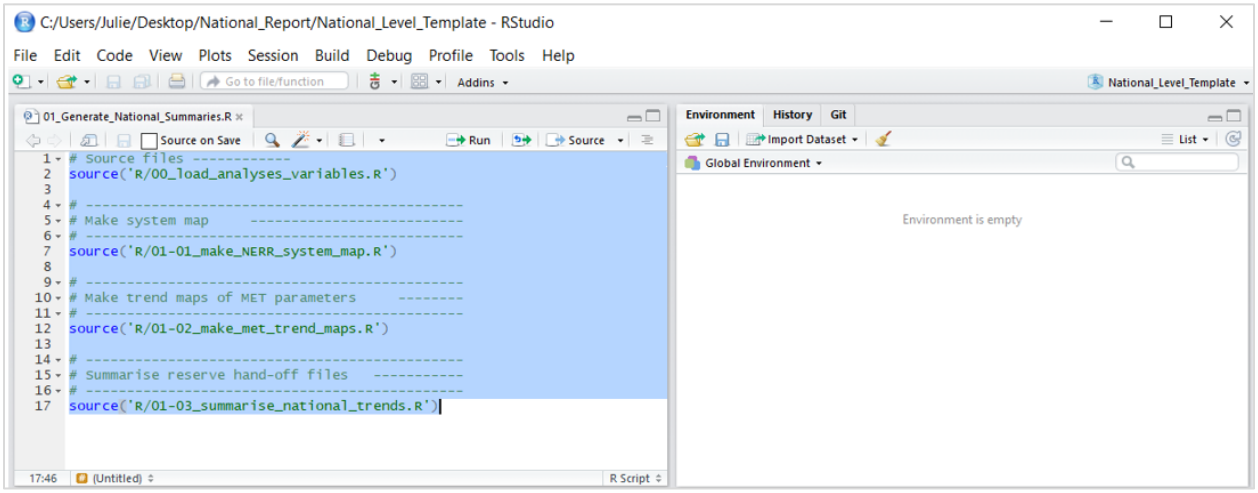


Figure 5. Screenshot of Selected Text in 01_Generate_National_Summaries.R

6. With all of the text selected, click on the "Run" button in the upper right-hand corner of the editor window (Figure 6).

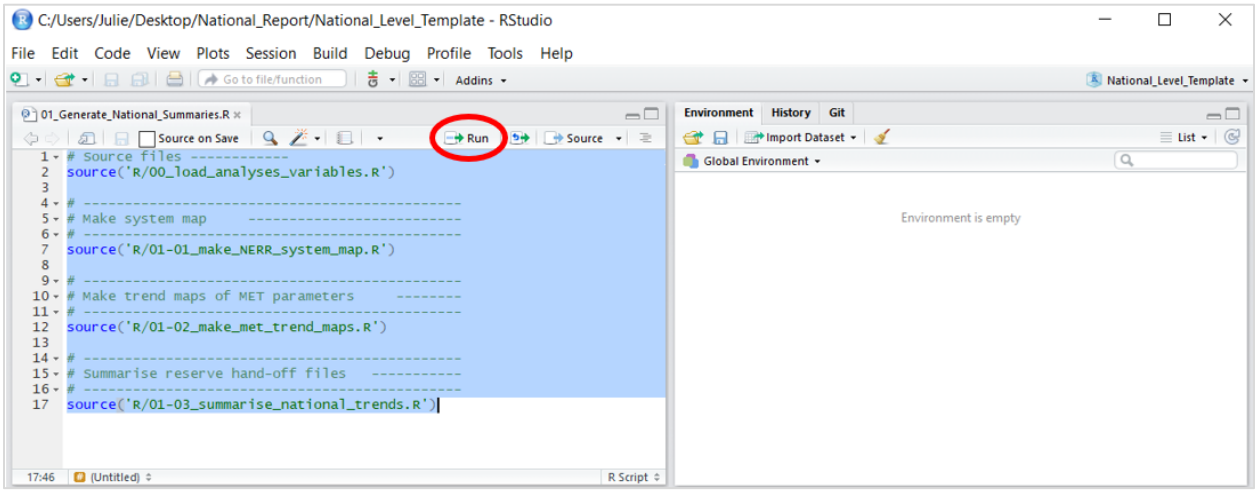


Figure 6. Screenshot of Selected Text in 01_Generate_National_Summaries. R and the Location of the Run Button in the RStudio Editor Window

7. Verify that figures were produced in the output folder.

2.1.2 Generating a Raw National-Level Template

Generating a raw national-level template assumes that all analyses associated with 01_Generate_National_Summaries.R have been run and there are plots in the output folder.

1. Review plots and data summary in the output folder (Figure 7).

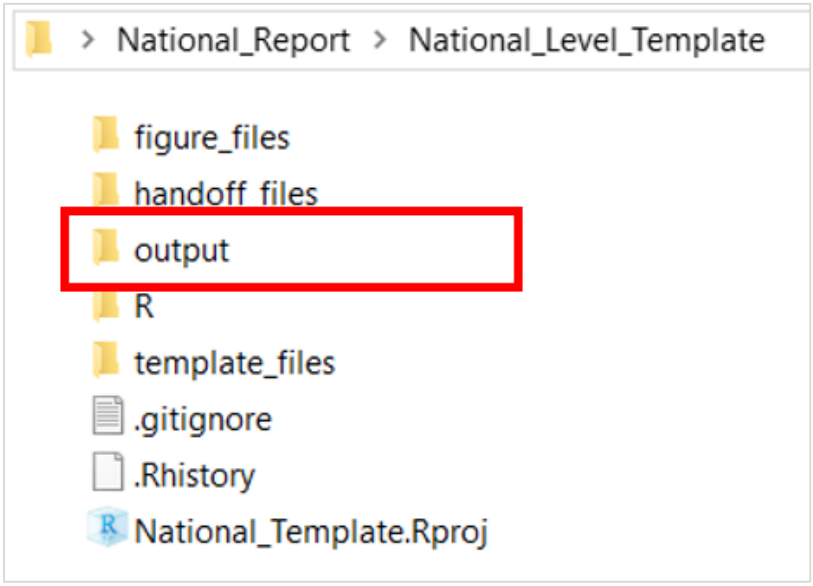


Figure 7. Screenshot of the output Subfolder

2. Populate text, images, and R figures in the National_Level_Template_Text_Entry.xlsx file (Figure 8). Additional details on modifying this file can be found in section 6.

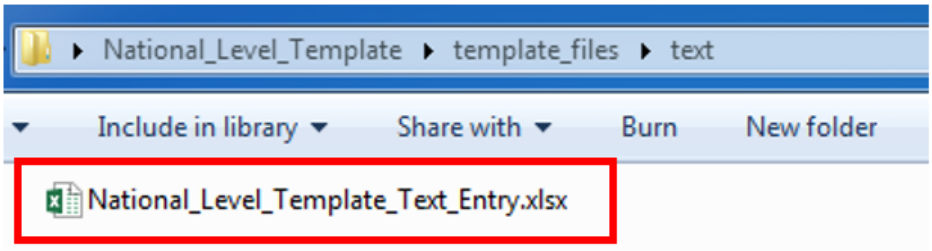


Figure 8. Screenshot of National_Level_Template_Text_Entry.xlsx Workbook

3. Double click on National_Template.Rproj to launch RStudio (Figure 9).

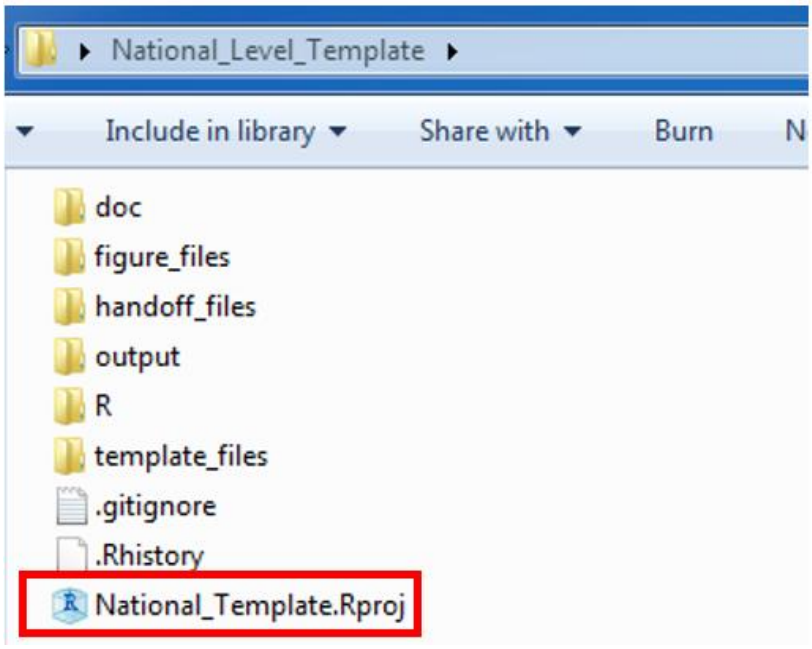


Figure 9. Screenshot of the National_Template.Rproj File within the Apalachicola Bay Folder

4. Open 02_Generate_Reserve_Template.R from the "Files" window (Figure 10).

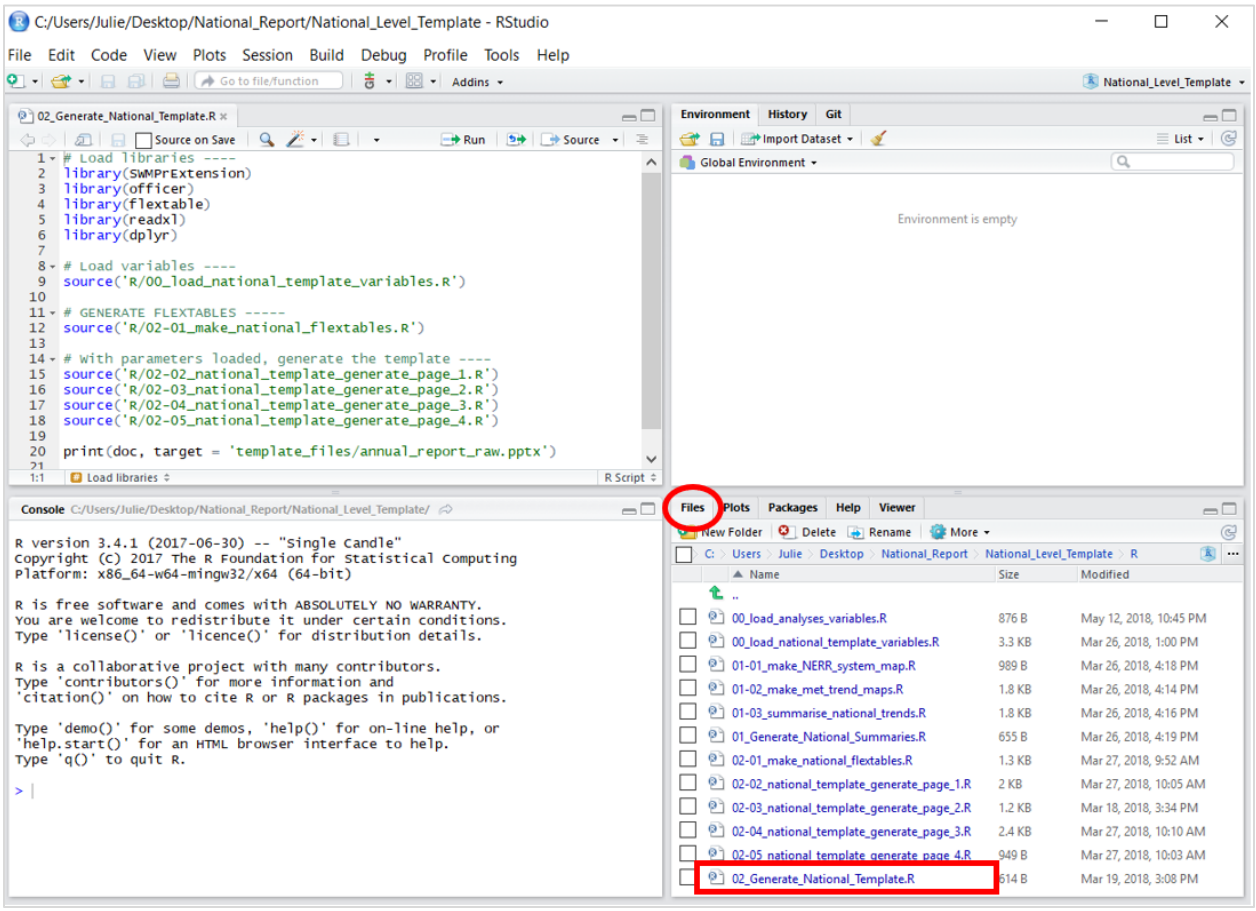


Figure 10. Screenshot of the RStudio User Interface, the Location of the File Window, and the Location of the 02_Generate_National_Template.R Script

5. Select all of the text within the editor window by clicking in the window and then using crtl+a on the keyboard (Figure 11).

