Appendix 10-A
Example of a Characterization of the Risks to Wetlands

As part of revisions to its critical areas ordinance, King County has prepared an *Assessment of Proposed Ordinances* that describes the risks to resources from the county's proposed regulatory and non-regulatory actions. This appendix reproduces Section 2.9 from Chapter 2 of the King County report, which describes the risks to the wetland resource from actions such as specified buffers, allowed alterations, classification (rating), and mitigation requirements. It is offered here as an example of characterizing risks as discussed in Chapter 10 of this volume. The full report by King County is available on the web at http://www.metrokc.gov/ddes/cao/.

POLICY DISCUSSION:

King County has an obligation to protect wildlife species through Federal, State and local regulations. The King County Comprehensive Plan requires a comprehensive approach to protecting wildlife species while balancing other requirements.

2.9 WETLANDS

Wetland Classification

Standard –Wetland Classification:

> *Wetlands are categorized based on the Washington State Wetland Rating System for Western Washington (DOE #93-74, 1993).*

The standard wetland protection proposed for the CAO is in large part based on the Department of Ecology's classification and rating system for wetlands. Although DOE's classification system is more comprehensive than King County's current SAO system, this proposed DOE method is outdated and does not accurately reflect the current state of scientific understanding i.e., BAS of wetland ecology and conservation. Recognizing this weakness DOE is reviewing wetland BAS and concomitantly revising the rating system with expected completion by late 2004 (McMillan pers. com.). King County has tried to overcome weaknesses in the DOE method by augmenting the existing classification-only approach with additional regulations covering wetland complexes, and landscape approaches including clearing and impervious area restrictions.

There are many ways of classifying wetlands for ecological and regulatory purposes with no one method being, or remaining, the optimum method. As scientists learn more about wetland characteristics and functions, classification and ranking methods change accordingly to better protect wetland functions. Currently, the science of classification is moving from the more descriptive historical assessment methods towards newer process-oriented, functional methods. The proposed CAO does not reflect this more comprehensive and empirical approach of classifying wetlands and consequently there is a high certainty that King County's chosen classification system will not adequately protect certain wetland types (e.g., fragmented wetlands, bogs) or some wetland functions (e.g., wildlife habitat).

In general, the level of risk to wetland functions and values will decrease from existing levels because the proposed CAO standards are more restrictive than the current SAO standards. However, risks remain because additional buffer widths may not provide adequate protection depending on wetland, adjoining area and watershed topography, soils, ground water, surface hydrology and vegetation conditions. The proposed DOE's ranking and classification system is also based mainly on habitat functions, with little emphasis on other wetland functions, which are important to protect. Hence these other functions may not be protected by fixed buffers to the extent that habitat is protected.

It is difficult to assess the potential effect of implementing the proposed CAO Classification System and its associated buffers on wetland functions, as King County's current information regarding wetland distribution, abundance, and characterization is incomplete. This fact is especially true for smaller wetlands and for forested wetlands, which are difficult to find through remote sensing techniques. There is little information regarding the functions that wetlands provide. Reasonably reliable habitat classification data exists (Cowardin et al., 1979) for most large, open water wetlands and select other wetlands that were surveyed in the past. Specific data on wetland habitat condition and data on other wetland functions are unavailable because formalized functional analysis did not exist during King County's historical wetland surveys in the late 1980s. Since these surveys, adjoining area and watershed development suggest that wetlands may be much different than twenty years ago. As a result, much of King County's assessment of wetland functions is based on historical descriptions and extrapolations, augmented by more recent remote sensing interpretations. Site-specific data can be gleaned from some project (e.g., development, restoration) specific reports, however, the overall lack of critical data necessary to assess specific wetland functions results in uncertainty when assessing the adequacy of fixed buffers for protecting wetland functions, and other standards, in the proposed CAO.

In summary, the chosen wetland rating system poses risks to wetland protection because it does not identify, consider, or rank the multiple functions that wetlands may exhibit. Included are relatively few and are biased towards habitat characteristics. Therefore the associated fixed-buffer widths and mitigation measures that are based on classification and rating may fail to adequately protect those functions not identified. Without adequate information on the additional functions needing protection, the level of risk remains high.

