QAPP Examples and Guidance

Long Island Sound Community Impact Fund

Thursday, October 3rd, 2024

CENTER FOR WATERSHED PROTECTION

Long Island Sound Study
A Partnership to Restore and Protect the Sound

RESTORE AMERICA'S ESTUARIES

Agenda

About the Webinar Series

Icebreaker

Introductions

Topics to Cover

- LISCIF QAPP Template
- Primary Data Collection
- Secondary Data Collection
- Modeling Data Collection
- Additional Resources

Q&A and Wrap up

CENTER FOR WATERSHED PROTECTION

Welcome

About Center for Watershed Protection (CWP)

- **National non-profit** founded in 1992
- **Mission to advance clean water resources** and healthy ecosystems through responsible land and water management

About this Webinar Series

- To provide training and support in the QAPP development process for projects that collect, analyze, or use environmental data.
- Available to anyone in Connecticut or New York, who is part of a non-profit organization, Tribe, or municipality.

Introductions

Presenters

Shahela Begum
Director, Long Island Sound Community Impact Fund

Lisa Fraley-McNeal
Sr. Watershed & Stormwater Research Specialist, Center for Watershed Protection

Deb Caraco
Sr. Watershed Engineer, Center for Watershed Protection

Alexandria Wilkins
Watershed Planner, Center for Watershed Protection

Poll Question

How much experience do you have with QAPP writing?

- I have never written a QAPP
- I contributed to writing sections of a QAPP
- I have written a complete QAPP and experienced the review process
- I can write QAPPs in my sleep
- What is this Q app you are talking about?

Icebreaker

Round Robin Introductions

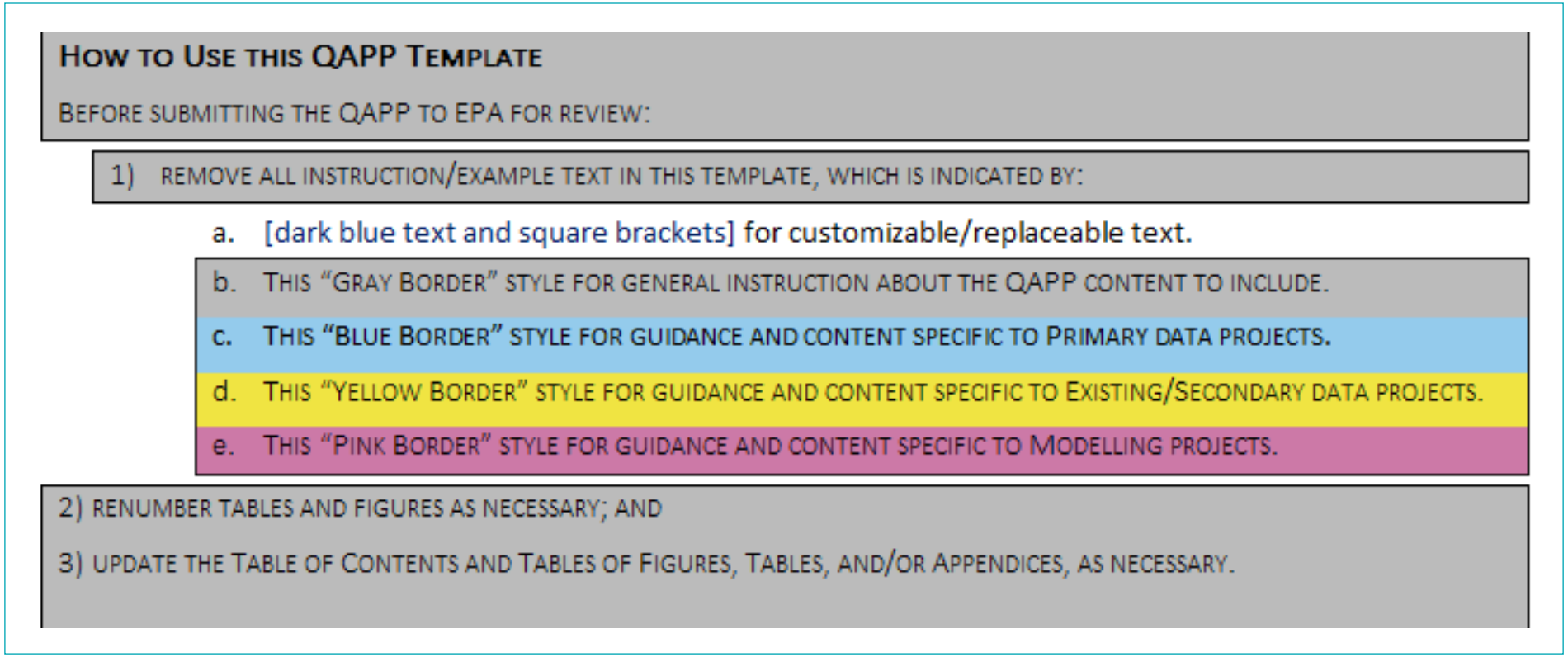
- Share your Name and Organization
- What's your experience with QAPPs?
- Are you currently working on a QAPP? What type of data are you working with?