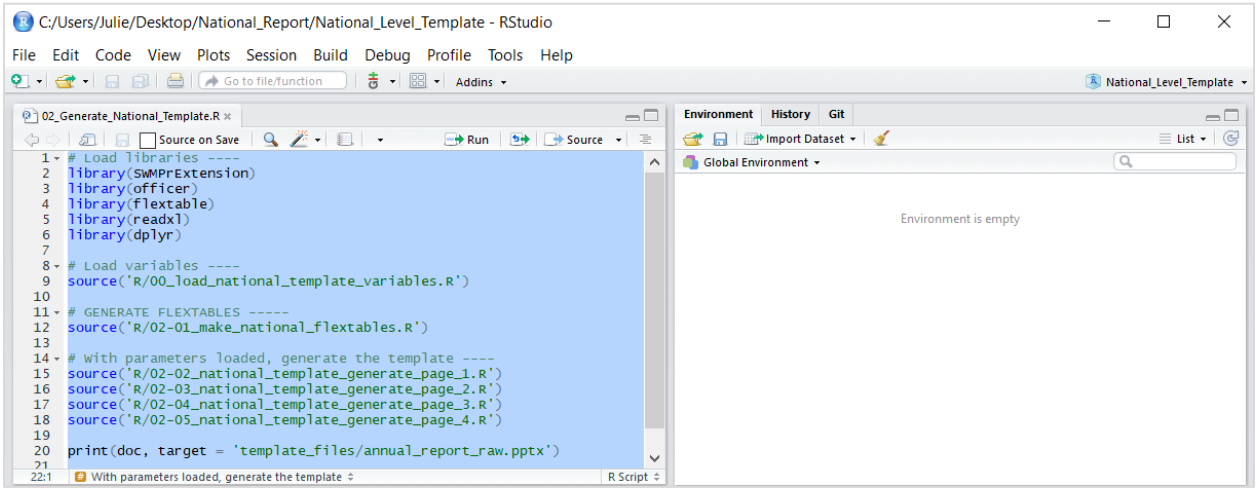


Figure 11. Screenshot of Selected Text in 02_Generate_National_Level_Template. R

6. With all of the text selected, click on the "Run" button in the upper right-hand corner of the editor window (Figure 12).

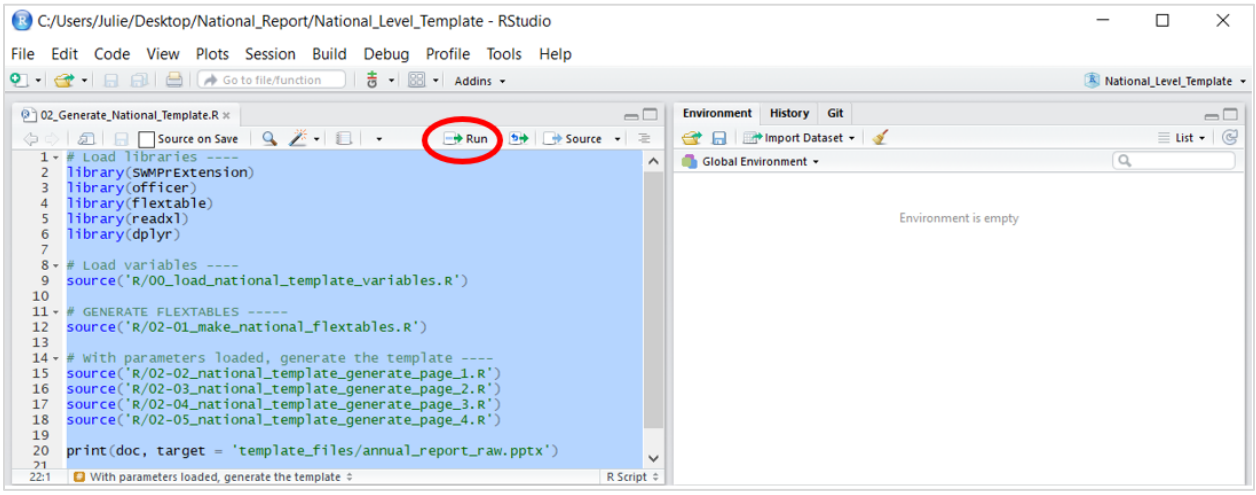


Figure 12. Screenshot of Selected Text in 02_Generate_National_Level_Template. R and the Location of the Run Button in the RStudio Editor Window

7. Verify that a raw national-level template was produced (Figure 13).

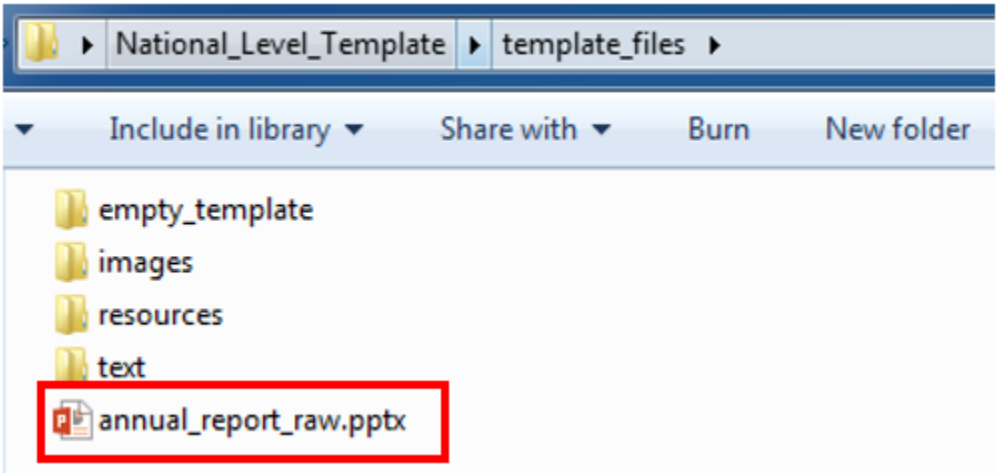


Figure 13. Screenshot of Raw National-Level Template

8. Complete manual formatting steps outlined in section 7.

2.2 Workflow Diagrams

There are two separate workflows that must be implemented to produce a raw national-level report: the data summary/plot generation workflow and the template generation workflow. The data summary/plot generation workflow produces all of the figures and generates all of the analyses outlined in section 3. The template generation workflow depends on the results from the data summary/plot generation workflow. As part of executing the report generation workflow, the user should review the

data summary and the plots produced by the data summary/plot generation workflow, and then produce text that appropriately describes the results of the analyses. After executing both workflows, the user can then format the raw national-level report into the final national-level report by using the formatting steps outlined in section 7.

The workflow diagrams are intended to help the user understand the relationships between the two user Excel templates (National_Level_Plotting_Variables.xlsx and National_Level_Template_Text_Entry.xlsx), R scripts, the summaries/plots that are produced, and the national-level template that is populated with these data plots. Each workflow contains four different types of colored shapes (Figure 14):

- The red rectangle—steps that require a user action.
- The blue oval—automated loading of variables.
- The blue rectangle—an analysis and the generation of a plot.
- The green rectangle—production of an output (i.e., a plot or a summary table).

Figure 14. The Four Types of Unique Actions with the Plot Generation and Template Generation Workflows

Two versions of the workflow are provided (Figures 15 and 16): one version describes each step in user-friendly terms (narrative-based workflow) and one highlights the files and R scripts used at each step of the process (script-based workflow).

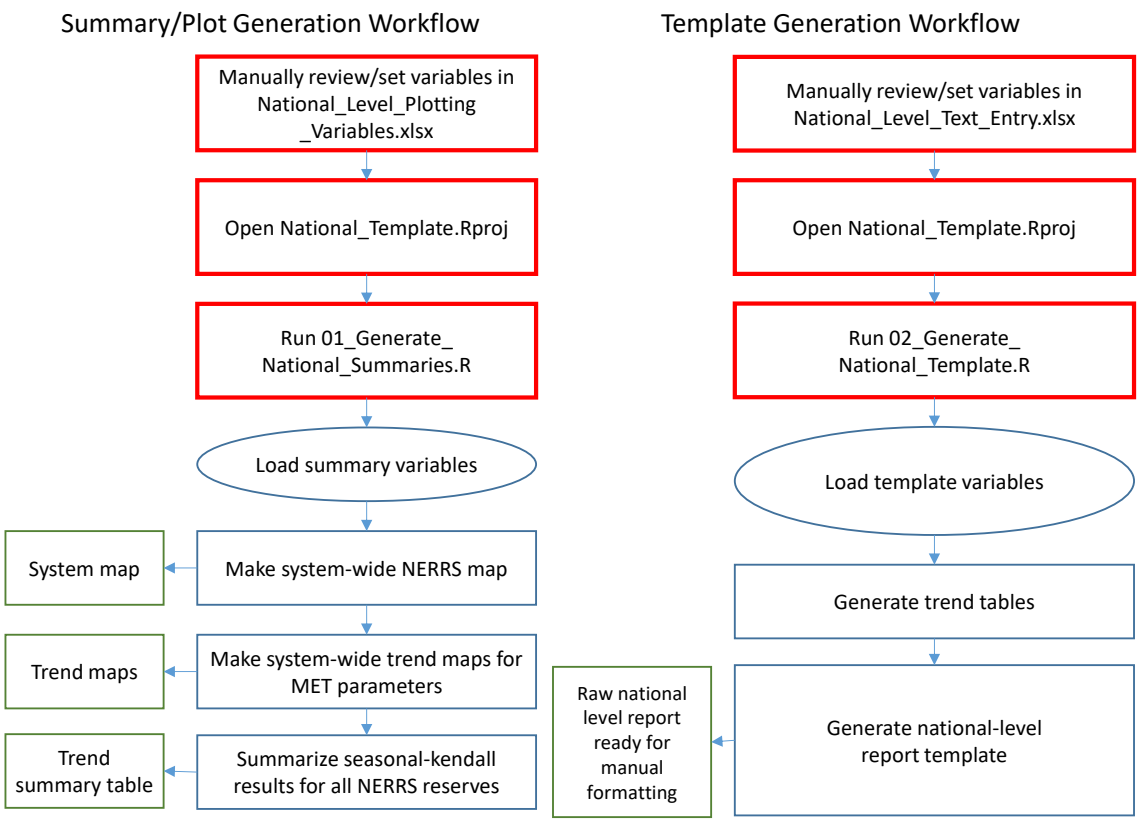


Figure 15. Narrative Workflow for the NERRS SWMP Annual National-Level Reporting Template Scripts

