





NOAA TAS Lesson Plan Template Instructions

First page of lesson plan template

 **NOAA Teacher at Sea Lesson Plan** 

Title

Subject (Focus/Topic): In one phrase, state the general subject area that the lesson addresses.

Grade Level: State the grade levels at which this lesson is specifically directed.

Average Learning Time: State how long it will take to teach this lesson in class periods, minutes, hours, days or weeks, etc.

Author:
Name
School, School address
e-mail (optional)

Creation date: List the date you created this lesson

LESSON PLAN DESCRIPTION

Lesson Summary (Overview/Purpose)
In one sentence, state what the students will do (the action(s) they will take) to gain the understanding of what the lesson teaches.

Overall Concept (Big Idea/Essential Question)
In 1-3 sentences, state the overall concept the students will understand as a result of this lesson. (This may also be written as the main question the students will explore.)

Specific Concepts (Key Concepts)
List 2-5 specific concepts, based on the overall concept, the students will understand as a result of this lesson

•
•

Focus Questions (Specific Questions)
List no more than 10 specific questions about the subject that students will explore in order to understand both the listed specific concepts and overall concept.

1.
2.

Objectives/Learning Goals
Using "Student will" statements, list what the students should know and/or do as a result of completing

NOAA Teacher at Sea Program Lesson Plan—1

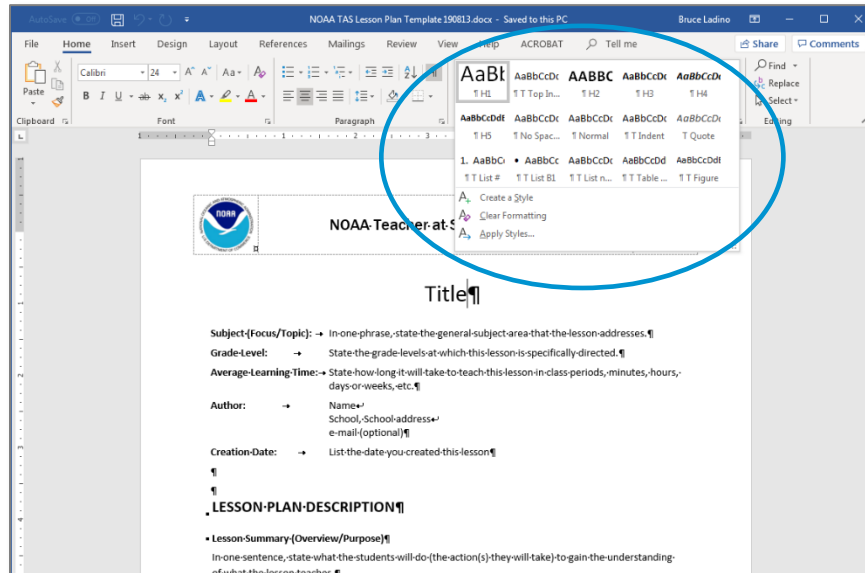
Starting a new lesson plan in a desktop version of Microsoft Office

1. Download or save the template file:
 - NOAA TAS Lesson Plan Template #####.docx
2. Double-click to open the template file
3. Begin working in this document. This is your new lesson plan.
 - NOTE: It is important to create your lesson plan in the template. In addition to content skeleton, it has built in accessibility features.
4. Save document under a new filename:
 - First Last Science/Career Lesson.docx

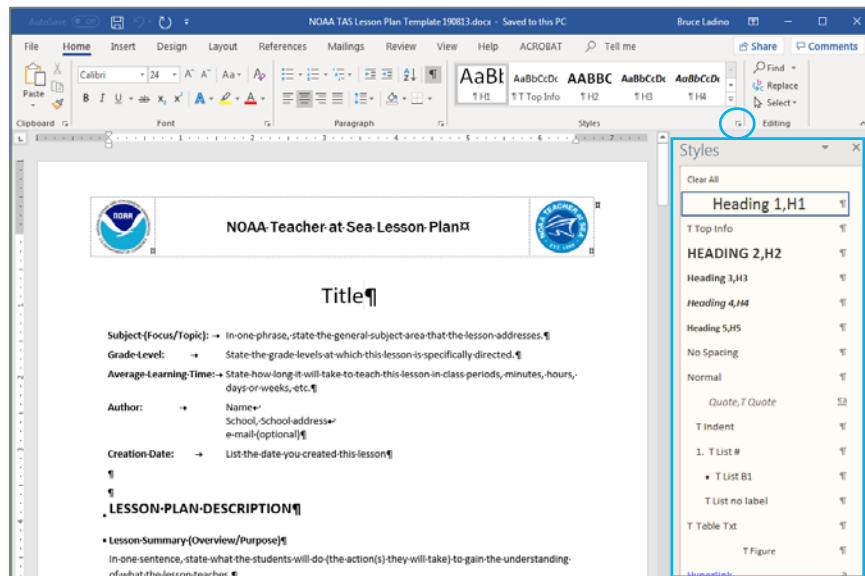
Working in the template: Instructional Text

1. Each heading, in bold text, is the final text and should not be changed.
2. The plain text under the headings is instructional and is meant to be replaced.
3. List bullets/numbers have been inserted to help you get started. Delete as necessary

Lesson Plan Template with Home ribbon Styles Panel showing





Lesson Plan Template with Styles Window opened



Working with the template: Styles

4. **WHAT:** The template includes 15 styles that are already used in the template text. Styles contain:
 - Formatting: font, size, spacing, etc.
 - Semantics: Heading levels, lists, etc.
5. **WHY (Important):** Styles should be used to make the document accessible to screen readers and other assistive tech.
6. **HOW-Passive:** The styles are already set up for you, so you don't have to decide which ones to use. By leaving the headings alone and replacing the instructional text you will have accomplished 90% of the styles work.
7. **HOW-Active:** If a style gets lost (i.e., you delete text and lose text formatting) or you are creating content, access styles from:
 - a. the "Styles" Panel of the Home ribbon (top figure).
 - b. the Styles Window (bot figure)
Open this by clicking on the expansion arrows of the ribbon's Styles Panel (circled)

“Top Information” filled out in the Sample Lesson Plan



NOAA Teacher at Sea Lesson Plan

Sample LP - Mystery of the Missing Fish

Subject (Focus/Topic): Fisheries Biology

Grade Level: 9-12

Average Learning Time: Approximately 1 hour

Author: Sample Teacher
Regional High School, 123 School Rd., City, ST 00000
sample.teacher@school.edu

Creation Date: 9/10/2000

LESSON PLAN DETAILS

Template Instructions replaced with content, shown in the Sample Lesson Plan

LESSON PLAN DETAILS

Lesson Summary (Overview/Purpose):
Students will attempt to explain why the population of a fictitious fish is decreasing (Atlantic Red Gill) by looking at a series of different data. Students will use the data to recommend allowing fishing of the red gill or recommend denying fishing permits.

