Discussion Group Outcomes

2015 Patuxent River Conference
June 19, 2015

The 2015 Patuxent River Conference was held June 18–19, 2015 at the Jefferson Patterson Park and Museum located on the Patuxent River. Eighty participants from over 35 organizations came together to learn and share about research, monitoring, restoration, and management occurring within the Patuxent River and the Patuxent River watershed. The overall goal of the 2015 Patuxent River Conference, in concert with other institutions and efforts, was to continue to work toward a Patuxent River that is drinkable, swimmable, and fishable.

The objectives of the 2015 Patuxent River Conference were as follows:

1. Understand past and current research, monitoring, restoration, and conservation efforts in the Patuxent River and its watershed.
2. Agree to key issues that the partners will address over the next five years.
3. Begin the framework of a 5-year research and monitoring plan, and identify management options to implement those actions.
4. Identify a mechanism for the partners to collaborate and share the results of ongoing work.

The anticipated outcomes included:

1. Identification of the locations where work is being done.
2. Determination of more efficient and effective methods of working.
3. Exchange of research and monitoring findings.
4. Identification of gaps and determination of next steps.

The first day of the conference, June 18, 2015, was used to share past and current research, monitoring, restoration, and conservation efforts in the Patuxent River and its watershed. Fourteen talks and three posters highlighting water quality, watershed impacts, tidal habitat and species, and citizen science were presented. PowerPoints from these presentations can be found on the Patuxent River Conference website: http://www.friendsofjugbay.org/eventsMeetings/PaxRiverConf/ConferenceResults/Presentation.html

On the second day of the conference, June 19, 2015 participants were randomly divided into five small facilitated discussion groups. Each of these groups brainstormed with the intent of generating and prioritizing gaps and questions of concern that, if addressed, they believed would most enhance the understanding of the Patuxent River ecosystem. This process culminated in three questions from each group, one from each of the following categories:

1. Watershed / Upland Habitat and Species
2. Tidal Habitat and Species
3. Conservation / Restoration / Management / Monitoring Strategy that would enhance water quality

Subsequently, fifteen questions were produced, three from each of the five groups. These questions were presented to the participants as a whole. Live polling ensued, resulting in the group at large voting for the five most fundamental questions to all participants, that, if addressed, would most enhance the understanding of the Patuxent River ecosystem.

Fundamental Questions

The five most fundamental questions are as follows:

Most Fundamental Questions
How do we effectively communicate the connection between land management and the Patuxent River watershed? *(Watershed / Upland Species and Habitat)*
How do we monitor and evaluate restoration practices through the lens of water quality, habitat connectivity, and species conservation? *(Watershed / Upland Species and Habitat)*
What role do tidal creeks and wetlands play in processing land-based or Patuxent tidal fluxes of nutrients and sediments? *(Tidal Species and Habitat)*
How effective are different management strategies (i.e. Citizen Science, Living Shorelines, adaptive management, Best Management Practices <BMPs>) in improving water quality / habitat quality, and how do we measure that effectiveness? *(Tidal Species and Habitat)*
How do we make integrated local demonstration projects to show stakeholders of the Patuxent River watershed that effective land management can improve the social and economic value of the land? *(Conservation, Restoration, Management, and Monitoring Strategy)*

All fifteen of the questions generated by the discussion groups, the percentage and number of votes cast for each question, and the overall questions of greatest concern are described below. This information can also be found in pictorial form under the Polling Results section on the Patuxent River Conference website: (*http://www.friendsofjugbay.org/eventsMeetings/PaxRiverConf/ConferenceResults/Pax%20Phase%20II%20Polling%20-%20Questions%20Final.pdf*).

Below, [MFQ] denotes those questions which are one of the five questions that captured the greatest percentage of votes from the group as a whole. This designates each of these questions as one of greatest concern, that is, one of the five most fundamental questions. More in-depth dialogue surrounding the questions generated by each discussion group can be found beneath the following tables.

[MFQ] = Most Fundamental Question

Watershed / Upland Species and Habitat

What is the most fundamental scientific question concerning watershed / upland habitat and species that would enhance our understanding of the Patuxent River ecosystem?

Votes		Fundamental Question
%	n	
29%	13	[MFQ] How do we effectively communicate the connection between land management and the Patuxent River watershed?
27%	12	[MFQ] How do we monitor and evaluate restoration practices through the lens of water quality, habitat connectivity, and species conservation?
18%	8	How do stream water condition and ecosystem function vary between physiographic provinces and land uses in ways relevant to people and policymakers?
18%	8	What interventions would be most effective in reducing sediment and nutrient loading?
9%	4	What is the baseline of the current health (nutrients, sediments, chemical contaminants) of the nontidal portion of the Patuxent River?
	*45	

*total number = 45

Tidal Species and Habitat

What is the most fundamental scientific question concerning tidal habitat and species that would enhance our understanding of the Patuxent River ecosystem?

