

West Virginia Watershed Assessment Pilot Project
Upper Guyandotte, Gauley, and Little Kanawha Watersheds
Second Expert Workshop Summary
January 8-9, 2013
Charleston, West Virginia

Workshop Objectives

The goals of this workshop were to:

- 1) present and compare updated relative and objective method current condition results for the Upper Guyandotte, Gauley, and Little Kanawha watersheds and get expert feedback;
- 2) present overall trends from current condition results for all five project watersheds and discuss potential strategies to address them; and
- 3) present preliminary Consolidated Analysis results for all three watersheds and get expert feedback on the results, methodology, and data recommendations.

Workshop Day 1
January 8, 2013

Presentation Summary

The workshop began with a review of the project objectives and timeline, as well as a brief review of the watershed assessment structure: units of analysis, model structure, landscapes, indices, and metrics. The Consolidated Analysis was introduced, followed by a description of its indices and metrics. The Team presented the updated current condition results for both the relative and objective methods of analysis, with maps of assessment results for all three watersheds. An open discussion around each watershed map followed each presentation, during which experts provided feedback and asked additional questions. Overview maps of the three watersheds were displayed for reference. After the watershed results presentations, the Team presented overall trends that emerged from the initial assessment results, and discussed potential strategies for addressing the identified trends with the experts.

Project Background and Objective Methodology

Ruth Thornton, TNC

Ruth presented the project background and a review of the methodology, including an introduction to the Consolidated Analysis model structure, with a detailed description of the indices and metrics used to determine potential future threats. A detailed review of both the relative and objective methods of analysis was presented, including reference and stressed catchment criteria, how objective thresholds were determined, and the concept of critical metrics (defined as metrics that are crucial enough to cap the overall score of a planning unit regardless of other metrics: the highest score of an index with critical

metrics defined is capped by the highest score of the critical metrics, regardless of other metric values). Ruth also introduced the idea of combining the objective and relative ranking methods into a combined results method, which starts with the objective score and then uses the relative ranking results to rank planning units relative to each other within an objective category. Benefits of the combined score include greater ease of use by presenting only one set of results, while a potential disadvantage would be that some of the detail of the objective and relative rankings would be lost.

A list of metrics, weights, and objective thresholds for the objective analysis was provided to the experts. Results maps for all three watersheds at both the HUC12 and NHDPlus catchment scales for both the objective and relative analyses were provided.

Overview of Upper Guyandotte Watershed Current Condition Results

Diane Packett, TNC

There is a large amount of active and legacy surface mining, as well as underground mining, in the Upper Guyandotte watershed, especially in the northwest and southeast areas. There are many oil and gas wells, but little concentrated development, except in the Logan area. Most of the major tributaries of the Guyandotte River are impaired. There are GAP 2 & 3 Protected Lands, including several WMAs and one state park. A seeming anomaly was presented for feedback by the experts: the overall results in the Wetlands model can differ greatly between the relative and objective methods of analysis. This is a result of the Wetlands Hydrology index, which is the only scored index for planning units without any mapped National Wetlands Inventory (NWI) wetlands but with underlying hydrology such as floodplain or hydric soils, a situation which can produce a low relative quality score but a Very Good objective quality score.

Comments: Experts mentioned that a large scale mitigation bank is being proposed on Pinnacle Creek and is worth noting.

Overview of Gauley Watershed Current Condition Results

Misty Downing, TNC

The Gauley watershed is notable for a large area of undeveloped protected lands in the east (Cranberry Wilderness, Cranberry Glades, etc.) and the large Meadow River wetland complex in the south. Surface mining occurs along the northern and some southeastern ridges of the watershed, and gas well development occurs in the northwest. Urban development is confined to the western part of the watershed, and is most dense along infrastructure such as US Hwy 19 in the northwest and US Hwy 60 and Interstate 64 across the south.

