

Summary of Science Related Comments on the *Action Agenda* and *Biennial Science Work Plan* for the Puget Sound Partnership

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Overview

The Puget Sound Partnership Science Panel greatly appreciates all the science-related comments submitted on the *Action Agenda*, *Biennial Science Work Plan*, and supporting information being developed by the Partnership to advance protection and recovery of the Puget Sound ecosystem (see Table 1 for list of *Action Agenda* and comment documents). Since the Partnership's inception, a great many people from federal and state agencies, Tribes, local governments, non-governmental special interest groups, academic institutions, as well as private citizens have participated in the Topic Forums, Action Area Meetings, workshops, study sessions, public meetings of the Leadership Council, Ecosystem Coordination Board and Science Panel, and have provided comments on the *Action Agenda* and *Biennial Science Work Plan*. The Science Panel has taken these inputs into consideration while preparing the *Strategic Science Plan* (SSP, PSP 2010) and developing the overall framework for coordinating specific science activities needed to support the Partnership's efforts to protect and restore the Puget Sound

ecosystem. The Partnership's *Strategic Science Plan* is intended to be a high-level, living document that can be revised by the Science Panel as needed, while specific implementation of science work will be guided by the *Biennial Science Work Plan*, which lays out the initiatives and activities in the context of the two-year state budget cycle.

The Science Panel provides here a summary of the major science-related comments received by the Partnership during the public comment process. This science-focused document complements the *Action Agenda* comment-response summary developed by Partnership staff which is available, along with the full text of the comments at http://www.psp.wa.gov/aa_action_agenda.php (Table 1).

Comment Categories

The following are the categories of comments that were defined based on the issues and concerns raised by reviewers. For each category, the reviewers' concerns and issues are summarized. Comments are identified by the comment author(s), the list of commenters and affiliations is provided in Table 2, and selected quotations are provided as endnotes.

Actions Based on Science¹

A large majority of reviewers expressed the need for the *Action Agenda* to be based on science – that priorities and recommended action plans and statements about the health of the Puget Sound are scientifically sound (Agnew, Benze², Beatty, Flora, Lindquist, Miller³, Sims, Symonds, Sutherland), that decisions are informed and supported by science (Nickels⁴), and that adequate resources are applied to establish a robust research, monitoring, and data management program to support Puget Sound science (Benze, Dethier, Dierauf^{5,6}). Additionally, reviewers stressed the need for assumptions to be vetted with the scientific community, that the science be conducted "ahead of" new regulations and requirements (Agnew, Benze, Holmes), that the actions taken will address known threats, and priorities will be developed based on science (Key, Stevens⁷). Some reviewers recommended that the Partnership define up-front what a "healthy" Puget Sound really means (Fuerstenberg, Joerger) recognizing that a "healthy" ecosystem is value-laden (Beatty, Landis) and depends on the point of view of the observer.

Other reviewers stressed that science should be the foundation upon which the actions are built taking into account social equity and environmental justice (Sims), including transboundary efforts that could provide a framework for focused research (Gilardi and Gaydos⁸), identifying meaningful actions (Stevenson and Griffith⁹), and increasing the capacity of the region to conduct science (Schanfald¹⁰). Robert Fuerstenberg noted that science will be unable to overcome the "goal dissonance" or the existence of two mutually exclusive goals in "A. 1.1 ... implement[ing] a Soundwide vision for accommodating population and economic growth while protecting the Puget Sound ecosystem," and cautioned about including "population and economic growth objectives set against ecological ones"

(Fuerstenberg¹¹). While many reviewers embraced the concept of "ecosystem health" (Gilardi and Gaydos, Housekeeper, Nickels, Stevens, et al.) others cautioned that a "healthy" ecosystem is a value-laden nominative term that cannot be scientifically defined (Agnew, Beatty, Landis).

Actions in the Face of Uncertainty¹²

Some reviewers expressed concern that oversimplifying issues and jumping to presumed solutions would squander resources and create unintended consequences while others thought delaying actions to conduct more detailed studies would be imprudent and exacerbate problems. The Puget Sound is a complex system that must be understood to be managed properly (Benze, Ladenberg), cause and effect relationships must be elucidated (Benze, Nickels, Sims), and protection, restoration, science, and monitoring must be balanced by defining what is meant by success (Dierauf). High uncertainty requires invoking the precautionary principle to do no harm (Fuerstenberg, Schonfeld), however, the precautionary principle is counter to adaptive management (Benze, Flora), because adaptive management requires actions that can be evaluated. Further, regulations that are unsupported scientifically can eat up a lot of resources (Benze, Schnwacher) and regulation alone, without economic considerations will be insufficient for protecting ecosystems (Fuerstenberg, Symonds).

Reviewers expressed a need for the *Action Agenda* to promote working together, recognizing separate roles of the various stakeholders, to develop context-sensitive regulations and policies (Fuerstenberg) and implement "forward looking designing" rather than "backward looking restoring" projects (Gilardi and Gaydos). Where to start should be determined by what has the highest potential for impact, reasonable certainty of effectiveness, and will engage cooperation with Canada (Joerger, Miller). Reviewers recommended that a science-driven review of restoration projects be conducted (Lohn and Varanasi), and watershed based approaches be developed to address storm water, persistent, bioaccumulative and toxic compounds (PBTs), nutrients, enforcement, capacity building, monitoring and information management, communication, and accountability (Miller). The science program is focused around the goals defined in the Action Agenda, however the plan should be coupled with short-term actions needed to assess the current situation and inform near term actions (Copping¹³).

The *Action Agenda* also needs to include a scientific discussion of the most important threats facing Puget Sound and provide a timeline for availability of the risk assessment (Sims, Broadhurst, Downy, Stevens). Additionally, reviewers commented that the science questions should be defined by the user community (Nickels), the process for identifying focused research initiatives should be explained (Roberts), and that the proposed research focus should be applied to all runoff not just stormwater (Roberts). Reviewers recommend that the science strategy should utilize "multiple approaches and scales" (Roberts¹⁴), apply a broad ecosystem context rather than single sites for evaluating progress (Lohn and Varanasi¹⁵), and move from single-species salmon recovery to ecosystem recovery

(Nickels¹⁶) by building upon [Water Resource Inventory Area] WRIA salmon plans, "...which have a 10-year focus and rolling three-year work plans that are updated periodically" (Sims). In general, the main problems facing the Sound are known (Sims¹⁷) and existing support tools can be used to define appropriate actions (Stevens¹⁸), however, goals may not be compatible (Stevenson & Griffith¹⁹) and the Partnership should recognize that some areas are further along than others and should move forward as quickly as possible (Stevenson & Griffith²⁰).

Adaptive Learning²¹

Many reviewers stressed the importance of implementing an adaptive management and performance accountability system for the Partnership. Reviewers recommended clearly defining adaptive management and explaining how it will be used (Booth, Wright) and emphasized the need for real "active" adaptive management based on hypothesis testing as opposed to "passive" adaptive management (Booth²²). Adaptive management and the science behind it is critical to achieving the Partnership's goals (Dierauf, Housekeeper, Miller, Sutherland, Schwmacher²³) – especially a combination of passive and active adaptive management, where the "experimental, hypothesis-testing active approach [is used] only in those instance where uncertainty is high" (Sutherland²⁴).

Reviewers also commented that the adaptive management system should be used to develop a road map for actions (Miller), enable "plan[ning] with [the] end in mind" (Sims), and that implementation of adaptive management for the Partnership should incorporate lessons learned from Forest and Fish program (Weiss²⁵). Reviewers noted that the details on systematic sampling and accounting are lacking in the Action Agenda (Brewer), that accountability needs to be built into the system (Broadhurst, Cantrell, Dethier, Joerger) and should be in place before broad or costly actions are implemented (Schwmacher). Dierauf²⁶ noted that adaptive management will take more time than the biennial cycle; it will require trial-and-error, and monitoring to determine "how things came out" (Flora²⁷). The adaptive management framework should also be used to develop the linkage between goals and actions and performance (Gilardi and Gaydos, Joerger, Miller, O'Neill) and provide an overall strategic map and performance measures to know if we are making progress in the right direction (Sims²⁸, Stevens²⁹).

Actions that are Cost Effective³⁰

Many reviewers commented that costs, return on investments ("bang for the buck"), and fairness of who has to pay are important determinants in setting priorities and initiating actions, and therefore, scientifically valid methods for valuation are needed to support implementation strategies. Reviewers commented that scientific evidence and cost or return on investment is needed for Actions, i.e. cost-effective actions that achieve real improvements (Symonds, Sims³¹), the need for science to support cost-benefit analysis of [costly] technologies and regulations (Benze, Holmes, Housekeeper, Ladenberg, Symonds), and that limited

resources begs for efficiency (Ladenberg). The protection of private property (Agnew³²) and effective use of market systems (Benze, Castle³³) were identified as important in gaining buy-in and acceptance by a wide range of the population. The ability to value nature (Gilardi and Gaydos) and conduct socio-economic research to determine cost-effective approaches and incentives (Miller³⁴) that includes working agricultural and forest lands (Stuart³⁵) were also identified as important in achieving implementation objectives.

Concern was raised about the high economic cost of "revitalizing" waterfront and urban areas (Stevenson and Griffith³⁶) while achieving little in terms of improved environmental quality. Others commented that the science basis for water quality trading could achieve "early" load reductions, reduce cost, act as incentives, offset future discharges, achieve greater environmental benefit, and could include habitat restoration (Ladenberg, Pranger). Examples of science-based alternative regulatory strategies includes the Navy's ENVVEST Phase II proposal (Symonds), using a TMDL approach to provide the framework needed for trading (Miller³⁷), and revamping the regulatory structure to allow innovative approaches based on science such as pollution trading, wetlands banking, and alternative in-water remedies that will allow resources to be focused where they can do the most good (Schwnacher,³⁸ Haub³⁹). However, Ecology commented that, in their experience, pollutant trading hasn't achieved real improvements in environmental quality (Manning⁴⁰) and a rigorous stakeholder process would be needed to fully evaluate the benefits of such a program (Stevens⁴¹).

Indicators, Benchmarks, and Targets⁴²

Many reviewers weighed in on the current status of indicators, benchmarks, and targets needed to guide Puget Sound protection and recovery. Comments ranged from concerns about specific indicators and/or alternative indicators to the framework, interpretation, and how the indicators will be used. Some reviews urged the Science Panel to assure "good" indicators are chosen that are linked to the actions (Dethier, Joerger), with benchmarks and targets tied directly to actions and accountability metrics (Trim). Other reviewers commented that the scientific basis for the provisional indicators needs improvement (Lohn and Varanasi⁴³, Miller, O'Neill, Schanfald, Sims, Starling, Stevens, Stevenson and Griffith), that some of the provisional indicators were conflicting (Benze) and were not linked to testable hypothesis (Booth). Recommendations included selecting indicators that build on the existing transboundary indicators (Kluckner⁴⁴, Miller), developing indicators that include both extent and quality (Brewer, Orians), identifying indicators based on desired ecosystem outcomes rather than what is considered achievable (Stevens⁴⁵), and providing more detail and transparency on the indicator selection process (Stevens⁴⁶). Additionally, the indicators themselves should be value-neutral; it is the results or trends that are open to interpretation (Orians, Orians et al. 2000).

Many other indicators were identified including steelhead trends (Brewer), summer chum recovery targets in Hood Canal (Brewer), invasive species (Brewer),

habitat and land conversion rates (Brewer), marbled murrelet (Cantrell⁴⁷), status and trends of multiple species (Cantrell), the number of sport/shell fishing days (Dewey), forage fish spawning success, rockfish populations, public awareness, increases in pervious surface, and growing working forests and farmlands (Broadhurst); Chinook targets and recovery plans for killer whales and salmon (Lohn and Varanasi), harbor seals for pelagic species (Gibaldi and Gaydos) as well as the status and trends of many other species needed to understand ecosystem processes (Cantrell⁴⁸). Other reviewers commented that more work on indicators was needed (Dierauf, Lohn and Varanasi), that the scientific justification/rationale for indicators, should not rely on migratory species (Cantrell), and that indicators should be expanded to include short term and long term indicators with threats accurately defined (Dierauf). The risk of multiple chemicals on marine and forage fish was not discussed in the Action Agenda as an indicator (McCollum) and linking the indicators to components of the adaptive management system (Stevens⁴⁹) is also critically needed.

Ecosystem Perspective⁵⁰

Many reviewers commented on the need for an ecosystem approach that includes the entire Salish Sea, is coordinated with Canada, and addresses multiple spatial and temporal scales. The ecosystem includes the entire Salish Sea (Webber⁵¹, Broadhurst, Gibaldi and Gaydos) therefore the science strategy should focus on the Salish Sea (Gibaldi and Gaydos⁵², Miller⁵³). Reviewers recommended that watershed recovery plans should make use of the regional habitat protection decision-making framework (Brewer, Miller) that could be used to develop the "criteria for high-risk habitat protection" (Sutherland). Reviewers also wanted the Partnership to follow through on development of the integrated ecosystem assessment (IEA) (Miller), apply better science in land use policies and zoning (Sims), and recognize that ecosystem management is "place-based" requiring knowledge of ecosystem structure and function for a defined area (Webber⁵⁴). Ecosystem management is more than just salmon recovery and should include other important parts of the ecosystem including sea birds, forage fish, and rockfish (Broadhurst). The *Action Agenda* should also address ecosystem resilience and adaptation (Broadhurst, Gibaldi and Gaydos), upland environment (Cantrell) including low elevation forests, oak woodlands, and prairies (Dierauf), as well as urban habitats (Cantrell) and groundwater (Dierauf).