Overall Concept (Big Idea/Essential Question):
How can different factors impact fish populations in oceans?

Specific Concepts (Key Concepts):
Students demonstrate use of the scientific method.

- Students can describe how factors can influence ocean populations.
- Students can experience how scientific research does not always yield solutions.

Focus Questions (Specific Questions):

- How do you use the scientific method to solve problems?
- How can multiple factors influence the population of an ocean organism?
- How do scientists use data to make informed decisions?
- How do scientists tackle problems that may not have an answer?

Objectives/Learning Goals:
Students are to use the scientific method to solve a problem. Students will learn that there is not a solution to this mystery and will then hypothesize other possible solutions. Students will then make a conclusion to allow fishing or to continue the fishing moratorium.

NOAA Teacher at Sea Program Lesson Plan—1

Fill in the Top Information

1. Replace the “Title” heading with your lesson title
 - NOTE: The title is the only document item in the “H1” style. The style contains the proper top and bottom spacing, so that no additional spaces/returns are necessary.
2. Enter the “Top Info” in the placeholders below the title:
 - a. Subject
 - b. Grade Level
 - c. Average Learning Time
 - d. Author
Select [SHIFT+ENTER] to insert a line break under a hanging indent
 - e. Creation Date

Replace Lesson Plan Details text:

3. All **headings** (H3, bold text) remain, and the plain text is replaced with lesson text.
4. Use, abandon, or change lists styles (number/bullet) as appropriate to your content.
 - Use the template’s 3 “T List” styles!



In addition to specifying Lesson Plan Details, some lesson plans include teaching materials for use by teachers and/or students.



Teaching Materials may include:

- Assessments
- Worksheets
- Handouts
- Data Sets
- Slides
- Posters, infographics or other pre-formatted printed reference materials
- Answer Keys
- Rubrics
- Other

These items should be inserted separately from the Lesson Plan Details, so it is appropriate to begin a new page with an H2 style heading for each separate teaching material included.

1. Refer to Instructions given in the Lesson Plan Template, pages 4-6.
2. Refer to figure for comparison of templates placeholder “Teaching Material” page (left) and the sample lesson plan’s worksheet (right).

First page of Sample Lesson Plan



NOAA Teacher at Sea Lesson Plan

Sample LP - Mystery of the Missing Fish

Subject (Focus/Topic): Fisheries Biology

Grade Level: 9-12

Average Learning Time: Approximately 1 hour

Author: Sample Teacher
Regional High School, 123 School Rd., City, ST 00000
sample.teacher@school.edu

Creation Date: 9/10/2000

LESSON PLAN DETAILS

Lesson Summary (Overview/Purpose):
Students will attempt to explain why the population of a fictitious fish is decreasing (Atlantic Red Gill) by looking at a series of different data. Students will use the data to recommend allowing fishing of the red gill or recommend denying fishing permits.

Overall Concept (Big Idea/Essential Question):
How can different factors impact fish populations in oceans?

Specific Concepts (Key Concepts):
Students demonstrate use of the scientific method.

- Students can describe how factors can influence ocean populations.
- Students can experience how scientific research does not always yield solutions.

Focus Questions (Specific Questions):

- How do you use the scientific method to solve problems?
- How can multiple factors influence the population of an ocean organism?
- How do scientists use data to make informed decisions?
- How do scientists tackle problems that may not have an answer?

Objectives/Learning Goals:
Students are to use the scientific method to solve a problem. Students will learn that there is not a solution to this mystery and will then hypothesize other possible solutions. Students will then make a conclusion to allow fishing or to continue the fishing moratorium.

NOAA Teacher at Sea Program Lesson Plan—1

Sample Lesson Plan

For further guidance, please refer to the full sample lesson plan, “Mystery of the Missing Fish”, that was shown in these Template Instructions.

- NOAA TAS Sample Lesson Plan.docx

Accessibility Guidelines for Teacher at Sea Lesson Plans

Table showing accessible link formatting

Rule	Accessible	Not Accessible
Make links clickable	https://www.noaa.gov/ <u>Note:</u> MS Word and many other apps automatically create a hyperlink when a space or return is inserted after the URL	https://www.noaa.gov/
Use more than just color to distinguish link text	https://www.noaa.gov/ <u>Note:</u> MS Word and many other apps automatically format links with blue coloring and underlining.	https://www.noaa.gov/
Make sure links are valid: working <u>and</u> leading to the correct destination)	https://www.noaa.gov/ <u>Note:</u> The URL may be wrong or the correct URL, showing in the text, may not be in the actual link address (shown when link is hovered over).	https://www.noaa.gov/ Wrong URL Text https://www.noaa.gov/ Link address doesn't reflect URL
Make link text descriptive, or use the URL	Teacher at Sea home page Or https://teacheratsea.noaa.gov/#/home/ <u>Note:</u> Descriptive link text is easier to understand when read by a screen reader, but the actual URL text may be necessary, as when listing addresses of web resources.	click here

Format of Links

Copying and pasting URL text into a web browser can present an accessibility barrier to people with visual or motor impairments.