Comments: It was noted that a road along the Cranberry River that divides the backcountry from wilderness is missing from the maps. Experts noted that the underground mining in Nicholas County is not showing up as causing impairments in Streams Water Quality (SWQ). This was explained by the Team as Underground Mining not being a critical metric, and while there are stream impairments for metals in this area, the overall SWQ score was not brought down significantly by these two metrics.

Experts noted that some water treatment is happening in this area as well, which may help impairments. Acid deposition and low buffering capacity are probably driving the existing impairments within the headwaters/wilderness areas. Some active mining occurs south of Richwood, and legacy mining along the Williams and Gauley Rivers in the east.

Overview of Little Kanawha Watershed Current Condition Results

Diane Packett, TNC

Threats from habitat fragmentation by grazing and roads are more prominent than in the other watersheds. There is very little surface or underground mining, although there are many oil and gas wells in the center of the watershed. Most of the major tributaries of the Little Kanawha River are impaired, with biological contaminants/fecal coliform and iron being the predominant impairments. GAP 1, 2, and 3 protected lands exist in the watershed, including several WMAs, two state parks, and one TNC preserve. The watershed is largely rural with very small towns, with the most significant urban development occurring in the northwest corner of the watershed, around Parkersburg. Higher quality areas for potential protection tend to occur in the south-central section of the watershed.

Comments: No comments related to presented results.

Results Discussion Summary

Ruth Thornton, TNC

After presenting the results for the three watersheds, the Team reviewed the final list of metrics and their corresponding weights for each current condition index. Experts provided input on changing metric weights, as needed. The experts were also questioned regarding objective ranking thresholds, the idea of presenting combined results, and how best to handle the Wetlands overall model issue.

Specific questions that participants were asked to consider were:

- Are metrics weighted appropriately?
- Are thresholds in objective ranking defined appropriately?
- Should we use the combined objective/relative ranking results?
 - Is this an appropriate method to compare the two rankings?
 - Will this make presentation of analysis results easier or more confusing for end users?
 - Are there alternate ways to combine the two rankings?
- How should results be presented in the interactive web tool?
 - Use of the combined ranking versus objective and relative separately?
 - Is there a suggested alternate work flow for end users?

The feedback and recommendations from the experts during the roundtable discussion and maps discussion sessions are summarized by topic in the following sections.

Individual Model and Index Discussions

Streams Water Quality Index

Resource extraction (underground and surface mining, oil and gas well drilling):

- Underground mining may be worse than surface mining in some cases (because of discharges of polluted mine water, dewatering of streams, high specific conductivity values, and mine pool discharges). Water returns to mines and gets “remineralized” over and over, so that dewatering is a water quality as well as a water quantity threat. Therefore Underground Mining should be weighted at least as high as Surface Mining. Response: Underground Mining weight was raised to 2, equal to Surface Mining.
- The effects of underground mining are already at least partially accounted for in the assessment, as the in-stream water quality (such as median pH, etc.) is affected by surface and deep mine discharges. The lack of exact locations of where mine discharges enter streams as a result of underground mining and resulting uncertainty of which planning units may be most affected preclude increasing the weighting of underground mining beyond 2.
- The temperature of deep mines is constant, so mine water temperature doesn’t fluctuate with the seasons.
- Experts suggested using pre- and post- SMCRA (Surface Mine Control and Reclamation Act) mining categories and using the SMCRA dataset for field data from the last 20 years.
- New data are being compiled by the EPA and OSM on how valley fill construction methods affect water quality. It was noted that valley fills would never reproduce the original water quality.
- OSM noted that water quality depends on the geochemistry of the enclosing rock. While valley fills affect the water quality for decades, the effects of underground mining persist for centuries.
- OSM noted that mining water crosses state lines. Gas drilling discharges also make their way into mine complexes and are discharged to streams (this sort of information is very difficult to capture as geospatial data).

