DEPARTMENT OF
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State of Washington

Calculating Credits and Debits for Compensatory Mitigation in Wetlands of Western Washington

Responses to Comments on First Draft and Operational Draft

June 2012

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by
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Introduction

This document contains all of the comments that the Department of Ecology received in 2010 and 2011 during peer review of the drafts of *Calculating Credits and Debits for Compensatory Mitigation in Wetlands of Western Washington*. For each comment submitted, the author has prepared a response, describing what action(s), if any, were taken. Comments are numbered sequentially and organized in the following way.

The final report, *Calculating Credits and Debits for Compensatory Mitigation in Wetlands of Western Washington* (Ecology Publication #10-06-011), is available on Ecology's web site at:
www.ecy.wa.gov/biblio/1006011.html .

The comments listed here are copied directly from the comments received in e-mails and letters. They have not been edited to correct spelling or grammatical errors.

PART 1: General Comments on first draft released October 2010

Comment 1: It's just too complex and onerous to be of practical use. You've got to get your guidance – and this pertains to ALL of you guidance for the past few years – down to manageable processes that people can actually use. I have to be honest with you – most people I know are just ignoring your documents; which is exactly the opposite of what your office should be trying to achieve. Are you there to protect wetlands, or just create paper? Many people find that the cost of hiring private consultants (who are willing to meet these guidance documents, and thus must charge very high fees) is so high that they just ignore everything; justifying that the risk of being caught with an illegal wetland activity outweighs the cost. In this economy, you need to be practical – have I created a process that people will actually WANT to use? I'm sorry to be so critical, but your office is actually making it harder for us to protect wetlands.

Response: I understand your issues. However, we have the opposite issue. The law states that regulations have to use best available science (BAS). You can dumb science down only so much before it stops being science. I have done repeated tests of our methods to see how far the results deviate from what would be a "scientifically"

accurate measure of functions and values. As it stands now the Rating System is only accurate in providing a relative rating of High, Medium or Low when it comes to specific wetlands functions. Any simplifications would mean the result would be a simple YES the wetland provides the function or NO it does not. Such a simplification is no longer acceptable as BAS.

Unfortunately there is this expectation out there that science can be done by anyone when it comes to wetlands. You don't expect most homeowners to be able to electrify their own homes or design a bridge that is safe. People hire specialists to do that and there is no expectation that the building and engineering codes be usable by people without any training. The same is true for wetlands and any natural resources we are trying to protect. Protection of wetlands requires specialized knowledge.

Comment 2: The forms worked fairly well and the explanation and rationale are clearly stated.

Response: Good, I am glad they work for you.

Comment 3: Forms are only a bit awkward in that we need to separate out again into to various types of mitigation (creation, enhancement...) when we have already totalled WQ, Hy, and Ha, per mitigation area.

Response: I do not believe there is much difference between this and current practices. Under current practices you still have to separate out the different types of mitigation because we have different area-based ratios for different types of mitigation.

Comment 4: Typically our wetland fills are mowed hay pasture and the wetlands used for mitigation area about 1/2 mowed pasture and 1/2 forested where they continue off into neighboring properties. We found it almost impossible to move hydrology in a positive direction between before and after because so few options exist in the criteria. We believe the biomasss of plants and woody debris provide water retention which is not addressed. Absent of any credit given to the difference in water absorption capacity for a stand of trees as compared to a mowed hay pasture, taken to the extreme, could actually result in a negative functional improvement.It would actually be possible to excavate soils and constrict ditches on an existing wetland so that in the first years the hydrology threshold for water levels increase (.6-2' increase to >2') only to find that when the trees grow to maturity the hydric regime decreases to saturation only. Thereby enhancement efforts would by the system show a negative functional improvement resulting from tree establishment based upon the few criteria listed for hydrologic function.

Response: This is an issue we discussed in the technical team developing the function assessment methods. We decided that this was not an important variable in the hydrologic functions based on the way we were defining them. We define the hydrologic functions as the wetland's ability to store water and reduce the velocity of excess flows.

1. Most of the hydrologic functions of storage and velocity reduction occur between October and April. At that time there is very little transpiration occurring in the plants,

whether they be trees or herbaceous. Thus the type of plant will not impact how much water a wetland stores or how it will reduce velocities.
2. The transpiration rate of forests in western WA is about 18"/year while that for herbaceous plants is about 8-10"/year. With an annual average rainfall throughout the area of about 48", we did not consider the difference to be significant for the functions as we were defining them.

Comment 5: Regarding Enhancement, we found that our subject wetland although mowed where proposed mitigated, when the full wetland was rated before and after, since it already had at least 10% forest (outside the control of the applicant so could be logged), and at least 10% emergent, and moderate species diversity, that enhancing the mowed portion did not raise the habitat score, no matter if 1 acre, 2 acres, or 3 acres of woody species replaced mowed hay pasture. While we could add a shrub area for a few points, this was not enough to raise the threshold. The unit rated as a whole already had been credited for downed woody debris, snags, in the portion NOT proposed mitigated and offsite, so then adding the woody debris into the pasture did not show any increase of functionality, either. End result is that it is possible that a 5 acre wetland that has at least 10% tree can have 4 acres restored to forest and shrub and no credit can be attached for the lift for enhancement. Since we are discouraged from adding a permanent water hydric regime, very few options exists within the criteria to show any creditable lift.

Response: I often get this question and it is not one we can resolve easily.
The fact we have to rate the entire unit rather than just the part of the wetland being mitigated is a result of people wanting a rapid method. Neither the Rating System nor the Washington Function Assessment Methods are rigorous enough to adequately quantify, or even just rate, the functions of only a small area of a wetland from either a statistical or ecological perspective. We did numerous tests on this question and both methods gave us scientifically invalid results on the levels of functions when compared to an independent assessment of those functions. As it is now, the Rating System is only accurate to a relative rating of High, Medium, or Low. We put numbers on the ratings to allow calculations of credits and debits. This, however, is a policy decision, not a scientific one. This policy decision was taken because we know from experience that the alternatives of using acreage or BPJ do not work. Our current acreage-based ratios result in a net loss of functions, and BPJ is not reproducible and often contentious. It is rare when two wetland scientists agree completely in their judgment.

To adequately assess functions of only a part of a wetland unit would require more detailed data. Most permit applicants are not willing to pay the price of such information so we have not developed methods to meet that need. Enhancing a small, degraded part of a larger complex wetland may cause a lift in some functions, but we currently do not have any methods to assess this lift in a scientifically valid way. One is always free to develop more detailed information to prove that a lift has occurred. However, such arguments now have to be based on scientific evidence rather than just professional judgment. NOTE: we have found no scientific research on the relationship between functions in a small area of the wetland rather than the entire wetland. So, one would first have to validate the following hypotheses: 1) the hydrologic, water

quality, and habitat functions of a small area of a larger wetland are significantly different from those in the entire wetland, and 2) mitigation actions in small areas of larger, complex wetlands can improve functions overall .

Finally, not all functions respond in the same direction to the usual type of enhancement. A reed canary grass pasture is the best type of wetland to improve water quality. Restoring a forested system would reduce the functioning of that wetland at improving water quality, especially in urbanizing areas. Enhancement can often increase one function at the expense of another. Our study on wetland mitigation (Ecology Publication #02-06-009) found that enhancement as a mitigation action often does not provide a lift in the water quality or hydrologic functions and only a small lift in habitat functions regardless of size. The Credit Debit Method (C/D Method) highlights this reality.

Comment 6: I feel a dis-ease in not rating the "after" with the effects of development included. If it rates higher after development because of opportunity, then it will also rate higher for the next door neighbor who now must mitigate based upon a higher rated wetlands in order to get his driveway in. I could envision a scenario whereby we rate a wetland after development for calculating credits, a determined neighbor reads the report and thereby "knows" what the wetland next to his property is. He then applies to put a driveway in and is told that his rating of the wetland, although part of the city records and completed just two weeks prior was incorrect based upon current conditions. Obviously there are some flaws in the scenario as the neighbor should have hired a professional prior to application in order to delineate and then rate his wetland. It is not flawed in that the neighbor would have read the report and noticed that the wetland next door was only a category IV and then be upset when his consultant rates it as a Category III for example.

Response: This is a question that often comes up but we do not have a legal framework to address it. Mitigation policy is constrained by what the courts have told us we can and cannot do. First, we cannot hold one person liable for something that might, or might not happen in the future. Also, regulations have to apply based on current conditions, not what was there in the past, nor might be there the future. These issues need to be addressed in long-term planning by each jurisdiction through the Growth Management and Shoreline Management Acts. The only thing we are allowed to regulate through an individual permit is what the permittee is proposing to do. We decided to include a policy that a developer should not be rewarded with an increased credit score for the fact that the proposed action will dump more pollutants and water into the mitigation site. This we can do.

Comment 7: Measuring transpiration/evaporation does not seem to me to be exactly the same as holding capacity as it would not account for water that is retained in the cells as the trees grow. You are presuming that the plant must transpire water in order to be able to increase volume it can absorb? So then that replacement is the only measurable increase in hydrologic function? Frankly we had a creek restoration emergency two years ago in January, because volume which had never ever before been seen was so extreme that literally a wall of water came off a hill, that had been logged that summer. The 40 winters prior had never experiences such a volume. This would be the result, I believe of

the land above loosing its absorption capacity in winter. I am almost certain that a grass covering the same area would not have much effect on reducing the volume and velocity in comparison. It just does not seem logical that by creating a high rise, so to speak...more cubic meters of vegetation would not show an increase in hydrologic holding capacity similiar to the difference between adding storage to a building by adding a second story.

Response: The amount of water held in a plant stays relatively constant. In order for this to play a role in the hydrologic function the amount would have to vary between seasons. The only increase in storage within the plant itself is through growth. That again is a small amount (annually) relative to evapotranspiration.

The problem you describe about the runoff is quite common, but it is an issue with logging uplands, not wetlands. Wetlands usually have saturated soils so do not, and cannot, infiltrate much surface runoff. Yes, lawns are usually modeled as being equivalent to about a 50% impermeable surface. But, wetlands themselves are often modeled as being close to equivalent to impermeable surface in hydrologic models. Groundwater infiltration is not a function of most wetlands.

Comment 8: Consider the contrary. The act of removing a small area of a larger wetland would then also need to be shown to exhibit a reduction of hydrologic, water, quality , and habitat functions in order to justify the need for mitigation. I guess rapid methods have their limits.

Response: A small area of a larger wetland has the same functions as the entire wetland. Since you are removing area and not just degrading the wetland you still need to do mitigation.

Comment 9: One significant issue I have with the document is that it largely duplicates the work we have to do for the WASHINGTON STATE WETLAND RATING SYSTEM for WESTERN WASHINGTON Revised Ecology Publication # 04-06-025. The Rating Systems are very similar, however there are enough differences that one probably ends up having to fill out both forms when considering a typical development scenario that has some wetland impacts. In Clark County, the county code creates buffers determined by the wetland category, (I, II, III or IV). However the Calculating Credits and Debits for Compensatory Mitigation in Wetlands of Western Washington document does not generate the categories. It looks to me that revising the Credits and Debits document so that it also performs all of the functions of WETLAND RATING SYSTEM document, chiefly by adding a page to generate the categories, would help streamline the process. The categories need to be the same in order for the new document to mesh with Clark County's existing code.

Response: We considered combining the Rating System and the Credit Debit Method (C/D Method), but it would have resulted in a very cumbersome tool. The two methods have different purposes, and it would be difficult to combine them. The categories in the Rating System are based on more than just the functions and values. We include four other criteria in addition to function when deciding on a category for determining how much protection is needed.

The C/D method was developed with one purpose in mind – to determine how much mitigation is needed. The Rating System was developed to determine how much

protection a wetland needs. These two objectives need slightly different approaches. The reason I developed the C/D method was that the Rating System could not be used to determine how much mitigation is needed. It was not designed to determine whether the "no net loss" policy was being met. The C/D method on the other hand does not provide the information necessary to adequately protect a wetland using buffers or other such mechanisms.

The one thing I have learned in developing assessment methods (19 of them) during the last 20 years is that methods need to be tailored to specific, and very limited, objectives. It is impossible to build a scientifically valid method that meets all needs, and this has also been well documented in the scientific literature. I believe that combining the category rating and the scoring for credits and debits into one document would create a lot of confusion for most people. One would need a tree diagram with different questions in different parts of the tree. The user would have to specify up front which path they were taking. If they were doing mitigation they would still need to fill out both a rating and a C/D worksheet.

Comment 10: For habitat, size does matter. Publication 10-06-011, and other wetland scoring systems I have seen, do not give enough weight to the size of a habitat area. This leads to the absurd result that a one acre wetland could possibly score as high as a 100 acre wetland. I suppose from a policy perspective, you do not want to loose small wetlands because they would rate low if you included size as a metric. But it does not make scientific sense to ignore size in a habitat Rating System.

Response: The question of size was discussed during the development of the function assessment methods on which both the Rating System and the C/D method are based. The group of wetland scientists who were developing the methods (together we had over 300 years of experience in wetland science) decided that size was not variable we could use because rapid methods such as these cannot address the habitat needs of individual species. All we consider is the number of niches present in the wetland unit. The more niches present, the higher the habitat score. We do not try to give more value to the charismatic macro-fauna since 80% of the energy in wetlands is cycled through the detritus food web which is dominated by the microscopic organisms and invertebrates. That said, a large wetland will usually have more niches present and therefore will probably score higher than a smaller wetland. The higher societal value we place on the macro-fauna (rather than ecological value) has been added in the value section.

Comment 11: The current wetland Rating System for Western Washington ultimately rates a wetland as being one of four categories, I, II, III and IV. In Clark County these categories are then used to determine the buffer widths and protection levels, and this is part of the county code. The new procedure needs to also perform this function. Can you combine the forms so we can get both the category rating, and a scoring for calculating credit/debit ratios out of the form?

Response: See Response to Comment #9. Also, the categories in the Rating System are based on more than just the functions and values. We include four other criteria in addition to function when deciding on a category for determining how much protection

is needed. The C/D Method was developed to with one purpose in mind – to determine how much mitigation is needed. The Rating System was developed to determine how much protection a wetland needs. These two objectives need slightly different approaches. The C/D Method does not provide the information necessary to adequately protect a wetland using buffers or other such mechanisms.

Comment 12: It would be helpful to provide a completed form as an example to follow with the directions. Include some commentary to go with it telling the reader why particular scores were used. I think this would have eliminated a lot of the confusion I had with the form the first time I went through it.

Response: This is best addressed through training. A full explanation would require doubling the size of the manual.

Comment 13: Water Quality. I thought the rating form gave too weight to water quality scores. Wetlands connected to streams get a low water quality score with this scoring system, yet they generally are home to many more species and provide better habitat than do the depressional flat wetlands. The scoring system also produces the absurd result that removing cows from a depressional wetland, and letting the grass grow to 6" high, creates the same lift as restoration of a Riverine wetland area.

Response: Each of the three functions is given equal weight in the scoring. The decision is based on the fact that the laws and regulations regarding wetlands at the state and federal levels do not specify that any function should be given more, or less, importance than another when doing mitigation. The team of experts that developed the function assessment methods and the Rating System decided that the level of functioning for improving water quality and the hydrologic functions was approximately the same in riverine and depressional wetlands. Slope and lake-fringe wetlands however do not perform these functions to the same level and are scored less accordingly.

Comment 14: Risk Factor. The credit/debit calculations assume that there is some level of risk associated with removing a functional wetland before replacing it with a functional mitigation wetland. The higher value of the wetland being removed, and the longer time for the establishment of it's replacement, the greater the risk. This is a reasonable argument.

Response: Risk factors are applied to the mitigation not to the impact. The factor that is included on the impact side of the equation is called the Temporal Loss factor. This is described in Chapter 3.

Comment 15: Habitat Enhancement Credit

It appears that the method does not always yield reasonable results for determining credits for enhancement of habitat function. The typical activities that enhance habitat in an existing wetland (planting, LWD placement, invasive vegetation management, etc.) generally cannot generate enough additional points in the scoring form to generate a statistically significant lift. When a wetland scores very low in the H1 section of the form pre-enhancement, it is unlikely that maximizing habitat enhancement measures will raise the H1 score from Low to Moderate (in the case we reviewed the H1 score was

raised 5 points, but the wetland still scored Low after enhancement), and thus will not generate any measureable lift or credit, but if the existing condition scores near the Low/Moderate threshold, a single enhancement measure increasing the score 1 or 2 points could result in a measureable "lift" and thus get credit.

Response: The question is how much lift does the usual habitat enhancement actually provide? Published research indicates that the usual measures do not really improve habitat unless it is linked with improvements in the landscape as well. Putting in LWD in a wetland that has no connectivity does not really improve habitat very much. Also, our studies on the ecological success of enhancement indicate that the standard methods of enhancement do not provide a significant lift in habitat at the site scale unless it is also linked with enhancement of the surrounding landscape. Both this method and the Rating System can only characterize species richness. If the enhancement is targeted at individual species, this method will not capture it. If you are targeting specific species you will have to negotiate with the regulators involved whether a trade-off between one species and others is acceptable.

The actual lift in habitat functions is not very highly correlated with the amount work done or its cost. That is why we developed the complementary document "Selecting wetland Mitigation Sites Using a Watershed Approach." This will answer the question of whether habitat enhancement should even be considered for a site. Not all sites are automatically suitable for habitat enhancement.

Comment 16: We see this as a limitation of the method rather than an argument that habitat enhancement is not an appropriate mitigation strategy to replace habitat functions. Our suggestion for looking at habitat enhancement is to focus on the magnitude of the change (delta) in score rather than using fixed thresholds for determining lift in the H1 section. Even then, it is difficult to generate a statistically significant result (a change of 6 points) without adding hydrologic enhancement to the mitigation plan.

Response: This issue is one of scientific validity. The problem is that we have three separate ratings for each function and the scores used to establish those ratings cannot be combined to get an overall score. To remain scientifically valid we need to treat each aspect (site potential, landscape potential, value) as a separate rating. Putting numbers on the ratings is a policy decision. We get away from scientific validity if we go too far beyond simple ratings. This is a constraint set by the need for a rapid method. The Rating System is scientifically valid for only three qualitative categories of level of functioning. If we had used the function assessment method we would be valid to about five to seven categories. Scientifically the categories are still only qualitative. Putting numbers on these qualitative ratings is a policy decision to meet policy needs. The numbers do not represent actual quantitative levels of function. Providing scientifically valid quantitative numbers for levels of function would require much more intensive sampling (monthly for at least a year). Thus, using a small change in score (delta) as a valid indicator in the increase in function further reduces the scientific validity of the measure.

Specifically, there are several scientific and mathematical problems with using the change in score.

1. The scores of H, M, and L for the different aspects of a function are not linearly related, and differ between functions and HGM class. For example, a [L]ow in the water quality function spans 6 points in the scoring. However, the span is only 5 points for an M or an H. In lake-fringe wetlands the scaling is reversed. There are 4 scores possible for an L, or M and 5 for an H. This discrepancy is even higher for the landscape potentials and values. For example, the value of water quality improvement has one for an L and an M, but 3 scores (2-4 points) possible for an H. It would be extremely difficult to calculate a "delta" for each case that would result in a statistically significant increase in function that could be translated into acre points. You would need a different factor for each of the three aspects of a function and for each of the three functions.
2. The ratings of H, M, and L are not related in any quantitative way. We cannot say that a rating of M for an aspect of a function means the function is being performed at twice the rate of wetland with an L, or that an H is three times as high as an L. The scoring system we used was calibrated to place a wetland into one of the three rating "buckets." We developed an independent, and qualitative, assessment of how well a wetland performs a function and then calibrated the scores of the indicators to get the best fit to that distribution of H, M, and L for each function. Thus, for example, 89% of the wetlands that were independently rated as having a low site potential for water quality scored between 0-5 points. This was the best fit I could get. The calibration involved alternatively changing the scoring for each of the three indicators and the scaling within an indicator to get the best fit. For example, if I increased the scoring for D4.1 to a maximum of 5 points and decreased the maximum for D4.2 to 6 points only 81% of the wetlands that were independently rated as low came out as low in the scoring.
3. The scoring system used is based on ordinal numbers only. In mathematical terms these are only rank ordered, and do not represent any mathematical relationships of quantity. Rank-ordering data simply puts the data on an ordinal scale. Ordinal measurements describe order, but not relative size or degree of difference between the items measured. In this type of mathematical scale, the numbers assigned to objects or events represent the rank order (1st, 2nd, 3rd, etc.) of the entities assessed. A scale may also use names with an order such as: "bad", "medium", and "good"; or "very satisfied", "satisfied", "neutral", "unsatisfied", "very unsatisfied." When using an ordinal scale, the central tendency of a group of items can be described by using the group's mode (or most common item) or its median (the middle-ranked item), but the mean (or average) cannot be defined.

