FINAL GRANT REPORT
ATTACHMENT C

Stakeholder Review Comments and Responses

Habitat Status and Trends Monitoring for the
Lower Columbia Region: Integrated Monitoring Design

FOR

Grant Agreement # G1400531
Habitat Status and Trends Monitoring for the Lower Columbia Region
Grant Recipient: City of Longview

The following table documents stakeholder comments provided on the Draft HSTM Monitoring Design and Report. Responses to each comment are provided by Stillwater Sciences and were used to guide the Final HSTM Monitoring Design and Report. Page numbers corresponding with approximate comment location in the draft report are provided for the body of the report.

COMMENTER	ORGANIZATION	DOCUMENT	PAGE NUMBER	COMMENT	RESPONSE
Karen Adams	LCFRB	Design	i	That doesn't look like the CD site, but more like the tribes restoration further upstream… Check the email dated Jan 5 at 2:34pm…	The photo documentation was checked as requested and the documentation is correct.
Karen Dinicola, Brandi Lubliner	Ecology	Design	i	Appropriately acknowledge funding source: WA Dept of Ecology and the City of Longview.	Acknowledgement added.
Karen Dinicola, Brandi Lubliner	Ecology	Design	iv	An abstract that boils the high points into 1-2 pages is needed for communication of the findings of this report to folks outside the project.	An abstract was added.
Chad Larson	Ecology	Design	iv	Ultimately, as proposed in this document, very few of these (physical and chemical) parameters will be measured at the Qa/Qx sites. Especially with regards to the habitat metrics that will be assessed, it may make it difficult to relate invertebrate communities to any habitat degradation.	Making such relationships on a site-by-site basis is not the purpose of S&T monitoring, and so no effort was made in achieving this outcome. It could not be accommodated under any feasible design.
Karen Dinicola, Brandi Lubliner	Ecology	Design	iv	Include "municipal stormwater" throughout document to clarify that this program isn't addressing construction, industrial, gravel, POTW, etc. – other types of NPDES permits that are issued to jurisdictions	Agreed.
Jeff Fisher	NOAA	Design	iv	There are multiple ESUs, identified by species…text descriptor should be used before acronym.	Agreed and text revised
Jeff Fisher	NOAA	Design	iv	But it (the study design) actually only includes the WA areas—based on the first paragraph…either need to modify first paragraph, or this one…	Clarified.

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Jeff Fisher	NOAA	Design	iv	(Insert) tributaries in (in front of "Washington" on line 38)? Don't believe we are focused in on the mainstem yet…	Constraining the project areas to tributaries would be too narrow given the current design. We have identified monitoring sites in both wadeable and nonwadeable streams (e.g. larger rivers with drainage areas >1000km^2)
Jeff Fisher	NOAA	Design	iv	Referencing the ESUs in this manner is not correct—it's not a portion of the ESU (there are multiple anyway) it is a portion of the geographic recovery domain that supports multiple ESUs—an ESU is a biological entity, not a geographic entity.	Duly noted and text revision appreciated
Mindy Fohn	Kitsap County	Design	v	Fully support this approach - should "metrics" be replaced with "parameters"? I see this throughout the document -	For the sake of consistency, we will use metrics throughout the report and strike the use of "parameters" as a term
Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	v	Consider using the term "water quality and hydrology" rather than Qa/Qx. I don't recall ever seeing this before.	This is the terminology from the Phase 1 report. It is unique to this project but has a history with it, and so it has been retained in this report.
Jeff Fisher	NOAA	Design	v	First use of this term (master sample)…should define what it means…	Addressed in text revisions.
Mindy Fohn	Kitsap County	Design	vi	Incorporation of legacy sites, when appropriate, is a strength of this program	Acknowledged
Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	vi	We were impressed with the phase I approach to including legacy sites.	We agree that the Phase 1 approach, in concept, was appropriate, and there has been no change to that framework--both Phase 1 and Phase 2 provide the ability to include legacy sites and noted the statistical ramifications. Phase 2 has also updated the Master Sample to include previously missing legacy sites. Because neither Phase 1 nor Phase 2 has had a truly complete representation of where legacy sites actually are located relative to prospective sampling sites, however, a final evaluation of the feasibility of the Phase 1 approach is warranted and will be necessary. In part, this depends on whether the stakeholders want a truly random or pseudorandom sampling scheme, and this decision has not yet been made (nor needs to be made as part of the design, only as part of implementation).

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Karen Adams	LCFRB	Design	vi	You will see that I have highlighted every instance that it is explained that something will be done during the next phase. This is a valid and necessary caveat. However, it ends up reading like our work is incomplete. If you don't know all the info, you might wonder what happened to the money and time that was slated for these tasks. Did the consultant not do a good job, did the project manager mis-manage the project or team leadership not push hard enough. I would recommend saving these up for the next steps section at the end. It is important to let people know where there are loose ends and why. When it is sprinkled throughout, it is possible that folks misinterpret what happened here.	The concern is understood, but it is challenging to retain an understanding of the issue when not discussed in context. As such, we advise retaining the current structure.
Karen Dinicola, Brandi Lubliner	Ecology	Design	vi	Need to clearly define (reaches). Also need to use this term consistently throughout the report.	Clarified in the revision.
Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	vi	Good (with respect to Qa/Qx sampling of reaches, not points).	Thank you.
Mindy Fohn	Kitsap County	Design	vi	This conversion of points to reaches is a strength of this approach. However, is there a description of this conversion? Such as how many points are to a reach, and the reach length? I was unable to understand this conversion. The interest comes from the desire to adopt this approach.	It is clarified in the main body of the report, but not in the Executive Summary given a desire for conciseness.
Karen Adams	LCFRB	Design	vi	Bringing reaches up at this point will be confusing to a reader. Habitat is sampled at sites using a reach based approach, but that detail is not necessary at the Exec. Summary level.	Addressed in text revisions
Karen Dinicola, Brandi Lubliner	Ecology	Design	vi	These considerations also apply to the stream benthos sampling included in Qa/Qx. Results for this metric are expected to vary along a hydrologic reach.	Agreed. Need for a consistent, meaningful setting for IBI sampling has been added.

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Karen Adams	LCFRB	Design	vi	Organization is going to be key here. Some folks are having a hard time following the logic of the document and I think a little reorganization and formatting would go a long way. I would add some subheadings here… one above line 6 to indicate that you are discussing site allocation and strata for Qa/Qx/ Move this paragraph to line 14 on the next page above where you start listing out the site allocation and strata for habitat and include a subheading for habitat there.	The Executive Summary was fully revised to address this and similar concerns
Karen Adams	LCFRB	Design	vi	I would make the ES match the workshop… present all WQ stuff then present Habitat stuff. Right now there is a lot of jumping around, especially in the Executive Summary.	Upon further discussion with LCFRB, the ES structure was not changed to match the workshop, but retained to match the report. The ES was revised for increased reader clarity
Jeff Fisher	NOAA	Design	vi	Question: does this design preclude future habitat restoration actions in the Master Sample site reaches?	No. Such exclusion applies when needing control conditions for effectiveness monitoring. That is not the case with STM . However, if restoration happened AT a site, clearly it would no longer be representative of a class of stream reaches and would need to be abandoned and/or replaced.
Karen Dinicola, Brandi Lubliner	Ecology	Design	vii	I still think we want all urbanized areas within the basin included as "inside UGA" or at least excluded from "outside UGA" – we can exclude them from sampling as a 3rd strata. As smaller cities grow they become candidates for inclusion in the permits. We want the S&T design to be lasting.	This suggestion has already been incorporated--the smaller cities within a UGA (but not currently NPDES permittees) are explicitly excluded from the "not UGA or NPDES" category. See responses to comments elsewhere.
Karen Adams	LCFRB	Design	vii	Recall our discussion during the meeting that this notation needs to be clear that we are looking at urban land uses. You used "Urban NPDES Areas" in the workshop and I thought that was great. Keep it in plain English as much as possible.	Addressed in text revisions.
Karen Dinicola, Brandi Lubliner	Ecology	Design	vii	I doubt this will be meaningful for Qa/Qx – fish don't impact wq, it's vice versa	We agree, but this is a management-driven stratum, not a presumed causal factor.
Karen Adams	LCFRB	Design	vii	The term Primary Population will need to be defined somewhere.	Addressed in text revisions

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Karen Adams	LCFRB	Design	vii	Start using "Urban NPDES areas" here for consistency, exchanging all UGA+NPDES for "Urban NPDES" throughout.	Addressed in text revisions.
Karen Dinicola, Brandi Lubliner	Ecology	Design	vii	Very few of the 24 segments appear to have legacy sites associated with them: how many, precisely? To be transparent and clear about teeing up this choice, more context needs to be provided. Most legacy sites are outside UGA+NPDES areas.	We have updated the Master Sample to include additional legacy sites from the City of Vancouver and Clark County. Additional data is available from Oregon agencies for inclusion in later phases of this process. Called out in "Next steps"
Karen Dinicola, Brandi Lubliner	Ecology	Design	vii	At the October workshop you suggested finding the downstream-most accessible sampling location and going with it. That seems perfect for all parameters except perhaps IBI. Is where you have sufficient sediment accumulated also likely to provide suitable/comparable IBI sites?	Although have a default approach to site selection is reasonable, a variety of logistical issues (including, but not limited to, site access, security for continuous samplers, suitability for IBI data collection, etc.) are likely to render most default guidance irrelevant. Nonetheless, we agree that an initial protocol is warranted and has been included.
Karen Dinicola, Brandi Lubliner	Ecology	Design	vii	Is this outside UGA+NPDES? Not clear.	Yes. Revised wording is appreciated.

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Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	vii	Rural Residential is a common Land Cover in Clark County	"Rural Residential" is a land-use category and not discriminated as such in coarse-level NLCD. There are the following categories in the NLCD (of which the first is the closest land-COVER category corresponding to this land USE): • Developed, open space (mostly grass and large-lot single-family housing) • Developed, low intensity • Developed, medium intensity • Developed, high intensity Although some (indeterminate) combination of the first two likely encompasses the land use "rural residential", at the present time we recommend retaining only the three primary land-cover classifications, insofar as they are sufficient to address the monitoring questions as currently posed. The data will always be available for more specialized post-stratification. In addition, the application of the 2006 NLCD has now been expanded in the methods section to make its composition more transparent to the reader.
Karen Dinicola, Brandi Lubliner	Ecology	Design	viii	I don't think this strata (inside/outside urban UGA) is appropriate for habitat. Stick with predominant LC.	This is a significant recommendation and one to be discussed. The recommendation has not been previously proposed and the report authors can make such a change to the design without broader stakeholder guidance. This question is teed up with the "Next steps."
Karen Dinicola, Brandi Lubliner	Ecology	Design	viii	Also consider the variation within urban. The Hobbs report showed differences between commercial/industrial and residential for both seasons and parameters. Impervious surface rules for flow impacts, but not necessarily for wq	There is no question that such WQ variations in urban land-use types exist, but up to this point the HSTM monitoring project has not sought to discriminate them.