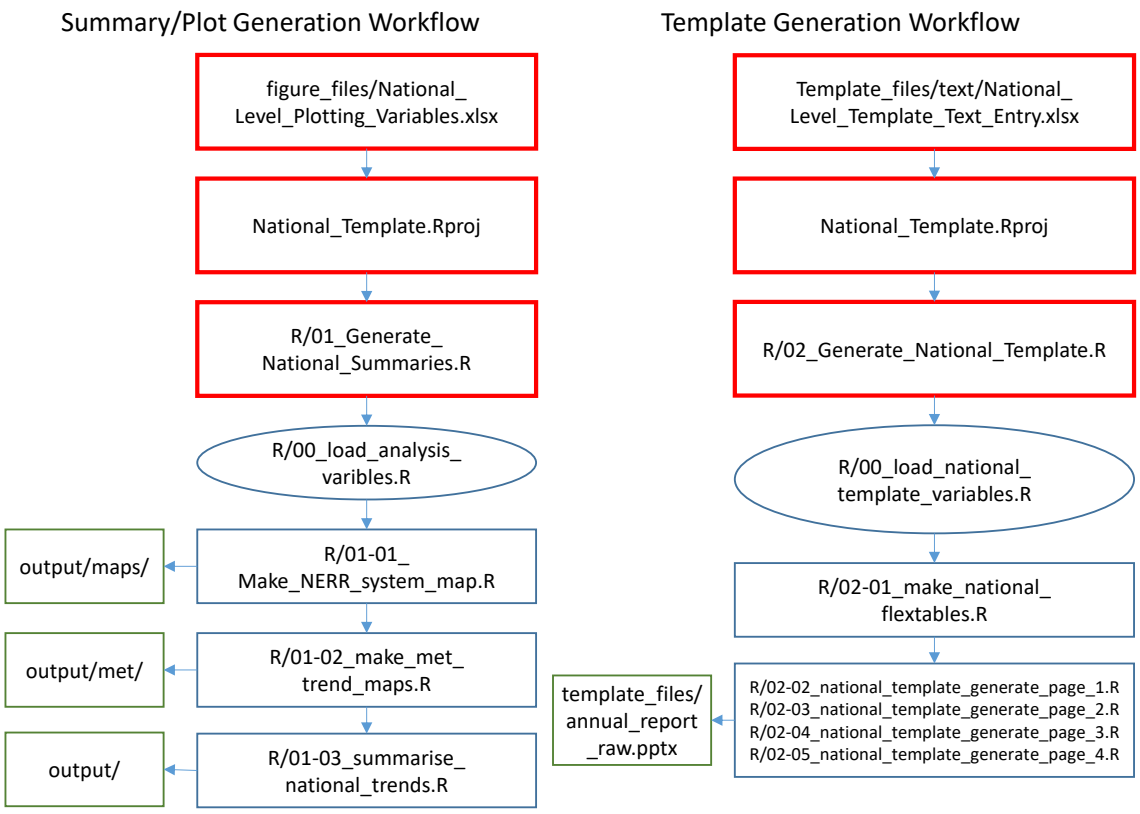


Figure 16. Script-Based Workflow for the NERRS SWMP Annual National-Level Reporting Template Scripts

2.3 System Requirements

To run the NERRS SWMP Reporting Scripts the user must have R and R studio as well as several additional R packages. The system requirements are outlined below.

Computer

- Windows
- Mac OSX

Microsoft Office

- 2007 and greater

Note: Microsoft office is not required to successfully run the national-level scripts, but it is recommended.

R

- R 3.4.1 or greater
- Rstudio 1.0.153 or greater

R Packages

- broom
- dplyr
- EnvStats
- flextable
- ggplot2
- ggthemes
- grDevices
- leaflet
- lubridate
- magrittr
- maptools
- methods
- officer
- tidyr
- scales
- RColorBrewer
- rgdal
- rgeos
- rlang
- stringr
- sp

3 Core Analyses and Plots

The national-level template scripts do not generate any unique national-level analyses. Instead, the scripts summarize trend results from the reserve-specific analyses in both tabular and map form. There are three core analyses and plots associated with the national-level report: a summary table of seasonal Kendall trend results for all NERRS reserves and parameters present in the "handoff_files" folder, a set of trend maps for meteorological parameters, and a system-wide map that displays the locations of all the reserves in the system.

3.1 Summary of Trend Data (SWMPrExtension function: summarise_handoff_files)

Output subfolder: <none>

The trend data summary groups reserves in the system into eight categories: Caribbean, Great Lakes, Gulf of Mexico, Midatlantic, Northeast, Pacific, Southeast, and West Coast. The summary provides a count of all reserves in a given category, the number of stations, and station counts for each of the four trend categories (increasing, decreasing, no trend, and insufficient data) (Figure 17).

	A	B	C	D	E	F	G	H
1	Region	reserve_ct	station_ct	decreasing	increasing	no_trend	insuff_data	parameter
8	Caribbean	1	4	0	1	3	0	chla_n
9	Great Lakes	2	8	0	1	3	4	chla_n
0	Gulf of Mexico	5	21	2	5	14	0	chla_n
1	Midatlantic	5	20	2	3	15	0	chla_n
2	Northeast	4	16	1	1	14	0	chla_n
3	Pacific	1	NA	NA	NA	NA	NA	chla_n
4	Southeast	5	20	8	5	6	1	chla_n
5	West Coast	6	25	3	1	21	0	chla_n

Figure 17. Screenshot of Trend Summary of Chlorophyll-a Data in NERRS_Trend_Summary_From_Handoff_Files.csv

3.2 National Map (SWMPrExtension function: res_national_map)

Output subfolder: maps

The national map function highlights all of the reserves within the NERRS and the states where the reserves are located (Figure 18).

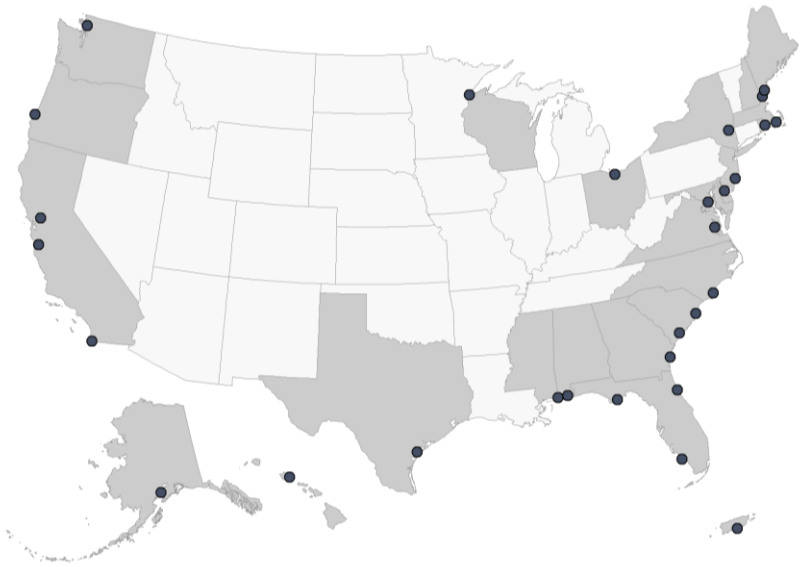


Figure 18. NERRS National Map

3.3 National Seasonal Kendall Map (SWMPrExtension function: national_sk_map)

Output subfolder: met > trend_sk_maps

The national seasonal Kendall map summarizes seasonal Kendall trend results for all meteorological parameters found in the 'handoff_files" folder (Figure 19).

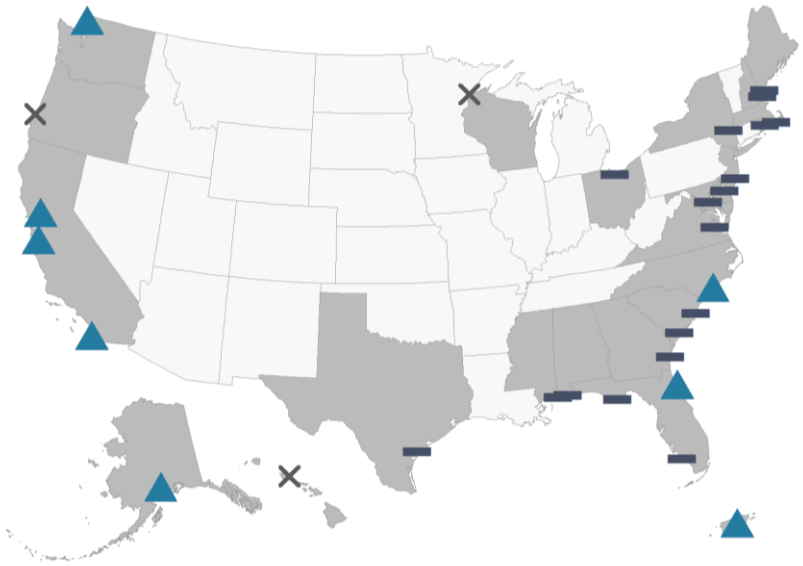


Figure 19. Air temperature results (data from 2007-2016)

4 Folder Contents and Additional File Descriptions

This section provides a reference of all the subfolders and files within the national-level directory. Each folder and its contents, within a national-level report folder, are described below.

4.1 doc

The **doc** folder contains user documentation for running the R scripts and creating the national-level report.

4.2 figure_files

The **figure_files** folder contains the **National_Level_Plotting_Variables.xlsx** Excel workbook. This workbook is used to feed variable settings into the R scripts in order to generate data plots. This workbook is one of the main products in the folder that the user will interact with. For detailed information on the content within the National_Level_Plotting_Variables.xlsx workbook see section 5. For the plot generation scripts to work properly, the user should not change the name or location of this file.

4.3 handoff_files

The **handoff_files** folder contains handoff files generated by the national-level reporting scripts. Since it is not possible to load all data from all reserves into R at once and perform data analyses, the handoff files provide summaries of seasonal Kendall trend results from each individual reserve. These files are loaded into R via the national-level reporting scripts and are used to create regional trend summaries, formatted trend tables for use in the report, and trend maps for meteorological parameters.

4.4 output

The **output** folder contains all of the figures produced by the R scripts for the national-level report and the regional trend summary. There are four subfolders in this directory: **maps**, **met**, **nut**, and **wq**. The maps subfolder contains one system-wide map that includes all NERRS reserve locations. The met subfolder contains another subfolder called **trend_sk_maps**. This folder contains the seasonal Kendall result maps for each meteorological parameter. The final two subfolders, wq and nut, are empty. They were included as part of the national-level report template in case future analyses are implemented for water quality and nutrient data. The data trend summary (**NERRS_Trend_Summary_From_Handoff_Files.csv**) generated by the national-level scripts is placed directly in the output folder.

4.5 R

The **R** folder contains all of the R scripts used to generate data plots and the raw national-level report. The function of each individual file is described below. Scripts in this folder fall into one of two

categories: scripts used to generate data plots and scripts used to generate the national-level report. The workflow diagram in section 2.2 provides a visual summary of this information.

4.5.1 Initial Install

4.5.1.a 00_initial_installation

The **00_initial_installation.R** script will install all of the R packages necessary to run the national-level template scripts. This script will also install Phantom JS on the user's system, which is only required for reserve-level mapping functions and not the national-level mapping functions. If the user does not want to install Phantom JS, then that portion of the script should be commented out. This script only needs to be run if the user does not have all of the relevant R packages and Phantom JS on their system.

4.5.2 Plot Generation Scripts

The plot generation scripts are used to generate trend plots and a data trend summary based on the user's settings in the National_Level_Plotting_Variables.xlsx and the National_Level_Template_Text_Entry.xlsx workbooks. To run these scripts and generate a complete set of plots, the user should first open the National_Template.Rproj file in the main directory, and then run the 01_Generate_National_Summaries.R script.

4.5.2.a 00_load_analyses_variables.R

The **00_load_analyses_variables.R** script loads variables from National_Level_Plotting_Variables.xlsx into R that are required to generate the data trend summary and the meteorological trend maps. Complete details on the variables within National_Level_Plotting_Variables.xlsx can be found in section 5.

