January 8, 2007

Puget Sound Partnership
c/o Puget Sound Action Team
PO Box 40900
Olympia, WA 98504-0900

RE: Draft Recommendations of the Puget Sound Partnership (October 13, 2006); Response to Critiques by Beyerlein et al. (October 26, 2006)

Dear Members of the Puget Sound Partnership,

The undersigned are writing in response to a letter submitted by members of Washington's scientific community during the public comment period for the Draft Recommendations of the Puget Sound Partnership, issued on October 13, 2006. Our comments are intended to provide additional points for consideration as your final recommendations move forward and debate continues over improving the health of Puget Sound.

We are all working members of Washington State's scientific community with practical expertise in the various aquatic resource and hydrogeologic issues that pertain to Puget Sound protection, including stormwater runoff and the best management practices and science that pertains to it. We disagree with many of the criticisms leveled at the Partnership by Beyerlein *et al.* in the scientists' letter dated October 26, 2006[1] (the Critique). It is our opinion the Critique failed to properly prioritize where limited resources will do the most good for Puget Sound within the planning horizon of the Partnership's recommendations.

The following points explain our reasoned response to the Critique of the Draft Recommendations of the Puget Sound Partnership (Partnership Recommendations). Five main points are made to put the Critique in context, followed by comments interspersed with the Critique text in an Appendix to this letter.

[1] Beyerlein, D., S. Bolton, D.B. Booth, T.W. Holz, T. Hooper, R.R. Horner, J.R. Karr, D Kirkpatrick, J. Lombard, C.W. May, G. Minton, D. Montgomery, D. Somers and C. Steward. October 26, 2006. Partnership recommendations to: improve water quality and habitat by managing stormwater runoff; protect ecosystem biodiversity and recover imperiled species; provide water for people, fish and wildlife, and the environment. Letter to the Puget Sound Partners.

Context #1: The Critique is focused primarily on stormwater flow control. This is for the most part a stream flow or water quantity issue, and is not directly related to a water quality or toxics issue for Puget Sound, which cannot be affected by stream flow controls in terms of water level. Appropriate flow control is necessary to prevent stream erosion and protect habitat suitability in streams that drain to Puget Sound and contribute to its ecology. However, the Critique's narrow focus on flow control and water quantity carries the implicit assumption that other aspects of Puget Sound Protection in the Partnership Recommendations are of lesser importance. This is wrong. Rectifying problems related to water quality, toxics, and impacts predominantly from development and industry constructed before today's more modern stormwater flow and water quality control requirements are important.

Further, the Critique ignores that impacts from redevelopment and new development on flow control will be diminished by the Partnership's recommendation to fully implement the newest stormwater manual version(s) approved by Ecology through ensured implementation of the Phase II NPDES program. The Critique ignores that the newest stormwater manual version(s) approved by Ecology all emphasize and encourage low impact development (LID) methods, infiltration, and dispersion where feasible and consistent with public and environmental safety. The Critique ignores that developers almost invariably choose to infiltrate wherever soils are suitable and offsite impacts from infiltration (if any) can be mitigated. The Critique ignores that monitoring data show that stormwater quality facilities constructed to modern standards are discharging water from urban density development at near predeveloped water quality levels and well within water quality standards of WAC 173-201A. The Critque ignores that developers often cannot narrow roadways or employ other LID features to reduce storm runoff because of local jurisdiction ordinances and emergency safety concerns; a bottleneck the Partnership developed a recommendation to address. The Critique ignores that incentives, education, and cooperative programs recommended by the Partnership work better than the punitive approach it proposes.

While some stormwater impacts from any engineered system may occur, the risk of significant impacts is lowered through the use of best available science as implemented through the new generation of Ecology-approved manuals. Growth in the Puget Sound Basin will not stop, and all stormwater cannot be infiltrated because of the low permeability till soils that predominate upland areas in our region. The Critique's narrow focus on tightening regulation of flow controls on new development lacks proof that impacts need to be lowered further than the new generation of stormwater regulations just developed in 2005 will take us, or that the new stormwater regulations in tandem with the

Partnership's Recommendations encouraging greater use of LID features and narrow roadways are inadequate to the task.