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Karen Adams	LCFRB	Design	viii	We should include “cleared” as a category and in discussion acknowledge that we don’t have this one ironed out yet. It isn’t so much that it doesn’t apply (this isn’t an insignificant amount of land in an area dominated by timber harvest); we just haven’t figured out how to reliably identify what “cleared” means, and it is a shifting target over time. Lots are cleared and sometimes allowed to grow back or are purposefully replanted so what is clear in one year, may not be clear in another. Lots that are regrowing toward a forest outcome only demonstrate the impacts of clearing for about 15 to 20 years tops anyway, at least in terms of the benthic community.	Although the "cleared" land cover category is laudable, it is not a land cover defined in the NLCD and would require additional analysis to determine its feasibility in any but specialized, localized applications. Beyond noting the interest, we do not advise actually including design elements that do not have a clear path to resolution, even if desirable. Data limitations on the design are a practical reality and establish constraints to a realistic monitoring design.
Karen Adams	LCFRB	Design	viii	I like this section (regarding the logic in defining the list of recommended strata) and it is missing from the WQ discussion above. I see opportunities to expand here though. Why do we care about drainage area? Why do we care about gradient, what is its relevance to our goals and objectives? Similar issue with land cover.	The Executive Summary (ES) was fully revised to address a range of comments. The text suggested in this comment is educational in nature and thus more appropriate for the body of the report, rather than an ES. However, the spirit of the recommendation was addressed in the revised ES with a reminder of relevant differences between water quality and habitat monitoring
Karen Dinicola, Brandi Lubliner	Ecology	Design	viii	Why (should the number of sites be consistent with QaQx)? Is the data variability similar?	It widely varies across the suite of proposed metrics and thus a rule of thumb for habitat data variability could not be readily applied
Karen Dinicola, Brandi Lubliner	Ecology	Design	viii	Why is there no recommendation for “pseudo-random” here (for habitat)? Most of the legacy sites are outside the Qa/Qx urban focus.	Addressed in the revision
Mindy Fohn	Kitsap County	Design	viii	Excellent discussion on frequency. Another strength of this analysis is the practicality of frequency and it’s based on science.	Thanks.
Karen Dinicola, Brandi Lubliner	Ecology	Design	ix	This paragraph probably belongs in the methods section, perhaps along with the preceding paragraph. This is the results section. You could also just drop it and leave these details in the body of the report.	Agreed and deleted

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Chad Larson	Ecology	Design	ix	This (substrate) is a broad term potentially encompassing many different measures	Clarified.
Karen Dinicola, Brandi Lubliner	Ecology	Design	ix	Need to list them (the metrics under consideration based on future findings). This also merits a bit more discussion here: what, besides cost, would recommend their inclusion or exclusion based on the experience and findings of other programs?	More fully addressed in Metrics section of report.
Chad Larson	Ecology	Design	ix	A definitive plan for this should be outlined and put in place so that it does not get forgotten once implementation begins.	This is what the implementation plan will outline.
Karen Adams	LCFRB	Design	ix	We should specify here that you are referring to the reach length represented by the sampled reach of 20XBFW. Especially for the on the ground folks who only deal with the on-the-ground data collection, the 20BFW sampling reach is what comes to mind first and is less a metric and more of a definition.	Revised as suggested
Karen Adams	LCFRB	Design	ix	Include Macros in habitat as well? It might be worth it to call out (later in the document) that a percentage of sites will be “trend sites” and continuous recorders of temperature, conductivity and stage will be utilized at these sites.	Macros are recommended for Qa/Qx sites, not habitat sites--their inclusion in the latter would likely represent a substantial increase in total program cost without any obvious benefit, since many of the drainage-area and slope categories for habitat are unsuitable for determining comparable IBI scores.
Karen Dinicola, Brandi Lubliner	Ecology	Design	ix	Decisions yet to be made (i.e., pseudo-random design) need to be articulated here (in next steps).	Addressed in the revision
Mindy Fohn	Kitsap County	Design	ix	This summation provides clear and logical next steps. Excellent approach.	Thanks.
Karen Adams	LCFRB	Design	1	Assuming the word "draft" will be deleted for the February Final report.	Yes.
Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	1	What are the project deliverables?	This is the deliverable… a design report. Other deliverables include a partial QAPP, stream gaging network assessment, and GIS layers. Because this report is a description of the monitoring design (not the monitoring design contract), they have not been explicitly listed here.

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Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	2	Nice figures but make them bigger.	Revised, as possible.
Karen Adams, Rod Swanson, Karen Dinicola	LCFRB	Design	3	City of Centralia and Aberdeen folks have not participated, though they may be affected by the work… They will be dealt with separately and need not be included.	Removed from text.
Rod Swanson, Jeff Schnabel, Ian Wigger, Karen Dinicola, Brandi Lubliner	Clark County	Design	3	Aberdeen and Centralia are not in the Lower Columbia	Agreed. Removed from list.
Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	3	The maps highlight Ridgefield as a city/UGA area. Where does this unpermitted city area fit in?	Good point--it IS a UGA within an NPDES permit area (that of Clark County) but is not itself a municipal NPDES permittee. It would be included in the "urban NPDES" monitoring strata, as indicated on the map.
Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	3	I didn't see that much feedback, mainly presentation of results.	The text was not meant to imply feedback only at workshops; many avenues for comments have been pursued throughout this project. Clarified in text.
Chad Larson	Ecology	Design	3	Perhaps a statement or two about the various workshops that have been held with the goal of engaging the various stakeholders, as well as refining monitoring objectives and sampling design?	Addressed in other sections of the report.
Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	3	There should be more description of the way we use metrics/parameters. For example, how do we use wetted width, how do we use stage to calculate flashiness, is there a function relating wetted width to stage or flashiness?	These are worthwhile issues but not associated with monitoring design itself.
Karen Dinicola, Brandi Lubliner	Ecology	Design	3	Use of NPDES as shorthand to describe guiding questions throughout this report is better served by consistently using the term "municipal stormwater permittees". Many types of NPDES permits are issued and cover jurisdictions (and businesses) throughout the region for quite different activities.	Agreed; meaning was always intended as indicated here, and the text has been modified to avoid any ambiguity.

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Chad Larson	Ecology	Design	4	Please provide specific references to support these statements (regarding the impacts of land use on water quality). Additionally, if turbidity has been implicated as reducing watershed health and salmon habitat, then shouldn't there at least be an initial attempt to assess whether or not it will be meaningful in the Lower Columbia Region rather than eliminating it all together based on S/N analyses from other regions or different studies?	Two examples have been added, and the wording changed to avoid any suggestion that specific studies concerning the LCR are being implied (although these likely do exist). As for specific metrics, relevance does not always translate into something that is easily measured. This topic is better handled in the Metrics section of the report, not the Q&Os.
Karen Dinicola, Brandi Lubliner	Ecology	Design	4	Further discussion of the 51% threshold (for describing predominant land cover) is appropriate – the location of the LU might dominate over the percentage. In the next stage, we need to hammer out a better definition. Add to next steps.	The level of analysis (and the disagreement in the scientific literature about what, exactly, to "analyze") is likely to confound future efforts to refine this definition which has been part of the project since Phase 1.
Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	4	Perhaps the beneficial uses are water-body specific rather than watershed specific.	Noted. Referenced WAC has specific water bodies within specific watershed--either way is fine.
Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	4	Many of the water-bodies have generic designated beneficial uses.	Noted.
Karen Adams	LCFRB	Design	4	It might be nice to excerpt the pages of the WAC for WRIA's 25-29 in an appendix to reference as well.	We advise sticking with the web link as the best source of original and complete information
Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	4	Do we need to specify a trend direction or target? That seems like a management goal rather than a monitoring goal.	These are not monitoring goals but monitoring objectives. As such, they do need something tangible to compare to (or at least a direction).
Karen Adams	LCFRB	Design	4	So are we looking at the best conditions among the sites visited or the best conditions as described in the WAC?	Recommendation is to use actual data to determine what "best conditions" look like. That's very much the point of an S&T monitoring program.
Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	4	Perhaps better define what "best conditions represented by the master sample" is. Will this information be available to permittees who are required to support a monitoring program under the 2018 permit?	Prior comments on the Q&Os have not raised this as an issue requiring more definition at this time. Availability of results will depend solely on implementation of this program but is unlikely to affect any element of future NPDES permit requirements.

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Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	5	Are these areas mapped as part of this project? Should they be? Most arable land was cleared in Clark County over 100 years ago.	Addressing this objective will require subsampling and post-data-collection analysis.
Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	5	These, such as temperature will be stream specific depending on the salmon use designation. That is more than one standard will apply.	Agreed. Wording changed.
Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	5	Does this report define statistically significant?	Yes, but this is not the section for such details.
Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	5	Why would anyone expect a trend toward reference conditions? What management actions are in place to do this? Also, this is a management goal not a monitoring objective.	This is not a goal at all, but an objective--as such, it defines a tangible analysis (for which "positive progress" is an obvious evaluation to make).
Jeff Fisher	NOAA	Design	5	While I agree that it is a management goal, evaluating the monitoring data trends as to whether there is evidence of moving towards reference conditions is an appropriate context for data interpretation in my mind…	This comment is responding to the immediately preceding comment by Rod Swanson, Jeff Schnabel, and Ian Wigger. We concur with the Fisher response
Mindy Fohn	Kitsap County	Design	5	Excellent WQ Questions	Thanks.
Jeff Fisher	NOAA	Design	5	Glad to see this (NOAA's properly functioning conditions) as the metrics from which to evaluate results of monitoring. I think we could just append the table…	Included as an Appendix
Karen Adams	LCFRB	Design	5	Include this table of properly functioning conditions somewhere.	Included as an Appendix
Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	5	Does this mean the metrics will be assessed for trends each year? If so, that is excessive because it will take a number of years to see any trends based on what we see in Clark County. Maybe five year time steps on any statistical analysis.	If data are collected annually then they should be analyzed annually. Agreed, not all will be expected to show significant trends year-over-year, but the analysis should not be deferred.
Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	5	Should these be identified somewhere in the report? How many watersheds have good data?	A reasonable question for the implementation report; not in-scope for the design, except to confirm that such programs do exist (e.g. WDFW Fish In/Fish Out monitoring).