Part 1: LISCIF QAPP Template

QAPP Template Features

The QAPP Template includes and provides:

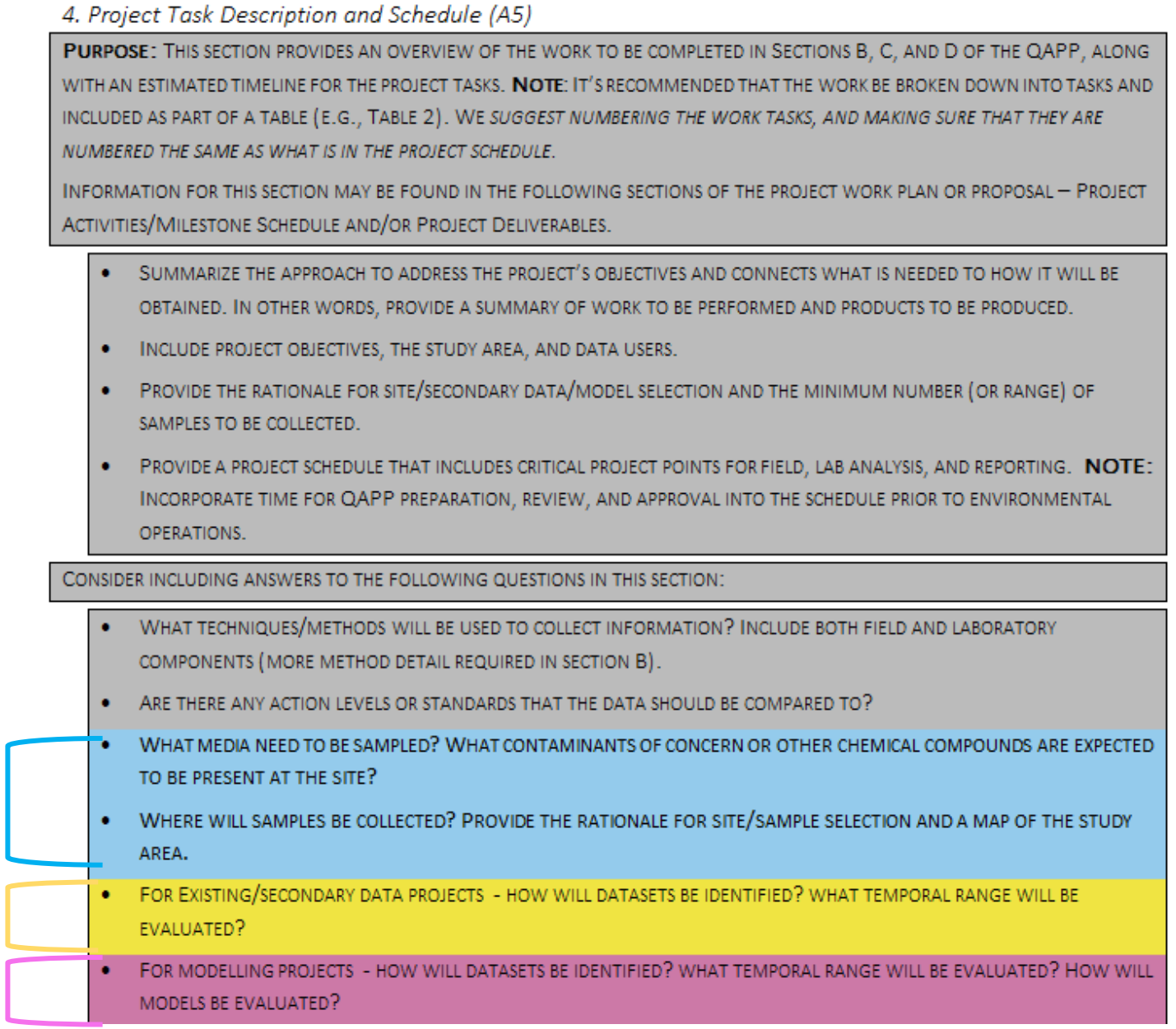
- Supplemental information to assist users in completing each section of their QAPP.
  - Color-coded sections identify general QAPP instructions and content assistance, and specific content related to the 3 types of environmental information.



QAPP Template Features

Working Through the QAPP Template:

- Each section of the QAPP includes
  - A description & purpose
  - Required content
  - Tips & Notes
  - Content prompts



4. Project Task Description and Schedule (A5)

PURPOSE: THIS SECTION PROVIDES AN OVERVIEW OF THE WORK TO BE COMPLETED IN SECTIONS B, C, AND D OF THE QAPP, ALONG WITH AN ESTIMATED TIMELINE FOR THE PROJECT TASKS. **NOTE:** IT'S RECOMMENDED THAT THE WORK BE BROKEN DOWN INTO TASKS AND INCLUDED AS PART OF A TABLE (E.G., TABLE 2). *WE SUGGEST NUMBERING THE WORK TASKS, AND MAKING SURE THAT THEY ARE NUMBERED THE SAME AS WHAT IS IN THE PROJECT SCHEDULE.*

INFORMATION FOR THIS SECTION MAY BE FOUND IN THE FOLLOWING SECTIONS OF THE PROJECT WORK PLAN OR PROPOSAL – PROJECT ACTIVITIES/MILESTONE SCHEDULE AND/OR PROJECT DELIVERABLES.

