

1. Document edits for Status-and-Trends Monitoring chapter writing team to complete (Chapters 2.3, 2.5, 2.6.1, and 3.1)

Distinguish between indicators with a quick and long term response to management actions. Both have value, but the November draft is too sparse on the former.

Include a baseline (status) or reference conditions, and identify stressors being evaluated. Need to address in experimental design, but this is inherent in S&T.

Decide what hypotheses to address and what experimental design to use. Describe the process by which these decisions will be made. Do not include rigorous study designs. We need monitoring to answer specific questions and retain the hypothesis-based focus on streams and nearshore. Want to ensure that contribute to Adaptive Management framework.

- Start with S&T hypotheses, best in draft, generally favorable comments, address concerns with indicators. Keep these (with modifications) in the scientific framework.

Describe where (geographic/water bodies) stormwater-related indicators will be evaluated for status and trends, and why?

- Start by establishing a regional stormwater monitoring program which focuses on small streams and nearshore marine environment (state of ecosystem health; pressures/stressors) within the context of the larger Puget Sound ecosystem.

Explain why – how to measure progress in stormwater mgmt (testable, verifiable, actionable)

- Continue locally-identified and prioritized monitoring of other water bodies/resources to protect, such as lakes, groundwater/aquifers, wetlands, marine areas, or large rivers and integrate these efforts into the context of the larger Puget Sound ecosystem

Address where within the water bodies will indicators/endpoints be evaluated:

- Consider land use stratification and status of implementation of stormwater management programs in selecting status and trends sites.
- How will sites be selected?
 - Use the probabilistic design –OR–
 - Do not use the probabilistic design and position stations near problem areas and resources of interest to protect –OR–
 - Select locations that are representative of reference conditions and can provide paired watershed approach sites

Decide whether to (see John Lenth's write-up):

- Change text to say S & T is long-term
- Add text to describe nested probability designs within watersheds
- Modify design to balance status and trend monitoring
- Follow QAPP for WHRST monitoring program (Ecology 2006) to sample non-random reference sites

Indicators

Monitoring Parameter Selection: Look at stressors not being monitored currently – get recommendations from toxics loading committee (gaps id'd), address in communication and governance? Opportunity for SWG to lead.

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Decide whether/how to prioritize development of benthic indicators and biological indices, especially for nearshore and marine environments.

Decide whether/how nutrient loading should be included as a parameter for monitoring and should be correlated to its possible impacts in fresh and marine waters.

Review programs and research currently dealing with the chemicals in Appendix E. Some of the parameters may warrant inclusion in the list for monitoring. We may modify the list in Appendix E in the future. Consider this as a list of examples and review as a group.

- Add sentence “Note not all of the parameters listed below will be monitored at all sites; see Table E.1 for which parameters are monitored at permanent and rotating sites.”

Biological Indicators for S&T Monitoring:

Good candidate indicators for stormwater impacts in small streams include:

- Salmon in small streams can be a good biological indicator for assessing stormwater impacts. Use various life stages for specific reasons. Examples:
 - Juvenile salmon
 - Pre-spawn mortality
 - In situ Salmonid Embryo toxicity testing
- Add coho to cutthroat ratio as an indicator in small streams.
- Juvenile salmon prey species
 - Vegetation
 - Terrestrial insects
- Benthic measurement (B-IBI) in small streams is a good biological indicator.
- Other

Good candidate indicators for stormwater impacts in nearshore areas include:

- Resident fish
- Forage fish
- Bacteria levels in water and shellfish
- Other

Determine indicators from among these lists (including “other”) in process of writing the QAPPs for these two regional S&T programs; done in coordination with effectiveness and source identification indicator selection

Sediment quality and WQ parameters/indicators to consider for S&T Monitoring (proximate to stormwater to support biotic monitoring):