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Mindy Fohn	Kitsap County	Design	5	(Re: the ability to identify significant correlations between habitat and fish metrics among various programs) Does the interface with these other programs need to be linked/connected in a more clear way in the "next steps"?	This is a laudable suggestion and was added to "next steps"
Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	5	Wouldn't this be part of this report?	The objective and key metrics, but nothing more at this stage. We have identified the limiting factor associated with each metric. During Implementation Planning, species-specific limiting factors can be highlighted which will in turn focus an analysis of the correlation between trends in select habitat metrics and trends in fish population metrics habitat conditions known to limit fish populations.
Jeff Fisher	NOAA	Design	6	As a filter to the monitoring questions in this (Landscape) section, is there a way to consider not just what land uses have occurred over the monitoring period that may translate to wq and habitat endpoints, but what bmps may have (or have not) been applied to these land use actions? For example, forestry land uses will be required to comply with forest practices rules and/or forestry HCP conditions (largely the same); actions in critical areas would also be required to be compliant with SMP provisions. What we don't really have a handle on, as data are still coming in (if they are coming in at all) is if the bmps are effective. Since the bmps are often prescribed to minimize effects to the endpoints that are the focus of the monitoring program, it would be useful to consider this, though I confess that it would take me some time to figure out statistically how that might be covered. I see this point was also brought forward in comment 94…	This is something that could be evaluated post stratification. It is not directly within the scope of this monitoring design, but could certainly be supported by the data to be collected
Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	6	What are potential land use activities? Would this be characterizing predominant land use by catchment? Is the method left to another project?	This is a "question," and those specifics (which are indeed important) are fleshed out in the objective that follows. No specific methods are included in this section.

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Karen Adams	LCFRB	Design	6	Should we add descriptions of what these key activities are related to? For example, those that affect salmon habitat or stormwater impacts	See previous response.
Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	6	The LCFRB did subwatershed-scale limiting factor analysis in the early 2000s. Is that work relevant?	Certainly. It will be valuable information for the Implementation Plan
Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	6	Is it worth considering other drivers such as state shoreline program and local GMA implementation monitoring?	Regulations have presumably affected land-cover change in the Region, but this question/objective is focusing on simply characterizing those changes. Analysis of the effects of regulation is well outside the scope of the HSTM project.
Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	6	Is this report going to propose a method or is that for another project?	It is for another section of this report. This is a "Questions and Objectives" section, not a methods section.
Jeff Fisher	NOAA	Design	6	This (text in objective 6.2) seems to leave the buffer zone question an open question. Can't we just spell it out discretely as to what the buffer width for analysis will be? (60m seems reasonable to me).	It may be, however the identification of a buffer zone is suited for the Implementation Phase

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Mindy Fohn	Kitsap County	Design	6	RE: NPDES permit related Questions and objectives) This NPDES portion is very logical in stratification, site numbers, frequency, parameters. It is very doable and including legacy sites, addresses the key issue of losing historical data. However, one weakness may be the lack of establishing a few key long term continuous flow stations in order to collect a 20 year record for a few undeveloped basins vs. developing basins. This would answer "are our management actions – for flow control – adequate?" Kitsap County Public Works partners – via an Interlocal Agreement (contract) with Kitsap PUD to establish a monitoring these sites. The benefit is KPUD already has an established flow data collection program and we just piggy back onto it. Also – all the data is available via the web – including key flow metrics (TQmean, RB index, etc.) see http://64.146.148.103/Streams/Flow_Metrics_Summary/BC_Stream_Metrics_Summary.pdf	A parallel program of stream gaging would unquestionably enhance the value of monitoring data, but the cost of a full flow-monitoring component to the recommended program was judged too high to advocate concurrent implementation. However, continuous stage readings are a parameter to be collected at all Qa/Qx sites, which in the judgment of project partners appears to provide highly useful information without the cost of full discharge gaging.
Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	6	Is it the permittees or the permitting agency that has the monitoring needs? We had a monitoring program that met our needs but it was not allowed to meet 2013 permit requirements.	Any jurisdiction whose needs were not being met by the HSTM would presumably have the option of non-participation. The purpose of having had multiple reviews and iterations of these Q&Os has been to minimize those shortfalls as much as possible. In the end, however, every jurisdiction will need to decide whether or not participation satisfies their needs (which will include, presumably, the "need" to comply with requirements of future NPDES permits).
Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	7	This only works for urban MS4. Clark County has a vast rural MS4 where public ROW exists. See our MapsOnline or GIS data provided to this project or phase I. Maybe separate rural and urban permit areas or just ignore the rural permit area?	The differences are recognized in this monitoring design, and the two areas are treated differently as a result.

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Karen Dinicola, Brandi Lubliner	Ecology	Design	7	This is all fine (regarding the use of UGA inside NPDES). But other urban areas may "grow into" the permit as well. I think they should be included in the urban areas stratum to support longevity of this study design. We're asking questions about stormwater management in urban and urbanizing areas. The permit seems to introduce unnecessary complexity to the design.	Wording has been clarified, but a problem is not evident. The creation of a "new" NPDES area in some future iteration of the stormwater permit does not require that it now be included in a S&T monitoring program, only that its conditions be reasonably well-represented by sampling sites having similar conditions--and this is already accomplished.
Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	7	What are these specific needs of the permits? Ecology would specify the needs of a general permit.	As noted above, the "needs" of Ecology as expressed in a permit are most likely going to become the "needs" of the permittees in short order.
Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	7	Generally refer to the permit as a (general) municipal stormwater permit. The MS4 is the permitted conveyance system owned by each permittee.	Wording improved by Ecology.
Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	7	How about legacy sites dating to the inception of the SWMP in Clark County?	Value of their incorporation is acknowledged at several points in the document.
Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	7	Perhaps list the legacy sites or show them on a figure in the results?	We have continued to request an up-to-date list of such sites for inclusion in the maps and analysis, but as of this report's preparation have not received a full list from all participants. The Master Sample is clearly incomplete and thus has not been relied upon.
Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	7	No separate strata for non-urban permit areas.	This is correct.
Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	7	This is a reasonable time and perhaps consider after each permit cycle – 5 years.	Agreed--we expect that analysis would occur annually, but that recognizing any meaningful trend would require much longer.

COMMENTER	ORGANIZATION	DOCUMENT	PAGE NUMBER	COMMENT	RESPONSE
Jeff Fisher	NOAA	Design	7	'Best' conditions is somewhat vague. Earlier, we say we will compare trends to the NMFS PFC's. Why wouldn't we use the same metrics here to gauge trends? Even if 'best' is to be interpreted in terms of the narrative standards of beneficial use, these are different criteria (though somewhat related) than the wq PFCs. Why are only the physical habitat metrics of PFCs being considered and not also the wq metrics? (Note that EPA has not consulted on their WQ standards in WA state for their ability to be protective of salmonids, or supportive of recovery efforts…a notice of intent to sue EPA over this has been filed with the courts…)	Agreed--reference to PFC's has been added to several objectives.
Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	7	How do we find comparable sites to represent Willamette valley ecoregion sites? Are they in Washington or the balance of the Willamette Valley region in Oregon?	We have not addressed the Oregon portion of the ESU in this design to date, however the strata, site selection and metrics recommended herein would apply to Oregon as well
Karen Dinicola, Brandi Lubliner	Ecology	Design	7	Conversion from what condition to urban: from cleared, ag, forest? From low-density to high density?	Given the likely limited number of locations where this will apply, no restriction on the prior non-urban condition is recommended. And "first developed" should imply non-urban to urban conversion, not redevelopment or low-density to high-density urban development.
Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	8	Also consider that these areas are likely converted ag and rural residential cleared for crops and pasture 100 years ago.	Agreed--this is why the reference condition should be drawn from the region, not from a belief in what's "best" without any consideration of what's also "attainable"
Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	8	Consider going back to areas developed under the 2005 SWMMWW and forward. People use infiltration wherever possible to deal with the forested predevelopment condition.	Given the time frame over which this is likely to be implemented (relative to the 2013 permit), our recommendation is to stick with the existing wording.
Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	8	Do we include flow metrics?	This was intended but not stated explicitly. Corrected.

COMMENTER	ORGANIZATION	DOCUMENT	PAGE NUMBER	COMMENT	RESPONSE
Karen Dinicola, Brandi Lubliner	Ecology	Design	7	Refer to permittees consistently throughout the report. This (NPDES) represents others not relevant to the stormwater monitoring	Agreed and clarified.
Karen Dinicola, Brandi Lubliner	Ecology	Design	8	It doesn't make sense to call this ("opportunistic selection from the larger population of sites") "opportunistic selection." The strata for answering this question is limited to a small subset of the UGA+NPDES, therefore limiting the number of sites. If any sites exist that meet the criteria that would be established to answer this question, sample them all.	We are in agreement—the "opportunism" is simply the need to evaluate whether or not the sites in the strata combination meet this additional criterion ("being affected by stormwater discharges from urban areas first developed under requirements of the 2013 municipal stormwater permits"). Any that do, should be sampled.
Karen Adams	LCFRB	Design	8	You've specified "over a 10 year period" above. Does that apply here as well?	In part. The period over which TRENDS should be considered needs to be short enough to be relevant, long enough to be meaningful given inherently variable data. But any discussion of duration is relevant only to TRENDS objectives, not STATUS objectives. The frequency of Qa/Qx and habitat metric sampling is presented in greater detail in Tables 4 and 5 of this report. And although analysis will occur annually, SMART objectives would evaluate trends over a longer period of time (e.g. 5-10 years). There is no inconsistency--trends in naturally variable data require multiple years to express themselves; based on other monitoring efforts, ~10 years is a reasonable expectation for seeing management-relevant changes in naturally variable data.
Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	8	Are these annual evaluations or evaluation of annually collected metrics?	Annual evaluation of annually collected metrics.
Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	8	Is there more detail about how this will be accomplished?	Yes, but not in the section on Questions and Objectives.
Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	8	Seems like this could be part of this project.	The reviewer is correct. This is an Objective of the project

