THE ANCHORAGE DEBIT-CREDIT METHOD

A PROCEDURE FOR DETERMINING DEVELOPMENT DEBITS AND COMPENSATORY MITIGATION CREDITS FOR AQUATIC AREAS IN ANCHORAGE, ALASKA

Developed by Representatives of the
U.S. Army Corps of Engineers,
U.S. Environmental Protection Agency,
U.S. Fish and Wildlife Service, and
Municipality of Anchorage

12/12/2000; Revised and Updated 04/28/2011

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General Notes

1. This document supersedes the 2000 ADCM. It has been refined and adapted through application to specific development, restoration, enhancement, creation/ establishment, and preservation projects. As the procedures are applied to future projects, the need will arise for further refinements. We intend to conduct an annual year-end review to assess this need and to incorporate appropriate revisions. For updates on or suggestions for revisions, contact the U.S. Army Corps of Engineers (Corps) Anchorage Field Office (753-2712), U.S. Environmental Protection Agency (EPA) Alaska Operations Office (271-5083), or the Municipality of Anchorage (Municipality) Community Planning Department (343-7922).

2. From this point forward, terms appearing in italicized text are included in the Annotated Glossary (Appendix A).

Preparers and Contributors

The Anchorage Debit-Credit Method (ADCM) was originally developed by Heather Dean (EPA), Marcia Heer (U.S. Fish and Wildlife Service (FWS)), Mary Lee Plumb-Mentjes (Corps), and Thede Tobish (Municipality), with substantial assistance from Dave Casey and Kevin Morgan (Corps). Representatives of the Alaska Departments of Environmental Conservation, Fish and Game, and Transportation and Public Facilities (ADOT&PF), the Alaska Division of Governmental Coordination, Alaska Railroad, Anchorage International Airport, Anchorage Waterways Council, HDR Alaska, Inc., Land Design North, National Marine Fisheries Service, and National Wildlife Federation also assisted with the original ADCM.

This update represents substantial effort by Ms. Dean, Dr. Plumb-Mentjes, and Mr. Tobish, along with other current or former representatives of the Municipality (Karen Keesecker) and the Corps (Harry Baij, Roberta Budnik, Estrella Campellone, Nicole Hayes, Faith Martineau, Shane McCoy, Maureen McCrea, Chelan Schreifels, Leslie Tose, Joe White, and Ryan Winn). It reflects input and assistance from current or former representatives of the ADOT&PF, Corps (Terry Carpenter, Christy Everett, Angela Hunt), Dowl HKM (Joe Christopher, Kristen Hansen, and Pat Whitesell), EPA (Tracy DeGering and Matthew LaCroix), FWS (Bill Rice, Jerry Tande), Great Land Trust, HDR Alaska, Inc. (Dan Billman, Anne Leggett, Paul MacLarnon, Leslie Robbins), Shannon and Wilson, Inc. (Tim Terry), URS Corporation (Brian Kovol), and others. Suzanne G. Fox of Red Bird Publishing provided invaluable editing services.

To cite this document:
Anchorage Debit-Credit Method, Heather Dean, April 2011.

SECTION I. INTRODUCTION

The Anchorage Debit-Credit Method (ADCM) is a tool for providing a consistent approach to determining the appropriate amount of compensatory mitigation for unavoidable adverse impacts from development and other construction projects in aquatic areas. It provides a mathematical means of expressing adverse impacts as *debits* and beneficial impacts as *credits*. The procedures take into account several factors, including

- the pre- and post-project Relative Ecological Values (*REV(s))* of the site and surrounding area;
- the nature and extent disturbance already affecting the site and surrounding area;
- the extent, nature, and permanence of anticipated direct and indirect adverse impacts;
- the type and extent of improvements in function expected to result from *restoration*, *enhancement*, and *creation/establishment* projects; and
- the extent of the threat of future development or other adverse impacts at proposed *preservation* sites.

The ADCM began in 1996, as part of the U.S. Army Corps of Engineers' (Corps) evaluation of a large-scale development proposal in an even larger Anchorage wetland complex. Both the proposed development and compensatory mitigation sites included areas ranging in function and value from high to low. Due to this heterogeneity, the Corps and other agencies involved (the U.S. Environmental Protection Agency (EPA), U.S. Fish and Wildlife Service (USFWS), and Municipality of Anchorage) concluded that project size and *Anchorage Wetlands Management Plan (AWMP)* designations were not sufficient factors for determining the appropriate extent of compensatory mitigation. That conclusion led to the ADCM's initial steps of delineating *projects sites* in terms of *REV*, and considering development in higher value (i.e., "higher *REV*") areas to cause greater adverse impacts, and thus, to require more compensatory mitigation than development in lower-value portions of the same site.

As the agencies, project proponents, and their representatives have worked together to apply and adapt the methodology to varying sites and projects, we arrived at the suite of considerations in the bulleted list above. Section II (Procedures) and Appendix A (Glossary) address the various factors in greater detail.

Significantly, the ADCM applies <u>only</u> to the determination of the <u>extent</u> of compensatory mitigation necessary to offset the adverse impacts of a project and/or the extent of adverse impacts that a *restoration*, *enhancement*, *establishment*, or *preservation* project could offset. The methodology does not supplant, and in fact, plays no role in, determining whether a project is contrary to the public interest, whether it incorporates all appropriate and practicable measures to avoid and mi-

nimize adverse impacts, or whether proposed compensatory mitigation measures represent an appropriate and practicable offset of the project's unavoidable adverse impacts. In other words, calculation of project *debits* and *credits* is not, in and of itself, sufficient to obtain project approval from the lead federal regulatory agency, even if the number of *credits* equals or exceeds the calculated *debits*. As such, it is inadvisable for project proponents to proceed with any but preliminary calculations or to make binding decisions based upon calculations until the federal evaluation process has progressed far enough to indicate that the proposed work is likely to receive approval.

Use of the ADCM is recommended, but not required. The ADCM provides a scientifically supported technique to inform decisions on compensatory mitigation in a consistent, robust, repeatable, and defensible manner. It also provides a common technical framework for discussion of complex issues related to adverse impacts and compensatory mitigation. The existence of these procedures, however, does not preclude the use of other tools for determining compensatory mitigation needs, and project proponents are welcome to propose alternative means for quantitative comparison.

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SECTION II. PROCEDURES

Part A. Mapping the Project Area

CAUTION: Before proceeding, determine whether the project's direct impacts are *de minimis*, as defined in the Glossary. If so, the ADCM does not apply.

STEP 1 Assemble the necessary materials and information, as applicable:

a) aerial photo or plan view that depicts the *project site* and surrounding areas within 300 feet;

b) a plan view of the *wetland* delineation, *waterway* mapping, and/or boundaries of *subtidal zone*, *intertidal zone*, and/or *waterbodies* within the project area;

c) plan and, if appropriate, cross-section views that depict the footprint and dimensions of all areas of proposed *permanent impacts*, *temporary impacts*, *restoration*, *enhancement*, *establishment*, and/or *preservation*; and

d) dimensions (i.e., length and *channel* or *wetted perimeter*) of any *waterway polygons* that the proposed project will affect.

STEP 2 On the base photo or plan view, delineate the footprint(s) of the following areas, as applicable:

a) proposed *permanent impacts*;

b) proposed *temporary impacts* associated with the proposed construction;

c) *new indirect impact zone(s)* associated with the proposed impacts;

d) proposed *restoration, enhancement,* or *establishment* project;

e) proposed *preservation* area;

f) *post-project indirect impact zone(s)* within area d or e; and

g) *existing indirect impact zone(s)* within areas a through f.

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STEP 3 Referring to Tables 1 and 2 delineate on the base photo or plan view the existing *landforms, polygons*, and *relative ecological values (REVs*) within each of the areas mapped in Step 2.