Some reviewers commented that the scientific basis of the *Action Agenda* needs more emphasis on ecosystem management (Fuerstenberg⁵⁵) with a focus on conserving entire functioning landscapes rather than single species or habitats (Fuerstenberg⁵⁶), correctly identifying the units of conservation: habitat (patch) > ecosystem > landscape > ecoregion, with an emphasis on knowing what is there and where they occur (Fuerstenberg⁵⁷), defining ecodistricts as units of land use for management, and developing ecosystem/landscape scale analyses to cover trade offs between ecological protection and economic benefits (Fuerstenberg). Protected areas must also consider the lands surrounding the protected areas

(Fuerstenberg). Reviewers recommended that the *Action Agenda* apply the 3r's for ecosystem protection - replication, representation, and resilience (Fuerstenberg), and address integrity - what is extra (invasive spp) and what is missing (endangered spp), resilience - how close to collapse or alternate states, and fragmentation (10 principles of healthy ecosystems Gilardi and Gaydos, Housekeeper). The *Action Agenda* should also recommend incorporating long-term stewardship into cleanup and mitigation projects (Lohn and Varanasi).

Reviewers also noted the conflict between protection of ecosystem function and structure and economic development. For example, levy maintenance for flood protection is counter to recovery of ecosystem function. Further, assuming that development "actions are mitigatable and therefore without consequence is to misapprehend ecosystem management and allow for further degradation and the further erosion of sustainability" (Fuerstenberg). Additionally, the *Biennial Science Work Plan* "fails to incorporate the correct social science perspective on human well-being. It also identifies research priorities that have the potential to produce biased results" (Plummer⁵⁸). This bias can be reduced by developing trade offs among the full set of human well being determinants and showing how various policies affect the incentive of individuals (Plummer⁵⁹). In this way the *Biennial Science Work Plan* can account for links to human well-being, including unintended consequences (Plummer).

Effective Coordinated Regional Monitoring⁶⁰

Reviewers clearly stated the need for an effective and coordinated regional monitoring and assessment program for the Salish Sea ecosystem. Reviewers stressed that assessment and evaluation is a critical component of adaptive management, monitoring for effectiveness (Dierauf, Grunenfelder⁶¹), and improved strategies to develop an integrated and coordinated regional monitoring are greatly needed (Dierauf, Greis, Lohn and Varanasi, Miller, Nickels⁶², O'Neill, Symonds, Sutherland, Schnwacher⁶³). The monitoring strategies should take advantage of local knowledge and expertise in conducting the monitoring program (Chitwood⁶⁴), including counterparts in Canada (Kluckner⁶⁵) and short-term actions to address effectiveness of actions that are already being taken (Weller⁶⁶).

The monitoring consortium is a pool of scientific experts working to increase the capacity to carry out monitoring in the Puget Sound region (Dinicola⁶⁷). Currently the monitoring consortium is working on governance and strategies for implementing an ecosystem based regional monitoring program for the Puget Sound (Dinicola) including a Stormwater Work Group that is developing pilot studies for implementation (Ecology 2010). Reviewers urged the Partnership to support ongoing monitoring programs and make a decision on the governance structure of the monitoring program (Dinicola, Grunenfelder). Improved strategies for well designed and funded, regionally coordinated monitoring are needed for stormwater and other sources, and to integrate water quality, habitat, and other ESA monitoring requirements so that "duplication is eliminated between municipal, county, state, tribal, and federal monitoring programs" (Dierauf, Lohn and

Varanasi, Miller, Babcock⁶⁸). Additional comments stated that the Partnership should build on accomplishments of Puget Sound Nearshore Ecosystem Restoration Partnership (PSNERP 2010, Ladenberg), monitoring requirements should drive research priorities (Dierauf), and that regional monitoring should be conducted in coordination with National Pollution Discharge Elimination System (NPDES) monitoring requirements to shift the focus from permits to the Puget Sound ecosystem (Stevens⁶⁹).

Collaboration and Coordination⁷⁰

Collaboration and coordination among stakeholders, local, state, and federal jurisdictions, and other participating groups will be critical to the success of the Action Agenda. Many reviews commented that ecosystem recovery efforts should make use of locally-based citizen stewardship such as the Northwest Straits Commission (NWSC) and Marine Resource Committees (MRCs, Broadhurst), SeaDoc Society, Sea Grant, Tribes, state and federal agencies, Canadian counterparts (Gilardi and Gaydos⁷¹), and regional fisheries enhancement groups (Beatty). Some reviewers felt that the *Action Agenda* lacked an understanding of the local capacity to “address and implement the Action Agenda” (Brewer), that efforts should be implemented to increase the capacity for improved science products in the region (Dethier). The proposed RFP process can be effective in selecting high quality science (MacCready, Copping⁷²), however the RFP process tends to promote competition and there is a need to fund key implementers and data gatherers at the local level to increase cooperation (Ladenburg).

Reviewers noted that there is a great pool of scientific experts and capacity to conduct science within the region (including Canada) (Dinicola, Gilardi and Gaydos) as well a local cities and counties which should be coordinated in a “bottom up” approach to take advantage of local knowledge and resources (Nickels,⁷³ Ladenberg), and leverage ongoing work such as Ecology’s South Puget Sound Dissolved Oxygen Study (Roberts).

Science and Technology Support System⁷⁴

Reviewers stressed the need to integrate the latest scientific and technical advances into Partnership's program and make the methods, tools, and results available to implementers. Reviewers wondered how well science will be integrated into the process for selecting priorities (Ladenberg, Sims), whether new construction methods and practices will improve ecological process (Agnew), and whether the science needed to support restrictions on over water structures and developments was adequate (Brewer). Some reviewers cautioned that science questions can't really be addressed in broad strokes, rather the science needs should be addressed on a site-by-site basis within the context of cumulative stressors and with an emphasis on reducing net impacts (Booth). Access to principal or senior scientists as technical experts that could assist on technical issues was identified as a good idea (MacCready, Roberts) and the importance of a rigorous peer review process was echoed by many reviewers (Benze, Dewey,

Dierauf, Mumford, MacCready, Possinger), although the Science Panel should be clear about the amount of time required to complete a rigorous peer review process (Dierauf).

A clear theme among reviewers was that the Partnership should build and sustain (fund!) the regional capacity to conduct science (Benze), by connecting to the larger scientific community (Booth, Gilardi and Gaydos), developing a process to define priorities and science-based guidance (Booth, Flora), and utilizing the scientific community and experts in developing the criteria for protecting high value ecosystem (Fuerstenberg) and improving the permitting process (Booth). Reviewers also commented that the Partnership should establish and publish the science record (Housekeep, Mumford, MacCready), provide technical support for evaluating and testing new technologies (Broadhurst, Haub, Hinman, Joerger, Lindquist, Schanfald,⁷⁵ Winters), provide technical support for clean ups (McCollum), stormwater management technology including monitoring (Dinicola⁷⁶), science based performance analysis of Low Impact Development (LID) techniques (Broadhurst, Haub⁷⁷, Hinman, Joerger), and the establishment of an LID center for research (Hinman⁷⁸).

Other reviewers commented that the Partnership should evaluate and recommend new technologies, for example: substitutes for priority pollutants, PBTs, and emerging chemicals (Nickels,⁷⁹ Stevens); conservation technologies such as waterless urinals (Dewey); standards for forest conversion (Downy); improved onsite sewer systems (Haub, Morse); clean up of oil spills and runoff (Peace); promote applications of new and innovative techniques for spectral imaging (Watts); and developing the scientific basis for land cover targets that takes into account climate change and addresses ecological processes (Fuerstenberg). As written, the Action Agenda gives impression that everything is known and "tools are already in place" (Booth⁸⁰).

Research Priorities⁸¹

Although the *Biennial Science Work Plan* identifies four areas of focused research, reviewers stated that the science program needs a prioritized ranking of research needs to support restoration and recovery of the Salish Sea Ecosystem (Gilardi and Gaydos⁸²). The scientific program needs to assure that there is an appropriate balance of applied research conducted in support of regulatory decision needs and basic research (Miller⁸³), with the primary focus on answering key policy questions (Nickels⁸⁴) like toxics reduction (Stevens,⁸⁵ Wright⁸⁶), social-marketing research to identify actions that would have broad public support (Stevens⁸⁷), and conducted within the context of an altered, built environment that will be constantly changing requiring a system-wide applied research to support monitoring and management (Processinger,⁸⁸ Haub⁸⁹).

Reviewers recommended more socioeconomic research to develop economic incentives to preserve and restore the Puget Sound (Talcott⁹⁰), measure and track its natural capital (Nickerson^{91,92}), and build the social and economic systems that

will be needed to support (i.e., pay for) Puget Sound recovery (Rogers,⁹³ Pranger⁹⁴).

Other technical areas for research identified by reviewers included conducting a review of sediment management standards (Greis⁹⁵), assessing the impacts on forage fish crucial to understanding the Puget Sound food web (Stevens⁹⁶), developing a pilot project to address mitigation on a watershed scale (Stevens⁹⁷), establishing the capability to respond to pathogen outbreaks (Wood⁹⁸), and conducting priority investigations on specific chemicals and contaminants so that they could be replaced and banned (Nickels).

Climate Change and Other Emerging Issues

A series of issues were identified that were not addressed by the *Action Agenda* or *Biennial Science Work Plan* including:

- Impacts of climate change (Brewer, Schanfald, Stevens⁹⁹), sea level rise, and ocean acidification (Broadhurst, Downy¹⁰⁰, Feely¹⁰¹)
- Clarify which threats are due to climate change and which result from human activity (Broadhurst¹⁰², Downy, Sims, Stevens).
- Raw and untreated sewage discharge from boats (Broadhurst)
- Impacts of derelict gear were not addressed even though scientific basis is established and well vetted (Broadhurst)
- Ballast water and invasive species (Cantrell)
- Biotoxins and link to eutrophication (Dewey)
- Importance of groundwater, impacts to water supply, and how to increase water reuse (Schanfald,¹⁰³ Dierauf)
- Air pollution/deposition (Dierauf¹⁰⁴, Joerger)
- Wildlife health (Gilardi and Gaydos)
- Expect extremes (Gilardi and Gaydos)
- Impacts of fish pens, shellfish farming, and other aquaculture (Schanfald,¹⁰⁵ Dewey, Downy)
- Wastewater discharges and biosolids and solid waste disposal (Schanfald)
- Cumulative impacts (Starling)

Modeling and Knowledge Integration¹⁰⁶

Reviewers commented that modeling and knowledge integration tools such as forecasting future scenarios would be very important to the success of the Partnership's initiative. A variety of modeling approaches and tools including conceptual models of ecosystem processes are needed and modeling is essential to understand complex systems (Benze, Dierauf¹⁰⁷, Flora¹⁰⁸, MacCready). Modeling approaches are needed to support urban recovery (Cantrell) and revitalizing waterfronts (Haub) as well as restoration and protection of rural areas. The Partnership should "not rely solely on one model" (Dierauf¹⁰⁹), as all models have limitations and biases.

Reviewers also noted that there is strong need for linkages between the indicators and proposed actions including future scenarios (Kluckner,¹¹⁰ Drewel¹¹¹,

Haub¹¹²), watershed processes including groundwater (Dierauf), food webs (Dierauf, Gilardi and Gaydos, MacCready) – especially rates and processes (MacCready¹¹³), basin-wide dissolved oxygen modeling (Haub, Roberts), and expanded use of modeling (Roberts¹¹⁴) for management actions such as developing habitat protection standards (Stevens¹¹⁵).

Data, Data, and More Data¹¹⁶

The Partnership must have an effective data management system that provides access to data from current and historic monitoring, assessments, modeling, and research studies. Many reviewers noted that the goals of the Partnership demand the establishment of an information management system that will include existing and historic data (Dethier), qualitative and anecdotal information (Dierauf, PSP 2009a), as well as hard data on how the Puget Sound/Salish Sea works (Flora¹¹⁷). The system should provide a baseline data for marine, freshwater, riparian, wetland, and upland ecosystems (which may all require different schemas or database structures), and user friendly GIS interfaces to locally identify data gaps (Key). The system should be flexible enough to share data and knowledge across the transboundary region (Kluckner, Gilardi and Gaydos), include performance management data to determine if actions are making a difference (Joerger¹¹⁸), and house data on programmatic and administrative information (Deithier).

Reviewers agreed that an effective information management system is needed to archive and make technical data, analysis, and reports readily available (Housekeeper, MacCready, McCollum, Schanfeld, Wright). Reviewers also urged the Partnership to move forward in developing a data exchange network (Manning,¹¹⁹ Brastad), and utilize science-based status and trends and tools similar to Environmental Knowledge Organizer (EKO) developed by Paladin Systems (Paladin Systems 2009, McCollum). Because the information management requirement is so huge, a reviewer recommended "Find[ing] a particular kind of data AND a particular user that needs it, and then work out the management system to help. Don't try to manage all the data for (an undefined) everyone" (MacCready). Others wondered whether existing data management networks will be modified to "focus on Puget Sound's needs, or is it mentioned here as an example of architecture?" (Roberts). Finally, the need for a transparent and accessible data management system cannot be over stressed (Stevens¹²⁰).