Buffers

Standard – Minimum Buffer Widths:

> *Minimum buffer widths of 300, 200, 100, and 50 ft. shall protect Category I-IV wetlands, respectively, in rural areas or within the Urban Growth Area if not a subdivision, short subdivision, urban planned development or binding site plan, with the exception of permitted alterations.*
>
> *Minimum buffer widths of 100, 50, 50, and 25 ft. shall protect Category I-IV wetlands, respectively, within the Urban Growth Area provided a functional assessment of the wetland and buffers is provided and approved. Restoration and enhancement will be required to restore the wetlands and its buffer to a fully functioning condition.*

Assessment:

This standard for minimum buffer widths in rural areas is within the range of recommendations in the BAS literature, while the standard in urban areas are lower and depart from the larger buffers suggested by BAS. However, BAS also indicates that wetland protection by fixed buffer widths alone may be insufficient. Specifically, fixed buffers are essential but inadequate to protect wetland functions because the buffers may not encompass the processes that drive respective wetland functions. Moreover, fixed buffers also allow development and other disturbances to completely encircle wetlands, thereby isolating such wetlands and segregating them from other

wetlands, aquatic habitats, and from essential upland habitats. Eventually such isolation leads to a shift in their wildlife and possibly the alteration of hydrology and other wetland functions.

Under ideal geologic, soil, and vegetation conditions, BAS suggests the recommended fixed buffers may be sufficiently wide to protect water quality of Category I and II wetlands in rural areas or Category I wetlands that have been enhanced per the report requirements in the urban areas. Buffers adjoining Category III, and IV wetlands in rural areas and Category II, III and IV in urban areas are at the narrow width limit for protecting wetlands from anthropogenic water quality impacts. Moreover, proposed buffers widths are insufficient to protect unique wetland vegetation and fragile wildlife that are sensitive to microclimatological changes associated with clearing or altering adjoining land. Proposed buffers may also not protect certain features of wetland hydrology and groundwater interactions, as these functions (given all conditions being equal) are proportional to buffer widths.

Level of Risk to Function and Values

In general, most wetland functions may be at some risk by only protecting wetlands in rural areas with standard, fixed 50 to 300 ft. wide buffers. Wetlands in urban areas will be at high risk for most or all wetland functions even with the enhanced buffer approach with the possible exception of water quality enhancement under unique conditions. Water quality enhancement functions on level terrain and for a well-vegetated, grass, shrub, and tree buffers, would exhibit the least level of risk. For wetlands greater than 500 feet from each other (i.e., non-complex wetlands), the greatest risk would be to maintain the full suite of wildlife functions as fixed buffers may not provide sufficient habitat for wetland species if development encircles wetlands. This level of risk in the rural area would be more difficult to judge because narrower buffers than in the urban area provide less remaining habitat and greater edge effect, although enhancement of the buffer itself could provide habitat features of benefit to some wildlife. Clearly, it would depend on the condition of the adjoining area, as a high quality, narrow rural buffer would not benefit from enhancement and would only be detrimentally impacted by narrower widths.

The risk of declines and local extinctions of native species increases as wetlands get physically isolated from each other by roads, development, and other potential barriers to migration. These risks would be greatest for amphibian and mammal populations as development, agriculture, forest practices, roads and other actions encircle entire wetlands, thereby isolating them from life-support habitat found at other wetlands and in upland watershed locations. The risk of declines would accelerate as populations become increasingly smaller from deterministic (e.g., pollution), and random (e.g., drought, freezing), and inbreeding. The risk to amphibians, birds, small mammals may also increase with urbanization beyond fixed buffers as bullfrogs, rats, cats, and dog populations increase and roam through buffers to prey on, or "play" with vulnerable wetland wildlife. The risk is highest in the urban areas where buffer widths are inadequate to provide protection from non-native wildlife.

BAS also suggests that the proposed maximum 300-ft buffer for rural areas is inadequate in most situations to protect microclimate (wind, humidity, temperature, soil moisture, etc.) within these and narrower buffers. Microclimate can not be protected in the urban area, even with the maximum 100-foot buffers for wetlands. Hence the existing soil conditions (e.g., organics, bacteria, mycorrhizal associates and fungi of decomposition) and vegetation associations in the buffer (mosses, herbs) most likely will change in proportion to buffer width. Often these climatological and soil changes enable non-indigenous species to outcompete and replace the

original biota. The risk to wetland groundwater and hydrological functions will vary widely depending on geology, soils, vegetation, topography and watershed size and condition. Therefore, the risk to wetland functions by the proposed buffers is conjectural, although with all things being equal, the least risk occurs to either of these two functions, microclimate and hydrology, when the buffers are largest and the greatest risk occurs in the urban areas.

