# **Compiled 2014 RITT and NOAA Reviews of Watershed M&AM Reports and 3YWPs**

*In 2014, the Puget Sound Recovery Implementation Technical Team (RITT) performed technical reviews of the Puget Sound watersheds’ Three Year Workplan (3YWP) and Monitoring and Adaptive Management Phase I Framework Reports, providing regional technical themes and watershed-specific reviews. NOAA conducted a policy review to identify regional themes of the M&AM reports and 3YWP project lists.*

Note: Each watershed should receive a single document that includes: 1. Regional Technical and Policy Review; 2. Watershed Specific Technical Review; 3. Watershed Specific Policy Review

**2014 Chinook Monitoring and Adaptive Management Report and**

**Three Year Workplan Project List Review: Regional Technical Themes**

Recovery Implementation Technical Team

RITT Reviewers:

* Kirk Lakey, WDFW
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*For the 2014 Regional Technical Review, RITT members reviewed the M&AM reports and 3YWPs for regional themes. Each lead reviewer was asked to include answers to these questions regarding the themes that were identified, and discussed them as a group : 1) What is the technical issue or challenge? 2) Which watersheds identified this as an issue/need? 3) Why is this issue of regional concern? 4) Recommendations for correction?*

**Watershed Capacity Support Needs**

A major challenge to implementing monitoring and adaptive management (M&AM) for salmon recovery in many Puget Sound watersheds is incorporating new information that has been collected since the completion of the Puget Sound Salmon Recovery Plan in late 2005, and subsequently adopted by the National Marine Fisheries Service (NMFS) in early 2007. This lack of incorporation has created disconnect between the most current science and decision making, or adaptive management. We now have up to nine years of additional (and often disaggregated) data that has been collected in the watersheds. In many cases, a considerable amount of additional analysis and modeling has been completed since the recovery plan chapters were completed in 2005. Moreover, there is a considerable amount of historical data that has been acquired since 2005 in some watersheds that would be valuable to their respective M&AM programs. These data, are available in various forms, which vary from raw data to published reports. This information needs to be compiled, in order for it to be useful for policy and management decisions. Most watersheds do not have the capacity, in terms of technical staff and financial resources, to distill all available data for use in decision making and adaptive management.

The types of data, analyses, and modeling results that are now available at the watershed and regional scale may include the following:

* Updated Chinook/chum/steelhead escapement and spawner distribution data
* Outmigrant data collected at smolt traps
* Marine survival studies in Puget Sound and North Pacific
* Updated freshwater, ocean, and stock productivity values
* Harvest records and management reports
* Freshwater, estuary, and nearshore habitat surveys and assessments
* Juvenile fish surveys and sampling (freshwater, estuary, nearshore)
* Streamflow records
* Water quality records
* Contaminant monitoring and aquatic impact assessments
* Effectiveness monitoring data and reports
* Freshwater benthic macroinvertebrate surveys
* Nearshore and offshore biological surveys
* Land development trend and impact assessments
* Updated GIS data layers for fish distribution, habitat conditions, land-use, etc.
* Research studies on fish abundance, distribution, and life-history variability
* Hatchery assessments
* Genetic analysis
* Results of fish and habitat modeling, including life-cycle, EDT, and SHIRAZ modeling
* Climate change research findings

This information can serve a number of useful purposes with respect to the M&AM projects being implemented for salmon recovery, including: 1) establishing historical baseline conditions for the Key Ecosystem Attributes (KEAs) and their indicators for viability assessments; 2) providing monitoring data for indicators; 3) validating the hypotheses employed in the recovery chapters upon which recovery strategies are currently based; 4) providing measures of effectiveness for specific strategies and actions; 5) updating recovery strategies; 6) updating the status and trends of fish populations and habitat conditions in each watershed; and 7) addressing data gaps.

While there is a substantial amount of data, analysis, and modeling results available for use by the watersheds in implementing their M&AM programs a number of watersheds have a limited technical capacity to process this information. In many watersheds, there is a disconnect between the technical organizations (including local, state, federal, and tribal scientists) and the policy and planning bodies (including lead entities). In some cases, research and monitoring reports that have been completed by the technical organizations are unknown to the policy and planning bodies, or are not available in a form which is useful for decision making. In other cases, research and monitoring efforts are conducted over many years before results are made available to the decision making.