Worse, the Critique's suggestions would have us divert focus and limited resources from the Partnership's greater priority emphasis on correcting known toxics problems and retrofits where stormwater is untreated. Certainly that is more important than tightening regulations where stormwater is treated to currently accepted best available science requirements embodied in the 2005 generation of stormwater manuals. Common sense tells you that most development in Puget Sound predated any level of water quality or flow control treatment requirements which began to appear in the 1990's and improved ever since. You cannot expect new development to repair the damage from past development before modern stormwater standards existed. The best new development can be expected to do is minimize further impact. The Partnership was not wrong in its priorities to focus on repairing past damage first, and ensure minimal further impact in the future.

Context #2: The Critique does not acknowledge the Growth Management Act (GMA). Concentrating development within urban growth areas to meet the objectives of GMA will cause some degree of impact to water quality and quantity where urban growth areas (UGAs) exist, even as mitigated through modern stormwater manuals. However, those impacts are intended to be <u>less</u> than would occur by sprawling an equal population over a broader area served by more roads.

Sprawl results in higher ratios of impervious surface, forest clearing, and automobile use per capita than concentrated growth under GMA. Many of the Critiques' suggestions would preclude GMA's objectives and perpetuate sprawl.

For example:

- The Critique wants to preserve 65% of all forest within the GMA that might otherwise be used to contain development and prevent pressure for sprawl outside the GMA;
- The Critique wants to mandate use of the Washington Department of Ecology's (Ecology's) Best Management Practice (BMP) T5.30 for all new development, including in urban areas. However, this BMP for "full dispersion" of stormwater without any treatment is intended for rural single family densities and rural neighborhood collectors and local access streets where 65% forest retention to accept the dispersed runoff is retained. It is irresponsible to suggest this BMP be adopted within urban growth areas planned for urban densities under GMA.

Context #3: The Critique pre-supposes the 2005 *Ecology Stormwater Management Manual for Western Washington* and the 2005 King County *Surface Water Design Manual* are grossly inadequate to mitigate stormwater impacts. However, none of the Critique co-signers or any other investigator have data supporting such a position, because there are no whole basins developed to modern standards, or even to the standards of the predecessor stormwater manuals published in 2001 (Ecology) and 1998 (King County), to determine how much protection current standards provide. It is laudable and required to ensure that stormwater is properly treated for quality and that flow control measures will prevent otherwise reasonably expected adverse impacts under both local ordinances and under the State Environmental Protection Act (SEPA). However, the Critique's suggestion that the current stormwater manuals in conjunction with GMA would be grossly inadequate to protect Puget Sound from stormwater impacts if the entire Puget Basin was built to 2005 standards, including the manuals' encouragement of LID measures, is conjecture without good foundation by the Critique authors.

Context #4: The Critique appears to say the Partnership's highest priority for a healthy Puget Sound by 2020 ought to be new controls on new development beyond those in the just-issued 2005 Ecology stormwater manual. These new requirements have barely begun to be implemented. It is contrary to common sense for the Critique to suggest limited resources ought to be diverted from the Partnership's priorities for this purpose. To name a few, these priorities include:

- Reducing toxics, nutrients and pathogens entering Puget Sound,
- Retrofitting areas where existing stormwater controls are absent or not up to current stormwater manual standards and are causing harm,
- Protecting physical habitat in Puget Sound,
- Ensuring requirements for expansion of the NPDES permit program occur on schedule and are adequately funded, and
- Accelerating efficient use of reclaimed water, completing instream flow targets by 2009, and restoring instream flows in priority river basins.

New development under current 2005 standards for flow duration controls and water quality treatment did not cause Puget Sound's current condition, and surely the new stormwater manuals mitigate much of the flow impacts as well as help maintain water quality standards. How could further restrictions for questionable gains be a better use of funds than the above Partnership priorities?

