The SWMPrats website and the Widgets

Marcus W. Beck[1]

[1]USEPA NHEERL Gulf Ecology Division
Email: beck.marcus@epa.gov

Objectives for the session (2:00 - 2:30)

- Overview of the website
- Overview of the widgets
  - SWMP summary
  - SWMP trends
  - SWMP aggregate

Interactive portion

There are no materials for this module, pull up the website or follow on my screen

Other modules:

- flash drive
- online: swmprats.net 2016 workshop tab

Interactive portion

There are no materials for this module, pull up the website or follow on my screen

Other modules:

- flash drive
- online: swmprats.net 2016 workshop tab

You will run examples whenever you see this guy:

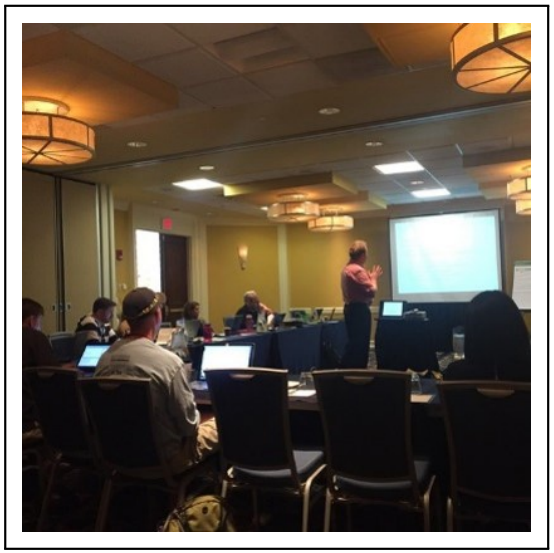
SWMPrats.net

System-***W***ide ***M***onitoring ***P***rogram
Resources for the ***A***nalysis of ***T***ime ***S***eries

SWMPrats.net

An ad hoc group formed to develop and expand the capacity of the NERRS program to more effectively use SWMP data

1) Training workshops 2014, 2015, today



SWMPrats.net

2) SWMPr is an open-source R package described on the website, v2.1.7

```
# install/load from R
install.packages('SWMPr')
library(SWMPR)
```

SWMPrats.net

3) SWMPrats.net (#swmprats) is our base of operations...

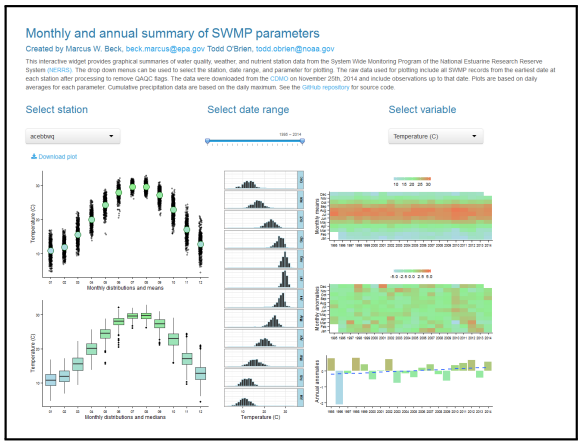
- Training materials
- SWMPr cookbook
- Forum (POTM)
- Widgets