Main Points

RULES:

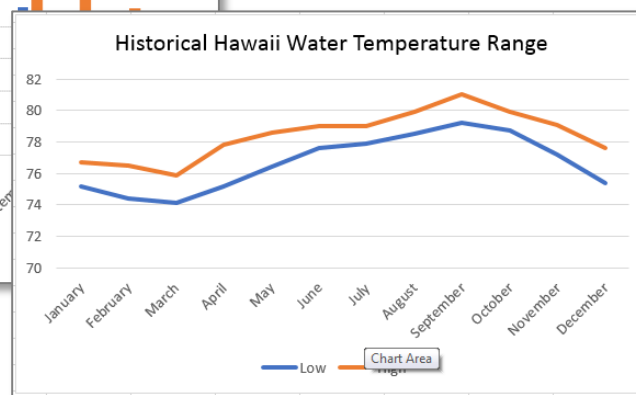
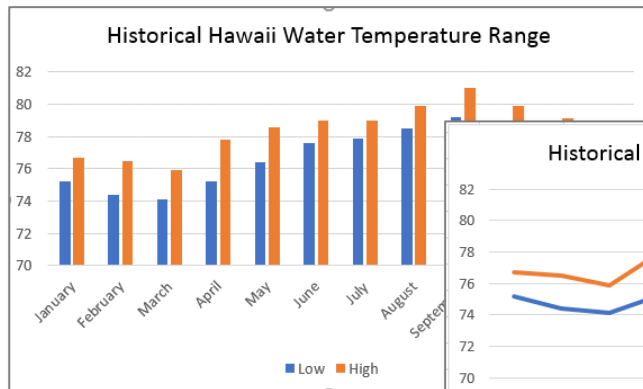
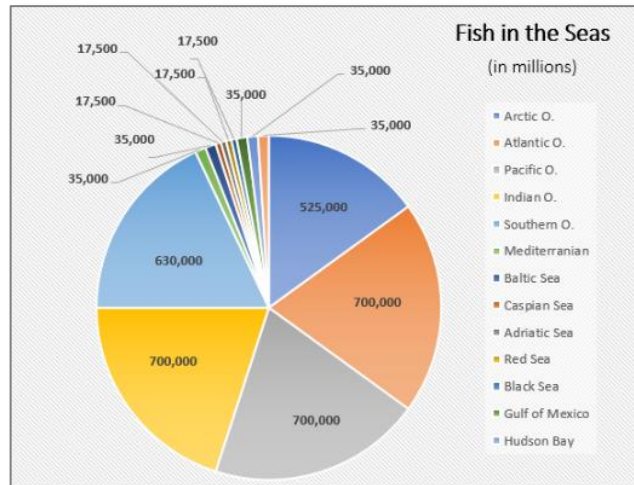
1. (Most) URL's should be "clickable" – made into hyperlinks.
2. Hyperlink text must be distinguished from normal text by more than just color.
3. All links must be valid – functional and leading to the correct destination.
4. Link text should contain either descriptive text or the URL:

WHO BENEFITS: Properly formatted links benefit people with the following disabilities:

- People with **low vision**
- People who are **Blind**
- People with **motor impairment**
- Bonus: *People without disabilities enjoy a document that is easier to use*

Common uses of color in different tables and charts

Fish in The Seas		
Body of Water	Number (millions)	Pct
Arctic O.	525,000	15%
Atlantic O.	700,000	20%
Pacific O.	700,000	20%
Indian O.	700,000	20%
Southern O.	630,000	18%
Mediterranean	35,000	1%
Baltic Sea	35,000	1%
Caspian Sea	17,500	0.5%
Adriatic Sea	17,500	0.5%
Red Sea	17,500	0.5%
Black Sea	17,500	0.5%
Gulf of Mexico	35,000	1%
Hudson Bay	35,000	1%
Caribbean Sea	35,000	1%
Total	3,500,000	100%
Overfished	87,500	2.5%



Use of Color

Color used in text, tables and charts can present a barrier to accessibility for people who cannot see color.

Main Points

RULE: Color cannot be the **only means** of conveying information.

REASON: Information conveyed only by color is not accessible to people who cannot distinguish color.

WHO BENEFITS: Proper use of color benefits people with the following disabilities:

- People with **Low Vision**
- People who are **Blind** (because screen readers can't interpret color)
- Bonus: Sighted people benefit from charts that are easier to read

CONTENT AFFECTED: Proper use of color is presented in the following pages for these items:

- Tables (and text)
- Pie Charts
- Line Charts
- Bar Charts

PROBLEM: Only color is used to identify the overfished seas.

Fish in The Seas		
Body of Water	Number (millions)	Pct
Arctic O.	525,000	15%
Atlantic O.	700,000	20%
Pacific O.	700,000	20%
Indian O.	700,000	20%
Southern O.	630,000	18%
Mediterranean	35,000	1%
Baltic Sea	35,000	1%
Caspian Sea	17,500	0.5%
Adriatic Sea	17,500	0.5%
Red Sea	17,500	0.5%
Black Sea	17,500	0.5%
Gulf of Mexico	35,000	1%
Hudson Bay	35,000	1%
Caribbean Sea	35,000	1%
Total	3,500,000	100%
Overfished	87,500	2.5%

People who cannot see color cannot tell which seas are overfished.

Fish in The Seas		
Body of Water	Number (millions)	Pct
Arctic O.	525,000	15%
Atlantic O.	700,000	20%
Pacific O.	700,000	20%
Indian O.	700,000	20%
Southern O.	630,000	18%
Mediterranean	35,000	1%
Baltic Sea	35,000	1%
Caspian Sea	17,500	0.5%
Adriatic Sea	17,500	0.5%
Red Sea	17,500	0.5%
Black Sea	17,500	0.5%
Gulf of Mexico	35,000	1%
Hudson Bay	35,000	1%
Caribbean Sea	35,000	1%
Total	3,500,000	100%
Overfished	87,500	2.5%

SOLUTION: Color and text (in Status column) can be read by everyone.

Fish in The Seas			
Body of Water	Number (millions)	Pct	Status
Arctic O.	525,000	15%	
Atlantic O.	700,000	20%	
Pacific O.	700,000	20%	
Indian O.	700,000	20%	
Southern O.	630,000	18%	
Mediterranean	35,000	1%	overfished
Baltic Sea	35,000	1%	
Caspian Sea	17,500	0.5%	overfished
Adriatic Sea	17,500	0.5%	
Red Sea	17,500	0.5%	
Black Sea	17,500	0.5%	
Gulf of Mexico	35,000	1%	overfished
Hudson Bay	35,000	1%	
Caribbean Sea	35,000	1%	
Total	3,500,000	100%	
Overfished	87,500	2.5%	

Use of Color in Text and Tables

PROBLEM: (Top figures)

- The table on the left indicates which seas are overfished by using red text.
- The grayscale version on the right simulates how the table would appear to someone who cannot see colors. All data is visible, but it is difficult to distinguish the overfished seas.