- SUMMARIZE THE APPROACH TO ADDRESS THE PROJECT'S OBJECTIVES AND CONNECTS WHAT IS NEEDED TO HOW IT WILL BE OBTAINED. IN OTHER WORDS, PROVIDE A SUMMARY OF WORK TO BE PERFORMED AND PRODUCTS TO BE PRODUCED.
- INCLUDE PROJECT OBJECTIVES, THE STUDY AREA, AND DATA USERS.
- PROVIDE THE RATIONALE FOR SITE/SECONDARY DATA/MODEL SELECTION AND THE MINIMUM NUMBER (OR RANGE) OF SAMPLES TO BE COLLECTED.
- PROVIDE A PROJECT SCHEDULE THAT INCLUDES CRITICAL PROJECT POINTS FOR FIELD, LAB ANALYSIS, AND REPORTING. **NOTE:** INCORPORATE TIME FOR QAPP PREPARATION, REVIEW, AND APPROVAL INTO THE SCHEDULE PRIOR TO ENVIRONMENTAL OPERATIONS.

CONSIDER INCLUDING ANSWERS TO THE FOLLOWING QUESTIONS IN THIS SECTION:

- WHAT TECHNIQUES/METHODS WILL BE USED TO COLLECT INFORMATION? INCLUDE BOTH FIELD AND LABORATORY COMPONENTS (MORE METHOD DETAIL REQUIRED IN SECTION B).
- ARE THERE ANY ACTION LEVELS OR STANDARDS THAT THE DATA SHOULD BE COMPARED TO?
- WHAT MEDIA NEED TO BE SAMPLED? WHAT CONTAMINANTS OF CONCERN OR OTHER CHEMICAL COMPOUNDS ARE EXPECTED TO BE PRESENT AT THE SITE?
- WHERE WILL SAMPLES BE COLLECTED? PROVIDE THE RATIONALE FOR SITE/SAMPLE SELECTION AND A MAP OF THE STUDY AREA.
- FOR EXISTING/SECONDARY DATA PROJECTS - HOW WILL DATASETS BE IDENTIFIED? WHAT TEMPORAL RANGE WILL BE EVALUATED?
- FOR MODELLING PROJECTS - HOW WILL DATASETS BE IDENTIFIED? WHAT TEMPORAL RANGE WILL BE EVALUATED? HOW WILL MODELS BE EVALUATED?

QAPP Template Features

Working Through the QAPP Template:

- Where possible, example text has been included.

6. Documentation and Records Management (A12)

[Add Text. Update the paragraph(s) below to match your project's documentation and records management plan.]

Any distribution, maintenance, or revisions of the QAPP will be completed by [Add name of responsible person(s) or organization]. Viewing of the QAPP will be limited to those listed above as well as the EPA Officials identified on the Approval Page (See section A7 – A10 for contact information). Any and all other project documents or records will be [Describe how other project documents will be handled (e.g., "written on password protected, private computers not to be shared with the general public and transmitted via email to only those listed and/or Laboratory personnel (for more information see B7)"]. A final report will be submitted at the end of the project currently scheduled to be [Add estimated project end date].

OR THE DESCRIPTION OF PROJECT DOCUMENT AND RECORD MANAGEMENT CAN BE BROKEN DOWN AS FOLLOWS:

The data generating activities such as [Add relevant activities (i.e., field measurements, sample collection, and laboratory sample analyses], will be documented using guidelines outlined below.

Field Sampling

[Add title or name of responsible person(s)/organization (e.g., field crews)] will document sample collection information and data with [Specify how data will be recorded (e.g., hardcopy data sheets)]. The field data collected will include [Outline the field data information collected (e.g., sampling date and time, latitude, longitude, etc.)]. Additional information will be filled in as the samples are transferred and processed.