- Use the Ecology WQI methodology for WQ parameters (Temp, DO, pH, FC, TN, TP, TSS and turbidity placed into a formula) so conform to this index.
 - Is Ecology’s WQI SOP adequate or do we need more?
- Use the list of parameters on pages 63-64 of the strategy document (TSS, TP, TN, T and D Cu, T and D Zn, Hardness, Temp, TPH, SVOCs, FC, OrganoPhos Pesticides)
- Use peer review list of parameters: Toxicity (chronic not acute?), zinc, copper, lead, bacteria (FC, EC, enterococci), ammonia, nitrates, phosphates, pH, cond, turbidity, suspended solids, COD.
- Add organic carbon to small stream list.
- Focus less on WQ parameters and more sediment and energy.
- Eutrophication

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- Focused toxics monitoring to fill in and complement toxics loading modeling work
- Other

Add table to text in Volume 1 (scientific strategy) with examples of stormwater-related indicators and parameters needed to assess indicators. Note that not all of these indicators will make it into the QAPPs.

Discussion: tables in draft doc appendix text not reviewed by committee. Strategy document needs to capture the examples we're thinking about for both proximate (stormwater-related, quicker timeframe) and long-term indicators and parameters.

Determine indicators from among this list (including "other") in process of writing the QAPPs for small stream and nearshore regional S&T programs; do in coordination with effectiveness and source identification indicator selection; get input from toxics loading steering committee.

- Hydrologic Parameters
 - Keep what's there
 - Add energy
 - Use level and flow (continuous) as in the document
- Sediment parameters
 - Is this a priority?
 - Add sediment toxicity test for wet weather
 - Focus on sediment contamination
- Physical Habitat Parameters
 - Use list of parameters
 - Use Ecology Federal Pacific Fish/Interior Fish Biological Opinion stream physical habitat index

Decide whether to (see John Lenth's write-up):

- Identify short term indicators for detecting trends earlier

2. Document edits for Source Identification Monitoring chapter writing team to complete (Chapters 2.3, 2.5, 2.6.3, and 3.3)

Source Identification needs a clearer articulation of purpose, a better framework, an appendix section, and a better explanation of how it interacts with Status and Trends and Effectiveness monitoring. Tie in compliance data, use characterization data (e.g. Phase 1), and use illicit survey data, etc. Include CSOs. Add text to strategy.

Capture this in source id sections of both volumes, will review new proposal in implementation plan

recommendations: Determining how much source control is needed to get a biological response is not needed necessarily. Doing this beforehand could impede progress. After source id, next step is source control. Need to continuously tie our work into the bigger picture of AM. Each source control activity needs a metric to measure its success, i.e., roughly quantify load reduction targets to provide science-based recommendation (How clean is clean? What is dirty? Adaptive). Stormwater monitoring feeds into this bigger-picture discussion of targets.

Decide what hypotheses to address and what experimental design to use. Describe the process by which these decisions will be made: when ID a problem (or early warning signal) through S&T or literature, design an appropriate study with appropriate indicators to address the problem. Short term process of describing the initial study design and long term process to add/connect. Process includes review/evaluation/vetting of new studies. Need a better discussion of what examples are included. Do not include rigorous study designs.

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Include characterization in source identification section. Define characterization (variation in relevant indicators/variables across the landscape and through time), the need for it in various studies, and what info we can get out of literature for a particular study. Relate back to an identified problem (S&T, existing literature, etc). Where are sources of problems and how much is coming from each source, to inform actions.

- Source ID hypotheses need background work and information (lit review). Be more vague about these in the revised scientific framework; include a couple of hypotheses as examples. Drop 4 Hypotheses in scientific framework. Perhaps have subgroup identify hypotheses for what are regionally significant source identification efforts? What collective analyses could be done? Connect to watershed specific efforts. Consider coming up with categories: e.g., copper, phthalates, fecal coliforms, locally-determined sources, specific land-use issues? Have source ID implementation plan section group work on this and develop hypotheses for each category.
- Add a sentence to Section 2.6.3 that “An essential component of the monitoring program will be to identify and characterize sources and loadings of pollutants in stormwater throughout the basin” in the source ID section. **Tom P will write draft language – hybrid of source id and characterization discussions**
- Add a sentence to Section 2.6.3 as follows: “Data from compliance monitoring, characterization data, and illicit discharge survey information will be used to help diagnose reasons water quality/beneficial use conditions are not met.” With modification: change “compliance monitoring” term because it is confusing, it means **both** sampling data and implementation of actions to different people (both are needed). Also include idea of both source and conveyance of pollutants. Source ID is finding the problem.
 - Data management issues (local-regional) can only be resolved when the structure and relationships in the monitoring agency are clarified. Deal with this in the implementation stage section 6.3 in implementation plan draft outline. Do a lit review and set up a framework for SOPs and data reporting for collective regional assessments.
 - In text: Cite earlier successful studies as examples (for all categories of monitoring). Need to know what SOPs are needed. Look at toxics loading steering committee work to help identify initial areas of concern. Discuss known sources of key stressors in text. Separate sources and conveyances.