SOLUTION: (Bottom figure) This is one of several possible solutions.

- A column is added for a text status indicator for overfished seas.
- The overfished seas can still be identified by the text, even without color.
- Color is 1 of 2 ways that information can be identified.
- Color is a **highlight**, not the **only identifier**.

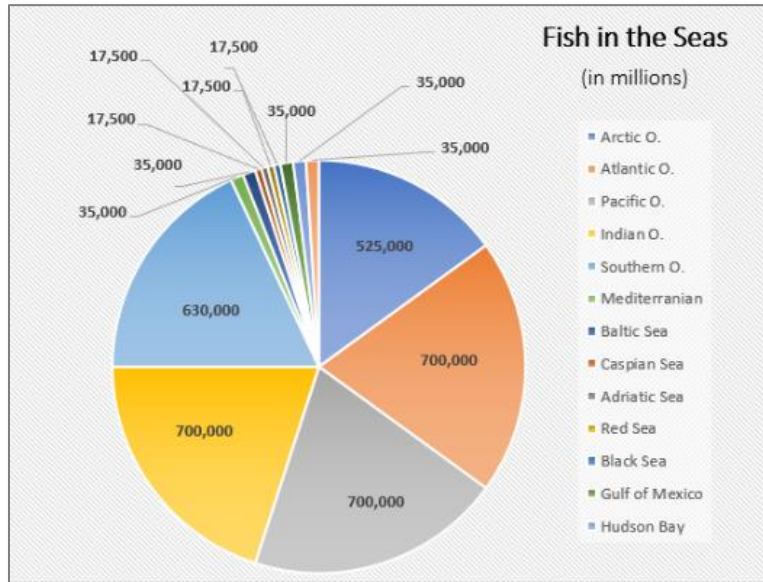
BASIC APPROACH for TABLES: **Add readable information that states what is indicated by color**—i.e., here it states that the colored seas are “overfished”.

- Note: There are other ways of applying this approach in tables, such as using a code or grouping items under headings.

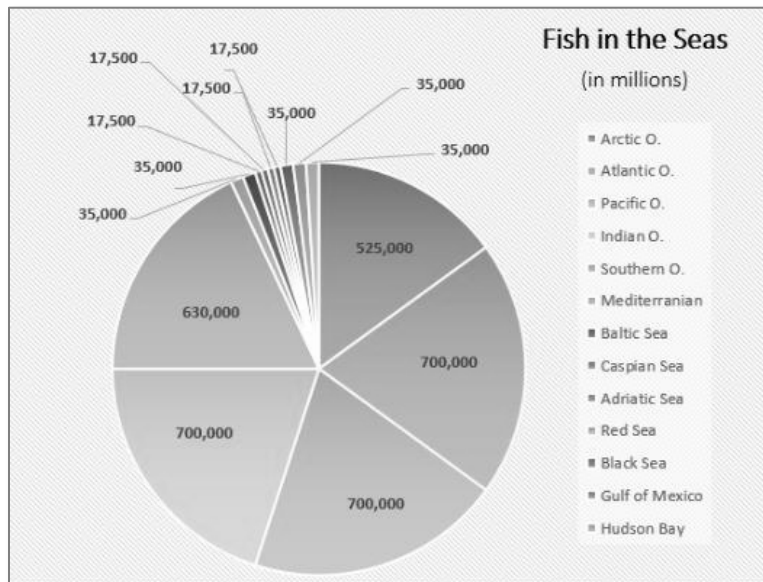
BETTER FOR ALL: In this case the accessible table indirectly benefits the non-disabled. It can now be:

- sorted by status (in the source file)
- incorporated more easily into a database
- read by someone who is temporarily disabled

PROBLEM: Pie chart identifies slices only by matching color to the legend.



PROBLEM: Slices cannot be matched to legend by people who cannot see color.



Use of Color in Pie Charts

Interpretation of pie charts with many colors is difficult for sighted people, and often is not possible for those with low vision.

PROBLEM (top and bottom figures):

- The small color squares in the legend are the only means of determining which sea matches which slice in the chart. They are difficult to match for sighted people.
- This becomes more difficult to a person who does not see color. Instead of 13 colors, they must match 13 similar shades of gray.