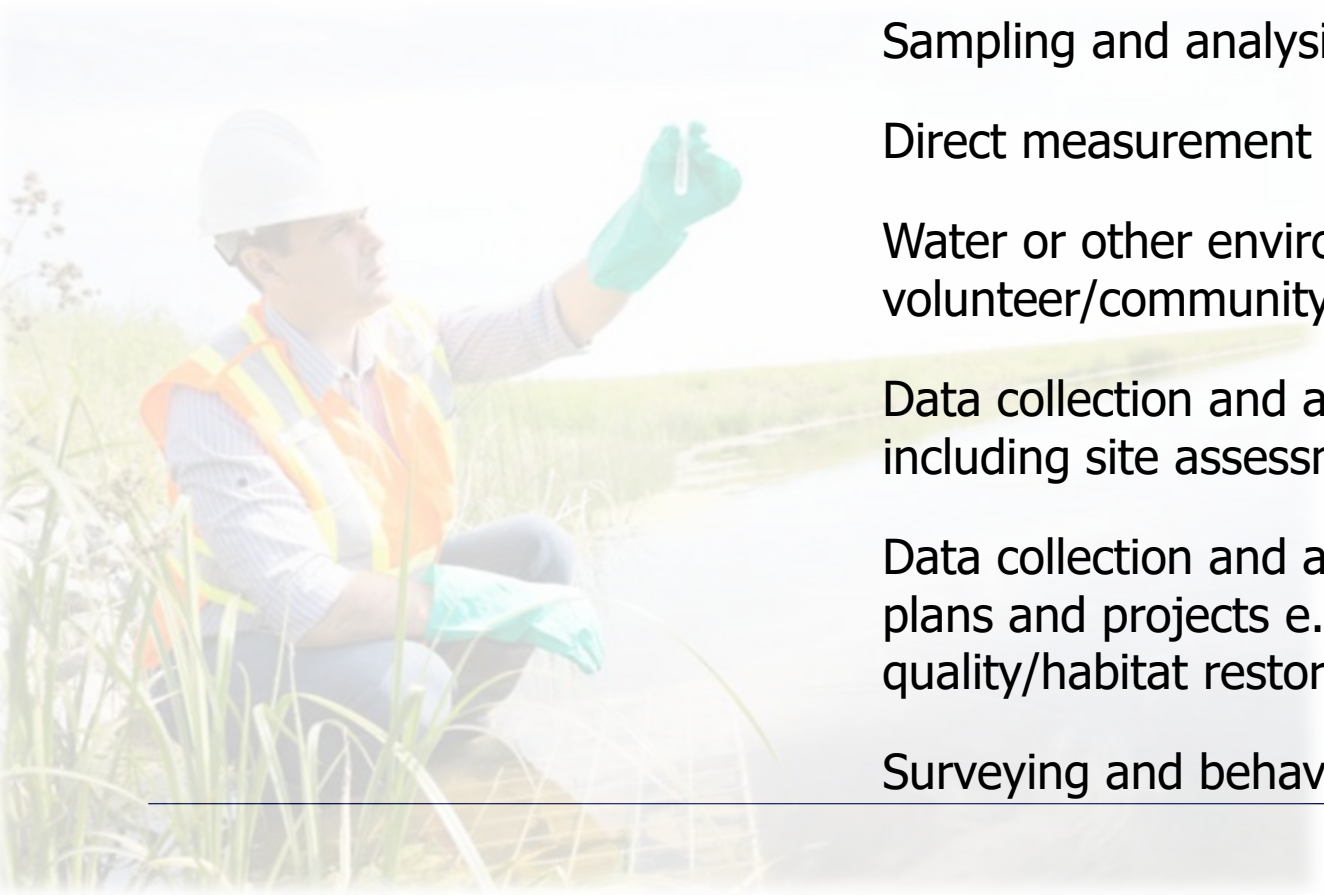
At the end of each trip, the [Add title or name of responsible person(s)/organization] will ensure the safe return of the samples and [Include additional collected data (i.e., data collection and chain of custody forms)] to [Add title or name of responsible person(s)/organization]. Data sheets (Appendix B) will be used during the processing of the water and sediment samples. The person(s) processing the samples will record the data/metadata [Add relevant details on the project's sample processing (e.g., "on the parameter data sheet and identify themself by

Q&A – QAPP Template

Part 2: Primary Data Collection QAPP Guidance and Examples

QAPP Guidance for Primary Data Collection

Primary data- New data observed, collected, stored, or generated directly for a specific purpose (project goal).



Monitoring data

Sampling and analysis data

Direct measurement of environmental conditions or releases

Water or other environmental media monitoring including volunteer/community-based efforts

Data collection and analysis proposed to support decision-making including site assessment prioritization

Data collection and analysis associated with development or design of plans and projects e.g. fish passage, watershed or water quality/habitat restoration project plans etc.

Surveying and behavior change work to support decision-making

QAPP Guidance for Primary Data Collection

Oyster Reef Restoration Example

The success of oyster reef habitat restoration projects have been limited in some locations. Environmental factors are suspected to influence oyster growth and reproduction. The goal of this project is to strengthen restoration project site selection by quantifying seasonal and spatial trends in oyster larvae settlement and determining the influence of local environmental conditions.

Primary Data Collection:

- Oyster Spat Monitoring
- Water Quality Monitoring
  - Water Depth
  - Salinity
  - Water Column pH
  - Temperature
  - Dissolved Oxygen

QAPP Guidance for Primary Data Collection

DQOs and Performance Acceptance Criteria (A6)

Data Quality Objectives (DQOs) - qualitative and quantitative statements that describe:

- What are the data needs?
- How 'good' do data need to be to support the project objectives?

Which of the following is an appropriate DQO statement for the oyster reef restoration example?

1. To follow all procedures outlined in the QAPP for collecting oyster spat and water quality.
2. To determine limitations to success of future oyster restoration efforts.
3. To collect oyster spat and water quality data capable of quantifying seasonal and spatial trends in oyster larvae settlement to identify limitations to restoration success.
4. To restore oyster reef habitat.

QAPP Guidance for Primary Data Collection

Data Quality Indicators (DQIs): How will you measure the quality of the data and determine if you have enough data to meet project objectives?