Loadings/characterization issues to discuss with indicators:

- Add to the text that we may identify a representative number of specific outfalls and perform monitoring. Weisberg recommended loadings and hydrographs as proximate indicators of management responses.
 - This may be a data gap
 - Study design question? How do you get representative outfalls to sample?

Propose: Stay with original 1/13 decision (see #3 above) and focus on collecting characterization data needed for effectiveness and source identification studies:

“Define characterization (variation in relevant indicators/variables across the landscape and through time), the need for it in various studies, and what info we can get out of literature for a particular study. Relate back to an identified problem (S&T, existing literature, etc).”

Propose: get clarification from S Weisberg about his recommendation to get a better idea of proximate responses to stormwater management; i.e. is outfall monitoring needed to do this? **Tom P to follow up and bring a recommendation back to this group.**

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Discussion: Perhaps consider outfalls as an indicator to inform a probabilistic model? Phase I characterization data has come in with variability similar to that in the national data base. Do we need some outfall monitoring to support S&T (with other ancillary data)? Source identification and effectiveness monitoring would likely include outfalls. Probabilistic S&T monitoring of outfalls might be helpful to answer effectiveness hypotheses? Might have a different perspective with respect to industrial outfalls.

Add a sentence to Section 2.6.3 as follows: “Data from compliance monitoring, characterization data, and illicit discharge survey information will be used to help diagnose reasons water quality/beneficial use conditions are not met.”

The document must acknowledge that part of experimental design will be to evaluate known source ID information, screen for stressors, and focus on receiving water monitoring where impacts may be greatest. All four source ID Hypotheses were roundly trashed; Recommendations should be made by the chapter writing team.

Do a lit review and set up a framework for SOPs and data reporting for collective regional assessments

In the implementation plan we will recommend developing a standardized version of a stormwater infrastructure and BMP inventory tool (see Schueler’s comment #5) for use across the region

- Discussion: applies to diagnoses and targeting management approaches as well as to effectiveness studies – belongs more in source identification section. A possible approach; tool for a focused study? Would provide methodology for collective regional analyses. Not just public infrastructure.

3. Document edits for Effectiveness Monitoring chapter writing team to complete (Chapters 2.3, 2.5, 2.6.2, and 3.2)

Decide what hypotheses to address and what experimental design to use. Describe the process by which these decisions will be made. Do not include rigorous study designs.

- Discussion: do we need to do a literature review to inform this? Got good feedback from public review and can do targeted searches. Or state that this can be refined as we do a literature review. Can we view hypotheses as questions we’d like to be able to answer, rather than these are the studies we’re going to design? Stay with assessment questions, and move to credible, testable, actionable hypotheses later? Concern that examples infer priorities.

Effectiveness hypotheses were too detailed, too quickly, without background work and information (lit review).

Be more vague about these in the revised scientific framework; include a hypothesis as an example for each category of effectiveness monitoring; refer back to assessment question process.

Add a 4th bullet/category for studies to test new and emerging techniques as needed (for both new and existing development). (Connect to TAPE)

Add a 5th bullet/category to continue to fill key data gaps for existing techniques. Say in text that it is not a current priority to recommend new studies, but... dependent on Phase I results and other research, we should evaluate needs for this type of information (fits into literature review and data management).

Add this wording/concept to the effectiveness monitoring framework and continue this idea in implementation plan: Identify effective stormwater management techniques (programs, methods, BMPs at a basin-wide level) that we know now, and work to implement them as soon as possible. “Work to implement ASAP” should be more along the lines of communication, AM. Ongoing feedback into management loop in addition to acting on what we already know. “As we learn from our monitoring and assessments, we apply

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what we've learned as quickly as possible." "Recommendations of what should be in the next permits will be decided in the process of writing the implementation plan."