4.5.2.b 01_Generate_National_Summaries.R

The **01_Generate_National_Summaries.R** is the primary script the user will interact with to generate the national-level data trend summary and plots. Running this script will call all of the other scripts necessary to load variables, clean data, and generate all plots in the output folder.

4.5.2.c 01-01_make_NERR_system_maps.R

The **01-01_make_NERR_system_map.R** script produces the national map in the output > maps folder. It produces a system-wide map that includes all of the reserves in the system.

4.5.2.d 01-02_make_met_trend_maps.R

The **01-02_make_met_trend_map.R** script produces the maps that are in the output > met > trend_sk_maps folder. It produces a series of maps that summarize the seasonal Kendall trend results for each meteorological parameter at each reserve.

4.5.2.e 01-03_summarise_national_trends.R

The **01-03_summarise_national_trends.R** script produces a system-wide summary table of seasonal Kendall trend results. The results are aggregated on a regional basis.

4.5.3 Report Generation Scripts

The report generation scripts are used to generate a raw version of the national-level report based on user-specified settings in National_Level_Template_Text_Entry.R. To run these scripts and generate a raw version of the national-level report, the user should first open the National_Template.Rproj file in the main directory, and then, run the 02_Generate_National_Template.R script. After generating a raw version of the national-level report, the user can then complete the formatting steps outlined in section 7 to produce a final version of the national-level report.

4.5.3.a 00_load_national_template_variables.R

The **00_load_national_template_variables.R** script loads variables from National_Level_Template_Text_Entry.xlsx into R that will be used to add text, images, and R figures into the raw national-level template. Complete details on the variables within National_Level_Template_Text_Entry.xlsx can be found in section 6.

4.5.3.b 02_Generate_National_Template.R

The **02_Generate_National_Template.R** script is the primary script that the user will interact with to generate the raw national-level template. Running this script will call all of the other scripts necessary to load variables, create trend tables, and generate a complete raw national-level template.

4.5.3.c 02-01_make_national_flextables.R

The **02-01_make_national_flextables.R** script generates properly formatted trend tables for page two of the national-level report.

4.5.3.d 02-02_national_template_generate_page_1.R

The **02-02_national_template_generate_page_1.R** script is used to create a copy of the empty national-level template and to populate it with text and images.

4.5.3.e 02-03_national_template_generate_page_2.R

The **02-03_national_template_generate_page_2.R** script is used to add a second page to the national-level template and to populate it with text and images.

4.5.3.f 02-04_national_template_generate_page_3.R

The **02-04_national_template_generate_page_3.R** script is used to add a third page to the national-level template and to populate it with the text, images, and plots or maps.

4.5.3.g 02-05_national_template_generate_page_4.R

The **02-05_national_template_generate_page_4.R** script is used to add a fourth page to the national-level template and to populate it with text and images.

4.6 template_files

The **template_files** folder contains all of the material necessary to generate a raw national-level report. There are four subfolders within this folder: **empty_template**, **images**, **resources**, and **text**. In addition to these subfolders, there may be a file called **annual_report_raw.pptx**.

4.6.1 empty_template

The **empty_template** folder contains one file: **National_Level_Template.pptx**. This PowerPoint file is a blank version of the national-level report that will be used by the R scripts to generate a raw report based on user-specified settings in the National_Level_Template_Text_Entry.xlsx workbook. The user does not need to modify this file or folder.

4.6.2 images

The **images** folder contains all images that the user would like to use in the national-level report.

4.6.3 resources

The **resources** folder contains a file called **Template_Resources.pptx**. This file contains preformatted shapes that the user will find helpful when formatting annual_report_raw.pptx into a final national-level report. For the national-level report, Template_Resources.pptx contains one slide with shapes for the first page. For detailed information on Template_Resources.pptx and the formatting of the final national-level template, see section 7.

4.6.4 text

The **text** folder contains the **National_Level_Template_Text_Entry.xlsx** Excel workbook. This Excel workbook is used to feed text, images, and R figures into the R scripts that populate the raw national-level template. For detailed information on the content within the National_Level_Template_Text_Entry.xlsx workbook see section 6. For the national-level template generation scripts to work properly, the user should not change the name or location of this file.

4.6.5 annual_report_raw.pptx (may not be present)

The **annual_report_raw.pptx** file is a raw version of the national-level template. If this file exists within *template_files* folder it means that the 02_Generate_National_Template.R script has been run based on the text settings in National_Level_Template_Text_Entry.xlsx workbook.

4.7 .gitignore

Git is a version control system that tracks changes in a folder over time. The .**gitignore** file tells git what files within a folder can be ignored when tracking changes. This file is not critical to the production of the national-level report.

4.8 .Rhistory

The .**Rhistory** file saves the history of a previous R session. It is not critical to the production of the national-level report.

4.9 .Rprofile

The .**Rprofile** file is a file that can be used to run R scripts that are run when R/RStudio is launched. Currently, there are no R files that are necessary to run at launch. The user does not need to modify this file.

4.10 National_Template.Rproj

The **National_Template.Rproj** file is a R project file. This is a file format used by RStudio to make project organization easier for users. When the user double clicks on this file, RStudio will launch and the working directory will automatically be set to the folder where the R project file exists. Working with R via a R project, all file path references can be relative instead of absolute. If file references are relative, then the R project can be easily transferred between computers without having to modify any R scripts.

The user should first open National_Template.Rproj if they want to produce data plots or a raw national-level report.

5 Plotting Variables Guide

The **National_Level_Plotting_Variables.xlsx** workbook has been developed to facilitate the production of the national-level annual report and is intended to minimize user interaction with the R scripts that produce the data summary and plots.

It is important to note that columns should not be inserted between the existing columns and existing columns should not be deleted.

5.1 Parameters

5.1.1 Parameter

This column contains a list of parameters to be analyzed. The format of each parameter name matches the column headings of a `swmpr` object.

Possible values:

- Any parameter name listed in the `parameters` attribute of a `swmpr` object

Additional formatting requirements:

- Case sensitive

5.1.2 Parameter_Category

Values in this column are used internally by the annual reporting scripts. If a new parameter is added to the Parameter field then `Parameter_Category` must also be specified.

Possible values:

- wq
- met
- nut

Additional formatting requirements:

- Case sensitive
- Lowercase abbreviation required

5.2 Reserve_Regions

5.2.1 NERR.Site.ID

This column contains a list of 3-letter NERR site identification codes for all NERRs in the system. If new reserves are added to the system, the appropriate 3-letter code should also be added.

Possible values:

- Any 3-letter abbreviation for a NERR

Additional formatting requirements:

- Case sensitive

5.2.2 Reserve.Name

This column contains the full reserve names associated with each 3-letter NERR site identification code.

Possible values:

- The full name of a NERRS reserve

Additional formatting requirements:

- None

5.2.3 Region

This column contains the region name associated with each reserve. These grouping assignments were approved by the Technical Advisory Committee composed of research coordinators, Central Data Management Office (CDMO) staff, and SWMP technicians.

Possible values:

- One of eight regions: Caribbean, Great Lakes, Gulf of Mexico, Midatlantic, Northeast, Pacific, Southeast, West Coast

Additional formatting requirements:

- Case sensitive

6 Text Entry Guide

The **National_Level_Template_Text.xlsx** workbook has been developed to facilitate the production of the national-level annual report and to help the user organize text, images, and plots or maps. The workbook is also intended to minimize user interaction with the R scripts that produce the national-level annual report.

It is important to note that columns should not be inserted between the existing columns and existing columns should not be deleted.

6.1 Worksheets

There are six worksheets within the National_Level_Template_Text.xlsx workbook: Years_of_Interest, Page_1, Page_2_NERRS_in_Trend_Table, Page_2_Params_in_Trend_Table, Page_3, and Page_4. The first worksheet is used to set the target year of interest and the year range of interest, while the other five worksheets correspond to pages in the national-level report.

6.2 Column Descriptions

6.2.1 Years_of_Interest

6.2.1.a Range

The range is the minimum and maximum year the user wants to use for plotting and statistical analysis.

Possible Values:

- Any two years in YYYY format

Formatting requirements:

- integer

6.2.1.b Target_Year

The target year is the year the user wants to highlight in the annual national-level report.

Possible Values:

- Any year in YYYY format

Formatting requirements:

- Integer

6.2.2 Trend Table (Worksheets Page_2_NERRS_in_Trend_Table, Page_2_Params_in_Trend_Table)

6.2.2.a NERR.Site.ID

This column contains a list of 3-letter NERR site identification codes for all NERRs in the system. If new reserves are added to the system, the appropriate 3-letter code should also be added.

Possible values:

- Any 3-letter abbreviation for a NERR

Additional formatting requirements:

- Case sensitive

6.2.2.b Reserve.Name

This column contains the full reserve names associated with each 3-letter NERR site identification code. These names will be displayed in the trend tables in the raw national-level template.

Possible values:

- The full name of a NERRS reserve

Additional formatting requirements:

- None

6.2.2.c Region

This column contains the region name associated with each reserve. These grouping assignments were approved by the Technical Advisory Committee composed of research coordinators, Central Data Management Office (CDMO) staff, and SWMP technicians.

Possible values:

- One of eight regions: Caribbean, Great Lakes, Gulf of Mexico, Midatlantic, Northeast, Pacific, Southeast, West Coast

Additional formatting requirements:

- Case sensitive

6.2.2.d Parameter

This column contains a list of parameters that will be included in the national-level report trend table. The format of each parameter name in this column must match the column headings of a `swmpr` object.

Possible values:

- Any parameter name listed in the parameters attribute of a `swmpr` object

Additional formatting requirements:

- Case sensitive

6.2.3 Report Text (Worksheets Page_One, Page_Three, Page_Four)

Within the three report text worksheets there are six columns that are common to all worksheets: Variable_Name, Type, Descriptions, Change, Text, and File_Name. There is one column that is only used in the Page_Two worksheet: Parameter.

6.2.3.a Variable_Name

The **Variable_Name** column contains a list of variables that are used in the R scripts to filter each worksheet table. This column must be correctly populated for the R scripts to successfully run.

The user should not modify this column.

6.2.3.b Type

The **Type** column is used let the user know what type of variable Variable_Name represents. It is not necessary to successfully run the R scripts. There are three potential variable types: text, image, and R figure. If a Variable_Name is text then the corresponding variable is used to populate text in the national-level template. If the type is R figure then the variable is used to populate a R figure into the template. Finally, if the Variable_Name type is image then the variable is used to add a picture to the report.

The user should not modify this column. It is merely informative.

6.2.3.c Description

The **Description** column provides a user-friendly text description to clarify the meaning of the variable listed in the Variable_Name column.

The user should not modify this column. It is meant to help the user interpret the Variable_Name column.

6.2.3.d Change

The **Change** column lets the user know whether they should modify the Text or File_Name columns.

The user should not modify this column. It is meant to help the user determine if they should modify the Text or File_Name columns.

6.2.3.e Text

The **Text** column is where the user should enter text that will be used to populate the national-level template. The Text column should be populated by the user if *Type = Text* and *Change = Yes*. If *Type = Text* and *Change = No*, then the cell has already been populated with text that should be used for the national-level report. Figures 20 and 21 illustrate the correspondence between the Text column on the Page_1 worksheet and the resulting text in the national-level template.