Element	Example Indicators
Precision Measure of repeatability of the measurement	• Differences in spat counts between samplers < 10% • Differences less than the following for repeat measurements: 0.3 mg/L dissolved oxygen, 0.2 pH, 3 ppt salinity, 3° temperature
Accuracy (bias) Agreement with a known value	• All calibrations within acceptable limits
Representativeness Ability to represent a population	• Monitoring sites chosen to be representative of an array of conditions which could impact restoration success
Comparability Ability to blend data from multiple datasets	• Follow standard sampling methods used by oyster monitoring groups • Consistent sample and processing methods across each site and sampling month to allow for data comparability between sites and seasons
Completeness Amount of data collected (as a % of data needed or intended)	• 80% of water quality samples collected • 100% of oyster spat counted on individual shells
Sensitivity Ability to differentiate between different levels of a measured variable	• 0-40°C for temperature, 0-20.0 mg/L for dissolved oxygen, 0.00-14.00 for pH, 0-100 ppt for salinity, 0-120 cm for water depth • Oyster spat 1 mm or less

QAPP Guidance for Primary Data Collection

Identification of Project Environmental Information Operations (B1)

Describe and provide the rationale for the project/sampling design.

Project/Sampling Design Components	Examples
Sampling Locations / Study Area	• 15 monitoring sites to represent a broad coverage of potential areas for future oyster restoration. • Map and locations provided for each monitoring site.
Media	• Oyster shells, water, air
Number/Types of Samples	• Monthly water quality and oyster spat monitoring for one year. • One sample for each water quality parameter. • 10 oyster shells for spat counts at each site per sampling event. • Sample sizes consistent with other established oyster monitoring programs.
Sample Depths	• Water temp at 20 cm above sediment surface • Water depth from sediment surface to waterline and total depth of spat collection device to the waterline • Water taken 20 cm above sediment surface
Field/Lab Parameters	• Field: temperature, water depth, dissolved oxygen • Lab: pH, salinity, spat counts

QAPP Guidance for Primary Data Collection

Methods for Environmental Information Acquisition (B2)

Describe or reference the methods to collect, analyze, and evaluate project data.

Field Activities	Examples
Sample Collection	• Record air and water temp to the nearest whole degree • Lower DO sonde to 20 cm above sediment and record measurement in mg/L • Lower a clean 60 mL HDPE sample bottle into the water column with the opening facing down until 20 cm above the sediment surface and then flip bottle to fill. • Lift oyster sampling device off the sediment surface. Remove all oyster shells and place in 5-gal bucket. Randomly select 10 oyster shells and add to a clean plastic bag. Refill the device with clean recycled oyster shells and redeploy the device in the same spot as retrieved.
Sample Handling and Chain of Custody	• Water sample will be labeled with a capital letter and recorded on the data sheet. • Oyster shell sample collection bags will be labeled with site ID, collection date, and sampler initials and placed in a cooler with no ice. • Upon returning to the lab, shell samples will be placed in the fridge at 2-4°C until spat counts are completed. • Water samples will be sampled for pH and salinity within 24 hours of collection. • Oyster shells will be sampled for spat counts no more than 30 days after field collection.
Lab Methods	• Hach Pocket Pro+ Tester pH and Temperature and Agriculture Solutions Salinity Refractometer will be used for measuring temperature and salinity. • Standard oyster monitoring SOPs will be followed and methods are provided in the Appendix.

QAPP Guidance for Primary Data Collection

Useability Determination (D2)

Describe how you will use the outputs of data review to determine if the data are the right type, quality, and quantity to support the intended use(s) and are suitable for the decision(s) to be made.

- Data scatterplots and value ranges will be reviewed for anomalies.
- Unexplained anomalies will be discussed with lead scientists on other oyster population monitoring projects.
- Data limitations will be considered when using data results to guide future oyster reef restoration site selection
- Spatial and seasonal trends in monthly spat counts (larvae settlement) can be used to predict where and when oyster restoration projects will be most likely to recruit oysters and create habitat with self-sustaining oyster populations.
- Water quality metrics collected will provide context for trends in oyster settlement beyond seasonality and help inform site selection parameters.

How would you improve this useability determination example?

Q&A – Primary Data

Part 3: Secondary/Existing Data Collection QAPP Guidance and Examples

QAPP Guidance for Secondary Data Collection

Existing/Secondary Data – Data that have been previously collected, derived, stored, or reported in the past or by other parties (for a different purpose and/or using different methods and quality criteria).

Existing sampling and analytical data from a previous investigation

Computer model simulations and applications pertaining to other studies

Historical GIS Data downloads

Data generated to verify innovative technologies and methods

Publications

Photographs

Topographical maps

Meteorological data

Environmental indicator data

Literature files/searches

QAPP Guidance for Secondary Data Collection

Innovative Stormwater Remediation Example

Nutrient pollution is one of America's most widespread, costly and challenging environmental problems, and is caused by excess nitrogen and phosphorus in the water. The goal of this project is to implement demonstration projects and test the nutrient removal effectiveness of an innovative method of nutrient reduction at multiple projects across the region. The first task is to complete a literature review of high-quality experimental and observational studies.