This is of regional concern because there is good information available that is not being used to inform the management and decision making processes, especially in the context of the M&AM programs currently being implemented by the watersheds under regional funding. Data related to spawning, escapement, harvest and habitat condition are being evaluated by diverse, but often separate, groups of researchers. What’s needed is an integrated analysis approach that is centered on specific goals and hypotheses that support Chinook recovery. To correct this problem, the RITT recommends the development of sustainable capacity to compile and make available the data, as well as monitor and model results, into a suitable format for informing policy and management decisions regarding salmon recovery. This capacity could be used to convert this information into a format useful for decision making, and by the watershed organizations to acquire, summarize, and utilize this information for policy and management purposes. The goal is not to integrate the data into a single database, rather the results of data analysis need to be integrated. Data would be organized to answer specific questions relevant to watershed recovery as required or needed by each watershed to complete their M&AM projects and programs. Data collection should be designed to answer specific questions about Chinook recovery.

## Coordination of Nearshore Efforts

The Puget Sound nearshore environment is critical to salmon recovery, but 9 years have passed since recovery plans were developed and the region has yet to define what and how much should/must be done in the estuary and nearshore marine environments in order to recover the multiple populations that use these areas. The RITT strongly believes that all watersheds included in the Puget Sound ESU have some responsibility for actions in estuary and nearshore habitats. While some watersheds have extensive estuary and nearshore habitats, others have no natal estuaries but instead have extensive nearshore habitat zones. These marine habitats are utilized by all populations of Puget Sound Chinook salmon, as well as other salmonid species.

The applicability of VSP parameters (abundance, productivity, spatial structure, and diversity) to the nearshore also must be considered and understood in some fashion. Research in the past 10 years has greatly improved our understanding of habitat use and survival in estuary and nearshore habitats, and these studies need to continue. In time, effectiveness of restoration efforts may additionally inform VSP parameters such as improved survival, extended habitat utilization over time and space, etc. However, it is not likely that each individual watershed entity will have substantial impact on salmon recovery unless efforts are coordinated and assessed across the region.

There are several efforts underway with the intent to understand the scope of this issue. NOAA’s NW Fisheries Science Center is in the process of developing a monitoring plan which will inform managers of ESU-scale status and trends of delta and nearshore habitats for inclusion in their required five-year status reviews. Puget Sound Ecosystem Monitoring Program (PSEMP) initiated a very coarse broad scale effort of monitoring nearshore environments and reporting ‘vital signs’ beginning in 2010. And Puget Sound Nearshore Ecosystem Restoration Program (PSNERP) has taken a broad-scale comprehensive approach over more than 13 years to build a plan which assesses, restores and manages the Puget Sound nearshore habitats. Local watersheds (those with extensive nearshore habitats) have formed a nearshore working group to identify commonalities across indicators and strategies developed during the M&AM project. In addition, the PSP is working with PSEMP and representatives from watersheds to identify a common set of indicators for both the marine and freshwater environments that will support the ability for the region to tell a regional story of recovery in the different environments. Coordination and cohesion amongst these efforts is important for future success. However, there is not likely a single means of tackling the issues of environmental quality of nearshore and estuary habitats in Puget Sound. Efforts to monitor actions on each spatial scale, (i.e., local, regional, and ESU-wide) should be nested in a consistent structure which accounts for biological and physical processes of the habitats and the species of concern. Also, monitoring of status and trends vs effectiveness and implementation of actions should also be carefully constructed. Strategies which guide monitoring in nearshore habitats must be consistent, clear and concise across the ESU.

Many watersheds refer to “no net loss” when it comes to habitat goals, but the reality is that these habitats are already currently “degraded” in many locations. While it is important to document what may seem to be ‘few’ losses in recent years (Higgins et al. 2014), watersheds should also consider what has already been lost relative to structure, function, and area (or extent).

There is also a need for policy and science to move forward in tandem on this issue. Recent research is beginning to inform restoration strategies. However, because of the considerable complexity of biological and physical processes, and the difficulties (money and time, policy, enforcement, and politics) in comprehensively tackling the many issues in our marine environment, our efforts have been limited. Monitoring on a coarse and ESU-wide scale should begin to inform the best use of limited resources for protection and restoration. Effectiveness monitoring of projects on local and watershed scales can identify what is successful, and begin to determine the extent of restoration of ecological function necessary to achieve salmon recovery.