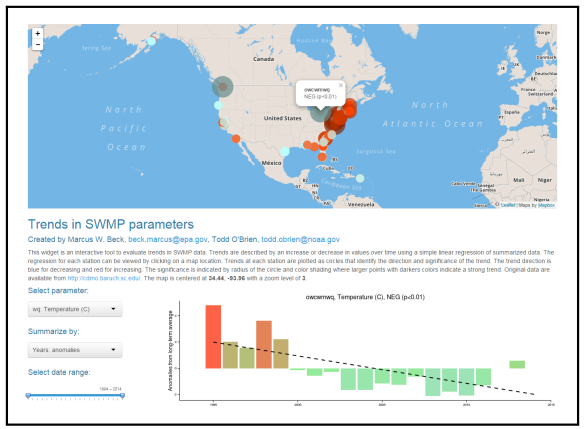
Widgets of SWMPrats.net

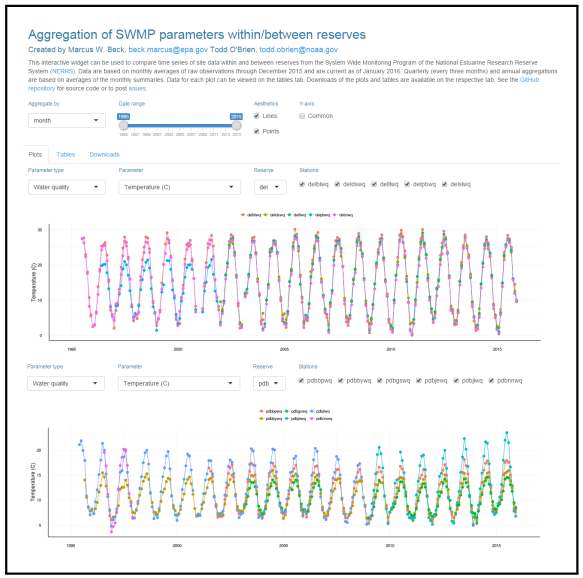
Improved data integration and accessibility with a point-and-click approach

Three Shiny applications allow users to visualize trends in SWMP data

These apps allow 'reactive' use of SWMPr functions







Widgets of SWMPrats.net

When using the widgets, understand...

- Focus is on a single reserve or comparisons between reserves

Widgets of SWMPrats.net

When using the widgets, understand...

- Focus is on a single reserve or comparisons between reserves
- Focus is on a single parameter or comparisons between parameters

Widgets of SWMPrats.net

When using the widgets, understand...

- Focus is on a single reserve or comparisons between reserves
- Focus is on a single parameter or comparisons between parameters
- They are for exploration - results or trends are not absolute

Widgets of SWMPrats.net

When using the widgets, understand...

- Focus is on a single reserve or comparisons between reserves
- Focus is on a single parameter or comparisons between parameters
- They are for exploration - results or trends are not absolute
- Data have been processed a particular way - there are possible errors