Variable_Name	Type	Description	Change	Text	File_Name
txt_trend_plot_ttl_1	text	title for plot #1	Yes	Trends in Precipitation	
txt_trend_plot_caption_1	text	caption for plot #1	Yes	Precipitation is not changing at most reserves within the NERRS system. However, there are a few exceptions. A decreasing trend has been observed at two reserves in the northeast, and an increasing trend has been observed at two reserves in the southeast and at the reserve located in Alaska. A decreasing trend means it is getting dryer and an increasing trend means it is getting wetter.	
txt_plot_data_caption	text	trend data date caption	No	*Based on data collected from	
img_trend_plot_1	R figure	top trend figure	Yes		output/met/trend_sk_maps/system_sk_totprcp.png

Figure 20. Screenshot of Page_3 Worksheet (Several Columns and Rows Have Been Hidden)

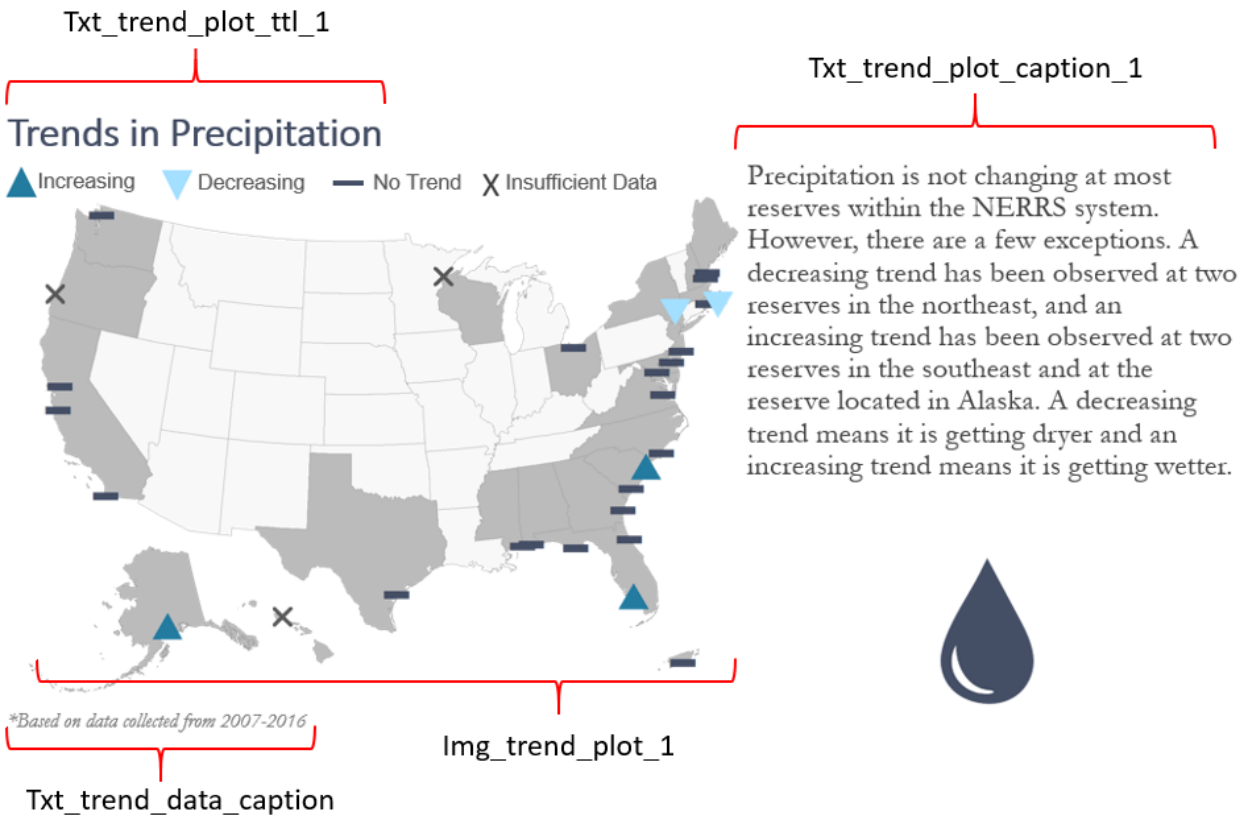


Figure 21. Screenshot of Part of Page 3 of the National-Level Report

6.2.3.f File_Name

The **File** column is where the user should enter the file name that will be used to populate images in the national-level template. There are two possible ways to populate this field: first if *Type = Image*, and

second, if *Type = R figure*. If *Type = Image* then the user can simply enter the name of the file within the template_files > images directory. Currently, the national-level template folder contains three images, one for Page_3 (Page3_header.jpg) and two for Page_4 (Page4_header.jpg and Page4_background.jpg) (Figure 22). If *Type = R figure* then the user must enter the file path and the figure name in order for the national-level template to populate correctly (Figure 23).

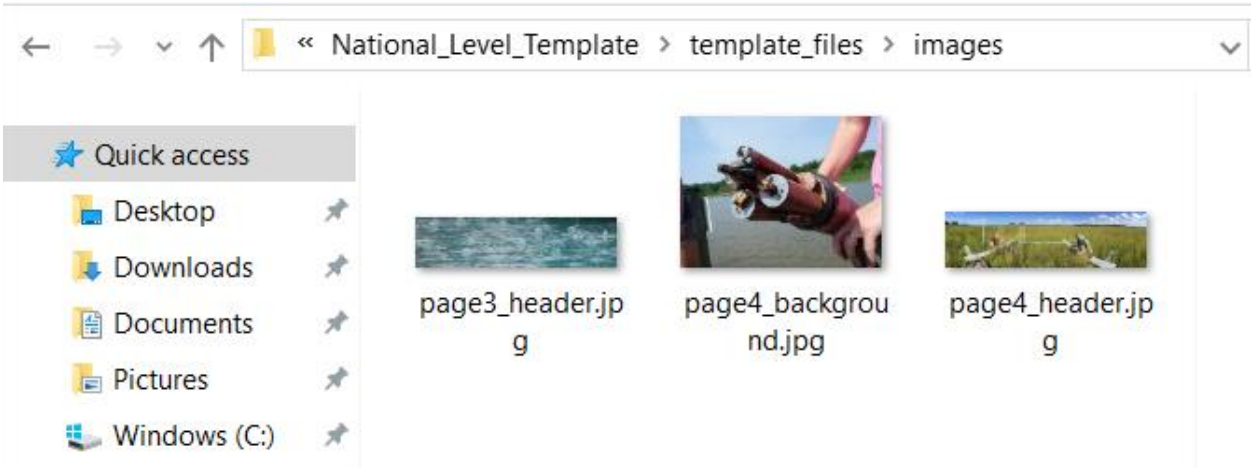


Figure 22. Screenshot of the template_files > images Directory

	A	B	C	D	F
1	Variable_Name	Type	Description	Change	File_Name
10	img_trend_plot_1	R figure		Yes	output/met/trend_sk_maps/system_sk_totprcp.png
11	img_trend_plot_2	R figure		Yes	output/met/trend_sk_maps/system_sk_atemp.png
12					

Figure 23. Screenshot of Page_3 Worksheet (Several Columns and Rows Have Been Hidden)

7 Report Formatting Guide

This section provides a guide on how to format an unformatted (raw) national-level template to create the final annual national-level report. Additional formatting information and guidance is provided in the "Report Style Guide" in Appendix A.

7.1 Opening the Raw Template File

The unformatted (raw) national-level report will be in the "templates_files" folder and will be named "annual_report_raw" (Figure 24).

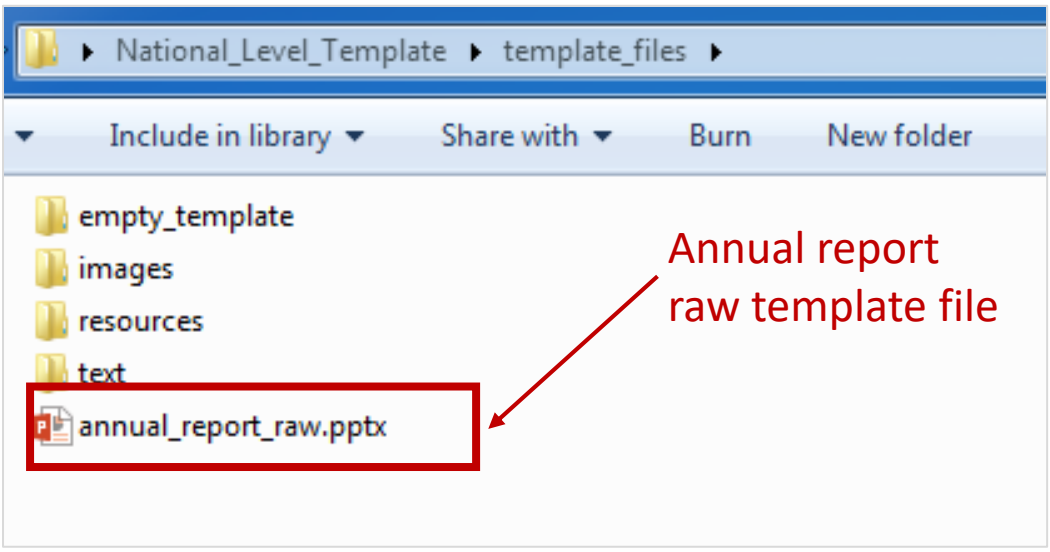


Figure 24. Screenshot of the Annual Report Raw Template file in in the "template_files" Folder

When the unformatted (raw) national-level report file is first opened, it may open in "Normal" view mode or "Slide Master" view mode (Figure 25). If the template file opens in "Slide Master" view mode, complete the following steps to switch the view mode to "Normal" (Figure 26). Go to the "View" section and the "Presentation Views" tab. Click on the "Normal" option to switch the view mode to "Normal."