Remove the phrase "increased/improved management actions" and instead describe the type of actions targeted for evaluation and the potential relevance of the actions to correct regional problems. Be specific enough to have a testable hypothesis.

- Before final hypotheses are collected/agreed upon, articulate why we are targeting each action, consider assumptions about its effectiveness (and perhaps available information about its costs and benefits); tie back to assessment questions

State that we will do a literature review prior to designing a study.

Add section in scientific framework explaining the need to track municipal and other stormwater management activities and programs and the information will be used as ancillary data to support effectiveness and source ID monitoring and help us answer other questions

- Includes municipal, business, other activities in a basin
- Also need to track other land use planning/land acquisition activities that affect stormwater management
- In the implementation document, describe how these types of compliance/programmatic data are (or will be) cataloged and tracked

Add text saying that we will take advantage of the opportunity to design efficacy studies in basins with stormwater-related TMDLs where actions are targeted at a specific impairment and progress in the receiving water will be tracked.

Public Education and Outreach:

- Education/outreach activities as BMPs?: this is part of the effectiveness component of the strategy which includes programmatic activities as well as traditional facilities
- Education/outreach activities planned as part of our regional coordinated monitoring program for stormwater: this is a chapter proposed for the implementation plan, should address audiences and vehicles for communication – should also be briefly referenced in executive summary for both volumes. Address transfer of science information in AM section.

Include planning hypotheses: Means: approach to manage stormwater through land use/watershed planning. Could also address development/zoning rules; other strategies besides LID for developing lands to address. Sources that require regional approaches. Already covered expanding hypotheses to include evaluation of these tools (say: range is broad and will expand over time). Be specific. Scale question. Say: Prioritization will occur in making effectiveness implementation chapter decisions.

Decide whether/how to incorporate water quality analysis/hypotheses into LID monitoring (Ho in strategy is flow; experimental design in appendix is Q and WQ?)

Decide whether to (see John Lenth's write-up):

- Keep emphasis on receiving water monitoring and aggregate effects of stormwater BMPs rather than a focus on influent and effluent
- Add monitoring before and during construction phase of BMPs

4. Document edits for Karen to complete (rest of the document)

Scope and purpose

Clarify the purpose of the SWG monitoring program and how the strategy document supports the SWG's purpose. Don't accept a task that was never ours to accomplish (nor could be accomplished). Use our charge from ECY and PSP, based on the Monitoring Consortium's recommendations, as our foundation (caucuses have accepted this). Remove contradictory statements in Task 4 of work plan and strategy – make sure documents are fully aligned. Modify based on all of the decisions we've made to this point.

All water bodies and land uses need to tie in. However, this document recommends the initial regional stormwater monitoring program focus on small streams, nearshore areas, and the full spectrum of urbanizing lands. Local priorities driven by other issues remain inherently supported.

Unregulated Stormwater: areas with no permits: These areas are covered by the scientific framework we've proposed. How to support and conduct any monitoring proposed for these areas will be addressed in implementation.

Conceptual Model (formerly Table 1 and Figure 2)

Include the elements in the subgroup's conceptual model: aquatic ecosystems, drivers, pressures, states, etc. – use the DPSIR model (and PSP indicator process) components and use open source language to describe how we'll use the monitoring information for adaptive management. Concern remaining that this doesn't depict stormwater impacts well

Include the arrows illustrating relationship between the elements. Make them all the same size except for the pathways (label added); add arrow from impacts to ecosystems

Include the specific examples included in each of the element boxes. Subgroup will continue to refine the content of the boxes. Figure in general is good enough to meet our purpose.

Include as a separate figure the "Watershed Characteristics" model *as an example* of a more specific conceptual scientific model for evaluating stormwater. Highlight areas where our hypotheses are targeted. Describe it as a useful approach and be clear about our intent.

Adaptive management

Restructure the primary document organization around types of monitoring, not adaptive management and retain adaptive management discussion.