BASIC APPROACH for PIE CHARTS: **Add legend labels to pie slices.**

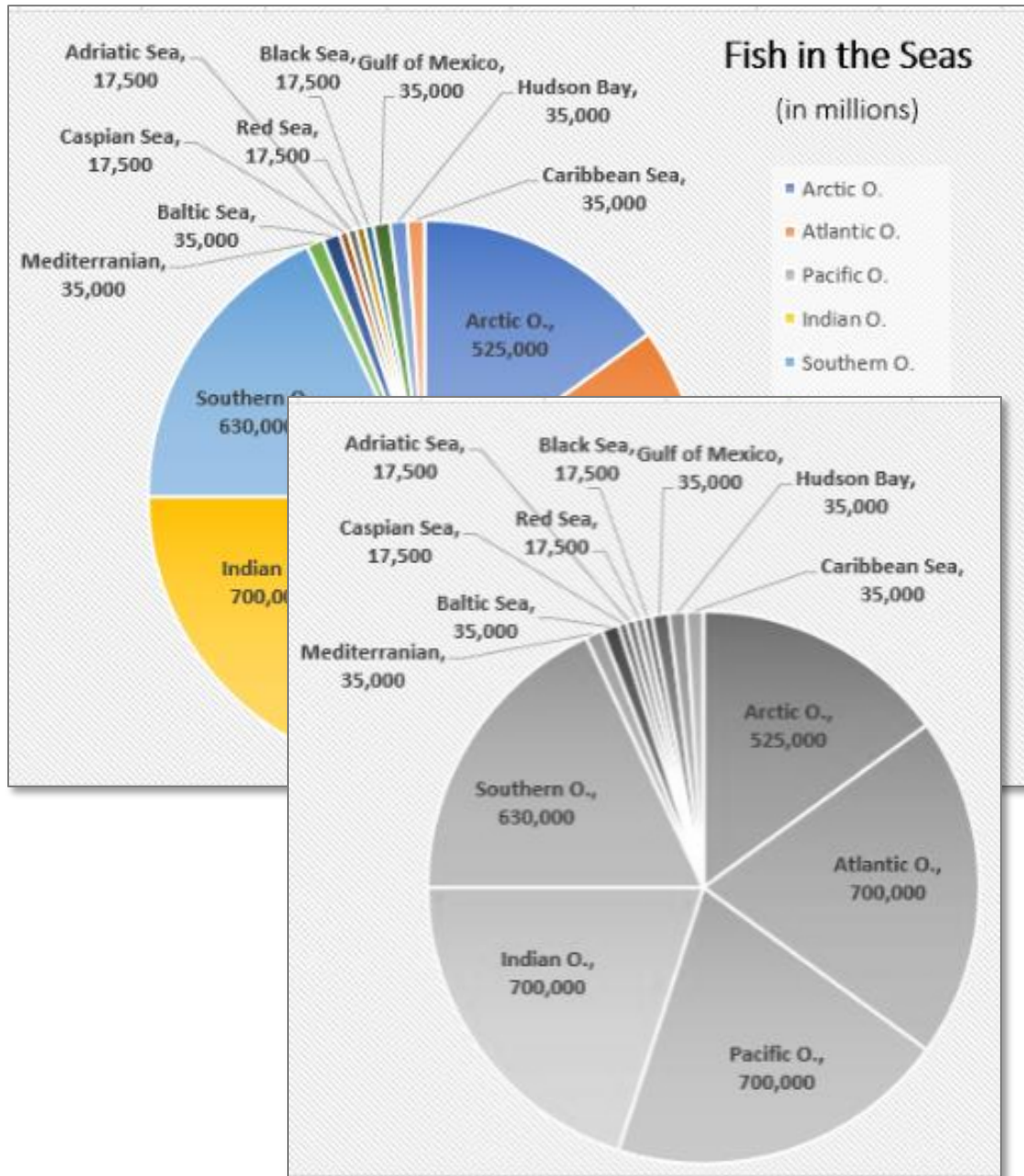
- Note: A legend is no longer necessary if pie is labeled.

SOLUTION (see figures on next page)

- Labels are added to the data series.
- The color enhances the chart but is no longer needed to identify data.
- The legend is no longer needed and is usually omitted.

BETTER FOR ALL: Pie Charts with labels are almost always easier for sighted people to read. This is a good example of how an accessible chart benefits everyone.

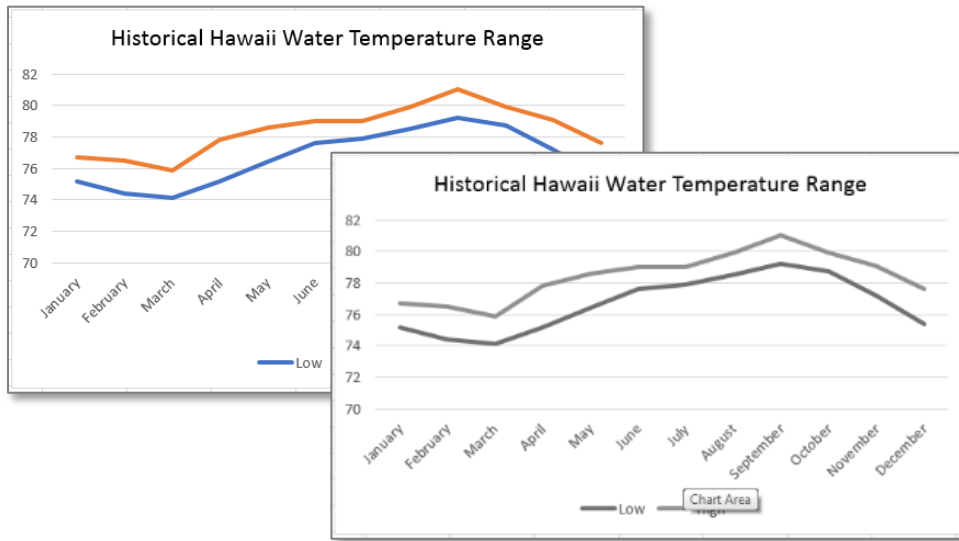
SOULTION: *Pie charts with labels and colors can be read by everyone (legend is now optional).*



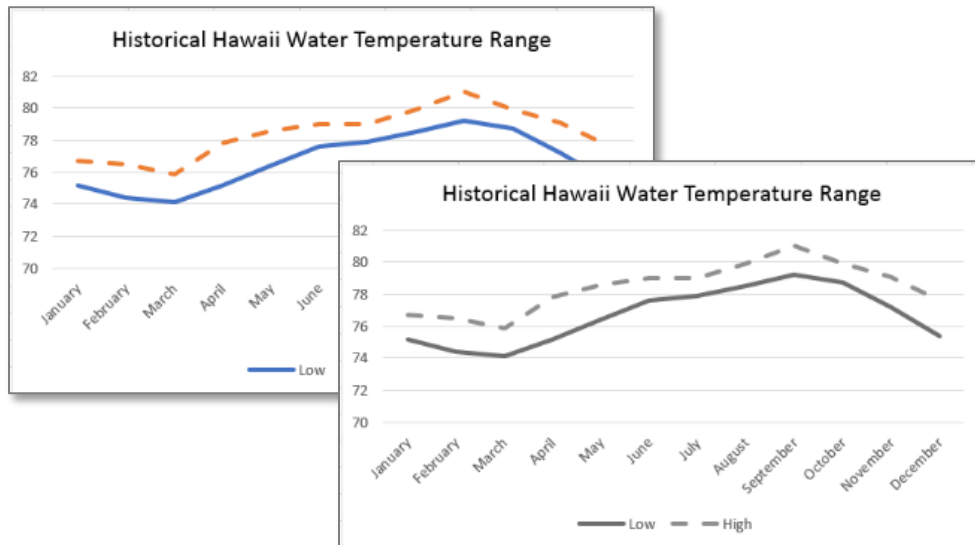
How to format chart labels in MS Word

1. Select all labels in your chart by
 - a. clicking outside the chart and then clicking on any label.
2. Right-click on the border of one of the selected labels.
3. Select **Format Labels** in the context menu.
 - a. The Format Labels window will appear on the right, opened to the **Label Options** panel.
4. Select desired options, such as
 - *Category Name* (i.e., “Body of Water”)
 - *Value* (i.e., # Fish, already was visible)
 - *Show Leader Lines* (usually a good idea)
 - *Percentage* (Excel computes, doesn’t have to be in the chart’s data table)

PROBLEM: Line chart distinguishes “Low” and “High” temp only by colors. Lines & legend are difficult to distinguish by people who cannot see color, as shown in grayscale.