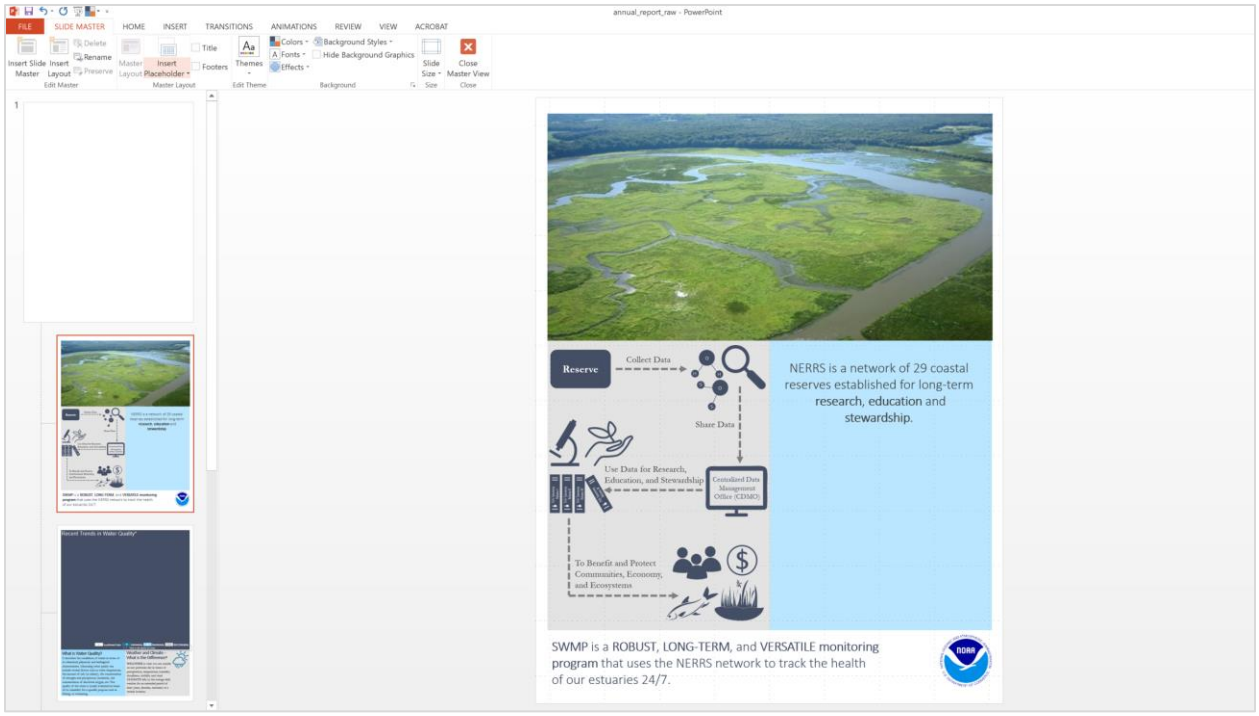


Figure 25. Example of "Slide Master" View Mode

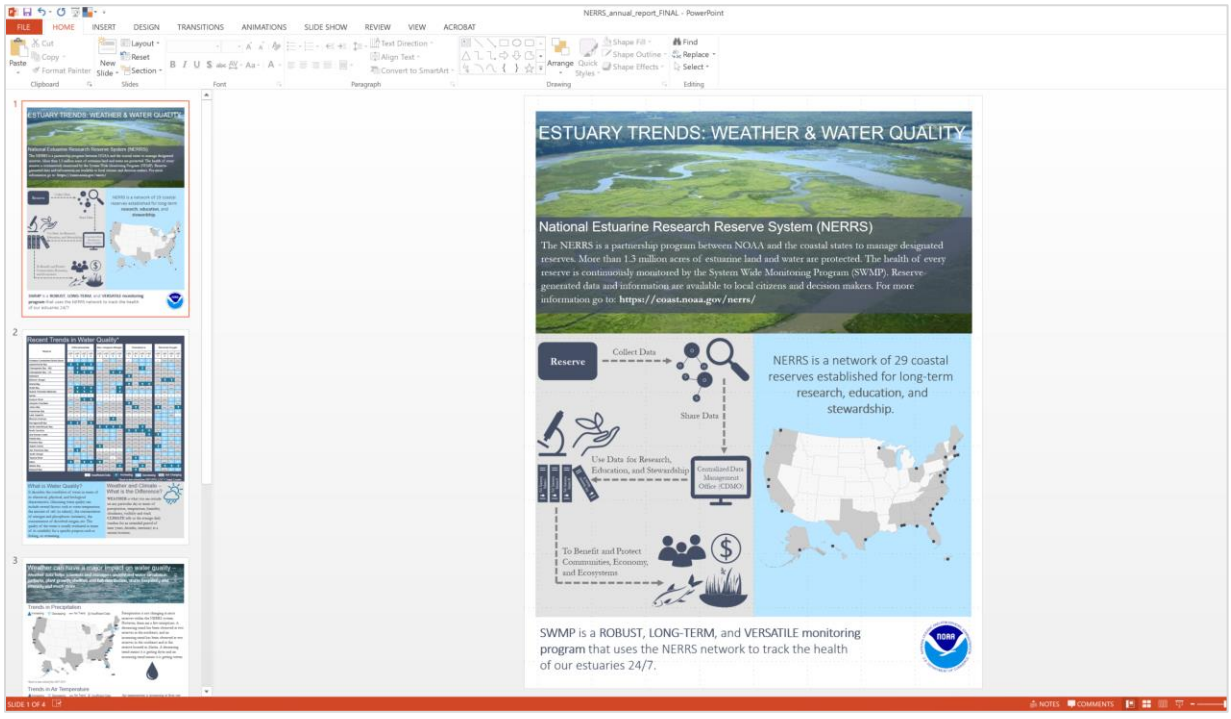


Figure 26. Example of "Normal" View Mode

7.2 Page One Formatting Steps

Step 1. Remove bullets

- Remove the bullets on the entire page. Go to the “Home” section and the “Editing” tab, click on the “Select” down arrow and click on “Select All.” Go to the “Paragraph” tab and click on the “Bullets” down arrow and select “None” (Figure 27).

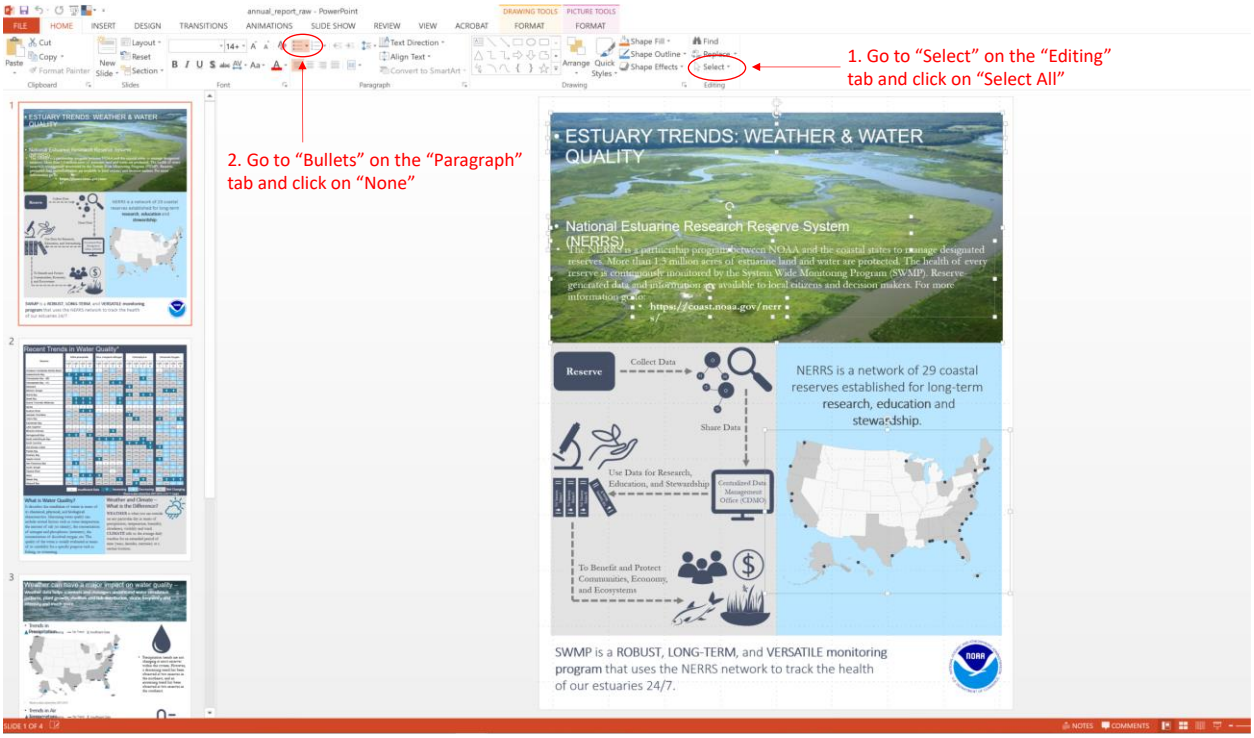


Figure 27. Screenshot of Steps to Remove Bullets on an Entire Page

Step 3. NERRS background information box

- Align the web link text with the "For more information go to:" statement on the same line as text (Figure 28).

Figure 28. Screenshot of the Web Link Unformatted (top) and Formatted (bottom)

- *Optional* - If the "National Estuarine Research Reserve System (NERRS) background text (in white font) does not have enough contrast with the cover photo, add the **Background Box for NERRS Program Content** (see Template_Resources.pptx, Page 1) element to create contrast and improve readability. Go to the "Template_Resources.pptx" file and select element, copy and paste into the report pptx file. Align the element to center around the background and web link text but don't move over to the left yet. Select the background and the web link text boxes, go to the "Format" section and the "Arrange" tab, click on the "Bring Forward" down arrow, and select "Bring to Front." Next, move the **Background Box for NERRS Program Content** element to the left so that is aligned to the left side of the page. A screenshot of the Page 1 Template_Resources.pptx elements is provided below (Figure 29).

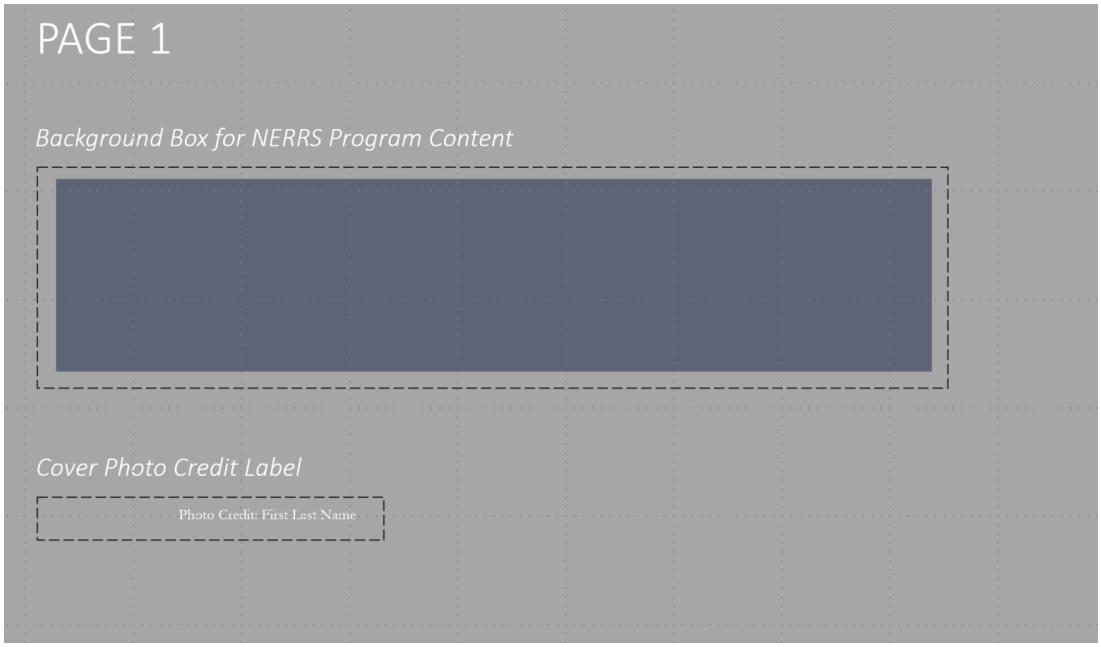


Figure 29. Screenshot of the Page 1 Template_Resources.pptx Elements

- *Optional* - Add the **Cover Photo Credit Label** (see Template_Resources.pptx, Page 1) if a photo credit is required. Go to the "Template_Resources.pptx" file, select the element and copy and paste into the report pptx file. Fill-in the photo credit information. Align the text box to the bottom, right side of the cover image. A screenshot of cover photo without (left) and with (right) the **Background Box for NERRS Program Content** and **Cover Photo Credit Label** is provided below (Figure 30).

Figure 30. Screenshot of Cover Photo Without (left) and With (right) the "Background Box for NERRS Program Content" and "Cover Photo Credit Label"

7.3 Page Two Formatting Steps

Step 1. Remove bullets

- Remove the bullets on the entire page. See detailed instructions on how to perform this action above in section 7.2, Step 1.

7.4 Page Three Formatting Steps

Step 1. Remove bullets

- Remove the bullets on the entire page. See detailed instructions on how to perform this action above in section 7.2, Step 1.

Step 2. Trends in Precipitation box

- If needed, adjust the text box width (increasing or decreasing) to improve the text layout on the page (i.e., not all of the text may fit within the template boundary).
- Fix orphans (i.e., a single word on a line) by adding a spaces(s) until the desired text moves to the next line.

Step 3. Trends in Air Temperature box

- If needed, adjust the text box width (increasing or decreasing) to improve the text layout on the page (i.e., not all of the text may fit within the template boundary).
- Fix orphans (i.e., a single word on a line) by adding a spaces(s) until the desired text moves to the next line.

7.5 Page Four Formatting Steps

Step 1. Remove bullets

- Remove the bullets on the entire page. See detailed instructions on how to perform this action above in section 7.2, Step 1.