- Acknowledge that the document did suffer from confusion and breakout: keep brief discussion of AM up front (it frames the entire strategy, not just the scientific framework). In Section 1 of our document, intro/purpose: Keep 1.4 and Reduce/edit 1.5 and 1.6 to key bullets and include in sidebars. And add transition text (how AM applies to each type of monitoring)

Either describe the institutional framework for the full adaptive management cycle (that is, inform monitoring and report findings) **OR** say that the job of this document is not to define that institutional framework and let this go. This is governance, so state the latter in the scientific framework – goes in implementation plan.

Connect Trio of Monitoring Types

Use a watershed approach to tie the three types of monitoring -- this is one of the scales at which we could do monitoring

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Tie the different types of monitoring together more closely in terms of stressors where we can, depending on the purpose of the monitoring. Don't restrict ourselves to a single list of indicators for the three types of monitoring. Do a better job of showing the linkages and how it all works together. S&T monitoring is biota-based and other types are stressor based. How do we link them (need to know what is causing negative impact to beneficial use)? Acknowledge this is an issue that we need to decide how to address in source identification monitoring. We are addressing this, needs to be in both volumes in parallel. Source id section was too slim in scientific framework.

Add Horner's ideas to our descriptions of our three categories: works for status and trends. We've described how monitoring applies, and need to link things together logically and clearly describe how change is made. Are there goals for all watersheds in PS that suit this approach? Do biotic endpoints suffice for this? Extrapolate based on what learning in certain areas?

Start with the stressors/problem for the region or in a particular watershed (use info from S&T monitoring to direct source ID efforts and prioritize effectiveness monitoring). Prioritize monitoring across categories, based upon impact. Tie S&T monitoring and management actions to the impacts in that watershed. See also figure 2/table 1 discussion topic.

Address uncertainty range as an overarching goal of the strategy – articulate credibility and confidence in each of our experimental designs.

- Add a paragraph: we need to address our collective/joint ability to sustain the effort to provide the answers we need with appropriate study designs and prioritized our efforts.
- Also articulate scale, how much, how often, and what we get for the effort. Be honest and transparent in approach to creating the overall study design, ensure that level of confidence is clearly articulated and appropriate for decision makers.

Focus on characterization is in source identification section [Define characterization (variation in relevant indicators/variables across the landscape and through time), the need for it in various studies, and what info we can get out of literature for a particular study. Relate back to an identified problem (S&T, existing literature, etc). Where are sources of problems and how much is coming from each source, to inform actions.

- Will need a certain characterization study design to calculate loads (not currently in strategy). Different data gap.
- Might be included in a research category – separate discussion

State in text that the example hypotheses in the revised scientific framework (as modified per above decisions) will be a starting point, and that we recognize that they are not necessarily everyone's highest priorities, and likely will change. Acknowledge the prioritization process we went through, ensure we pick indicators that help us separate out stormwater impacts.

Include short discussion/definition/purpose of hypotheses in Strategy. As a base, consider Spooner's Goals and Hypotheses (in her peer review). Also consider Bill Taylor's comment about "working" hypotheses.

Include concept of "power" of statistical tests. Add to the text a discussion of data needs for specific hypotheses with experimental design.

- Power analysis is important and should be done before studies implemented, but too early to provide this level of detail

Include discussion of necessity of a literature review. Stress importance of using existing data (particularly local data) to inform stormwater monitoring efforts.

Do not respond to each detailed critique of a particular hypothesis. Rather, consider a general response that the hypotheses in the draft strategy are starting points. Additional hypotheses will be decided after detailed

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discussions of issues (appropriate scale, level of confidence, study design, power analysis, QA/QC, etc.) among specific stakeholders.

Describe purpose of Indicator Monitoring? How will data be used?

- To measure the state of the system
 - Not to diagnose problems
- To determine if stormwater management actions are protective of, or restoring, resources.
- To measure improvements or decline in a biological endpoint.
- Useful:
 - To determine which water bodies are to be 303(d) listed.
 - To determine the miles of streams in poor health.
 - To provide data for modeling
 - To provide data for mass loading to PS.

Conduct ongoing Puget-Sound-wide analyses of stormwater-related indicators and syntheses of stormwater-related scientific knowledge

Start a “parking lot” for details and issues that could be helpful at a later phase of implementation.