Suggestions from the experts:

- Combine Surface and Underground Mining into one Mining metric, and let the web tool user drill down into what type of mining/discharges they are interested in. Response: the Team kept both surface and underground mining in the analysis for ease of use.
- Increase weight of oil and gas wells in relation to sedimentation issues. Response: The AllWells weight was increased from 1 to 1.5.

- Suggestion to include NPDES water quality data into the analysis. Response: The Team will look into the feasibility of including these data.

Questions from the experts:

- Did the Team consider the age of surface mines (assuming older mines like Barton Bench would have fewer detrimental effects)? Response: The Team does not know of a reliable data source for this information.
- Why is Sulfate weighted so low (at 0.5)? It should be higher, since sulfates could come in with mine water seepage. Response: There was a high correlation between Sulfate and Specific Conductivity. The Team decided to increase the weight of Sulfate to 1.
- Should Agriculture and Grazing be weighted higher in watersheds where they are more significant stressors on the landscape? Response: The goal of the project is to develop a methodology consistent across all the watersheds of the state, it is therefore desirable to weight metrics the same across all watersheds for ease of use. Additionally, effects from these metrics are captured by the metric Natural Cover in Riparian Area.

Streams Water Quantity Index

Suggestions from the experts:

- Increase Underground Mining to a higher weight than Surface Mining. Response: Underground Mining weight was increased to 1.5.
- Impervious Surface is the main agent of flow alteration in this index. Response: No change, since this is already a critical metric in this index.
- Dams that actively regulate flow have managers that you can work with to shift flow releases, so dams are regulated and should not be a critical metric. Response: No change is needed because this was not a critical metric.
- The Team should consider modifying the Dam Drainage metric (meant as a proxy for volume of dam water storage relative to catchment volume) to include only the part below the dam. Response: This suggestion was not incorporated.

Streams Biodiversity Index

Experts questioned if the non-native invasive species (NNIS) data was robust enough to be weighted a 1.5. Response: All of the biodiversity data are weak, so the Biodiversity index weight was lowered to 0.5.

Streams Riparian Habitat Index

Experts noted that active surface mines seem more of a problem than legacy surface mines, which are now mostly re-vegetated. In the future, active mines will become legacy mines. Response: No change; Active Surface Mining is already weighted at 2 and Legacy Surface Mining at 1, which addresses this issue.

Wetlands Overall Results

The major issue the Team presented regarding Wetlands results was the apparent lack of agreement between the Wetlands Overall model results between the relative and objective methods. This is an artifact of the methodology: the relative method gives a low score to planning units that have no wetlands, while the objective method assigns the score of underlying hydrology (if present) to the entire index for planning units without mapped NWI wetlands.

Suggestions from the experts:

- Include a legend that shows planning units symbolized as white = no existing or potential wetlands (no wetlands hydrology present), gray = potential wetlands (wetlands hydrology present but currently no mapped NWI wetlands). Label planning units with existing hydrology and no mapped wetlands as having “restoration potential” and flag them as restoration priorities (which would place them in the Fair category).
- Create a special category for planning units with hydrology and no wetlands, since this is an important consideration for planning restoration projects.
- Regardless of how the issue is handled, make sure it is discussed in the executive summary and in the wetlands discussion of the final reports. Response: The Team agreed to implement these suggestions in some form, and plans to document the issue in the final reports.

Questions from the experts:

- OSM questioned the reason for having Overall Model scores at all, as they found it confusing and thought it was losing detail. Response: Watershed associations and private citizens are likely to use the overall results, which should therefore be retained in the analysis. Two different types of users are expected: those who are graphically-oriented and those who are text-oriented. This should be considered in designing the map symbology, map navigation tools, and attribute information tables of the web tool.

Wetlands Hydrology

Experts suggested an increase in the weight of Hydric Soils. Response: The metric weight was relatively low because of the inconsistency of the soils data among counties, but was increased from 1 to 1.5.

Wetlands Wetland Habitat

Experts suggested an increase in the weight of the metric Development in Wetland Buffers. It is a critical metric and should therefore be weighted higher than it currently is. Development is permanent while other land conversions like agriculture have the potential to be reversed. Response: The Team increased the weight of Development in the Wetland Buffer from 1 to 2.