Education, Training, and Outreach¹²¹

An effective education, training, and outreach program is a critical component of success in achieving the Partnership's goals (Ladenberg, PSP 2009a). Reviewers recommended using the existing educational infrastructure to expand public education and outreach (Broadhurst, Haub,¹²² Brastad¹²³), especially coordinating volunteers through education and outreach programs (Stevens) and increasing the capacity for citizen science (PSP 2009a, Racine¹²⁴). The Partnership needs a focused emphasis on education, as education is the key to making real change occur within the region (Nickels¹²⁵, Sims¹²⁶, Haub, Spangler¹²⁷). There is an urgent

need to expand education and training opportunities for K-12, undergraduate, and graduate studies, especially in community and technical colleges to train the engineers and technicians needed for storm and waste water programs, GIS Techs, code enforcement officers, and inspectors for the local community" (Olsen¹²⁸). An educational road map for natural science, social science, and technology is needed (Stevens¹²⁹) to develop a sustained, technically accurate public information outreach program (Greis¹³⁰) and educate the public on technical issues facing the Puget Sound/Salish Sea ecosystem (Wood¹³¹).

Loose Ends¹³²

Additional comments were made that didn't fit into the categories described above. These included technical as well as administrative issues. Reviewers noted that it should explained that the *Biennial Science Work Plan* uses the Washington State fiscal period (Dierauf), explain what "developing and demonstrating capabilities" means and why (Dierauf), define the make up and structure of Science Panel (Wood¹³³), and more clearly define the role of the Science Panel and what they can actually accomplish (Booth). Reviewers noted that the Science Panel needs a mission statement, a set of bylaws, and an organizational structure upon which the Science Panel operates (Ufnar¹³⁴) and questioned whether the current make-up of the Science Panel is even capable of leading ecosystem restoration within the region (Booth¹³⁵). Other reviewers stressed the need for the use of common language, and suggested that an expanded glossary of terms and references be included in the *Biennial Science Work Plan* (Ladenburg) "because different organizations and people define both science and research differently" (Roberts).

Concluding Remarks

We greatly appreciate the effort and high level of interest of all the reviewers who provided science-related comments on the *Action Agenda, Biennial Science Work Plan*, and supporting information developed to describe the science program for the Puget Sound Partnership. Based on these inputs and reviews, we have strengthened the *Strategic Science Plan* to emphasize the need to support actions based on science and implement actions in the face of uncertainty by applying adaptive learning. Within the Partnership, the Science Panel is supporting efforts to develop procedures needed to better identify actions that are cost effective. We have also received comments on how to define and implement indicators, benchmarks, and targets, maintain an ecosystem perspective, develop effective coordinated regional monitoring, and obtain collaboration and coordination for a relevant and responsive science and technology support system for the Puget Sound/Salish Sea ecoregion. Additionally, reviewers provided recommendations on how to identify research priorities, address climate change and other emerging issues, effectively apply modeling and knowledge integration, assure timely and

easy access to technical data and information, and foster improved education, training, and outreach activities.

We have taken these inputs into consideration while preparing the *Strategic Science Plan* and developing the overall framework for coordinating specific science activities needed to support the Partnership's efforts to protect and restore the Puget Sound and Salish Sea Ecosystem. As part of the *Strategic Science Plan* we incorporated guiding principles for using science to guide ecosystem recovery: expect surprises (follow the data not conventional expectations), integrate the science (collaboration across science disciplines, geographic, and political boundaries), seek scientific common ground (agreement on facts and investigations needed to fill gaps), acknowledge the limits of science (clearly identify uncertainties and confidence in conclusions), and do not delay (apply adaptive management to advance learning). A critical aspect of the *Strategic Science Plan* is the integration across assessment, monitoring, and modeling activities to summarize knowledge, propose hypotheses, and provide forecasting capabilities needed to inform the decision making process (Costanza et al. 2002).

We also urge the broader scientific community to engage in the Partnership's science program through participation in technical working groups and peer networks and by performing directed studies on behalf of the Partnership, responding to RFPs for specific projects, leveraging ongoing and proposed work by aligning with the Partnerships goals and objectives, supporting internships and rotational assignments for Partnership projects, sponsoring or mentoring student scholarships and fellowships, and assisting in technical- and peer-review of Partnership science proposals and products. We hope that this document helps achieve feedback to the broader scientific community and shows that we are open and responsive to suggestions on how to improve the scientific and technical capacity needed to support conservation and recovery of the Puget Sound/Salish Sea ecosystem.

Respectfully submitted
March 26, 2010

Puget Sound Partnership Science Panel

Timothy Quinn (Chair)

Joel Baker (Vice-Chair)

Joseph Gaydos

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Katherine Wellman

Citations

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[http://www.psp.wa.gov/downloads/SP2009/IndicatorSummaryReport\(Final\)120108.doc](http://www.psp.wa.gov/downloads/SP2009/IndicatorSummaryReport(Final)120108.doc)
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- (PSNERP) Puget Sound Nearshore Ecosystem Restoration Project 2010. <http://pugetsoundnearshore.org/>
- (PSP) Puget Sound Partnership 2009a. [Action Agenda Comment-Response Summary 05/09](http://www.psp.wa.gov/downloads/LC2009/0509/03CommentSummaryCompleteFINAL.pdf).
<http://www.psp.wa.gov/downloads/LC2009/0509/03CommentSummaryCompleteFINAL.pdf>
- PSP 2010. Strategic Science Plan. January 2010 Review Draft. Prepared by the Puget Sound Partnership Science Panel. Puget Sound Partnership. Olympia, Washington. <http://www.psp.wa.gov/scienceplan.php>

Tables

Table 1. Summary of Action Agenda and comment documents (Updated Aug 8, 2009).

http://www.psp.wa.gov/aa_action_agenda.php

Updated Action Agenda (posted May 27, 2009)

http://www.psp.wa.gov/downloads/LC2009/0509/03_Updated_Action_Agenda.pdf

COMMENT SUMMARIES

Science Comments (14 Mb PDF provided by S. Redman)

draft action agenda comments_11-23 scienceRKJ.xls (excel file of complied comments provided by S. Redman)

[Cities](#) (PDF)

[Citizens](#) (PDF)

[Counties](#) (PDF)

[Federal Agencies](#) (PDF)

[Interests](#) (PDF)

[Other Governmental or Special District](#) (PDF)

[State](#) (PDF)

[Tribes](#) (PDF)

[NEP](#) (PDF)

ADDITIONAL DOWNLOADS

[Action Agenda Comment-Response Summary 05/09](#) (PDF)

[Action Agenda \(2008\)](#) (PDF)

[Action Area Profile Tables 11x17](#) (PDF)

[2009-2011 Biennial Science Work Plan](#) (PDF)

[DNS](#) (PDF)

[Final SEPA checklist](#) (PDF)

[Action Area maps](#)

APPENDICES

[Funding Strategy Work Products](#) (PDF)

[New Innovative Funding Sources, December 2008](#)

[Estimates of Spending Related to Puget Sound, January 2009](#)

[Public Involvement & Outreach Summary](#) (PDF)

[Threats and Drivers summary](#) (PDF)

[Topic Forum Materials](#)

Table 2. List of Reviewers and Commenters.

Author	Organization	Type	Source
Agnew, Richard	Shoreline Property Owners and Contractors Association	NGO Envir	Comment on Draft AA/BSWP
Babcock, Elizabeth	National Oceanic and Atmospheric Administration (NOAA)	Govt. Fed	spreadsheet summary
Beatty, David	Nooksack Salmon Enhancement Association	NGO Envir	Comment on Draft AA/BSWP
Benze, Bob	Kitsap Alliance of Property Owners	NGO Envir	Comment on Draft AA/BSWP
Booth, Derek	Stillwater Sciences	Consultant	Comment on Draft AA/BSWP
Brastad	Washington State Environmental Health Directors	Govt. State	Comment on Draft AA/BWSP spreadsheet summary
Brewer, Scott	Hood Canal Coordinating Council	Govt. Local	Comment on Draft AA
Broadhurst, Ginny	Northwest Straits Commission	Govt. Local	Comment on Draft AA
Cantrell, Shawn	Seattle Audubon Society	NGO Envir	Comment on Draft AA/BSWP
Castle, Art	Kitsap Homebuilders Association	NGO Industry	Comment on Draft AA/BSWP spreadsheet summary
Chitwood, Scott	Jamestown S'Klallam Tribe	Govt. Tribe	spreadsheet summary
Dethier, Megan	Citizen	Citizen	Comment on Draft AA/BSWP
Dewey, Bill	Taylor Shellfish Farms	NGO Industry	Comment on Draft AA/BSWP
Dierauf, Leslie A	United States Geological Survey (USGS), Northwest Area Office	Govt Fed	Comment on Draft AA/BSWP
Dinicola, Karen	The Puget Sound Monitoring Consortium's Governance Committee	Govt State	Comment on Draft AA/BSWP
Downey, Robin	Pacific Coast Shellfish Growers Association	NGO Industry	Comment on Draft AA
Drewel, Bob	Puget Sound Regional Council	Govt. Local	spreadsheet summary
Feely, Richard	NOAA	Govt. Fed	Comment on Draft AA/BSWP SP Meeting May 8, 2009
Flora, Don	Citizen	Citizen	Comment on Draft AA/BSWP
Fuerstenberg, Robert	King County	Govt. Local	Comment on Draft AA
Greis, Thomas	Washington Department of Ecology (Ecology)	Govt. State	Comment on Draft AA/BSWP spreadsheet summary
Gilardi, Kirsten and Joseph Gaydos	University of California Davis, The SeaDoc Society	Academic	Comment on Draft AA/BSWP
Grunenfelder, Gregg L.	Washington Department of Health (WDOH)	Govt. State	spreadsheet summary
Haub, Andy	City of Olympia	Govt. Local	Comment on Draft AA/BSWP

Hinman, Curtis	Washington State University (WSU) Extension	Academic	Comment on Draft AA/BSWP
Holmes, Frank	Western States Petroleum Association	NGO Industry	Comment on Draft AA/BSWP
Housekeeper, Brandon	Washington Policy Center	Govt. Local	Comment on Draft AA/BSWP
Joerger, Sue	Puget Soundkeeper Alliance	NGO Envir	Comment on Draft AA/BSWP
Kluckner, Paul	Environment Canada	Govt. Int'nl	Comment on Draft AA/BSWP spreadsheet summary
Knackstedt, Mary	San Juan County - Marine Resources Committee	Govt. Local	Comment on Draft AA/BSWP spreadsheet summary
Key, Susan	San Juan Islands Conservation District	Govt. Local	Comment on Draft AA/BSWP
Landis, Wayne	Huxely College of the Environment, Western Washington University (WWU)	Academic	SP meeting of March 4, 2009
Ladenberg, John	Pierce County	Govt. Local	Comment on Draft AA/BSWP
Lindquist, Scott (Keith Grellner)	Kitsap County Health District	Govt. Local	Comment on Draft AA/BSWP
Lohn, Robert and Usha Varanasi	NOAA, National Marine Fisheries Service	Govt. Fed	Comment on Draft AA/BSWP
MacCready, Parker	University of Washington	Academic	Comment on Draft AA/BSWP
Manning, Jay	Ecology	Govt. State	Comment on Draft AA/BSWP spreadsheet summary
McCollum, Paul	Port Gamble S'Klallam Tribe	Govt. Tribal	Comment on Draft AA/BSWP
Miller, Elin	United States Environmental Protection Agency Region X	Govt. Fed	Comment on Draft AA/BSWP
Morse, Ken	Net Septic	Industry	SP Meeting Aug 6, 2008
Mumford, Tom	Washington Department of Natural Resources (WDNR)	Govt. State	SP Meeting Aug 6, 2008
Nickels, Gregory	City of Seattle	Govt. Local	Comment on Draft AA/BSWP
Nickerson, Donna	Citizen	Private	Comment on Draft AA spreadsheet summary
Orians, Gordon	Washington Academy of Sciences	Academic	SP Meeting Mar 10-11, 2009; SP Meeting Jun 24, 2009
Olsen, Stan	Kitsap County Surface and Stormwater Management	Govt. Local	Comment on Draft BSWP, spreadsheet summary
O'Neill, Sandie	NOAA	Govt. Fed	Comment on Draft AA/BSWP
Peace, Herb	EcoTech	Industry	SP Meeting Aug 6, 2008
Plummer, Mark	NOAA	Govt. Fed	Comment on Draft AA/BSWP
Weller, Chris	Point No Point Treaty Council	Govt. Tribe	spreadsheet summary
Possinger, Jeffrey	King County Conservation District	Govt. Local	Comment on Draft AA/BSWP, spreadsheet summary
Pranger, Denise	Northwest Natural Resource Group	NGO Envir	Comment on Draft AA/BSWP