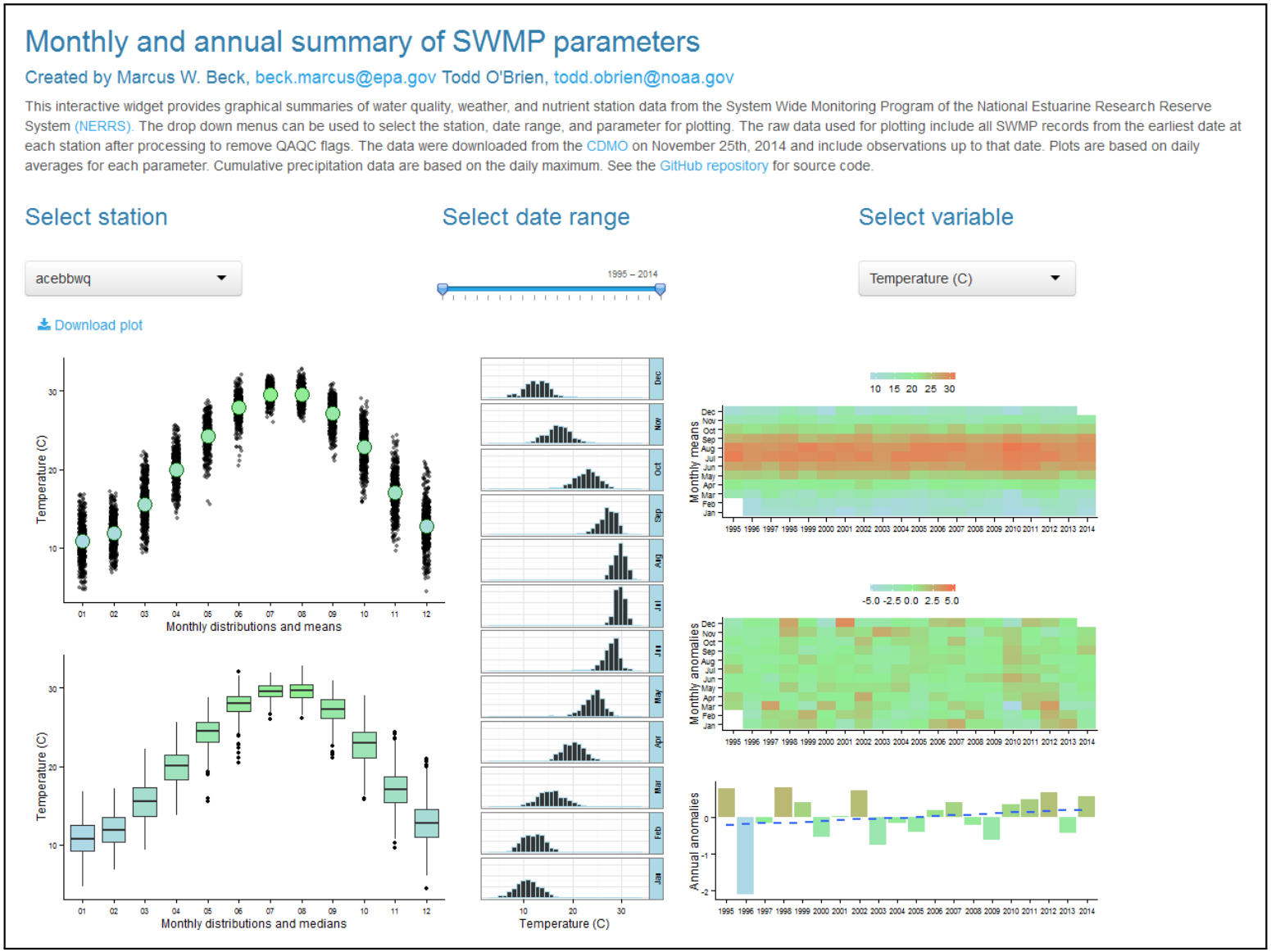
Widgets of SWMPrats.net

When using the widgets, understand...

- Focus is on a single reserve or comparisons between reserves
- Focus is on a single parameter or comparisons between parameters
- They are for exploration - results or trends are not absolute
- Data have been processed a particular way - there are possible errors
- Data are static - hosted directly with app or on private site after processing, updated once a year or catastrophic error...

Widgets of SWMPrats.net: SWMP summary

For summarizing trends at one site and one parameter



Widgets of SWMPrats.net: SWMP summary

For a given ***site***, ***date range***, and ***variable***, it shows:

- Monthly distribution with means (top left)
- Monthly distributions by boxplots (bottom left)
- Histogram frequency by month (center)
- Monthly means by years (top right)
- Monthly anomalies by year (center right)
- Annual anomalies and trend (bottom right)