Uplands Habitat Connectivity

Experts mentioned that the fragmentation from wind turbines and energy transmission lines is more long-term than timber harvesting operations. Timbering is not necessarily equivalent to deforestation or habitat fragmentation, and does not permanently convert land. However, the impacts of unpaved roads from timber harvesting and energy development on water quality may be similar. Response: The nature of the timber harvesting data was not spatially precise enough to increase the weight of the Timber Harvest metric in the analysis.

Uplands Biodiversity

Experts asked what species were represented in these data. Response: Only terrestrial plants and animals (no aquatic species were included for the Uplands Model).

Protected Lands Index

The Team requested expert opinion on how to deal with the Protected Lands Index for each landscape. Most planning units contain no permanently protected lands, thus potentially artificially lowering the overall model scores. Should this index be moved to another category or removed from the analysis?

Experts felt that this information was valuable, as agencies and organizations often seek to expand upon existing protected lands. It may also be valuable to include a metric that indicates adjacency or proximity to protected lands. Response: The Team has considered this but has not found a practical way to accomplish this, since the presence of roads or other fragmenting features may negate the value of the adjacency. An option would be to buffer protected lands by an arbitrary distance and increasing the ranking of areas within the buffer, but this would not take into consideration parcel ownership or size, development, etc.

It was decided that a new category should be created, such as “opportunity” or “feasibility,” that would include protected lands and priority interest areas. The Protected Lands index would be removed from the current condition models, and the Priority Interest Areas would be removed from the Consolidated Analysis, incorporating both into the new category.

Combined Results Maps Discussion Summary

Experts were asked to provide feedback regarding the presentation of Combined Results in the web tool. Sample draft maps of combined results for the Gauley watershed were presented. Excel spreadsheets of numerical results were presented to illustrate some of the differences between the relative and objective methods, and corresponding results of the combined method.

Response from the experts:

- Some experts thought having one set of results was useful, but were wary of the combination technique. They thought users may stop there and not dig deeper into the details of the results and potentially missing important nuances of the results.

- Some experts preferred having only one results map, particularly if users can start with the combined results and then view the objective categories and relative rankings as attributes of planning units to dig deeper into the analysis.

Suggestions from the experts:

- Modify the colors to more clearly distinguish between shades (they found it hard to distinguish High Quality Very Good and Low Quality Poor, for example). Response: The presented results were an initial draft to get expert feedback on the concept, more time will be spent refining the final symbology before the final web tool and reports are completed.
- One monochromatic color ramp could be used for the combined results instead of using four different hues for the four categories: a continuous scale may provide a “quick assessment” of the entire watershed.
- In the final reports, highlight a few of the instances where relative and objective results seem to contradict each other and explain why this happened in terms of the methodology. Response: The Team plans to incorporate such examples in the final reports.
- Experts suggested including maps of objective and relative results in addition to the combined results, enabling users to turn these layers on and off. Response: The Team is concerned this may require too many data layers and create capacity issues in the web tool, but will look into it.
- Consult social science research how to best represent the quality of different areas using colors and/or symbology. Response: The Team will research colors and conduct an informal office survey to ensure the final symbology is intuitive and comprehensible.

Interactive Web Tool Discussion Summary

Experts were asked to provide feedback on optimal features and symbology to include in the interactive web tool. They were also asked about what sort of work flow they might use in the tool, and what a good sample work flow may be for potential end users.

Suggestions from the experts:

- Include a mechanism for users to submit data to the web tool, or at least include contact information on the website guiding users on whom they should contact with new data. Response: The Team plans to compile a list of contacts and links for the website to contact for more information.
- Consider adding mitigation bank and In Lieu Fee projects as a new layer. Response: The Team will try to obtain this data layer, but it may not be available in a spatial form, at least for the first iteration of the web tool.
- Include an “identify” tool that would display attribute information for a planning unit. Response: The Team plans to incorporate this feature into the final tool.
- Create a User Guide or provide alternate work flows for each type of user and project type. Response: The Team plans to provide a User Guide that would address a wide range of work flows.