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Dorie Sutton	City of Vancouver	Design	8	(RE: Objective 10.1 -) This analysis would be at the regional level, not NPDES permittees. Fish studies outside the scope of permit requirements.	Given the previous reviews of the Questions and Objectives, we hesitate to make such a change at this time without broader input. If it's found at the outset of Implementation, that Objective 10.1 should be removed, that can be readily accomplished.
Jeff Fisher	NOAA	Design	8	I agree that fish monitoring is beyond NPDES permittee requirements, but this language seems to capture that in recognizing that other programs are doing this…	Agreed
Chad Larson	Ecology	Design	9	It is unclear what is trying to be said in this paragraph regarding target populations for monitoring sites	Clarified.
Chad Larson	Ecology	Design	10	It is unclear why this (primary population strata) should be established as a stratum? Is this not a consequence of habitat/conditions rather than something to stratify? Better justification for inclusion as a unique stratum should be provided.	Clarified.
Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	10	Is the project going to include this map product?	It is presented as Figure 3
Karen Adams	LCFRB	Design	10	I agree to the extent that the metrics are not overlapping in purpose… temperature, conductivity, and stage for example are only useful in either case if you have continuous data for at least a critical season and would also be informative for habitat assessment. It might be worth acknowledging that WQ metrics ARE equally critical habitat metrics in aquatic habitats. Given the limited number of water quality metrics, I would like to see more overlap in the habitat portion with the exception of sediment metals, which are expensive and may not provide a signal at most sites.	As stated in section 2.1.1.2, "Habitat status and trends monitoring addresses physical and biological attributes that affect watershed health and salmon recovery." Unless it is assumed that there are insufficient numbers of Qa/Qx sampling sites/strata, the S&T for WQ throughout the region should be adequately characterized without adding several hundred additional sites. In addition, the level of effort needed to implement continuous data collection at habitat sites would probably increase the cost of this program many-fold without providing commensurate value.
Chad Larson	Ecology	Design	10	Who embraces this guidance (NRC 2009)? Not clear from this statement.	Clarified.

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Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	10	I've heard some folks say that low S/N parameters might be less useful simply because they don't change much or may be insensitive to management actions.	This may also be true, but a low S/N ratio provides no information on the responsiveness of a metric to management actions, only that it's very difficult to detect any such trends if they do exist.
Karen Adams	LCFRB	Design	10	I feel like this is a KEY statement, not just a parenthetical. For the layperson, a "statistical perspective" doesn't really describe what result we are working toward. It would be good to call out in a separate sentence that what we are doing is identifying what data is reliable and what data isn't so we know what data we would WANT to share (the reliable data). No one wants to incorporate data of questionable quality into their data set. THIS is the key aspect of how signal to noise informs sharability. First, do we want to incorporate or share someone's data… well, let's look at its S:N and get a sense of our confidence in the data? THEN we talk about how we share those data that are reliable even if they are not collected in the same way. That is a separate step. I think this is a key link that has not been called out in a way for some people to understand what they get from Signal to Noise and why we are doing this as part of the shareability discussion.	The text has been revised to address this concern
Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	11	Here they are talking about precision. What if the data are fairly accurate and precise such as lab data and turbidity? But still have a wide range of results?	If data are highly variable, you need more data points (monitoring sites) to detect a significant change. The current recommendation of 15 sites/strata combination is based on a CV of 0.5-1.
Chad Larson	Ecology	Design	11	Collecting too little data can have the same effect (as imprecision, which compromises the utility of data for diagnosing causes of impairment)	Agreed.
Karen Dinicola, Brandi Lubliner	Ecology	Design	11	Tell us where to find these results (of the literature review) in this report, please	The literature review resulted in S/N data presented in Tables 4 and 5 as well as Appendix A and B

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Chad Larson	Ecology	Design	11	It is important to note that a significant part of the cost of sampling any particular stream reach is the initial efforts to get there. Overall, the biggest issue will likely be how many total sites can be reasonably sampled with the eventual budget, with the number of metrics gathered at each site being decided once a final budget is available. Having a list available of the metrics with the highest potential for useful information is a very good idea at this point, but we also feel deciding on the final list of metrics that will be measured at each site is secondary to the overall experimental design. Hashing out which metrics will eventually be measured should be a major part of the next phase of this project.	We fully agree, and don't believe that anything in this passage contradicts this sentiment. It also restates why a "final" design cannot be determined without clear financial boundaries on what can be afforded, something that is not likely to be developed until reaching the implementation phase.
Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	12	Can you provide any detail at all on the upcoming implementation plan?	An overview is provided in Section 3.6 of the report.
Karen Adams	LCFRB	Design	12	Water quality objectives? It might be helpful to provide that descriptor here to give the reader a bit of context. I find myself going back up to the Q&Os to recall what the gist was…	Brief tagline added.
Karen Dinicola, Brandi Lubliner	Ecology	Design	12	I disagree that this (directed, pseudo-randomized approach) is a different approach – it's more that the sites with the unique characteristics to answer these questions are quite limited and therefore the total target populations are reduced. The answer may end up having less statistical confidence. It is up to the stakeholders to decide if it's worth the extra cost to answer the questions at a reduced confidence level.	The contrast made in the text was between probabilistic and opportunistic sampling which are fundamentally different methods of selecting sites. It is certainly true there may be a limited # of sites that meet the specified criteria, but intentionally selecting legacy sites is directed/opportunistic sampling which does reflect a different approach. And mixing probabilistic sites drawn from the master sample with directed/opportunistic sampling constitutes a pseudorandom approach which will reduce the confidence level, but likely increase the predictive capacity of the results.
Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	12	Reference Phase I work when talking about the pseudo-random sample draw	Addressed in text revisions

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Karen Dinicola, Brandi Lubliner	Ecology	Design	12	This (that the water quality parameters vary gradually) is not true for the stream benthos sampling and that consideration needs to be recognized and addressed.	Although stream benthos isn't a "water quality parameter," it is recommended for sampling at Qa/Qx sites. The text here says "most" (not "all") and this exception is called out in a later section. The need for specific conditions for meaningful sampling is recognized.
Karen Adams	LCFRB	Design	12	Suggested insert: "More specifically, water quality data are assumed to represent the conditions within that reach, not just the point at which it is taken. Thus…"	Included
Karen Dinicola, Brandi Lubliner	Ecology	Design	12	Please include a footnote defining what marks the end of one reach and the beginning of another. Because this can be subjective to a certain degree (i.e., what tributary input is relevant?) it needs to be defined. We came up with a definition for Puget Sound that was applied in site selection and confirmation. Let me know if you need criteria and/or the reference.	Clarified at this point in the main text.
Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	12	Temperature may be influenced by localized conditions within a reach if the reach is long and the stream small.	Correct. Text revised to soften statement
Karen Adams	LCFRB	Design	12	Is this true? What if there is a discharge point downstream of your sampling location? You won't capture that impact. This is one of the only reasons I feel like trying to sample toward the bottom of a reach makes sense. You capture more of the impacts in the reach that way. Not sure this needs to change, but it is a point I would like to understand better.	Yes, this is true, by virtue of the limitations placed on the range of drainage areas that bracket the definition of "reach." Of course, tributary inputs can still keep the reach within the specified drainage-area range, and they will certainly make a contribution to the constituents in the water. But we are seeking to characterize reaches as a population, not a specific 'reach' in question. The greater concern might be whether a systematic bias might be introduced in the specifics of site selection, e.g. always just above or just below a tributary or outfall--but as long as the sample locations are random (or at least not systematically biased) they results should still be suitably representative.

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Jeff Fisher	NOAA	Design	12	Given that I am not clear just how long each reach may be—and they could be of some significant length, I agree with Karen's comment above…	See above response, and text addition. Concrete examples appear somewhat later in the text on Figure 6.
Karen Dinicola, Brandi Lubliner	Ecology	Design	13	This (idea that no selected site should drain into any other selected site) doesn't recognize that a reach is defined by major tributary inputs or other changes deemed significant. Adjacent land use, outfalls, etc. can have a notable Qa/Qx impact.	Segments for this purpose are defined strictly by drainage area. As for the last point, yes, this is true. See prior response.
Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	14	How is this determined beforehand? Or is it part of site evaluation after the sample set is selected?	We expect that this is largely addressed in the make-up of the Master Sample; but as with all such remotely sensed data, they will need to be field-verified before certainty is achieved.
Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	10	It might be good to make a distinction between stormwater runoff monitored from MS4 outfalls and receiving waters heavily influenced by stormwater runoff from various nonpoint sources.	Addressed in text revisions
Karen Dinicola, Brandi Lubliner	Ecology	Design	10	This quote (from NRC 2009) is not applicable in this context. The study design is for sampling of receiving water, not stormwater.	Proposed revision accepted
Karen Adams	LCFRB	Design	14	We discussed how sites impacted by the Columbia River are an important area for consideration in habitat monitoring given the importance of these areas for rearing and acclimation of juveniles (particularly chinook). It would be helpful to incorporate a discussion of how those sites could be incorporated into an Estuary Scale design at some point in the future.	Addressed in text revisions
Karen Adams	LCFRB	Design	15	In figure 3, it would be helpful to have the red circles on the top map to help georeferenced these images in our heads.	Addressed in text revisions
Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	15	Will there be a data layer to define the area for exclusion (tidally influenced areas)?	This will not be part of the Design Report.

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Karen Dinicola, Brandi Lubliner	Ecology	Design	15	Recommend dropping this (subbasin per primary population strata) for Qa/Qx. Can keep for habitat if the fish folks prefer – but really they should just densify the design in the Lewis River basin.	Interest has been expressed in other quarters for keeping it. Re-combining the categories at a later date, however, would be easily accomplished. Note that it is only applied for the "regional" monitoring component of Qa/Qx monitoring (i.e., "outside" of urban NPDES areas).
Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	16	There aren't any now. We only monitor stormwater at outfalls and do effectiveness studies.	Agreed and noted.
Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	16	Perhaps qualify this in that the project is looking at receiving water, while stormwater monitoring is at MS4 outfalls to receiving waters. Not exactly the same thing. But likely nearly the same in intensely urbanized catchments.	Agreed. See text changes.
Karen Adams	LCFRB	Design	16	RE: Figure 4. Unless I am interpreting this wrong, this does not sound like useful data to me then… just as metrics have poor signal, the data will have poor signal if we don't collect enough data at enough sites. While affordability is key, what we need to know is what is an ideal situation would be and then we can figure out how to scale this down the road. With the metric reductions I feel that the S:N analysis justifies the cuts. Please discuss how this will impact our ability to detect significant trends if we have 50%-100% error in our data due to too few sites.	As previously discussed, building an "ideal situation" led to a guidance document in the previous phase that had almost no transferability into a potential real-world application. We ARE "down the road," and now is the time to begin tackling these issues head-on. It is very unlikely that project partners will be able to afford to "buy" greater certainty--the best that can be hoped for is that the actual variability of the data is less than is anticipated here, and that errors will be reduced commensurately.
Mindy Fohn	Kitsap County	Design	18	RE: Figure 4. This correlation of samples needed for highly variable stormwater and applying it to receiving waters may not be "like to like" but it's probably the best that can be done.	It is admittedly not ideal and likely a worst-case condition. Systematic data collection (here and elsewhere) will likely clarify the actual variability.
Karen Dinicola, Brandi Lubliner	Ecology	Design	18	Confusing to introduce this term (channels). Suggest using reaches. But you might mean sites, so I added that choice in my edits.	Agreed. See text changes.
Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	18	Will there be perennial flow in the 2.5 k catchments? Does that matter?	Based on anecdotal experience these are likely to be perennial. And yes, it would be a problem if they're not.