Existing/Secondary Data Collection:

- Literature Review
  - Existing sampling and analytical data from previous studies
  - Publications
  - Literature Files/Searches
- Project Site Identification
  - Historical data
  - Case studies

QAPP Guidance for Secondary Data Collection

DQOs and Performance Acceptance Criteria (A6)

Data Quality Objectives (DQOs) - qualitative and quantitative statements that describe:

- What are the data needs?
- How 'good' do data need to be to support the project objectives?

Which of the following is an appropriate DQO statement for the innovative stormwater remediation example?

1. To ensure that site selection and assessments are conducted using accurate and precise information that satisfy project criteria.
2. To determine the potential of the innovative method to reduce nutrient reductions.
3. To collect secondary data that is relevant to the project goal, representative and salient to the region under study, and accurate.
4. To determine if a document is appropriate and how much influence each document should have on the final recommendations.

QAPP Guidance for Secondary Data Collection

DQOs and Performance Acceptance Criteria (A6)

Acceptance Criteria – The criteria the collected data needs to achieve in order to minimize incorrect and uncertain conclusions from the data.

Acceptance Criteria Example	Description
Relevance to the Study	Relevant data will support the project goal of reducing nutrient input from stormwater runoff through the use of the innovative bioremediation method. Any gaps in data will also be identified, such as lack of studies or where studies and theories seem to disagree.
Representative of the areas and times of the study	The focus will be on documents relevant to the Gulf Coast. Other salient work relevant to general, or "theoretical," overarching principles will be considered and evaluated for their applicability. Both recent and long-term data will be considered.
Individual Observations: anomalous or extreme outliers	Individual data values might be in error due to variables such as transcription errors or equipment malfunctions. Data will be examined for anomalous values and reject values reported well beyond the range of observed variability.

QAPP Guidance for Secondary Data

Data Quality Indicators (DQIs): How will you measure the quality of the data and determine if you have enough data to meet project objectives?

Element	Example Indicators
Year *Representative of the time of the project*	• High Quality: Published in or after 2000 or seminal research • Low Quality: Published prior to 2000
Applicability *Relevance to the project goals*	• High Quality: Purpose or scope of existing data matches information need • Low Quality: Does not apply to project goals or information need
Study Location *Representative of the target project area(s)*	• High Quality: Within target project area(s) (i.e., list of states) • Low Quality: Outside of larger regional project area and not representative
Data Collection & Analysis Methods *Soundness of the methods used to generate the existing data*	• High Quality: Approved state or federal methods used; statistically relevant analyses • Low Quality: Methods not documented; insufficient data collected
Conclusions *Degree of clarity and completeness of conclusions pulled from data*	• High Quality: Scientific method evident; conclusions supported by statistical analysis • Low Quality: Inconclusive; insufficient evidence for conclusions made
References *Extent of independent verification, validation, and peer review*	• High Quality: Majority peer-reviewed • Low Quality: Minimal to no peer-review

QAPP Guidance for Primary Data Collection

Useability Determination (D2)

Describe how you will use the outputs of data review to determine if the data are the right type, quality, and quantity to support the intended use(s) and are suitable for the decision(s) to be made.

- Data will be examined for anomalous values and reject values reported well beyond the range of observed variability.
- Any gaps in data will also be identified, such as lack of studies or where studies and theories seem to disagree.
- The number of exclusions, the source of the data excluded, and the suspected cause of error or rationale for exclusion will be documented.

How would you improve this useability determination example?

Q&A – Secondary/Existing Data

Part 4: Modeling Data Collection QAPP Guidance and Examples

QAPP Guidance for Modeling Data

Modeling Data: Data from a predictive system that provides representations of the environment.

Use of Existing Models:

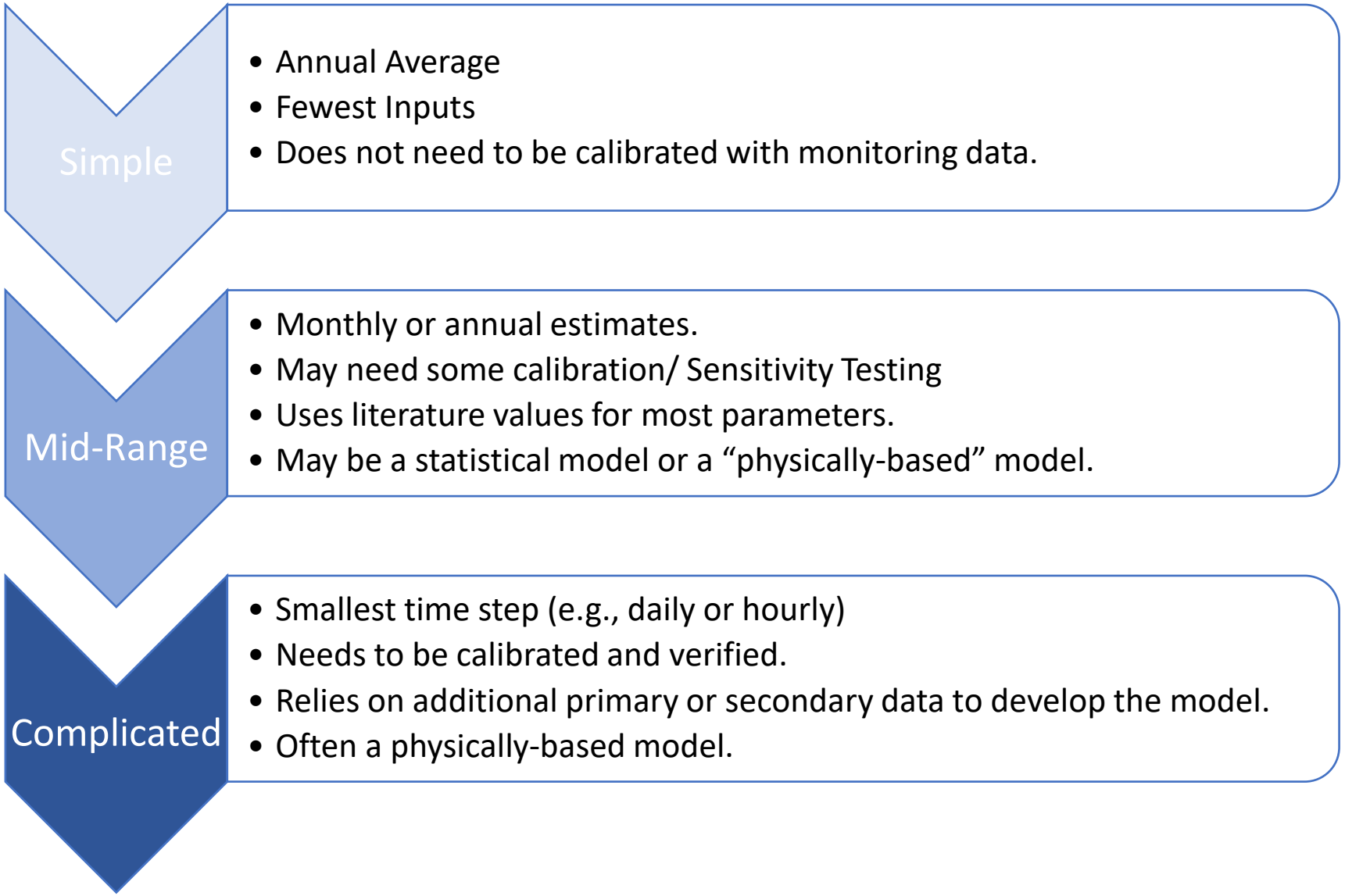
- Hydrologic/Hydraulic
- Watershed/Pollutant Loads
- In-Stream Water Quality
- Ecological (Biological Population)
- BMP Performance Calculators

Developing a New Model:

- Any new equation or process to estimate a natural process.

QAPP Guidance for Modeling Data

Models can vary from very simple to extremely complicated



QAPP Guidance for Modeling Data

Watershed Planning Example

A small urban watershed drains to a larger estuary which is impacted by nitrogen pollution. The purpose of this watershed plan is to identify restoration opportunities to reduce the loads from urban runoff and land-based sources of pollution and use modeling to quantify watershed loads of nitrogen.

Modeling Activities:

- Estimate Nitrogen Loads
- Estimate Pollutant Load Reduction from restoration activities:
  - Riparian buffer restoration.
  - Stormwater retrofits
  - Stream restoration
  - Municipal operations (street sweeping and catch basin cleaning)

QAPP Guidance for Modeling

Data Quality Objectives (A6)

Data Quality Objectives (DQOs) - qualitative and quantitative statements that describe:

- What are the data needs?
- How 'good' do data need to be to support the project objectives?

Which of the following is an appropriate DQO statement for the Watershed Planning Example?

1. Identify high quality and cost-effective restoration projects.
2. The modeling effort needs to produce graphs of change over time.
3. Complete modeling of sufficient quality to estimate average annual loading from a baseline, at a fine enough detail to document 10% pollutant reduction from identified projects.
4. Involve the public in the planning process.

QAPP Guidance for Modeling Data

Data Quality Indicators (DQIs): How will you ensure that the methods used will meet the project objectives?

Element	Example Indicators for Model Selection and Performance
Soundness Extent to which methods are reasonable for the intended application.	• Model uses standard methods for estimating pollutant loads, which coefficients and assumptions similar to other models. • The model has been used by other watershed planners in the region.
Applicability and Utility Extent to which information is relevant for the intended use.	• Model estimates annual loads of nitrogen from small watersheds. • It is capable of modeling urban BMPs included in the watershed plan. • Land uses in the watershed are consistent with those identified in the model.
Clarity and Completeness Degree of clarity and completeness of documentation.	• The model includes complete model documentation and a users' guide.
Evaluation and Review Extent of independent verification, validation and peer review.	• Model should be peer-reviewed, *or* • Model is recommended or approved by the relevant state agency.
Accuracy and Precision (Of Model Load Estimates)	• Within 25% of estimates from regional literature or available known loading rates. • Estimated to the nearest 1 lb/yr of N

QAPP Guidance for Modeling Data

Methods for Environmental Information Acquisition (B2)

Describe methods used to gather data and model selected.