PSP 2009a	Puget Sound Partnership Action Agenda Comment-Response Summary posted 05/09	Govt. State	Response to comments on AA/BSWP and NEP
Racine, Michael	Washington Scuba Alliance	NGO Envir	Comment on Draft AA/BSWP spreadsheet summary
Roberts, Mindy	Ecology	Govt. State	Comment on Draft AA/BSWP
Rogers, Karen	Association of Washington Cities	Govt. Local	Comment on Draft AA/BSWP spreadsheet summary
Schanfald, Darlene	Olympic Environmental Council	NGO Envir	Comment on Draft AA/BSWP
Schnwacher, David	The Boeing Company	Industry	Comment on Draft AA/BSWP spreadsheet summary
Sims, Ron	King County	Govt. Local	Comment on Draft AA/BSWP
Skahill, Brian	US Army Corps of Engineers	Govt. Fed	Comment on Draft AA/BSWP
Spangler, Jon	City of Redmond	Govt. Local	spreadsheet summary
Starling, Alison	Save a Valuable Environment:	NGO Envir	Comment on Draft AA/BSWP
Stevens, Naki	People for Puget Sound	NGO Envir	Comment on Draft AA/BSWP
Stevenson, Pat and Jason Griffith	Stillaguamish Tribe	Govt. Tribal	Comment on Draft AA/BSWP
Stuart, Don	American Farmland Trust	NGO Industry	Comment on Draft AA/BSWP spreadsheet summary
Sutherland, Doug	WDNR	Govt. State	Comment on Draft AA/BSWP
Symonds, James	Dept. of Navy	Govt. Fed	Comment on Draft AA
Talcott, Mark	Citizen	Private	Comment on Draft AA/BSWP spreadsheet summary
Trim, Heather	People for Puget Sound	NGO Envir.	SP Meeting Aug 6, 2008
Ufnar, Daniel	Certified Professional Soil Scientist (CPSS)	NGO Professional	SP Meeting Apr 29, 2009
Watts, Lou	Citizen	Private	SP Meeting Apr 15-16, 2008
Webber, Burt	Huxely College, WWU	Academia	SP meeting Mar 10-11, 2009
Weiss, Josh	Washington Forest Protection Association	NGO Professional	Comment on Draft AA/BSWP spreadsheet summary
Winters, Nancy	Citizen	Private	Comment on Draft AA/BSWP spreadsheet summary
Wood, Bob	Citizen	Private	Comment on Draft AA/BSWP
Wright, Terry	Northwest Indian Fisheries Commission	Govt. Tribal	Comment on Draft AA/BSWP spreadsheet summary

Endnotes

Specific comments

¹ Actions Based on Science

² "To improve the health of the Sound, we have to spend a lot of money on a scientific, interactive program that begins with extensive information gathering. This is not recognized by the Action Plan, "adaptive management" notwithstanding. There is a lot more that we don't know than we do know about the Puget Sound system – and we need to spend a lot more time and effort making observations and gathering information before recommending any significant actions to adaptively manage" (Benze).

³ "Need to scientifically support with data all assertions about the state of Puget Sound's health; it's understandable that the Partnership wants to take actions immediately, but unless sound data are used to guide decisions about which problems to tackle first and to identify what the cause of each problem is, then actions may not be supportable, and could be challenged. Basically, need to document/provide supporting evidence, for all statements about Puget Sound's health" (Miller).

⁴ "[Continually improve the scientific basis for management actions through a comprehensive and prioritized regional science program] is very important and has not been a large part of the materials presented to date. We would also suggest including an evaluation of how science is being used to inform decisions and to identify actions that can be taken to promote greater use. Scientific, research and pilot project/study capacity needs to be enhanced and PSP should look to partner with Seattle and other local governments in these areas. Along with taking action to address known problems, there is a need to develop a better understanding of cause and effect relationships between human impacts and the biota in order to guide prioritization of future actions. We would recommend including a strategic priority centered on learning or adaptive management" (Nickels).

⁵ "We will need a robust research, monitoring, and data management program to learn from our restoration efforts and to be accountable to the public. We must manage development. However, we must commit to doing things differently in order to ensure that the Partnership does not simply document the decline of Puget Sound species and habitats. We need action and implementation to serve the needs of future generations" (Dierauf).

⁶ "Question 4, action table, priority D – no mention of a developing a robust Puget Sound research and monitoring program. Is this not a near term priority? If not, near term, when?" (Dierauf)

⁷ "It is important for the Partnership to promote an aggressive new retrofit program to address existing problems. This would involve establishment of new funding for this work, not simply "prioritizing" projects. Further, we are concerned that the prioritization be based on science, rather than just a policy that prioritizes urban areas across the board" (Stevens)

⁸ "...these efforts should be transboundary and include Canadian scientists, agencies, managers, Tribes, and policy makers. Such a collaborative effort will have several long-term benefits. First, a broad-spectrum integrated approach will help identify research that will provide information that is applicable to improving management or policy related to designing healthy ecosystems. Additionally, it will provide a list that multiple funding agencies can use. The Partnership will not be able to fund all of the research needed, but by having multiple organizations identify research needs at multiple levels, there will be broad-scale buy-in for other organizations to seek or provide funding for the identified needs. Finally, the identified needs would provide a foundation for the Partnership's RFP process" (Gilardi and Gaydos)

⁹ "The Stillaguamish Tribe has already given a lot to help recover fish and wildlife populations - they have not fished for Chinook salmon in twenty years! We would encourage the Partnership to hold other groups to the same level of sacrifice." (Stevenson & Griffith)

¹⁰ "Will broad-brushed action recommendations, of which there are many, undercut science? For instance, when you say "revitalize waterfront communities," where does science play a role on how sites may be

"revitalized?" This question can be asked for a great deal of recommendations and should be answered. ... we strongly endorse: implementing focused, well-balanced science programs to improve regional capacity to understand the ecosystem, [and] climate change programs to prepare adaptation strategies." (Schanfald)

¹¹ "... [A.1.1 ... implement a Soundwide vision for accommodating population and economic growth while protecting the Puget Sound ecosystem] statement as written is a classic example of "goal dissonance". Two competing and sometimes mutually exclusive goals in a single sentence that often make one or both of the goals virtually unattainable. This section is not the place to include population and economic growth objectives set against ecological ones." (Fuerstenberg)

¹² Actions in the Face of Uncertainty

¹³ "I want to commend the panel for creating a detailed plan in the limited time available and under serious staffing constraints. I find it difficult to evaluate the strength of the work plan without the backdrop of a strategic plan, although I fully understand the need to produce a working document in a timely fashion. For that reason I find I cannot make many specific comments or recommendations on parts of the plan; rather I would like to comment on what I see as the overall structure and scope of the plan. By organizing the science plan around the Puget Sound Partnership questions and purposes, the Science Panel has taken an important first step mapping the science to the appropriate remedial and conservation actions. The work plan focuses on understanding the ecosystem, and setting a baseline against which to measure future change. This approach, relying on a subset of current constructs through which the scientific community views the coastal ocean, has the potential to set in place a long-term framework that will allow better science to drive decision-making in future. The downside of the approach is that it is not coupled with any short-term specific actions that might allow better assessment of the present situation or produce actionable remediation and restoration of the Sound and watersheds" (Copping).

¹⁴ "... multiple approaches and scales are necessary. There is tremendous value in screening-level assessments at a rough scale to identify missing elements and the most important factors ..." (Roberts)

¹⁵ "The potential ecosystem scale effects of large actions should also be considered. By designing one or more of the large estuary restoration projects as experimental treatments that can be measured, scientists and resource managers would be better poised to answer whether actions work as planned; the role of nearshore biology, physical processes, and functions in the broader ecosystem context; and what findings can inform similar projects around Puget Sound" (Lohn and Varansi)

¹⁶ "However, we note that some of the actions important to restoring ecological function in more urbanized environments are missing, such as removal of fish passage barriers. Seattle is well positioned to demonstrate what is possible in restoring urban creeks and their wildlife – we are a good "pilot" area for a number of innovative efforts and research that could be applicable in other urban areas and where we could partner with the PSP. We also recommend that the PSP consider funding a series of smaller long-term pilot watershed restoration projects in both rural and urban areas around the Sound over a number of years in order to demonstrate what effective restoration looks like and provide a model for other areas. Restoration projects should include effectiveness monitoring that includes establishing a baseline and continues after construction. A top priority should be on developing and securing long-term sources of funding for related projects or projects along a stretch of river or shoreline. The ecosystem recovery goals of the PSP will require the completion of many large and complex protection and restoration projects that exceed the capabilities of the individual organizations that serve as project sponsors. These large-scale projects will require multiple sponsors, and will need to target multiple species. PSP can expedite the recovery process by helping the watershed groups transition from a single-species approach (e.g., Chinook salmon) to a complex multi-species effort" (Nickels).

¹⁷ "King County science staff agrees that habitat alteration and loss, pollution, [and] flow alterations are the three primary threats to the health of Puget Sound. ... The Science Plan suggests that substantial modeling and indicator development are needed in order to "understand" Puget Sound. This may be true

for select areas like the impacts of emerging chemicals and to create ongoing benchmarks of success or failure. However, the real threats to Puget Sound – overfishing, habitat and flow alteration, toxic stormwater, and toxic sediments – are well known. These issues are typically well documented, although those efforts are often not well known outside the responsible agency" (Sims).

¹⁸ "A watershed scale study of changes in land use patterns as related to the condition of aquatic habitat called for in (Question 3, p.5) already exists in the Snohomish Basin watershed characterization study conducted by Department of Ecology in 2000. This study became the basis of a decision support tool used to set priorities for wetland mitigation. This tool has been further developed by People for Puget Sound in the Puget Sound Blueprint, which includes Soundwide data sets. Overlays between these existing models and other decision support tools that focus more on biodiversity (TNC Ecoregional Planning Model), salmonid support (SSHIAP), and nearshore process protection and restoration (PSNERP) will be possible within the next six months when the Puget Sound Nearshore Ecosystem Strategic Needs geodatabase is completed. We recommend these decision support tools be acknowledged within the Action Agenda and recommended for completion and coordination to develop a comprehensive decision support system that can consider multiple prioritization factors across multiple scales and consider the benefits of multiple projects in proximity to one another. WDFW's Habitat Work Schedule is emerging as the most likely data framework to support this function." (Stevens)

¹⁹ "There is no historical precedence for restoring a large ecosystem while accommodating millions of new people. We emphasize the word restore here since the local watersheds are currently unable to maintain the status quo (forest cover, salmon numbers, impervious area, etc) with the current rate of economic activity. At certain level of humanity (any of our UGA's), ecosystem functions are lost, no matter how carefully development is constructed. Watersheds filled with low impact development and buffers are still not functioning compared to a forested landscape. What makes the Partnership so certain that the all of the AA goals are compatible? This assumption must be tested before society is told they can have it all-growth and ecological restoration. In our experience, the environment always suffers." (Stevenson & Griffith)

²⁰ Agenda details the "watershed characterizations" that are needed to prioritize restoration and protection actions, along with directing growth. In our experience, such an effort is not needed in the Stillaguamish and would further delay implementation of our Chinook Recovery Plan. This highlights a concern of ours that threads through the whole of the AA- the call for further studies. The AA mentions doing the best of the best, in the proper sequence, at the right location (which is true to an extent), but we really need to do a lot of restoration and protection work everywhere- after all, nearly the entire landscape sustained historical fish and wildlife populations. While we are not familiar with the other action areas, the Whidbey Basin has more than enough scientific groundwork for decades of restoration and protection work. Every year that passes without significant progress means many new missed opportunities (new subdivisions, more pavement, less forest cover, more infrastructure in the floodplain). The AA needs to recognize that some areas are further along than others, and can begin implementing more aggressively right away."(Stevenson & Griffith).

²¹ Adaptive Learning

²² [Adaptive management is] hypothesis-driven monitoring, beginning with the explicit understanding that any management action in such a complex, ill-defined system is by definition an experiment and that the first action is NEVER going to be in exactly the right direction. With a clear hypothesis and a well-chosen set of attributes to monitor, however, you should be able to get feedback sufficiently promptly to maintain, accelerate, or adjust your management actions to improve outcomes.."on the fly," so to speak. I know that you and your Science Panel (SP, hereafter) were given such information on adaptive management programs (and even some specifics); where did it go?" (Booth).

²³ "Boeing strongly supports the actions proposed in Priority E 1.2. and 3 which addresses the adaptive management systems to revise and adjust the Action Agenda and its implementation. These are the processes that must provide the accountability and transparency needed to allow for course corrections

based on science, changes in the environment and funding options. These processes should be in place first before substantive actions on new programs in the Action Agenda. Specifically we support: [1] An adaptive management approach to assessing progress and making revisions to plan based on better information, [2] accountability based on scientific results presented in understandable and defensible values (metrics), [3] a focused scientific program to develop appropriate measurement of effectiveness in support of the accountability requirements, [4] flexibility to revise program funding based on the provisional indicators of progress and results, including cancelling a program failing to meet expectations" (Schwnacher).

²⁴ "E.1 The Plan/Do/Assess/Adapt framework proposed in Section E.1 is a passive adaptive management approach. It will elucidate correlations between management actions and results, but will not demonstrate cause-effect relationships. In order to do that, an active adaptive management approach is needed using an experimental approach. We suggest a combination of these two approaches be used, using the experimental, hypothesis-testing active approach only in those instances where uncertainty is high." (Sutherland)

²⁵ "We appreciate that the Agenda recognizes the robust adaptive management program found in the Forests and Fish law, and recommend that the Partnership work to incorporate this model into its own systems" (Weiss).

²⁶ Section 1.2.2 –Adaptive management principles will be difficult to apply over the biennial planning and funding cycle. This is because the response of the Puget Sound ecosystem to changes in management actions will likely be slow and subtle relative to the immediate costs and impacts of new regulations or policy. Thus at the end of a two-year cycle, it is easy to imagine that indicators may not yet show any sign of recovery following management actions that will likely have an immediate effect on people's habits and expenses. In most cases, measurable [sic] ecosystem responses would be unlikely within two years" (Dierauf).