Votes %	Votes n	Fundamental Question
26%	12	MFQ What role do tidal creeks and wetlands play in processing land-based or Patuxent tidal fluxes of nutrients and sediments?
26%	12	MFQ How effective are different management strategies (i.e. Citizen Science, Living Shorelines, adaptive management, BMPs <Best Management Practices>) in improving water quality / habitat quality, and how do we measure that effectiveness?
20%	9	How do we synthesize long-term monitoring and apply that data to improve water quality?
15%	7	How do we prepare for impending climate change through improved understanding of salinity changes, sea level rise, ground water, storm events, and the role of the keystone areas (marshes, forest buffers, and tidal streams)?
13%	6	What is the most significant impact of climate change on tidal systems?
	46*	

*total number = 46

Conservation, Restoration, Management, and Monitoring

What is the most significant conservation, restoration, management, or monitoring strategy that would enhance water quality in the Patuxent River over the next 5 years?

Votes %	Votes n	Fundamental Question
30%	14	MFQ How do we make integrated local demonstration projects to show stakeholders of the Patuxent River watershed that effective land management can improve the social and economic value of the land?
24%	11	How do we engage the public through education, knowledge, and attitude?
20%	9	Can we put together a dynamic, complete, and current database to reveal gaps in the data in order to determine additional research needs?
17%	8	How do we move across policy “stovepipes” or structures to address cross-cutting goals wherein one management action may have unintended consequences which are contrary to other goals in tidal waters?
9%	4	Where and why are counties falling short on WIPs (Watershed Implementation Plans) and TMDLs (Total Maximum Daily Loads)? Emphasize the evaluation of BMPs (Best Management Practices) for agricultural practices and engagement of the agriculture community to promote change.
	46*	

*total number = 46

Review

The fifteen questions generated from the five small discussion groups and the dialogue surrounding them are classified into the following categories:

1. Education and outreach to the public, land owners, policymakers, and other stakeholders.
2. Evaluation and effectiveness of restoration practices, and how that effectiveness is measured.
3. Necessity for an integrated database to be shared amongst scientists, the findings of which would be shared with policymakers, the public, and other concerned parties.
4. Understanding the impacts of climate change.
5. Wetlands, marshes, and small tributaries acting as natural BMPs (Best Management Practices).

These categories and the questions within each category are elaborated on below.

[MFQ] = Most Fundamental Question

1. Education and outreach to the public, land owners, stakeholders, and policymakers.

The resounding strategy promoted by the breakout groups was education and outreach. It was thought that landowners do not understand or appreciate the effect their land management decisions have, not only on their own land, but also on the health of the waterways. Educational techniques suggested ran the gamut from supplying the public and policymakers with factual materials, to demonstrating practice or behavioral changes in an effort to encourage effective land management techniques. Demonstrating the desired practice or behavior and linking this with an outcome that is beneficial to the individual, such as economic or health advantages, was thought to be more effective than simply telling the public what to do. The anticipated results are land management techniques that are beneficial to the individual, as well as to the health of streams and ultimately, the estuary.

Translation of research from science to the general public, managers, and decision-makers was emphasized. It was reiterated that policymakers must have appropriate scientific knowledge in order to make informed decisions. Consistent messaging amongst jurisdictions, agencies, and institutions was deemed critical.

Educational topics were addressed in nine of the fifteen discussion sessions. Four of the fifteen fundamental questions generated by the breakout groups contained education and outreach as a primary component, and two of these questions were within the five overall most fundamental questions. Those fundamental questions and the accompanying discussion are detailed below.

[MFQ] Most Fundamental Question: How do we effectively communicate the connection between land management and the Patuxent River watershed? *(Watershed / Upland Species and Habitat)*

There are a variety of effective land management techniques that can be applied to address issues such as erosion, runoff, and nutrient pollution from urban, suburban, and agricultural lands. However, many landowners within the watershed do not fully appreciate how their land management decisions affect the health and economic value of their own land as well as that of streams and the estuary. One potential strategy to address this question might be to utilize applied social and economic research designed to better communicate goals for land management and long-term monitoring. Clear, concise messages must be developed for the public that link land management to the qualities of the river (those being swimmable, fishable, etc). These messages should be coordinated across jurisdictions, as well as across agencies, including the U.S. Department of Agriculture (USDA), Soil and Water Conservation Districts, Maryland Department of the Environment (MDE), non-governmental organizations (NGOs), etc. Decision-makers also need the best available information and messaging so that they can create effective policies.