The RITT recommends developing a strong focus on the relationship between nearshore habitats and Chinook salmon use. It is imperative that his relationship and resulting recovery efforts inform policy and decision making processes. The RITT also believes that efforts to develop indicators and strategies for nearshore must be coordinated and grounded in solid science. The RITT recommends that a nearshore watershed workgroup with strong technical background and help from PSP policy staff develop first a nearshore conceptual model and then common/generic hypotheses and results chains for the nearshore habitats. Then priority indicators can be identified. The RITT already provided guidance on a more limited priority list of indicators, but there still lacks a strong Conceptual Model and results chains. These results chains can then be tailored to specific watershed needs as appropriate. However, for a region-wide assessment of nearshore habitats, some list of common metrics will need to be monitored across the broad spatial scale. This is the same recommendation as delineated below in “Next Steps”.

## H Integration

H-Integration is the ***coordinated combination of actions among all sectors - harvest, hatchery, and habitat – that together work to achieve the goal of recovering self-sustaining, harvestable salmon runs*.** In their 2003 guidance to the local watersheds, the Puget Sound Technical Recovery Team (TRT) identified the need for an integrated “all-H” strategy to recover Puget Sound Chinook. This message was emphasized again in the Puget Sound Salmon Recovery Plan (2005) and the NOAA supplement (2006). All of these documents clearly state that actions in habitat, hatchery, and harvest management must be coordinated to achieve recovery of Puget Sound Chinook salmon.

Although actions are taking place for all three of these “Hs” in the watersheds with three-year work plans, the work plans do not yet reflect coordination or integration of the Hs (e.g. many watersheds have results chains for the different Hs, but do not include results chains that shows integration or coordination of the Hs). Work plans should be able to summarize how the Hs will work together to achieve the goal by: 1) identifying actions within each H; 2) predicting the outcomes in terms of VSP; 3) balancing the risks imposed by habitat, hatchery, and harvest actions consistent with the desired population status (Figure 1); 4) tracking progress on the implementation of actions; and 5) reporting progress on using indicators of VSP outcomes and the pressures and stressors affecting those outcomes.



**Figure 1. Integrating risks of habitat, hatchery, and harvest management according to the desired VSP population status.**

The Shared Strategy identified the following six steps in advancing H-Integration with the watersheds:

1. Identify the people that need to participate and how to involve them.
2. Gain a common understanding of how the system works—habitat conditions and fish populations. This includes: habitat conditions and priority limiting factors, harvest rates, hatchery management, fish population status (e.g. VSP parameters), and community needs.
3. Agree upon common goals and a set of outcomes across the H-sectors that describe what will be achieved related to those goals in measurable terms.
4. Examine, evaluate and select a suite of complementary actions across the Hs to achieve the outcomes and determine what evaluation tools to use.
5. Document: rationale, implementation steps (specific complementary actions in hatcheries, harvest, and habitat), expected outcomes (including effects on VSP), and benchmarks.
6. Build and implement a Verification, Effectiveness and Accountability system. Implement actions, monitor results, prepare annual performance reports, and adjust over time.

Balancing the risks imposed by habitat, hatchery, and harvest actions consistent with the desired population status is fundamentally a policy activity informed by technical analyses. It does require that the appropriate decision makers participate. A few watersheds have expressed some frustration that not all the necessary participants are participating to effectively integrate the Hs or that neither side has the capability to make changes to the processes that drive the management of all the individual Hs. The RITT continues to urge the Recovery Council, whose members include all of the key parties in salmon recovery, to provide the leadership to ensure that all Hs must work together through a transparent adaptive management process. Historically, without this kind of leadership and participation, these decisions are likely to occur through the courts. The RITT believes that both effectiveness and efficiency of management and recovery dollars will be increased if habitat restoration, habitat protection, harvest management, and hatchery management are all part of the same salmon recovery plan.

**Priority Next Steps for Monitoring and Adaptive Management**

Phase I of the Monitoring and Adaptive Management (M&AM) process translated Chinook recovery plan watershed chapters into a common framework from which watersheds can develop or expand their current monitoring and adaptive management process. Phase I was a good start to this process and is useful to identify where the watersheds and the Puget Sound region needs to focus future monitoring and adaptive management efforts.