Analysis of Phase I monitoring info should inform the starting point

Loadings/Characterization. Add text to document that says: We need a literature review before specific studies can be implemented

- We need to evaluate existing monitoring before implement more monitoring. Integrate existing outfall information where possible. As appropriate, evaluate data from Phase 1 monitoring and other NPDES permit-related monitoring (industrial, boatyard, shipyard, etc. for early identification of problem sectors, areas, and information gaps)
- As relates to Experimental Design: At some point in experimental design the assumptions being made should be clarified and explicitly stated. What is the “prevailing knowledge” about the relationship of concentrations, flow rates, volumes, loadings, sediment transport, particle size, etc.? Reference should be made to a prevailing theory, a reference, or perhaps some topics should be the subject of a white paper so that monitoring participants and study designers will be aware of background assumptions.

Do not adopt the structure in Horner’s suggestions for a four-tiered approach that incorporates our three approaches and melds them with characterization and research but instead keep our three categories AND use his ideas.

Literature review

Do initial step of reviewing existing data and programs must be a foundation for all later work. This analysis would include a thorough catalog of watershed land-use metrics, identification of stressors, a prioritization of at-risk watersheds, an identification of what techniques are most effective in which watersheds, and what are the data gaps and needed research. Already discussed and recognized need to do this. Should discuss how and when to do it (sooner than later). Categories include: review of existing data, compilation of programs, review of effectiveness (program approaches and BMPs), identification of data gaps and research needs (studies vs monitoring vs modeling); use other compilations from around the country (CASQWA, CWP). Pure probabilistic design won’t get us all the answers in a timely fashion, need to prioritize. Need another discussion of monitoring design.

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Investigate tying the monitoring to other existing Puget Sound long-term or short-term monitoring programs.

Other gaps in the document

Climate: we have not discussed this, should this be part of effectiveness studies? These are different questions. Is this a priority for (1) the overall framework **yes** and (2) our initial prioritization and focus **no**. We should add a high level recognition that climate change impacts what we're doing, and our work needs to tie into a bigger picture over the long term.

Global pollutant levels: We should add a high level recognition that global pollutant loading impacts what we're doing, and our work needs to tie into a bigger picture. Bring in air deposition early for source identification.

Additional science needs/ancillary data

Do not add detail on land use/land cover metrics. This could be a potential outcome of the monitoring, depending on specific monitoring activities, but should not be a precondition. We don't need the breakdown – we need the overall activity:

Watershed characteristics: Land cover, impervious surface and other land-use characteristics must be surveyed. Extensive body of knowledge to build upon – another area for literature review. Screening and guiding mechanism for what to monitor.

- Need to continue to collect and maintain this data.
 - Meaning of “ancillary” – absolutely required information (find and use a different word?)
- Might need to collectively integrate
 - Land use/land cover (continue Ecology's 5-yr interval analyses)
 - Mapping
- Current Phase I permit requirements with requirement to use national GIS standards help with this and should continue throughout region – how?

Discuss whether to use VMT/ADT/Stream crossing/Street dirt/Urban simulation data and approaches that are available

- From Seattle street sweeping study: VMT could be surrogate for estimating pollutant loads up to a certain level (then traffic seems to dissipate pollutants)

Modeling

Make a better connection from our data to modeling. Modify the current section on models to say:

There are different types of model that 1) model problems and mechanisms, 2) extrapolate results from small scale studies to regional (urban and rural) effects, and 3) extrapolate the benefits associated with different management actions.

Our goal is to connect our monitoring to the models that support actions to restore watershed health, but the specifics of all the possible connections is outside the scope of this document.

In the meantime, author might describe an appropriate, relevant example of how we would connect to a program (for example, HSPF/WHM or others).

Process to determine what we need to collect. Go through/identify the list of most relevant models that are out there and identify their data needs. (What priorities have been identified by PS Science Panel? What suits focus of what we need for stormwater management?) State intention that we'll collect data under this monitoring plan that we know is needed for many stormwater-related models, and key relevant data gaps. Cross boundaries to see where our efforts inform other activities.