Fundamental Question: How do stream water condition and ecosystem function vary between physiographic provinces and land uses in ways that are relevant to people and policymakers? *(Watershed / Upland Species and Habitat)*

The Patuxent River watershed lies within the Piedmont and Coastal Plain physiographic provinces in Maryland. Streams in the Piedmont region tend to have steeper gradients than those of the Coastal Plain and are underlain by bedrock rather than the unconsolidated fine-grain deposits typical of the Coastal Plain. As a result, Piedmont streams tend to be zones of sediment erosion and transport, while those in the Coastal Plain tend to be depositional zones. Wetland hydrology, geomorphology, and land use also differ between the provinces. Management and policy decisions need to be informed by a scientific understanding of the differential effects of land uses and management actions in the Piedmont versus the Coastal Plain.

MFQ Most Fundamental Question: How do we make integrated local demonstration projects to show stakeholders of the Patuxent River watershed that effective land management can improve the social and economic value of the land? *(Conservation, Restoration, Management, and Monitoring)*

A critical gap in some current efforts is that the general public is told what to do, rather than shown examples of effective land management in practice. Local demonstration projects focusing on improving water quality within a few small tributaries of the Patuxent would provide opportunities for jurisdictions to highlight land management options that improve water quality. Observing restoration outcomes and best management practices firsthand may provide land owners with the information they need to take responsible action when issues arise on their own properties. If demonstration projects and monitoring are co-located within small watersheds, the likelihood of documenting improvements due to local land management actions is likely to be greater than for the Patuxent River as a whole. Demonstration projects are also an actionable strategy that could yield positive results within a relatively short timeframe. With effective assessment of restoration strategies and BMPs, cost / benefit analyses could be conducted to maximize benefits to farmers, landowners, and the environment.

Fundamental Question: How do we engage the public through education, knowledge, and attitude? *(Conservation, Restoration, Management, and Monitoring)*

- Education must play a major role in conserving and restoring the Patuxent River.
- The idea that everyone in Maryland has an important role to play in protecting the river must be made clear. Specific actions need to be cited so that people know how to be better stewards of the river.
- Engaging the public is critical in improving the health of the Patuxent River – people need to gain knowledge and alter their attitude as prime ingredients of an education campaign.

---

2. Evaluation and effectiveness of restoration practices, and how that effectiveness is measured.

Evaluating the effectiveness of restoration practices was the next most prominent theme. Multiple management strategies are available to address the problem of poor water quality. With increasing pressure by TMDLs (Total Maximum Daily Loads) to limit nutrients and sediment, this information is indispensable in identifying the most efficient restoration approach.

The evaluation and effectiveness of restoration projects and practices were addressed in four of the fifteen discussion sessions. Three of the fifteen fundamental questions developed by the breakout groups contained the evaluation and effectiveness of restoration projects as a primary component, and two of these questions

are within the five overall most fundamental questions. Those fundamental questions and the accompanying discussion are detailed below.

[MFQ] Most Fundamental Question: How do we monitor and evaluate restoration practices through the lens of water quality, habitat connectivity, and species conservation? *(Watershed / Upland Species and Habitat)*

Elaboration:

- Monitor long-term success of stream and stormwater restoration practices.
- Be more adaptive with restoration practices.
- Wastewater treatment plants need to upgrade to ENR (Enhanced Nutrient Removal) standards. How can nutrient input to the river be reduced?
- Map watershed inputs and develop a nutrient budget.
- Is the system recalcitrant to restoration because of legacy issues?
- Is there a way to rank species that are currently under threshold?
- How do we engage the agricultural community?
- How can restoration strategies that are resilient to climate change be designed?
- How can strategies to address hot spots on streams be developed?
- How can strategies be funded?
- How can urban planners account for long-term environmental planning?
- How can agriculture be made environment-friendly?
- What is the effect of continued dam construction associated with urban development?

Fundamental Question: What interventions would be most effective in reducing sediment and nutrient loading? *(Watershed / Upland Species and Habitat)*

Elaboration:

- Interventions are needed to protect the permeable surfaces of the Patuxent River watershed.
- Evaluate land use in the watershed more frequently than every five years.
- Educate and incentivize property owners, farmers, and homeowners to adopt control / restoration practices.
- Enhance outreach to local and city councils.
- Undertake additional targeted studies regarding the impact of stormwater runoff on nutrient loading.
- Improve monitoring of the effectiveness of management plans.
- Evaluate the effectiveness of wetlands in removing nutrients, that is, the effectiveness of wetlands as a means of controlling “nutrient obesity” in their role as the “kidneys of the watershed”.
- Evaluate carbon cycling in wetlands.
- What actions should be taken to control chicken waste on the Eastern Shore?