We assign numbers to these ranks only for the purpose of trying to come up with a way to meet our needs of figuring out some way that most people can agree on how much mitigation is needed. It attempts to quantify BPJ to minimize the arguments between people with different interpretations of the data. This keeps us as close as possible to what the data are actually telling us about wetland functions.

Comment 17: Landscape position and potential should have a significant effect on the value of habitat enhancement. The method does not recognize that habitat enhancement at a site with higher landscape potential for habitat will likely have more value as mitigation for habitat functions. When enhancement is scored on the H2 section of the form, the score is not affected by the proposed mitigation, thus there is no functional lift generated. We suggest applying a multiplier derived from the H2 score to the H1 delta to calculate functional lift from habitat enhancement. The same logic might also be applied to the H3 section.

Response: I agree that landscape position is important. That is why the landscape potential of a site is one-third of the score. An extra multiplier in addition to this is necessary. You get more mitigation credits (a maximum of 3 points out of 9) if the enhancement site has a good landscape position (questions H2). Usually, however, the enhancement does little to change the landscape score. We do not want to give sites that are in a poor landscape position the same amount of credit that a site in a good position might get; regardless of what is being proposed. That is why sites have to be chosen that are in the appropriate landscape position (see Ecology publication #09-06-032). We did however find that we were able to increase the landscape score when we tested the method at large mitigation bank that also removed disturbances in the buffers and increased connectivity.

Comment 18: If the credit calculation method for habitat enhancement cannot be revised, we would like to see some definitive discussion in the manual regarding the applicability of the method for enhancement of habitat functions. We understand that the method is intended to be a guideline; our concern is that once the method is finalized, many jurisdictions could lose sight of the limitations and rely on or require the method in cases where it may not be appropriate. As a result, habitat enhancement measures could be excluded from mitigation plans on the basis that, for the cost, they provide little or no benefit (e.g. credit) to the applicant. We might expect to see mitigation plans that do not include planting or invasive vegetation management to minimize monitoring and maintenance costs and the method would suggest that such mitigation measures are of limited or no value.

Response: We disagree with your conclusions. We have found, and the scientific literature supports us, that habitat enhancement measures often do not achieve their goals because of other issues in the landscape. Habitat enhancement should not be attempted in urbanizing areas without extensive resources to maintain connectivity and protection of the buffers. Habitat enhancement efforts in these areas will probably not replace the functions lost in the long term. Also, the scientific literature is clear in its conclusions that plantings are very expensive and in most cases do not result in the plant community that was predicted for the site. Studies have consistently shown that more than 90% of the plants at a site are volunteers and not the planted species. The plantings that usually succeed are species that can be considered as opportunistic and aggressive native species such as willows, alder, or cattails that fill the same ecological functional niche as the so called "invasives." This is also related to management of such species. For example, research on reed canary grass (RCG) over the last decade shows that this species is not "invasive" in the sense that it comes and overpowers native populations. RCG is an opportunistic and aggressive species that populates

disturbed areas. Removing RCG without removing or controlling the disturbances that caused its colonization in the first place will not result in "control." The way to control it is to replace it with native species such as willows or cattails that belong to the same ecological "function group," and thrive in disturbed areas.

Comment 19: Relationship to Standard Wetland Mitigation Ratios
It would be helpful to local jurisdictions if the manual included a detailed discussion of how the results of the method relate to the standard ratios in Appendix 8D.3, Wetlands in Washington State Vol. 2. Many jurisdictions that have adopted the standard ratios into local ordinance will be pressed to justify this approach in individual cases and it will be much easier to do so if the justification is thoroughly addressed in the manual. DOE might consider re-evaluating the standard ratio tables once the method has been use for a while.

Response: The relationships between the previous Ecology guidance on ratios and the ones developed in this method are discussed in Chapter 5, Sections 5.2 and 5.3. We used the Ecology guidance as our starting point. There are significant differences, however, because the area ratios that come out of the calculations in this tool are based on the actual lift in functions rather than simply on the category of the wetland and the area involved. Further comparisons cannot really be made except on a case-by-case basis. When we tested the method we found that in some cases the area required for mitigation turned out to be smaller than that recommended in the Ecology guidance, and in some cases it was higher.

One objective of this method is to bring the entire process of mitigation more in line with current science. This is an ongoing process and unfortunately the regulatory environment is not easily changed at the same rate as the scientific information improves. We are constantly re-evaluating our guidance, and will try to update it as quickly as we can.

Comment 20: Guidelines for application under local CAOs
It would be helpful to have more thorough guidelines for how local jurisdictions might apply the method within the context of a CAO. This discussion might be provided in a separate document or "Focus Sheet". Some of the questions that might be helpful to discuss include:

Does the CAO need to be revised?
Is there recommended code language for the current Model CAO?
Should this method replace standard ratios?

Response: These are good ideas and they were passed on to our management.

Comment 21: Forensic Applications
We've already had some experience with applications trying to apply the method in violation cases. The applicant's consultants have tried to skew the results to favor less mitigation. While this might be addressed with training for consultants in how to apply the method, it would be helpful if the manual discussed how to approach a forensic application of the method and at what point the uncertainty in the pre-existing condition of the affected wetlands would render the results statistically meaningless.

Response: Unfortunately,I have no data to develop a statistically based analysis of how valid the results may be in such a situation. It all depends on how accurately the re-creation of past conditions is done. How well can you predict the answers to the questions on the field form? This can only be determined if we do numerous tests and then analyze the data.

Comment 22: Training
The training program for this method should follow the training program for the Rating System. It would also be helpful if DOE could maintain a list of people who have completed the training.

Response: The Department of Ecology is holding regular trainings on the Credit Debit method through our Coastal Training Program. The classes are announced on our list-serve and through the Coastal Training Program. In order to keep the training to one day, rather than three, we require that participants have already taken the training on the Rating System.

Comment 23: The fundamental role of the credit/debit scoring system within the regulatory context needs more explanation**.** The document is well-written and provides a very thorough overview of wetland boundaries, functions, and other technical factors, but it would be helpful to include a more thorough discussion of the fundamental role of the credit/debit system in the land-use decision-making process:

- How specifically will/should the scores resulting from the credit/debit system described in the document be used by project proponents and regulatory agencies?
- Will the scores be used as a basis for denying permits? Or should they be considered/ applied more generally within existing state/local regulatory contexts?
- Is the credit/debit system described in the document a recommended approach for regulatory entities to apply, or will the scores actually serve as the basis for regulatory decisions?

Response: This document is meant to be guidance for regulators and local governments. We do not dictate is use by regulators when making decisions about land-use. It is similar to the other wetland guidance documents Ecology has developed such as the Rating System and the guidance on buffers. A local jurisdiction can adopt them, or not, as it wishes. For example, only 160 of the 188 jurisdictions that have updated their critical area ordinances have actually also adopted the wetland Rating System. Even fewer have adopted our guidance on buffers. Ecology would like to see the C/D Method applied broadly when planning mitigation, but we cannot require it. This has been clarified in the introduction.

Comment 24: The discussion at the beginning of Chapter 5 (page 94) is a good start, but you might consider expanding that discussion and moving it to a more prominent role at the beginning of the document to set the stage for the details of the system that follow.

Response: The discussion of this issue was expanded in the introduction and now includes the clarification in the response to comment #23.

Comment 25. The relationship between the scoring forms in Appendix A and the credit/debit worksheets in Appendix E could be better clarified. The document would benefit from a better explanation of the overall role of the worksheets and how they are to be used. The system is explained in the Summary and beginning on Page 4, but it still required several careful readings to understand how everything fits together. It might be helpful to include a very basic outline or step-by-step overview of the process at the beginning of Chapter 2 that summarizes the entire process, around which the details in the subsequent sections could be organized. Something like:

1. First, identify the boundaries and calculate the size of the affected wetlands (Chapter 3).
2. Next, classify the affected wetlands and calculate the functions that are present (Chapter 4).
3. Then, estimate the adequacy of proposed mitigation based on affected areas and associated wetland functions and values (Chapter 5)

Response: These factors are now included in Section 1.2 "How the method works."

Comment 26: Under "Scoring", it states that, one "…of three wetland functions valuable to society is "Habitats for plants and animals". However, the scoring of mitigated habitat for plants and animals intrinsically assumes spatial equivalence between sites with different abilities to provide plant and animal propagules to colonize that mitigated habitat, which in fact is almost never the case. Some factor should exist that permits incorporating the spatial non-equivalence of habitat to provide colonizing animal and plant propagules from adjacent unmitigated habitat. Considering the reverse condition, if wetland loss involved the loss of habitat for select sensitive animal or plant species, the mitigated habitat can almost never guarantee the replacement of that loss.

Response: I tried to address the issue of general colonization potential in the "landscape potential" part of the scoring. Wetlands that are well connected to undisturbed habitat will have a higher rating for the function. Also, the method is not suited for characterizing habitat losses or gains for individual species. No rapid method can be since all we can address are the indicators of species richness. This is discussed in the Rating System on which the C/D method is based but I did not include it in this document. The clarification was added to the introduction of the section on the habitat functions.

Comment 27: Under "Addressing Temporary Loss": It specifies that, "If however, mitigation is done in advance, and the functions already exist before impacts occur, the temporal loss factor is not included in the calculation of Debits." It is unclear whether criteria are used to determine whether functions exist on the mitigation site or some fixed amount of time is used to assume that functions exists. Since it earlier states that, "Scientific studies have shown that it may take many decades to fully develop the functions at a mitigation site", some formula or criterion must exist for defining this boundary. This would seem to be a condition that would be easy to abuse under mitigation circumstances.

Response: This has been changed. The temporal loss factor for advance mitigation has been set at 1.25 to account the lag time.

Comment 28: Under "Addressing Risk of Failure": It specifies that, "In the last three years new data suggest that mitigation is improving. As a result, the risk of failure has been reduced in the calculations. The ratio used to account for the risk of failure is 1.5:1 instead of 2:1 when calculating the Credits." However, this assumes some degree of equivalence among mitigated wetland efforts that is not warranted. Wetlands mitigation projects associated with high energy water systems (i.e., stream or tidal influences) have less predictability of success. One way to address this would be that if an HPA is needed for the work, a minimum 2:1 replacement ratio should be retained because high energy condition increases the risk of success. For example, streams can drain adjacent wetlands or channel changes may place channel where the wetlands were placed. An additional increase in ratio should be considered in situations where the replacement or mitigation wetland is placed in a sub-basin that has greater than some percentage of impervious surface because these will be flashy systems and less able to sustain water on plants and soils to keep designed wetlands as wetlands.

Response: We do not have any data to support a higher risk factor for wetlands along streams. If such data become available in the future, we will consider changing the risk factor for these types of wetlands. With regards to the impervious surface: The studies of recent mitigation success did not differentiate between areas where the water regime has been destabilized or not. Many of them were in urbanizing areas. Our assumption is that mitigation success has improved even in areas where impervious surface is present. The risk factor, however, is reduced if the mitigation site is chosen using our guidance on choosing a site using a watershed approach. In the guidance we say mitigation is not going to be very successful in areas where the hydrologic regime has been heavily altered unless it is maintained and managed into the future.

Comment 29: Remaining comments address Chapter 4 of the document and whether or not the Rating Systems are adequate for protecting amphibians and reptiles associated with wetlands in Western Washington. The common species are likely covered, but the species that are declining or at risk may not. In general, we believe the following are inadequately addressed:

1. Species with strong fidelity to certain habitats (breeding, overwintering).
2. Species that require aquatic connectivity between sites.
3. Species that require disturbance to maintain early successional wetland seral vegetation.

The species likely to be most impacted by the failure to maintain the original wetlands would be Western Toad (#1, 3) and Oregon Spotted Frogs (#1-3). Inclusion of these conditions for the value of a site would benefit many amphibian and reptile species.

Response: The method is not suited for characterizing habitat losses or gains for individual species. No rapid method can be since all we can address are the indicators of species richness. All of Ecology's guidance relating to mitigation of the habitat function is based on biodiversity. This is discussed in the Rating System on which the

C/D method is based and in the guide for selecting mitigation sites using a watershed approach (Ecology document 10-06-011). Both of these methods are pre-cursors to the C/D method and should have been applied to a site before any estimates of credits are made. A brief discussion this issue has been added to the introduction of the habitat section. If the focus of mitigation is to protect or restore an individual species other tools need to be used.

Comment 30: Similar to the existing wetland Rating System, it appears as though the Credit/Debit method could allow for the intentional degradation of wetland areas in order to yield a more favorable debit or credit score. For example: a land owner or permit applicant may mow an emergent wetland, manage overhanging vegetation in ditches or along streambanks, remove snags, and/or initiate livestock grazing, knowing that modifications to these features would result in a lower initial functional score. These controllable variables in the system may make it possible to obtain a skewed Credit/Debit ratio. Can this updated system be established to somehow discourage the "legal" modification of wetlands by offering a higher credit for preservation?

Response: This is an issue we have discussed at length with different interest groups. We cannot, however, penalize a land owner for legally permitted modifications to wetlands. The courts are very clear about this. Also, we have to assess a project based on current conditions at the site. Regulations have to apply based on current conditions, not what was there in the past, nor what might be there the future. Such issues need to be addressed in long-term planning by each jurisdiction through the Growth Management and Shoreline Management Acts. The only activity we are allowed to regulate through an individual permit is what the permittee is proposing to do. We decided to include a policy that a developer should not be rewarded with an increased credit score for the fact that the proposed action will dump more pollutants and water into the mitigation site. This we have done.

Comment 31: The wetland mitigation-to-impact ratios we derived by the system were approximately 20:1 to 30:1 for a few case studies we conducted. This is 4 to 5 times what the current Ecology guidance prescribes (*Wetlands in Washington State – Volume 2: Guidance for Protecting and Managing Wetlands*, publication #05-06-008). How will the Credit/Debit method change the consideration of the current Ecology guidance? Will the Credit/Debit method be mandated similar to other Ecology guidance for project compliance under Section 401 of the Clean Water Act and State Water Pollution Control Act? If so, when will the Credit/Debit method be finalized and required for the preparation of compensatory mitigation plans under Ecology review? Will there be any vesting of applications submitted before an adoption date?

Response: Our laws and regulations state that mitigation has to result in "no net loss" of both functions and values. All of the scientific studies done on the success of mitigation have shown that we are not meeting that goal. This is especially true when enhancement is used as mitigation. The ratios recommended in the Ecology's guidance were based on area and represented the best approximation of average conditions we could make a decade ago. At that time we did not have methods to provide actual data on the functions and values of mitigation sites. This C/D Method was developed to specifically address that gap. We now have a way to estimate when a mitigation project will actually provide the necessary "lift" in

functions that is needed to replace the functions lost. If you calculate that 20 – 30 acres of mitigation are needed to offset one acre of impact, it means that the site is not suitable for mitigation because it is already performing functions at a high enough level. Any mitigation actions you propose will not provide the necessary "lift." We have tested other sites where the area of mitigation required under this method is lower than the ratios recommended by our earlier guidance. Also, the previous area-based ratios represent an average for all mitigation sites. The Credit Debit Method allows you to be more specific and assess the mitigation potential for an individual site.

Comment 32: Our WSDOT reviewers were concerns about the complexity of this new method and, in general, believed that it would require significantly more time and effort by the applicant to prepare, and for regulators and local jurisdictions to review and evaluate. Both of these issues can result in impacts to project delivery and significantly increase costs at a time when the economy of the state is in a difficult time. Therefore, we strongly recommend that the application of this method be limited to the King County ILF program under development where it can be tested and further evaluated under a variety of conditions and circumstances. WSDOT would like to see a clear statement in the guidance that explains that this is one approach that can be used to evaluate if mitigation is adequate to compensate for project impacts, but would not be required of all mitigation projects at this time.

Response: This document is meant to be guidance for regulators and local governments. We do not dictate its use in the land-use decision-making process. It is similar to the other wetland guidance documents Ecology has developed such as the Rating Systems and the guidance on buffers. A local jurisdiction or regulatory agency can adopt them, or not, as it wishes. For example, only 160 of the 188 jurisdictions that have updated their critical area ordinances have actually also adopted the wetland Rating System. Even fewer have adopted our guidance on buffers. Ecology would like to see the C/D Method applied when planning mitigation, but we cannot require it. This has been clarified in the introduction.

Comment 33: The experience and data obtained by piloting this new method with the ILF program should provide opportunities for refining and improving the method. At this time, WSDOT believes that we have insufficient experience and/or data to conclude that this method would be more effective than current procedures at ensuring that mitigation adequately replaces the functions and values lost when a wetland is altered. There was considerable concern about making such a substantial change in the mitigation evaluation process without allowing more time for evaluation and stakeholder participation to ensure there is a clear understanding of the technical and economic implications of this new method for all parties. WSDOT believes that additional testing and evaluation of this method is warranted, and that input from a process that would allow participation and discussion with stakeholders would improve the method and shed light on its limitations. Further evaluation should include careful consideration of the economic costs to all parties and the consequences for project development for parties proposing wetland mitigation as well as the agencies that will be reviewing and authorizing proposed wetland mitigation. Additional testing and review should be completed before this method is considered for adoption as final guidance applicable to all proposed mitigation projects.

Response: I agree, that a period of time is needed in which a new method is tested and refined. However, this method has already undergone an eight month testing period and an additional one year of field testing (after this comment was made). Also stakeholders have participated in developing the tool. A workshop for technical experts and stakeholders was held July 2010 with 26 participants, and the invitation was extended to all agencies at that time. I do not think the technical and scientific aspects of the method would change significantly with additional testing. Furthermore, the workshop participants helped refine the policy aspects related to how credits and debits are assigned, and reached a general consensus on the ones in the current draft.

How the method is applied in a regulatory context, however, will be an ongoing discussion. Our approach is similar to that used for the Rating System and Ecology's guidance on how to use it. The Rating Systems were published separately as technical documents (Ecology publications #04-06-15 and #04-06-025) and before the recommendations on how to use them in a regulatory context (Ecology publication #05-06-008). This allowed us refine the recommendations to better reflect what the new scientific information was telling us about wetlands and how to protect them.

Comment 34: WSDOT reviewers felt that this guidance would require significantly more work by the applicant, yet it is not clear that its implementation would result in greater success in replacing wetland functions and values, or that this method is sensitive enough to account for the benefits of some significant mitigation activities.

Response: Current monitoring of wetland mitigation does not allow us to determine whether a project actually replaces the functions and values lost. Monitoring structure and the water regime at mitigation sites does not tell us how much functions have changed or increased. To my knowledge, no mitigation project actually has tried to quantify the changes in functions. This method will allow us to begin assessing changes in function, and is an attempt to redress the failure of some current practices. As you note, it may not be sensitive enough to capture small changes in function. This is a result of the need to be rapid and still scientifically valid. More detailed methods such as our wetland function assessment methods can always be used if project proponents wish to capture small changes in function.

Comment 35: This methodology would result in significant changes to current procedures, requiring additional time and effort by the applicant and regulatory entities to review results. This will lengthen review times and increase project costs. The support documentation of the method does not lead us to conclude there will be increased certainty that the proposed mitigation will adequately mitigate for unavoidable impacts to wetland functions and values.