Context #5 The Critique says the Partnership "leans on failed practices for protection" from stormwater. This is not true because the practices are new - most development in Puget Sound occurred prior to their initiation. Prior to the early to mid 1990's, there were no even marginally effective stormwater

controls for flow control or for water quality control. The majority of development in the Puget Sound basin had happened by then. Applying current regulations and practices to "retrofit" untreated stormwater runoff, as well as cleaning up past industrial and point source contaminants, are sound practices we ought to encourage, just as the Partnership seeks to expand LID features to reduce runoff.

Thank you for considering these comments.

Sincerely,

John Cherry, P.E.
Senior Civil Engineer
HBA Design Group

Keith J. Goldsmith, P.E.
President and Chief Executive Officer
Goldsmith and Associates

Carl Hadley
Principal
Cedarock Consultants, Inc.

W. Noel Higa, P.E.
Managing Partner
CHB Development, LLC

Andrew C. Kindig, Ph.D.
Principal
A. C. Kindig & Co.

Curtis J. Koger, P.G., P.E.G., P.Hg.
Principal Geologist/Hydrogeologist
Associated Earth Sciences, Inc.

Marc J. Servizi, P.E.
Senior Project Manager
W&H Pacific

October 26, 2006

Puget Sound Partnership
c/o Puget Sound Action Team,
P.O. Box 40900
Olympia, WA 98504-0900
Dear Puget Sound Partners

SUBJECT: PARTNERSHIP RECOMMENDATIONS TO:
IMPROVE WATER QUALITY AND HABITAT BY MANAGING STORMWATER RUNOFF
PROTECT ECOSYSTEM BIODIVERSITY AND RECOVER IMPERILED SPECIES
PROVIDE WATER FOR PEOPLE, FISH AND WILDLIFE, AND THE ENVIRONMENT

We, the undersigned members of Washington State's scientific community, have been studying impacts of urbanization on habitat and aquatic life for decades. There is a large body of literature regarding the relationship of urban runoff and the health of waterbodies. We have had the privilege of contributing papers describing the status and trends in Northwest rivers, wetlands, and coastal environments, the impacts of urban runoff (and other effects of human activities on Puget Sound waters), the effectiveness of mitigation measures, and original and effective methods for monitoring waterbody health. All undersigned have credentials to comment on effective approaches for urban runoff management.

These comments are in response to preliminary recommendations by the Puget Sound Partnership, dated October 2006, for action to preserve and recover Puget Sound.

IMPORTANCE OF STORMWATER RUNOFF MANAGEMENT IN THE PUGET SOUND BASIN
Urban runoff scours streams, destroys aquatic life characteristic of a healthy ecosystem, and carries enormous loads of contaminants to Puget Sound. Stormwater is most likely a primary source of destructive flows and contaminants leading to the precipitous decline in the health of the Puget Sound ecosystem.

1. If the stormwater is unmitigated, we can agree. However, Ecology and EPA both find that new development constructed to the new 2005 approved Ecology Stormwater Management Manual for Western Washington and its approved equivalents (like the 2005 King County Surface Water Design Manual) will protect State Water Quality Standards in combination with programs to restore impaired waterways (i.e., Total Maximum Daily Load (TMDL) plans to return waterways to water quality standard compliance that are required by the federal Clean Water Act).
2. Most development in Puget Sound was built before modern standards for stormwater control began to develop in the 1990's. Part of the Partnership's Recommendations is to retrofit where stormwater treatment does not occur or is substandard and causing problems, AND to ensure modern stormwater manual practices are applied in smaller cities through timely expansion of the National Pollutant Discharge Elimination System (NPDES) permit program mandated by EPA and the federal Clean Water Act.

3. Other sources of contaminants, for example toxic waste sites and industrial effluent point source controls, have left residual toxic problems and their cleanup is appropriately assigned greater priority by the Partnership.

Because of urbanization, peak stormwater flows can increase stream discharge by factors of up to 10-fold over predevelopment peaks. Annual flow volumes can double. Contaminants in and volumes of urban runoff discharged to streams change the types and numbers of aquatic species, changes that are key signals of declining ecological health.