COMMENTER	ORGANIZATION	DOCUMENT	PAGE NUMBER	COMMENT	RESPONSE
Karen Dinicola, Brandi Lubliner	Ecology	Design	18	Please give a more precise idea of how many (watersheds with non-urban land cover but within the NPDES jurisdiction of Clark County) you mean	It's about 50, but they are not called out for specific sampling. In any case, there are clearly "enough" to achieve a meaningful sample population.
Mindy Fohn	Kitsap County	Design	18	Stream gradient is not a strata for WQ. That makes sense except for Macroinvertebrates. We're finding that the gradient and stream order may be relevant in interpreting trends. Stream power relates to the population – and if relying on EPT – this may result in unwanted noise.	The need for consistency in channel gradient for IBI is recognized and will be incorporated into the protocols for this metric. That need does not require the creation of a new stratum, just a screening for those sites that are selected to ensure that the data collected there are meaningful.
Karen Adams	LCFRB	Design	19	We need to define urban in a way that is in addition to the Urban Growth Area Boundary. I have fielded the following question: There are areas outside of a UGA that have every bit as high density of parcelization and development as within the UGA, particularly adjacent to these boundaries. If those areas are lumped into the Non-Urban category are they not skewing the data? I have responded that the number of actual sites/stream reaches within this situation is minimal and they should not have an impact. Also it is possible that in the screening process, they would not meet the non-urban criteria and would be eliminated during site selection. I'm not sure if I'm right on those responses, but they are my current hypotheses regarding what this means on the ground and how to deal with it. Perhaps a definition of Urban in terms of not only jurisdiction but density of residents would be useful here. Perhaps an acknowledgement of this situation and some discussion or recommendation on how to deal with it would be beneficial as well.	The text has been careful to distinguish "urban", as a category in the 2006 NLCD, from "urban areas" as defined by the location of UGA's. The question that was posed to you points out that these are not the same thing, and that a meaningful stratification needs to distinguish between them. That is exactly what is being recommended here: a "jurisdictional" stratification, for which the state has chosen to use the term "Urban Growth Area" (and so we do, too); and a land-cover stratification taken directly from the 2006 NLCD, and for which we believe the term "urban" is most intuitive. It is also true that these ex-UGA, urban land cover areas are not extensive and should be no more "skewing" of the data than their actual presence/importance would indicate.
Chad Larson	Ecology	Design	18	(is non-urban the same as) Non-UGA?	Yes, in the context of the jurisdictional stratification. See above comment regarding the different uses of "urban."

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Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	19	What (GIS) data sources (used to help id site within a reach)? Parcel data, etc.	An example approach has been added by citation; but the specifics are best handled in the implementation stage--not particularly relevant/critical for design.
Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	19	Legacy sites will generally have this taken care of.	True, but we will be sampling more than legacy sites
Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	19	This is an interesting issue because there are large areas where the county MS4 exists in the rural area (outside UGA). And large areas of state and industrial forest where there is no permitted MS4.	We fully agree, and we believe that there is no benefit (or scientific justification) to combine monitoring data from these "rural MS4" areas with those from the "urban NPDES" areas.
Chad Larson	Ecology	Design	18	Since this is supposed to be a long-term monitoring project, future growth will mean that this statement (regarding the adequacy of regional sampling to address non-urban permitted sites) may not always be true.	Given the relative proportions of urban to non-urban land (presently), this statement--though probably not true forever--is likely to be true enough for a long time to come.
Chad Larson	Ecology	Design	19	Why 15? Was this number chosen because it is between 10 and 20? Please provide rationale for why this specific number (for QaQx sites) was chosen.	Yes, because it lies between 10 and 20.
Karen Dinicola, Brandi Lubliner	Ecology	Design	19	Might also tease up the question of whether we need representations of industrial, commercial, residential urban land uses rather than dumping them all in one category (urban). Refer to outfall monitoring data findings (Hobbs et al, 2015) for most relevant differentiation of land uses.	Not judged to be a critical discrimination for regional S&T monitoring due to domination of the region by forest cover.
Karen Dinicola, Brandi Lubliner	Ecology	Design	19	Yet another term (segments)! Again, I suggest reach.	Agreed. We settled on the term “segment” for the drainage-area-defined length of stream from which to select a Qa/Qx sampling location and “reach” to describe the portion of the stream length sampled for habitat.

COMMENTER	ORGANIZATION	DOCUMENT	PAGE NUMBER	COMMENT	RESPONSE
Karen Dinicola, Brandi Lubliner	Ecology	Design	19	Need to define this – what change in flow is meaningful (in defining a site location along a stream reach)? 10%? 25%? The Puget Sound experience was that 20xbankfull width is too little length for locating WQ sites if truly considering logistics first. We like the hydrologic reach approach for Qa/Qx.	The segments recommended for site selection are defined by drainage area category as a proxy for change in flow. 20x bankfull width is not recommended for the Qa/Qx monitoring--anything within the "reach" will do.
Karen Dinicola, Brandi Lubliner	Ecology	Design	19	This (logistic considerations of access and land ownership) is among the reasons that we liked the October approach of finding a suitable site as close to the downstream end of the reach as possible.	The text has been clarified to be consistent with the October approach
Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	20	Map figures are too small	They are small on paper, but we believe most readers will review the document electronically which allows a magnified view. Splitting the figures apart to enlarge them would lose the benefit of side-by-side presentation.
Karen Dinicola, Brandi Lubliner	Ecology	Design	20	Identify this (criteria for identifying a location along a sample reach) as a next step in the conclusion of the report.	Agreed. Added reference to SWG criteria.
Chad Larson	Ecology	Design	20	This (defining criteria for locating sites in a reach) will be important; as sites are revisited, sampling approximately the same stream reach will be necessary for evaluating changes in habitat metrics.	Agreed--a site once chosen should be maintained. Note, however, that this section is for Qa/Qx monitoring, not habitat monitoring.
Mindy Fohn	Kitsap County	Design	20	Fully support the tidal influence analysis and omitting these sites.	Thanks.
Karen Adams, Rod Swanson, Karen Dinicola	LCFRB, Clark County	Design	23	Suggested insert “(undeveloped areas within the UGA)” to describe what questions 8.1 and 8.2 were about so we don't have to go back and look. It would be helpful to the reader to add a short-hand description of the question “S&T of Qa/Qx in UGA+NPDES” rather than sending us back in the report to find the list of objectives.	This and related comments suggest that the readers would prefer a brief recap of these objectives rather than looking back 13 pages. We can do that.

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Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	23	Questions 8.1 and 8.2 tend to fall into what might be better described as a long-term targeted effectiveness study.	A reasonable comment--the division between a "long-term effectiveness study" and "status and trends" is fuzzy. Given the long period of presentation/review/revision that the Q&Os have already been through, however, our plan is to retain them in this design document.
Karen Dinicola, Brandi Lubliner	Ecology	Design	23	Add a new section heading here, perhaps "Sustainable Level of Effort"	A reasonable suggestion but not judged necessary.
Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	23	Notably, the SWG study only examines only the Puget Sound lowlands while the SW WA work extends to the top of the cascades and coast range mts.	Agreed--good reminder to insert.
Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	24	See the PS geographic area (regarding the upper limit on what is feasible in the LC).	Same response as above.
Chad Larson	Ecology	Design	24	What are they? (compelling reasons to stratify sample sites by drainage area)	Reworded for clarity.
Karen Adams	LCFRB	Design	24	Given the scale of regional monitoring, why would we not just expand the metrics to include the 3 not already shared between Qa/Qx and Habitat (Conductivity, Stage, and Sediment Metals)? Cost and continuous monitoring are two reasons I can think of, but if we are recommending them for 400 sites, then perhaps 400 of the 1200 sites required for habitat monitoring would need to have this level of effort and it could be our "trends" data set.	This would represent a tremendous increase in cost for uncertain increase in value. See prior discussion of the likely feasible limits of a LCR-funded effort on Qa/Qx sampling, based on the Puget Sound experience. This recommendation would probably increase the cost of this program beyond the limits of both.
Karen Dinicola, Brandi Lubliner	Ecology	Design	24	This is the first mention of primary populations and the term needs to be defined. It is not relevant to the stormwater monitoring objectives, but readers of this report should be informed what it is and what it means and why it would drive the monitoring design.	The term appears and is first defined on page 10. It has been added to the glossary. The second part of the comment is addressed elsewhere.
Karen Dinicola, Brandi Lubliner	Ecology	Design	24	Also, the grant was directed at fish beyond salmon. How if at all does this represent other important aquatic resources?	"Fish beyond salmon" benefit in the same manner as salmon from the HSTM which provides a systematic characterization of the conditions and changes in watershed health

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Dorie Sutton	City of Vancouver	Design	24	Organizational comment - Puget Sound population discussed above, just as reminder that we are now back to fish populations.	Good point, thanks for the clarification.
Karen Adams	LCFRB	Design	24	"Primary Population" needs to be defined somewhere. Primary populations are those populations that we are required to recovery to a high viability, that is there has to be a 95% chance of persistence of a primary population over the next 100 years. Only after all of the viability goals (high to maintenance levels) for all populations are achieved can we delist salmon in the lower Columbia ESU.	Addressed in text revisions, see other comments.
Karen Dinicola, Brandi Lubliner	Ecology	Design	24	Based on stormwater characteristics and the driving questions for Qa/Qx, commercial/industrial and residential should be split out in lieu of Primary Populations which have no effect on Qa/Qx.	Rationale for combining all urban land uses is explained earlier. The document never implies that PP's are a "cause" of Qa/Qx conditions--just that management applications may want to ensure that the subwatershed supporting the most populations are sufficiently well-represented in the monitoring.
Mindy Fohn	Kitsap County	Design	25	This (Primary Populations) is such an interesting idea for strata. I do hope it's not lost. Maybe in the future discuss the goal of "preservation" vs. "recovery". Both are so important and one should not be sacrificed over the other.	Thank you for your understanding of its value. Clearly, not fully shared by all other reviewers.
Karen Dinicola, Brandi Lubliner	Ecology	Design	25	Not sure exactly what is meant by this (Land cover discrimination).	Clarified.
Karen Dinicola, Brandi Lubliner	Ecology	Design	25	I'm not sure why this (description of the region as broken out by watersheds) is discussed in such detail here. It's distracting – seems like you've moved to the "outside UGA" strata but you haven't.	Reviewer is mistaken--this is in the subsection "3.2.1.2 Regional Qa/Qx monitoring", which clearly IS outside the UGA.
Karen Dinicola, Brandi Lubliner	Ecology	Design	25	Please also recognize that urban areas exist between these watersheds as do other aquatic resources besides salmon. For the "inside/outside" UGA+NPDES Qa/Qx strata we still have work to do here.	Addressed in earlier comments.