Level of Uncertainty

Specific information relative to urbanization impacts to wetlands in King County does not exist regarding the optimum widths of buffers adjacent to wetlands and their respective effectiveness in protecting wetland functions. The best information covers buffer widths required to protect water quality enhancement functions of streams but even this data is mostly extrapolated from agricultural and silvicultural studies. Some data exists on the widths of various stream buffers and their wildlife following clearcutting of adjacent forests however these studies are relatively recent and therefore have not yet monitored wildlife for sufficient lengths of time. Moreover, clearcutting and subsequent reforestation impacts are significantly different than the permanent primary and secondary impacts of urbanization. Consequently, there is a high degree of uncertainty regarding the ability of 50-300-ft. buffer widths in rural areas to protect wetland hydrology, groundwater interchange, and fish, wildlife and habitat functions of specific wetlands from adjoining area and watershed urbanization. In contrast for wetlands in general within an urbanizing area, BAS suggests that wetland functions will definitely decline with only fixed buffers of 25 to 100 ft.

Standard – Buffer Averaging:

> *Minimum buffer widths may be modified on a case-by-case basis. There would be no net loss of buffer area and the buffer width is not reduced to less than 75 percent of the standard buffer width.*

Assessment:

Buffer averaging is consistent with BAS if implemented to increase widths and wetland functions at specific sites and concurrently not harm functions from reduced widths elsewhere. For this select situation, there would be equal total buffer area and a net increase in select functions, a goal supported by BAS.

Level of Risk to Function and Values

Buffer averaging provides the opportunity to decrease the level of risk to wetland functions if buffer widths are reduced where they are not necessary and increased where they would be beneficial. However, buffer averaging could pose an increased risk to functions if averaging increased buffers for one function at the expense of another. For example, at a wetland with low flood control function and high wildlife function, buffer averaging to increase the flood control function could pose a risk to wildlife function.

Level of Uncertainty

The implementation of ecologically supported buffer averaging may prove difficult without standardized empirically and scientifically accepted methods of consistently identifying and determining functions. In general, wetland ecologists do not have the tools to trade off buffer widths with a high degree of certainty unless adequate information has been obtained. Any certainty that does exist depends on function to be gained by increasing buffers. Consequently, the certainty of improved water quality enhancement function by wider grass, shrub, and tree buffer is greater than the certainty of improving groundwater recharge or wildlife functions. Clearly, it would take considerable studies of groundwater recharge capacities, including the presence and flow of aquifers, to reduce the uncertainty in providing groundwater interchange functions within an enlarged buffer. Finally, the increase in wetland buffers allowed by buffer averaging might only marginally benefit functions. For example, wildlife may additionally be protected from adjoining noises and other disturbances by wider buffer widths at certain locations but most likely will not benefit appreciably by the relatively small increases in habitat from buffer averaging.

Standard – Grazed and Tilled Wet Meadows:

Existing grazing and tilling activities may continue in wet meadows.

Assessment:

Wet meadows exhibit the ability to provide significant groundwater recharge, flood control, water quality enhancement, and wildlife functions depending on their vegetation, morphometry, soil porosity and subsurface geology. BAS suggests that grazing in wet meadows is compatible with BAS if best management practices (BMPs) are used (see Chapter 3, Section 3.2 Farm Planning). For example, if meadows are used for nesting or foraging by waterfowl and waterbirds, grazing may only be permitted at times when wildlife is not present or at locations where livestock will not harm wildlife.

Level of Risk to Function and Values

The timing and density of grazing can significantly increase the risk to wet meadow functions, particularly to water quality and wildlife functions The timing of grazing is controlled by the proposed BMPs therefore the risk from livestock may be low if animal units, timing and other aspects of meadow use are appropriate for the site. High livestock numbers however, can result in high nutrient concentrations within meadows and in runoff, potentially causing large algal blooms, anoxic conditions (of detriment to macrophytes, invertebrates, waterfowl and other taxa) and other eutrophic situation in nearby wetlands and other aquatic areas. Overgrazing may also lead to increase soil compaction, soil erosion and other disturbances leading to higher water quality and associated ecological risks from sediment runoff.