Response: The current practice is to use area as a surrogate for functions. All the data that have been published on mitigation confirm that this approach results in a net loss of functions and values. To determine whether the "no-net-loss" policy is being met we need a tool that is based on functions rather than area. The wetland Rating System has proved to be an acceptable tool for characterizing functions over the last six years. By basing the C/D Method on the Rating System, we are building on the experience we

have gained in developing and using it. The National Academy of Sciences has concluded that an indicator-based approach to rating functions is scientifically valid. For these reasons we disagree with the statement that the use of this method will not increase the certainty that proposed mitigation will adequately mitigate for impacts to functions and values. We probably will never achieve full certainty, but the probability that the mitigation is adequate will increase significantly relative to using area and category only.

Comment 36: This methodology relies heavily on previous work from the Western Washington Rating System, using a revised scoring system to rate three major groups of wetland functions and for each provide scores based on site potential, landscape potential and value to society. The site potential indicators are the same as those used in the Western Washington Rating System, while the indicators for scoring landscape potential and the value of the function to society are new. Overall WSDOT feels that more experience with this new method is needed to evaluate how these revised scorings will effect the outcome of this new scoring system and resulting calculations of the site index.

Response: One of the criticisms of the Rating System was that the landscape potential and the values were not adequately addressed and were combined into the "opportunity" part of the scoring. This created some confusion among the users of the Rating System. The approach taken in this method was first applied in the method for riparian uplands that was reviewed and published in a peer-reviewed journal in 2009. Most of the questions in the landscape potential and values sections are from the original Rating System. Only three of the 65 questions on the form ask for information that is not in the Rating System in one way or another. The questions were just "packaged" in a manner that made the scoring more transparent and better able to meet the needs of mitigation. The new questions relating to accessible habitat reflect the latest research on the subject (citations are in the document). These three questions replace those concerning the buffer and connectivity in the Rating System. Our objective is to incorporate the latest scientific information into our methods where possible.

Comment 37: With the number of steps in the rating, assigning, scoring, and calculating process for both impact site, and each mitigation element (before and after) the mitigation activity, we do not have confidence that this tool can predict with any certainty that the functional outcome will appropriately mitigate for project impacts while preventing an unintended requirement to over-mitigate.

Response: See response to comments #34 and #35.

Comment 38: In addition the Summary notes that this methodology "incorporates new concepts that have been developed for 'rapid' methods since then, and have been summarized in Hruby (2009)." Unfortunately no reference to Hruby was included in the draft released for review. Also, the 'new concepts' noted in this statement are not identified or discussed in this draft of the methodology. To evaluate this tool carefully reviewers need to have access to the information about these new concepts. We recommend including a summary of these concepts and their application to this methodology in revisions to the document.

Response: A summary and the citation have been added to the document.

Comment 39: Some WSDOT reviewers stated concerns that the method did not appear to be sensitive enough to capture the functional lift that is represented by mitigation actions that are generally understood to be beneficial, such as removing disturbances associated with domestic animal grazing from. Given the complexity of this tool, more examples of how it applies could help stakeholders develop a familiarity and better understanding and build the capacity of stakeholder groups to comment and improve the tool.

Response: Much of the recent research into the success of mitigation has shown that our understanding of what can be considered as "beneficial" is very limited and does not accurately reflect what is actually happening at sites. The sensitivity of a method at capturing functional lift is directly correlated to monitoring and sampling effort. Over the last 15 years we have collected and analyzed enough data and used enough different methods to make this conclusion. I could have developed a method based on the function assessment method that would have allowed the lift in functions to be calculated using five or seven categories (e.g. H, MH, M, ML, L). However, the people participating in the development of this method did not want a tool that was as complicated as the Washington Function Assessment Method (WFAM). There was a general consensus among our stakeholders that they wanted a method that did not require more detailed information than the Rating System. This however limits the tool to three categories (H,M,L) to maintain its scientific validity.

Comment 40: Several commenters spoke about their anticipated difficulties of certain parties correctly using this system. Individuals with less technical expertise may not understand the results, and likely will not be able to use tool correctly, or review an application of the tool effectively.

Response: As with the Rating System, this tool should only be used by wetland professional whohave been trained by Ecology. Ecology is providing training on this method just as we do on the Rating System. Since over 90% of the questions in the Credit Debit method are the same as in the Rating System, anyone who has been trained in using the Rating System should have a fairly short learning curve. We had the same comments when we first released the Rating System, but now have over 850 people who have taken the training and use the method regularly. There seems to be a pervasive expectation that anyone should be able to assess natural resources such as wetlands. This is curious because there is no similar expectation when it comes to designing roads, bridges or installing wiring in a house. The level of expertise to do these properly, however, is about the same.

Comment 41: Likewise, those with expertise and greater familiarity may be able to use the tool to drive mitigation decisions that benefit their interests instead of meeting the stated purpose to ensure that mitigation adequately replaces impacted functions.

Response: The problem of misuse of the method is no greater or smaller than with the Rating System. Misuse is a potential problem with any technical tool that is used in a regulatory context.

Comment 42: WSDOT projects are often complex linear projects that result in narrow impacts to numerous wetlands along the highway right-of-way. For these kinds of projects the application of this method to evaluate project impacts and proposed mitigation will require increased evaluation, documentation and cost, without providing certainty that the functions impacted are efficiently and effectively mitigated.

Response: It is my understanding that WSDOT currently characterizes all of its linear wetlands using the Rating System. Since most of the information needed to answer the questions in the Credit Debit method is the same, I do not expect the work of filling out the new forms to be as onerous. With regards to the certainty of replacing functions please see responses to comments #34 and #35.

Comment 43: A concern of reviewers is that this methodology does not have the ability to distinguish the specific functions of narrow wetland impacts along right-of-ways, that are often the location of WSDOT impacts, from the functions of the larger wetland scored as a unit by use of the method. Where impacts are to these narrow strips of wetlands along road edges, the method may not capture adequately the functions of the area being impacted. The boundary of the required wetland rating unit may encompass a large area relative to the impacted area and characteristics of this larger wetland unit may not reflect the functions being impacted. For example, in cases where impacts are to a degraded edge of a large high quality wetland, the method does not account for the impact being to lower functioning area of the wetland. In this case the method would result in more required compensation for impacts and in particular compensation for impacts to habitat functions that have not been impacted directly.

Response: I often get this question and it is not one we can resolve easily. The fact that we have to rate the entire unit rather than just the part of the wetland being mitigated is a result of users wanting a rapid method. Statistically and ecologically neither the Rating Systems nor the WFAM are rigorous enough to adequately quantify or even just rate the functions of only a small area of a wetland. We did numerous tests on this question, and both methods gave us scientifically invalid results when only a small area of a wetland was rated. As it is now, the Rating System is only accurate to a relative rating of High, Medium, or Low. We put numbers on the ratings as a policy decision. There is no scientific meaning to the numbers. This approach, however, is still better than the professional judgment of an individual because two wetland scientists may often disagree in their judgment.

To adequately assess functions of only a part of a wetland unit would require much more detailed data. People are typically unwilling to pay the price for such information so we have not developed methods to meet that need. I am not saying that an impact or lift does not exist; we just don't have any methods to assess it in a scientifically valid way. Anyone is always free to develop more detailed information and to prove their argument to the regulators. However, such arguments now have to be based on best available science rather than just professional judgment. NOTE: we have found no scientific research on the relationship between functions in a small area of the wetland rather than the entire wetland. So, BAS would require collecting data to prove your point. The hypothesis you would need to prove is: The hydrologic, water

quality, and habitat functions of a small area of a larger wetland are significantly different from those in the entire wetland.

Comment 44: "Ecology should run a test program to determine whether or not the implementation of this guidance will result in the desired effect (compensatory mitigation adequately replaces the functions and values lost when a wetland is altered). This guidance would require a significant amount of work by the applicant yet it does not seem clear as to whether the implementation of this guidance would result in greater success in replacing wetland functions and values. This is a significant change to current procedures and changes such as these should not be made without some supporting evidence that they will be more effective than current procedures."

Response: See response to Comment #33. In addition, mitigation projects often take 10-20 years to become "mature." It is only after such a time that we can truly determine if the C/D Mmethod improves on the current practices which we know do not adequately replace functions and values lost.

Comment 45: "A basic concern is this tool's inability to "tease out" functions lost specific to the areas that are actually impacted. Debit scores may be assigned to high functioning forested wetland areas connected to disturbed roadside wetlands where transportation related impacts often occur. For linear projects, it seems that the intended linkages between "impacts", "debits", and "credits" can get easily get broken since the actual "impact" areas cannot be evaluated independently.

Response: See response to comment #43.

Comment 46: In my test case, proposed impacts included almost no practical impacts to hydrologic functions. The water storing component of the wetland performing the hydrologic functions is far from the highway and will not be affected by the project. The mitigation proposal includes significant lift in hydrologic functions, yet the tool seemed to be "too soft" to account for the real net benefits of the mitigation."

Response: See responses to comment #39 and #43. In addition, we have no data on how smaller areas of a wetland function relative to the entire unit. In this case, BPJ has no "case history" of actual measurements of functions that can be used to support the BPJ. Thus, in order to meet the requirements of "best available science" we cannot rely on BPJ. As regulators, we need to ensure that functions are not lost, and in this case we need to apply the precautionary principle in addition to applying the best science we have available.

Comment 47: The water quality component revealed similar problems in the test case. There appears to be only negligible practical loss of water quality functions associated with impacts yet the "credits" did not exceed the "debits". The act of removing cattle from the mitigation site in and of itself would seem to provide significant functional lift in water quality functions. No credit is awarded for this through use of the tool."

Response: There is a difference between removing sources of pollutants such as the cattle and improving the biophysical and chemical ways in which a wetland removes pollutants. The function called "water quality" is defined in the function assessment methods, the Rating System, and in the current C/D Method as "improving water

quality." We characterize the processes that are present in a wetland to remove pollutants. The site potential looks at the structural elements in the wetland that indicate the processes of cleaning up the water are present. You might get an increase in points if the vegetation is currently grazed below 6" in height and the mitigation will restore higher vegetation. The questions of landscape potential address the issue of pollutants coming into wetland. Removing cattle should be considered as an "out-of-kind" mitigation that needs to be addressed on a case-by-case basis.

Comment 48: I am concerned about the amount of work this Credit/Debit Method is going to require for our larger projects with over 30 wetlands, and mitigation sites with several different types of mitigation and site characteristics.

Response: Most projects currently require that the wetlands be rated using the wetland Rating System. If so, the effort should not be that much greater because there is only one new piece of information required to complete the Credit/Debit forms that is not required in the Rating System. Also, current mitigation ratios are based on the type of mitigation being proposed. Calculating the appropriate mitigation ratios for many small projects is also a time-consuming task, and the calculations can get very complicated if the mitigation involves a combination of creation, re-establishment, rehabilitation and enhancement.

Comment 49: Concern was voiced about duplication and complications related to having to use this method for DOE/Corps permitting and then find that the local jurisdiction's required ratios for local permits – how is that going to work? Do local jurisdictions intend to adopt this method?

Response: See response to Comment #32.

Comment 50: The document states that it should not be used in developing design criteria. If regulators will be expecting you to obtain more credits than debits with your mitigation site, applicants will use the document to develop design criteria.

Response: This point has been clarified. Our current guidance on developing mitigation plans stresses the need to develop design criteria based on restoring wetland processes that maintain functions. This method, like the Rating System, is based on characterizing the structure of a wetland because of the need to be "rapid." We do not collect data on processes because that would require more than one site visit. We tried to minimize the potential for misuse of this method in designing a mitigation plan by giving more credits to plans that have followed our guide that looks at watershed processes first (See Ecology Publication #09-06-032). If proponents use this method to develop design criteria then they won't be getting as many credits compared to an approach that is based on restoring processes.

Comment 51: Throughout the document and appendices, there are many references to using the information for the rating and/or rating form. It should be referring to the score and/or scoring form. Otherwise, this causes confusion as to whether one is rating the wetland to determine a category or scoring the wetland to determine debits/credits.

Response: Thanks for noting this. The text has been reviewed and corrected for consistency.

Comment 52: Why is there a separate wetland rating form and a wetland scoring form? While the questions are different on the two different forms, the forms both assess wetland functions and values. Ecology should make the wetland mitigation process more user friendly by combining the rating and scoring form."

Response: We considered combining the Rating System and the C/D Method but it would have resulted in a very cumbersome tool. The two methods have different purposes and it would be difficult to combine them. The categories in the Rating System are based on more than just the functions and values. We include four other criteria in addition to function when deciding on a category for determining how much protection is needed.

This method was developed with one purpose in mind: to determine how much mitigation is needed. The Rating System was developed to determine how much protection a wetland needs. These two objectives need slightly different approaches. The reason I developed the new method was that the Rating System could not be used to determine how much mitigation is needed. It was not designed to determine if the "no net loss" policy was being met. The Credit Debit Method on the other hand does not provide the information necessary to adequately protect a wetland using buffers or other such mechanisms.

I believe that combining the category rating and the scoring for credits and debits into one document would create a lot of confusion for most people. One would need a tree diagram with different questions in different parts of the tree. The user would have to specify up front which path they were taking. If they were doing mitigation they would still need to fill out both a rating and a C/D worksheet.

Comment 53: This process does not take into account that portions of wetlands are impacted which do not represent the functions and values of the entire wetland. This requires applicants to mitigate for functions and values that are not impacted and may result in mitigation that does not accurately reflect the impacted functions and values.

Response: See response to comment #43.

Comment 54: Additionally, the process requires the applicant to score an entire wetland unit when enhancement and rehabilitation are being used for mitigation. This could make the "functional lift" for the mitigation appear to be more or less than what is actually being provided by the mitigation due to existing site conditions.

Response: See response to comment #43.

Comment 55: Note 5 of the credit work sheet identifies the basis for differences in scoring of the landscape potential for hydrologic and water quality functions versus landscape potential for habitat functions. The former are scored based on current conditions, while the landscape potential for habitat is scored based on future conditions. The method has a significant level of complexity and it is not clear to this reviewer that this difference in approach should be included. The method should score the wetlands function before and

after to evaluate all functions with a consistent approach and provide the basis for a determination of functional lift.

Response: This added complexity was made necessary as a result of the field testing of the method. Our first example was a mitigation bank that removed sources of pollutants to a large wetland complex. The final score for "improving water quality" of the project was lower than the original one because the score for the landscape potential dropped. On the other hand, we did not want to give mitigation credits to a developer who created sources of pollution in the buffer of a mitigation site when none were there previously. The landscape potential for habitat did not respond in a similar way.

Comment 56: Water Quality improvements made by a site that also functions as habitat for native species has value to those species. A site's listing on the 303(d) list or identification within a watershed plan as important to water quality improvements places an overly restrictive limit on indicators for evaluating whether the Water Quality improvement provided by a site is valuable to society. If we assume that society in general values wildlife and habitat that serves the needs of wildlife across the landscape, this needs to be captured in these indicators. The list of indicators should be expanded accordingly.

Response: Conceptually this is true. However, we were unable to model this aspect of the "water quality" function for several reasons. First, we have no data showing how much improvement is needed to provide benefits for wildlife. Second, the benefits will probably differ among species. Finally, when we tried to model this aspect in developing the function assessment methods (using BPJ only because we had no data) we had to stop when our list of variables was ten and still climbing. One of the limitations of rapid method is that we cannot model all aspects of a function.

Comment 57: Preservation of existing wetlands is an important strategy that protects functions that could be degraded by the continual nature of land use actions across the landscape. The value of preservation as a mitigation approach should be carefully considered in the context of this Debit/Credit Methodology. It is not possible to see clearly whether the calculations for credits available from preservation based on the Basic Score (acre-points) multiplied by the appropriate scaling factors result in an appropriate mitigation value for wetland preservation. The use of two scaling factors based on whether the area of wetland impact has been replaced or not is another issue that complicates evaluation of the value of preservation through this methodology.

Response: The preservation ratios were designed to match the ratios developed by the Department of Transportation as part of the Wetland Strategic Plan Implementation project (WSPI). The ratios in the WSPI document were used as the starting point for the scaling factors. The use of two scaling factors is a policy decision that was decided by Ecology and King County. It reflects the current informal policy to require more preservation when the mitigation does not replace the acreage of wetland lost to impacts.

Comment 58: In addition the definitions of High, Moderate and Low Threats should be discussed and reviewed to ensure that they reflect the reality of threats to existing

wetlands. We would benefit from an opportunity to test this method on a variety of preservation sites.

Response: The definitions of threats were developed by the Ecology and King County wetland staffs based on their experience in reviewing mitigation projects. The method was field tested for 8 months at over 15 sites. I am sure that refinements will be needed in the future based on longer use, but we do not think further field testing will significantly change the method. The method was available for a total of 18 months of field testing before the final version was published in March 2012.

Comment 59: The scoring in this methodology uses indicators to determine the relative level of function being performed at a wetland. The list of thee indicators is short in some cases (D 3.0, D 5.0, D 6.0 for example). There should be an opportunity for reviewer to write in other indicators that suggest function is being performed, and/or is valuable to society. The development of this method could benefit from more discussion and review of indicators and how they are assigned points for the landscape potential to support a particular function and the value of a particular function to society."

Response: This method has already undergone an extensive review of the new indicators and an 18-month testing period. The method went out to a peer review group of 68 (including DOT personnel) at the end of June 2010. A workshop for technical experts and stakeholders was held last July with 26 participants, and the invitation was extended to WSDOT at that time. The indicators were discussed in all these venues and are based on the general consensus of those participating.

Comment 60: It is important to make clear with the release of this new guidance, what its intended use will be and that it is being proposed as one possible option for evaluating mitigation impacts provided in support of the King County and Puget Sound Partnership ILF program. Further testing and experience will be necessary before this should be proposed for final guidance and encouraged for use on all wetland mitigation projects. After working through several test projects, we find it difficult to provide meaningful comments without having a training and without using the Method in "real time" and under multiple conditions. Therefore, we strongly suggest Ecology retain the Credit/Debit Method in draft form for at least one year. During this time, Ecology can provide trainings on the draft Method and allow users to apply the guidance. Only then can we offer comments which are truly relevant and useful. We believe the Method is important enough to take the time for this judicious approach.

Response: I agree, that a period of time is needed in which a new method is tested and refined, and that training will be required. We decided that the next version would be released as an operational draft valid for one year. At the end of that time we will accept further comments and revise the document to come up with a final version. At present, this method has already undergone an eight month testing period and many technical experts have participated in developing the tool. A workshop for technical experts was held last July with 26 participants

How the method is applied in a regulatory context however will be an ongoing discussion. Our approach is similar to that used for the Rating System and Ecology's guidance on how to use it. The Rating Systems were published separately as technical

documents (Ecology publications #04-06-15 and #04-06-025) and before the recommendations on how to use them in a regulatory context (Ecology publication #05-06-008). This allowed us refine the recommendations to better reflect what the new scientific information was telling us about wetlands and how to protect them.

Comment 61: I would like to have the opportunity to review the scientific basis for the assignment of ratio values and weighting factors used in the calculations. These seem somewhat arbitrary and are not well explained in the guidance.

Response: Briefly: We developed an independent, and qualitative, assessment of how well a wetland performs a function and then calibrated the scores of the indicators to get the best fit to that independent assessment of each function. For example, 89% of the wetlands that were independently rated as having a low site potential for water quality scored between 0-5 points. This was the best fit I could get. The calibration involved alternatively changing the scoring for each of the three indicators and the scaling within an indicator to get the best fit. For example, if I increased the scoring for D4.1 to a maximum of 5 points and decreased the maximum for D4.2 to 6 points only 81% of the wetlands that were independently rated as low came out as low in the scoring. This process was repeated for each indicator and its scaling. Further details can be found in [Hruby, T. (2001). Testing the basic assumption of the hydrogeomorphic approach to assessing wetland functions. Environmental Management 27:749-761, and in Hruby, T. (2009). Developing rapid methods for analyzing upland riparian functions and values. Environmental Management 43:1219-1243.]. We did not wish to encumber the text with the statistical details. If you are interested I can forward the spreadsheets to you with all the data.