COMMENTER	ORGANIZATION	DOCUMENT	PAGE NUMBER	COMMENT	RESPONSE
Chad Larson	Ecology	Design	24	(Is eliminating land use cover strata) More likely (to reduce the level of effort) than potentially removing the number of primary populations?	No. Comment noted but text unchanged. See other comments on strata for this design.
Chad Larson	Ecology	Design	24	As mentioned previously, not sure why this (Primary Populations) needs to be a strata of interest. Additionally, sites selected in the 4+ primary populations will likely be more spatially clustered than sites from other categories.	Rationale explained previously. Unclear why greater spatial clustering is anticipated, except perhaps that the total area of 4+ subwatersheds is modestly smaller than that of the others. Is that a problem?
Karen Dinicola, Brandi Lubliner	Ecology	Design	26	Above, where? There are several descriptions (of how to locate sites), including deferred decisions.	Clarified.
Karen Dinicola, Brandi Lubliner	Ecology	Design	26	This is a slightly different approach (for selecting QaQx sites) than what was described at the October workshop and I don't remember this shift in thinking/approach being articulated in January. I have made other relevant comments in previous sections about LU changes and tributary inputs as well as site selection considerations. "Along the same reach" needs to be clearly defined.	The approach is described more completely here but is unchanged from the intentions expressed at the last workshop. Agreed that "along the reach" needs to be made more explicit, to the extent that this is possible in a design report absent any actual sites.
Chad Larson	Ecology	Design	24	Unclear how this (urban land cover) differs from sampling that will already be conducted in UGA?	UGAs do not always have the urban land cover classification according to the NLCD, albeit, most of the time they do
Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	26	Can you describe how rural suburban (such as areas of ~ 5 acre lots) is separated from Ag?	This is a land COVER classification, not a land USE classification. These are primary categories of the NLCD data and have been applied without further interpretation. Rural residential development is most likely to be categorized as "Developed, Open Space"; if it is truly interspersed with true agriculture, then at the scale of the 2006 NLCD each 1/4-acre pixel will be classified accordingly. Note that tater subsampling will always be possible for specific jurisdictional applications.
Chad Larson	Ecology	Design	26	How many urban-outside UGA are there expected to be? (in terms of the urban land cover strata)	Few and they are analyzed in a later section.

COMMENTER	ORGANIZATION	DOCUMENT	PAGE NUMBER	COMMENT	RESPONSE
Karen Adams	LCFRB	Design	26	Cleared is not feasible to assess right now, but is a needed land cover and should be included, especially if it is among the items to be continued in the next phase. Again, we want to know what a robust design is, and we can determine how we want to scale the work in the next phase.	issue addressed in a previous comment
Chad Larson	Ecology	Design	26	This needs to be outlined better. How will this (Habitat monitoring) information be linked to stormwater monitoring? Perhaps a conceptual diagram of the overall experimental design and how the various components are linked would help clarify this for the readers?	The linkage of habitat monitoring to stormwater monitoring has not been clearly articulated to date in any Phase 1 report or project document. There is a broad expectation that coordinated monitoring will yield synergistic benefits, and that expectation has been articulated in this document as well. There is no conceptual framework that provides greater detail, and this report is not scoped to create one on its own.
Karen Adams	LCFRB	Design	26	Primary populations serve to support management goals that include focusing restoration efforts and/or understanding limiting habitat factors	Suggested revision noted
Chad Larson	Ecology	Design	26	This (justification for using primary populations as a means to guide restoration efforts to support salmon recovery) assumes that the number of returning salmon populations is completely deterministic (i.e. a direct indication of impairment or health, which it may not be).	This text is an example of how the information could be used and why it is judged to be a useful stratification. Certainly there are factors other than water quality and habitat that affect the number of returning salmon. This complexity is not directly tied to the suitability of a management stratification such as Primary Populations
Karen Adams	LCFRB	Design	26	We should maintain this in our strata though we may not use it to start or pin it down until later. This follows the same logic used to defend keeping objectives 8.1 and 8.2. We know it is important even if it is not well defined or populated with sites at this time.	issue addressed in a previous comment

COMMENTER	ORGANIZATION	DOCUMENT	PAGE NUMBER	COMMENT	RESPONSE
Chad Larson	Ecology	Design	26	Still unclear how this (inside/outside UGA in Permitted area strata for habitat) differs from Qa/Qx UGA sites. Why not collect the same metrics at those sites?	Different stratification for in/out of urban NPDES areas is necessary because the character of the watersheds and their receiving waters are very different. The same metrics are collected at both (next section, not this one), but they are subdivided differently to ensure that all major receiving-water types in these two (very) different areas are all adequately represented by the monitoring.
Karen Dinicola, Brandi Lubliner	Ecology	Design	29	I disagree (with replacing UGA with UGA within NPDES), particularly for habitat it makes more sense to distinguish all urban and designated UGAs from other rural land uses because stormwater management practices, though permit-required, happen at different levels throughout urban areas regardless of permit specifications.	We agree that from the perspective of the physical features, there is no "meaning" to the NPDES jurisdictional boundary. However, the NPDES permittees appear to be rather supportive of having this regulatory discrimination called out explicitly. If project partners support a distinction between Qa/Qx monitoring (which will likely be required by the next municipal stormwater permit) and habitat monitoring (which likely will not), however, then the monitoring design will not suffer or be greatly altered. The number of UGA's that are NOT within an NPDES permit area are a vanishingly small fraction of the total Master Sample sites in any case, so functionally this decision is unlikely to make any difference to the site selection outcome at all.
Jeff Fisher	NOAA	Design	29	I don't agree that stratifying by primary populations presumes a deterministic approach necessarily. Yes, many other factors play out in determining reach abundance and productivity. That doesn't mean that stratifying by this method necessarily means anything other than a reflection of how the different populations have been tiered for recovery purposes, and is a pragmatic way to explore the trend relationships. Clearly though, a positive trend in abundance in a monitored reach that correlates with a trend towards PFCs for wq and habitat, cannot necessarily be construed to causation; making that leap would pose a potential type 1 error without some further study.	The stratification by Primary Population is not intended to demonstrate causation between wq/habitat and abundance. In fact, none of the STM strata can achieve that target. At best we will detect significant correlation between wq/habitat metrics and fish abundance and productivity. However with respect to the Primary Population strata, it is included to ensure adequate weight (think of it in terms of site distribution) is placed on site selection relative to the salmon recovery priorities in a given watershed. This is specifically designed as a management tool to demonstrate progress towards salmon recovery.

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Mindy Fohn	Kitsap County	Design	29	This (The lack of consistency in published literature for setting acceptable levels of variability) is unfortunate and a frustration for many of us.	Agreed. Despite the tremendous amount of resources invested by the region in *collecting* monitoring data over the past decade, remarkably little progress has been made in actually *analyzing* it and drawing useful recommendations for others.
Chad Larson	Ecology	Design	30	This is redundant information. This paragraph is one example of how this report could be made to be much more concise.	The primary gist of nearly all comments has been to increase the level of detail and explanation in the document.
Karen Adams	LCFRB	Design	30	For habitat, I don't think the limitations will be as much about the cost of the metrics as for the time for a team to collect data at the site. Most of the metrics are measured with tapes and observation… there are no sample costs. Reducing the number of metrics would not be likely to increase the number of sites we can do simply because of logistics of driving and hiking to the site.	As long as the activities can be conducted within a "unit" of time (i.e., a day), then this is true. So cost reductions may be a step function, not a continuous relationship to number of metrics…but there does come a point where "more data" really does translate into "more cost."
Karen Dinicola, Brandi Lubliner	Ecology	Design	30	None (financial resources) are currently available!	Agreed, thus the inability to move to a truly final design.
Mindy Fohn	Kitsap County	Design	30	This table (Table 2) is a good summary and brings it home that you're selecting from strata that are dominant.	Thanks for the understanding.

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Karen Adams	LCFRB	Design	30	While this is great news overall in terms of limiting the number of sites, I would imagine that we would want to know something about the condition of forested lands in small drainages. Especially on lower slopes, there could be a lot of habitat value in some of those for coho and steelhead who like to use the headwaters for spawning and some rearing. Likewise for the other categories that are removed from consideration as viable strata combinations. If this is just for the NF Lewis rather than the region, then on a regional scale could we still get enough sites perhaps? If is on a regional basis, then could we sample all sites in each combination and have a representative sample by virtue of having sampled all reaches.	Please note that this table is ONLY for the urban NPDES areas. There simply aren't very many small forested watersheds in these areas (that's why they're "urban").
Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	30	(Some of the strata combinations have numbers of sites that are pretty close to the best estimate of 15… How would we deal with these?	Presumably, they would be reviewed for suitability; if the project partners hold firm to the desire to maintain a strict level of statistical confidence then those less than 15 would be dropped or relegated to a lower level of priority. Thus, this depends in part on available resources and so cannot be resolved at this stage of design.
Mindy Fohn	Kitsap County	Design	31	In the workshop it was mentioned Puget Sound lost 50% of sites. They used points, and not reach. Also, they did not stratify. Kitsap had several sites, including legacy sites nearby, but these were not included. By converting to reaches and stratifying – my guess is you will only lose 20-25% of sites.	This would be great news, given the number of categories that are pretty close to 15 right from the start.
Karen Adams	LCFRB	Design	31	A valid exclusion is those combinations with NO sites… But for the 8 sites in Ag with 3 primary pops and high slope in a 2.5 -50 km drainage we could sample them all. Then it isn't stats but actual condition as we have sampled all reaches.	True, however would need to be done on a case-by-case basis and driven by limiting factors for listed populations are not thought to be represented by the current monitoring design and for which we anticipate the conditions might change. For example,