Level of Uncertainty

Compliance with BMPs would provide important certainty to protecting wet meadows from overgrazing and other detrimental agricultural effects. Storage sheds barns and additional

residences however may continue to be built on wet meadows reducing or eliminating the functions the replaced wet meadows may have been serving.

Mitigation

Standard – Mitigation Ratios:

> *Under special situations mitigation ratios shall be used to mitigate adverse impacts and will vary based on wetland location and category.*

Assessment:

The proposed CAO provides restoration and replacement ratios for wetland impacts and losses that are based on "best professional judgement", as there are no scientific studies that identify empirically determined mitigation ratios. The NRC (2001) references studies that imply a '1.5 to 1' ratio of 'mitigation to lost acreage' would be needed to equal the area lost (if all other permit conditions are met including functional equivalency). However, these ratios are often additionally adjusted to reflect temporal loss of wetland functions, functional values of the impact site, and other factors. Specifically, replacement ratios increase proportionately with the length of time it takes to reach equivalent function. Higher ratios are also suggested for replacing pristine wetlands with higher functional values than that for mitigating severely degraded wetlands, which essentially reflects scientific uncertainties in replicating certain kinds of wetlands. King County's proposed mitigation ratios are within the ratio range of BAS by requiring equivalent or greater function for impacts. However, King County ratios may be lower than what is implied by BAS when recognizing and considering the temporal lag in replacement of wetland functions. It is also lower than BAS in situations were equivalent or greater function is not possible, as for example, when replacing a mature forested wetland with a new shrub-scrub wetland.

The proposed CAO standard also differs from BAS in that it is based on wetland category, with the assumption that wetland category is a surrogate for function which may not necessarily be the case. BAS further notes that preferences for on-site and in-kind mitigation should not be automatic, but rather based on an analytical assessment method of the wetland needs in the watershed, and the potential for the compensatory wetland to persist over time (NRC 2001). Although King County has considered similar functional criteria in their mitigation process no formalized assessment tool is currently proposed.

Level of Risk to Function and Values

Mitigating for lost wetland acreage is difficult and highly risky. Functional replacement is even more difficult and requires extensive training, information gathering and monitoring. BAS indicates that mitigated wetlands have not yet succeeded in replacing lost acreage or functions with any predictability. Consequently the risk to replacement of wetland acreage and their functions and values remains high. Mitigation has not met the "no-net loss of area, function and values" goal in King County's Comprehensive Plan and if past performance is an indicator of future success the risks remain high. Wetland enhancement and restoration, regardless of proposed ratio, as mitigation for wetland losses always results in a decline of wetland acreage.

The risks of replacing lost functions and values depend at least on two factors: (1) the availability of restoration sites; and (2) the complexity of functions and values required to be replaced. If restoration sites are unavailable within the same basin as the impacted wetland then the risk is high that some of the irreplaceable functions that the wetland provided (e.g., groundwater interactions, habitat for wildlife, vegetation, recreation etc.) will be lost to that basin. It also remains uncertain whether flood control, water quality enhancement and other wetland functions that are lost by permitted activities can adequately be replaced through engineered projects. Regardless, a loss of functions remains between the time the permitted wetland is altered and the mitigated wetland provides the full capacity of the suite of functions of the original wetland.

Level of Uncertainty

The level of uncertainty in wetland mitigation in general does not lie in the ratios. Rather, to a large degree, success lies in the extent of project planning, construction, monitoring, and overall oversight. Consequently, with proper funding and other resources the uncertainty of success can be decreased and minimized regardless of ratios.