SOLUTION: Different line types and colors can be distinguished by everyone.



Use of Color in Line Charts

PRINCIPLE: Color cannot be the only way of identifying and/or differentiating lines in a chart.

- Many charts have only one line. This applies only to charts with more than one line.

PROBLEM (top figure):

- Orange and Blue lines represent high and low temperatures. Each color is keyed at the bottom of the chart.
- To people who cannot see color the lines appear in shades of gray, which are difficult to distinguish.

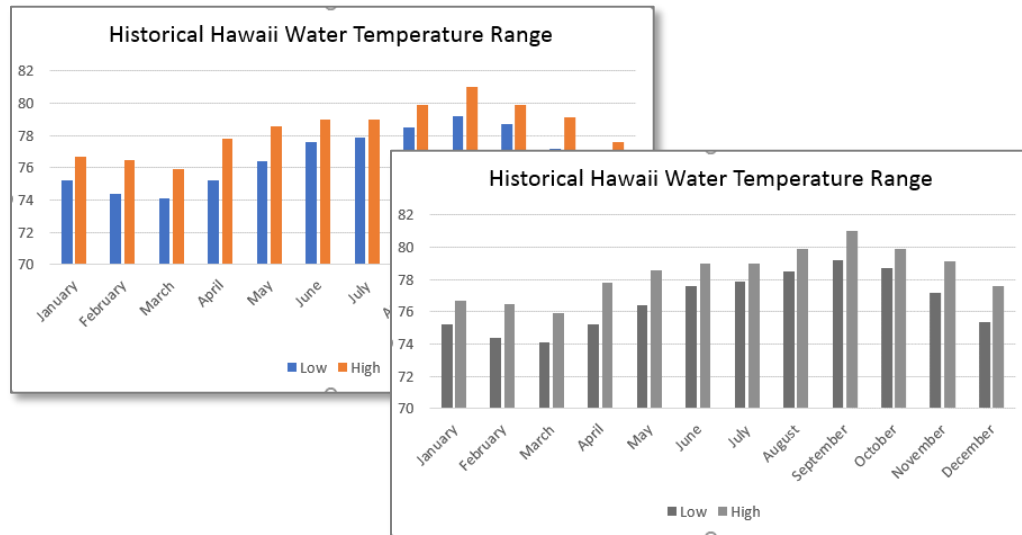
BASIC APPROACH for LINE CHARTS: **Use different line types** (solid, dashed, dotted, etc.)

- Note: A legend is still required to identify each line's color/type.

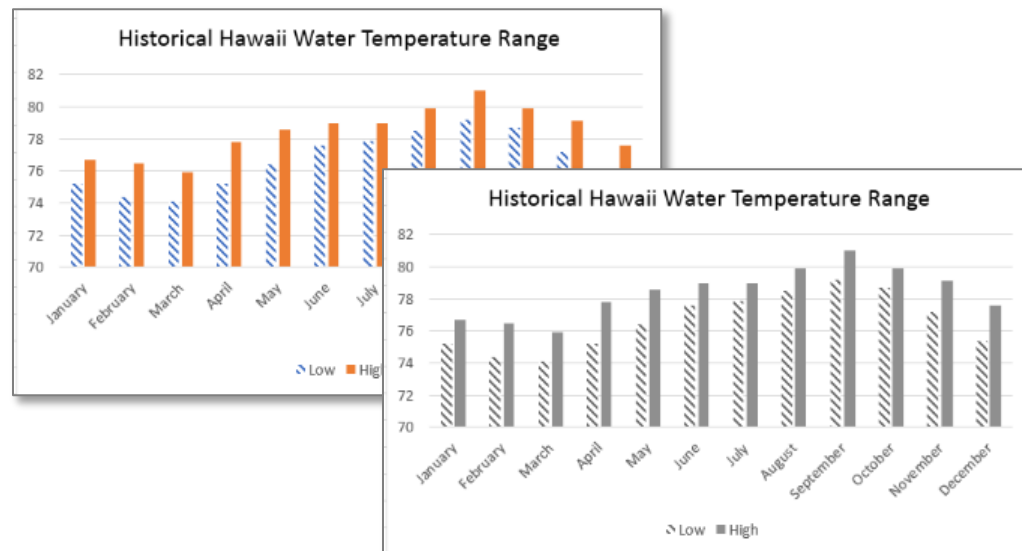
SOLUTION (bottom figure):

- One line is changed from solid to dashed, with the legend automatically reflecting this change.
- By giving the top line a different line type as well as color it is easily distinguished by everyone.

PROBLEM: Bar chart shows “Low” and “High” temps only by colors. Bars and legend are difficult to distinguish by people who cannot see color, as shown in grayscale.



SOLUTION: Different bar fills and colors can be distinguished by everyone.



Use of Color in Bar Charts

PRINCIPLE: Color cannot be the only way of identifying and/or differentiating bars in a chart.

PROBLEM (top figures):

- Orange and Blue bars represent high and low temperatures. Each color is keyed at the bottom of the chart.
- To people who cannot see color the lines appear in shades of gray, which are difficult to distinguish.

BASIC APPROACH for BAR CHARTS: **Use different fill types** (solid, striped, cross-hatched, etc.).

- Note: A legend is still required to identify each bars' color/fill.