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Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	31	Clark has EMAP metrics for the 10 long-term index sites.	Excellent. Duly noted in the text
Jeff Fisher	NOAA	Design	32	How did you guys set on 20x bfw; typically habitat surveys are considered valid by sampling reaches 10x bfw…within the UGAs this might place some constraints (access, private property, etc.). No real problem with using 20x bfw, it just seems like, in practical purposes, this could be a challenge for sampling in some areas.	Reference added. That said, logistical constraints may well limit the feasible distance in some locations.
Karen Dinicola, Brandi Lubliner	Ecology	Design	32	How much flexibility is available here – why not upstream of or inclusive of (the randomly selected site rather than just downstream)?	If the choice of direction is at the discretion of the surveyor, it's not strictly "random". Specific protocols for site/reach selection will be part of Implementation. It does not affect design.
Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	32	Include summer base flow as a criterion for site selection.	Why? For habitat metrics flow is not required.
Karen Dinicola, Brandi Lubliner	Ecology	Design	32	This sentence (regarding an analogous program for comparing feasibility) is not followed up with information about costs, only metrics are listed. The following “level of effort” paragraph can stand alone.	The paragraph ends with the level of effort required by a field crew. This has not been translated into "cost," but since field crew time represents the dominant expense for such a monitoring program we respectfully disagree with this comment.
Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	32	Are these metrics (responsive to changes in stream flow or sediment load) identified in the report?	Yes, these are the metrics recommended for HSTM monitoring
Chad Larson	Ecology	Design	32	Without fishing, habitat can be collected at a reach by a crew of two and completed in approximately 3-4 hours, yielding over 250 habitat metrics (rather than a team of 3 requiring a day).	Noted. However, the time required to get to the site and deal with data after the site visit makes more than one site visit in a day unlikely, even sampling fewer metrics.

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Jeff Fisher	NOAA	Design	32	Is this (Mean residual pool vertical profile area) something different than residual pool depth? If not, why not use the simpler term?	They are not the same. From monitoringmethods.org: "The mean residual pool vertical profile area is the calculation of an accumulation of areas over the course of the reach. The input data includes the thalweg depths of the channel, taken at 10 stations dived equally between Transects, the slope of the reach, and the increment which is the distance between stations. At each station we calculate a residual pool profile area, and we accumulate those areas to determine Mean Residual Pool Vertical Profile Area in meters squared per reach. The calculations used to determine Mean Residual Pool Vertical Profile Area are derived from the EPA EMAP program and additional information may be obtained from Phil Kauffman of the EPA."
Scott Anderson	NOAA	Design	32	For this HSTM effort, need to specify where LWD pieces are measured- everything in the floodplain? Bankfull? Wetted perimeter?...ideally within the bfw, as wood provides different functions under different flow stages.	Agreed, this will be necessary and will be part of the protocols in the implementation report. Such details do not affect the monitoring design (this report), however.
Mindy Fohn	Kitsap County	Design	33	Excellent analysis. S/N feedback to metric selection and anticipated variability. This is a strength of this program.	Thanks.
Karen Dinicola, Brandi Lubliner	Ecology	Design	34	Regarding additional stakeholder input: It would be appropriate to include a discussion of the questions posed as to whether the S/N for metrics in urban settings are realistically represented by the S/N found by rural-based programs.	The most developed datasets and analysis for S/N are for stormwater monitoring in urban settings. We realize it's not ideal to apply the same conclusions to rural settings, but we do not have a better available alternative.
Chad Larson	Ecology	Design	34	Considerable data from the Lower Columbia is readily available in Ecology's EIM/STREAM database. An S/N analysis of statewide data is already underway.	We are aware of several such 'ongoing' efforts, but none that were willing to share their results in time for this report. We fully expect, however, that the intensive efforts being made throughout the region will be incorporated as they become available.
Karen Adams	LCFRB	Design	34	Include some alternatives here, what are some options for the best course of action for phase II?	Addressed in text revisions

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Dorie Sutton	LCFRB	Design	34	Funding decisions won't change the design, but will affect implementation. I would take this statement out.	We respectfully disagree with this comment--funding imposes fundamental, and commonly irrevocable, constraints on the design of a monitoring program. Its exclusion for consideration during Phase 1 of this project, for example, rendered much of that prior work irrelevant by virtue of its utter implausibility of ever being implemented.
Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	34	Are there sources (monitoring programs) that identify metrics associated with urban runoff?	Yes--identified in Table 4 and Appendix A.
Karen Dinicola, Brandi Lubliner	Ecology	Design	34	This table belongs after the four paragraphs of text remaining in this section. I have made multiple suggested edits to make this table more clear and accessible to stand-alone use	The table has been moved as requested and the proposed edits incorporated into the final table.
Jeff Fisher	NOAA	Design	34	The footnote referenced here (for conventional stormwater pollutants) is confusing…are we saying the list could be expanded based on 2015 monitoring? Can we be more specific as to the rule set that would modify this list? None of the parameters monitored correlate with the pre-spawn mortality recognized in Seattle's urban streams…a comment I thought I made a long time ago.	I assume this comment is misplaced. The footnote indicated merely identifies those stormwater pollutants that have been commonly measured over the last 30 years, without any reference to (for example) the Seattle pre-spawn mortality study. I note that the 2011 PLoS ONE abstract for that study states " The weight of evidence suggests that freshwater-transitional coho are particularly vulnerable to an as-yet unidentified toxic contaminant (or contaminant mixture) in urban runoff." Such constituents are particularly challenging to list in a table of metrics, and the lack of correlation with prior or current recommended parameters is not surprising.
Karen Dinicola, Brandi Lubliner	Ecology	Design	34	In Puget Sound, the full suite of habitat metrics associated with the IBI (watershed characterization) is proposed to be collected once per 5 years.	Agreed (see next comment)
Mindy Fohn	Kitsap County	Design	34	(Table 4, RE: frequency of data collection) Once per 5 year period?	Yes. Corrected.
Chad Larson	Ecology	Design	35	This (EPT) is only one of many other metrics associated with macroinvertebrates.	Agreed and removed

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Karen Dinicola, Brandi Lubliner	Ecology	Design	36	If the broader habitat program is never implemented, is it not a concern that there would be no full habitat data at any of the Qa/Qx sites? Will this monitoring to inform how to improve B-IBI scores without habitat data?	There is little published evidence that *any* direct causality can be drawn between BIBI scores and physical habitat, except insofar as substrates are either suitable or not, grain-size-wise. If we could afford only one metric, period, to characterize instream health then I would advocate for this one. Other metrics will provide additional information, but they're the "optional" ones if funding is an issue.
Karen Dinicola, Brandi Lubliner	Ecology	Design	36	Are flow, sediment chemistry and substrate size sufficient to support interpretation of B-IBI scores?	As noted above, there is no set of physical parameters that are "sufficient" to support interpretation of BIBI scores…but every little bit helps. The scientific literature is replete with examples of weak correlations, plausible explanations without controlled experiments to prove, and complex factor-ceiling and factor-floor relationships that defy simple explanations or direct causal mechanisms. This program is not going to change that state-of-the-science.
Karen Dinicola, Brandi Lubliner	Ecology	Design	36	My colleagues here have asked that you consider adding embeddedness and relative bed stability to help explain the B-IBI results at Qa/Qx sites that are not selected as habitat sites – that would likely be most of them.	Yes, owing to the number of Master Sample points, it should be assumed that no Qa/Qx and habitat sites will overlap. We have no quibble with either of these metrics (they are included in the recommended ste of habitat metrics), except for their potential to increase field time (and so potentially the cost). Note that RBS is simply the ratio of data already collected (substrate and bankfull depth) so this suggestion is moot. We would encourage your colleagues to share their analyses that explain BIBI results in terms of these two metrics.

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Chad Larson	Ecology	Design	36	This is a very limited set of habitat metrics. Inevitably, if macroinvertebrate metrics suggest impairment, municipalities will want to know what is causing the low scores. Without habitat data, it will be difficult to determine potential causes of the impairment. Some of these habitat metrics are also related with storm water issues and tractable through time (e.g. relative bed stability, embeddedness, etc.). Consideration should be given to measuring the same set of habitat metrics as will be measured at the other sites.	Duplicating all habitat metrics at Qa/Qx sites will almost certainly reduce, substantially, the total number of sites that can be afforded. As noted previously, the ability to deduce the cause(s) of poor BIBI scores from habitat data has no clear support in the scientific literature; rather, the accumulation of effects from watershed alteration seem to be the most consistently reported finding. This program could, indeed, provide another data set to support this elusive pursuit of causality, but that has not been articulated as a primary driver (nor one of the Questions and Objectives) for this program.
Karen Dinicola, Brandi Lubliner	Ecology	Design	36	NAWQA is collecting habitat metrics as well. Please contact Patrick Moran at pwmoran@usgs.gov or Bob Black at rwblack@usgs.gov	Comment noted
Karen Dinicola, Brandi Lubliner	Ecology	Design	36	Are “substrate size” and “substrate particle size (% composition” the same thing?	Yes - for some programs. We intentionally did not specify the method for characterizing substrate because protocols differ between programs
Chad Larson	Ecology	Design	36	Substrate is a very broad parameter	Agree. See comment above
Mindy Fohn	Kitsap County	Design	36	(The Kauffman 1999 study) If I understand correctly – this is from Atlantic region. The concern is that these grades may not correlate well with PNW references and be applicable.	Kaufmann et al. (1999) reports S:N from both the "Mid-Atlantic" and "Oregon" (their terms). We are reporting here the Oregon values, with the expectation that they are the most applicable.
Karen Dinicola, Brandi Lubliner	Ecology	Design	37	This is a good place to explore and reference the Hobbs paper and other efforts for typical stormwater indicator parameters.	The Hobbs data are exemplary in their reliance on continuous, flow-weighted sampling to provide meaningful data on pollutant concentrations in stormwater. As such, that study implicitly embraces this paragraph's (and the study's) rejection of water-column grab sampling as a meaningful source of data. However, we assume that Hobbs et al. selected parameters for evaluation on the basis of much prior work, and this is what is being discussed here. The Hobbs report findings inform the metric selection for this study design.