²⁷ "Adaptive management means trial-and-error, and there's been lots of 'error' in manipulation of natural systems, where 'error' means a difference (plus or minus) between expectation and actual outcome. That's ok. "Irreducible ecological consequences" are hard to find. The century-ago intense industrial use of Bainbridge Island's bays is an example, with the bays now termed 'pristine'. Indeed, the great premise underlying PSP restoration activity is that ecological consequences CAN be undone. With adaptive management comes monitoring to see how things came out. The Science Panel sees this clearly. It's not cheap: Remember it a budgeting time, please." (Flora)

²⁸ "[Section] E.1.2.2 describes having a performance measure for "all actions." While this is important, more important but missing is a sense that there will be an overall strategic map that shows how performance measures for these actions are related, roll up, or support the plan's overall strategic intent. It is easy to create a measure for every action, but it is much more difficult to develop a set of nested, cascading measures that show progress towards achieving a complex, long-range goal such as ecosystem recovery. This should be one of the Partnership's top priorities. Such a strategy map could take the form of a logic model (used by federal, state, and local governments), an ecosystem stress/response model (used by The Nature Conservancy among others), or some other standardized theory-of-change approach. Such a framework would make more explicit and apparent:

1. environmental outcomes
2. threats
3. actions to improve the environment or decrease threats
4. measures to track both implementation of actions (outputs) and initial outcomes (impacts/results)" (Sims).

²⁹ "Priority E talks about building the management system needed to support the Draft Agenda, however it never mentions how the data for the indicators will be collected and reported to insure

that we are making progress towards recovering Puget Sound. Without this data, we will be where we are today, not knowing whether our actions are making any difference." (Stevens)

³⁰ Actions that are Cost Effective

³¹ "While many recommendations in the document appropriately indicate careful targeting of actions and state that actions must be cost-effective, more work is needed to identify clear priorities. A key element – costs of actions – has not yet been identified in the draft, yet many actions identified have a hefty price tag and resources will be limited. Cost information is anticipated in the December 1 version along with an assessment of effectiveness, which may allow for a prioritization or ranking based on cost-effectiveness, among other factors. It is important that this analysis be defensible, as it will likely suggest potentially controversial decisions such as funding certain actions over others, and directing resources to specific geographic areas that cross jurisdictional boundaries.

o To that end, cost-effectiveness is one element of research that appears under-emphasized in the science plan. In addition to cause-effect studies, the research plan should continue to research cost along with effectiveness of actions. This could be another role for the science group, finance team, or other entity. The public will demand that resources spent are spent effectively.

o In some areas, it appears that the Action Agenda is built with the approach of determining what actions are needed (without thinking about cost) and then to ask how to fund them. A different way to look at it – which may help in the prioritization process – might be to ask the question what would be done first if limited funding were available" (Sims).

³² "In our view, a high priority should be to shelter our fresh and salt waters from the harmful effect of storm water runoff from the surrounding communities. Regarding funding, we believe that a significant amount of the various taxes levied on waterfront activities(excise taxes, fuel taxes at marinas, B&O taxes on charter operations, etc.), should be redirected to (earmarked for) addressing Puget Sound clean-up and preservation. Rather than simply being a disbursement from the general fund, we believe that a portion of these taxes should be allocated directly to the pool of funds that is going to be used to address the effort to save the Sound. It may be wise to expand the allocation of those moneys to address navigable lakes and rivers of Eastern Washington as well to garner more Statewide support for the effort. At the same time, we believe that the construction of residential docks and realignment and repair of bulkheads, as that activity is conducted today using modern environmental standards, do not contribute to the degradation of Puget Sound, or would hinder restoration of the Sound in any manner. Therefore, we urge reconsideration of the recommendations found in sections A.2.2.3 and A.2.7, to remove any implications that docks and bulkheads may not be constructed or repaired as a matter of policy. Further, as required by state law, consideration must be given to the protection of private property, including from flooding." (Agnew)

³³ "We support reality based incentives and market-based solutions. They need to be utilized as the first choice wherever possible. Creative and innovated solutions that encourage people will be much more effective than command and control in the long term and will provide greater support and likelihood of success. Those affected and impacted must be engaged to solicit their thoughts and ideas to make these effective" (Castle)

³⁴ "While there may be a desire to see specific types of programs applied to the PSP efforts (e.g., E.2.3.2), here also careful research should be undertaken to determine which type of incentive/incentives (economic, market-based, non-market-based) can best achieve the environmental and policy goals" (Miller).

³⁵ "... if we are to take advantage of the immense ecosystem market supply opportunities available from private farm and forest landowners, it will be critical that we engage those industries in an open and constructive discussion of their needs, concerns, and ideas for how we might structure the marketplace so it works for them. It would be quite useful, therefore, to see this Agenda include some mention of engaging in discussions with agriculture and forestry on the design and structure of ecosystem markets.

A beginning is currently being made through the study and anticipated pilot projects that were authorized by last Session's SB 6805 - the Washington Conservation Markets bill. It would be good to see the Puget Sound Partnership and the Agenda reinforce that effort, specifically recognize the contribution that can be made by working lands, and clearly acknowledge the need to fully engage the agriculture and forest industries in the design and operation of the anticipated marketplace" (Stuart).

³⁶ "In addition, we feel it is misguided to call for revitalizing waterfront communities as a priority of the AA- that is work for developers not those in the business of protection and restoration. The restoration cost per acre or feet of shoreline in these highly degraded areas is often staggering. After the projects are finished, they will still be an urban area. Wouldn't money be better spent on protecting and restoring non-urban shorelines and estuaries?"(Stevenson and Griffith).

³⁷ "This section suggests that "EPA should support and help fund the creation of water quality trading policy and programs in the Puget Sound region." The identification of a TMDL for a pollutant suitable for trading is a crucial first step. The TMDL is essential to provide the appropriate environmental context for trading. Also, we have learned from an early grant effort in Oregon (1997) that establishing a broad trading framework without a pilot project underway leads to guidance and tools that may not actually work in practice. Therefore, EPA would prefer to see language that identifies several TMDLs in the Puget Sound Basin that are being considered for implementation with the water quality trading tool, and that further analysis will determine which ones are appropriate, and that a pilot project with one of them will be used to develop a trading framework for the Basin and/or the State. If they don't have any specific TMDLs in mind yet, then they need to describe that as the first step to take before committing to water quality trading. Trading impermeable surface area, while posing many challenges, is an interesting approach to cap and trade linked to land use changes that affect water quality." (Miller).

³⁸ "The regulatory structures at all levels [sic] of government have stifled the ability of many to conduct good works for the Sound. The shorelines management act, critical areas ordinance, growth management act, and other land use and pollution control laws are well intentioned efforts that have become so cumbersome as to actually hinder environmental protection. The Partnership should immediately explore the major environmental laws to identify inconsistencies, conflicts and bureaucracy that work against protecting the Sound. These regulatory burdens need to be cleared up to maximize the effectiveness of funding available now and in the future. Further, the Partnership should develop recommendations to the legislature that support innovative thinking such as pollution trading, wetlands banking and alternative approaches to in-water remediation that will allow resources to be transferred within the Sound to where they can do the most good" (Schwnacher).

³⁹ " Action Agenda suggests that improved implementation of various State and Federal requirements such as Salmon Recovery Plans, NPDES and SEPA will lead to our preferred environmental outcomes. We do not have evidence that these tools will lead to meeting the Partnership's goals and performance measures. Preferably, the Partnership will play a more dynamic role than proposed in resolving land development and environmental protection conflicts" (Haub).

⁴⁰ " Ecology has trading policies articulated in State Water Quality Standards – WAC 173-201A. We can engage in this discussion but are unaware of any approaches that actually simplify permitting or achieve greater environmental performance. Nationally, trading programs have been elongated, expensive, resource intensive, and not highly protective of water quality" (Manning).

⁴¹ "We have serious concerns about a water quality trading program, and if this is to be implemented, there should be a stakeholder process to discuss the issues fully" (Stevens).

⁴² Indicators, Benchmarks, and Targets

⁴³ NOAA recommends additional description and documentation be added to the Action Agenda to establish the relationship between the proposed targets and benchmarks for lowland forest and impervious surface area, and ecosystem recovery by 2020. The current proposed targets for lowland forest area and impervious surface area, of "no more than a 10% decrease in lowland forest area (from

the 2001 area) or no more than a 20% increase of impervious surface area (from the 2001 area" appear to need additional scientific documentation.

NOAA recommends the targets and benchmarks for eelgrass be further refined to be able to be directly linked to improvements in eelgrass status and trends. The current target for eelgrass of "having a greater number of sites with increased eelgrass than sites with less eelgrass" appears somewhat imprecise, since the sites could be of different size.

NOAA observed that the PSP's proposed indicator for percent exceedance of instream flows does not mention needed flow in dry years. NOAA recommends revision of the target to be based on flow levels that are adequately protective of ecosystem functions and species. The same principle applies to the benchmark for the instream flow provisional indicator. The 2020 target for instream flow protection states that instream flows should "exceed minimum levels set by rule or other agreement." The proposed target assumes the rules or agreements are sufficiently protective of ecosystem functions and species to support recovery by 2020. Because instream flow rules are typically set to achieve multiple objectives for both species protection and consumptive uses, the proposed target may not lead to improved ecosystem functions nor species protection by 2020 as desired.

NOAA recommends the PSP consider further refining the targets and benchmarks for toxics in pelagic fish. The proposed targets relate to meeting an unspecified level of toxics in herring in the Strait of Georgia without (apparently) first establishing that the level in the Strait of Georgia is adequate. Using toxic load levels in herring may be an appropriate target or benchmark, but NOAA believes additional refinement and scientific documentation would strengthen this target" (Lohn and Varanasi).

⁴⁴ "This section calls for the development and implementation of an information management system to support ecosystem management decision making. The transboundary indicators group is also currently examining possibilities for an information system that will facilitate future updates and stronger linkages to decision making. The intent is to facilitate timely information exchange among scientists and policy makers" (Kluckner) see <http://www.epa.gov/region10/psqb/indicators/> .

⁴⁵ "The goal set by the Partnership should, at a minimum, state that 65/10 be the goal for all watersheds throughout the region. In areas where we are currently above 10% impervious surface, we should institute major stormwater retrofit programs to achieve the goal. It makes no sense to us that the Action Agenda would set a standard that scientists have shown will cause salmon runs to collapse" ... "To use the target of "historic" isn't helpful because older estimates of Soundwide eelgrass cover are both lacking and would be subject to the "shifting baselines" phenomenon. We recommend the target for increased acreage by 2020 be calculated based on recovery statistics from other estuary restoration programs such as Chesapeake Bay and Narragansett Bay whose programs focused on eelgrass recovery" (Stevens).

⁴⁶ Instream flow provisional indicator does not appear to be based on best available science. No current status is reported so we do not know how close we are to this target and benchmark. This indicator seems limited in its utility because instream flow standards have not been set for many streams and may vary depending on which species occur there. The addition of 20 percent impervious surface would continue, if not accelerate, development practices that cause reduction of summer low flows and the multiplication of peak winter flows. It is illogical to assign instream flow values to streams when the plan nearly guarantees that they will be violated. We suggest a link to impervious surfaces and land use where excessive flows affect salmon spawning habitats, as well as the more traditional measures of instream flow directed at providing sufficient flows. Instream flow benchmarks and targets should also consider minimum overbank flooding frequency and magnitude needed to maintain river delta accretion levels that will keep pace with projected sea level rise. mammal. Also, forage fish biomass should be a high level indicator as they are vital to the Puget Sound food web as is acknowledged in the draft plan on page Q2, P4: "Pacific herring in Puget Sound are a universal source of prey..." Finally, there are a number of additional indicators mentioned in the following section (Question 2) of the Action Agenda that are not among the list of provisional indicators, and it is unclear whether any of these will also be measured and by whom. The process the Partnership used to narrow down from this longer list of potential indicators to the selected

provisional indicators is not apparent in this section and does not appear to be tied in any way to the draft biennial science plan framework. We recommend convening a special workshop between the science panel and the leadership council to align the biennial science plan to the action agenda..." (Stevens).

⁴⁷ "The Marbled Murrelet is a potential indicator species that makes the connection between the upland and marine environments apparent as the bird species relies on both. The Marbled Murrelet is listed as a threatened species and a recovery plan for the species is already in place" (Cantrell).

⁴⁸ "There needs to be a greater evaluation of the status and trends of species not included in the Action Agenda. This keeps the Agenda focused on an ecosystem approach to recovery by including species not yet benefiting from a recovery plans" (Cantrell).

⁴⁹ "The biennial science work plan defines a logical approach to science implementation and is well referenced. Statements in the Action Agenda should flow more logically from the biennial science plan, including outlining areas of immediate action that are supported scientifically and don't require additional studies. As soon as possible, the Partnership Science Panel should review and amend the provisional indicators to be more consistent with the framework in the biennial science plan, or, if time does not allow within the schedule for Action Agenda adoption by the Governor and Legislature, a more explicit citation linking the provisional indicators to the adaptive management portion of the biennial science plan framework should accompany the provisional indicators table" (Stevens).