4. Ten-fold increases in peak discharges cannot legally occur for new development, but did occur before modern standards were implemented.
5. Increasing streamflow peaks ten-fold is not allowed by the 2005 Ecology Stormwater Management Manual for Western Washington (or it's approved equivalents).
6. The 2005 Manual (and approved equivalents) standard flow control requirement is that stormwater releases match pre-developed historic forested conditions for flows from 50% of the 2-year peak up to the full 50 year peak.[2]
7. Water quality treatment is required by the 2005 Ecology Manual (and approved equivalents) to maintain state water quality standards under WAC 173-201A. These standards were developed with the specific purpose of protecting fish, shellfish, and wildlife. Monitoring data have shown these facilities can maintain state standards at discharge, and minimize water quality changes.

The decline in stream health begins with the clearing of the forest and modification of river channels in a watershed. Stream flow usually increases dramatically after clearing and often streams are devastated even before any development takes place. Every square foot of effective impervious surface then added to a watershed counts further toward the stream's decline. ("Effective" impervious area is that connected by a conveyance system to surface water.) With the first increments of effective impervious area in a watershed, the numbers of the most sensitive species decline dramatically. Contrary to popular dogma, there is no threshold of development below which there will be no biological degradation.

8. There has been no claim from anyone that any amount of development won't have some type of impact. Halting all development is an unrealistic goal. The relevant issues are how development impacts can be mitigated to comply with state water quality standards and local, state and federal laws, and how to bring the considerable areas where no treatment is provided for

[2] Ecology 2005 Stormwater Management Manual for Western Washington, Volume I, Page 2-33.

storm water reaching Puget Sound into compliance with those standards.

9. To say streams are devastated by legal clearing alone is to ignore requirements of local Critical Areas Ordinances mandated by the GMA for protective buffers and storm drainage, as well as requirements for flow control to prevent such impacts under the Individual and General NPDES Permit requirements for Construction Stormwater Discharge implemented under Section 302 of the Clean Water Act by Ecology. The Critique's authors are resorting to inflammatory statements without any acknowledgement of the ever-increasing efficacy of programs that are preventing impacts we all want to avoid.
10. This statement simply speaks to the importance of applying the existing Partnership stormwater priorities to:
    a. Retrofit where there is no stormwater treatment;
    b. Ensure timely implementation of the Phase II NPDES program and other water quality improvement plans; and
    c. Coordinate requirements between different jurisdictions in the same basin.

Although all groups of aquatic organisms are affected by the actions of humans, anadromous fish in our region are the most widely understood and appreciated species that suffer enormously in streams draining urbanized watersheds. Salmon and sea-run cutthroat trout spawned and nurtured in Puget Sound's streams are important for several reasons: regional icons, contributors to regional economies, and key players in the food webs that range from mountain forests to the health of Puget Sound orcas. In short, a healthy Puget Sound depends on a healthy regional biota, especially anadromous fish populations.

END-OF-PIPE TREATMENT AND DETENTION DISCREDITED

End-of-Pipe" management of stormwater refers to the practice of treating and detaining runoff from urban land uses before discharging it to surface water. Underlying the employment of end-of-pipe management is the assumption that forested watersheds can be converted to any type of land use (including 100% impervious) and that the impacts of these changes on receiving waters can be negated through the use of engineered stormwater-management hardware.

The prescriptions and methods for design of such hardware are found in drainage design manuals in use by every jurisdiction in the basin. An example of such a manual is the DOE's "Stormwater Management Manual for Western Washington". Newly written NPDES permits require that jurisdictions use this manual (or its equivalent) in mitigating for urban runoff. However, the DOE manual itself disavows claims to protect aquatic life. From Volume 1, Section 1.7.5: *land development as practiced today is incompatible with the achievement of sustainable ecosystems.

11. A fuller context of the Ecology statement is more useful than the single portion the Critique quoted above. Ecology is saying that societal commitment to shrinking roadways and automobile

reliance will be necessary to fully merge urban and rural development with full return to all stream beneficial uses. It is not saying that its manual provisions for stormwater flow control are ineffective – just that they are one part of a larger solution.