- Include the ability to search for sites that meet specific criteria (e.g., wetland soils with no wetlands, fecal coliform impairments, future threats, etc.).
- Add congressional districts as an additional informational overlay layer.
- Use language such as “a purely GIS-based analysis suggests...” rather than explicitly stating that an area is the best to work in (for both reports and the web tool).

Potential Strategies Discussion Summary

Project objectives were reviewed with an emphasis on the goal of developing strategies to address watershed trends identified by the assessment. The purpose of the final tool is to inform a wide variety of end users, including federal and state agency personnel, watershed associations, and non-profit organizations. Thus, the project should suggest strategies that are broad and widely applicable, and avoid prescribing specific stream reaches or wetlands as conservation action targets. The goal is to identify general trends of stressors within a watershed and potential strategies to abate them. A summary of recurring trends from all five watersheds was presented. Experts were divided into two breakout groups and asked to consider the following questions:

- What are potential strategies that could be developed to address these stressor trends?
- Is this level of detail a useful part of the watershed assessment? Is it too detailed?
- What can we do to improve the usefulness of the strategies section for the end user?

Suggestions from the experts:

- Create a drop-down box with a list of strategies and actions that a user could consider to address identified issues.
- Provide links to other resources such as online manuals, websites, and organizations active in a watershed. Response: The Team will provide a page of useful links, including the West Virginia Watershed Network list of watershed associations within the state and their contact information.
- Consider questions such as: “What can I do as a landowner?”, “Who should I call?”, and “What can we do as a watershed association?”
- Provide examples of specific strategies that have been used successfully.
- Be sure to note that these are suggestions and not a comprehensive list, and are not necessarily endorsed by the Project Team. Add a disclaimer statement that relieves TNC, DEP, EPA, and any other partners of liability for listed recommendations.
- Note that regulatory and enforcement actions are often needed to effect certain changes, which may be outside the users’ scope of influence.

Potential strategies suggested by the experts:

Overall

- Develop a statewide green infrastructure plan.

- Work with local governments to integrate the watershed assessment findings with zoning or comprehensive plans.
- Develop resources and/or points of contact for each watershed (e.g., basin-wide coordinators or county floodplain coordinators).
- Include information for lay users on subjects such as mineral rights, deed restrictions, enforcement of conservation easements.

Streams

- Create and enforce stormwater management regulations or implement new techniques (rain gardens, semi-pervious surfaces, protection/restoration/construction of small urban wetlands).
- Conduct education and outreach for owners of small businesses that may discharge to streams (e.g., dry cleaners, car washes).
- Build special handling plants for toxic materials affecting streams.
- Protest issuance of new permits.
- Add culvert sizing requirements for nation-wide permits.
- Have citizen groups assist DEP/EPA with water quality monitoring.
- Suggest Federal programs that provide funds to fence off water sources from livestock: Conservation Reserve Program (CRP) or Natural Resources Conservation Service (NRCS) for private landowners.
- Sediment control.
- Invasive species control.

Wetlands

- Develop new or influence existing floodplain management plans
- Conduct education and outreach to the public and local government officials on the value of wetlands and floodplains and the ecosystem services they provide.
- Invest resources in the mapping and inventory of wetlands, including identifying important wetlands/floodplains. Characterize wetlands (by chemistry, structure, biology) and determine their history.
- Take advantage of state tax credits for wetland protection or conservation easements.

Uplands

- Streamline procedures for constructing access roads (the BMPs for farmers, wind turbines, timber harvesting, and mining are all different).
- “Checkerboard” surface mine complexes (like timber harvest is often done) to leave habitat islands and corridors.
- Forest Reclamation Approach (FRA): cultivate multi-species stands of hardwoods instead of managing for one species.