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Chad Larson	Ecology	Design	37	Unless you cite specific examples of this (substituting grab samples for more cost prohibitive continuous monitoring) occurring, including this is unnecessary	Ok.
Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	37	Take a look at the phase II permit to see the status and trends cost allocations by permittee for Puget Sound region. That should give an indication of what is acceptable.	At present, we are relying on the prior analysis by the city of Longview to assess order-of-magnitude "affordability." More detailed investigations will be necessary but not at this stage of the project.
Karen Dinicola, Brandi Lubliner	Ecology	Design	37	This study is not really applicable to this paragraph, but it is definitely applicable above and to other discussions elsewhere in this section and overall report.	Agreed.
Karen Dinicola, Brandi Lubliner	Ecology	Design	37	The stormwater characterization data and findings deserve a paragraph of their own in this section. Clark County puts a substantial effort in collecting those data and they are highly relevant to the objectives of this monitoring program.	We added text to recognize the work being conducted by Clark County, and the findings of the Hobbs report were considered in selection of metrics for this study design.
Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	37	We once used the EPA “rapid assessment” protocol in EPA 841-B-99-002 and found them useful for quick assessment of good fair poor conditions. Good accuracy but poor precision… according to EMAP reporting as I recall.	That matches my experience as well--coarse, but time-consuming.
Chad Larson	Ecology	Design	39	A reference to our bank stability (a score from Puget Sound summertime 2009) shows up as an “A”. That is actually a method we decided to re-work due to failing score. The now-defunct method has been replaced.	Good to know. The Merritt and Hartmann 2012 report lists the score as an "A". Perhaps it reflects the new method.
Rod Swanson, Jeff Schnabel, Ian Wigger	Clark County	Design	41	What are the deliverables for the current project?	This is the deliverable… a design report. Other deliverables include a partial QAPP, stream gaging network assessment, and GIS layers

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Chad Larson	Ecology	Design	41	RE: Data collection and management task - We should consider that: Studies using a once-annual summer index sample may not reflect on how signal to noise would express in monthly (e.g. WQI) measurements. Habitat sampling will express difference signal-to-noise depending upon i-Region monitored (e.g. variance of large wood would be different in Columbia Plateau than other regions). ii- Temporal scale (1x annually vs. monthly, daily or every 30 minutes) iii - Spatial scale – We expect less noise when limiting analysis to a set of small streams within a given watershed. iv - Signal to noise for routine measurement systems like habitat are best used in the analysis phase rather than deciding upon which things to measure - It may take more effort to disassemble routine measurements from established forms, database scripts, and training than it would to measure it all.	All of these are good points; some (e.g., the last) is better addressed during the implementation report; others will be dependent on having data collected by the identified protocols or analyzed by others who have already collected those data. Should the results demonstrate that variance is lower than anticipated then either the level-of-effort can be scaled back, or a greater level of statistical confidence will have been achieved without additional effort. Good news in either case.
Chad Larson	Ecology	Design	42	Additional comments: 1. Please consider major re-editing to streamline text. 2. Many jargon terms (e.g. primary population) are found throughout the document; please consider a glossary of terms.	Suggestions taken to heart.

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Chad Larson	LCFRB	Design	General	Overall, I think we have a pretty strong design here. In terms of the report, edits with an eye to organization and formatting would be helpful. I know that a few people have mentioned that they have a hard time following the logic/storyline as you are telling it. The ideas jump around somewhat. Look at this document in terms of organization and see if moving text around and some formatting (using headings, bullets, etc.) would improve that. The second general comment I have is that this report needs to be presented in plain English... I heard at the workshop that people had a difficult time following the report, but if it said exactly what you all said in the workshop, it would be great. It was presented in plain English and folks got it. Also, the design should inform folks of what components help us answer management questions (this includes relevant strata and metrics), and the addition of discussing how we might scale up or down, or what components we could alter to fit budgets and time/staffing constraints. Actually making those alterations should come at an implementation planning or management level. Finally, and very importantly, more appendices could be valuable to explain the methodology in a bit more detail. We may need to come back to this in a few years and we would like to be able to follow the decision making process. There is some question about whether the text in this report is sufficient to allow us to do this.	We have significantly revised the Executive Summary to scale back the details and present a more user-friendly overview. As for the organization, we have retained the integration of Qa/Qx and habitat in each major element (e.g. strata, site selection, metrics). It is somewhat more cumbersome than first presenting the Qa/Qx monitoring and then the habitat as was done in the workshop; however upon consultation with LCFRB, it was decided to retain the current report organization given the importance of integration. As suggested, we have revised the report to make it easier to follow/understand where possible. Rather than adding appendices, we expanded methodology, definitions, source documents and design rationale.

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Abby Barnes, Dorie Sutton	DNR Aquatic Division, City of Vancouver	Design	General	A glossary of terms and list of abbreviations is needed. There are several terms (i.e. "Primary populations) that are never defined that I would imagine many of us are not familiar with. Also a lot of acronyms. Having a list would give us a convenient place to refer to when we can't remember what it is and we don't know what page it was first spelled out on.	Addressed in text revisions
Nikki Guillot	Ecology	Design	General	Please use the term "Ecology" as the short name of the Washington State Department of Ecology instead of "DOE". "DOE" is the federal Department of Energy.	Addressed in text revisions.
Nikki Guillot	Ecology	Design	General	Please use "Lower Columbia Region" in place of "Lower Columbia ESU" in the title. This is consistent with previous documents and the grant agreement.	The title was revised to " Lower Columbia Region"
Nikki Guillot	Ecology	Design	General	Please refer to the Phase I and Phase II Western Washington Municipal Stormwater NPDES Permits as "municipal stormwater NPDES permits" throughout the document. Ecology issues multiple types of NPDES permits to local jurisdictions and this clarity is important.	Except where the need for abbreviation and the context are unambiguous, this has been done.
Nikki Guillot	Ecology	Design	General	Please include with this final report a summary of the GIS work attempted or compiled from Oregon agencies as well as a brief section on stream gauge network feasibility assessment, in accordance with the grant agreement.	Submitted as attachments to the report
Nikki Guillot	Ecology	Design	General	Please provide an abstract of the report. The executive summary is not accessible to important members of the target audience.	This was developed following completion of the report
Nikki Guillot	Ecology	Design	General	Please include and briefly describe the stakeholder feedback process including workshops, and task team and leadership team meetings in the background section. It should be clear this is a step in a multi-phase project.	The concept of a multi-phase project was added to the Background section. The stakeholder feedback process was added to the Participants section 1.4

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Nikki Guillot	Ecology	Design	General	Please narrow the use of terms and define segments, channels, reaches, sites, etc. These terms are used somewhat interchangeably and inconsistently. In particular, "reach" needs to be clearly defined for use in the site allocation sections.	Addressed in text revisions.
Nikki Guillot	Ecology	Design	General	Please clarify the process of site selection. While the body of the report appropriately defers decisions on pseudo-randomization questions to the next project phase, some of the transitions from what was proposed in October to what is proposed in the report are not clear in this report.	The target populations from which the sites will be selected have been identified, together with the stratification that will ensure that all important sub-categories of the Master Sample are adequately represented.
Nikki Guillot	Ecology	Design	General	In particular, for site selection, the proposal presented in October was to identify the most accessible Qa/Qx sampling location at the downstream end of a candidate urban subbasin. Please confirm that the discussion in section 3.2.1.1 is not departing from this recommendation and that the 20xbankfull width reach length definition is limited to the habitat sites. This shift was not highlighted at the January workshop. The October proposal gained favorable reviews from stakeholders familiar with stormwater issues. It also addressed the frequent site disqualification problems encountered in Puget Sound. Please reconsider the shift or articulate that this issue, like the pseudo-random approach, needs to be settled in the next phase.	Thank you for your comment. We have incorporated these considerations, and clarified the text, as indicated.
Nikki Guillot	Ecology	Design	General	Selecting tributary areas based on hydrology is a sound approach but outfalls and tributaries can significantly affect water quality. This is not an issue for the most-downstream-sampling-site approach described in October, but it becomes one if the site selection process goes back to a strict GRTS approach.	See response to comment above. Revisions also include suggested addition of manmade outfalls as affecting mid-reach water quality.

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Nikki Guillot	Ecology	Design	General	Please more fully consider the Hobbs et al 2015 stormwater discharge monitoring report that was provided to you last month and what implications the findings may have for parameter selection and further stratification by urban land uses.	The findings of this report have definitely informed the current design and metric selection.
Nikki Guillot	Ecology	Design	General	Please describe what would be required to elevate the parameters under consideration into the final program design. Please indicate when this evaluation will be done, even if it is approximate.	If additional information from other programs becomes available early in the Implementation Plan development, particularly with regard to the precision and importance of a particular parameter (stemming from stakeholder recommendations), it would be reconsidered at that time. The cost to include the additional parameter would also need to be evaluated in light of available resources.

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Nikki Guillot	Ecology	Design	General	Please consider adding non-permitted urban areas to the UGA+NPDES strata. It may be informative to consider more detailed urban land use types, specifically industrial and commercial uses versus residential uses.	From the perspective of municipal stormwater permittees it's easy to imagine that the more targeted (regulatory-based) category, as recommended here, will make the "sale" of this program to their respective jurisdictions (internally) more simple than if monitoring sites combine permit-required and non-permit-required locations. There is no pressing technical value to include these points in the "urban NPDES" stratum (there are plenty, already), although from a strictly technical perspective there's no need to exclude them, either. If a monitoring question was articulated that expressed the value of a finer stratification of urban land uses, then a monitoring design could surely be formulated to answer it. Indeed, the current design may achieve that goal through post-stratification--but it was not designed with that explicit need in mind, and a retooling of the monitoring questions and objectives would be necessary to incorporate that interest now.
Nikki Guillot	Ecology	Design	General	Please consider what value the Primary Populations categories add to answering the water quality and quantity questions. This new stratum came into the design without full explanation. The number of Primary Populations present in a water body is not a factor that affects water quality - or habitat - but rather results from instream and other conditions.	As noted in other comments, there is no presumption that PP's are a causal agent of water quality--only that management concerns may want to ensure that sufficient monitoring has been conducted in high-priority subbasins to support recovery efforts.
Nikki Guillot	Ecology	Design	General	Please consider adding the possibility of densifying the site allocation in the Lewis River basin instead of imposing this stratification on the overall design.	If the Lewis River subbasin is the only area of high priority, then the current stratification need not be changed and only the categories would need to be redefined: two, from 0-3 PP's and 4+. This change can be made at any time prior to implementation without affecting the structure of the monitoring design, but it should probably happen only with the full concurrence of project partners.