TABLE 1: *POLYGONS* AND *RELATIVE ECOLOGICAL VALUES* (*REVS*), BY *LANDFORM*

TABLE 2: *LANDFORMS* AND *POLYGONS*, BY *RELATIVE ECOLOGICAL VALUE* (*REV*)

CAUTIONS:

1) Delineate *polygons* in *REV* order (i.e., *REV* 1 first and *REV* 4 last). Make sure to map all *setbacks* and *buffers* before proceeding to the next *REV*.

2) The project area may contain *setbacks* and/or *buffers* for waters that are outside the *project site*.

3) If a *polygon* could be more than one *REV*, assign the higher *REV* (e.g., *REV* 1 instead of 2), except as indicated in Notes within the tables.

4) For *preservation* projects, it is necessary to split *wetland buffer* and *upland setback polygons*, based on *regulatory constraints factors*. (See Table 11.) Split *wetland buffers*–except those for *streams* or *waterbodies* with more than a 50-foot *setback*–into the inner 50 and outer 250 feet. For *upland setbacks*, the split follows Municipal requirements. (See Table 11, Note 5.)

NOTES:

1) The *landform*, *polygon*, and *REV* delineations should be confirmed in the field whenever possible.

2) Site-specific circumstances may warrant *REV* assignment(s) different from those indicated in Tables 1 and 2. In such cases, provide the rationale for the deviation as a notation on the appropriate spreadsheet(s).

3) If the site includes a number of *polygons*, it may be helpful to assign each one an identification number for later reference; otherwise, *polygon* descriptions may suffice.

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STEP 4 Determine the *disturbance category* for each *existing* and *new indirect impact zone(s)*, based on the type of activity occurring within the disturbed area, according to Table 3 (next page).

Table 3: *Disturbance Categories*

Type of Activity				*Disturbance Category*
none	no existing activity			0
commercial	hotel/motel, office building, restaurant, self-storage facility, store			3
industrial	heavy equipment/large truck parking, marshalling, repair, storage			
	manufacturing			
	material (raw or waste) extraction, processing, storage, treatment, disposal			
	office building			
institutional	church, hospital, library, office building, school			
	municipal or state snow disposal site			2
recreational	golfing facility			3
	playground, picnic area, neighborhood park			
	sports field			
	trail: stand-alone[1]	culverted crossing	diameter ≥ bankfull width	2
			diameter < bankfull width	3
		winter-only OR unimproved, non-motorized		1
		improved OR motorized use		2
residential	driveway	footprint ≤ 30 ft wide		
		footprint > 30 ft wide		3
	1-3 homes			2
	subdivision (i.e., > 3 homes)			3
site investigation	soil sampling	conducted in winter		1
		conducted outside winter		2
transportation & shipping	automobile	driveway: non-residential		3
		parking lot		
		road, including associated bike path/sidewalk/trail		
	aviation facility			
	culverted crossing	diameter ≥ bankfull width		2
		diameter < bankfull width		3
	port facility			
	railroad	loading/unloading, office, storage, marshalling		
		track (away from above facilities)		2
	distribution facility, shipping facility, warehouse			3
utilities	office building			
	substation			2
	utility line	≤ 10 ft wide surface disturbance AND, if new, winter construction		1
		> 10 ft wide surface disturbance OR, if new, non-winter construction		2
other	dam, weir			3

[1]"Stand-alone" refers to trails that are not part of an existing road corridor.

STEP 5 On the map, eliminate all but the *dominant indirect impact zones* (*existing*, *post-project*, and *new*).

STEP 6 Identify *polygons* based on the overlap of the various *project site*, *indirect impact zone*, *landform*, and *REV* boundaries and assign them *polygon* identifiers (e.g., numbers or letters).

STEP 7 Enter the *polygon* identifiers in Column U of Spreadsheet (SS) 1 (see Appendix B), based on the *landform* and *REV* indicated in Columns S and T.

STEP 8 In Column V of SS 1, select a description for each *polygon* listed in Column U.

STEP 9 Consult Table 4 and, in Column W, enter the *indirect impact factor* for the *dominant existing* or *post-project indirect impact zone*, if any, that overlaps the *polygon*.

Table 4: *Existing* and *Post-Project Indirect Impacts Factors*

Disturbance Category	***Indirect Impact Factor***
0	1.00
1	0.99
2	0.95
3	0.90

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STEP 10 In Column X, enter the appropriate *size factor* for each *polygon*, according to Table 5.

Table 5: *Size Factors*

Size of *Contiguous Undeveloped Area*	***Size Factor***	
	Heavily Impacted Watersheds	***Other Watersheds***
≥ 15 ac	0	1
5.25-14.99 ac	1	2
2.75-5.24 ac	2	3
1.75-2.74 ac	3	4
1.5-1.74 ac	5	6
1.25-1.49 ac	7	8
1-1.24 ac	9	10
0.75-0.99 ac	12	14
0.5-0.74 ac	16	17
< 0.50 ac	19	20

REMEMBER: The *contiguous undeveloped area* extends beyond the *project site* if lands bordering it are not *developed*.

STEP 11 Column Y will populate automatically with the *aggregate indirect impact factor* for each *polygon*.

STEP 12 Enter the size of each *polygon* in Column Z.

STEP 13 Complete the appropriate section(s) of Parts B (*debits*) and/or C (*credits*), as well as Part D (summary) to determine the project's net *debits* and/or *credits*.

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Part B. Determining *Debits*

CAUTION: Before proceeding, determine whether the project's direct impacts are *de minimis*, as defined in the Glossary. If so, the ADCM does not apply.

STEP 1 Map the project area according to Part A.

STEP 2 Complete the "Information for Projects Producing Debits" section on the Project Information spreadsheet (SS; see Appendix B).

STEP 3 Most projects will use SS 2a; those that meet the ADCM's definition of having only *partial impact* will use SS 2c. In Column M of SS 2a or 2c, select the description of the *polygon(s)* located within the areas of *permanent impacts*, *temporary impacts*, and *new indirect impact zone*, as applicable, based on the *landform* and *REV* indicated in Columns K and L.

NOTES:

1) If the project's *new indirect impact zone* extends into a *waterway*, describe the affected *waterway polygon(s)* in Column M of SS 2b instead of on SS 2a or 2c. Steps 17 through 29 will calculate the *debits* associated with that portion of the *new indirect impact zone*.

2) It may be possible to combine *polygons*, rather than listing each one separately. Those that would have the same entries for Columns M through R and X on SS 2a or Columns M through O, R through T, and X on SS 2c may be combined in the same row; subsequent columns will differentiate between direct and indirect impacts.

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STEP 4 The *debit ratio* from Table 6 should populate automatically in Column N.

Table 6: *Debit Ratios*

REV	***Debit Ratio***	
	Waterways	**Other *Polygons***
1	2,000 sf/db	1.0 ac/db
2	3,000 sf/db	1.5 ac/db
3	4,000 sf/db	2.0 ac/db
4	5,000 sf/db	2.5 ac/db

CAUTION: There are no *debits* for *upland polygons* that are developable without direct aquatic impact.

STEP 5 For projects with only *partial impacts*, skip to Step 8. For all other projects, indicate in Column O whether the impacts to the *polygon(s)* will be *permanent* or *temporary*. If the impacts will be *permanent*, skip to Step 8.

STEP 6 For projects with *temporary impacts*, indicate in Column P whether the project proponent will provide *financial assurance* for impact rectification. If there will not be *financial assurance*, skip to Step 8.

NOTE: Column P is set to populate with "N/A" for projects with *permanent impacts* (i.e., when you enter a "P" in Column O). Making an entry in Column P overrides the auto-populate instruction so, if a user subsequently changes Column O from "T" to "P", the "N/A" will no longer appear in Column P. You can copy the instruction from another row, enter "N/A" manually, or leave the cell blank. There will be no effect on the *debit* calculation formula for Columns U and Y.