Comment 62: I would like to know what was done to evaluate the repeatability of this qualitative method and to know about the magnitude in the variance in scores obtained from a variety of users with different backgrounds and experiences. What specifically was done to validate this approach and the conclusions? If a group of permittees and regulators are excited about the potential mitigation values offered by a particular site (i.e. feel it has excellent mitigation value) but when the site is scored using this method the value indicates that the mitigation potential is relatively low, what does that mean? Does it mean that the intuition of the review team is over valuing what they have been observing on the site or does it mean that the scoring methodology is not properly detecting the mitigation value of the site? To validate this method we would need some basis for addressing this question. The method should be evaluated by scoring some of the mitigation sites WSDOT has developed and where we have some experience to judge their potential.

Response: The references cited in the response to comment #61 describe the process used to assess variability and the results of these analyses.

Comment 63: I would like to see the results of any sensitivity analyses performed using this Rating System to better understand how various factors and the ratio values being provided influence the overall scoring.

Response: See response to Comment #61.

Comment 64: One of the "functions" used in the rating is "value to society", which is not an ecological function, and confuses the term "function" as applied in this document with the ecological definition of function. This could lead to a confusion between science and policy; we strongly recommend that it is clearly noted up-front in the document introduction what aspects of the proposed credit/debit calculation are based on current scientific understanding of how the systems function versus the aspects that are based in societal values (3rd type of indicator) which do not have a scientific underpinning. Otherwise, the current method is at risk of giving the ultimate total rating derived from application of this method an objective scientific "patina" that may be unfounded in some aspects, and make the method less defensible. While factors other than science play a role in resource decision-making, clearly indicating the separation of those factors is important for transparency, and the credibility of the science and the proposed method.

Response: Both aspects of wetlands need to be replaced when mitigating impacts as required in law and policy. Throughout the text we have always used the words "functions and values" when discussing the objective of the method. All of the methods we have developed here in Washington include components of societal values that were developed through consultations and consensus of stakeholders. A section on values has been added in Chapter 2 to further clarify this point.

Comment 65: Related to the above, it's great that you mention there is a trade-off/tension between science and rapidity with which the method can be applied, it would be helpful to have an up-front statement about what that trade-off may mean in the results from the application of the method—is it likely to achieve "no net loss" of function? What type of errors may result from this trade-off?

Response: This document is more of a field manual than a treatise on assessment methods. Details such as you have suggested are more appropriate in other publications and have already been published in Hruby 1999, 2001, and 2009.

Comment 66: Recommend a clear definition of "function" vs. "condition" as applied in the method; sometimes seemed used interchangeably, which is confusing. Unclear whether some indicators may not be more indicative of "condition" than "function"; it's important to be clear as to what an indicator is truly evaluating. If the programmatic driver for the method is to replace function, and we are not evaluating function, are we achieving replacement of function? We think it important to be clear about the limitations of the method up-front—it ultimately makes the method more defensible when one can clearly indicate what assumptions (e.g. about probable system function based on a "snap shot" of condition) are embedded in applying the method.

Response: We very specifically avoided using the word "condition" in any context that might imply functions. The only place we use the word is when we ask the user to identify the specific condition in which an indicator is found. It is linked to a specific description of a condition or state of an indicator. We used the term condition because that is the one most commonly understood by users. The concept of "state" is not that familiar to many. That said, many of the same indicators can be used to characterize functions as well as condition. The difference in their use however will be in the scoring and scaling of the indicators. Again, this method was designed to be a field manual and is not intended to contain all the ancillary information about analytical

tools used in rating wetland functions. These issues are addressed in other publications.

Comment 67: Many statements lack a scientific reference, might be helpful to recheck the document to assure statements that need support include references.

Response: I have tried to include citation wherever I thought it was needed. Most citations are in the grey boxes that describe the rationale for the indicators. Statements made without citations represent the best professional judgment of the experts developing the methods and the team of expert reviewers that participated in the projects. Over 50 wetland scientists have participated in the process of developing the methods starting with the wetland function assessment methods first published a decade ago.

Comment 68: Helpful if acknowledgements includes the key people (and their organizational affiliations), who contributed to the calibration and/or other aspects of the method. Helpful to credibility/acceptance of method.

Response: This method is a culmination of almost 20 years of work here in Washington and there were over 200 people who contributed to this effort. Rather than creating a large list I referenced the contributors to the previous tools we have developed. This method however was written and calibrated by myself.

Comment 69: We have some concern that as currently written application of the method may make it possible for impacts to a relatively intact system, for instance in a rural landscape, to require less compensatory mitigation than necessary to truly replace functions lost because of the application/weighting of the "value to society" indicator. For instance, if a proposed impact were not immediately upstream of a downstream community that would be impacted by possible increased flooding, the mitigation ratio applied would be less, even though the ecological functional loss resulting from the impacts would be the same. Is it OK to impact more intact sites that may not directly abut a population center because there is less "societal need" for the functions they perform?

Response: Local residents subject to the flooding might have a different perspective on this issue. They would probably favor impacting a site that with the same level of ecological function in an areas where that function is not considered to be as valuable to society. Saying that ecological functions should be rated equally across the landscape is a value statement that may not be shared by all. The values represented in the method are those that have been agreed to in numerous stakeholder meetings and committees. One of the comments we often received from natural resource managers in urban areas was that most tools developed were biased in favoring relatively undisturbed wetlands. The developers of methods undervalue urban wetlands because of their belief (value) that "pristine" is better.

Comment 70: While we did not apply the method to an actual site, in doing a thought experiment on sites we know, it seemed that replacement of functions which impact water quality may be give more weight overall in the method? If that is the case, it would be helpful to the user to make that clear.

Response: The method was designed to give equal weight to each of the three functions. There is no mathematical way that the function of Water Quality Improvement can be given more weight than the other functions since the results are first transformed to a rating of H, M, or L.

Comment 71: We appreciate the Washington State Department of Ecology's (Ecology's) intent to increase the rigor and consistency for determining appropriate wetland mitigation. We support the concept of the Credit/Debit Method.

Response: Thank You. No change needed.

Comment 72: The Credit/Debit Method appears to add a significant number of hours (and cost) to preparing a mitigation plan. This may be appropriate for simple medium sized projects. Although the additional time may go down with familiarity, the additional time and cost may not be appropriate for smaller projects (< 1 acre). Conversely, for large complex mitigation projects, the Method may become unwieldy when you have several wetland units each with several vegetation classes. If there was a way to scale the analysis to the project size, we believe there would be a more equitable cost and less public opposition.

Response: See response to comment #48. Also, the current practice is to use area as a surrogate for functions. All the data that have been published on mitigation confirm that this approach results in a net loss of functions and values. To determine whether the no-net-loss policy is being met we need a tool that is based on functions rather than area. The wetland Rating System has proved to be an acceptable tool for characterizing functions over the last six years, and is the most rapid one available. Only three of the 65 questions on the form ask for information that is not required for the Rating System in one way or another. The questions were just "packaged" in a manner that made the scoring more transparent and better able to meet the needs of mitigation. Most projects already require the completion of a rating form and collecting of those data so the extra work will be minimized.

Comment 73: As stated before, we appreciate the increase in technical rigor and consistency. As a result, we recommend users be required to attend initial and supplemental training. Due to the increased technical rigor, we believe the reviewers need to have the expertise to recognize errors and approve deviations. Therefore, we recommend reviewers be required to have the same professional qualifications as the users.

Response: This document is meant to be guidance for regulators and local governments. We do not dictate its use in the land-use decision-making process. It is similar to the other wetland guidance documents Ecology has developed such as the Rating System and the guidance on buffers. A local jurisdiction or regulatory agency can adopt them, or not, as it wishes. As a result we cannot require training; all we can do is recommend that users be trained.

Comment 74: It seems as this document is trying to do several things: update the wetland Rating System manual, provide additional guidance on how to use the manual, and present a new system that uses portions of the wetland rating manual to determine wetland impact

debits and potential mitigation credits. I don't believe that these multiple purposes are compatible. If the wetland rating manual needs to be updated, that process should be done as a separate item, not cloaked in the determination of wetland mitigation debit and credit. I believe this does a disservice to these purposes.

Response: See response to comment #9.

Comment 75: I strongly object to the use of "value" as a parameter for mitigation, and in particular to the way value is used as a multiplier. Value is, first of all, subjective, and for this reason the term was dropped from the *Compensatory Mitigation for Losses of Aquatic Resources; Final Rule*, *"... we have eliminated the term "values" from the final rule because the term "services" is currently being used in the ecological literature to relate to the human benefits that are provided by an ecosystem. The concept of ecosystem services provides a more objective measure than "values" of the importance of the functions performed by the ecosystem to human populations* (Federal Register / Vol. 73, No. 70 / Thursday, April 10, 2008).

Services, as defined by the Final Rule, are "*the benefits that human populations receive from functions that occur in ecosystems*". There is no indication that services are intended to be used as a multiplier of function, rather than services flow naturally from the functions a wetland performs.

Services play an important role in understanding what wetlands do, but this role should be carried out in the rating of wetlands and in the mitigation site selection process, rather than in the mitigation debit/credit calculations. This approach would be more consistent with the Final Rule, which states: *The concept of ecosystem services is important for considering where compensatory mitigation projects should be located. The relative locations of compensatory mitigation projects in the landscape helps address certain public interest factors, such as water quality, flood hazards, and fish and wildlife protection* (Federal Register Vol. 73, No. 70). The Final Rule also indicates that the services are appropriately considered in the selection of mitigation sites, and that a mitigation site may not perform the same social services as the impacted wetlands.

Response: This method was developed to meet the needs of local and state government, and specifically the King County In-lieu-fee program. At present, none of our policies and laws use the term "ecological services." The terms used are no net loss of "functions and values." Not even the federal Clean Water Act has yet been amended to change to the new words used by EPA. For this reason I have kept the old language. Most regulators are familiar with the term functions and values and don't understand the correlation between services and values. If the term services were used, it would be more difficult to convince regulators that they were meeting their policy goals.

Furthermore, here in Washington State we have always been clear that the functions for which we develop assessment methods are those that provide ecosystem services/values to society. This has been the way we have been defining functions in the Function Assessment Method, the Rating System, the Guide to Selecting Mitigation Sites Using a Watershed Approach, and now in the C/D Method. This is a narrower definition of functions than that used by EPA.

The values/services we characterize in the C/D method are not a multiplier. Rather they represent only one-third of the final score for a function. The functions we are scoring are actually already defined as ecosystem services. Thus, the value part of the score is intended to highlight those wetlands where the ecosystem services they provide are more important because of factors in the surrounding landscape.

Comment 76: Much of the information presented in Chapters 3 and 4 is copied verbatim from the wetland rating manual. Some information is presented in multiple locations in nearly the same form (e. hydrology sections for multiple HGM classes). This material should be omitted, and the rating manual revised separately, if that's deemed necessary. This manual should focus on the new material for evaluating mitigation. Some of this new material is obscured by text that is very similar or identical to the wetland Rating System text.

Response: See response to Comment #74. Also, the copying of questions for the site potential from the Rating System is intentional. The site potential is based on indicators of functions within the wetland itself. These were independently calibrated and are based on the scientific information we have collected. Research done since the Rating System was developed indicates that there is no need to change the questions for site potential. The recent research however has indicated that there are better indicators of landscape potential for habitat functions and these were incorporated into the C/D method.

Comment 77: Overall, I believe that the document would benefit from a strong edit to focus on the bare bones of the system. The resulting document should be more widely distributed and rigorously evaluated by the professional community, either on a test set of mitigation sites, or on newer mitigation projects over a 1-2 year period. The results of this evaluation should be incorporated into the final document before being adopted as guidance. I believe this is the process that was followed for the WAFAM and wetland Rating Systems, and I believe it would be a good process for this document as well.

Response: I agree, that a period of time is needed in which a new method is tested and refined. However, this method has already undergone an eight-month testing period and numerous stakeholders have participated in developing the tool. A workshop for technical experts and stakeholders was held last July with 26 participants and a draft was circulated to 64 experts for peer review. This is exactly the same process that was used for the Function Assessment Methods and for the Rating System.

How the method is applied in a regulatory context however will be an ongoing discussion. Our approach is similar to that used for the Rating System and Ecology's guidance on how to use it. The Rating Systems were published separately as technical documents (Ecology publications #04-06-15 and #04-06-025) and before the recommendations on how to use them in a regulatory context (Ecology publication #05-06-008). This allowed us refine the recommendations to better reflect what the new scientific information was telling us about wetlands and how to protect them.

Comment 78: A small item, - the next draft should be reviewed for typographical errors. I noticed several throughout the document, and I was not looking for typos all that carefully.

Response: The final version has been reviewed by an editor.

Comment 79: Is there any precedent for using this type of methodology elsewhere in the U.S.? If so, what are lessons learned?

Response: The approach to scoring and scaling factors is based on a method developed by the Corps of Engineers in South Carolina in 2002. I do not, however, have any information on its use or effectiveness. The original method developed by the Corps is at www.sac.usace.army.mil/assets/pdf/regulatory/sop02-01.pdf .

Comment 80: In many of our projects, we are trying to identify basic environmental constraints and whether certain project elements would "pencil out" when it comes to the feasibility of providing compensatory wetland mitigation. We use federal, state, and local laws, which rely on the original Wetland Rating System (publication 04-06-025). This new guidance uses a modified Rating System that may result in a different outcome. I am concerned that the use of two versions of a Rating System will be problematic if we are trying to get a reasonable idea of what mitigation would be required for a project.

Response: This method should be used in conjunction with our recent guides on "Selecting Wetland Mitigation Sites Using a Watershed Approach" (Ecology publications #09-06-032 and # 10-06-007). The Rating System was never intended to be used for mitigation, and it is unfortunate that people have been trying to do so. That is why we developed the C/D method.

Comment 81: My concerns have to do with calculating credits for the large wetland re-establishments we are doing here. The scenario is one where a large wetland has been dissected by roads and ditches. Several mitigation projects will be implemented to restore several pieces of the wetland to its larger original configuration. By way of comment, I think my struggles with how to use the mitigation tool would be useful for you to see problems with either interpretation of what is written or need for clarity or problems with application of the tool as designed. Each wetland creation only entails acreages varying from ½ acre to six acres or so, but the resulting wetland is to create 60-100 acres out of two – five smaller pieces ranging from 6- 14-30 acres. The confusion is about several aspects of this:

What is confusing is there are three different wetland pieces, that would not be rated as separate wetland units once reconnected, and the before score is separate for each of them. Should we rate the lift for each wetland by comparing its before score to the final score of the total wetland, and multiply the points of lift by the final acreage? Your instructions don't say how to handle various components for a complex project especially where the rehabilitation isn't a separate project exactly from the creation.

Response: Specific examples such as this have been added to the training. It is difficult to describe how to address individual situations in the text. For the situation you describe I would try to the following:

a. For the areas created/re-established, you would score the functions for the entire completed wetland first. The restored wetland becomes one unit for the purpose of rating and scoring it. To calculate the credits generated by the creation/re-establishment you would combine all the area for the separate

pieces of creation and multiply it by the score for the big wetland. You do not however use the area of the entire wetland in your calculations.
*Total area created **x** score for each function of entire wetland unit = acre-points*

b. For areas being rehabilitated or enhanced the calculation becomes more complicated. **First,** you have to separate the site into units for scoring following the procedures in the manual (they are the same as for the Rating System) regardless of what is being proposed in terms of restoration. Call these Unit 1, 2, etc. The units have to be scored individually. These numbers will be the "before" scores you use to calculate the lift. Each unit may have a different "before" score. I am having trouble figuring out these units from the map you included so I cannot help you with your example. **Second,** your AFTER score for the functions will be those you estimated for the entire wetland site. To calculate the lift you will have to treat each original unit separately. Take the area being re-habilitated or enhanced in Unit 1 and multiply it by the lift in Unit 1.
*Area of mitigation in Unit 1 **x** (function score entire wetland (AFTER) – function score in Unit 1 (BEFORE) = credits in Unit 1*

Do this for all units. When you add the lift in functions for each unit together you will get your overall lift in a function for the project.

Comment 82: The scoring instructions are not very clear for rating various wetland units. Some portions of the before and after wetlands are Riverine, BUT not sure how to add that to the mix above.

Response: Clarifying statements have been added to the text. The wetland units should be classified using the key in the manual. This is the same procedure used for the Rating System. Since you have taken the training for the Rating System I hope this will not be too difficult. If you can identify separate HGM units they have to be scored separately. If you cannot separate out the HGM classes within one wetland use the procedure outlined in question 8 of the key.

Comment 83: The other problematic issue is that portions of the final wetland have clay soils and some portions don't and that makes a difference in final score. Some of the pieces may be predominantly clay, but when combined into the final wetland for the score, the clay may not be predominant in the wetland as a whole, due to the sandy soils throughout much of this area.

Response: These questions are again the same as in the Rating System so you would follow the procedures therein. If one of the smaller original units has clay you would score it; if it does not, you do not score. Since there is clay somewhere in the overall site, you would score the clay for the "future" condition. You only need one "hit" to get your points for the soils. Note, however, that the clay cannot be in areas that are permanently ponded unless the site is mapped by NRCS as having a "true" clay or organic soil.

PART 2: Specific comments on first draft released October 2010

Comment 84: Page iv, para 1. Need lit cite for Hruby 2009.

Response: Citation will be provided.

Comment 85: Chapter 1. I'd caveat up-front what types of wetlands can and cannot be evaluated using this credit/debit system, just so there is no confusion for the reviewer. I wouldn't wait until page 94 to say wetlands with special characteristics can't be used for this method.

Response: Good point. This information has been added to Chapter 1 as well.

Comment 86: P6. , Section 2.3. Are the reference sites that were used for calibration in this document the same as in the original Ecology Rating System?

Response: Yes. In addition, the method was field tested at more than 20 actual mitigation sites.

Comment 87: P 7. para 1. Results of the field texture test can vary greatly among individuals. Does this provide sufficient accuracy and reproducibility for clay or organic content? What a clay or organic soils is on the texture chart should be more clearly defined.

Response: A new field guide to soil texture developed by the soil scientists at Washington State University has been added to the appendices. Also, we rely strictly on the NRCS definitions of clay and organic soils.

Comment 88: P 7 para 2 "Review of the literature …." Is this intended to be a subheading?

Response: The text was reorganized. These paragraphs were changed to bullets.

Comment 89: P 7 para 3 "The final decisions on scoring, however, were developed from graphical analysis…" What does this mean exactly? Should there not be some sort of statistical break in the data?

Response: The data on scores were normally distributed so there are no statistical breaks in the data. The graphs were used to determine where the breaks should be placed so there was a relatively even distribution in the categories.

Comment 90: P 7 para 4. Unclear what defines "compelling evidence" in the paragraph.

Response: This section has been re-written.

Comment 91: P 8, first 3 paras. This seems to be consistent with the short guidance on using the wetland Rating System for evaluating mitigation sites. However, this may miss substantial lift in a particular function that is confined to a portion of a wetland. I'd hoped this more detailed method would be able to "see" these finer distinctions.

Response: This comment is similar to comment #5. Please see response to that comment.

Comment 92: P8. Inset box, last sentence. Why "monthly sampling for at least one year"? I would omit this. Some functions may require more intensive sampling (e.g. daily sampling via data logger for hydrologic data), over shorter or longer periods (e.g. sample the water during the rainy season, look for ESA plants when they are in bloom). This periods may be shorter (e.g. sample water levels during the rainy season), or longer (e.g. sampling for ESA plants during their bloom period over 2 years).

Response: The text has been revised to add "at a minimum."