⁵⁰ Ecosystem Perspective

⁵¹ "Finally we understand that Puget Sound is part of a larger inland sea that integrates structure and function with the Strait of Juan de Fuca and Georgia Strait ecosystems. For some time this larger inland estuarine sea has been called the Georgia Basin/ Puget Sound. More recently the name Salish Sea has been used to refer to the larger ecosystem that encompasses the ecological structure and function of the total inland estuarine area." (Webber)

⁵² "The Science Plan identifies the intent to produce a 2009 State of the Sound report and a 2010 Puget Sound Science Update. In keeping with our first top principle for designing healthy ecosystems, the Science Panel should consider collaborating with British Columbia and producing a 2009 State of the Salish Sea report and a 2010 Salish Sea Science Update" (Gilardi and Gaydos).

⁵³ "Transboundary ecosystems require transboundary mechanisms to coordinate research, monitoring and protection approaches. Such coordination needs to be ensured within the Management Conference structure and Action Agenda development and implementation procedures. Invitation to the Provincial Ministry of Environment to participate on the ECB as an ex-officio member and perhaps something similar with the Science Panel could be very helpful in aligning ecosystem protection on both sides of the border. Encouraging and facilitating transboundary coordination in action areas neighboring the border would also be constructive. The EPA-EC Statement of Cooperation will also be supportive in ensuring federal level coordination" (Miller).

⁵⁴ "One of the strengths of Ecosystem Management is that it is place based. That is, the knowledge of ecosystem structure and function is applied to a defined area. Ecosystem management recognizes that the boundaries of the ecosystem of interest should be set. Based on management objectives. I do not see this first step in Ecosystem Management clearly discussed in the current science plan materials." (Webber)

⁵⁵ "[The BSWP] Guiding principles for Ecosystem management in Puget Sound. These are excellent principles for development and implementation of the action agenda. However, they seem to be a mixed set of criteria for choosing and implementing activities with some few guiding principles for ecosystem management. Ecosystem management principles are rooted in the behavior of ecosystems and recognize attributes of scale, levels of organization, and the relationship among process, structure, and function. There are many useful discussions of ecosystem management that could provide a basis for evaluation of strategies developed through the principles and criteria you have listed here. A few of them are: Jorgenson and Muller, eds. 2000. Handbook of Ecosystem Theory and Management. CRC Press. Grumbine, E. 1994. What is ecosystem management? Conservation Biology 8 (1): 27-38. Spence, B.C., G.A.

Lomnický et al. (1996). An Ecosystem Approach to Salmonid Conservation. TR-4501-96-6057. ManTech Environmental Research Services Corp., Corvallis, OR." (Fuerstenberg)

⁵⁶ "1. The ecosystem is an appropriate target level for conservation planning and for integrating concerns from larger and smaller scales and levels of organization. This does not exclude habitats or species from consideration as conservation objectives; it implies that single species or single habitat conservation is unlikely to be successful. Ecosystems integrate process, structure and function at a useful scale for conservation. 3

2. Conservation of a single level of organization (a single species for example) or at a single spatial scale (a reach in a river or a habitat patch in a terrestrial environment) is unlikely to be successful;

3. Conservation of entire functioning landscapes and their associated processes must be addressed;

4. The resilience of systems (the ability to recover after a disturbance) is a critical attribute of sustainability. Multiple representations of systems across the landscape are necessary.

5. The units of conservation should be based on the boundaries described by the interaction of the processes and structures that control system function and maintain mosaic integrity (minimum dynamic areas): forests and fires, floodplains and floods, riparian forests and large woody debris recruitment, etc. Single habitats or habitat features are not useful targets for conservation.

6. Conservation must recognize the timing and duration of ecological cycles and the variability inherent in ecological systems; (Fuerstenberg)

⁵⁷ The discussion [about ecosystem management] could benefit from a brief introduction to ecosystem attributes, perhaps with a few examples and some definitions of process, structure and function. Several terms are used that have distinct meanings in ecosystem management but seem to be used almost interchangeably here. First, recognize that landscapes, ecosystems and habitats are not equivalent ecological units. Concomitant with geographic scale are temporal scale and, often, levels of ecological and biological organization (sub-populations > populations > species). We should be as clear as we can about these fundamentals that support the work of the action agenda. The most recent work in landscape and ecosystem ecology recognizes these hierarchical units across the land and water system beginning with the small unit of habitat or patch: Habitat (patch) > ecosystem > landscape > eco-region

A focus on the ecosystem, while appropriate, does not neglect larger and smaller units of the system and recognizes time scales associated with process and function at each geographic scale (the hierarchy principle of ecosystems)" (Fuerstenberg).

⁵⁸ "...the Science Plan cites the DPSIR framework as a guide for collecting data and evaluating policy actions, presumably using ecosystem services as indicators of human wellbeing. While this approach can be valuable for discerning the effects of policy responses, it can also produce a biased evaluation if the DPSIR framework is incomplete. Typically, the DPSIR framework focuses on a set of drivers that are "bad" and a set of impacted activities that are "good." In both sections discussed here, the implication is that "good" ecosystem services are currently being diminished by "bad" drivers such as urbanization and other human uses of the environment. The DPSIR framework can then be used to evaluate the effectiveness of policy responses by gauging their effects on the flow of ecosystem services. [the approach outlined in the BSWP] will provide a biased view of the effects of policy responses if the DPSIR framework does not include a full accounting of the links between its elements and human well-being. Human well-being is a function of more than ecosystem services. Indeed, human well-being is quite capable of increasing in the face of declining ecosystem services (over some range) as long as other "non-ecosystem" goods and services, so to speak, are increasing. Activities that are typically identified as drivers provide obvious and strong support for human well-being. Policies that seek to increase the flow of ecosystem services can therefore have negative effects on human well-being. First, by restricting driver activities, policies can directly reduce the human well-being that the activities support; and second, by changing the incentives of people who engage in the driver activities, policies can set into motion changes in other activities that can reduce HWB through other DPSIR pathways (i.e., unintended consequences)" (Plummer).

⁵⁹ "...discerning the net effect on human well-being comes from analyzing the tradeoffs among the full set of human well-being determinants, not just among the set of ecosystem services.... Research should be focused not just on ecosystem services but on the full set of human well-being determinants and how various policies affect the incentives of individuals engaged in driver activities as well as activities that use or enjoy ecosystem services. Focusing research only on the latter has the strong potential to produce biased policy recommendations by effectively assigning the other sources of human well-being a zero value" (Plummer).

⁶⁰ Effective Coordinated Regional Monitoring

⁶¹ "In order to provide meaningful data on the state of the Sound and the effects of management actions, the region's monitoring programs must be well designed and funded. This includes fish and shellfish monitoring for toxics, pathogens/indicator organisms, and biotoxins that is conducted over appropriate time and spatial scales to provide the right data to answer the most important questions" (Grunenfelder).

⁶² "There are many monitoring programs underway in the Puget Sound. They all have one thing in common: lack of long-term funding. Without long-term funding certainty, these monitoring programs typically become short-term "before and after" snapshots of ecosystem health. There is a need to develop a more comprehensive and cohesive strategy to collect, analyze and apply information. We have reservations that a monitoring program conducted by many entities can achieve the efficiency and effectiveness of one conducted by a single, qualified entity. We believe that we need an independent, scientific group to oversee all monitoring in Puget Sound. The Southern California Coastal Water Research Project (SCCWRP) <http://www.sccwrp.org/> is a very good model" (Nickels).

⁶³ "Support monitoring coordination efforts as delineated in sections E.3.1,2,3,6, 11-15 as the most essential monitoring efforts. These provisions are the underpinning of the scientific selection programs and measuring their results" (Schwnacher).

⁶⁴ "A coordinated regional science/monitoring program would be useful, as long as it emphasizes the coordination part amongst decentralized governments and agencies (i.e. is not about centralized control of science/monitoring)" (Chitwood).

⁶⁵ "It would be interesting to explore monitoring efforts that are consistent on both sides of the border. The Coastal Waterbird Survey is being run by Bird Studies Canada on the BC coast using volunteer citizen monitors, and there has been some talk of Audubon running the program in the Puget Sound region. If the two programs could be run so that data could be consolidated and compared across the border, it would help facilitate communication" (Kluckner).

⁶⁶ " Build and implement the management system to support the implementation and continual improvement of the Action Agenda: This section is well conceived and effectively laid out. However, it along with the Biennial Science Work Plan that it summarizes, stands at some distance from the monitoring and assessment efforts required. Doing so is appropriate in order to gain the proper perspective and develop an effective and integrated approach over the long term. Still, near-term monitoring and assessment actions considered in other forums and applicable here should be considered here for inclusion. Examples, including harvest and artificial production actions, are contained in the salmon recovery plans.

Also, regarding regulatory programs related to growth and shoreline protection, little to no monitoring of the regulations effectiveness is currently in place and efforts to assess past effectiveness are few. Regulatory protection of habitat is a critical component of recovery and it is important that we understand its history and track its progress so that we can effectively manage it. What is missing in this section, and relates also to section D.5, are new near-term actions to monitor and assess the existing habitat protection, regulatory measures" (Weller).

⁶⁷ "The [Monitoring] Consortium's research, analysis, and recommendations apply more to the structure and organization of these efforts; but also provide a sense of the capacity needed to support the desired functions. The Consortium provides the Science Panel with efficient access to a substantial pool of

scientific expertise and experience from a variety of entities at local, state, and federal levels; and to the considerable capacities of these entities" (Dinicola).

⁶⁸ "E.3: We believe that completion and implementation of a scientifically-based monitoring and adaptive management program for the recovery plan is absolutely critical and needs to be a high priority for both the Recovery Council and the Partnership in 2009-11. NOAA will help you as you and your team continue your effort to complete this work. As I said at the retreat, NOAA is not as well positioned to develop and implement this work as your team is. We do, however, have a responsibility to ensure that a monitoring and adaptive management program gets implemented and assists in the evaluation of the status of the species and habitat in Puget Sound. This is a fundamentally important part of the overall recovery approach, and NOAA likely would need to step in to develop the specifics of such program if it were not produced through the existing technical teams at the watershed and regional level" (Babcock).

⁶⁹ E.3.1 Develop and oversee a coordinated monitoring program. "This action should also include a discussion of the need to determine the "governance" of a regional monitoring program. Monitoring. We suggest these edits: "Establish priorities and resource needs for creating a coordinated water quality monitoring program under National Pollutant Discharge Elimination system (NPDES) IN CONCERT WITH A REGIONAL MONITORING PROGRAM FOR THE PUGET SOUND BASIN." We strongly support this action but are concerned that, as written, the focus is on the permits rather than the large context of the Puget Sound ecosystem." (Stevens)

⁷⁰ Collaboration and Coordination

⁷¹ "The Science Plan (page 19) calls out the need to present scientific knowledge to the public and students to "empower people who use and affect the land and waters of Puget Sound." While it will be important for the Science Panel to serve as advocates for science and science training, relying on the Science Panel to do this will be like trying to drain a lake with a straw, as the science team is too small to undertake this effort effectively. All scientists in the region with the capacity and interest should be called upon to serve as science advocates and be asked to provide information for scientific updates as well as for the Partnership's Education and Outreach efforts. The three tenants of place-based conservation are to know, connect and protect. Science reveals fascinating information that helps the general public know and connect to the Salish Sea and the wide-spread dissemination of scientific information to multiple audiences will be critical for empowering the region's citizens and policy makers who daily make decisions that impact the health of the ecosystem" (Gilardi and Gaydos).

⁷² "Several specific programs and projects are called out in the Science Plan; I presume they are examples with which individual members of the Science Panel are familiar. I suggest that the Science Panel make it clear these are examples only, and consult more broadly with the scientific community to gather further examples, before evaluating which might make the best actionable cases. I want to commend the Science Panel for the commitment to engage the scientific community in future studies through an open call for proposals. An open call has the potential to garner the best scientific input, as well as to open up the process to a broader range of scientific thinking in the region, but it is also highly vulnerable to the public process. Previous iterations of Puget Sound management and restoration have made similar commitments to research but have been unable to bring them to fruition when budgeting realities come into play. I sincerely hope that the Science Panel can hold the Partnership to their commitment to fund scientific input to the Puget Sound recovery process. I suggest that the panel work hard to ensure that future calls for proposals be developed with the help of professionals familiar with nationally recognized processes (NSF, NIH, Sea Grant, etc.), and that available funding be adequate to carry out good science. These actions will ensure that the best scientists, from this region and beyond, will engage with Puget Sound recovery efforts" (Copping).

⁷³ "Ecosystem protection and recovery can best be achieved from the bottom up, not top down. The PSP should focus on building partnerships that can achieve results and not hinder progress with too much process. The PSP should concentrate on supporting and improving the ecosystem research, restoration, pollution prevention and treatment, and habitat protection projects efforts" (Nickels).

⁷⁴ Science and Technology Support System

⁷⁵ "Language should include research and investigation into those technologies that do more cradle to grave/cradle, such as processes that recapture heat for energy, do not release CO₂ and have zero to little waste at the end. We recommend funding in this biennium for research into alternative treatment methods of entire wastewater treatment loads, solids and effluents, with a future goal of establishing these methods by 2015. This goes miles further than releasing, intentionally or not, one way or another, post "treated" contaminants back into the marine environment." (Schanfald).