Data/ Methods	Source/ Selection	Use in/ Data for Modeling
Model Selected	• Watershed Treatment Model (Selected based on DQO criteria)	• Model methods will be used. • Efficiencies and pollutant concentrations will primarily use model defaults.
Primary Data	Field assessment techniques to identify restoration methods (Field sheets and methods as an appendix)	• Project Extents and drainage areas. • Estimate of site-level imperviousness. • Stream condition (to estimate channel erosion) and extent of stream restoration opportunities. • Opportunities for buffer restoration.
Secondary Data (Digital and presumed high quality)	• State and County GIS Data • Census Data • Weather Data	• Land Use/ Land Cover • Hydrologic Soil groups • Watershed Population • Annual Rainfall
Secondary Data (Literature)	• Pollutant Efficiencies • Land Use-Based Loading Rates	• Used to check or modify model defaults. • Later used in model calibration.

QAPP Guidance for Modeling Data

Methods for Environmental Information Acquisition (B2)

Also describe what we're doing with all this data:

- The model will use default concentrations and other assumptions.
- Default model characterization of land uses will be adjusted using land cover data.
- Describe how field data will be used in the model (what inputs will be included from each field

Photo Source: Ectopiatech.com

QAPP Guidance for Modeling Data

Data Review (D1)

Describe Model Parameterization and Model Corroboration

What is the process we use to adjust input values?

1. Start with model defaults (and adjusted impervious cover/ land cover).
2. No monitoring data are in place to reflect "real world" concentrations or loads.
3. Use literature-based values to estimate typical loads.
4. Check to see if the values are within 25%
5. If they are different, adjust model assumptions, *or*
6. If we can explain the difference (e.g., the land in this watershed is highly impervious), keep the original value.

Why is this step so simple?

How would it be different if we were using a more complex model?

What other "tweaks" could we make?

Q&A – Modeling Data

Part 5: Additional Resources

QAPP Resources

EPA Resources

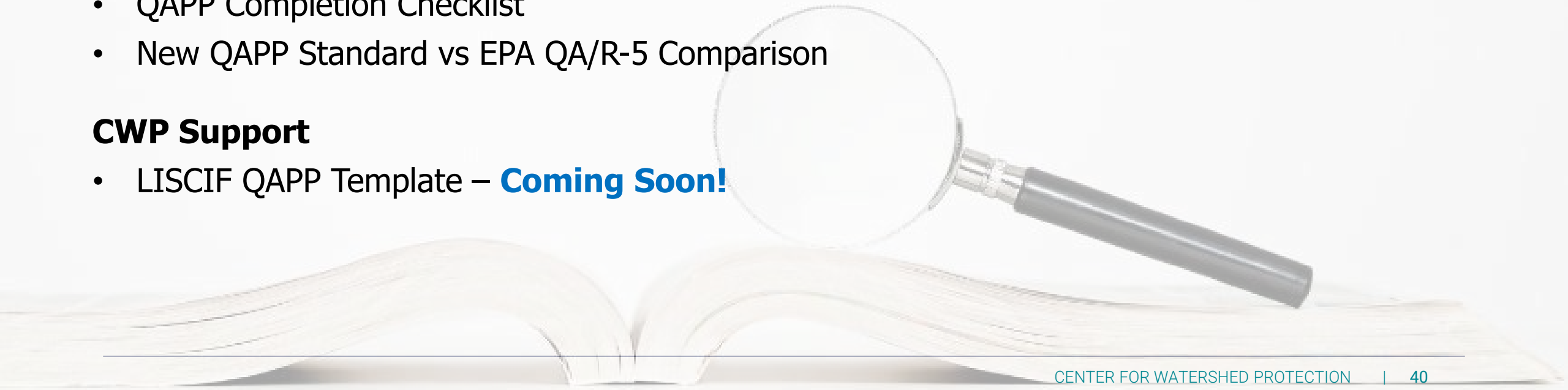
- Quality Assurance Project Plan Development Tool website
- Quality Assurance Project Plan (QAPP) Standard

Region 1 Resources

- Quality Assurance Project Plan (QAPP) Program Guidance
- Optional QAPP Template and Instructions
- QAPP Completion Checklist
- New QAPP Standard vs EPA QA/R-5 Comparison

CWP Support

- LISCIF QAPP Template – **Coming Soon!**



THANK YOU FOR JOINING US!

Recording and slides will be post on the LISCIF website.

Please complete the survey to help inform future trainings.

Questions?

Shahela Begum
Director, Long Island Sound Community Impact Fund

sbegum@estuaries.org
(347) 325-2627

Lisa Fraley McNeal
Sr. Watershed & Stormwater Research Specialist, Center for Watershed Protection

lfm@cwp.org
(410) 696 -3975

Deb Caraco
Sr. Watershed Engineer, Center for Watershed Protection

dsc@cwp.org
(410) 696 -3938

Alexandria Wilkins
Watershed Planner, Center for Watershed Protection

ajw@cwp.org
(410) 941-8255