There is significant work that needs to be done in several areas to strengthen the M&AM products as M&AM plans are developed.

A primary task is to ensure that the results chains are scientifically defensible before moving forward into Phase II of the Monitoring and Adaptive Management process. Developing M&AM plans without first having defensible Results Chains and underlying conceptual models would complicate the process and potentially waste valuable time and resources. The RITT recommends the following steps for improving the Results Chains:

1. Develop Conceptual Models - The conceptual models are the basis for the Results Chains and still need to be developed for most watersheds. Doing so will provide a common understanding of the logic behind the Results Chains and shed light on why Results Chains vary across watersheds
2. Complete a Regional Consistency Review – Results Chains should be compared across the watersheds to identify similar strategies, and intermediate results, but different actions and pressures. PSP and watersheds will determine if these differences were process and input driven or if these differences are related to unique local circumstances.
3. Complete a Pressure Assessment- The RITT recommends that a pressure assessment is completed for each watershed (likely following a methodology that is more robust than that provided by Open Standards but not as extensive as the Puget Sound Pressures Assessment [PSPA]). A first step would be to look at the results of the PSPA by watershed and identify where there are consistencies and differences from the pressure identification that the watershed completed in Phase I. If there are differences, the watersheds should try to identify underlying reasons. The results of the pressure assessment should be reflected in the Results Chains and priority strategies. Completing a thorough identification and prioritization of pressures will help watersheds focus their efforts, monitoring, and resources.

Phase I identified the importance of quantifiable, scientifically defensible goals. All but one of the watersheds, have goals established by NOAA for the Chinook populations in their watershed. In addition, some watersheds have quantifiable goals for habitat. However it is unclear if these watersheds have determined if habitat goals and associated actions will achieve population recovery goals. A scientifically defensible recovery plan means having established a defensible linkage between habitat restoration actions and significant suitable habitat necessary to sustain and recover Chinook populations to achieve population goals.

Another regional need is to establish indicators and the metrics for monitoring by watershed and across the region, and metrics to monitor status and trends in population performance (productivity, abundance, and diversity) and habitat. The Phase I process was to include the identification of indicators and a binning exercise to evaluate current status relative to goals. Not all watersheds completed this task and it is clear, from reviewing the Phase I products, there is a need to provide guidance for a common set of indicators for the Puget Sound Region as well as recommended metrics and methods to determine condition and trends.

**2014 Chinook Monitoring and Adaptive Management Report and**

**Three Year Workplan Project List Review: Regional Policy Themes**

NOAA

NOAA reviewers:

* Thomas Sibley
* Matt Longenbaugh
* Paul Cereghino
* Randy McIntosh
* Alison Agness

**Capturing All Strategies**: The NOAA reviewers note that a lot more work is happening in the watersheds than what is captured in the results chains. This may be because those strategies have been developed since the 2005 plan was written or due to sensitivities around making strategies public. It is essential for plan updates and adaptive management to be captured in writing (and in Miradi) to reflect everything that the watersheds are doing. There are some very complex and innovative actions and approaches that can be shared across watersheds.

**Indicators**: For the future, need to make sure that we are including relevant content from Bruce Crawford’s report, Methods and Quality of VSP Monitoring of ESA Listed Puget Sound Salmon and Steelhead, as well as the indicators that NOAA is looking at applying across the entire ESU. Watersheds should continue to work collaboratively to prioritize indicators to a more manageable level.

**H-Integration**: The reviewers had a lengthy discussion on H-integration and how hatchery and harvest strategies could be used to leverage habitat strategies given that co-managers have greater control on hatchery and harvest. The reviewers recommend that an H-integration strategy may be best implemented at the regional scale as opposed to a watershed by watershed scale given that there is control at the local level on adaptive management of hatchery and harvest by only the co-managers. Some of the strategies presented by watersheds in this process may provide more coherence for a regional approach based on following the lead of co-managers in each watershed. The reviewers recommend a regional assessment across all watersheds to see where there are gaps on integration. No matter which direction we decide to take on H-integration, the reviewers believe it is important for the co-managers to be aware of and invited to participate in the M&AM work.

**Integration of protection and restoration**: The reviewers recommend that watershed work on building and maintaining landowner relationships over time through easements and other assurances of local regulatory protection: this may help accomplish longer term restoration goals. The reviewers want to see more emphasis on long term private landowner stewardship across all watersheds, however they recognize that there are challenges in securing funding for this work.