Comment 91: P 9. Bottom of para 2. "The criteria used for separating wetland into different units are based on the observations made during the calibration of the Rating Systems and the methods for assessing wetland function. They reflect the collective judgement of the teams of wetland experts that developed and calibrated the methods." This sort of statement is basically rhetoric. The calibration of the methods mentioned was done what – 5-10 years ago now? The scientific community has significantly advanced the knowledge of these systems in the meantime (as evidenced by the need for this system of calculating mitigation credit/debit).
If there is a valid scientific reason for the division of the wetlands (and I believe there is) it should be stated clearly and reference the appropriate literature, such as the BAS. The collective judgment of an undefined group of scientists is not an appropriate reference, it's reliance on false authority. Parse the text carefully for these rhetorical statements and excise them from the text. Ruthlessly.

Response: The need to separate wetlands into units at the scale at which they are regulated is strictly a societal need. There is little scientific evidence to suggest that contiguous wetlands have different functions or don't interact. This is similar to the issue of delineation. At a policy level we have decided that a vegetated ecosystem with 51% cover of wetland plants is a wetland and one with only 49% wetland plants is an upland. Ecologically there is very little difference in functions between the two sides of the line. We have a similar policy need to identify wetland units for the purpose of regulating and mitigating them. The criteria that were developed for the function assessment methods and refined in the Rating System attempt to blend the policy needs with the scientific information we have. During the last 15 years in which these criteria have been used we have not come across any data that would invalidate them.

Comment 92: Section 2.3: Helpful to clarify that a calibration differs from a validation of the method. Pg 7 – what kind of compelling evidence would be used to weight a function as more important than others? Be clear, if it is best professional judgment, a reviewer of an application of the method would need to know how a rating was arrived at.

Response: These clarifications have been added.

Comment 93: Section 3.1: pg 10-12 – helpful to clarify the scope of Ecology jurisdiction for wetlands along banks of streams/rivers; does it include impacts below the ordinary high water mark? If so, would application of this method allow out-of-kind (e.g. riparian) compensatory mitigation for in-stream impacts?

Response: Ecology does not have the same jurisdiction over aquatic resources that Oregon has. A text box has been added describing that the method only applies to wetlands as delineated using the manual. Out of kind replacement is a policy decision that cannot be addressed in a method such as this. It has to be negotiated on a case-by-case basis.

Comment 94: Section 3. 6; Great that you include very small wetlands; does this method promote/accommodate assessment of cumulative impacts on a landscape scale?

Response: No, this method does not accommodate assessing cumulative impacts. The concept of this method is based on a tool developed by the South Carolina office of the Corps of Engineers. Their method included an automatic "cumulative" impact factor in calculating the debits. It was set at 0.05. Debits were increased for all mitigation projects by 5% to account for cumulative impacts. I decided not include such a factor because it was so small relative to all other factors. I did not want to complicate the calculations any further.

Comment 95: Section 4.1: pg. 19 - Is HGM still considered a "new" method? Seminal papers are over a decade old.

Response: "New" has been deleted.

Comment 96: 18. P. 19, inset box. Has there already been training for the scoring method used in this publication? How large was the sample group?

Response: These data are based on the Rating System. Since only 3 of the 65 questions on the data form are different from the Rating System the errors between this method and the Rating System are expected to be about the same. This has been clarified in the text. Over 850 people have now been trained in the Rating System and I have been collecting data on the results during all the trainings.

Comment 97: Section 4.3: pg. 33 (D1.2)- It is unclear why a sample should be picked from "2 inches below" the duff layer. Instance where a citation is really necessary.

Response: A better explanation has been provided in the Rationale.

Comment 98: Chapter 5. I think there needs to be a more thorough discussion about what this score actually means, and how it should be used in the decision-making for a reviewer. How does this score fit into the Best Available Science literature and statutory requirements for no net loss of wetlands? What are potential solutions or ways to troubleshoot a plan that does not generate an acceptable balance?

Response: How the method is applied in a regulatory context will be an ongoing discussion. How the data are used in making decisions about mitigation is an issue outside the scope of a field manual. Up to now, there have been no methods available that attempt to quantify functions and values to meet the no net loss policy. Every case has been judged on an individual basis and on the best professional judgment of those involved. The National Academy of Sciences and the data collected by Ecology all indicate that this approach results in a net loss. The Rating System meets the statutory requirements for Best Available Science and that has been upheld by the Hearings Board. That is why we based the scientific aspects of the C/D method on the Rating

System. If a plan does not generate an acceptable balance the issue will have to be negotiated between the permit applicant and the regulator.

Comment 99: Pg. 35 (D1.4) – why two consecutive months for inundation? Provide a reference.

Response: Information such as this is not referenced because it is based on the best professional judgment of the teams developing the methods. The rationale contains the reasons why this was chosen, but we do not have citations for it because research on this subject has not been published.

Comment 100: P. 35, inset box. Soils may become anoxic during inundation. This depends on the duration of saturation/inundation. This rationale may lead to a "false positive" for this indicator. See comment 34 in annotated version of 04-06-025.

Response: The technical teams developing the function assessment methods and the Rating Systems concluded that areas ponded for more than 2 consecutive months will develop the required anoxia to provide adequate denitrification. This is different from the assumptions made in the delineation manuals and by soil scientists where only 2 weeks during the growing season are needed to develop anoxic conditions. We decided to increase that time to two months because we did not limit the ponding to only the growing season and we wanted to insure that there was a long enough time for the denitrification to process the nitrates that had build up during the period when the soils were aerobic.

Comment 101: P 37, note. "Calibrated" GPS? GPS units are not actually measuring anything (just performing mathematical operations on data received from satellites), so they are not calibrated in the traditional sense. Correction of the data to account for positional inaccuracy is referred to as "differential correction". This can be done either "real time" (via radio signal) or in post-processing.

Response: The wording has been changed.

Comment 102: P. 37, D 2.0. This should be opportunity, not potential.

Response: The "opportunity" aspect used in the Rating System has now been split up into the "landscape potential" and "value."

Comment 103: Pg 38 (D2.1; D3.2) – unclear what is being rated here. Increased pollutant loading to a wetland may well affect how well that wetland will function in other ecological parameters (community structure, supporting biodiversity, quality of habitat provided, how well it will function in larger landscape (e.g. metapopulation dependency/connectivity in larger conservation corridor)

Response: Each indicator was chosen and scaled specifically for the function. If an indicator also was important for another function it was included in that function. For example, questions D1.1 and D4.1 apply to the same indicator, but it has different scores that reflect its relative importance for each function separately. We did not have any specific ways to characterize the impact of decreased water quality on the habitat functions and thus could not include it as a negative in the habitat functions.

Water quality issues were addressed indirectly, however, in the landscape potential section of the habitat function.

Comment 104: P 38, D2.1 Presumably this also includes surface discharge, not just stormwater discharge from ponds (see p. 45 of the annotated version of 04-06-025)

Response: In this case, it is just stormwater discharges, other surface discharges are addressed in question D 2.2. The questions on the landscape potential are not exactly the same as the opportunity questions in the Rating System.

Comment 105: P. 38, D2.2: Do we also need to refer back to criteria made in the annotated version of 04-06-025, but that are not mentioned in this credit/debit method? For instance, I'm looking at the pollutant sources in D2.2, but pollutant sources such as areas that have been clearcut within the last five years are not mentioned in this document.

Response: The C/D method uses the same information as the Rating System but in different ways. The questions on pollution sources look at the same basic data but generate a score that better meets the needs of mitigation. There is no direct one-to-one correspondence between the opportunity questions in the Rating System and the landscape potential in the C/D method. This is one reason we had to develop a separate method to be used in mitigation.

Comment 106: P40, top inset box. Last sentence. "Could result in irreparable damage" … or not. Omit hyperbole.

Response: This section addresses the values to society, so we believe that such statements are appropriate to point out the value of a function.

Comment 107: P40, bottom inset box. Last sentence. Where are "values to society that need to be replaced" defined?

Response: The sentence has been changed to say "additional values at the local level."

Comment 108: P 41, 2nd inset box, last sentence of 1st para. The tolerance of the correlation should be defines, or this sentence omitted. The disclaimer in the previous sentence is sufficient.

Response: The sentence has been deleted.

Comment 109: P 43, last para. If there is outflow from a headwater wetland – does it have the capacity to desynchronize additional water? How is this determined?

Response: Headwater wetlands are defined as having a channelized surface outflow to a stream system. Surface flow is desynchronized because the time of travel is lengthened through the vegetation and flat topography.

Comment 110: Pg . 43 – headwater wetlands; great quote from Michael Davis, Army, but scientific references should be included here.

Response: This section is copied directly from the Rating System developed in 2002. At that time, we did not have any other citations. We decided not to update references or other aspects of the science to avoid confusion for the users. The data forms are also identical for the site potential so users could easily transfer data from one to the

other. We did not think it critical for a field manual to update all the references if the information is still valid.

Comment 111: P. 44 – contributing basin. The text would benefit from a better description on how to determine the basin boundaries, or a reference to standard or approved methods for this procedure.

Response: Links to methods have been added to the text.

Comment 112: P44. D5 is opportunity, not potential.

Response: See response to comment #102.

Comment 113: P48. Note. "…smaller than those in the immediate area". I believe more finely textured would be more clear.

Response: The suggested wording has been added.

Comment 114: P 51. Rationale for indicator R2.3. Is there data on what pollutants are removed at what distances?

Response: Yes, they are reviewed in the reference cited. Since this is a field manual and not a review document we just reference the information and do not try to present all of it.

Comment 115: R 5.0: Not clear how account for role of stream itself? Feel a little bit like a disconnect to not look at total function in landscape.

Response: Unfortunately, our laws force us to manage one resource at a time even though the ecosystem is much greater than just the wetland. Since this tool may be used in the regulatory arena we need to work within the limitations of regulations and laws.

Comment 116: P 69. 1st apra. "scaled orthophotograph". An orthophotograph has been rectified to show terrain in their true plan positions. So, either "scaled aerial photograph", "rectified aerial photograph", or "orthophotograph" would be correct.

Response: The text has been corrected.

Comment 117: L 6.0: pg. 69 (L6.1) – "Are there resources, both human and natural, along the shore that can be impacted by erosion?" ---Does this make the case for riprap?

Response: If depends on how you look at it. Riprap by itself can be considered a human resource that the wetland protects. Most ripraps are not 100% effective at preventing erosion. So in this case I would consider riprap a human resource that can be impacted by erosion.

Comment 118: P70. The method for measuring slope described is not very accurate. Slopes may be accurately measures with a tape measure, surveyors hand held level, and stadia rod, or tape and abney level or inclinometer. These are relatively inexpensive pieces of equipment. See *Elementary Forest Surveying and Mapping I and II* (Wilson 1978 and 1994) and/or *Introduction to Geographic Field Methods and Techniques* (Lounsbury and Aldrich 1979) for a simple description of the process.

Response: This question is from the Rating System and we have found that very few of the 850 people that have been trained actually have these instruments. I agree that the method described is not very accurate. What I do say in the training however, is that more accurate equipment may be needed if the answer to the question becomes one that is critical in the final rating or scoring of the function.

Comment 119: S1.2, pg 71 – Why only 2 inches from surface? Citation or rationale needed.
Response: This is the same question as D1.2, and the more detailed rationale for the indicator is given there.

Comment 120: P 76. Setting a standard method for determining % of depressions might improve accuracy for S 4.2.
Response: S 4.2 has been deleted because it does not make a difference in the rating of the site potential when all the possible combinations of scores are considered.

Comment 121: H1.1 Pg 79 – Sometimes more habitat niches are provided by a wetland *complex*, or the position of a wetland provides habitat because of how it is situated in the landscape/relative to other landscape components that a specific species may need. H1.2 – ditto to above, may be more true within a landscape matrix, rather than within an individual wetland, but each individual wetland (or other landscape feature/aquatic feature) is important to overall function within landscape; this is a question of the scale of the function being evaluated. Also, what about artificiality – we often impose a hydrologic period on aquatic resources?
Response: Indicators H1.1 – H1.5 are directly copied from the wetland Rating System. We will not be changing or modifying these indicators to maintain consistency with the Rating System. We try to address the landscape components in a general way through the questions on the Landscape Potential. That is why we give equal weight to the site potential and the landscape potential.

Comment 122: H1.2, pg 83 – does not seem to account for the rarity/endemism of species that *are not* listed as T&E? Some species simply have very limited range/occurrence.
Response: Rapid methods such as the C/D method are not able characterize the needs of individual species because they only collect data on the physical structure of the wetland. This is discussed in the introduction to section 5.7.

Comment 123: Section H1: Does the Wetland Unit have the potential to provide habitat for many species? The authors underline the word "potential" but do not tell us what they mean by "potential". Do they mean; 1) If I fix up the area it would be habitat for many species, or 2) The area currently has habitat for many species. However the actual presence of those species is not considered when answering this question.
Response: A definition of potential has been added to the text.

Comment 124: This question also begs the question; "Habitat for what?". This section in the rating scheme does not adequately define what species we are concerned with. It mentions "invertebrate and vertebrate species" (section H 1.3), Macro-invertebrates, (H 1.4), Bacteria, fungi, invertebrates, birds, other animals, fish, amphibians, and aquatic

mammals, (H 1.5), salmonids, and WDFW Priority species, (H 3.1). Are we to give a wetland a high score for being a good place for bacteria?

Response: see response to Comment #122. Also, the importance of one individual species relative to another is a question of personal values. As an ecologist, I consider the bacteria more important than most species because 80% of the energy that passes through a wetland does so through the bacterial food web.

Comment 125: I submit that it is more meaningful to define some wildlife species we are interested in providing habitat for within a developed landscape. After all, the about the only times we use such rating forms is when we are considering some sort of development. I propose those species include deer, raccoons, beaver, opossums, wood-peckers, squirrels, moles, salmon, garter snakes, and probably a few more that could reasonably be found in urban and suburban landscapes and streams.

Response: this is a value judgment not an ecological one. It is best addressed in the "value" section of the method. Currently we value those species that are considered "Priority" species by the Department of Fish and Wildlife. This is the only acceptable state-wide list we could find on which everyone could agree.

Comment 126: This section also instructs that the following species not be included for rating habitat: "Eurasian water-milfoil (Myriophyllum spicatum), reed canary grass (Phalaris arundinaceae), Purple Loosestrife (Lythrum salicaria), and Canadian thistle (Circium arvense)." No reason is given for excluding these species, whereas any number of other low value plant species are included.

Response: This is the only list on which the team of experts could agree. We started the discussion with about 25 species. The explanation is given in the rationale.

Comment 127: Some common sense considerations need to be applied in reviewing these questions. For example, the subject property is fenced on all sides, and this will be a barrier to animals such as deer, fox, wolves, bear, cougar, lynx, elk, raccoons, rabbits, opossums and probably beaver. Although the area may have a <u>potential</u> to support some of these species, they are partially or wholly excluded, and some are completely expatriated from the area. It makes little sense to suggest that a restoration will in fact create habitat for most of these species. However many smaller animals such as snakes, squirrels, voles, mice, amphibians should pass through the fence relatively unimpaired, so there is some potential for this property to provide habitat for these species.

Response: We attempted to address these issues in the section on "landscape potential." We did not attempt to differentiate between species because that is not possible for a rapid method such as this.

Comment 128: *H 1.3 Richness of Plant Species/ H 1.4 Interspersion of Habitats:*
Overall, ranking higher for plant species richness and habitat complexity is valuable, but most amphibian species need depressional and riparian wetlands without shrubs and trees for breeding. Increases in overhead (tree and shrub) species could negatively impact breeding success for most pond-breeding amphibians because of decreased solar radiation. Overemphasis of shrub and forested wetlands (later seral stages) would be problematic for this group.

Response: Rapid methods such as the C/D method are not able characterize the needs of individual species because they only collect data on the physical structure of the wetland. This is discussed in the introduction to section 5.7.

Comment 129: ***H 1.5*** *Special Habitat Features:* This section fails to address the need for early successional/seral wetland conditions, the loss of which is a prominent problem in Washington due to loss of grazers and local hydrological changes linked to urbanization. Western Toad and Oregon Spotted Frog require early successional wetland conditions and most other amphibian and aquatic associated reptiles likely benefit. Wetlands that still have natural disturbance regimes (primarily beaver engineering, but also fire, river flooding, etc.) are more significant for amphibians than those that will eventually move to late seral succession stages. A new mitigated site may not have this value. Perhaps this is or could be captured under "*H 2.0* Does the Landscape Have the Potential to Support the Habitat Functions of the Site?" P. 85: 1) large downed wood can also provide cover for wildlife (including amphibians – which can also be important on the "banks" of wetlands as amphibians metamorphose and come onto the land for dispersal to winter overbreeding habitats, or as cover for individuals that are traveling to the wetland during the breeding season); 5) "thin-stemmed plants" – a wetland can provide habitat regardless of whether a species is able to use the feature for breeding. Perhaps reword this so that it doesn't seem as though the wetland habitat is better or worse depending on presence of thin-stemmed plants, but rather that it fulfills more of the requirements of the complete life cycle of the amphibian if there is suitable breeding area.

Response: See response to previous comment. The Rating System looks only at biodiversity in general. The wetland function assessment method addresses individual groups of species, but the potential users of this tool did not want a tool that requires the higher level of effort needed to do a function assessment. The indicators of site potential used in this method are exactly the same as used in the wetland Rating System. We had a number of different WDFW biologists on the teams that worked on the Rating System and the indicators chosen were based on WDFW input. These will not be changed at this time to maintain concurrency with the Rating System.

Comment 130: P 85. Fenceposts and pilings may provide habitat function. I believe there are some purple martin nest cavities in old pier pilings in Grays Harbor.

Response: Fenceposts can be counted as noted in the text. We did not highlight pilings but did say "other vertical posts" and that would include pilings.

Comment 131: P. 87, H2.0. In the WQ and hydrology functions, proximity to higher intensity land uses increased the "value" of a function. Here the performance of a function is degraded by the adjacent high intensity land uses, but there is no corresponding multiplier that takes into account the increased "value" of these more scarce resources. Rather value is only based on regulatory imperatives (e.g. PHS, ESA).

Response: The landscape potential addresses how well the landscape can support the habitat functions of the site. The value of more scarce resources is addressed in H 3. If the site has been identified as a scarce resource in a local plan, it will get additional points. However, we cannot decide this value as individuals because everyone has a

different understanding of it. Since value is a personal decision not an ecological one, we have to rely on the formal processes by which such values are established for society.

Comment 132: P89, Table 2. Level of impact and land use types in Table 2 are not fully consistent with 06-06-011a.

Response: The land uses in Table 2 were developed for a different purpose than that in 06-06-011a. Table 2 was developed to best meet the needs of characterizing landscape potential, not for estimating buffer widths which is the purpose of Table 2 in Ecology's guidance on buffers.

Comment 133: P 90. What is the basis for the 1 km area for habitat accessibility? Doesn't the distance differ by species?

Response: Yes, the distance differs by species. The 1km area was chosen based on a synthesis of the research in the articles cited. Again, as with delineation and selecting units, we have to place a line on the landscape in a situation where the ecosystem does not have a fixed line.

Comment 134: H*2.1 What is the area of Accessible Habitat?*
This seems to focus on the uplands surrounding wetlands. As far as I can tell, there is no place in the document that addresses the significant of aquatic connectivity between wetlands. This is not to say that isolated wetlands are not significant, but rather, a mitigated wetland may not provide the same values as the original wetland if the new wetland is isolated and the former wetland was part of a complex. Species, such as the Oregon Spotted Frog, require aquatic connectivity. Even amphibian species that can move through the uplands, likely benefit from aquatic travel corridors.

Response: Since the method does not address the needs of individual species or groups of species, the importance of wetlands relative to other undisturbed habitats was not considered significant. It is the presence of accessible habitat, whether upland or wetland, that is considered to be most important when considering biodiversity in general. This is documented in the literature cited.

Comment 135: *H 3.0* Is the Habitat provided by the site valuable to society?
Species, such as the Western Toad (a State Candidate) would not be captured. Because of its fidelity to breeding locations and its patchiness on the landscape, a mitigated site would not necessarily be colonized by this species.