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STEP 7 For projects that will include *financial assurance* for rectification of *temporary impacts*, enter the duration of impacts, in Column Q, expressed in days, from initiation of disturbance to successful rectification.

NOTES:

1) To determine the amount of *financial assurance* needed, enter the expected duration of impacts. Once rectification is complete, use the actual duration of impacts to determine the *debits* for *temporary impacts*.

2) Column Q is set to populate with "N/A" for projects with either permanent impacts or temporary impacts, but no financial assurance (i.e., when you enter a "P" in Column O or an "N" in Column P). Making an entry in Column Q overrides the auto-populate instruction so, if a user subsequently changes Column O from "T" to "P" or Column P from "Y" to "N", the "N/A" will no longer appear in Column Q. You can copy the instruction from another row, enter "N/A" manually, or leave the cell blank. There will be no effect on the *debit* calculation formula for Columns U and Y.

STEP 8 In Column R of SS 2a or Column O of SS 2c, enter the *aggregate existing indirect impact factor* from Column Y of SS 1.

STEP 9 Record the identifiers for *polygons* with direct impacts in Column S of SS 2a or Column P of SS 2c.

STEP 10 In Column T of SS 2a or Column Q of SS 2c, enter the size of each *polygon*/group of *polygons* with direct impacts.

REMEMBER: For all *polygons* except *waterways*, use acres as the unit of size for direct impacts. For *waterways*, the size of direct impact is the total area of *jurisdictional bed* and/or *bank* directly affected by the project. For the direct impacts of projects involving the entire channel cross-section (e.g., pipes, utility-line crossings, diversions), the area calculation uses both the length of affected channel and its *wetted perimeter*, plus any *jurisdictional* areas of *bank* above the *wetted perimeter*; for other projects (e.g., *bank* stabilization), it uses just the square footage of affected *bed* and/or *bank*.

NOTE: The color-coded rows on the SS will carry running totals by *REV* and *landform* and the bottom row will tally the overall total size of direct impacts.

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STEP 11 For projects with only *partial impacts*, skip to Step 12. For all other projects, Column U should populate automatically with the *debits* for the project's direct impacts, using the equation described in the cell dialogue box and Note 1. Skip to Step 23.

NOTES:

1) For *permanent impacts*, the *debits* equal the size of the impacted *polygon*(*s*) (Column T), divided by the *debit ratio* (Column N), and multiplied by the *existing indirect impact factor* (Column R). For *temporary impacts*, without *financial assurance*, the *debits* use the same formula, with an additional multiplier of 0.5. For *temporary impacts* with *financial assurance*, the additional multiplier is the duration of impacts (Column Q) divided by 1826 days, rather than 0.5.

2) *Debits* for projects without *financial assurance* are non-refundable.

STEP 12 For projects with only *partial impacts*, refer to Appendix C (for *waterways*) or Appendix D (for other *polygons*) and indicate, in Column R of SS 2c which of the *polygon's functions* the project will affect.

NOTE: The *AWAM* (Appendix D) is a *wetlands* assessment method. If the project involves *partial impacts* to *subtidal*, *intertidal*, *waterbody*, or *upland polygons*, it may be necessary to adapt the *AWAM* or develop some other mechanism for both quantifying the effect on *function* and the contribution of the affected *function(s)* to the overall *function* of the area, to calculate *debits* in a manner similar to that for projects with *partial impacts* to *waterway* or *wetland polygons*.

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STEP 13 Assess the pre-project *functions* of the contiguous aquatic area that includes the *project site*. For *waterway polygons*, use the *WAMA* (Appendix C); for other *polygons*, use the *AWAM* (Appendix D) or an adaptation thereof.

NOTE: *AWAM* data sheets for sites already assessed for the *AWMP* are available from the Municipality. It is acceptable to use a pre-existing assessment if it applied to the entire contiguous aquatic area, as opposed to *AWMP* units that were non-contiguous (e.g., *AWMP* unit #51) or were part of a larger contiguous aquatic area (e.g., *AWMP* units #34, 34D, and 34G), and there have been no changes in the circumstances that the assessment addressed.

STEP 14 Enter the pre-project scores in Column S of SS 3a (for *waterways*) or Column X of SS 3b (other *polygons*). The bottom row of each section will tally the total pre-project score for that *function*.

STEP 15 For projects in *waterways*, skip to Step 17. For other projects, assess the post-project *AWAM functions* of the contiguous aquatic area and enter the scores in Column Y of SS 3b. The bottom row of each section will tally the total post-project score for that *function*.

STEP 16 Column Z of SS 3b should populate automatically with the percent to which the proposed project would reduce each affected *function*, if constructed as designed and permitted. Enter those numbers in the appropriate rows of Column S, SS 2c. Skip to Step 21.

STEP 17 For *waterway* projects that will affect only the *species occurrence function*, skip to Step 19. For other projects, determine the post-project *WAMA* scores for *hydrologic*, *habitat,* and *social function*, using the *WAMA* data sheets, and enter those scores in Column T of SS 3a. The bottom row of each section will tally the total post-project score for that *function*.

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STEP 18 Column U of SS 3a will populate automatically with values representing the percentage to which the project would reduce each affected *waterway function*, if constructed and maintained as designed and permitted. Enter those numbers in the appropriate rows of Column S, SS 2c. If the project would not affect *species occurrence*, skip to Step 21.

STEP 19 Unlike for the other three *functions*, *debits* related to a *waterway's species occurrence* derive not from changing the *polygon's* score, but from creating impediments to the passage of fish and other biota. For such projects, refer to Section II.C. of Appendix C and enter in Columns X and Y of SS 3a the existing and proposed measurements for each type of impediment the project would create.

STEP 20 Column Z of SS 3a will populate automatically with the percent to which the project would impede passage for fish and other biota, if constructed and maintained as designed and permitted. Enter that number in the appropriate row(s) of Column S, SS 2c.

STEP 21 In Column T of SS 2c, enter the pre-project percent to which the affected *function(s)* contribute to the overall *function* of the *polygon(s)*, from Column Y of SS 3c.

NOTES:

1) For projects in *waterways*, the *WAMA* section of SS 3c should populate automatically. For *species occurrence function*, the pre-project score from SS 3a will appear in both Columns T and U of SS 3c. (Projects that do not change *REV* will not change the site's *WAMA* score for *species occurrence*.)

2) For non-*waterway polygons*, go to the *AWAM* section of SS 3c and enter an "x" to identify the Municipal sub-area in which the project site is located. The remainder of the *AWAM* section should then populate automatically.

STEP 22 Column U should populate automatically with the *debits* for the project's direct impacts, using the equation shown.

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STEP 23 For *waterway polygons* in the *new indirect impact zone*, skip to Step 28. For all other *polygons* in the *new indirect impact zone*, record the *polygon* identifiers in Column V.

STEP 24 In Column W, record the size of each *polygon*/group of *polygons* in the *new indirect impact zone*. The color-coded rows will carry running totals by *REV* and *landform* and the bottom row will tally the overall total size of indirect impacts.

REMEMBER: For all *polygons* except *waterways*, use acres as the unit of size for indirect impacts. For *waterways*, record the size in square feet, using both the length of affected channel and its *wetted perimeter*, plus any *jurisdictional* areas of *bank* above the *wetted perimeter*.

NOTE: The color-coded rows on the SS will carry running totals by *REV* and *landform* and the bottom row will tally the overall total size of direct impacts.

STEP 25 Consult the map prepared in Part A and note how far the new activity extends disturbance toward each *polygon* in the *new indirect impact zone*. (See Figure A-12.)

NOTE: You may use either the maximum distance between the edges of *new* and *existing* disturbances, which simplifies the calculation, or the average distance, which more accurately reflects the extent of impact.