**Nearshore**: A number of regional assessments are underway or slotted to begin to define benefit and use of nearshore in Puget Sound. Reports and preliminary project designs by PSEMP based on scientific evidence enable prioritization decisions around nearshore watersheds. The reviewers recommend that a cost-benefit analysis of nearshore might be useful to see how much we are getting given that acquisitions are very expensive. The Skagit watershed has a very sophisticated approach to nearshore strategies with very specific targets. This will help measure progress and do adaptive management and may be a model for other watershed working in the nearshore. In addition, the original, stand-alone Nearshore Chapter needs updating and may need a related M&AM plan developed.

**Existing regulations**: Very few jurisdictions are taking advantage of implementing existing regulations such as those in compliance with FEMA’s NFIP. Watersheds should consider how the regulations can be used to further salmon recovery efforts. In addition, it is essential that enforcement and resources are secured for regulation implementation and this should be considered as part of all watershed strategies. This will be something for the SRC Regulatory Subcommittee to further discuss and provide guidance to watersheds on.

**PSP Leadership**: The reviewers recommend stronger PSP leadership on strategies of regional significance to prevent development of uncoordinated, parallel strategies. PSP should provide support to watersheds in making the plans more cohesive through specific guidance, considering NMFS recommendations and guidance in the Final Supplement to the Shared Strategy’s Puget Sound Salmon Recovery Plan. PSP can help identify where there are successful strategies in watersheds that can be transferred to other watersheds. PSP can also identify where the steelhead process and framework development can learn from the Chinook experience.

**Outreach**: The reviewers would like to see outreach strategies developed in more detail around the region. There are examples from some of the watersheds that could be used by other watersheds, such as identifying stakeholders that have ownership over certain parts of the river and identifying specific strategies for each (e.g. Puyallup).

**Stormwater**: There was less information on how stormwater impacts water quality and Chinook habitat when the plans were written in 2005. The reviewers would like to see more assurance of stormwater control in all of the watersheds.

**Results Chains**: Simplification (possibly through an executive summary) and standardization will support regional roll up of information and identification of commonalities across the watersheds. When structuring strategies, watersheds should consider how they want to tell the story (see Nooksack example).

**Watershed Specific Technical and Policy Reviews**

The RITT was asked to respond to the following questions:

*I. Consistency and Sequencing of Project and Activity List*:

1. Is the sequence of actions identified in the 3YWP consistent with the current hypotheses and strategies as identified in the watershed’s M&AM Framework?
2. (if applicable) Is the sequence of actions identified in the 3YWP consistent with the current hypotheses and strategies as identified in strategies for other species, including steelhead?
3. Are actions sequenced and timed appropriately for the current stage of implementation?

*II.* *Monitoring and Adaptive Management Framework Review*

1. Are projects and activities appropriately linked to strategies within the Framework?
2. Are the indicators selected for viability, pressures and effectiveness appropriate for the watershed?
3. What are the major technical gaps and challenges the watershed is likely to experience in developing and implementing their Monitoring and Adaptive Management Framework and subsequent Plan? What are potential solutions to overcoming these challenges? What regional technical support do you anticipate is needed for this watershed to succeed with implementing their Monitoring and Adaptive Management Framework and subsequent Plan?

The reviewers from NOAA were asked to consider the following questions:

1. Do the watershed’s strategies make sense given the local context?
2. Does the suite of strategies identified support recovery in the watershed? Why or why not?
3. Are any strategies missing? Examples of strategies to look for include the following:
	1. Freshwater restoration and acquisition
	2. Nearshore restoration and acquisition
	3. Freshwater habitat protection
	4. Nearshore habitat protection
	5. Harvest
	6. Hatchery
	7. H-integration
4. Are any strategies particularly exemplary or commendable that could be shared with other watersheds?
5. What needs, challenges, or barriers has the watershed identified that require regional support?

Three-year work plans describe how the strategies in a watershed recovery plan are implemented. The Recovery Implementation Technical Team (RITT) has reviewed three-year work plans since the Puget Sound Chinook Salmon Recovery Plan was adopted by the National Marine Fisheries Service in 2007. During 2013-2014 watershed groups made significant efforts to translate the original watershed recovery plans into a consistent framework of watershed monitoring and adaptive management steps and components across the Puget Sound. This year the RITT reviewed a set of questions focusing on sequencing of projects, which has been part of all our reviews since the beginning, and we examined the linkage of the projects to the development of the watershed monitoring and adaptive management plans.