- Forest Stewardship Council (FSC) certification for timberlands.
- Develop a system of carbon credits.

Suggestions and comments from the experts:

- Ensure that the project's basic instructions should be sufficient for a watershed group to use.
- Strategies for handling current and legacy mining work are already available in SMCRA.
- Treatment for issues like acid mine drainage requires a mechanism that is permanent and long term (e.g., an endowment) and requires substantial investment and equipment. This may be beyond some users' capability. However, the abandoned mine lands program has money for pre-SMCRA sites, which established watershed associations can apply for.

Questions from the experts:

- Will the user not already know which strategies are needed? It is more important to spell out the problems, not the solutions. Users might be looking for places to implement strategies they have already developed. Response: Because the tool is intended for different types of users, and because it is a project deliverable for the grant, strategies need to be included in the assessment.

Workshop Day 2
January 9, 2013

Presentation Summary

The second day of the workshop consisted of presentations of Consolidated Analysis results for the three watersheds. Experts were asked to provide feedback and suggestions for improvement of the overall methodology and model structure, as well as suggestions for any additional data sources that may help make the product more robust.

A significant suggestion regarding the Consolidated Analysis model methodology was to change from a discrete, vector-based analysis to a continuous, raster-based analysis that would present a gradient of potential threat across the entire HUC8 watershed. This would address some of the shortcomings of the current, HUC12 planning unit-based analysis, including the coarse scale of many of the individual metrics. The Team plans to try this new methodology to determine if it provides a better representation of the Consolidated Analysis results. Another significant suggestion was to add an additional category that would capture the idea of “opportunity” or feasibility, and would include the Protected Lands and Priority Interest Areas metrics, since they do not fit well within the current condition analysis.

Overview of Upper Guyandotte Watershed Consolidated Analysis Results

Diane Packett, TNC

The overall Consolidated Analysis results suggest that the greatest potential future threats lie in the eastern portion of the watershed. Within the Energy index results, the northwestern portion of the watershed also emerged as highly threatened, largely due to the extensive future coal mining potential in that area. Within the Population/Development index, a few major roads are proposed to run along the southern ridge of the watershed (King Coal Highway) and across the eastern section (Coalfields Expressway and Shawnee Parkway). Priority Interest Areas are restricted primarily to the southern and eastern portions of the watershed.

Suggestions from the experts:

- Coal could be separated into metallurgical versus steam coal, since metallurgical has a much higher probability of development, which may affect the threat potential. Response: Attribute information that distinguishes between the different types of coal is not available.
- Provide coal seam layer names in the attribute information of the dataset.
- The 2002 Environmental Impact Statement (EIS) report has maps and data for each coal seam volumetrically. Response: The Team will research these to determine if the data can be used.
- The analysis seems to be missing Route 10. Response: Some of the Route 10 construction has been completed but the proposals for other parts are not done yet.

Questions from the experts:

- Is the project tapped into TNC's Energy Development/Development by Design work? Response: Yes, we have included the data that are completed, but many of the results will not be ready for another 6-12 months. The Team plans to incorporate the newly released TNC Aquatic Resiliency data.
- What is the definition of good vs. bad for the future energy threat? Response: Red corresponds to higher ecological threat to stay consistent with other color symbologies used in the assessment, where red indicated lower quality.
- What is the time frame considered in the Consolidated Analysis? Response: This varied by metric, but the Team tried to stay as consistent as possible given different sources of data, and generally projected threats for the next 50 – 100 years.

Overview of Gauley Watershed Consolidated Analysis Results

Misty Downing, TNC

Results suggest that the greatest potential future threats are in the north-central portion of the watershed. Within the Energy index results, the northern portion and part of the northeast also emerged as highly threatened, largely due to the extensive future coal mining potential in the north, and wind and shale gas development potential in the east, though this is an area largely within existing protected lands. Priority Interest Areas are restricted primarily to the eastern portion of the watershed, around the existing protected lands areas.