Standard – Mitigation Banking:

> *The department may approve mitigation in advance of unavoidable adverse impacts to wetlands caused by the development activities through an approved wetland mitigation bank.*

Assessment:

Wetland mitigation banking is a valuable compensatory mitigation tool to stem the loss of wetland functions and values. Mitigation Banking has been implemented in other regions in the U.S. and in Washington is being used by the Department of Transportation (WSDOT). King County has one mitigation bank. As recommended in the BAS literature, banks are established and fully functional prior to permitted losses at existing sites. In practice however, credits are released incrementally as hydrological performance and other developmental and functional stages are attained. When done carefully and according to specified standards such as those developed in the King County Mitigation Banking Rules, mitigation banking may successfully implement siting as recommended by BAS literature. The replacement of small, marginal wetlands of low, single function such as small totally isolated wetlands and those adjacent to roads and highways with larger wetlands of higher and potentially multiple functions is consistent with BAS. Nevertheless, concerns regarding replacement ratios (see previous section), in-kind versus out-of-kind replacement and bank sighting when projects are permitted that harm or destroy higher quality wetlands remain. Although BAS suggests that a wide diversity of banks, bank sizes and bank functions should be created, the economy of scale benefits may not be realized unless banks are of certain minimum size and in certain economically-determined locations. The proposed CAO provides the flexibility to mitigate with a diversity of bank sizes and functions and hence there is no departure from BAS. In practice however, market forces result in larger, easily constructed wetland types. Finally, mitigation banks are relatively new and have not been monitored long enough to ecologically assess their success or failures. Although wetland losses are mitigated by mitigation banking, empirically determined success of specific targeted goals for hydrology, water quality, vegetation, and wildlife functions are limited to only a few sites and not commonly undertaken.

Level of Risk to Function and Values

Decreases in total wetland acreage always occur when wetland enhancement and restoration mitigate wetland acreage loss. Otherwise mitigation banking poses a low level of risk as full functions are required to be demonstrated at the bank site prior to loss of any wetland functions at the permitted site. Currently however, restoration is not ideal, and credits are released prior to full wetland mitigation resulting in loss of wetland acreage and functions. Moreover, wetlands may not be replaced within the watershed in which they are situated; thereby posing risks to the remaining watersheds for unreplaced transferred functions. Risks of lost functions may accrue in areas of high mitigation pressure such as in urban areas as mitigation for lost functions moves elsewhere.

Level of Uncertainty

Generally there is less compliance uncertainty with mitigation banks than other wetland restoration programs because of their larger size and diverse institutional oversight. Larger sites also provide a greater economy of scale than smaller projects and potentially enables a more carefully thought out process considering all aspects of project design, construction and monitoring presumably leading to greater certainty in success. Uncertainty increases with respect to bank complexity and habitat types with permanent, smaller seasonal and semi-permanently flooded banks being difficult to create. Scientific uncertainty remains high regarding the best method for achieving overall functional benefits.

Allowed Alteration

Standards – Development Standards and Alterations:

> *Alterations identified in the proposed CAO (K.C.C. 21A.24.) are allowed within a wetland or wetland buffer if the alteration complies with all applicable requirements, standards, and mitigation requirements established in the proposed CAO.*

Assessment:

The County allows numerous actions that allow activities within a wetland or wetland buffer. For some situations, these allowed alterations might be inconsistent with recommendations suggested by BAS. These include some rural activities and the building of roads, utilities, and other necessary infrastructure. Data to the extent to which these activities influence wetland functions and are adequately mitigated is unavailable. Tree removal in buffers, for whatever reason, influences water budgets through transpiration and nutrient storage as mentioned in the literature review. The removal of trees and other vegetation influences microclimate, which in turn influences remaining plants and wildlife. Incrementally, and collectively these exemptions continue to erode the wetland base in King County and therefore reduce the multiple functions they may provide.

Reasonable Use Exemptions also may enable encroachment on wetlands and their functions if no other on-site development possibilities are available. Consequently, the non-mitigated exemptions and allowed alterations are not consistent with BAS for wetland protection if they

lead to incremental, cumulative losses in wetland area, functions and values. Conditions on allowed alterations may lessen these impacts but do not mitigate for their losses.

Level of Risk to Functions and Values

Individually departures under exemptions and allowed alterations are small and may seem not to pose any risk. Collectively however, they contribute to the cumulative loss of wetland functions and values because for the most part, these losses are permitted without mitigation. Consequently the immediate risk to wetlands may be small and localized although cumulatively over many years the risks increase and spread over larger areas. For many allowed alterations such as the construction of large roads and powerline corridors the impacts to wetland functions and values may not be mitigatable. For example, the groundwater interchange and wildlife functions of roads cannot readily be mitigated on site or replaced elsewhere. Roads and utility corridors may result in permanent habitat loss, reduced habitat quality and permanently fragment wildlife habitat resulting in smaller isolated populations and therefore increased risks of extinction. Roads additionally kill wildlife through animal vehicle collisions or harm animals through altered wildlife behavior. Roads and utility corridors also indirectly pose high risk to wetlands because of their large direct and indirect watershed and landscape effects.