Response: A mitigation site would get credit for providing habitat for valuable species only if it has been identified in advance as a suitable site. The question is stated as: Does the site provide habitat for_____. A mitigation site would only get the value added as credit if it can be shown to provide the habitat currently, or if it has been identified as a suitable site in some regional planning document.

Comment 136: H3.1, pg 93 – final two paragraphs; it might be possible to interpret this as undervaluing providing habitat that keeps species *off* a state or federal T&E list; we are uncomfortable with that message.

Response: The legal interpretations of laws regulating natural resources have been clear in specifying that we cannot hold a landowner responsible for what might happen in the future. Thus, we cannot "debit" a landowner for this case.

Comment 137: Pg. 96, second Note, "…where data exist showing one function is more important than another." More important as an ecological function for the function of the ecosystem, or more *valued by society*? These are not the same thing, so recommend clearly indicating what is meant here.

Response: Saying that one ecological function is more important than another for the functioning of the ecosystem is a value statement in itself. So I do consider it to be the same. Ecosystems do not care what processes are occurring and at what rate. We as humans value different aspects of the ecosystem we wish to maintain and thus the processes that maintain those conditions are the ones some of us value more than others.

Comment 138: P 100/101. The scaling of risks as shown is unclear. What is the basis for the different risk factors? They appear to be arbitrary.

Response: The risk factors are based on the starting values cited in section 3.3 and the research cited therein. The scaling up and down from these values is based on the experience of the peer review group that participated in the workshop and the experience of Department of Ecology wetland staff and staff from King County DEP. (*note: this discussion was moved from Chapter 5 in the first draft to Chapter 3 in the Operational Draft and the Final Report)*

Comment 139: Risk Factors, pg. 100– How were the numbers used to discount basic credits arrived at (i.e. 25% rather than 50%)? How is it scientifically supported? As near as we can tell, none of the studies that are cited are from Washington/the humid Pacific Northwest; it may well be that the "improvements" cited in those studies have as much, or more, to do with social changes—better enforcement, new rules/guidances promulgated by the state addressing site selection for mitigation, changes in behavior/zoning, etc.—than with improvements in science/technology of restoration practices that are *transferable* to western Washington. To make such a significant change (50% increase in discount, from 50% to 25%) based on these studies, recommend clearly addressing the stated questions as to why the results of those studies can be assumed to be applicable here.

Response: We hope to be providing data from local projects soon. Our mitigation compliance study funded by EPA is collecting data to support this, but have not analyzed all the data yet. For now, we used published data from other areas to support our choice.

Comment 140: Pg. 102 – Who is WSPI? Important to indicate qualifications of that group to inform the scaling factors used to calculate credits.

Response: WSPI stands for the Wetland Strategic Plan Implementation project that was sponsored by the WA Department of Transportation to improve wetland mitigation in Washington. All major stakeholders in Washington were at the table in developing this guidance. The reference cited is the final report of the project. This

project had a significant impact on wetland mitigation in Washington, but may not have received much notice elsewhere. This will be clarified in the document.

Comment 140: The discussion of preservation as mitigation is cursory. Additional detail should be added to this section.

Response: Since this is a field guide for calculating mitigation needs, we did not think it appropriate to discuss all the policy aspects of preservation. These are addressed in policy documents such as 06-06-11a.

Comment 141: Appendix A, Landscape Sections:
Similar to the Wetland Rating System, the Landscape sections in this Method do not appear to accurately reflect probable land use changes. Rather than rating the landscape for current conditions, we suggest the landscape be rated according to the underlying zoning or proposed land use in the project application. It is reasonable to assume the landscape will eventually be developed to the approved zoning for the area. Not accounting for the zoning will likely result in a wetland being under protected and required compensation will not be sufficient (NOTE: it is extremely likely the project prompting the Credit/Debit Rating is the same project that will change the landscape surrounding the wetland, even more reason not to rate the landscape based on current conditions).

Response: This is an issue we have discussed at length. Our approach however is constrained by past court decisions. First, we cannot hold one person liable for something that might, or might not happen in the future. Also, regulations have to be applied based on current conditions, not what was there in the past, nor might be there the future. These issues need to be addressed in long term planning by each jurisdiction through the Growth Management and Shoreline Management Acts. The only thing we are allowed to regulate through an individual permit is what the permitee is proposing to do. We decided to include a policy that a developer should not be rewarded with an increased credit score for the fact that the proposed action will dump more pollutants and water into the mitigation site. On the other hand, a project proponent can increase his mitigation credits if he restores connectivity in the landscape by increasing the accessible habitat.

Comment 142: Appendix A, Landscape Sections and Appendix E Credit Worksheet:
We do to understand the intent behind the way points are assigned for the Landscape sections. The Credit Worksheet explains that the Landscape rating must be based on current conditions to avoid giving points for degrading the landscape or for losing points for improving the landscape. We believe it is reasonable and appropriate to give points for improvements to the landscape. If you do not, the Method does not accurately capture ecological lift. Consequently, the Method will have the potential to discourage buffer improvements and frustrate the process by limiting the ways in which a project can achieve credits. It appears as if you can solve this dilemma by reversing the point calculation: You get 0 points for a degraded landscape but can gain a point(s) for landscape improvements.

Response: The credits are calculated based on the actions being proposed in the mitigation. If you improve the landscape around a site to the extent that you increase the scores for the landscape potential then you can count that as lift in the calculations.

The credit scores are calculated based on what the site and the landscape will be in the future based on the restoration of processes and structures being proposed. See also response to comment #141.

Comment 143: Appendix A, all:
We applaud Ecology for trying to distil a complex ecosystem into a few streamlined questions. However, we would rather there be more questions than risk missing key functions, this seems especially true for Slope and Lake classes. (e.g. Question S 5.0 does not include important attributes of the landscape such as slope, aspect, downslope outlet, etc.)

Response: This question comes up often because as ecologists we have a difficult time separating similar ecological functions in different areas of the landscape. The indicators you have mentioned all affect how the surrounding landscape traps and slows down water. However, they have little impact on the way the wetland itself functions internally. By law we can only require mitigation for the functions found within the wetland unit itself. If there are important functions in the surrounding landscape, they need to be protected by some other legal means. The landscape questions are tailored to specifically address how the wetland itself is performing the function. For example all we can address is how well a buffer protects and improves the habitat provided by a wetland. We cannot include in the assessment the habitat functions provided by the buffer alone.

Comment 144: Appendix A, Societal Value Section:
The Societal Value questions do not appear to provide the full range of ways society may value a wetland (e.g. S 6.0 there may not be surface flooding now, but if the wetland weren't there then perhaps flooding would occur). If the Method does not provide the full range of ways society may value a wetland, then the rating gives the false impression that a rating of "L" means the wetland is not valued. Rather, what "L" means is that the wetland does not contribute to the select few societal goals listed in the Method.

Response: Values are very subjective. Every individual has a different set of values. The values we have included needed to represent those commonly held by the largest majority. We have included only those that have been agreed to by general consensus through the peer review and public comment process used in the development of our different methods.

Comment 145: Appendix A, Landscape and Societal Value Sections:
The weight given the Landscape and Societal Value sections seem out of sync with the ability for a project to influence these factors. These sections are two thirds of the credit/debit score, yet based on the existing questions; the attributes which contribute to the score are primarily outside the control of the project. The questions could be changed to reflect ways in which a project could provide landscape "lift" or reduce the weight of these sections. We understand that perhaps this weighting is partially a realistic reflection on how much control a project has on wetland functions; however, we still believe the weighting could better reflect ways in which mitigation can improve landscape function and societal value. Fewer questions constrains the ways in which mitigation can achieve the Credits; possibly skewing mitigation to types inappropriate for the site just to gain points.

Response: As you say our main goal for the method is to provide a "realistic reflection on how much control a project has on wetland functions," . I agree that this rating is very coarse, but that is the trade-off we have to make when people require a "rapid" method. The moment we started expanding the concept we end up with over 20 variables that have to be considered and modeled. We tried but were not able to provide some intermediate level of rating. Once we started to parse out the questions different people had a large number of different values and we either had to include all of them or none of them.

Comment 146: Appendix E, Risk Factors:
What is the definition of an "independent analysis of watershed?" We assume less developed, more rural areas are less likely to have local "plans" or "independent analyses." If this assumption is true, then it is possible that the Risk Factors are exacerbating the economic disadvantage common with these areas. If the above assumption is true, would Ecology consider collaborating with these governments to help produce the "local plans" or fund the "independent analyses"?

Response: Good catch. The definition has been added. In general, it means a watershed analysis that is not done by a local planning agency or government. It can be done by anyone, but has to include an analysis of environmental processes in the watershed that have been impaired and where on the landscape they can best be restored.

Comment 147: Appendices: Add members of technical review team for this specific document, consistent with other Ecology publications.

Response: We did not have a technical review team that developed the method in the field as we did for the Rating System and the function assessment methods. Since only 5% of the questions are new in the C/D method we did not consider that a technical field team was required. We did however have over 30 people provide comments during the peer review process. We do not however list these peer reviewers in our documents.

Comment 148: At the end of the Calculations for credits form we have total credits for WQ, Hy, and Ha. It would then follow in form filling out that you would then transfer those totals to a summary. However you do not. You actually go back and get the creation, rehab, and enhancement and extract them back out of each area of mitigation area then total area 1 creation with area 2 creation, area 1 rh with area 2 rh, area 2 E with area 2 E to fill out the summary form. I don't have a solutions as it seems that the summary form needs to explain each type of mitigation and at least at that time all the areas are added together instead of again having to report each area. I think it is the best it can be. Or perhaps the calculating credit form does not need to total creation with rh, with E at that time and save it for the final summary form. Either way is fine. What i was relaying is that for example in tax form, we complete worksheets and then the totals from those worksheets are then transfered to the next form (which is the same as the summary form) An improvement would be to add columns so the form could be used to rate several wetlands, or to provide a before and after enhancement score for the same wetland.

Response: The summary form has been revised to make it easier to use. The scoring forms are reasonably well organized and easy to use.

Comment 149: The directions are lacking or insufficient for the process of converting each numeric score into a letter score (H, M, or L) for each factor, and then converting these letter scores back to a numeric score on the "scoring form" page.

Response: a better explanation has been provided.

PART 3: General Comments and responses on the Operational Draft released Feb. 2011

Comments received between February 2011 and March 2012.

Comment 150: (compiled from several emails on the same subject by the same person): I left this until last as I consider this to be the fatal flaw of the draft methodology. This has to do with the scoring method where the initial numeric score for each functional section is turned into a L, M or H and then later, in the Summary of Scoring, is turned back into a numeric score. This is not an issue when a person is simply scoring the existing functions of a wetland. However, I found that this method does not necessarily reflect functional changes over time. In some instances, a problem arises when comparing the existing scores to the projects 'after-mitigation' scores in order to determine functional lift.

Believe me, I do appreciate the complexity of creating a rapid assessment method that is simple for an environmental system (wetlands) that is anything but simple. But your defense of why the draft method is set up the way it is still does not address my main concern: That the comparison of existing conditions to post-mitigation conditions is not consistent from wetland to wetland. I am 100-percent certain that the regulatory agencies will be very frustrated when they have to approve a very small amount of mitigation acre-credit that does not adequately mitigation for losses at some wetlands (see my comment in my initial email) while at some other wetlands landowners will have to mitigate with an inordinately high amount of acre-credits (again, see my comment in my initial email). I hope that these two aberrations will not occur in most of the projects that require wetland mitigation, but there is no way to know that at this point in time.

What I do know is that the proposed method cannot not provide a consistent way of assessing needed mitigation from wetland to wetland because the 'moderate range' for all functional assessments is too large to accurately determine what the actual functional lift is. I agree with you in the scientifically accurate way you are looking at choosing the low, moderate and high values for assessing functions in a snap-shot of time. That is not the problem. The problem comes in comparing the two snap-shots. Because the numeric range for moderate is so large, it cannot help but show some wetland mitigation has resulting in far more functional lift that it actually does provide, while other wetland mitigation will provide a great deal of actual function lift that will not show up in the methodology at all.

I don't like to just complain about something without coming up with some thoughtful options that might be considered for taken care of a problem. But, I just can't think of anything besides breaking out the 'moderate range' into small units.

I left this until last as I consider this to be the fatal flaw of the draft methodology. This has to do with the scoring method where the initial numeric score for each functional section is turned into a L, M or H and then later, in the Summary of Scoring, is turned back into a

numeric score. This is not an issue when a person is simply scoring the existing functions of a wetland. However, I found that this method does not necessarily reflect functional changes over time. In some instances, a problem arises when comparing the existing scores to the projects 'after-mitigation' scores in order to determine functional lift.

This problem came up when I used this methodology on a riverine wetland in which vegetation enhancement and removal of cattle from the wetland and buffer is proposed. I found that for each of the three functions only the site potential score changed between existing and post-mitigation assessment; the landscape potential and societal value stayed the same.

For instance, there was a change in the water quality function score only in the site potential section; a 6 point change or, when looked at as a percentage, a 400% change for site potential (and a 100% change for the water quality scores including all the site potential, landscape potential and societal value scores together). However, because the site potential section has a large numeric range when translating to L, M or H AND because the existing wetland had an initial score in the low range of L; the post-mitigation score shows up as M; a 1 point function lift.

Out of curiosity, I looked at other potential scores; what if the initial score had changed by eight (a reasonable assumption since the score potential for water quality ranges from 0 to 16). Then, what if the initial score was a "2", giving it a L. With a rise of 8 points, that would still have put it in the M range with a functional lift of 1. But what if the initial score was "5" – still a L. But a rise of 8 points gives it a H resulting in a functional lift of 2 for the exact same rise in points; resulting in a significant increase in acre-credits for larger wetlands.

Even more disturbing was when I started playing with smaller changes to the initial score for water quality site potential. For instance, if the initial score was 2 and rose by only 3 points post-mitigation, the functional assessment would stay at L and a functional lift of 0 for water quality would show up. But if the initial score was 5, the same rise of three points would change the functional assessment to M; a functional lift of 1.

I found these same disturbing results for hydrologic and habitat functions in the site potential section.

The flaw that I see in the scoring is that the numeric range for L, M and H in the site potential section for each function is too large. Small changes might show up as functional lift, or it might not. Larger changes could potential show up as the largest possible lift (2), or maybe only a 1 or maybe none at all. Thus, some wetlands with a very small change associated with mitigation could potentially show more functional lift than wetlands that result in far more beneficial changes after mitigation. In cases where, the larger wetland shows a functional lift of "0", it doesn't matter what size it is, it will get no acre-credits.

Another potential is that two mitigation projects with the same numeric score changes between existing and post-mitigation could end up with one wetland showing more

functional lift than the other (or one showing no functional lift at all) depending on where within the range (L, M) the initial score fell. The result of all this will be that some mitigation projects will get more lift credit than they provide, some will get the lift credit they deserve and other mitigation projects that actually do provide a great deal of lift would get little to no credit; all based on an arbitrary breakout of ranges for the L, M and H assignments.

It is the large numeric range for L, M and H that creates this discrepancy. If you were to break up the site potential initial numeric score into smaller units this methodology would better reflect the true functional lift of mitigation. This would require assignment summary scores with decimals vs. whole numbers (such as 0, 0.5, 1, 1.5 and 2). This would make the method somewhat more complex. But not much more complex and it would go a long way to ensure that each project is given the credit it deserves; no more and no less.

Response:
I understand your difficulties in applying the method. However, we face just the opposite problem. The law states that regulations have to use best available science (BAS). You can dumb science down only so much before it stops being science. I have done repeated tests of our methods to see how far the results deviate from what would be a "scientifically" accurate measure of functions and values. As it stands now the Rating System is only accurate in providing a relative rating of High, Medium or Low when it comes to specific wetlands functions. We get away from scientific validity if we go too far beyond simple ratings. This is a constraint set by the need for a rapid method. A difference of several points in the scoring sheet is not statistically significant from a scientific perspective because the indicators used are so general and simple. When we started developing the models, we often had more than 20 indicators per function. We had to reduce these to make the method "rapid." This reduction however also reduces the sensitivity of the models to "real" changes in functions.

The sensitivity of a method at capturing functional lift is directly correlated to monitoring and sampling effort. Over the last 15 years we have collected and analyzed enough data and used enough different methods to make this conclusion. I could have developed a method based on the function assessment method that would have allowed the lift in functions to be calculated using 5 or 7 categories (e.g. H, MH, M, ML, L). However, the people participating in the development of this method did not want a tool that was as complicated as the WFAM. There was a general consensus among our stakeholders that they wanted a method that did not require more detailed information than the Rating System. This however limits the tool to three categories (H, M, L) to maintain its scientific validity.

A statistical analysis of the data I have collected over the years indicate that the scoring of the indicators on the scoring sheets provide an estimate of functions that has a standard deviation of $\pm$ 21-28% (depending on the function and HGM class) relative to an independent estimate of function. When you add the user error to this ($\pm$ 4-5 %) it is not possible to conclude that a change of a few points reflects an actual change in the level of function.

Thus, the C/D method, which is based on the Rating System, is only scientifically valid for three qualitative categories of level of functioning. If we had used the function assessment method the method would be valid to about 5 categories. Moreover, the categories are still only qualitative. Putting numbers on these qualitative ratings is a policy decision to meet policy needs. The numbers do not represent actual quantitative levels of function. Providing scientifically valid quantitative numbers for levels of function would require much more intensive sampling (monthly for at least a year).

And yes, this causes problems when we only have three categories of ratings that are scored. A one point difference on the scoring sheet near the "boundary" can change the rating from an L to an M whereas a one point difference in the middle will not. This however, is a problem in any scoring system that reduces a higher range of scores into a lower range of scores. There is no way around it. We had that problem with the function assessment method, the IVA, and the Rating System (when setting buffers). There is less chance of Type 1 and Type 2 errors when we use the three categories and the breaks in the scoring rather than actually allowing a one point difference to represent a "lift" in functions.

Enhancement/rehabilitation vs. Creation/re-establishment:

One misconception that is prevalent among those who work in mitigation is that enhancement can provide a significant lift in the functions of a wetland. However, the research published in the last decade indicates that the usual enhancement measures do not really improve functions significantly. One function such as habitat may be enhanced, but the other two (improving water quality and hydrologic functions) often are not. The area-based ratios we have been using for enhancement and rehabilitation are probably insufficient to replace functions lost. Calculations during the development of the C/D Method indicated that one may need an area based ratio of 20:1 or more to adequately replace all three functions since one of the three functions will often be limiting and not get much "lift" from the enhancement.

In addition, research has shown that a lift in habitat functions is low unless it is also linked with improvements in landscape. We have found, and the scientific literature supports us, that habitat enhancement measures often do not achieve their goals because of other issues in the landscape. Habitat enhancement should not be attempted in urbanizing areas without extensive resources to maintain connectivity and protection of the buffers. Habitat enhancement efforts in these areas will probably not replace the functions lost in the long term. The C/D method attempts to capture this by rating the landscape potential as well as the site potential and is a more accurate reflection of the actual lift in functions possible at a site. This approach is based on new research that has come out in the last 10 years and is referenced in the manual.

For example, the water quality improvement functions might actually be reduced if you remove reed canary grass (RCG) because this species is one of the best at removing pollutants. Hydrologic functions can only be improved if you increase the storage capacity of the wetland or reduced water velocities. These aspects are often not part of the mitigation design so I would not expect much lift in an enhancement project.

Further discussion on this topic:

The ratings of H, M, L are not related in any quantitative way. We cannot say that a rating of M for an aspect of a function means the function is being performed at twice the rate of wetland with an L, or that an H is 3 times as high as an L. The scoring system we used was calibrated to putting a wetland into one of the three rating "buckets." We developed an independent, and qualitative, assessment of how well a wetland performs a function and then calibrated the scores of the indicators to get the best fit to that distribution of H, M, L for each function. For example, 89% of the wetlands that were independently rated as having a low site potential for water quality scored between 0-5 points. This was the best fit I could get. The calibration involved alternatively changing the scoring for each of the 3 indicators and the scaling within an indicator to get the best fit. For example, if I increased the scoring for D4.1 to a maximum of 5 points and decreased the maximum for D4.2 to 6 points only 81% of the wetlands that were independently rated as low came out as low in the scoring.