Suggestions from the experts:

- The power plant proposed for Rupert/Rainelle appears to be off the books and will not be constructed. Response: The Team will remove it from the analysis.
- Wind development and natural gas development within the Monongahela National Forest is a policy and mineral ownership issue. While some forms of development are unlikely in the Forest, they are not strictly prohibited, and there is no guarantee that energy development will not occur on national forest lands. Response: Mineral ownership on federal lands is included in the analysis, and only the portions in the National Forest where mineral rights are owned by other entities are included in the analysis.

Overview of Little Kanawha Watershed Consolidated Analysis Results

Diane Packett, TNC

The overall Consolidated Analysis results suggest that the greatest potential future threats are in the eastern portion of the watershed. Within the Energy index results, the eastern portion of the watershed emerged again as highly threatened, due to potential shale gas development and a proposed energy transmission line, though it is believed that the PATH line has been cancelled. The watershed has a few scattered pockets of high resiliency and current density (indicating relatively low fragmentation of

habitat), mostly away from existing development and infrastructure. Priority Interest Areas are found throughout the watershed, mostly around major tributaries to the Little Kanawha River.

Comments from the experts:

- The PATH transmission line is officially off the books. Response: The Team will remove it from the analysis.
- Potential future Marcellus Shale gas development is influenced not only by the shale bed thickness, but also by proximity to existing transmission lines. Areas close to existing lines are more likely to be developed first, which should be included in the analysis. Natural gas is compressed and transported by rail from North Dakota, suggesting that rail availability may also influence the likelihood of gas well development while pipelines are being constructed. Response: The Team will investigate the feasibility of including these factors in the analysis.

Consolidated Analysis Discussion Summary

After the presentation of the Consolidated Analysis results, experts were divided into two breakout groups to discuss the following questions:

- What is your comfort level with the Consolidated Analysis model given the data limitations?
- How do we best integrate the Consolidated Analysis model with the web tool?
 - First select candidate conservation sites using Current Condition analysis results,
 - Then use Consolidated Analysis results to provide more information and make final selection of sites to explore further.
- Should Protected Lands be moved to this category instead of being in Current Condition?
 - Though Protected Lands are a reflection of the current state of the watershed, they are not an ecological factor, and inform the feasibility or priority for projects more than ecological quality.

Suggestions from the experts:

- USACE Institute of Water Resources is completing the Ohio River Basin climate change study, which will have basin-specific 30-year modeled precipitation and temperature changes due to climate change. The dataset should be available within a few weeks. Response: The Team plans to incorporate these data if they become available in time.
- Check the Department of Education for new schools data or school consolidation data. Response: The Team researched but found no spatial data for proposed schools in the five watersheds.
- The final reports and web tool should state clearly that the Consolidated Analysis is a broad generalization and the available data are coarse-scale, modeled, or vague.
- Include the Consolidated Analysis results in the final reports but not the web tool.
- Include sources and dates for the data and thoroughly explain any limitations.

- Experts liked the idea of having three categories: Current Condition/Function, Future Threats, and a third category that indicates conservation opportunities and includes protected lands and priority interest areas.
- Include FEMA mitigation lands, if available.
- Demonstrate the web application to the experts before presenting it at the partner/stakeholder workshops or releasing it to the public to get experts' feedback on the functionality and included datasets.
- Check the geothermal study quality assessments; the experts suspect it may have been "debunked".

Questions from the experts:

- Why are there no National Park Service data in Priority Interest Areas? Response: The Team has tried repeatedly to obtain these data and has not received it. We will continue to try to get these data.

Next Steps

Prior to the final partner/stakeholder workshop, the Team will incorporate suggested changes to the metric thresholds and weighting, symbology for wetland hydrology and combined results, and strategies. Final results will be presented at the stakeholder workshop in addition to a demonstration of a preliminary version of the interactive web tool.

Meeting Attendees

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