CAUTION: Disregard *existing* disturbances that are of a lower category than the new one. For example, when the new project is a road, the measurement would extend to the nearest Category 3 disturbance, even if a Category 1 or 2 disturbance were closer.

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STEP 26 Using the distance measured for each *polygon* in Step 24, determine the *new indirect impact factor* from Table 7 and enter it in Column X.

Table 7: *New Indirect Impact Factors*

<table>
<tr><th rowspan="2">Distance Between Existing and New Disturbances</th><th colspan="3">Disturbance Category</th></tr>
<tr><th>3</th><th>2</th><th>1</th></tr>
<tr><td>≤ 7 ft</td><td>0</td><td>0</td><td rowspan="5">0</td></tr>
<tr><td>8-29 ft</td><td>0.01</td><td rowspan="2">0.01</td></tr>
<tr><td>30-39 ft</td><td>0.02</td></tr>
<tr><td>40-59 ft</td><td>0.03</td><td rowspan="2">0.02</td></tr>
<tr><td>60-79 ft</td><td>0.04</td></tr>
<tr><td>80-99 ft</td><td>0.05</td><td rowspan="2">0.03</td><td rowspan="6">0.01</td></tr>
<tr><td>100-124 ft</td><td>0.06</td></tr>
<tr><td>125-149 ft</td><td>0.07</td><td rowspan="2">0.04</td></tr>
<tr><td>150-189 ft</td><td>0.08</td></tr>
<tr><td>190-239 ft</td><td>0.09</td><td rowspan="2">0.05</td></tr>
<tr><td>≥ 240 ft</td><td>0.10</td></tr>
</table>

STEP 27 Column Y will populate automatically with the *debits* resulting from the project's *indirect impacts* to non-*waterway polygons*, using the equation described in the cell dialogue box and Note 1.

NOTES:

1) For *permanent indirect impacts*, the *debits* equal the size of the impacted *polygon*(*s*) (Column W), divided by the *debit ratio* (Column N), and multiplied by both the *existing* and *new indirect impact factors* (Columns R and X, respectively). For *temporary indirect impacts*, without *financial assurance*, the *debits* use the same formula, with an additional multiplier of 0.5. For *temporary indirect impacts* with *financial assurance*, the additional multiplier is the duration of impacts (Column Q), divided by 1826 days, rather than 0.5.

2) *Debits* for projects without *financial assurance* are non-refundable.

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STEP 28 If the *new indirect impact zone* does not extend into a *waterway*, skip to Step 30. If the *new indirect impact zone* for a project in a non-*waterway polygon(s)* extends into a *waterway*, use SS 2b to determine the *debits* for indirect impacts to the *waterway*, resulting from the loss of *setback*/*buffer* (see Appendix B).

STEP 29 In Column M select the description of the *waterway polygon(s)* affected by the *indirect impacts* of the new project, based on the *REV* indicated in Column L.

STEP 30 In Column N, record the identifiers for the *setback* and/or *buffer polygons* into which the project would encroach.

STEP 31 In Column R, indicate whether the encroachment will be *permanent* or *temporary*. If the impacts will be *permanent*, skip to Step 23.

STEP 32 For projects with *temporary impacts*, indicate in Column S whether the project proponent will provide *financial assurance* for impact rectification. If there will not be *financial assurance*, skip to Step 23.

NOTE: Column S is set to populate with "N/A" for projects with *permanent impacts* (i.e., when you enter a "P" in Column R). Making an entry in Column S overrides the auto-populate instruction so, if a user subsequently changes Column R from "T" to "P", the "N/A" will no longer appear in Column S. You can copy the instruction from another row, enter "N/A"

manually, or leave the cell blank. There will be no effect on the *debit* calculation formula for Columns U and Y.

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STEP 33 For projects that will include *financial assurance* for rectification of *temporary impacts*, enter the duration of impacts, in Column T, expressed in days, from initiation of disturbance to successful rectification.

NOTES:

1) To determine the amount of *financial assurance* needed enter the expected duration of impacts. Once rectification is complete, use the actual duration of impacts to determine the *debits* for *temporary impacts*.

2) Column T is set to populate with "N/A" for projects with either *permanent impacts* or *temporary impacts*, but no *financial assurance* (i.e., when you enter a "P" in Column R or an "N" in Column S). Making an entry in Column T overrides the auto-populate instruction so, if a user subsequently changes Column R from "T" to "P" or Column S from "Y" to "N", the "N/A" will no longer appear in Column T. You can copy the instruction from another row, enter "N/A" manually, or leave the cell blank. There will be no effect on the *debit* calculation formula for Column Z.

STEP 34 In Column U, enter the *aggregate existing indirect impact factor* from Column Y of SS 1.

STEP 35 In Column V of SS 2b, enter the pre-project (i.e., existing) width(s) of the *setback* and/or *buffer polygons* into which the project would encroach.

NOTE: You may choose either to enter the maximum existing *setback* and b*uffer* width, which is simpler, or to determine the average existing widths, which more accurately reflects the extent of impact. In either case, the existing *buffer* width equals the width of the *setback* plus the width of additional undeveloped areas beyond the *setback*, up to a total of 300 feet.

STEP 36 In Column W, enter the width(s) of *setback* and/or *buffer polygons* that the project will directly affect.

NOTES:

1) You may choose either to enter the maximum extent of new encroachment into the existing *setback* and/or *buffer*, which is simpler, or to determine the average extents of encroachment, which more accurately reflects the impact.

2) In contrast to Step 24, the width of *buffer* encroachment does not include the *setback width*. For example, if a *waterway* has an intact 300-foot *buffer* and the proposed project would encroach all the way to the 100-foot *setback*, the entry for Column W (i.e., the width of encroachment) would be 200 feet. (The entry for Column V would be 300 feet.)

STEP 37 In Column X, enter the acreage of the new encroachment into the *setback* and/or *buffer polygon*s, from Column T of SS 2a or 2c. The bottom row of Column X will tally a running total.

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STEP 38 Consult the map prepared in Part A and note how far the new activity extends disturbance toward each *waterway polygon* in the *new indirect impact zone*. (See Figure A-12.) NOTE: You may use either the maximum distance between the edges of *new* and *existing* disturbances , which simplifies the calculation, or the average distance, which more accurately reflects the extent of impact.

CAUTION: Disregard *existing* disturbances that are of a lower category than the new one. For example, when the new project is a road, the measurement would extend to the nearest Category 3 disturbance, even if a Category 1 or 2 disturbance were closer.

STEP 39 Using the distance measured for each *polygon* in Step 27, determine the *new indirect impact factor* from Table 8 (next page) and enter it in Column Y.

Table 8: *New Indirect Impact Factors*

<table>
<tr><th rowspan="2">Distance Between Existing and New Disturbances</th><th colspan="3">Disturbance Category</th></tr>
<tr><th>3</th><th>2</th><th>1</th></tr>
<tr><td>≤ 7 ft</td><td>0</td><td>0</td><td rowspan="4">0</td></tr>
<tr><td>8-29 ft</td><td>0.01</td><td rowspan="2">0.01</td></tr>
<tr><td>30-39 ft</td><td>0.02</td></tr>
<tr><td>40-59 ft</td><td>0.03</td><td rowspan="2">0.02</td></tr>
<tr><td>60-79 ft</td><td>0.04</td><td></td></tr>
<tr><td>80-99 ft</td><td>0.05</td><td rowspan="2">0.03</td><td rowspan="5">0.01</td></tr>
<tr><td>100-124 ft</td><td>0.06</td><td></td></tr>
<tr><td>125-149 ft</td><td>0.07</td><td rowspan="2">0.04</td></tr>
<tr><td>150-189 ft</td><td>0.08</td><td></td></tr>
<tr><td>190-239 ft</td><td>0.09</td><td rowspan="2">0.05</td></tr>
<tr><td>≥ 240 ft</td><td>0.10</td><td></td></tr>
</table>

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STEP 40 Column Z of SS 2b should populate automatically with the *indirect impacts debits* for each *waterway polygon*/group of *polygons* and *REV*, as well as the total for the project, using the equation described in the cell dialogue box and Note 1.