The scoring system used is based on ordinal numbers only. In mathematical terms these are only rank ordered, and do not represent any mathematical relationships of quantity. (The following is from Wikipedia, downloaded October, 2011 which cites: Stevens, S. S. (1946). "On the Theory of Scales of Measurement". Science 103 (2684): 677–680.) Rank-ordering data simply puts the data on an ordinal scale. Ordinal measurements describe order, but not relative size or degree of difference between the items measured. In this scale type, the numbers assigned to objects or events represent the rank order (1st, 2nd, 3rd, etc.) of the entities assessed. A scale may also use names with an order such as: "bad", "medium", and "good"; or "very satisfied", "satisfied", "neutral", "unsatisfied", "very unsatisfied." When using an ordinal scale, the central tendency of a group of items can be described by using the group's mode (or most common item) or its median (the middle-ranked item), but the mean (or average) cannot be defined.

We assign numbers to these ranks only for the purpose determining how much mitigation is needed. It attempts to quantify Best Professional Judgment to minimize the arguments between people with different interpretations of the data. For that reason I have assigned scores only on the last level of the method; that is assigning the scores based on the distribution of ratings for each function. This keeps us as close as possible to what the data are actually telling us about wetland functions.

Comment 151: I recommend that a different temporal loss factor be given for wetland areas that are temporarily affected vs. wetland areas that are permanently lost. Wetland

areas that temporarily affected should not have the same temporal loss values as for permanently lost wetland. It helps to define temporarily affected wetland: where vegetation is disturbed/destroyed, but soil is not moved and the topography remains the same as before the disturbance, and wetland hydrology is not affected. Under these conditions, a re-planted wetland will continue to provide *some* water quality and hydrology functions (water storage) since the hydric soils and hydrology are still in tact. It will be only those functions dependant on vegetation that will be temporally lost: adsorption/absorbtion, flood velocity reduction and most habitat functions. Assigning temporarily affected wetlands with the same temporal loss value as for permanently lost wetlands that need to be replaced is not represented of the actual loss of functions.

Temporal loss also depends on what type of mitigation is used to replace permanently lost wetland habitat. Where wetland enhancement is used, and assuming that only additional plants are used for enhancement, there will be no replacement of lost temporal loss for some water quality and hydrology functions (such as lost flood storage). On the other hand, functions dependant on certain vegetation characteristics can be established more quickly than in areas where mitigation is being accomplished through creation. Intact hydric soils and hydrology in enhancement areas will result in quicker hydric vegetation establishment. Using creation, it can take up to 4 years for hydric soils to form and several years for the new hydrologic regime to equilibrate; both of which affect how long it takes for new hydric vegetation to establish. In some areas, rehabilitatation and re-establishment may fall in between created wetlands and enhanced wetlands for temporal losses. While the temporal loss values in the draft methodology are fairly accurate for mitigation that requires creation or for mitigation that depends on re-introducing wetland hydrology to rehabilitated or re-established wetlands, these temporal values result in acre-credits for some mitigation types far in excess of what is necessary to replace functions. I understand that this becomes much more complex when you include mitigation type into the temporal loss values. However, over-simplifying this calculation will put this methodology in jeopardy as the acre-credit requirements for mitigation in some instances will not be defendable.

> **Response:** We have added as section on addressing temporary impacts based the interagency guidance (Ecology publication #06-06-011a). The final report now provides a way to calculate mitigation needs for temporary impacts.

Comment 152: I have a comment that I came up with during my use of the method. I have a project that will be impacting wetland that lays along the edges of a stream associated system that is a sloping/depressional system (not riverine since stream is less than 10% of the wetland area). The entire wetland system receives 7's and 8's using the credit debit method because it is a large contiguous area with multiple vegetation communities, etc associated with high functioning wetlands (it is a high Category II). The project site is already highly developed and the project involves construction of a road along the disturbed edges of the wetland system adjacent to the develoepd areas and will not extend into the main body of the wetland. The road will fill three separate areas of wetland that either but up to an existing fence or extend in a narrow, disturbed finger into the developed site and comprise only 15,000 square feet. When I used the method, I found that our

proposed mitigation is well under the acreage necessary to compensate for loss of functions. We have to stick with our proposed mitigation because of client wishes and so in my report, I talked about the fact that because the wetland fill will occur around the disturbed edges, the functions are somewhat diminished due to past activities and the impact won't affect the functioning of most of the wetland. Therefore, the mitigation area is sufficient to compensate for the loss of the lower functioning portions of the wetland.

My comments on the method would be to include some type of caveat or questions that address the position of the actual impact area particularly when the project is not proposing to impact large areas of contiguous wetland that could actually have impact to the wetland system and its functioning. I realize that we rate all portions of a system for functions but I think we also need to take into consideration those areas that may not be functioning as highly as the remainder of the system.

> **Response:** The fact we have to rate the entire unit rather than just the part of the wetland being mitigated is a result of people wanting a rapid method. Statistically and ecologically neither the Rating System nor the Washington function assessment methods are rigorous enough to adequately quantify, or even just rate, the functions of only a small area of a wetland. We did numerous tests on this question and both methods gave us scientifically invalid results on the levels of functions when compared to an independent assessment of those functions. As it is now, the C/D system is only accurate to a relative rating of High, Medium, or Low. We put numbers on the ratings as a policy decision, not a scientific one.
>
> To adequately assess functions of only a part of a wetland unit would require much more detailed data. No one is ready to pay the price of such information so we have not developed methods to meet that need. I am not saying that that the functions may not be as high; we just don't have any methods to assess it in a scientifically valid way. You are always free to develop more detailed information and prove your argument to the regulators. However, such arguments now have to be based on best available science rather than just professional judgment. A quick note: we have found no scientific research on the relationship between functions in a small area of the wetland rather than the entire wetland. So, BAS would require collecting data to prove your point. The hypothesis you would need to prove is: the hydrologic, water quality, and habitat functions of a small area of a larger wetland are significantly different than in the entire wetland.

Comment 153: The newest version of the credit generation method has removed a multiplier for restoring hydrology in advance of impacts. This inducement to limit the temporal loss was significant for a project we were working on and used the earlier draft credit generation worksheets on. I think the general philosophy of providing credit for generating wetland functions in advance of impacts should be left in the system.

> **Response:** We had to change the factors because we had to change the definition of advance mitigation in the Credit/Debit method to meet the definition we use in the multi-agency guidance on advance mitigation. The definition of advance mitigation in

the first draft was different and so we had different factors. We also had to change the risk factors for advance mitigation to reflect the different definition.

Comment 154: I did not find this addressed in the Guidance anywhere, and it's pretty non-standard: in calculating risk factor on a mitigation site, the advance mitigation risk factor is 1.0, yet it obviously accounts for SOME risk, since the site can be just 2 years old and still at risk of failure. My question is, what percentage of 1.0 is that risk? I have a site in the ground for nearly 14 years and would like to lower the risk factor to something reflecting that there really is no risk of failure (force majeure aside).

Response: We made a policy decision to say that an advance mitigation site that meets its two-year performance standards will not have the credits discounted to account for the risk of failure. A risk factor of 1.0 means the risk of failure is considered to be 0%. We cannot go any lower than that. So, you 14-year old site would also have a risk factor of 1.0 for the calculations. This decision was made to make the tool consistent with the interagency policies on advance mitigation.

The place where the age may make a difference is on the calculations of the debits. An advance mitigation site that is built prior to the impact still has a temporal loss factor of 1.25 to account for the fact that all functions will not have been fully restored after 2 years. You could argue that 14-year old site should have a temporal loss factor less than 1.25 because the functions have reached a much higher level than one that is only 2 years old.

Comment 154: In 2011 WSDOT gained firsthand experience with issues related to use of this method through a trial of the method on a portion of the SR 502 Corridor Widening project in Clark County. This trial used the Credit-Debit method to evaluate functional impacts to nine wetlands with direct impacts in the Gee Creek watershed, and the mitigation proposed to compensate for those impacts. This trial illustrated the costs of applying the method to a linear corridor project with multiple wetland impacts.

- The method took considerable review with agencies to come to agreement about the evaluations used to fill out the Debit and Credit Worksheets. This added time and effort to the development of an acceptable mitigation plan.

- The method adds additional documentation for the Debit and Credit worksheets, Summary Worksheets and required maps. The appendix to the mitigation plan that contained these forms was 147 pages for the SR 502 trial that addressed one of three watersheds.

In a different region, based on a trial application of the method, the Biologist determined what it would take to prepare the Credit-Debit method and discussion text for internal review. For a portion of the Tacoma HOV project that had several wetlands but was not complex they estimated it would take 1 week to prepare materials for the Credit-Debit method. They also noted that project support for GIS/CADD work might be needed adding

cost and time. As an example of a more complex corridor with more wetlands they estimated it would take three weeks for the SR 101 Shore to Kitchen project. This does not include the necessary internal review/revisions to produce a discussion draft document.

Although it builds on the familiar framework of the Rating System, it is not accurate to describe this as slightly more effort than the Rating System. We do not agree with the assertion on page 6 of this method taking 15 minutes to a couple hours to apply. This requires significantly more time and documentation which translates to added project cost. This is a significant source of concern for users, especially given current economic conditions.

Response: The question of the time required to apply the tool often comes up and it is a difficult one to resolve. On the one hand, users want a tool that takes as little time as possible and on the hand we need a tool that is scientifically based. If a tool is simplified too much it loses its scientific credibility and becomes just a judgment call. I have done repeated tests of our methods to see how far the results deviate from what would be a "scientifically" accurate and repeatable measure of functions and values. As it stands now the Rating Systems and Credit Debit Method are only scientifically accurate in providing a relative rating of High, Medium or Low when it comes to specific wetlands functions. Any simplifications would mean a scientifically valid result would be a simple YES the wetland provides the function or NO it does not.

The wetland Rating System has proved to be an acceptable tool for characterizing functions over the last 6 years, and most users consider the time required to use it to be reasonable. Only four of the questions used in the Credit Debit Method ask for information and data that are not also required for completing the Rating System. A correctly filled out rating form requires six maps for depressional wetlands, seven for riverine, six for Lake-Fringe and four for Slope wetlands. The Credit Debit Method only requires one additional map derived from an aerial photo to answer three of the four questions. This map does not have to be digitized or put into a CAD system. Downloading an aerial photo, drawing a 1 km circle around the wetland unit and estimating the area of different land uses using a gridded overlay takes less than 15 minutes for an experienced user. In my class exercise, I allocate one hour for mapping both impact and mitigation sites. Nine out of 10 students with no previous experience can complete this task within the allocated time. The other new question involves accessing the Ecology web site to determine if the wetland is linked to any 303d listed waters. This task usually takes less than 10 minutes.

Comment 155: This is a concern not only due to the initial investment for scoring wetlands. The fact is that projected wetland impacts change in size and type as project designs evolve, often as part of efforts to avoid and minimize wetland impacts. This method has potential to add significant effort at each step where re-calculation may be needed. This method is very cumbersome when making changes and does not appear to be nimble for efficient application to project development without significant effects to schedule and budgets.

Response: Generally, the scores for the impact site will not change because the unit analyzed remains the same. If only the footprint of the impact is changed during the

planning process then the only re-calculation needed is to change the area of impact in the tables. We will be releasing spreadsheets to facilitate the calculations after the final draft is released. All that will be needed then is to change the one number in the Debit Worksheet and the debit scores will be changed accordingly.

Comment 156: After gaining some experience with the method, it has to be said that we are not confident that this tool can reliably provide a more accurate assessment than the strategies detailed in the joint 2006 Mitigation Guidance (Ecology publication # 06-06-011a) .

Response: The Joint Mitigation Guidance estimates the mitigation needs based on area only. The Credit Debit Method is based on functions so it is difficult to compare the accuracy of the strategies. Many studies have found that mitigation requirements established using an area-based ratio are often not adequate to replace the functions lost on a one-to-one basis (see Bendor 2009 referenced in the method). That is the reason we developed the Credit Debit Method. Ratios based on area will probably remain an important tool for estimating mitigation needs for some time to come, but we know they do not accurately assess the gains or losses in functions. The Credit Debit Method, however, is not the only tool that could be developed. Other methods based on functions could be used once they are calibrated to the wetlands found in Washington.

Comment 157: The method requires full replacement of all functional impacts, yet it does not incorporate all project actions that provide functional benefits. WSDOT feels this could result in an inaccurate accounting with respect to impacts and benefits to wetlands and aquatic resources. To accurately represent the impacts and benefits at the project level in each of the functional areas, additional assessment information would be needed to characterize the lift provided by stormwater improvements (removal of pollutant discharge), and other actions that have a clear benefit but are not captured in this method.

Response: Correct, this tool is not meant to represent all the possible benefits at a project level. In addition to the example you give, proposals often suggest that impacts to freshwater wetlands be mitigated by restoring streams or restoring tidal wetlands. At present this is still a policy decision because it involves a trade-off between different types of aquatic resources and different functions. We currently do not have tools that can assess the functions gained by restoring areas other than freshwater wetlands. We also to do not have tools to develop a "balance sheet" for quantifying the trade-offs in functions between dis-similar ecosystems. Such trade-offs are value judgments that cannot be quantified using indicator-based methods.

Comment 158: Stormwater improvements are often part of project development. When previously untreated road surfaces adjacent to wetlands are proposed for stormwater retrofitting that effectively treats runoff, there is benefit to the adjacent wetlands that will receive fewer pollutant discharges. This is not considered in the Credit-Debit method.

Response: See response to Comment 157.

Comment 159: Wetlands are scored positively for providing stormwater functions through a fairly narrow set of conditions such as in 303dlisted waters or when drainpipes

discharge into the wetlands. Recognition is not provided for pollutants treated by wetlands that arrive by sheet flow, or healthy systems where wetlands provide water quality functions in non-degraded places.

Response: Wetlands are scored for improving the water quality of incoming waters. This aspect is addressed in the "landscape potential" part of the questions (questions D2, R2, L2 and S2). The 303d listings refer to the extra value to society provided by this improvement in water quality that the wetland provides.

Comment 160: Another example of an action that has obvious positive benefits but cannot be scored with this method is the removal of livestock grazing from a wetland. This was encountered in one of our tests. Removing pastured animals from wetlands and streams can have significant benefits to downstream water quality and is widely recognized as beneficial yet cannot be scored by this credit method. When a particular beneficial action does not fit into this method there should be another way to document it in the overall evaluation of mitigation adequacy.

Response: Removing cattle is a valid way to mitigate impacts. However, it must be considered as an "out-of-kind" mitigation where the actual wetland functions are not replaced. The water improvement that the "impacted" wetland provides is compensated by removing pollutants elsewhere in the basin. Removing cattle removes the source pollution. This requires decisions on a case-by-case basis. Is the removal of 10 cattle equal to the loss of the water improvement of one acre of wetland, or do you need 15, 20 acres, etc.? Since the Credit Debit Method does not quantify the actual levels of removal the decision becomes one of judgment. This is similar to a mitigation plan that replaces the hydrologic storage of a wetland by an engineered structure rather than restoration of an existing wetland.

Removing cattle does not necessarily improve the actual function within the wetland unless the removal results on other changes. One can expect that the wetland where cattle are removed will become re-colonized by wetland plants. Even if no plantings are proposed one could predict that the site will become a reed canary grass or shrub dominated wetland. This would probably increase the score for the water quality function that could also be counted as part of the mitigation balance sheet.

Comment 161: Another issue is sensitivity. We realize this is intended as a rapid assessment tool and that generally means tradeoffs to balance precision and practicality. The problem remains that the model is often not sensitive enough show what would normally be recognized as impacts to a wetland or conversely as impacts to a degraded wetland at a mitigation site. This undermines confidence in the model.

Response: As far as we know, there are no alternative methods that have been calibrated to wetlands in Washington's ecoregions and that are more sensitive. Professional judgment is not usually adequate to establish mitigation requirements because it is not reproducible among users and often results in disagreements. Furthermore, the results of the Credit Debit analysis can always be superseded by actual data on functions collected from smaller areas of the assessment unit at either the impact or mitigation site.

Comment 162: Mitigation Ratios: The methodology states: "Currently mitigation ratios are the most commonly used approaches to determine the adequacy of wetland compensatory mitigation. The Credit-Debit method provides regulatory agencies, developers and project proponents with another method to apply at the project level in helping determine if wetland mitigation is adequate."

It may be another method, but the Credit-Debit method seems to largely incorporate the ratio system but adds significant process and complexity of scoring credits and debit. The added modifiers are difficult to track and can lead to errors in calculations. The standard rationale is given for using the ratios of temporal loss, however two of the three basic functions (hydrologic and water quality) are primarily governed by the site's initial contours and their performance would largely be achieved at the beginning of the life of a mitigation site. This is not reflected in the credits/debit method since the ratios have a permanent effect on the mitigation requirement.

Response: Yes the Credit-Debit Method uses ratios. Ratios have been an accepted way to account for both the temporal loss of functions and the risk of failure in most approaches to calculating mitigation needs. The use of ratios, however, is independent of the "currency" used to calculate credits and debits. Up to now, the common currency has been area, but it is not the only currency used. For example, the "South Carolina" method developed by the Corps of Engineers and used by their regional offices in Charleston and New Orleans also uses ratios but has a currency based on functions, cumulative loss, and social values. The Credit-Debit Method uses ratios but has a currency based on level of functions and values.

Your comment that the hydrologic functions are often replaced sooner than the other functions, and therefore should have a lower temporal loss factor, has merit. Our technical review team made up of regulators, however, has decided that this issue should be negotiated on a case-by-case basis. There are too many variables to describe when a difference in the temporal loss factor could be applied. The temporal loss factor for the water quality function (improving water quality) should not be lowered because a recent review of the data indicates the time required to fully develop this function may be even longer than that for habitat (*Moreno-Mateos et al. (2012) Structural and functional loss in restored wetland ecosystems. PLoS Biology 10(1): e1001247)*.

Comment 163: Implementation: For these reasons we discuss here, WSDOT feels strongly that this tool should be available as an option, but not be required for evaluating the adequacy of a mitigation proposal. This method is one approach to assessing wetland functions. We have great respect for the time and effort involved in the development of this method. At the same time it seems only fair to recognize that it has strengths and weaknesses and its application should be at the discretion of those involved with a specific project analysis. WSDOT recommends that this method be clearly offered as one way, but not the only way an applicant can evaluate functional lift for proposed mitigation. Applicants should be able to use alternative methods to achieve the same purpose and other possible approaches should not be dismissed in the discussion of how to use the Credit Debit method.

We do not feel this is ready to be made a regulatory requirement. We appreciate the early coordination it the development of this methodology, but it is problematic when methodologies like this, which have yet to be subject to full public review, to blind scientific review process or to significant real world practical application are adopted into regulations and become a requirement. We understand that this is not the intent of Ecology, but the discussion on Page 3 seems to be confusing in this regard. The text box there specifically points to the idea of requiring this method under local regulations. The options for doing this are specially denoted by using bullets in a special text box right in the front of the document. We strongly recommend that this method be offered as an option, to be chosen based on its own utility and merits rather than suggesting it be made a requirement through local regulation.

Response: The box on page 3 has been edited to make it clear that this is one option and the tool is not a requirement. We also want to make it clear however, that as far as we know there are no other function-based methods available that have been calibrated for the wetlands in Washington State. The studies done during the development and testing of other indicator-based methods all conclude that results are not accurate unless they are calibrated in the wetlands within a region. This has been found in Oregon, Pennsylvania, New Jersey, and the Appalachian region.