Step 2. Have Questions? box

- Add contact information for the staff member who will be the main point of contact.
- Adjust the spacing to be consistent with the formatting in other boxes. Go to the Home section and the “Paragraph” tab. Click on the “Line and Paragraph Spacing” down arrow and select the “Line Spacing Options” section. Under “Spacing”, change “Before” to “0 pt” and “Line Spacing” to “Exactly” and “At” to “17 pt.”

7.6 Create Final PDF

After the formatting steps have been completed, the user is ready to create the final annual national-level report as a PDF. Go to “File” and “Save As” (Figure 31). Specify the location where you want to save the PDF. Go to “Save as type:” and select “PDF” (Figure 32). Make sure the “Standard (publishing online

and printing) option is selected and then click "Save." A PDF version of the annual national-level report should now be created and available for distribution.

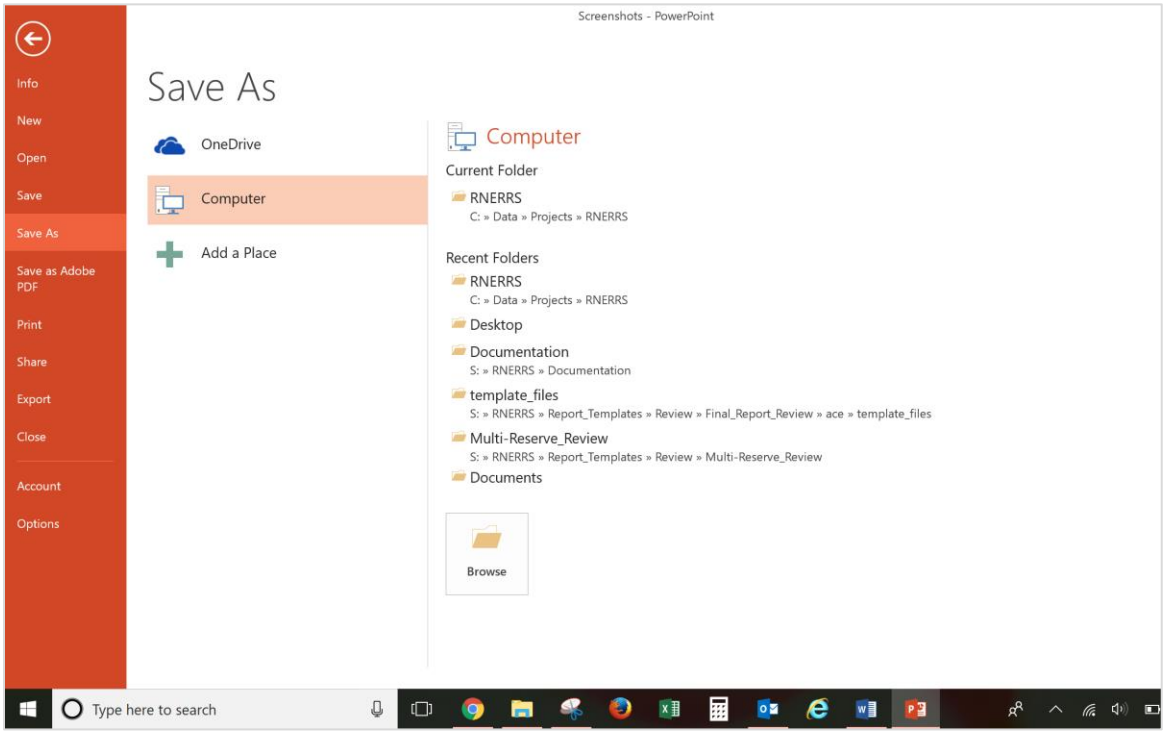


Figure 31. Screenshot of PowerPoint File and "Save As" Option Page

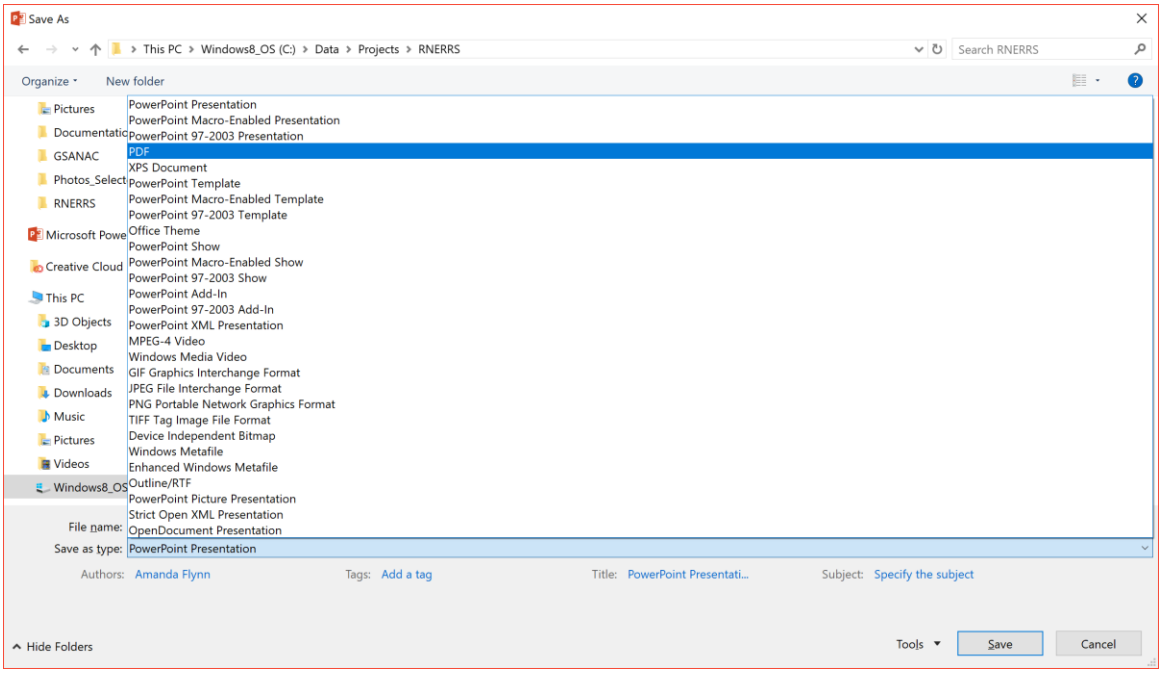


Figure 32. Screenshot of the "Save as type" Options in PowerPoint and Selection of PDF

Appendix A: Report Style Guide

Style Guide

NERRS SWMP Reserve-Level Annual Reports

Introduction

These guidelines describe the visual elements that represent the NERRS SWMP Reserve-Level Annual Report identity. This includes elements such as color, typography, graphics and images.

While each reserve is unique and has it’s own image and character, it is important to send a consistent message of the NERRS SWMP to present a strong and cohesive image for the program as a whole.

These guidelines reflect a commitment to quality, consistency, and style.

Table of Contents

1. Color Palette

The color palette is based on the NOAA Office of Coastal Management NERRS website reserve web pages. The color palette consists of blues and grays. All colors in the report should follow this color palette.

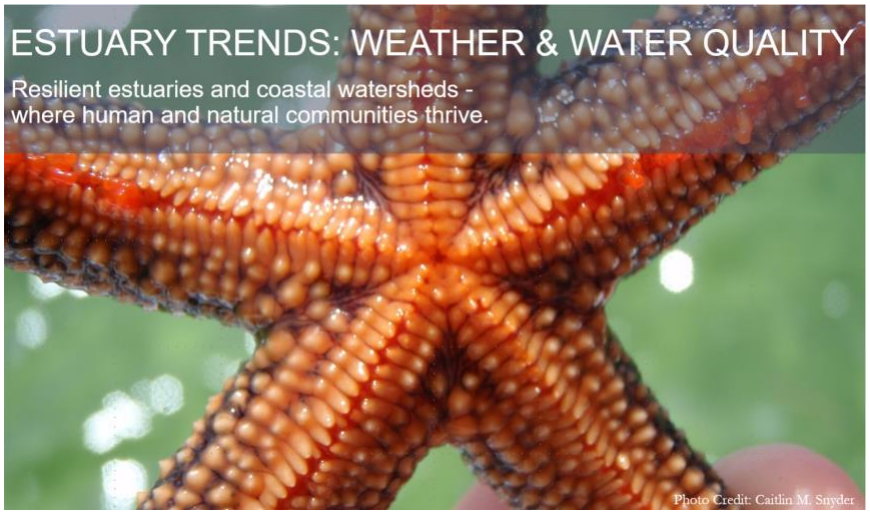
An example of the color palette used for the reserve web pages can be found here:
https://coast.noaa.gov/nerrs/reserves/wells.html

Light Blue	Medium Blue	Dark Blue
RGB 163,223,255 Hex #A3DFFF	RGB 36,123,160 Hex #247BA0	RGB 68,78,101 Hex #444E65

Light Gray	Medium Gray	Dark Gray
RGB 217,217,217 Hex #D9D9D9 **Set at 25% transparency*	RGB 89,89,89 Hex #595959	RGB 64,64,64 Hex #404040

The titles, headers, and highlight statement font color varies and includes white (RGB 255,255,255), medium gray (RGB 89,89,89), and dark blue (RGB 68,78,101). Examples are provided below.

Title



Header

2016 HIGHLIGHTS

Highlight Statement

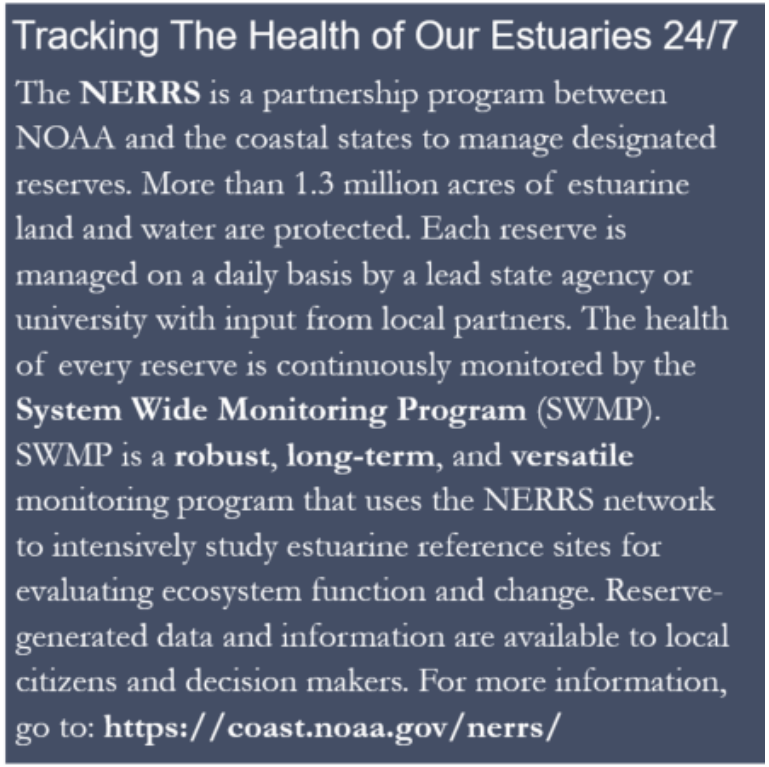
Water Quality is a MAJOR Driver of Ecosystem Change

What happens on the land affects the quality of the water and the health of the plants and animals that live in the estuary.

The body text font color is typically dark gray (RGB 64,64,64) or white (RGB 255, 255, 255). If dark gray body text is used and bolded words are needed, the bolded words are in dark blue (RGB 68,78,101). If white body text is used and bolded words are needed, the bolded words are in white. Examples are provided below.