SOLUTION (bottom figure):

- The blue bar's fill is changed from solid to cross-hatched, with the legend automatically reflecting this change.
- By giving the blue bar a different fill type as well as color it is easily distinguished by everyone.

Examples of text with insufficient contrast

Sample Text

Sample Text

Sample Text

Sample Text

Sample Text

Sample Text

Sample Text

Examples of insufficient contrast of font color on cell shading

Combination	Example
Black text on dark gray	Black Text – FAIL
White text on light gray	White Text – FAIL
Black text on dark teal	Black Text – FAIL
White text on light blue	White Text – FAIL
Brown text on dark yellow	Brown Text -- FAIL

Minimum Contrast

Insufficient contrast is a barrier to accessibility for people if they are unable to read text against its background.

Main Points

RULE: The text-to-background contrast ratio must be at least **4.5:1**, or 3:1 for Large text (18+ point).

- WCAG 2.0 (Level AA), SC 1.4.3

REASON: Text having low contrast to its background cannot be distinguished by people with low vision.

WHO BENEFITS: Proper use of color benefits 1+ classes of people:

1. People with **Low Vision**
 - + Extra: Sighted people have documents that are easier to read

WHAT IS AFFECTED: Proper contrast applies only to text. A drawing with low contrast lines and no text, for example, does not fall under Section 508 requirements. Types of content explained below are:

- Text
- Tables
- Charts
- Slides
- Posters and Infographics
- Maps

Examples of passing and failing contrast in different text colors

Sample Text – Pass (R=0 G=0 B=0) = BLACK

Sample Text – Pass (R=51 G=51 B=51)

Sample Text – Pass (R=77 G=77 B=77)

Sample Text – FAIL (R=150 G=150 B=150)

Sample Text – FAIL (R=192 G=192 B=192)

Sample Text – Pass (R=91 G=155 B=213)

Sample Text – FAIL (R=156 G=194 B=229)

Sample Text – Pass (R=153 G=102 B=51)

Sample Text – FAIL (R=255 G=192 B=0)

Default ink Text - Pass (R=0 G=0 B=255)

Default V-Link Text – Pass (R=112 G=48 B=160)

Examples of passing and failing contrast between text and cell shading

Background Color (RGB Code)	Black Text	White Text
(77,77,77)	Black Text – FAIL	White Text – OK
(150,150,150)	Black Text -- OK	White Text – FAIL
(46,116,181)	Black Text – FAIL	White Text – OK
(189,214,238)	Black Text -- OK	White Text – FAIL
(255,192,0)	Black Text -- OK	White Text – FAIL

Contrast in Text

Most documents have black text on white pages and don't have a problem with contrast of the main text. Styled documents, such as reports, are more likely to have insufficient contrast in the following areas:

- Headings (medium→dark blue is fine)
- Links (standard blue is fine)
- Captions
- Headers/footers

GUIDELINE for TEXT: Do not go any lighter than a medium shade for text against white backgrounds. Refer to the text samples at left for a visual guide.

Contrast in Tables

Cell shading is the main consideration for contrast in tables. A medium blue cell with black text, for example, may not have sufficient contrast, but a light blue cell might. Refer to the table at left for a visual guide.

GUIDELINE for TABLES: Use Black text in cells with medium-to-light shading and white text in cells with shading darker than medium.

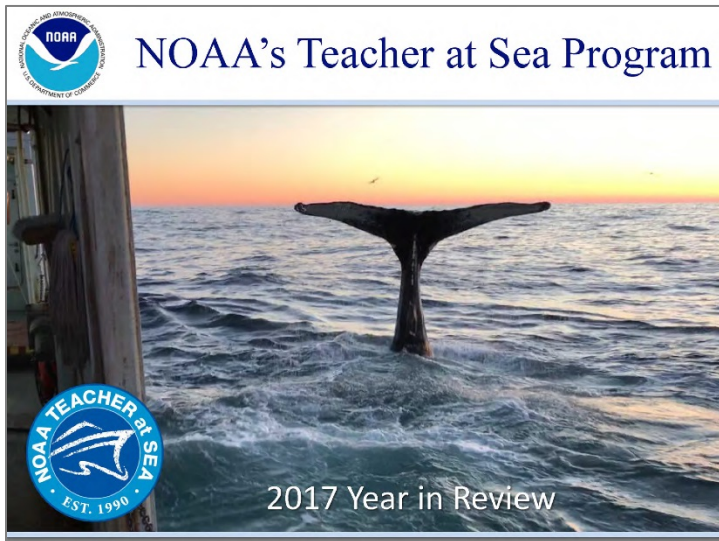
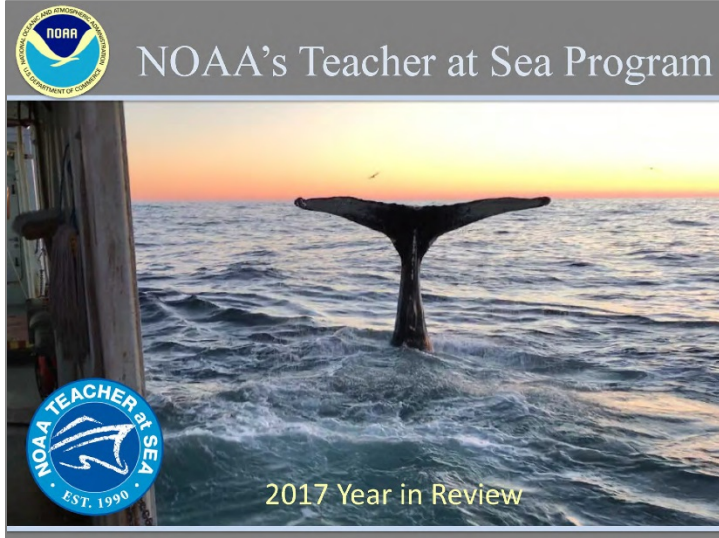
Contrast in Charts

Charts are more likely to have a problem with proper Use of Color than with contrast.

GUIDELINE for CHARTS: Ensure that legends, axis labels, and data labels are not washed out. Remember:

- The minimum contrast rule applies only to text.
- There is no minimum font size.

Examples of insufficient and corrected contrast between title and background



Contrast in Slides

Insufficient contrast of colored text against various backgrounds is a common issue in Slide presentations.