In summary, BAS indicates that permitted activity whether residential, non-residential, silvicultural, agricultural or infrastructure related may have negative impacts on wetlands and their functions. In King County, some of these impacts do not have to be mitigated, and for the ones that do have to be mitigated, information indicates that the existing mitigation strategy is not working. Without specific assessments of departures, we should assume that larger projects and cumulatively smaller projects might continue to lead to wetland aerial and functional loss.

Level of Uncertainty:

Data on the number of exemptions and allowed alterations and their influence on wetland acreages and functions and values are unavailable. Hence the prevalence of risk to wetland functions and values remain undetermined. Conditions on allowed alterations may lessen these impacts but impacts nevertheless occur. There is little uncertainty in the ongoing and cumulative loss of wetland functions and values from unmitigated permitted activities.

POLICY DISCUSSION:

Buffers are one tool that King County is proposing in conjunction with clearing restrictions, rural stewardship, and other regulatory and incentive based provisions. The adopted King County Comprehensive Plan provides guidance as to the management strategy for protection of wetland functions:

> E- 132 King County's overall goal for the protection of wetlands is no net loss of wetland functions within each drainage basin. Acquisition, enhancement, regulations, and incentive programs shall be used independently or in combination with one another to protect and enhance wetland functions.
>
> E- 133 Development adjacent to wetlands shall be sited such that wetland functions are protected, an adequate buffer around the wetlands is provided, and significant adverse impacts to wetlands are prevented

The proposed ordinance requires that within the Urban Growth Area the applicant complete a critical area report showing that the wetland and its adjoining buffer are fully functioning, or have a restoration/ enhancement plan that will be implemented to achieve a fully functioning wetland and buffer.

Balancing of King County's other responsibilities under the Growth Management Act further influence the widths of buffers proposed, particularly within the Urban Growth Area. These responsibilities, outlined in the King County Comprehensive Plan are:

- ***Preserve the high quality of life*** by balancing infrastructure needs with social, cultural, educational, recreational, civic, health and safety needs.

- ***Spend money wisely and deliver services efficiently*** by:

- Concentrating infrastructure investments and service delivery to support the regional development pattern near cities where a full range of local services are located or can be made available;

- Solving service deficiencies within the County to meet existing service needs and phasing service improvements for the needs of future growth;

- Looking to King County to provide countywide facilities and services, and;

- Relying primarily upon cities and special purpose districts as the providers of local facilities and services appropriate to serve those local needs, except where the County is the local service provider (e.g., Rural Area).

- ***Continue our economic prosperity*** by promoting a strong and diverse economy for King County residents through policies and programs that encourage new business opportunities, increase family wage jobs and create a predictable regulatory environment for businesses and citizens.

- ***Increase the housing choices for all residents*** by permitting a wide variety of home styles and by increasing housing opportunities for all residents in locations closer to jobs.

- ***Ensure that necessary transportation facilities and services are available to serve development at the time of occupancy and use*** by targeting road and transit investments where growth is desired and for equitable contributions to the transportation system by new development.

- ***Balance urban uses and environmental protection*** through careful site planning that maximizes developable land while respecting natural systems.

- ***Preserve rural, resource and ecologically fragile areas for future generations*** by maintaining low residential densities in the rural areas and in areas containing regionally and nationally important ecosystems for fish and wildlife and by recognizing that resource lands, such as farms and forests, provide economic, social and environmental benefits.

With regard to grazed wet meadows and other agricultural practices, the proposed ordinance exempts existing agricultural activities. To apply standards retroactively would not only be detrimental to existing agricultural enterprises but also inconsistent with how other existing activities are regulated by this ordinance. In addition, King County Comprehensive Plan policies support ongoing agricultural activities as part of a diverse landscape.

> R- 503 King County shall promote and support forestry, agriculture, mining and other resource-based industries as a part of a diverse, regional and sustainable economy.
>
> R- 504 Well-managed forestry and agriculture practices are encouraged because of their multiple benefits, including natural resource protection.