NOTES:

1) For *permanent indirect impacts* from encroachment into a *waterway setback* or *buffer*, the *debits* equal the size of the encroachment (Column X), divided by the *debit ratio* (Column Q), and multiplied by both the *existing* and *new indirect impacts factors* (Columns U and Y), as well as the ratio of the width of encroachment to the pre-project *setback* or *buffer* width (Columns W and V). For *temporary indirect impacts*, without *financial assurance*, the *debits* use the same formula, with an additional multiplier of 0.5. For *temporary indirect impacts* with *financial assurance*, the additional multiplier is the duration of impacts (Column T), divided by 1826 days, rather than 0.5.

2) *Debits* for projects without *financial assurance* are non-refundable.

3) Automatic rounding in Excel may result in a difference of 0.01 *debit* between the overall total and the sum of sub-totals or individual totals in Column Z. Use SS 6 for the definitive totals.

STEP 41 Column Z of SS's 2a and 2c should populate automatically with the *debits* for each *polygon*/group of *polygons* and *REV*, as well as the total for the project, using the equation shown.

NOTE: Automatic rounding in Excel may result in a difference of 0.01 *debit* between the overall total and the sum of sub-totals or individual totals in Column Z. Use SS 6 for the definitive totals.

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Part C. Determining *Credits*

1. *Restoration*, *Enhancement* and *Establishment*

STEP 1 Map the project area according to Part A.

STEP 2 Complete the "Information for Projects Producing Credits" section on the Project Information spreadsheet (SS; see Appendix B).

STEP 3 Determine whether the project constitutes *restoration*, *enhancement*, or *establishment* and open the appropriate spreadsheet (i.e., SS 4-RES for *restoration*, 4-ENH for *enhancement*, or 4-EST for *establishment*).

STEP 4 In Column O of the appropriate spreadsheet select the description of the post-project *polygon(s)*, based on the *landform* and *REV* indicated in Columns M and N.

NOTES:

1) If you do not see the post-project *REV* or *polygon* description for the project you are assessing, you likely are using the wrong section of SS 4.

2) Selection of *non-naturalized polygons* in Column O should be limited, for example, to stormwater treatment projects in which it is necessary to use vegetation that meets the definition of *non-naturalized* or to situations in which it is necessary to recalculate *credits* because the *restoration*, *enhancement*, or *establishment* project was not fully successful.

3) *Polygons* that would have the same entries for Columns O through T and W through Y may be combined in the same row.

STEP 5 In Column P, select the description of the pre-project *polygon(s)* that currently exist within each of the *polygons* described in Column O.

NOTE: If you do not see the pre-project *polygon* description for the project you are assessing, you may be using the wrong SS 4 or the project may not qualify as *restoration*, *enhancement*, or *establishment*.

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STEP 6 Enter the *REV(s)* for the pre-project *polygon(s)* in Column Q.

NOTES:

1) For *restoration*, *enhancement*, or *establishment* projects, existing *polygons* that are *non-naturalized* will have a pre-project *REV* of 4, regardless of *landform* and position. The post-project *REV(s)* should reflect both the anticipated physical condition of the *polygon(s)* and its position (e.g., whether it is part of an *anadromous stream* or a *setback*).

2) For *restoration*, *enhancement*, or *establishment* projects involving *inclusions*, *setbacks*, or *buffers*, assign the pre-project *REV* according to the existing physical condition of the *polygon* (i.e., whether it is *natural*, *naturalized*, or *non-naturalized wetland* or *upland*), without regard to its position. The post-project *REV(s)* should reflect both the anticipated physical condition of the *polygon(s)* and its position.

STEP 7 The *REV Improvement* should populate automatically in Column R, according to the equation shown.

NOTE: *Enhancement* projects that improve one or more *functions* of an aquatic area or associated *upland* may qualify for *credits* even if they do not improve the *REV(s)* of the affected *polygon(s)*. See Steps 12 through 21.

STEP 8 The *credit ratio* should populate automatically in Column S, according to Table 9.

Table 9: *Credit Ratios* for *Restoration, Enhancement* and *Establishment* Projects

REV Improvement	***Credit Ratio***	
	Waterways	**Other *Polygons***
3	2,000 sf/cr	1.0 ac/cr
2	3,000 sf/cr	1.5 ac/cr
1	4,000 sf/cr	2.0 ac/cr
0	5,000 sf/cr	2.5 ac/cr

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STEP 9 In Column T, enter the *aggregate post-project indirect impact factor* from Column Y of SS 1.

STEP 10 Record the for each *polygon* in Column U.

STEP 11 Enter the size of each *polygon*/group of *polygons* in Column V. The bottom row of Column V will carry a running total.

REMEMBER: For all *polygons* except *waterways*, use acres as the unit of size. For *waterways*, the size is the total area of *bed* and/or *bank* improved by the project. For projects that produce *credits* through *restoration*, *establishment*, or *enhancement* with *REV improvement*, the area may extend up to the top of the *waterway's bank(s)*, depending on the project. For *waterway enhancement* projects that improve only certain *functions*, consult Appendix C to determine how to calculate the size of the area improved.

STEP 12 For *restoration* and *establishment* projects, as well as *enhancement* projects that will improve the *REV* of a *polygon(s)*, skip to Step 22. For *enhancement* projects that will not change the *REV*, but will improve one or more *functions* of the *polygon(s)*, refer to Appendix C (for *waterways*) or Appendix D (for other *polygons*) and indicate, in Column W of SS 4-ENH the *function(s)* that the project will improve.

NOTES:

1) Use a separate row on SS 4-ENH for each *function* the project will improve.

2) The *AWAM* (Appendix D) is a *wetlands* assessment method. If the project involves *enhancement* of *subtidal*, *intertidal*, *waterbody*, or *upland polygons*, it may be necessary to adapt the *AWAM* or develop some other mechanism for both quantifying the improvement in *function* and the contribution of the improved *function(s)* to the overall *function* of the area, to calculate *credits* in a manner similar to that for *waterway* or *wetland enhancement*.

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STEP 13 Assess the pre-project *functions* of the contiguous aquatic area that includes the proposed *enhancement* site. For *waterway polygons*, use the *WAMA* (Appendix C); for other *polygons*, use the *AWAM* (Appendix D)or an adaptation thereof.

NOTE: *AWAM* data sheets for sites already assessed for the *AWMP* are available from the Municipality. It is acceptable to use a pre-existing assessment if it applied to the entire contiguous aquatic area, as opposed to *AWMP* units that were non-contiguous (e.g., *AWMP* unit #51) or were part of a larger contiguous aquatic area (e.g., *AWMP* units #34, 34D, and 34G), and there have been no changes in the circumstances that the assessment addressed.

STEP 14 Enter the pre-project scores in Column S of SS 3a (*waterways*) or Column X of SS 3b (other *polygons*). The bottom row of each section will tally the total pre-project score for that *function*.

STEP 15 For *waterway enhancement* projects, skip to Step 17. For other projects, determine the *AWAM* scores for the proposed post-project condition of the contiguous aquatic area that includes the *project site* and enter them in Column Y of SS 3b. The bottom row of each section will tally the total post-project score for that *function*.

STEP 16 Column Z of SS 3b should populate automatically with values representing the percent to which the proposed project would, if successful, improve each affected *function*. Enter those numbers in the appropriate rows of Column X, SS 4-ENH. Skip to Step 21.