12. Ecology 2005 Manual Vol 1 pages 1-25 to 1-26:
    a. *"The manual can provide site development strategies to reduce the pollutants generated and the hydrologic disruptions caused by development.*
    b. *"Ecology understands that despite the application of appropriate practices and technologies identified in this manual, some degradation of urban and suburban receiving waters will continue, and some beneficial uses will continue to be impaired or lost due to new development.*
    c. *"There is some agreement that preserving a high percentage of the land cover and soils in an undisturbed state is necessary. To achieve these high percentages…a dramatic reduction is necessary in the amount of impervious surfaces.*
    d. *"Surfaces created to provide 'car habitat' comprise the greatest portion of impervious area in land development. Therefore…we must reduce the density of our road systems, alter our road construction standards, reduce surface parking, and rely more on transportation systems that do not require such extensive impervious surfaces.*
    e. *"Improving our stormwater detention, treatment, and source control management practices should help reduce the impacts of land development in urban and rural areas. We must also improve the operation and maintenance of our engineered systems so that they function as well as possible. This manual is Ecology's latest effort to apply updated knowledge in these areas.*
    f. *"In summary, implementing improved engineering techniques and drastic changes in where and how land is developed and how people live and move across the land are necessary to achieve the goals in the federal Clean Water Act…"*

13. We all may wish that roadways and automobile traffic could be reduced in the Puget Sound basin by 2020, but is it meaningful or helpful for the Critique to urge the Partnership Recommendations include reconstruction of the transportation network in the Puget Sound basin to favor mass transit and reduce the footprint of roadways by 2020, when that would take more financial resources than the entire state could likely afford? As a long term goal, beyond the planning horizon for the Partnership Recommendations and intent, we can all agree improved public transit and less reliance on private automobiles and the space

afforded to them is desirable, and that jurisdictions are working towards that end.

And also from Volume 1, Section 1.7.5: The engineered stormwater * systems advocated by this and other stormwater manuals * cannot replicate * hydrologic functions of the natural watershed that existed before development, nor can they remove sufficient pollutants to replicate the water quality of predevelopment conditions.

14. Stormwater controls can bring stormwater quality into compliance with state water quality standards, and they can prevent streambed erosion when properly applied.
15. Ecology 2005 *Stormwater Management Manual for Western Washington*, Vol I, page 1-9: *"The Stormwater Management Manual for Western Washington provides a default set of stormwater practices which satisfy State and Federal stormwater requirements."*
16. Monitoring of projects where modern stormwater treatment is provided has also shown compliance with state water quality standards.

End-of-pipe stormwater management has been and continues to be a failure at adequately protecting streams, wetlands, and Puget Sound. The literature in the past 30 years documents the negative effects of stormwater discharges on receiving waters.

17. The literature referred to does not analyze how much benefit is provided from modern stormwater controls, because they have not been in existence for very long and no watersheds are completely built to modern 2005 standards to study. Rather, the studies have largely been on watersheds with significant areas lacking modern stormwater controls.
18. Moreover, the literature referred to cites lack of flow control, and not lack of water quality treatment, as the overriding cause of stream degradation. The 2005 stormwater manuals require both stringent flow control and water quality treatment for new development.

In the past 5 years several papers have been published describing the marginal differences in stream damage between those watersheds where treatment and detention is installed and those where discharges are unmitigated.

SEE COMMENT 17

Hydrological studies are available that show that no amount of end-of-pipe mitigation can protect streams from urban runoff. In short, conversion of forests to traditional urban land uses cannot be mitigated by end-of-pipe prescriptions.

SEE COMMENTS 11-18

Since 1996, the correlation between urbanization (and concomitant decline in forest cover, loss of stream buffers, new impervious area) and stream health has been documented in detail. It is now possible to predict, with considerable confidence, the ill*effect of continuing urbanization on the last vestiges of healthy streams in the basin if such development follows the same formula employed in the past.

SEE CONTEXT #2 AND COMMENTS 11-18

THE PARTNERSHIP LEANS ON FAILED PRACTICES FOR PROTECTION

SEE CONTEXT #5 ABOVE

The following is the stormwater recommendation from the latest draft of Puget Sound Partners recommendations (dated October 2006):

1. Issue NPDES Phase I and Phase II permits that brings 80% of the Puget Sound's population (and some 80 cities) into active stormwater management. Also:

a. Implement a coordinated water quality monitoring program.

b. Expand programs to maximize stormwater infiltration.

c. Promote a basin approach to stormwater by sponsoring pilot projects.

d. Increase funding for Low Impact Development (LID) demonstration projects and develop incentives to encourage the use of LID.