Adamus, P., J. Morlan, and K. Verble. 2010. Manual for the Oregon Rapid Wetland Assessment Protocol (ORWAP). Version 2.0.2. Oregon Dept. of State Lands, Salem, OR.

Stander, EK; Ehrenfeld, JG (2009): Rapid assessment of urban wetlands: Functional assessment model development and evaluation. Wetlands 29(1, Mar), 261-276.

Jordan, TE; Andrews, MP; Szuch, RP; Whigham, DF; Weller, DE; Jacobs, AD (2007): Comparing functional assessments of wetlands to measurements of soil characteristics and nitrogen processing. Wetlands 27(3, Sep), 479-497.

Hatfield, CA; Mokos, JT; Hartman, JM (2004): Development of wetland quality and function assessment tools and demonstration. Rutgers University and NJ DEP.

Hatfield, CA; Mokos, JT; Hartman, JM (2004): Testing a wetlands mitigation rapid assessment tool at mitigation and reference wetlands within a New Jersey Watershed. Rutgers University and NJ Dept. Enviromental Protection.

Cole, CA; Brooks, RP; Shaffer, PW; Kentula, ME (2002): Comparison of hydrology of wetlands in Pennsylvania and Oregon (USA) as an indicator of transferability of hydrogeomorphic (HGM) functional models between regions. Environ. Manage. 30(2, Aug), 265-278.

Rheinhardt, RD; Brinson, MM; Farley, PM (1997): Applying wetland reference data to functional assessment, mitigation, and restoration. Wetlands 17, 195-215.

Stein, ED; Fetscher, AE; Clark, RP; Wiskind, A; Grenier, JL; Sutula, M; Collins, JN; Grosso, C (2009): Validation of a wetland rapid assessment method: Use of epa's level 1-2-3 framework for method testing and refinement. Wetlands 29(2, Jun), 648-665.

Cole, AC; Cirmo, CP; Wardrop, DH; Brooks, RP; Peterson-Smith, J (2008): Transferability of an HGM wetland classification scheme to a longitudinal gradient of the central Appalachian Mountains: initial hydrological results. Wetlands 28, 439-449.

Thus, any other indicator-based method that could be used in Washington would first have to be calibrated in local wetlands to provide accurate data. The wetland Rating Systems on which the Credit Debit method is based were calibrated in 120 wetlands in western Washington and 91 wetlands in eastern Washington.

Comment 164: We would also encourage Ecology to remain objective and avoid prematurely disqualifying other possible approaches for determining credits and debits and recognize the possibility of alternative scientifically valid approaches to assessing wetland credits and debits. Several places in the document seem to be rather critical of the idea of assessing functions for a portion of the wetland. The text box on Page 2 states: No rapid methods exist that can rate small sub-units of wetlands that may have a different structure than the rest of the unit, and that will meet the scientific rigor needed for "best available science." (Perhaps this universal statement should be preceded by "to the author's knowledge".)

Response: The statement has been qualified as suggested.

Comment 165: The Credit/ Debit method relies on the use of indicators of wetland functions for good practical reasons that we have discussed in the past. It does not seem logical however to contend that an indicator is a proper way to asses function for 100% of a wetland but that it would be completely inadequate or unscientific for considering any portion of the wetland. The methodology contains discussion on pages 23 and 24 further asserting that only direct measurement would be scientifically valid for assessing functions for anything other than the entire wetland. The discussion states "This would require monitoring and measuring the actual processes taking place in different parts of a wetland rather than characterizing the structural indicators present, and will certainly require monthly sampling for at least one year."

We recognize that there are challenges with looking at a portion of a larger system, but it seems like the point may be overstated in the methodology by claiming that the only valid way would be direct measurement for a prescribed duration. We are unaware of the scientific basis for this broad assertion and would very much like to better understand the data used and the many analyses referenced leading to this conclusion of the viability of this approach. Perhaps it would be better to simply say 'the authors are unable to determine a practical and valid way to assess the functions provided by a portion of a wetland.'

Response: This question is one that often comes up. Our conclusions are based on the data we collected when testing both the functions assessment methods and the Rating System. From a statistical and ecological perspective, neither the Rating System nor the Washington function assessment methods are rigorous enough to adequately quantify or even just rate the functions of only a small area of a wetland. We did test this for six different wetland sub-units. Both the function assessment method and the Rating System generated results we could not use. The average deviation of the models' estimate of level of function when we looked at only a part of a wetland unit was > $\pm$ 60% of the estimate used as the independent variable. This deviation was considered not acceptable compared to the estimate for the deviation of $\pm$ 21-28% when characterizing the entire unit using the Rating System and $\pm$ 9-14% when using the function assessment methods (the ranges represent the differences in deviation

among the functions). The Rating System has a higher deviation because it relies on fewer indicators and those indicators are grouped into fewer "buckets." This increases the variability of the model results, and is the price we pay for being more rapid.

To make the method more rapid most indicators are identified as only present or absent or present within certain "buckets" such as 10-30% cover, etc. For example, we use the presence of a snag to indicate a habitat structure that is important for perching by many bird species that use the entire wetland. We cannot therefore assume that a smaller area within the wetland without the snag provides a lower level of habitat than the part of the wetland with the snag.

Furthermore, many of the structural subunits are linked and increase the overall level of functions by being adjacent to each other. A reed canary grass meadow next to a forest within a wetland can provide a higher species richness overall than either sub-unit by itself. Raptors can use the forest for perching, cover, and nesting while the reed canary grass provides the major source of small mammals for food. Similar comparisons can be made between the different structural elements (open water, Cowardin classes, interspersion) used as indicators in the methods. If a wetland sub-unit contains only one of these structural elements its importance as habitat will not be adequately rated if the scoring is limited to that specific sub-unit.

Other studies using rapid, indicator-based, methods show similar variations between the indicators and actual levels of functioning. These studies include:

Cole, CA (2006): HGM and wetland functional assessment: Six degrees of separation from the data? Ecol. Indic. 6(3, Aug), 485-493.

Jordan, TE; Andrews, MP; Szuch, RP; Whigham,DF; Weller, DE; Jacobs, AD (2007): Comparing functional assessments of wetlands to measurements of soil characteristics and nitrogen processing. Wetlands 27(3, Sep), 479-497.

Stander, EK; Ehrenfeld, JG (2009): Rapid assessment of urban wetlands: Functional assessment model development and evaluation. Wetlands 29(1, Mar), 261-276.

To adequately assess functions of only a part of a wetland unit would require more detailed data that quantify the processes that drive the functions. We have been unable to find published data showing that methods using indicators are accurate when assessing the functions of only a small part of a wetland. In the absence of such published data we have had to use the results of our own studies. Based on our work, we conclude that assessing the functions of a wetland sub-unit will require actual measurements of the level of functions within that unit. (NOTE: Some indicator-based methods have been developed that characterize small portions of wetlands within a circle of a specified diameter. All of these methods, however, characterize condition and not functions. A number of studies around the country and my own here in Washington (Hruby 2001) have shown that condition cannot be used a surrogate for functions.)

The information available also shows that functions are dynamic and cannot be assessed in only one site visit. Given the variability in wetland conditions from year to

year we also conclude that it will take at least two years of data to adequately assess the differences in function between a wetland sub-unit and the entire wetland itself. These points will be clarified in the text.

Finally, I am not asserting that differences do not exist in the levels of functioning between different areas of a wetland. We just don't have any methods to assess them in a scientifically valid way. One is always free to develop more detailed information and prove your argument to the regulators. The hypothesis you would need to prove is that the hydrologic, water quality, and habitat functions of a small area of a larger wetland are significantly different than in the entire wetland. If indicators are to be used instead of actual measurements of functions, then the models would have to be calibrated in local wetlands.

Comment 166: The position is even more difficult to understand when later in the same document, pages of figures in section 4-24 are devoted to instructions how to assess subdivisions of wetland systems using breaks in hydrology or vegetation or even assessing opposite shorelines of a stream as completely different units. The rationale for this seems to be based largely on pragmatic grounds. We agree, and think this suggests that something other than years of direct function measurement might be possible for evaluating a portion of a wetland. It seems unnecessary, as part of the explanation of this methodology, to be dismissive toward other possible approaches.

Response: The rationale for separating units for the purpose of rating them was based on the need to provide some limits in large and extensive wetland systems. However, the criteria for separating units are based on ecological criteria rather than property boundaries or the footprint of the impact. We base our boundaries between units on two of the major drivers of wetland functions, the water regime and the presence/absence of plants. Furthermore, the criteria were calibrated to the different conditions found in the state. We have different criteria for eastern and for western Washington that have been field tested. I am not familiar with any other approaches that are ecologically based and have been field tested in Washington. The text has been re-written to clarify this point.

Comment 167: The sections that calculate the rating of value to society of water quality function provided at a site are all dependent on the site association with degraded waters. This overlooks the fact that wetlands that currently provide water quality function may be very important in improving water quality in aquatic systems even if the waters are not significantly degraded. The credit debit method does not account for this important function.

Response: The overall score for a function is additive, so a wetland that performs a function at a high level will have a higher score than one that does not, regardless of the value. The value aspect is only 1/3 of the overall score. Wetlands in areas where water quality is an issue however are considered to be more important than ones in areas where water quality is not an issue. Our laws and regulations require us to mitigate for both the functions and the values. Given two wetlands that have the same site and landscape potentials (same potential to improve water quality) the policy teams developing the method decided to require more mitigation for this function in

watersheds where water quality is an issue. The "value added" aspect is also discussed in Section 2.3 of the manual.

Comment 168: Likewise in the section that calculates a site's value to society for providing hydrologic function, the points are earned by documented downstream flooding, or being identified in local plan as important to conveyance or flooding. Similar to the water quality discussion above, this approach does not allow a way to account for this function in a system that is not already showing a problem. This is too narrow an approach for assigning points for value to society.

Response: See response to comment #166.

Comment 169: There needs to be a way to add to the assignment of points for value to society if they have site potential and landscape potential to provide water quality improvement function or hydrologic functions.

Response: Yes, this is the process used to calculate the score. The site potential is 1/3 of the score, the landscape potential is 1/3 of the score, and the value is 1/3 of the score. This has been clarified in the text.

Comment 170: There are several references to study findings such as the accuracy of non trained people using method or the section 4.6 discussion of accuracy of rating small wetlands where the actual source of the information is not provided. As a scientific document, this would be strengthened if the methods, and results were available.

Response: All, these data are available for review on request. We have extensive spreadsheets that include the statistical analyses on which the conclusions are based. Some of the data have been published in the articles listed below, but we do not have one document that discusses all aspects. To my knowledge, all the other studies that have been done on reproducibility of rapid assessment methods have used trained people. We are the only state that has collected data using untrained people.

Hruby, T. (2009). Developing rapid methods for analyzing upland riparian functions and values. Environmental Management 43:1219-1243.

Hruby, T. (2001). Testing the basic assumption of the hydrogeomorphic approach to assessing wetland functions. Environmental Management 27:749-761.

PART 4: Specific Comments and Responses on the Operational Draft released Feb. 2011

Comment 171: I have a question pertaining to Questions D2.1 and D5.1 in the Calculating Credits and Debits for Mitigation document. The questions seem to be referring to directed stormwater, would a wetland adjacent to a roadway get the point for both of these questions. Any guidance you can provide would be greatly appreciated.

Response: The answer would be yes if the runoff from the road goes directly into the wetland either as channelized flow or surface sheet flow. However, DOT sometimes collects this runoff and directs it somewhere else. In that case the wetland would not get the points.

Comment 172: Questions R1.2 and R4.2: the descriptor of ">90% cover at person height" is not clear and could use a more clear definition of what this means. For instance, does it mean looking straight down at one's feet? Or looking out at the landscape at approximately a 45% angle? Or looking at ground approximately X number of feet from where a person is standing? Each of these options gives a very different answer to these questions and I was unable to find a clear definition in this or other Ecology methodologies that used this descriptor.

Response: The descriptions of R1.2 and R4.2 have been expanded to describe more closely what is needed.

Comment 173: Regarding question R 6.2 on page 10 of the scoring form pertaining to value to society for hydrologic functions: the question is: Has the site been identified as important for flood storage or flood conveyance in a regional flood control plan? I have search high and low in the County's Regional Flood Control District website and found that the wetland I am rating is located in an area identified as flood plain, but nowhere does it specifically identify or specifically state that the area of the wetland as important for flood storage or flood conveyance. Does the map showing the wetland and surrounding area as floodplain satisfy the term "identified as" in the scoring form? Can I give a yes answer based on the County maps?

Response: Just being in the floodplain does not mean it has been identified in a flood control plan. The flood control district needs to have developed a flood control plan or flood hazard mitigation plan that identifies what areas need to preserved or enhanced to improve flood protection. E.g.
http://www.ci.snoqualmie.wa.us/CityProjects/HazardMitigation/tabid/476/Default.aspx
King County is in the process of developing such plans for many of its watersheds, but I don't know about other areas. Also Snohomish has one:
http://www1.co.snohomish.wa.us/Departments/Public_Works/Divisions/SWM/Work_Areas/River_Flooding/Planning/IndexSnoRiverFloodControlMgmtPlan.htm

Comment 174: We were using the lacustrine fringe scoring form and noticed on question L5.1 on the actual scoring form asks Is the lake used by power boats with more than10 hp?,

but in the guidance to help with scoring the question is listed as Is the lake used by power boats with more than 5 hp? Can you tell us which question is the correct one to use for scoring? Is it 10 hp or 5 hp? It will make a difference for the site we are rating.

Response: Thanks for catching this error. The scoring form has the correct number and the text has been corrected. It should be boats with more than 10 hp. The issue here is waves that can erode the shore. Small boats with motors smaller than 10hp usually don't have much of a wake.

Comment 175: The instructions for scoring the type of upland is not clear as to whether the scores listed in the 'Type of Upland Habitat' are cumulative or hierarchical. It appears to be cumulative since there are no instructions that explain otherwise. In talking to Tom, I discovered that it is to be hierarchical. This should be clearly explained in the methodology as it can potentially make a huge difference in the amount of acre-credits that are available if it is not clear that only one score can be used.

Response: The text has been changed to clarify the scoring for the preservation of upland habitat.

Comment 176: If uplands that meet the criteria under 'Types of Uplands' (that is, agency documentation of the area as valuable habitat), then Category III and IV wetlands should also get acre-credits if they meet this same criteria. We know that, in general, wetlands provide more functions than uplands, so it only makes sense to include Category III and IV wetlands in the scoring section with upland preservation. Otherwise, you are saying that Category III and IV wetlands that meet the uplands criteria are considered to have less value than the uplands.

Response: Good point. Our policy group has decided to allow preservation of Cat. 3 and 4 wetlands based on your comments. The credits received from such preservation however will not be very high.

Comment 177: In the scoring sheet for Preservation of Uplands (p. 7 in Appendix E), there are 4 potential scores shown for upland habitat. If the upland habitat meets all four upland habitat descriptions, would it then recieve the total of all four scores; that is, a score of 29?

Response: The upland habitat would only get the highest score it meets. You do not add them all up. Nine points is the highest function score for wetlands so we also made it the highest function score for the upland habitat. The text has been clarified.

Comment 178: I have a question about the Credit worksheet and Appendix E, relating to preservation of uplands. Can the enhancement and subsequent protection of wetland buffers be considered for upland preservation credit? I'm thinking about a mitigation site we are looking at where there would be some components of wetland creation and enhancement. The existing wetland buffer is mowed and we will be planting it with typical forested vegetation and then protecting it in perpetuity with a conservation covenant. What are your thoughts?

Response: It will depend on the regulator(s) who is reviewing the permit application. That said, usually Ecology requires buffers for mitigation sites without giving them any credit because they are critical for the functions of the wetland itself. Without the buffer the site would not function adequately to replace the functions lost (especially if

habitat is one of the functions being mitigated). If a buffer is degraded we usually require that a buffer be restored as part of the mitigation, and we do not give any "credit" for it. However, this decision needs to be made on a case by case basis. We sometimes give credit if the buffer is larger than the one we recommend in our guidance.

Comment 179: The section on calculating credits through preservation (page 7 of the worksheets) notes that hydrologic and water quality functions that uplands provide are not directly comparable to those provided by wetlands, and that there is no method for rating them. As a result credits for preserving habitat functions associated with preserved uplands can only be used to compensate for impacts to habitat functions. It would improve this method's ability to accurately incorporate all functional improvements if the hydrologic and water quality functions of uplands could be assessed and incorporated in the credit calculations.

Response: Yes, I agree. Unfortunately, we were unable to come up with an indicator-based approach. Such an effort would require convening a group of hydrogeologists and soil scientists to develop and calibrate the necessary models just like we did with the Rating Systems. A project proponent, however, can always monitor the actual rates of water movement and pollution removal of an upland site and propose a "currency" exchange based on these values.

Comment 180: In the section on calculating Risk Factors for the Credit-Debit worksheet, the definition of 'advance mitigation' needs clarification. As-built submittal does not always occur at the time a project is completed and plants installed. This should be tied to as-built submittal or other approved documentation that the project has been completed and plants have been installed for one full growing season (minimum May to October).

Response: The definition for advance mitigation used in the C/D Method is the same as the one being used in the draft joint policy document on advance mitigation from Ecology and the Corps of Engineers. This latter document is in the final stages of being approved so we did not want to propose a different definition.

Comment 181: The Credit-Debit worksheet has a section that calculates a Risk factor between 1.0 and 0.4 that is applied to the basic mitigation credit (BMC) to arrive Total Credits for the mitigation site by function. Criteria in charts 1-3 and Charts 4-11 of the Site Selection guidance are used in this Credit Debit method to evaluate risk. The Site Selection Guidance was reviewed and finalized prior to this CR/DB method. The Risk Factor is adjusted by determining if you have met the requirements of the charts 1-3, and for appropriateness of function charts 4-11. These charts provide general guidance that does not seem specific enough to capture all cases, and when required in this method they have the potential to result in 10-33% loss in mitigation value at a site. This can have a large effect on the value of a proposed mitigation as it is a multiplier to the basic credit score. Use of these charts in the site selection guidance should be recommended, not required. The explanation of how a site meets the sustainability criteria of the site selection guidance should be developed on a case-by-case basis with careful attention to detail and context of the project and proposal.

Response: The use of the guide for selecting mitigation sites listed in the table for Risk Factors is not required. If a project proponent does not wish to use it, the basic mitigation ratio for the risk of failure is 1.5:1. This is actually lower than the risk factor of 2:1 Ecology had in its mitigation guidance (see discussion in Section 3.3). Instead of assuming a 50% chance of failure, the current method assumes a 25% risk of failure. The risk of failure can be further reduced if a proponent follows the Site Selection Guide. The purpose of this multi-agency Guide was to help a user identify those sites where mitigation will have higher probability of success. We therefore feel confident that sites that meet the criteria in the guide will have a lower risk of failure than the basic rate of 25%. This is especially true for sites identified as prime restoration areas in watershed plans.

Comment 182: These Risk factors decrease the credits scores while the Temporal Factors increase the debit score. Taken together it is not clear that this does not result in an overestimate of mitigation needed to replace lost functions. One ratio applied at the end of the calculation to address these combined uncertainties may be a more transparent way to address these concerns.

Response: We disagree. The purpose of separating the ratios was to make the factors more obvious. The Ecology guidance on mitigation combines the temporal loss factor and the risk factor into one ratio. As a result we end up with complicated tables (Tables 1a, 1b in Ecology publication #06-06-011a) that do not give a project proponent any guidance on how those ratios might be improved by changing the mitigation plan. Furthermore, the guidance in the tables does not address ways in which the risk factors might be reduced nor address the increased temporal losses that result when a plan in not implemented concurrently with the impact.

The mathematical approach used in the Credit Debit Method was first developed by the Army Corps of Engineers in 2002 (the Charleston Method http://www.swl.usace.army.mil/regulatory/funassessmethod.html) and has been used by the Corps in other regions. We believe it makes sense to incorporate the temporal of functions as an impact that is independent of the risk of failure of the mitigation project.