STEP 17 For *waterway enhancement* projects that will improve only the *species occurrence function*, skip to Step 19. For other projects, determine the post-project *WAMA* scores for *hydrologic*, *habitat*, and *social function*, using the *WAMA* data sheets, and enter those scores in Column T of SS 3a. The bottom row of each section will tally the total post-project score for that *function*.

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STEP 18 Column U of SS 3a will populate automatically with values representing the percentage to which the project would, if successful, improve each affected *waterway function*. Enter those numbers in the appropriate rows of Column X, SS 4-ENH. If the project does not include any improvements to *species occurrence*, skip to Step 21.

STEP 19 Unlike for the other three *functions*, *credits* related to a *waterway's species occurrence* derive not from changing the *polygon's* score, but from

reducing impediments to the passage of fish and other biota. For such projects, refer to Section II.C. of Appendix C and enter in Columns X and Y of SS 3a the existing and proposed measurements for each type of impediment the project would correct.

STEP 20 Column Z of SS 3a will populate automatically with values representing the percentage to which the project would, if successful, improve passage for fish and other biota. Enter that number in the appropriate rows of Column X, SS 4-ENH.

STEP 21 In Column Y of SS 4-ENH, enter the post-project percent to which the improved *function(s)* contribute to the overall *function* of the *polygon(s)*, from Column Z of SS 3c.

NOTES:

1) For projects in *waterways*, the *WAMA* section of SS 3c should populate automatically with the scores entered in SS 3a. For *species occurrence function*, the pre-project score from SS 3a will appear in both Columns T and U of SS 3c. (Projects that do not change *REV* will not change the site's *WAMA* score for *species occurrence*.)

2) For non-*waterway polygons*, go to the *AWAM* section of SS 3c and enter an "x" to identify the Municipal sub-area in which the project site is located. The remainder of the *AWAM* section should then populate automatically.

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STEP 22 Column Z of SS 4-RES, 4-ENH or 4-EST should populate automatically with the *credits* for each *polygon*/group of *polygons* and *REV*, as well as the total for the project, using the equation shown.

NOTES:

1) If the *restoration*, *enhancement*, or *establishment* project includes any activities that would incur *debits*, complete the appropriate section(s) of Part B. SS 6c will deduct any such *debits* from the total project *credits* to yield the net *credits* for the project.

2) Automatic rounding in Excel may result in a difference of 0.01 *credit* between the overall total and the sum of sub-totals or individual totals in Column Z. Use SS 6 for the definitive totals.

CAUTION: *Enhancement* involving the conversion of one type of aquatic area (e.g., *wetland*) to another (e.g., *waterbody*, *stream*) would incur some *debits* for the permanent loss of existing aquatic *functions*. Projects in which the *debits* for loss of existing *function* would exceed the *credits* for *enhancement* (e.g., construction of a *waterbody* in a *REV* 1 or 2 *wetland*) likely would not receive the approval of the lead federal regulatory agency (i.e., Corps of Engineers or EPA).

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2. *Preservation*

STEP 1 Map the project area according to Part A.

STEP 2 Complete the "Information for Projects Producing Credits" section on the Project Information Spreadsheet (SS; see Appendix B).

STEP 3 In Column R of SS 5, select the description of the *polygon(s)* to be *preserved* based on the *landform* and *REV* indicated in Columns P and Q.

CAUTION: The accrual of *credits* for *preservation* of *waterway polygons* and *REV* 3 or 4 *polygons* of other *landforms* is very limited; refer to note 1 of Tables 10 and 11, as well as the discussions of *preservation* in the Glossary (Appendix A). Listing ineligible *polygons* in Column R is acceptable for tracking of parcel acreage; however, do not make any entries in Columns S, T or W.

NOTE: *Polygons* that would have the same entries for Columns Q through W may be combined in the same row.

STEP 4 In Column S, enter the *regulatory constraints factor* for each *polygon*, using Table 10 for *waterways* or Table 11 for other *polygons*.

TABLE 10: *REGULATORY CONSTRAINTS FACTORS FOR WATERWAYS*

TABLE 11: *REGULATORY CONSTRAINTS FACTORS FOR SUBTIDAL, INTERTIDAL, WATERBODY, WETLAND AND UPLAND POLYGONS*

CAUTION: The accrual of *credits* for *polygons* with a *regulatory constraints factor* of 4 *polygons* is very limited; refer to notes 2 and 3 of Table 10 and notes 2 and 4 of Table 11, as well as the discussions of *preservation* and *regulatory constraints factor* in the Glossary (Appendix A). Listing ineligible *polygons* in Column R is acceptable for tracking of parcel acreage; however, do not make any entries in Columns T or W.

NOTE: Site-specific circumstances may warrant assignment of a different *regulatory constraints factor* than indicated in Tables 10 and 11 (e.g., when there are no less damaging practicable alternatives but to cross a high-value area (which typically would have a high *regulatory constraints factor*) to provide access and/or utilities to a lower value area). In such cases, provide the rationale for the deviation as a notation on SS 5.

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STEP 5 In Column T, enter the appropriate *accessibility factor* for the proposed *preservation* area, based on its size. Table 12a provides *accessibility factors* for *preservation* areas less than 10 acres in size, while Tables 12b through 12d apply to areas of 10 to 25 acres, 25 to 75 acres, and more than 75 acres, respectively.

Table 12: *Accessibility Factors*

CAUTION: Table 12 does not incorporate costs associated with separated grade crossings such as bridges, underpasses or tunnels. For *preservation* projects involving parcels that would require one or more separated grade crossings for access to the property, the ADCM user should consult with the Municipality, Alaska Department of Transportation, or other qualified entity to estimate costs for the crossing(s). Determine the additional cost per acre associated with the crossing(s) and assess whether the additional cost would be likely to warrant a different *accessibility factor* than indicated by the other road work needed, based on the Table 12 thresholds identified in the Glossary.

STEP 6 The *threat* should populate automatically in Column U, according to the equation shown.

STEP 7 In Column V, enter the *credit ratio*, according to Table 13.

Table 13: *Preservation Credit Ratios*

***Waterways* (*Credit Ratios* in sf/cr)**								
REV	*Threat*							
	1	2	3	4	6	8	9	12
1	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500
2	3,000	4,000	5,000	6,000	7,000	8,000	9,000	10,000
3	4,000	5,500	7,000	8,500	10,000	11,500	13,000	14,500
4	5,000	7,000	9,000	11,000	13,000	15,000	17,000	19,000
Other *Polygons* (*Credit Ratios* in ac/cr)								
REV	*Threat*							
	1	2	3	4	6	8	9	12
1	1.0	1.25	1.5	1.75	2.0	2.25	2.5	2.75
2	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0
3	2.0	2.75	3.5	4.25	5.0	5.75	6.5	7.25
4	2.5	3.5	4.5	5.5	6.5	7.5	8.5	9.5

STEP 8 In Column W, enter the *aggregate post-project indirect impact factor* from Column W, go to SS 1.

STEP 9 Record the identifiers for each *polygon* in Column X.

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STEP 10 Enter the size of each *polygon*/group of *polygons* in Column Y. The color-coded rows on SS 5 will carry running totals by *REV* and *landform* and the bottom row will tally the overall total size of the *preserved* area.

REMEMBER: For all *polygons* except *waterways*, use acres as the unit of size. For *waterways*, the size is the total area of *bed* and/or *bank* to be *preserved*, including both *jurisdictional* and non-*jurisdictional* areas of the bank.

STEP 11 Column Z of SS 5 should populate automatically with the *credits* for each *polygon*/group of *polygons*, as well as sub-totals for *landform* and *REV* and the total for the project, using the equation shown.

NOTES:

1) If the *preservation* project includes any activities that would incur *debits*, complete the appropriate section(s) of Part B. SS 6c will deduct any such *debits* from the total project *credits* to yield the net *credits* for the project.
2) Automatic rounding in Excel may result in a difference of 0.01 *credit* between the overall total and the sum of sub-totals or individual totals in Column Z. Use SS 6 for the definitive totals.