The Partnership recommendation to issue NPDES permits is unnecessary in that this will be done regardless of Partnership stance.

19. The PSP recognizes requirements of the federal Clean Water Act take money and human resources to implement. It thus has prioritized timely implementation that might otherwise be delayed, and actions to aid permit requirement compliance.

Furthermore it is widely known that NPDES offers little hope of protecting streams and Puget Sound.

20. The Critique takes the unusual step of claiming the federal Clean Water Act NPDES program is "widely known" to be useless for water quality protection. While the authors may think that additional measures could be more protective, this statement is surely not true and is unsupported.

NPDES permits issued by Washington State require only that permittees adhere to the state's "Stormwater Management Manual for Western Washington", a set of prescriptions for end-of-pipe engineering hardware. The manual recognizes that end-of-pipe engineering will not protect streams and source control is necessary (Volume 1). But, in the subsequent volumes containing

its prescriptions, the manual is silent about the advisability of conversion of forests to intense forms of land use. The manual allows development projects that convert up to 100% of a forested site to impervious area. The manual's prescriptions are concerned only with sizing of hardware. The scientific literature demonstrates that it is not possible to fully mitigate for any such conversions regardless of hardware size.

SEE COMMENTS 11-18 ABOVE

The Partnership should not expect that NPDES or continued end-of-pipe management of runoff will lead to the protection or recovery of Puget Sound.

21. No one believes that, taken alone, implementing the 2005 Stormwater Manual provisions can cause Puget Sound to recover. After all, it is applied to new development and in some cases redevelopment (often to greater density). How can new development alone lead to recovery when it has no effect on existing development constructed without modern standards that led to some of the problems in Puget Sound in the first place?
22. We should reasonably expect that minimizing impact of new development in combination with implementing GMA, cleaning up toxic problems, retrofitting areas lacking functional stormwater controls, encouraging broader use of low impact development (LID) features where feasible, and all other priorities established in the Partnership Recommendations will lead to a healthier Puget Sound by 2020.

Encouraging infiltration (in the absence of LID standards) is meaningless ("b." above). For traditional high-impact development, jurisdictions disallow infiltration on till soils. Encouragement to "maximize" infiltration will not make soils more porous. And the Partnership should not be "encouraging" anything. The Partnership should be describing practices and standards that are vital to Sound recovery and recommending that they be implemented and enforced.

23. Maximizing infiltration potential means encouraging recognition and use of situations where water can be infiltrated, not trying to force water into till soils that cannot accept it.
24. The Partnership proposes to encourage this through efforts to have more ordinances written to enable construction of various LID techniques, increase state grants, increase LID incentives, and promote LID demonstration projects. LID techniques may also be suitable for some retrofits where stormwater controls are lacking. These actions are not "meaningless."

More low impact development pilot and demonstration projects, at best, will delay essential action ("c" and "d." above). We have sufficient experience with traditional end-of-pipe stormwater management to know that it is not an alternative and we must turn from it as quickly as possible. Sufficient projects have been constructed to show that LID projects can be successful at retaining runoff on project site. To recommend more such projects (in the absence of action to introduce

changes into development code to require them) reflects unjustifiable timidity in the face of great danger to the Sound. Moreover, the Partnership recommendation for incentives ("d" above) to abide by LID standards, in the absence of regulations to force such changes, is destined to fall far short of the goal to protect and restore Puget Sound.

We regrettably conclude that, if the above is the extent of the Partnership recommendations regarding stormwater, little hope should be held for restoration of Puget Sound. Indeed it is far more likely, with the arrival of millions more newcomers and concomitant high*impact development, that the health of Puget Sound will continue in its precipitous decline.