⁷⁶ "The Stormwater Work Group has begun identifying and prioritizing objectives for stormwater (including the questions enumerated in section 2.2.2 of the BSWP) and will create a regional stormwater monitoring and assessment strategy by June 2010. We look forward to close coordination with the Partnership in creating this strategy and offer the resources, experience, and expertise of Stormwater Work Group members to assist in formulation of the requests and evaluation of the proposals related to this section" (Dinacola).

⁷⁷ "We appreciate the Biennial Science Work Plan drafted by the Partnership's Science Panel and through it support significantly increased scientific research and technological advancement. As municipality, we are especially interested in research focused on stormwater management. We understand the importance of stormwater management to Puget Sound's health and suggest that the existing science of managing stormwater is grossly inadequate. Even with our longstanding and ambitious stormwater utility, stormwater and water quality management in Olympia remains very challenging. As stated in the Action Agenda, "insufficient resources have been devoted to stopping pollutants before they reach our rivers, beaches, and species." We hope that the Science Panel can help bring increased scientific rigor to the field of stormwater management. We are willing to help" (Haub).

⁷⁸ "Support the continued development of an LID center for research, but also demonstration, outreach and training (WSU is in the process of developing a center in central Puget Sound, but funding is necessary to continue operation). A center can act as a place to test technology and train designers in the latest application and science" (Hinman).

⁷⁹ "Priority Investigations: add new sub-action and Near-term action: Review data on priority pollutants such as pesticides and PBTs for chemicals/products that have highest long-term impacts and are unnecessary or have effective alternatives. Develop the science base for the governor, PSP, and legislature to push for banning/restricting sale and use of those products in the Puget Sound watershed" (Nickels).

⁸⁰ "There are an awful lot of actions that just entail "support"--one might imagine that almost all the tools are already in place to save the Sound. I don't think you mean that, and I do believe that we are currently utilizing only a fraction of the regulatory authority already available to effect genuine progress. The overall impression, however, is that not much new needs to be "done"--we just need to keep doing, only a little better. No, you don't SAY that, but please be sensitive to the overall impression being given. (Booth)

⁸¹ Research Priorities

⁸² "The Biennial Science Plan points out the need to identify high-priority research needs and begins by identifying four projects. Beyond this, we recommend that the Partnership's Science Panel work closely with the SeaDoc Society, Washington Sea Grant, Tribes, State and Federal resource and human health agencies and regional foundations that fund research to identify additional high priority research needs. ... these efforts should be transboundary and include Canadian scientists, agencies, managers, Tribes, and policy makers. Such a collaborative effort will have several long-term benefits. First, a broad-spectrum integrated approach will help identify research that will provide information that is applicable to improving management or policy related to designing healthy ecosystems. Additionally, it will provide a list that multiple funding agencies can use. The Partnership will not be able to fund all of the research needed, but by having multiple organizations identify research needs at multiple levels, there will be broad-scale buy-

in for other organizations to seek or provide funding for the identified needs. Finally, the identified needs would provide a foundation for the Partnership's RFP process" (Gilradi and Gaydos).

⁸³ "It is imperative that the PSP recognize the different roles of applied science (particularly in support of regulatory actions) and basic research. Both types of scientific work are needed in Puget Sound, and failure to recognize the distinctly different "playing fields" of applied science and research will lead to confusion and inefficiency. In particular, regulatory agencies have different documentation and public disclosure demands than academic researchers" (Miller).

E.3.4.4. Suggest re-write of E.3.4.4. to: "Develop and follow processes to ensure the integrity of science, including: define gaps in applied science (e.g., to support regulatory decisions) and basic research, clarify differences in applied science and research work (e.g., peer review, documentation, public disclosure), develop competitive bidding approaches, promote quality assurance planning and internal/external peer review" (Miller).

⁸⁴ "We support the capacity to conduct science, but it needs to include the capacity to conduct science that is useful and informative for decision makers. This requires models of collaborative partnerships between the research community and the user community, which implies that the user community helps to frame the research by identifying what information they need. Absent that we could have plenty of capacity to conduct science, but no capacity to use it because it was framed and conducted without input from the users of the science. This is an issue the water sector is grappling with here in the US and apparently internationally as well" (Nickels).

⁸⁵ "ADD NEW ACTION: RESEARCH AND DEVELOPMENT FOR TOXICS REDUCTION: AS RECOMMENDED BY THE TOXICS REDUCTION ADVISORY COMMITTEE, HELP BUSINESSES REACH A 50% TOXICS REDUCTION GOAL BY INCREASING RESEARCH AND DEVELOPMENT ON SAFER ALTERNATIVES, IDENTIFY AND PRIORITIZE HIGHLY TOXIC CHEMICALS FOR REDUCTIONS. The TRAC committee has developed a number of important recommendations that are supported by a broad range of stakeholders. These are included as suggested new actions" (a) establishing policies and programs that help businesses phase out their use of chemicals of concern to Puget Sound through increased technical assistance and partnerships with research institutions, businesses, and nonprofit groups to identify safer alternatives" (Stevens).

⁸⁶ "PBT's – The current programs can't keep up with the number of chemicals being addressed and will not keep PBT's out of Puget Sound. The PSP should articulate that we need to prevent all PBT's from entering PS or we cannot have a healthy PS. 2. Nutrient loading – The path articulated does not contain enough targets yet to focus effort on reduction. Tribes would like to see more emphasis on reuse and recycling of water to minimize the nutrients and contaminants entering PS. 3. Stormwater – The toxics entering PS (including some PBTs) through stormwater is staggering. Treatment is extremely costly and for many toxins, treatment technology does not exist. We must emphasize reducing the quantities before it enters the stormwater systems. This is a combination of changing products to eliminate toxics and cleaning up streets before the toxics enter the stormwater systems" (Wright)

⁸⁷ "We recommend that more community-based social marketing research be done to assess whether the education initiatives chosen in the action agenda are the best ways to go to get public support and action to meet Puget Sound recovery and restoration goals" (Stevens).

⁸⁸ "The Science Work Plan addresses several key issues: 1) science must be approached in the context of an altered built environment that will be constantly growing and changing. The recognition that human and economic health are primary considerations when looking for solutions to natural resource protection and enhancement is a key step to engaging the private sector; 2) integrated and sustained system wide monitoring and management and applied research is essential and 3) independent, transparent and accountable scrutiny is required to maintain public support and confidence in the proposed solutions" (Prossinger).

⁸⁹ "As accurately identified in the Agenda, the South Sound region has specific environmental challenges. We seek to address these challenges. The following South Sound issues are important to the City Of

Olympia: [1] Stormwater runoff and its more effective management. [2] Puget Sound-wide dissolved-oxygen modeling and its application to Budd Inlet. [3] Implementation of State strategies and actions including the Deschutes TMDL. [4] High priority habitat preservation including Budd Inlet's Gull Harbor. [5] Revitalizing waterfront while enhancing shoreline environments and correcting historical contamination. [6] Onsite sewer system oversight and management as well as conversions to sanitary sewer systems. [7] A focused outreach campaign addressing the vital need for individual responsibility and action" (Haub).

⁹⁰ "... more attention is needed on methods to harness the power of market approaches to produce conservation outcomes." Evaluating new financial compensation methods for the environment's cost due to our land use should be a top priority of the Agenda. Today, landowners that develop/use their land for more ecologically harmful purposes are, for the most part, subsidized by those that don't. Monetary compensation for land of more ecological value would be an effective program that could withstand the test of time. Higher ecological value should amount to higher economic value. Landowners should be penalized for their ecological impacts (for which they are now, to a certain extent), and landowners whose property has more ecological value should be compensated. This sort of new system could reduce the amount to which developed lands are subsidized by non-developed lands and raise money for impact fees. Economic solutions like this would inherently produce more of a positive outcome for the environment, as economic forces would aid in regulation. However, there is only a slight mention of ecosystem service markets in the draft, and it only mentions in-lieu-fee mitigation and water quality. More programs need to be tested, even if they are over a small area, to find a permanent solution" (Talcott).

⁹¹ "[The] Puget Sound is important to our state's regional economy and produces valuable economic benefits. More specifically, David Baker et al.*, have conservatively valued the benefits of the ecological services from Puget Sound to be between 7.4 to 61.7 billion. These services are free if we simply maintain the natural capital of Puget Sound's resources. The natural capital of Puget Sound Basin is conservatively valued at 243 billion to 2.1 trillion (David Batker et al. 2008). Maintaining our natural capital should be built into Priority E (pg 56), as a performance indicator under the Performance Management System. We need an inclusive accounting system that measures the amount of our natural capital and the subsequent ecological and economic services that are produced" (Nickerson).

⁹² "Our current policies that measure and thus promote growth in sales revenue and other traditional means of defining "economic success" at the state and local level really are inconsistent with our desire for progress in preserving our natural wealth and the services we receive and depend on for both ecological and economic health. Are we losing more economically than we have gained with our current economic development priorities and goals? This is an important question the Partnership must ask and try to answer in the performance measures. The measures of success for all levels of government need to value our net economic progress. Inclusion of natural capital and ecological services into these performance measures and the states broader measures of success will help indicate net economic progress" (Nickerson).

⁹³ "...we believe there needs to be some recognition of the other agendas that are essential to a healthy Puget Sound including accommodation of population, employment and a healthy economy. These are essential elements because, in the final analysis, they will fuel and fund the recovery. These other elements are identified in the scope of the legislation, in the early references of the Action Agenda and are part of the regulatory fabric that local governments are obligated to address. These elements need to be identified here as well" (Rogers).

⁹⁴ "... although ecosystem services are mentioned several times, it is almost entirely from the consumer side. Ecosystem services actions need to address the providers of these services, in most cases forest and farmland owners. There is significant need for pilot programs and planning stages to include private landowners and organizations such as NNRG who represent their needs. For example, worries about Alder regrowth leading to nitrogen loading should not be just addressed through restoration; these are recurring

issues that need to be addressed with management changes and landowner incentives to support these changes" (Pranger).

⁹⁵ "[The Partnership should] initiate comprehensive amendments to Chapter 173-204 (Sediment Management Standards). The triennial review required by the rule has only been formally conducted once or twice in the 17+ years since adoption, thus many of the scientific underpinnings of the rule are now outdated. The rule needs more than "band-aid" revisions that address only the most critical issues and sections. Will remedial actions at aquatic sites be protect[ive of] benthic communities and habitats, or protect human health if the standards are inadequate or unclear?" (Greis)

⁹⁶ "A study of stressors affecting the Puget Sound pelagic food web and restoration of forage fish populations as called for in (Question 3, p.5) is crucial for determining the productive capacity and limitations to species recovery within the sound" (Stevens)

⁹⁷ "We suggest these edits: "Establish and implement a PILOT watershed-based approach to mitigation." While we recognize that mitigation has not worked well, we are concerned that the Partnership not 100% endorse a new approach that also may not work well. We suggest that the first efforts should be considered pilot until the Partnership and other scientists can evaluate how well the new approach works" (Stevens)

⁹⁸ However, a plan for immediate action should be considered as a top priority in order to avoid any unexpected pandemics from a disease perspective. ... One pathogen could, wipe out an entire specie or several if not caught in a very timely fashion. Yes, cleaning up waste water, sewer systems, agricultural and industrial run off will help in keeping some sources of pathogens from entering the Puget Sound system. But detecting these pathogens and putting a "fast track" response to a pathogen that may overwhelm a system should be a top priority ... Put in place First Responder health protocols. Protocols that can address immediate pandemic situations. (Wood)

⁹⁹ "Climate Change - the final Action Agenda should include a section on climate change that describes the actions needed to ensure the Sound and its watersheds will be resilient in the face of the changes we can expect in the coming years" (Stevens).

¹⁰⁰ "What are the biggest problems?? There is no reference to acidification of the Sound due to CO₂ uptake in the ocean. Current levels of ocean acidification are much higher than predicted in current climate change models. Increased acidification will prevent shellfish from forming shells and could lead to the collapse of the food web. This is the greatest challenge facing the Sound. See research by Dr. Richard Feely, Supervisory Chemical Oceanographer at the Pacific Marine Environmental Laboratory of the National Oceanic and Atmospheric Administration (NOAA) in Seattle, WA" (Downy).

¹⁰¹ "Our recent research that was published in Science In June demonstrated that coastal upwelling along the Washington-Oregon-California coasts brings ocean acidified "corrosive" waters up onto the continental shelf in the spring and summer months. It its these same waters and fills the bottom waters of Puget Sound in the mid and late summer. The naturally high amounts of biological activity in the Sound will probably cause the deep waters to become even more corrosive to the indigenous shellfish species, particularly clams and oysters. Since ocean acidification can also affect the chemistry of many toxic compounds in seawater, it may can also affect other marine species. I would be happy to discuss these issues in detail with your Science Panel" (Feeley).

¹⁰² "Threats: The list of threats is not comprehensive. It needs to include adequate consideration of sea level rise, ocean acidification and both raw and treated sewage. The rising levels of Puget Sound will affect nearshore restoration projects and may fundamentally alter existing nearshore habitats. This must be considered a priority for monitoring and research. New science is showing that ocean acidification is already occurring and we can expect major changes in the chemistry of Puget Sound over the next century. More research is required at the regional level on ecosystem resilience and adaptation" (Broadhurst).

¹⁰³ "language about dwindling water supplies and conservation and safe reuse of water, and doing more locally to change our local actions to minimize activities (transportation, etc.) that use water in ways we don't need" (Schanfald)

¹⁰⁴ Section 2.2, "Partnership need" - The sentence "These studies should work across ecosystem issues of landscape ecology...." should be expanded to include "water availability," and "air quality."