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Part D. Summarizing Project *Debits* and *Credits*

STEP 1 If there are no *debits* associated with the project, skip to Step 3. For projects with *debits*, Columns T through Y of the "Project Debits Summary" section of Spreadsheet 6 (SS; see Appendix B) should populate automatically with the total number of *debits* for each *landform* and associated *REV*, as calculated in Column Z of Spreadsheets 1a and 1c. The bottom row should total the *debits* by *landform*.

STEP 2 The *debit* totals for each *REV* and the overall *debits* for the project should populate automatically in Column Z. If there are no *credits* associated with the project, skip to Step 5.

NOTE: Automatic rounding in Excel may result in a difference of 0.01 *debit* between the overall total and the sum of sub-totals or individual totals in Column Z. Use the bottom row of the "Project Debits Summary" section for the overall *debit* total for the project.

STEP 3 For projects with *credits*, Columns T through Y of the "Project Credits Summary" section of Spreadsheet 6 (SS; see Appendix B) should populate automatically with the total number of *credits* for each *landform* and associated *REV*, by project type, as calculated in Column Z of Spreadsheets 4-RES, 4-ENH, 4-EST and/or 5. The bottom row should total the *credits* by *landform*.

STEP 4 The *credit* totals by project type and associated *REV* and the overall *credits* for the project should populate automatically in Column Z.

NOTE: Automatic rounding in Excel may result in a difference of 0.01 *credit* between the overall total and the sum of sub-totals or individual totals in Column Z. Use the bottom row of the "Project Credits Summary" section for the overall *credit* total for the project.

STEP 5 Columns R through W of the "Project Debit-Credit Balance" section of SS 6 should populate automatically with the *debit* and *credit* totals from the above sections.

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STEP 6 Column X should populate automatically with the net *credits* (positive numbers) or *debits* (negative numbers), for each *REV*, according to the equation shown.

STEP 7 If there is a net *credit* for one or more *REVs* and a net *debit* for another *REV(s)*, proceed with Step 8; otherwise, skip to Step 9.

STEP 8 In Column Y, subtract the number of net *credits* needed to offset net *debits* on another row. Add those *credits* to the row(s) with net *debits*.

CAUTION: *Credits* offset *debits* on a one-to-one basis, regardless of *REV* so long as the lead federal regulatory agency (i.e., Corps of Engineers or EPA) has determined that the available *credits* constitute appropriate compensatory mitigation for the project *debits*. *Credits* of a different *landform* or lower *REV* may not be appropriate compensatory mitigation.

NOTE: The total of subtractions and additions in Column Y must always equal zero.

STEP 9 Calculate the balance of *credits* or *debits* for each *REV*, according to the equation in Column Z. Record net *credits* as positive numbers and net *debits* as negative numbers. The overall balance of *credits* or *debits* should populate automatically in the bottom row.

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Table 1: *Polygons,* and *Relative Ecological Values (REVs),* Grouped by *Landform*

Landform	*Polygon* Characteristics					*REV*
Subtidal Zone	shallow					2
	deep					3
Intertidal Zone	*vegetated*					1
	unvegetated	*beluga whale concentration area*				
		water bird concentration area				
		other				2
Waterway	open channel	*stream*	*perennial*	*natural* or *naturalized*	supports *salmonids*	1
					does not support *salmonids*	2
				non-naturalized [1]	supports *salmonids*	
					does not support *salmonids*	3
			intermittent or *ephemeral*	*natural* or *naturalized*		
				non-naturalized [1]		4
			inactive channel	connected to active channel at bankfull discharge or less		same as active channel
				disconnected from active channel at bankfull discharge or less		as indicated by other applicable *landform* and *polygon* characteristics[2]
		drainageway	*natural* or *naturalized*			3
			non-naturalized [1]			4
		ditch	supports *salmonids*			2
			does not support *salmonids*		*naturalized*	3
					non-naturalized [1]	4
	piped					
Waterbody	*persistent*	*natural* or *naturalized*	>2500 sf or part of *mosaic* [4]			1
			very small and *remote*			2
		non-naturalized [1]	>2500 sf or part of *mosaic* [4]		remnant *natural* or *naturalized* shoreline	1
					remainder of *waterbody*	2
			very small and *remote*		remnant *natural* or *naturalized* shoreline	
					remainder of *waterbody*	3
	seasonal	*natural* or *naturalized*	>2500 sf or part of *mosaic* [4]			2
			very small and *remote*			3
		non-naturalized [1]	>2500 sf or part of *mosaic* [4]		remnant *natural* or *naturalized* shoreline	2
					remainder of *waterbody*	3
			very small and *remote*		remnant *natural* or *naturalized* shoreline	
					remainder of *waterbody*	4
Wetlands	*inundated*	from break-up through the end of June	>2500 sf or part of *mosaic* [4]	*natural* or *naturalized*		1
				non-naturalized [1]		2
			very small and *remote*	*natural* or *naturalized*		
				non-naturalized [1]		3
		for at least two consecutive weeks in spring and/or autumn	>2500 sf or part of *mosaic* [4]	*natural* or *naturalized*		2
				non-naturalized [1]		3
			very small and *remote*	*natural* or *naturalized*		
				non-naturalized [1]		4
	rarely or never *inundated*	*quaking bog*				1
		inclusion [3]				same as surrounding area
		setback for *waterway* or *waterbody* [3]				same as *waterway /waterbody*
		300' *buffer* for *REV* 1 or 2 aquatic area[3]				2
		other		*natural* or *naturalized*		3
				non-naturalized [1]		4
	mosaic of *inundated* & non-*inundated wetlands*					same as *inundated wetlands* [4]
Uplands	not *developed*	*inclusion* [3]				same as surrounding area
		setback for *waterway* or *waterbody* [3]				same as *waterway /waterbody*
		300 ft buffer for REV 1 or 2 aquatic area3				2
		other		*natural* or *naturalized*		3
				non-naturalized [1]		4
	developed					
Mosaic	mix of *wetlands* & *uplands*					same as *wetlands* [4]
	mix of *wetlands* & *waterbodies*					same as *waterbodies* [4]

[1] For *restoration*, *enhancement*, or *establishment* projects, existing *polygons* that are *non-naturalized* will have a pre-project *REV* of 4, regardless of *landform* and position. The post-project *REV(s)* should reflect both the anticipated physical condition of the *polygon(s)* and its position (e.g., whether it is part of a *setback*).

[2] In the spreadsheets, disconnected *inactive channels* may be combined with other *polygons* with which they share the necessary commonality of attributes. Mapping, however, should still identify the channel as a separate feature, to facilitate the evaluation of mitigation opportunities.

[3] For *restoration, enhancement*, *or establishment* projects involving *inclusions*, *setbacks*, or *buffers*, assign the pre-project *REV* according to the existing physical condition of the *polygon* (i.e., whether it is *natural*, *naturalized*, or *non-naturalized wetland* or *upland*), without regard to its position. The post-project *REV(s)* should reflect both the projected physical condition of the *polygon(s)* and its position.