25. The Partnership recommendations will encourage LID features where they are feasible, as do the new generation of Ecology approved stormwater manuals.
26. All stormwater manuals contain provision to infiltrate stormwater (eliminating "effective impervious surfaces"), and developers are always interested in doing so where soils are suitable and they are not penalized or prohibited by local regulations.
27. Some sites, such as the SEA Street project in Seattle, are touted as LID successes over till soils. However, data collected by the undersigned demonstrate that the SEA Street project is infiltrating into non-till soils. Where sites can infiltrate, similar LID features are a good idea and are encouraged by the Partnership Recommendations. Further, the SEA Street project has very narrow roads, and it is doubtful that Seattle or other jurisdictions would approve such narrow roadways over an extensive area for fire and emergency service safety and access concerns. The Partnership Recommendations include a provision to address this conflict in favor of LID.
28. As the Critique points out, requiring infiltrative LID measures will not change the fact that most of the uplands in the Puget Sound basin are comprised of poorly infiltrative till.
29. The restoration of Puget Sound cannot come about by requiring LID for new development as the Critique suggests, or by encouraging it where it is feasible as the Partnership recommends. Using LID where it makes sense in combination with modern stormwater manuals can only hope to prevent adding new impacts from new development. Retrofit and correction of existing problems is the key priority issue, as recognized by the Partnership's Recommendations. See Context #1 through #5 comments above.

PRACTICES THAT MUST BE IMPLEMENTED IF PUGET SOUND IS TO BE SAVED

Science supports the following actions and practices related to land use as necessary to halt the

decline of Puget Sound ecosystem, provide for recovery of anadromous fish, halt the increase in and reduce the load of pollutants carried by stormwater to Puget Sound, and begin the steep climb toward restoration. This list is not all-inclusive. It is left to others to urge the many other action items needed to restore Puget Sound and other regional water bodies to healthy condition.

1. Preserve Existing Least-Disturbed Watersheds and Subwatersheds. The scientific literature is clear that the healthiest and most biologically productive streams are found in undisturbed watersheds. Very small levels of disturbance in the healthiest watersheds immediately start their inevitable biological or ecological decline, beginning with the loss of their most sensitive species, to decline in predators and to the increase in the most tolerant species.
Such watersheds and associated streams should be set aside and protected from disturbance. If we are serious about preserving Puget Sound, we must identify those watersheds that we can characterize as in good or excellent condition and preserve them. The means employed for preservation must ensure that it is certain and permanent.

30. Excluding areas from development for habitat, wetland, stream, or shoreline protection is consistent with comprehensive planning and critical areas protection provisions of GMA. To the extent such protections remove land from urban growth areas that are necessary to achieve density targets and affordable housing objectives, then UGAs will need to be expanded to offset.

2, No Net Loss of Forest Cover in the Puget Sound Basin. Forest loss must be limited in the process of conversion to urban purposes, and such loss must be balanced by increasing/restoring forest cover in disturbed areas within the basin.

Forest loss owing to new development should be limited through development code. An example of such code can be found in DOE's "Stormwater Management Manual for Western Washington", Volume V, BMP T5.30. The Partnership should recommend that this code be used to guide all new development.

31. BMP T5.30 is not intended for, and is unsuitable for, urban development. The Critique is irresponsible to suggest such practices are in the public safety and interest or consistent with GMA objectives within areas designated to contain urban growth.
32. BMP T5.30 [3] "Full Dispersion" is a best management practice allowing for full dispersion of runoff from impervious surfaces and cleared areas where 65% of the site is permanently left in forest or native vegetation. No other water quality or flow control treatment is required.
33. This BMP is primarily intended for rural densities:
    - *"Rural single family residential developments should use these dispersion BMPs wherever possible to minimize effective impervious surface to less than 10% of the development site."*

[3] Ecology *Stormwater Management Manual for Western Washington*, Vol V, page 5-22 to 5-25

- *"Roadway runoff dispersion is allowed only on rural neighborhood collectors and local access streets.*
- Roof downspouts must "*…have vegetated flow paths through native vegetation exceeding 100 feet."*

34. The dispersion option, which requires no other stormwater treatment for quantity or quality control, is clearly not appropriate for urban density development.
35. By suggesting this option as a regulatory standard, the Critique's authors are insisting that the Puget Sound population be dispersed in rural densities with attendant sprawl.
36. To the extent BMP T5.30 is applicable to new rural development, it is contained in the 2005 Ecology Manual that is encouraged for more widespread use by PSP's support of timely implementation of the Phase II NPDES program.