MFQ **Most Fundamental Question:** How effective are different management strategies (i.e. Citizen Science, Living Shorelines, adaptive management, Best Management Practices) in improving water quality / habitat quality, and how do we measure that effectiveness? *(Tidal Species and Habitat)*

There are several key issues / questions relative to the tidal portion of the Patuxent River:

- How are water quality conditions in the lower portion of the river separated from the influences of the Bay?
- Can Living Shorelines be a positive influence on the health of nearshore habitats? If so, how can the state implement more frequent use of this type of erosion control? What will the impact of sea level rise be on this type of engineered shoreline protection?
- With the advent of climate change and altered habitats, what potential impacts will result from invasive species or other species that expand their range into the watershed?

---

3. The need for an integrated database to be shared amongst scientists, the findings of which would be shared with policymakers, the public, and other concerned parties.

Consolidation and coordination of monitoring data was acknowledged as an essential component of effective research, regulation, management, policy, conservation, restoration, and action. Extensive data is available but it is not being combined or applied in an effective way. Synthesizing data from various sources and highlighting conclusions would reveal gaps which could be addressed by future research. Establishing a clearinghouse for this information would allow the general public, stakeholders, managers, and decision-makers the opportunity to understand the past and current state of the river, thereby allowing more effective investment of time, money, and efforts for the future.

Consolidation and coordination of data was addressed in four of the fifteen discussion sessions. Three of the fifteen fundamental questions generated by the breakout groups contained this topic as a primary component. Those fundamental questions and the accompanying discussion are detailed below.

Fundamental Question: What is the baseline of the current health (nutrients, sediments, chemical contaminants) of the nontidal portion of the Patuxent River? *(Watershed / Upland Species and Habitat)*

There is a gap in knowledge / research between upland science and tidal science in the Patuxent River watershed. Several key aspects of this gap are:

- How do 'wet' spaces provide ecosystem function and biodiversity, as well as serve as corridors in the upper portion of the tributary?
- There is a need for model refinement to help bridge the gap between tidal and nontidal regions of the Patuxent River.
- There is a need for a clearinghouse for local monitoring data.
- More information and better communication is needed regarding *Vibrio* and other potentially dangerous bacteria in order to address concerns over public health safety.

Fundamental Question: How do we synthesize long-term monitoring data and apply that data to improve water quality? *(Tidal Species and Habitat)*

There are many good monitoring projects throughout the watershed. However, these efforts are poorly coordinated and the resultant data is not combined and used in an effective way. The data should be

synthesized to highlight conclusions and to identify potential gaps that need to be addressed. Monitoring results should be communicated to the general public and decision-makers.

Fundamental Question: Can we put together a dynamic, complete, and current database to reveal gaps in the data in order to determine additional research needs? *(Conservation, Restoration, Management, and Monitoring)*

Elaboration:

- Education and outreach to the public is key.
- Provide simple tools to help volunteers evaluate the impact of storms on the Patuxent River system post-storm.
- Train citizen scientists in good data management and encourage watershed stewardship.
- Gain an understanding of biomass movement in the Patuxent River watershed and determine what implications are important in its management.
- Put together an atlas or equivalent comprehensive report of the river system profiling the Patuxent River's physical, chemical, and biological characteristics, trends, issues, and gaps in knowledge, as well as recommended actions, including policy implications and regulations. Make this product available online. Consider providing a summary for decision-makers in the form of a white paper.
- Establish a clearinghouse for data gathering and analysis, and share with all parties including the general public.
- Coordinate efforts along the entire length of the Patuxent River.
- How can the anticipated impacts of climate change on the watershed and the Patuxent River, such as sea level rise, salinity change, invasives, etc., be managed?

---

4. Understanding the impacts of climate change.

The thread of climate change ran through many conversations. Water quality will increasingly be affected by extreme weather events, salinity changes, sea level rise, and flooding predicted with climate change. Managing the impacts of climate changes and anticipating an alteration in habitats are indelible factors of the future of the Patuxent River.

Climate change was addressed in five of the fifteen discussion sessions. Two of the fifteen fundamental questions suggested by the breakout groups contained climate change as a primary component. Those fundamental questions and accompanying discussion are detailed below.