Options for tabular data and saving plots/tables

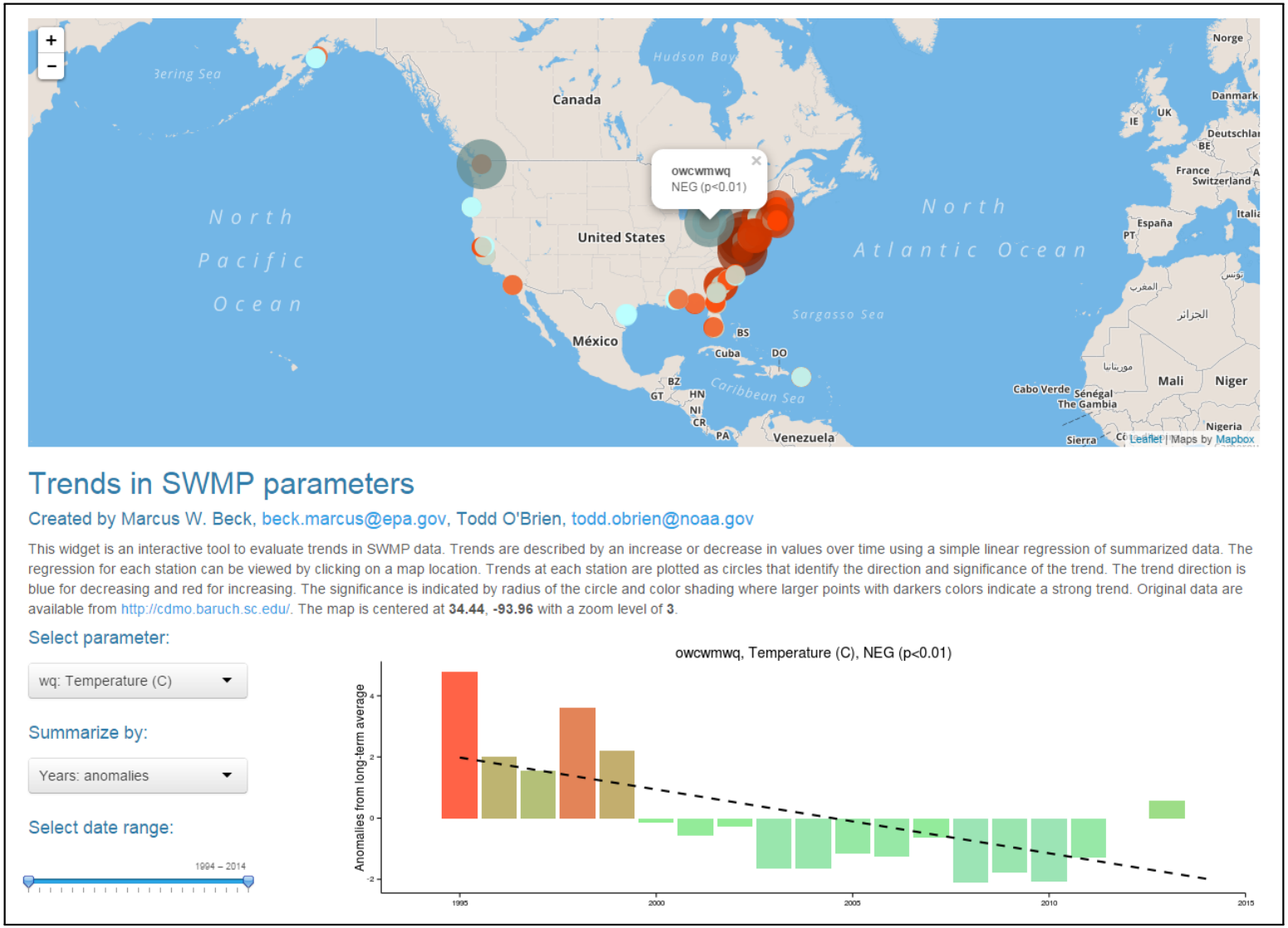
Widgets of SWMPrats.net: SWMP summary

Note: The `plot_summary` function in SWMPr is used to create the plots.

```
library(SWMPr)

## import data
data(apacpnut)
dat <- qaqc(apacpnut)

## plot
plot_summary(dat, param = 'chla_n', years = c(2007, 2013))

## get individaul plots
plots <- plot_summary(dat, param = 'chla_n', years = c(2007, 2013),
  plt_sep = TRUE)

plots[[1]] # top left
plots[[3]] # middle
plots[[6]] # bottom right

## get summary data
plot_summary(dat, param = 'chla_n', year = c(2007, 2013), sum_out = TRUE)
```

Widgets of SWMPrats.net: SWMP compare

Compare trends for a single parameter between reserves/space



Widgets of SWMPrats.net: SWMP compare

For a ***given parameter*** and ***date range***, at all sites:

- Evaluate annual or monthly changes

Widgets of SWMPrats.net: SWMP compare

For a ***given parameter*** and ***date range***, at all sites:

- Evaluate annual or monthly changes
- Evaluate anomalies (difference from grand mean) or observed

Widgets of SWMPrats.net: SWMP compare

For a ***given parameter*** and ***date range***, at all sites:

- Evaluate annual or monthly changes
- Evaluate anomalies (difference from grand mean) or observed
- Trends shown as increasing (red), decreasing (blue)

Widgets of SWMPrats.net: SWMP compare

For a ***given parameter*** and ***date range***, at all sites:

- Evaluate annual or monthly changes
- Evaluate anomalies (difference from grand mean) or observed
- Trends shown as increasing (red), decreasing (blue)
- Significance (based on simple regression) is shown as size of point

Widgets of SWMPrats.net: SWMP compare

For a ***given parameter*** and ***date range***, at all sites:

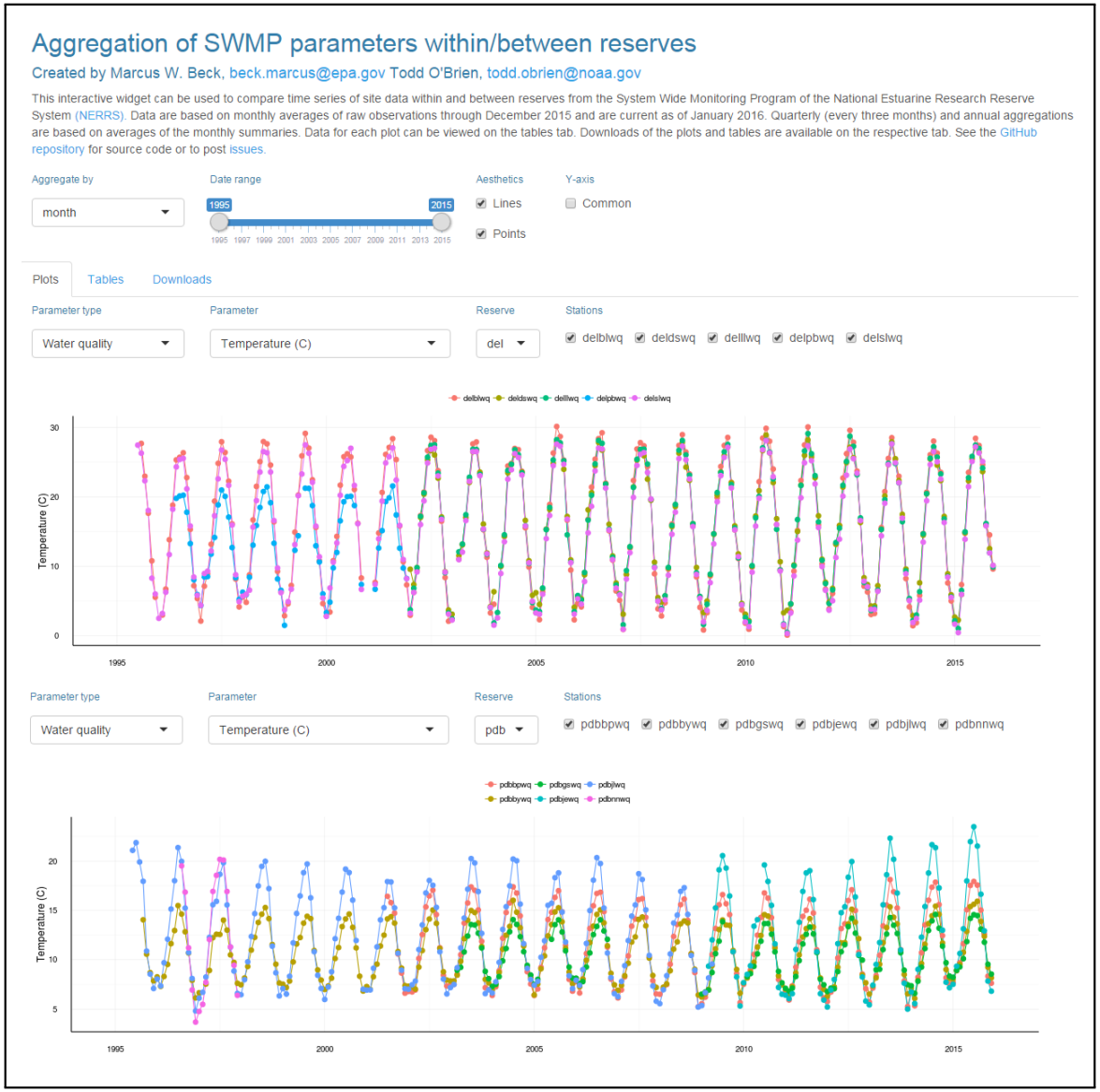
- Evaluate annual or monthly changes
- Evaluate anomalies (difference from grand mean) or observed
- Trends shown as increasing (red), decreasing (blue)
- Significance (based on simple regression) is shown as size of point

All trends are relative (***compare***)...

Zoom the map to view finer spatial scale and click to view results for single stations

Widgets of SWMPrats.net: SWMP aggregate

Compare aggregated parameters within and between reserves



Widgets of SWMPrats.net: SWMP summary

This app allows multiple comparisons:

- Within and between sites

Widgets of SWMPrats.net: SWMP summary

This app allows multiple comparisons:

- Within and between sites
- Same or different parameters

Widgets of SWMPrats.net: SWMP summary

This app allows multiple comparisons:

- Within and between sites
- Same or different parameters
- Seasonal (monthly, quarterly) or annual trends

Widgets of SWMPrats.net: SWMP summary

This app allows multiple comparisons:

- Within and between sites
- Same or different parameters
- Seasonal (monthly, quarterly) or annual trends
- Options for tabular data and saving plots/tables

Widgets of SWMPrats.net: SWMP summary

This app allows multiple comparisons:

- Within and between sites
- Same or different parameters
- Seasonal (monthly, quarterly) or annual trends
- Options for tabular data and saving plots/tables

Water and air temperature example at ACE basin.... note the common y-axis and effect of aggregating incomplete years

Up next... Time Series Topic 1: Weighted Regression

Questions??