¹⁰⁵ "Some of the biggest pollution is sanctioned by the state and federal governments: floating fish pens that contaminate, on a daily bases, wide swaths of sediments. Waste water treatment plant effluent, often with commercial and industrial contaminants, sent out to the Sound/Strait and the sludge spread on land, only to wash back down into ground and surface water bodies, and sicken the public that live nearby the spread of the sludge" (Schanfald).

¹⁰⁶ Modeling and Knowledge Integration

¹⁰⁷ "Language should be added so it is clear that the goal is to not only identify stressors, but also to quantify the link between drivers and stressors, so the impacts of changes in drivers can be modeled. For example, the most significant stressors in the marine system may have drivers in the terrestrial system" (Dierauf).

¹⁰⁸ " Modeling, emphasized in the Science Plan, will surely clear some fog from some of the many technical and policy issues afloat on the Sound. Understanding the Sound ecosystem will need portrayal of the many, many interactions in this non-static environment. Modeling - the mathematical kind, not colored boxes joined by arrows - may well require multi-equation systems, simultaneous equations, stochastic analyses, structural as well as predictive models, and so on. Many will require special software for their construction and use" (Flora).

¹⁰⁹ "Section 3.1.2 - This section mentions capacity, specifically modeling capacity. When modeling watersheds and surface water, care should be taken to not rely solely on one model. There are several possible watershed/surface-water models that could be used, and typically they have different strengths and weaknesses. Though it may not seem cost effective, the capacity for multiple modeling efforts should be supported to take advantage of the strengths of the different models. This is a very common approach when modeling climate, for the same reason. Also, modeling capabilities should include ground-water modeling, and coupled ground-water/surfacewater models that can be used to better understand the regional impacts of ground water on stream flows and surface-water loads" (Dierauf).

¹¹⁰ " ...strong linkages among indicators, monitoring and reporting. Specific references to the transboundary indicators are not made, however these should play a key role in reporting on the State of the Sound. Consistent between PSP and transboundary indicator initiatives are near term plans to develop projections of future scenarios based on historical data and conduct spatial analyses to evaluate current ecosystem status, threats and drivers to inform management decisions" (Kluckner).

¹¹¹ "Modeling. A Near Term Action in section E.3 (E.3.14) calls for the development of a long-term plan for future scenario modeling, describing the roles and responsibilities of collaborators in carrying the work forward. PSRC conducts regional transportation, land use, and air quality modeling for the central Puget Sound region, which may be of benefit to this action. If PSRC were involved in this effort, support for additional scenario modeling and analysis would likely be necessary" (Drewel).

¹¹² " Many of the social, legal, and technical issues revolving around land use and environmental protection can not be resolved locally. The Partnership needs to play key role in defining regional approaches, institutional and legal constraints, and likely environmental outcomes. The Science Panel's proposal to develop basin-wide models depicting land use futures will be helpful. Additionally, current assumptions regarding future conditions, available technologies, and potential solutions need to be more rigorously tested. For example, the low impact development techniques have not been subject to either scientific scrutiny or on-the-ground validation. Some of us that have aggressively fostered low impact development techniques consider the field to be in its infancy and likely to encounter continued difficulties" (Haub).

¹¹³ "Underestimated Difficulty [of] Food Web Modeling (p. 18), [this] is a GREAT thing to be working toward. I sincerely believe that it will be among our most effective tools in the future for both understanding and planning. Unfortunately we scientists are not very good at it yet. For this effort I would advise that PSP adopt a more long range plan. What food web or ecosystem models need is MUCH more observational data on states (e.g. how many phytoplankton, zooplankton, and fish of what species are most important where and when?). But of equal importance we need observations of RATES (nutrient uptake and remineralization, growth and grazing, etc.) The experience of my own group's research efforts recently in modeling the marine ecosystem in the Columbia River plume demonstrated clearly to me how lost we would be without rate data. When I say "lost" here that means a complete inability to make reliable predictive statements like "if we double the non-point nitrate loading to Puget Sound then ## will happen." This modeling effort will only work if vetted by the rigorous peer review system..." (MacCready).

¹¹⁴ "expand the use of modeling (see <http://www.ecy.wa.gov/pubs/0803006.pdf> for examples) ... expand alternative futures modeling to include potential and management actions to broaden alternative future scenarios and characterize them as numerical experiments rather than absolute predictions ...Thank you for recognizing the importance of modeling! Ideas from the Focus Sheet listed above could be worked into the summary to clarify how modeling can help" (Roberts)

¹¹⁵ "... [a] uniform set of habitat protection standards, as proposed in the Habitat Topic Forum Paper. These standards need to be based on science and targeted not just at protection at the site level, but also at protection and recovery at the watershed scale. The lack of consistent standards that apply Soundwide for protection of habitat and water quality has resulted in a hodge-podge of buffer widths and variances, exemptions, exceptions and other ways to get around land use restrictions, depending on the county and city. With little or no incentive and no requirement to do what it would truly take to protect the Sound, jurisdictions do the minimum – to save money and time and avoid politically tough decisions on local land use. The only way to bring fairness to the system and true protection to the Sound is to prepare, apply and enforce minimum habitat protection standards Soundwide" (Stevens)

¹¹⁶ Data, Data, and More Data

¹¹⁷ "While many models reflect conceptual or established physical relations, the interties remain to be established for many Sound issues. That means data, and lots of it, of course. Not just descriptive data but also comparative data across time, space, stressors and stressees. Happily, the Science Plan goes into data accession in encouraging detail" (Flora).

¹¹⁸ "Priority E talks about building the management system needed to support the Draft Agenda, however it never mentions how the data for the indicators will be collected and reported to insure that we are making progress towards recovering Puget Sound. With out this data, we will be where we are today, not knowing whether our actions are making any difference" (Joerger)

¹¹⁹ "In regard to developing an information management framework, Ecology encourages the Partnership to utilize the proposed information management working group (proposed in the Biennial Science Workplan) to define a set of information exchange protocols and standards for sharing activities and performance information rather than having the Partnership unilaterally establish a set of standards which the partners must adhere to" (Manning).

¹²⁰ E.1.3.2 Data Management. We suggest these edits: "Implement a distributed data and information exchange system that IS FULLY TRANSPARENT AND can be contributed to and accessed by scientists, implementers, policy makers and other interests." While we strongly support the development of a data management system, our past experience compels us to request that the words "fully transparent" be added. Information collected using public funds should be easily accessible to the public in a timely manner. (Stevens)

¹²¹ Education, Training, and Outreach

¹²² "Increase and sustain coordinated efforts for communications, outreach and education to increase public awareness and encourage individual stewardship. Education is in many ways one of the most

difficult challenges for the Partnership. The success of the Action Agenda depends on public commitment and support. The rigor and professionalism that goes into the science and policy arenas of the Action Agenda should also be applied to education. Social research should be conducted to craft effective education programs, measure performance, track progress and guide improvement through adaptive management. The Partnership could provide the research, evaluation and other tools to help local communities carry out best practices for education, outreach and media communication.

¹²³ "Priority E: Communication, Outreach, and Education - This is another priority action of LHJs. We believe that this activity needs to be done on a regional scale, address the critical issues in the Agenda, and educate and assign responsibility to the residents of Puget Sound to do their share" (Brastad).

¹²⁴ "...section E.3.4.1 of the draft action agenda speaks to the need for scientific capacity and E.4.2.3 speaks to the notion of volunteer involvement through citizen science. Near term action #7 under priority E calls to \"Develop and implement a coordinated citizen science program.\" I don't see anything in the science plan that speaks to involvement of citizen scientists. Clearly not all volunteers are capable of participating in rigorous, peer-reviewed scientific studies. There are, however, some. And we'd like to be involved. In rigorous science. we can add capacity to the system. You have 10 lbs of work to do, but only a 5 lb sack to do it with. We can help increase your capacity to do rigorous science, particularly in data collection/monitoring. Please consider involving citizens with expert knowledge and skills who can help in the data collection/monitoring aspects of the science program" (Racine).

¹²⁵ "Education and outreach needs to be a high priority – implemented in a meaningful, coordinated fashion at a significant scale, focused on issues that can have the biggest impact. The PSP need to find an issue(s) related to the state of the Puget Sound that captures attention and compels action. Outreach and education should create broad community support and significant action. PSP should develop programs to combine efforts and pool resources to help implement these programs. This would help make sure that public receives a consistent message on how they can change their behavior/actions to reduce the amount of pollution in stormwater. Residents of Puget Sound must accept ownership of the problem; government action is only part of the solution. It is critical that we create a paradigm shift in willingness of society to change behavior – we must figure out how to preserve and restore environmental integrity in face of significant population growth and human impact.

E.3 Near Term Action: We suggest adding an action that fits current NPDES phase I and II permit outreach requirement: 'Work with Department of Ecology and local government NPDES managers to rapidly identify and fund outreach materials and regional campaigns that meet their NPDES permit requirements' " (Nickels).

¹²⁶ "The Science Plan's education, training, outreach, and communication efforts need to be placed front and center to develop and integrate the existing knowledge into a compelling story worthy of the expensive, politically challenging investments required of the public, governments, and business to restore Puget Sound" (Sims).

¹²⁷ " "Focus on social marketing - The overall goal of an outreach program should be to foster a change in personal behavior by cultivating a change in social norms. The method of reaching this goal is through the use of social marketing techniques that include: [1] Using this foundational research to develop messages and programs that address barriers to behavior changes, [2] Using pilot projects or other evaluation techniques to field-test programs and messages, [3] Adaptively managing the program based on this evaluation. Support volunteer programs but recognize limitations - Volunteer programs can support and re-enforce behavioral changes of those that already hold a good deal of concern about the environment. Likewise, information and awareness—while necessary—will not in and of themselves promote and sustain the desired behavioral changes. Build on current outreach efforts - The action plan should recognize, coordinate and commit support to Outreach and Education programs that local jurisdictions are implementing as part of Salmon conservation, NPDES, and TMDL processes. In particular, the plan needs to coordinate with the regional groups that have outreach programs; groups such as STormwater Outreach for Regional Municipalities (STORM), and the WRIA's" (Spangler).

¹²⁸ "Consider establishing an affordable web based Env. Science Education Masters Program. The goal would be to place these educators in the Community and Technical Colleges. The CCs and TCs would then train Engineering Techs for storm and waste water, GIS Techs, code enforcement officers, and inspectors for the local community. Looking ahead the program could be expanded to provide four year degree opportunities in Civil and Environmental Engineering for the local community" (Olsen).

¹²⁹ Education was identified as an essential component of the Puget Sound Initiative but in the draft action agenda its action elements are not integrated into the action agenda nor its outcomes clearly defined. The menu of major communications and education initiatives does not provide a clear roadmap to what will be accomplished by whom and in what time frame. We note that on the draft agenda urges people to get involved with "...hundreds of organizations that need your help. Visit www.psp.wa.gov to connect with a group in your area." However, we cannot find any such groups listed on the Partnership website. ... Communications, education and outreach actions and their outcomes need to be more clearly delineated and defined. Raising awareness and effecting behavior change are two very different outcomes requiring different strategies and tactics and cannot be accomplished solely with a long-term, high-visibility communications effort. We recommend that more community-based social marketing research be done to assess whether the education initiatives chosen in the action agenda are the best ways to go to get public support and action to meet Puget Sound recovery and restoration goals. (Stevens)

¹³⁰ "Create a comprehensive public awareness campaign that results in widely accessible presentations (different formats, highly visual) describing the State of the Sound, actions needed and being taken to protect and restore it. Video-based (e.g., Hudson River example at Liberty Science Center, NJ). CD-based (Planned by interagency "MUDS" [sic] project) and mailed to neighborhood associations with offers of various staff to host neighborhood meetings. Increased TV coverage." (Greis).

¹³¹ "Educate the public to the importance of medical testing marine mammals and how by doing so, the endangered populations can be protected" (Wood)

¹³² Loose Ends

¹³³ "The Scientific Board, though well qualified and distinguished, does not seem to be broad enough in its disciplines. There should be members that have specific disciplines which are currently working in the areas of on the water investigations whose findings are of an immediate nature. There are numerous scientist and researchers that are currently working on studies that are looking at pathogens and diseases that could have immanent impacts on humans, marine mammals, fish and other marine species as well as having direr socioeconomic impacts that need to be put on a "fast track." ... Expand the scientist panel to incorporate Veterinarians, more microbiologists and epidemiologists (Wood)

¹³⁴ "... based on the statements made at the beginning of the document—and comments made on Wednesday, there appears to be a need for this document to lay the groundwork for future Science Panel work. It is almost as if the document should take the form of a set of bylaws on how the panel will perform the tasks assigned to it (i.e. how the panel will coordinate specific scientific activities). Setting up this structure will help to address the on-going science needs of the partnership." (Ufnar)

¹³⁵ "I really like the concept of a SP, but its current role is oversold. As I and many others have noted, the underlying expertise of the membership, although high, is not what would be expected of a technical guidance group for ecosystem restoration. This is no criticism of any individual--but they are in no position yet to "lead the charge," and it does a disservice to the existing expertise throughout the region to imply otherwise. The PSP process has done a good job of engaging that broader community, and you must continue to do so as the SP grows into its role. It is (emphatically) not there yet, however, and stating otherwise does not make it so. Just tone down the rhetoric a hair, ok?" (Booth)