Sequencing:

Sequencing refers to implementing projects in the right place, in the right order, at the right time, and with a level of effort that will produce the desired effects. This level of detail is rarely available in the three-year work plans for the RITT to review but it is evaluated in detail when considered for funding by the Salmon Recovery Fund Board’s technical review teams. The RITT review focuses on the first stage of sequencing, which is ensuring that the most important projects are put forward for funding.

# **WRIA 8**

**RITT Review:**

I. Consistency and Sequencing of Project and Activity List:

-Sequence of actions identified in the 3YWP are consistent with the hypotheses and strategies as identified in the M&AM Framework

-Actions are sequenced and timed appropriate for the current state of implementation.

-Projects and activities are appropriately linked to strategies within the Framework

-The indicators selected for viability, pressures and effectiveness are appropriate for the watershed.

The Phase I Monitoring and Adaptive Management framework for the Lake Washington, Cedar, and Sammamish Watershed (WRIA 8) was completed by Scott Stolnak and WRIA 8 Technical Committee. Feedback and support to the report were provided by the WRIA 8 Salmon Recovery Council, WRIA 8 Implementation Committee, WDFW, and the Puget Sound Partnership sponsored advisors. Materials were shared with the Muckleshoot Indian Tribe, and they were given opportunity to comment on them (as well as participate in the process). The WRIA 8 Technical Committee completed an M&AM report that is a hallmark of simplicity, clarity, and understanding. They did a superb job translating a very large and complex recovery chapter into succinct and intelligible report. Distilling all the details of a large recovery plan into a concise yet comprehensive plan requires a lot of hard work which is evident to the reader. The core team also overcame some major difficulties imposed by the framework they were provided, especially with regard to the need to addressing a major ecosystem component unique to WRIA 8 - large lake ecosystems- that are critical to the life history, growth, productivity, and diversity of Chinook salmon in the watershed. They effectively hammered a square peg into a round hole, much to their credit.

WRIA 8 has made outstanding progress in improving the list of actions in their 3YWP. The list of projects is much shorter than that submitted in previous years, and appropriate for a three-year planning period. The project list is prioritized according to three tiers of projects. The list of actions is well spread out between the two Chinook population zones in WRIA 8: the Cedar and Sammamish basins. The sequence of actions identified in the 3YWP are consistent with the current hypothesis and strategies identified in the watershed’s M&AM framework, with each project clearly linked to a specific strategy (e.g. protect and restore channel complexity). The actions are sequenced and timed appropriately.

The M&AM framework focuses on a very workable subset of ecosystem components that are strongly linked to Chinook viability in the watershed. Nine ecosystem components were included in the WRIA 8 framework: two Chinook populations (Cedar and Sammamish), channels less than 50m BFW, side channels, non-channel lakes and wetlands (i.e. the largest natural lentic ecosystem in the Puget Sound), species and food webs, uplands, bluff backed beaches, and pocket estuaries.

The KEAs identified for each of the major ecosystem components were well-chosen and made a lot of sense. A short list of appropriate indicators for KEA were clearly and specifically defined. KEAs for “non-channel lakes and wetlands”, including Lake Washington and Lake Sammamish, include habitat connectivity, nutrient supply, and riparian functions. The list of KEAs and indicators appeared to be short for a freshwater ecosystem as important as the Lake Washington. The WRIA 8 team would be encouraged to expand on the list of lentic ecosystem KEAs and indicators, since these unique areas present special challenges and opportunities to the recovery of Chinook salmon and steelhead in the watershed.

A much more comprehensive list of KEAs and indicators is provided for channels less than 50m. The KEAs and indicators are very appropriate, and have obvious links to juvenile Chinook habitat which is regarded as a major limiting factor to Chinook production in the WRIA 8 recovery plan. The KEAs include hydrology, nutrient supply, floodplain and habitat connectivity, riparian, sediment dynamics, and organic matter processing attributes.