Fundamental Question: How do we prepare for impending climate change through improved understanding of salinity changes, sea level rise, ground water, storm events, and the role of keystone areas (marshes, forest buffers, and tidal streams)? *(Tidal Species and Habitat)*

Elaboration:

- Model salinity changes along the Patuxent River in the face of climate change.
- What are the impacts of flash events on the system?
- Incorporate flooding projections into planning.
- Where do marshes / forest buffers play a keystone role in the tidal system? View these areas with

a lens for protection.

- How can socio-economic valuation of marsh ecosystem services be used to change behavior?
- Where are the worst problems in tidal habitats? There is a need for prioritization – consider a scale.
- Understand and quantify the impact of the Chesapeake Bay influence on the tidal area.

Fundamental Question: What is the most significant impact of climate change on tidal systems? *(Tidal Species and Habitat)*

Elaboration:

- Determine the influence of the Bay on the tidal system of the Patuxent River.
- Determine the influence of the Patuxent River on the Bay

---

5. Wetlands, marshes, and small tributaries acting as natural "BMPs".

The concept of marshes and tidal creeks functioning as natural filters for nutrients and traps for sediment was raised. The natural function of wetlands to improve water quality heightens their ecosystem value. This value can be quantified and used to protect these areas.

Wetlands as "natural BMPs" that filter nutrients and trap sediment was addressed in three of the fifteen discussion sessions. One of the fifteen fundamental questions contained this concept as a primary component, and that question was within the five overall most fundamental questions. That fundamental question and associated discussion is detailed below.

MFQ Most Fundamental Question: What role do tidal creeks and wetlands play in processing land-based or Patuxent tidal fluxes of nutrients and sediments? *(Tidal Species and Habitat)*

Nutrients and sediment enter the Patuxent River via river flows and tidal fluxes from the main Bay. Tidal creeks along the Patuxent estuary may function as "high-end BMPs" to trap sediment and transform or remove nutrients from fluvial or tidal sources. The role of these "sub-sub-estuaries" in maintaining the water quality of the tidal Patuxent needs to be better understood. These systems should be protected and managed.

---

6. Other Questions of Most Concern

Two other fundamental questions were generated by the breakout groups. The first addresses management practices with conflicting results, wherein the success of one management action has a negative effect on the other. The other questions the origin of barriers and gaps which interfere with counties' success in meeting WIPs (Watershed Implementation Plans) and TMDLs. It endorses the evaluation of agricultural BMPs and advocates for engagement of the agricultural community. These fundamental questions and associated discussion are detailed below.

Fundamental Question: How do we move across policy "stovepipes" or structures to address cross-cutting goals wherein one management action may have unintended consequences which are contrary to other goals in tidal waters? *(Conservation, Restoration, Management, and Monitoring)*

For many of the research examples highlighted at the 2015 Patuxent River Conference, a given management solution for one challenge may have the potential to impact a different goal. For example, TMDL-motivated sediment reductions have the potential to reduce the ability of tidal wetlands to keep up with sea level rise. Nutrient reductions targeting improved water quality may impact food web structures and productivity of fish populations. To meet this challenge, we need "outside-the-box" thinking, as well as mechanisms for coordinating management holistically.

Fundamental Question: Where and why are counties falling short on WIPs and TMDLs? Emphasize the evaluation of BMPs for agricultural practices and the engagement of the agriculture community to promote change. *(Conservation, Restoration, Management, and Monitoring)*

Elaboration:

- How can a clearinghouse for information be developed?
- How can nutrient input to the river be reduced? One example is the upgrade of waste treatment plants to ENR standards.
- How can the agricultural community be engaged?
- How can developers be engaged?
- Institute monitoring programs that involve stakeholders in ecosystem goals.
- Evaluate BMPs for agriculture practices. Engage the community to encourage change in traditional practices. Incorporate adaptive management.
- How does the system operate as an overall concept?
- Where and why are counties falling short on WIPs / TMDLs? What are the barriers and the gaps?

---

7. Effect of the Chesapeake Bay on the water quality of the Patuxent River

Although the exchange between the Chesapeake Bay and the tidal Patuxent River was not a primary component of the fundamental questions generated, it was addressed in four of the fifteen discussion sessions. Those conversations centered on the influence of the Bay on the water quality of the lower Patuxent. The interplay between the upstream processes of the Patuxent River watershed and the influxes of nutrients and sediment from the Bay is an important component of understanding natural processes and the apparent effectiveness of management strategies. These comments are detailed in the discussion of the questions above.