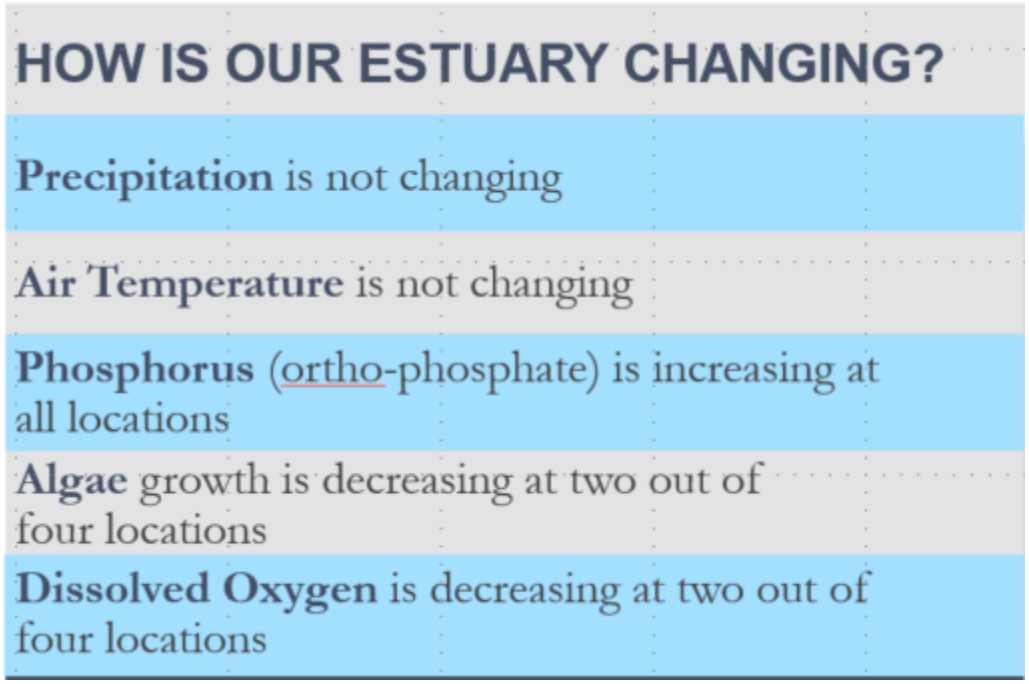
Dark gray Body Text & Dark Blue Bolded Words

White Body Text & White Bolded Words

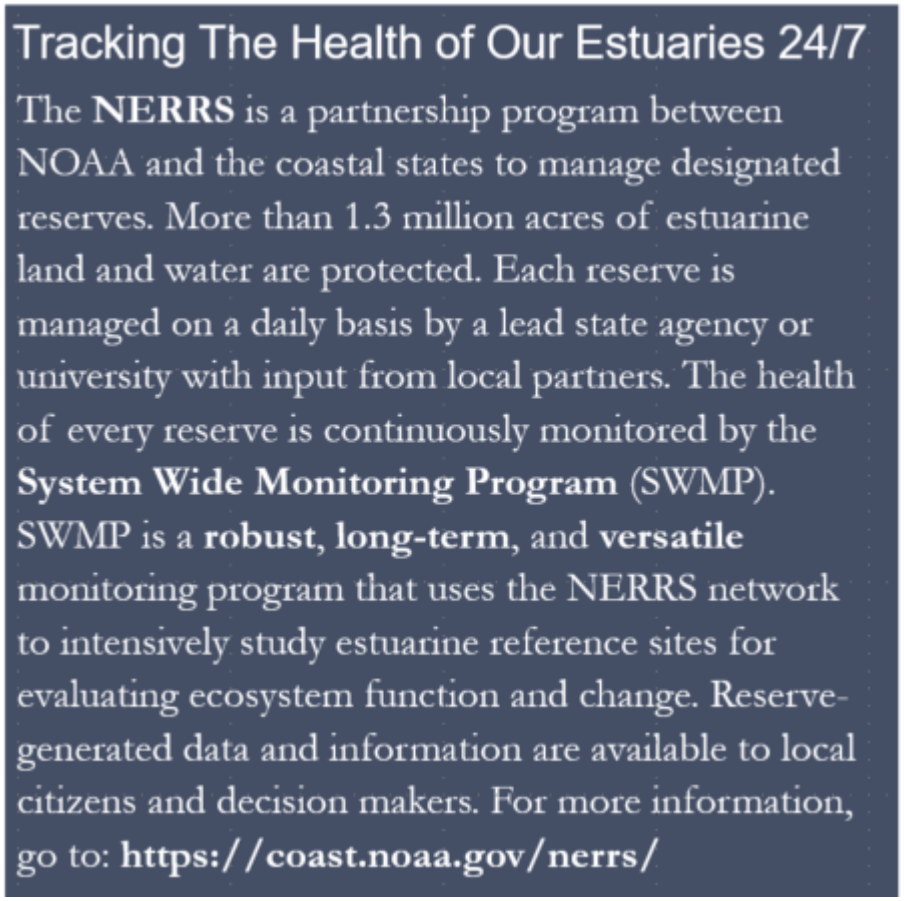


Box element fill colors vary and include dark blue (RGB 68,78,101), light blue (RGB 163,223,255), and light gray (RGB 217,217,217 at 25% transparency). Examples are provided below.

Light Blue & Light gray Fill

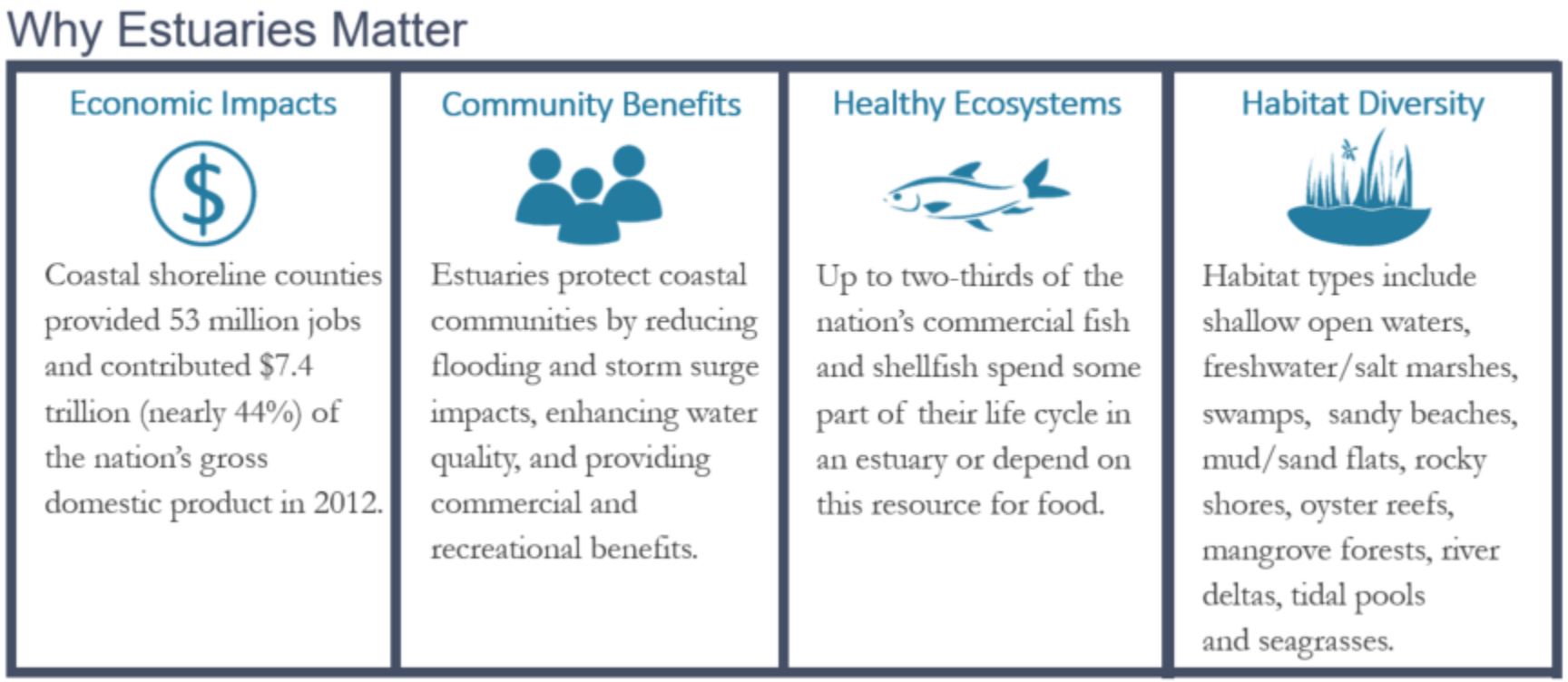


Dark Blue Fill



Icon colors are currently all in medium blue (RGB 36,123,160). An example is provided below.

Medium Blue Icons



2. Typography

The dominant typefaces are Calibri-Light and Garamond. A description and example of how each typeface is used in the report is provided below.

The Calibri-Light typeface is used for titles, headers, and highlight statements. In the current version of MS PowerPoint, Calibri-Light is a slight variation of Calibri Light (no hyphen). The use of the Calibri-Light variation of Calibri Light was needed for compatibility with the R package available at the time the reserves templates were being developed.

Calibri-Light

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

a b c d e f g h i j k l m n o p q r s t u v w x y z

0 1 2 3 4 5 6 7 8 9

The Garamond typeface is used for body text and dense text.

Garamond

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

a b c d e f g h i j k l m n o p q r s t u v w x y z

0 1 2 3 4 5 6 7 8 9

A third typeface is used in the report but ONLY for plots and tables. The Arial typeface is used in the plots generated for the report by the SWMPrExtension R package. The Arial typeface is also used in the "**Trends in Weather & Water Quality**" table on Page 2 of the report. Typically, only two typefaces are selected for the presentation of reports, brochures, fact sheets, infographics, etc. However, because the reports are also presenting data and Arial is the best typeface for plots and tables, this third typeface was selected. The intention is that the Arial typeface will only be used for plots and tables.

Arial

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

a b c d e f g h i j k l m n o p q r s t u v w x y z

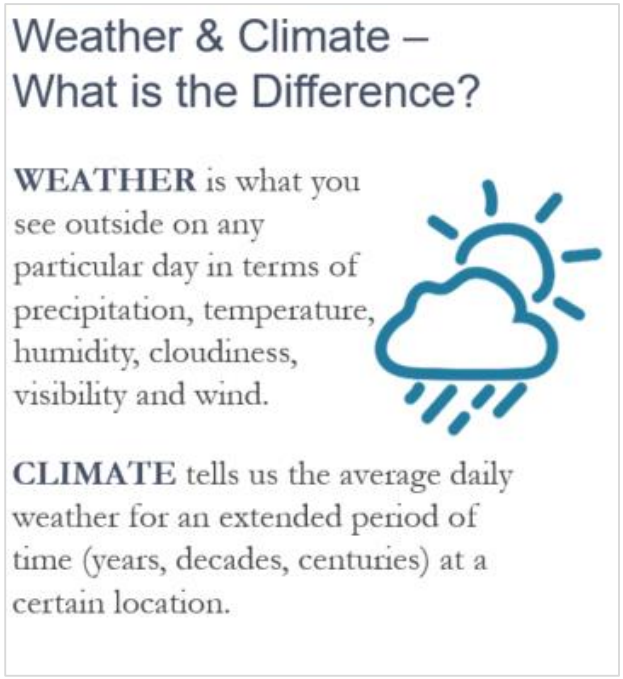
0 1 2 3 4 5 6 7 8 9

3. Graphics & Images

Graphics used in the report reflect a simple, flat design style. Any new graphics used in the report should maintain the style and look of the existing graphics. An example graphic is provided below.

Images should be visually pleasing, representative of the estuary environment in the reserve of interest, and reinforce the message conveyed. The images should be high quality and high resolution. Print quality resolution is typically 300 dpi. However, it should be noted that the current version of PowerPoint used to develop the reserve templates (i.e., PowerPoint 2013) only allows a maximum resolution of 220 dpi. Newer versions of PowerPoint (i.e., 2016) should allow for higher resolution images.

Simple, flat design graphic



Relevant, high quality image