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Discussion: work we're doing needs to feed into the modeling work that is needed (and vice versa). For example, Toxics Loading committee has a list of modeling needs. Need to identify this step and create this list for stormwater.

We will work with modeling experts to identify specific data needs for models. Incorporate a modeling-specific data collection plan into the strategy.

Add text to Modeling Activities – expansion of recommendations above

- Examples: need watershed runoff and loading, empirical models relating upstream land use and cover to stream and outfall quality, etc.
- Intent of strategy is to collect data that supports modeling activities and can be used to verify past efforts. This data collection must be targeted to modeling efforts that will be useful in providing insight to help answer our questions.

Research

Add a short section to the document that says: Research is **important**, agency support is needed to manage research projects, and list the projects above as examples. Add new category but don't necessarily prioritize it. [Discussion: are we adding a 4th category of monitoring? Do we endorse an activity of tracking research activities and emerging issues and recommending new studies relating to the other three categories? Does a comprehensive strategy necessitate this category under the big tent? Not necessarily prioritized in our starting point. Horner's comment was that problem diagnosis and research are confused in our document. Basic research that is not directly applied to what we're doing needs to be conducted. We had a research category of assessment questions in our initial document (decided not to prioritize those questions as part of initial starting point).] **But**, it is outside the scope of this document (scientific framework and implementation plan) to define the structure needed to make this happen. Our current goal is to implement best available science now, that is, connect management to results of earlier research; and address emerging issues and distribution of research dollars at a later time.

Experimental design

Appendices E and F: Remove the appendices and details from the scientific framework. Leave only high-level discussion and respond to higher-level comments (i.e., scale, paired watershed, etc.). Post all of the examples provided by the consulting team in an online library, separate out by category of monitoring, and summarize relevant comments on the ones that were included in draft vol 1. The status and trends, effectiveness, and source identification writing teams will address the relevant examples and decides explicitly to: use/modify/replace each example and dive down in the implementation plan where each chapter will propose whatever level of detail is appropriate for their category of monitoring):

- Propose/outline experimental designs for small stream and nearshore status and trends and how we would move forward to approve monitoring plans (recognize commitment to build on state/PS indicators and ECY small stream monitoring). If examples are used, address the detailed technical comments, contact specific commenters to help.
 - Build specific tools/approach for source id (there was no Appendix in draft vol 1).
 - For effectiveness, articulate a vision rather than study designs, and concentrate on who can do what.
- ONLY the examples that are determined to be useful for the regional monitoring program will be retained in the strategy document.

Decline reviewers' request to specifically describe the analyses that will be performed. Include the monitoring designs as examples, but this is a "scientific framework" document, not the implementation document. We will

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include a broader set of designs as examples, over time. We will discuss which specific examples below with experimental design.

Yet to be done/discussed:

Not deciding whether/how to address compliance monitoring yet

Focus on the strict definition of stormwater (conveyance) and not non-point (other sources such as failing septic systems, historical sediment toxics, etc.). – different topic, doesn't belong here, hold for later discussion

Include new version of Table 1.

Economics and costs. Address in implementation (scientific framework is setting priorities acknowledging the need to prioritize); add big picture statement that monitoring needs to be sustainable – governance/implementation issue; recognize that it is expensive and we need to know what we can afford to do, also include benefits (what the investment saves us down the line). Vol 1 doesn't talk about cost, Vol 2 will executive summary for paired set should have this concept (keep management audience in mind).

Include in implementation strategy:

- SOPs and data management; data sharing
- Use monitoring data to define research needs

Governance issues:

Include in Strategy the concept of a “monitoring consortium” (Horner/Schueler) with authority to assure funding, rule on adequacy of science, study design, QA/QC, peer review completed work, track projects, maintain databases, etc. Develop full proposal to include in implementation document.

A “lead entity” has to coordinate and manage this effort.

Public ed/outreach; Including community in decision making

Strengthen diagnostic approach and elaborate on how adaptive management will work to get corrective feedback to managers. Do this primarily in the implementation plan. Add some text and perhaps a diagram to scientific framework: how do we make this useful? How do we apply the information? How do we communicate the information? We really need to work on this issue. Needs to dovetail with governance being developed by PSP.