The KEAs and indicators for bluff backed beaches, pocket estuaries, side channels, and species and food webs could use some more development in WRIA 8. The importance of these KEAs to Chinook are identified in the report. However, a greater and more diverse number of indicators would seem to be justified in these KEAs. The species and food webs KEAs and indicators appear to be too sparse for an aquatic ecosystem where predators, especially introduced species, are a major threat to juvenile Chinook survival. Lake Washington contains one of the most well-studied lentic systems in the world with regard to food webs and energy flow. The region should consider giving special support in terms of lake ecosystem science to WRIA 8 due to the unique and overriding influence of the Lake Washington and Lake Sammamish on the life history, growth, and survival on Chinook and steelhead.

The Chinook population KEAs and indicators are especially well developed in the WRIA 8 plan. The framework includes a broad set of appropriate KEAs and indicators that would be useful in monitoring the status and trends of the two Chinook populations in the watershed. The KEAs and indicators for Viable Salmonid Population (VSP) parameters, including productivity, genetic diversity, life history diversity, and spatial distribution, are well thought out and well documented. The attention to VSP-related KEAs and indicators in WRIA 8 commendable, and could serve as an example for other watersheds in the Puget Sound.

A total of 10 results chains for high priority recovery strategies are included in the M&AM framework report for WRIA 8. These are:

1. Protect and restore floodplain connectivity;
2. Protect and restore riparian vegetation;
3. Protect and restore channel complexity;
4. Restore lake shorelines;
5. Reconnect and enhance small creek mouths;
6. Protect and restore water quality;
7. Protect and restore forest cover;
8. Protect and restore high quality habitat in Tier 2 subareas (major tributaries);
9. Reconnect marine backshore areas;
10. Provide adequate stream flows for migration and spawning.

These results chains have been carefully developed and well structured. These show a very understandable linkage between potential actions, pressures, stressors, key habitat attributes and life history components, and Chinook population viability. One of the major data gaps identified in the report is the development and review of intermediate objectives and indicators for many of the recovery strategies by the WRIA 8 technical and policy bodies. Additional time would be needed in the future to fully vet these objectives and indicators with these bodies to gain a broad base of support for the M&AM framework.

The Viability Assessments (VAs) for the KEAs identified in WRIA 8 are largely incomplete. The priorities and gaps section of the M&AM report identifies the lack of quantitative desired future conditions (DFS) as a major gap that needs to be filled in order to complete a VA matrix for a large number of the KEAs. Regional assistance and guidance is recommended for developing the data need to establish quantitative goals and VA category thresholds for the diverse range of habitat found in the watershed. WRIA 8 had developed quantitative goals for Chinook VSP indicators in partnership with the co-managers, which is one of the strong points of the M&AM framework. The development of these VSP indicators is the result of a successful implementation of the H-integration process in the watershed.

Additional regional support, including scientific guidance and increased staff capacity, is recommended to more fully develop KEAs and indicators for ecosystem components in the marine nearshore environment (including bluff backed beaches and pocket estuaries). Additional support is also need to address juvenile habitat use, migration, and survival issues that are unique to WRIA 8, including lake residency and passage through the ship canal and locks (the latter with cooperation with the U.S. Army Corp of Engineers).

**Policy Review**

*See supplemental comments submitted by ML*. The reviewers identified the major strategic concern with this watershed as the populations: the TRT originally identified 3 populations, but now there are two and some genetic testing shows there may only be one population. This will be considered further in NOAA’s 5 Year Status review. The watershed raises questions on whether the instream flows were appropriate: while these have been signed off by NMFS any proposed changes to the City’s instream flow regimes would be considered within the existing Instream Flow Agreement, to which the State (WDFW and Ecology), Muckleshoot Tribe, NMFS, and FWS are signators. Given that legacy forestry is raised as an issue, the reviewers recommend that WRIA 8 (and other watershed) become familiar with WA-DNR’s statewide Forest Practice Rules HCP that addresses legacy forestry issues and implementation of the state’s forest practice rules. Also, another HCP implemented by WA-DNR includes adaptive management on state forest lands throughout western WA. The two major strategic gaps that the reviewers recommend strengthening in future plan updates include identifying strategies for improving passage at the locks and addressing nearshore/railroad issues. Overall, the plan covers most limiting factors aside from the Locks and there is strong staffing and governance in the watershed. The reviewers recognize that like WRIA 9, the tribes are not present at the table but engage in other ways, which may require regional attention.