THREE TASKS FOR TODAY

- **Refine the conceptual model**
- **Convert general management questions contained in the conceptual model to scientific monitoring questions**
  - This is the task we will focus on this morning
- **Determine the collection methods most in need of standardization to address the monitoring questions**

CONCEPTUAL FRAMEWORK

- **Inputs**
  - Sources
  - Source locations/jurisdictions
- **Treatment**
  - Source control
    - Education
    - Product bans
  - Local removal
    - Street sweeping
    - Storm drain Inserts
    - Trash capture devices
  - Remediation
    - Beach/Shoreline clean up
    - Ocean removal
    - Creek clean up
- **State**
  - Quantitative (load)
  - Qualitative (condition)
- **Effects**
  - Human health
  - Wildlife health
  - Recreation/Economy

TRANSLATING MANAGEMENT QUESTIONS INTO SCIENTIFIC MONITORING QUESTIONS

- **Management questions**
- **Managerially relevant scientific questions**
- **Scientific monitoring questions**

TRANSLATING MANAGEMENT QUESTIONS INTO SCIENTIFIC MONITORING QUESTIONS

- **Management question:**
  - Have our management actions been effective at reducing trash in the environment?
- **Managerially relevant scientific questions:**
  - Has the amount of trash in the ocean decreased over time?
- **Scientific monitoring question:**
  - Are we 95% certain that we have a decline of at least 10% per year in the volume of plastic debris between 5-25 mm size found in Bay/Ocean water column during a summer index period?

ANOTHER EXAMPLE

Management question:

Have our management actions been effective at reducing trash in the environment?

- **Managerially relevant science question:**
  - Has the amount of trash in the ocean decreased over time?
- **Scientific monitoring question:**
  - Are we 95% certain that we have a decline of at least 10% per year in the volume of plastic debris of 5-25 mm size found in Bay/Ocean water column during a summer index period?

- **Managerially relevant science question:**
  - Is the amount of trash in an area where we have taken a specific management action different from that in an area where we did not take that action?
- **Scientific monitoring question:**
  - Are we 90% certain that there is at least a 30% difference in cigarette butt density in the sand during the summer between beaches that do and do not allow smoking?

SCIENTIFIC MONITORING QUESTION ELEMENTS

Are we 95% certain that we have a decline of at least 10% per year in the volume of plastic debris of 5-25 mm size found in Bay/Ocean water column during a summer index period?

- **What metric?**
  - Volume
- **What target?**
  - Plastic of a particular size
- **What habitat?**
  - Ocean water column
- **What temporal window?**
  - Summer
- **Desired level of precision**
  - Power to detect 10% change with 95% confidence

SCIENTIFIC MONITORING QUESTION ELEMENTS

- **What metric?**
  - Counts
  - Volume
  - Percent of area where trash is present
- **What target?**
  - Total debris
  - Plastic
  - Plastic of a particular size
- **What habitat?**
  - Creeks
  - Beaches
  - Fish stomachs
- **What temporal window?**
  - Summer
  - Year round
  - Three days following rain
- **Desired level of precision**
  - 95% confidence intervals that are within 30% of the mean
  - Power to detect 10% change with 80% confidence

HOW DOES THIS RELATE TO METHODS?

- **Method choice flows from three key aspects of the monitoring question**
  - What habitat do you want to sample?
  - What metric are you targeting?
  - What is the desired precision in the answer?

- **One goal of the standardization project is to quantify method uncertainty to help in sample design**

- **After we have translated the four questions into scientific questions, we will focus on method prioritization**

CHARGE FOR THE NEXT 90 MINUTES

- **Turn the four questions we prioritized yesterday into scientific questions:**
  - What is the metric?
  - What is the target?
  - In what habitat?
  - During what temporal window?
  - With what desired level of precision?