PROBLEM (top figure):

The draft version of this slide had insufficient contrast between the light gray title text against medium gray background.

SOLUTION (bottom figure):

It was not possible to find an acceptable font color with enough contrast, so the design was modified. The gray background was switched to white, and the title was switched to navy blue. Also, the bottom text font was enlarged and changed from yellow to white.

Note: Slides have a higher percentage of text that meets the reduced **3:1** minimum contrast requirement:

18-point regular font

14-point bold font

Checking Contrast

The guidelines above should suffice for most documents.

If there is a special slide, map or infographic, the foreground to background color ratio can be tested with these online tools:

- <https://webaim.org/resources/contrastchecker/>
- <https://contrastchecker.com/>

Example of poster with insufficient and corrected contrast in title and text box



Contrast in Posters and Infographics

Text in graphics presentations also must meet the minimum text-to-background contrast ratio.

PROBLEM (top figure):

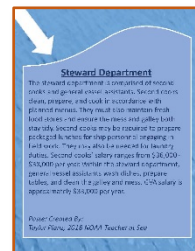
This informational poster has 2 areas that do not meet the minimum contrast requirement:

- Main Title
- Lower right text box

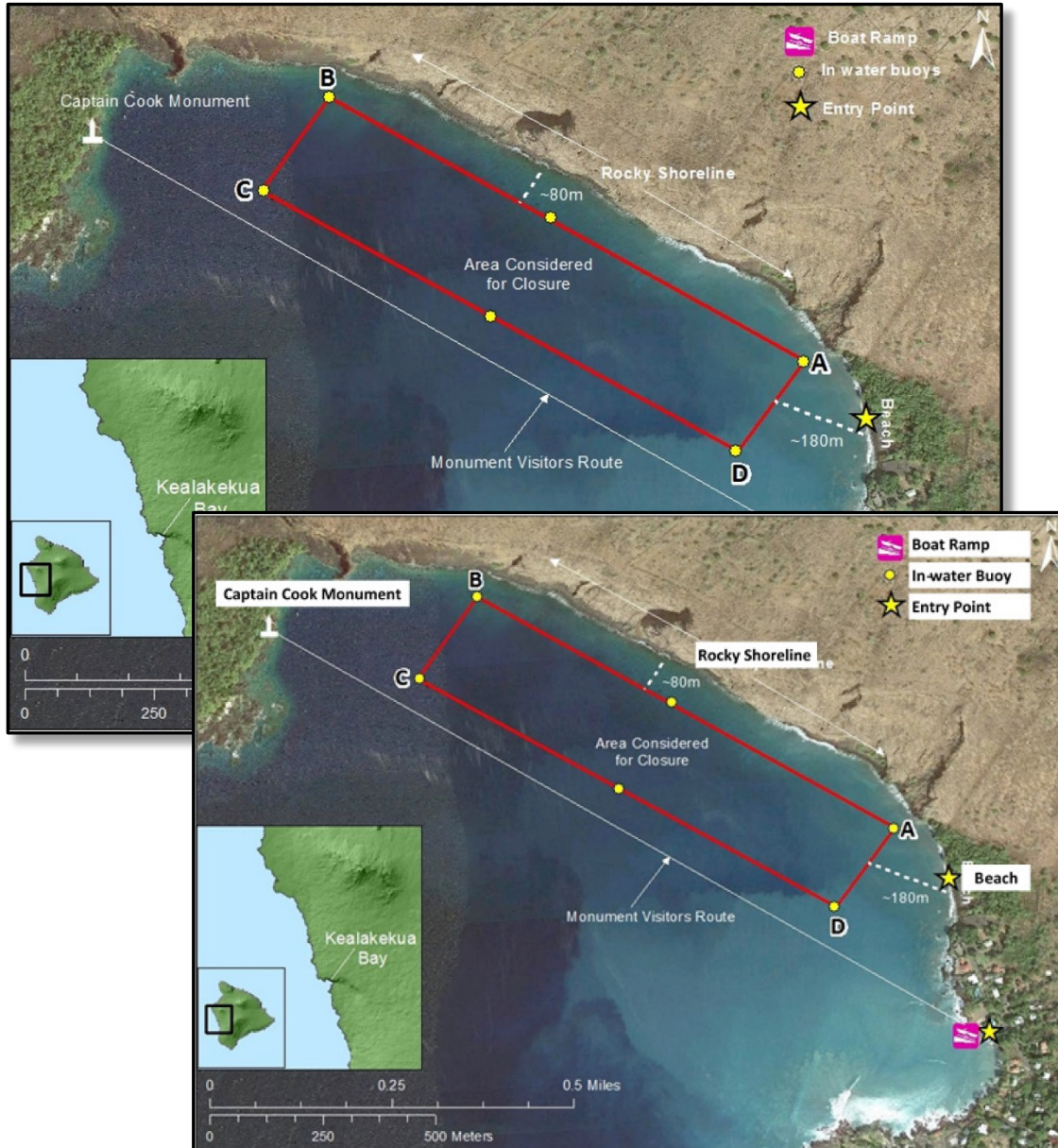
SOLUTION (bottom figure):

A navy blue font, of the same color already used in the poster, was substituted for the white font in the title and text box.

Note: The RGB values of the four other text boxes were checked and found to have sufficient contrast.



Example of map with insufficient and corrected contrast of labels and legend



Contrast in Maps

Maps inserted into documents are usually pre-made images which have text labels and lines added to show pertinent geographic information.

RULE: Text in maps that is significant needs to have a 4.5:1 minimum contrast ratio:

- Labels of features pertinent to the topic
- Applicable legend text

Example of Non-Significant Text: On map with 900 labeled streets surrounding 10 labeled streets in an area of interest, the 900 street names would be considered *non-significant*.

GUIDLINE for MAPS: When adding text to maps, make sure to use a font with sufficient color contrast, or use a text box with a contrasting background color.

PROBLEM (upper map):

White text labels overlapping land have insufficient contrast.

- Note: Text over water has sufficient contrast.

SOLUTION (lower map):

The image was modified (in Microsoft Office) by inserting text box labels with black text and white backgrounds over the labels with insufficient contrast.