To mitigate for the fraction of forest cleared in each new development (i.e. the fraction not preserved by code), the Partnership should recommend a program of clearing trading rights. Such a program would ensure that for each portion of a site cleared for development an equivalent forest area is restored elsewhere in the basin. (Forest restoration in disturbed areas can be affected by a variety of programs. Restoration of buffers along urban streams is an example.)

37. Many jurisdictions and building industry interests are on record as encouraging Critical Areas Ordinance (CAO) provisions that provide incentives for buffer restoration, for example the City of Bellevue's new CAO and the draft CAO under consideration by Mount Vernon.
38. The Critique fails to consider the Partnership Recommendations provide for restoring 100 miles of marine shorelines, and improving habitat mitigation programs to increase their success rate.

3. Halt Runoff From New Impervious Area in the Puget Sound Basin. Methods for eliminating runoff from impervious surfaces include (but are not limited to) using pervious paving materials, associating impervious area with bioretention facilities, reducing such areas to functional minimums, and so on.

The Partnership should recommend code changes requiring that most new paving and roofing be constructed using materials and practices to prevent them from generating runoff to surface water.
These methods are some of the tools in the practice of "low impact development".
4. Preserve Existing and Restore Destroyed Buffer Areas Adjacent to Streams. Destroyed buffers are often found in private ownership. The Partnership should recommend that these be purchased, or otherwise protected, and that soil and riparian vegetation be restored. The protection of Puget Sound as a public good requires creative approaches to these activities. The Partnership should recommend that jurisdictions adopt a system of prioritization of stream buffers

to be restored and a time table for restoration. Obviously, restoration of existing problem-buffers may take decades; even so, the Partnership should set reasonable targets for buffer restoration for year 2020 and other milestone dates.

SEE COMMENTS 37 AND 38.

5. Reduce the Amount of Runoff From Existing Impervious Area. Much existing impervious area is unnecessary and should be removed. (For example, two-way streets could be converted to one-way and a lane eliminated.) Existing impervious area could be disconnected from surface water by repaving using pervious materials or bordering with bioretention facilities or both.

39. LID techniques reliant on infiltration are generally not suitable where till is at the surface or at shallow depths. Installing porous pavers over till, for example, would be a large expense with little change in runoff benefit for the storms capable of causing stream damage. Surface runoff will still need to be dealt with.
40. LID infiltrative techniques on suitable soils should be encouraged where practical, and will be amplified by the Partnership Recommendation to remove regulatory obstacles to their use and promote LID where feasible.
41. Most LID techniques reliant on full retention of water are generally inconsistent with higher density objectives of GMA which reduce sprawl and reduce impervious surface and vehicle use per capita.

The Partnership should recommend a program of prescriptions and incentives to reduce existing total and effective impervious area.

See Context #2, Context #4, and Comments 11-18, and 39-41 above.

The Puget Sound Partnership has a daunting task and carries the burden of responsibility for the fate of the basin's ecosystem. We the undersigned applaud the effort, and offer our services in making the best possible recommendations to the Governor.

Sincerely,

Douglas Beyerlein, Professional Hydrologist and Professional Engineer
Susan Bolton, PhD, Professional Engineer
Derek B. Booth, PhD, Professional Engineer and Professional Geologist
Thomas W. Holz, Professional Engineer
Thom Hooper, Fisheries Biologist
Richard R. Horner, PhD, Environmental Engineering Research
James R. Karr, PhD, Ecologist
DeeAnn Kirkpatrick, Fisheries Biologist
John Lombard, Planner and Environmental Policy Analyst
Christopher W. May, PhD
Gary Minton, PhD, Professional Engineer
David R. Montgomery, PhD, Professor of Geomorphology

David Somers, Fisheries Biologist
Cleve Steward, Fisheries Biologist