Table 2: *Landforms and Polygons, Grouped by Relative Ecological Value (REV)*

Variable *REV* Areas					
Landform	*Polygon* Characteristics				
Waterway	*inactive channel*		disconnected from active channel: *REV* assigned based on other applicable landform and *polygon* characteristics[1]		
Mosaic	mix of *wetlands* & *waterbodies*			same as *waterbodies*[2]	
	mix of *wetlands* & *uplands*			same as *wetlands*[2]	
	mix of *inundated* & non-*inundated wetlands*				
***REV* 1 Areas**					
Landform	*Polygon* Characteristics				
Intertidal Zone	*vegetated*				
	unvegetated		*beluga whale and/* or *water bird concentration area*		
Waterway	open channel	*stream*	*perennial*	*natural* or *naturalized*	supports *salmonids*
			inactive channel	connected to active *REV* 1 channel at bankfull discharge or less	
Waterbody	*persistent*		*natural* or *naturalized*	>2500 sf or part of *mosaic*[2]	
			non-naturalized[3]	>2500 sf or part of *mosaic*[2]	remnant natural or naturalized shoreline
Wetlands	*inundated* from break-up through the end of June		>2500 sf[2]		*natural* or *naturalized*
	rarely or never *inundated*		*quaking bog*		
			inclusion in REV 1 aquatic area[4]		
			setback for REV 1 *waterway* or *waterbody*[4]		
Uplands	not *developed*		*inclusion* in REV 1 aquatic area[4]		
			setback for REV 1 waterway or waterbody[4]		
***REV 2* Areas**					
Landform	*Polygon* Characteristics				
Subtidal Zone	shallow				
Intertidal Zone	*unvegetated*		not a *beluga whale* or *water bird concentration area*		
Waterway	open channel	*stream*	*perennial*	*natural* or *naturalized*	does not support *salmonids*
				non-naturalized[3]	supports *salmonids*
			inactive channel	connected to active *REV* 2 channel at bankfull discharge or less	
		ditch	supports *salmonids*		
Waterbody	*persistent*		*natural* or *naturalized*	very small and *remote*	
			non-naturalized[3]	>2500 sf or part of *mosaic*[2]	not remnant *natural* or *naturalized* shoreline
				very small and *remote*	remnant *natural* or *naturalized* shoreline
	seasonal		*natural* or *naturalized*	>2500 sf or part of *mosaic*[2]	
			non-naturalized[3]	>2500 sf or part of *mosaic*[2]	remnant *natural* or *naturalized* shoreline
Wetlands	*inundated*	from break-up through the end of June	>2500 sf[2]	*non-naturalized*[3]	
			very small and *remote*	*natural* or *naturalized*	
		for at least two consecutive weeks in spring and/or autumn	>2500 sf or part of *mosaic*[2]		
	rarely or never inundated		*inclusion* in *REV* 2 aquatic area[4]		
			setback for *REV* 2 *waterway* or *waterbody*[4]		
			300 ft buffer for REV 1 or 2 aquatic area4		
Uplands	not *developed*		*inclusion* in *REV* 2 aquatic area[4]		
			setback for *REV* 2 *waterway* or *waterbody*[4]		
			300 ft buffer for REV 1 or 2 aquatic area4		

Table 2 (Continued): *Landforms and Polygons*, by *Relative Ecological Value (REV)*

***REV 3* Areas**					
Landform	*Polygon* Characteristics				
Subtidal Zone	deep				
Waterway	open channel	*stream*	*perennial*	*non-naturalized* [1]	does not support *salmonids*
			intermittent or *ephemeral*		*natural* or *naturalized*
			inactive channel	connected to active *REV* 3 channel at bankfull discharge or less	
		drainageway		*natural* or *naturalized*	
		ditch		*naturalized*	
Waterbody	*persistent*		*non-naturalized* [3]	very small and *remote*	not remnant *natural* or *naturalized* shoreline
	seasonal		*natural* or *naturalized*	very small and *remote*	
			non-naturalized [3]	>2500 sf or part of *mosaic* [2]	not remnant *natural* or *naturalized* shoreline
				very small and *remote*	remnant *natural* or *naturalized* shoreline
Wetlands	*inundated*	from break-up through the end of June	very small and *remote*	*non-naturalized* [3]	
		for at least two consecutive weeks in spring and/or autumn	>2500 sf of *mosaic* [2]		
			very small and *remote*	*natural* or *naturalized*	
	rarely or never *inundated*		*setback* for *REV* 3 *waterway* or *waterbody* [4]		
			other	*natural* or *naturalized*	
Uplands	not *developed*		*setback* for *REV* 3 *waterway* or *waterbody* [4]		
			other	*natural* or *naturalized*	
***REV 4* Areas**					
Landform	*Polygon* Characteristics				
Waterway	open channel	*stream*	*intermittent* or *ephemeral*	*non-naturalized*	
			inactive channel	connected to active *REV* 4 channel at bankfull discharge or less	
		drainageway		*non-naturalized*	
		ditch			
	piped				
Waterbody	*seasonal*		*non-naturalized*	very small and *remote*	not remnant *natural* or *naturalized* shoreline
Wetlands	*inundated* only in spring and/or autumn (for at least two consecutive weeks)		very small and *remote*	*non-naturalized*	
	rarely or never inundated			other	*non-naturalized*
Uplands	not *developed*		other	*non-naturalized*	
	developed				

[1] In the spreadsheets, disconnected *inactive channels* may be combined with other *polygons* with which they share the necessary commonality of attributes. Mapping, however, should still identify the channel as a separate feature, to facilitate the evaluation of mitigation opportunities.

[2] For *mosaics*, the size threshold used in determining *REV* applies to the entire *mosaic*, rather than to individual *inundated* areas.

[3] For *restoration*, *enhancement*, or *establishment* projects, existing *polygons* that are *non-naturalized will have* a *REV* of 4, regardless of *landform* and position. The post-project *REV(s)* should reflect both the anticipated physical condition of the *polygon(s)* and its position (e.g., whether it is part of a setback).

[4] For projects involving the *restoration, enhancement*, *or establishment* of an *inclusion*, *setback*, or *buffer*, assign the pre-project *REV(s)* according to the existing physical condition of the *polygon* (i.e., whether it is *natural*, *naturalized*, or *non-naturalized*), without regard to its position). The post-project *REV(s)* should reflect both the projected physical condition of the *polygon(s)* and its position.

Table 10: *Regulatory Constraints Factors* for *Waterways*

Polygon Characteristics					*REV*	*Regulatory Constraints Factor*[1]
non-*jurisdictional* aquatic area					as indicated by other applicable *landform* and *polygon* characteristics	1
within footprint of existing, unexpired permit[2]						
previous compensatory mitigation site	formally *preserved* as part of compensatory mitigation requirements[1]					4
	other					3
park or similar site	designated to be managed for *preservation* /natural resources protection[3]					
	other					as indicated by other applicable *landform* and *polygon* characteristics
stream	open channel	*perennial*[4]	*natural* or *naturalized*	supports *salmonids*	1	4
				does not support *salmonids*	2	
			non-naturalized	supports *salmonids*		
				does not support *salmonids*	3	3
		intermittent or ephemeral	*natural* or *naturalized*			2
			non-naturalized		4	
	piped					1
drainageway	*natural or naturalized*				3	2
	non-naturalized				4	
ditch	open channel	supports *salmonids*			2	3
		does not support *salmonids*		*naturalized*	3	2
				non-naturalized	4	
	piped					
inactive channel	connected to active channel at bankfull discharge or less				same as active channel	
	disconnected from active channel at bankfull discharge or less				as indicated by other applicable *landform* and *polygon* characteristics	

Polygons with a *regulatory constraints factor* of 4 are not eligible for *preservation credits*. *Regulatory Constraints Factors* other than "1" apply only to *jurisdictional waterways*. The *regulatory constraints* for non-*jurisdictional* aquatic areas will typically be "1", as indicated in the first row of the table; such determinations should be explained in a footnote on Spreadsheet 5 (see Appendix B).

If the permit has expired, it may be appropriate, depending upon the amount of time elapsed and any changes in attendant circumstances and/or regulatory policies, to assign a different Regulatory Constraints factor, based on the other guidelines in this table. In such cases, the ADCM user should provide the rationale for the assignment as a notation on Spreadsheet 5.

If the legal protections that apply to the park or similar site are sufficient to ensure permanent preservation of the polygons within it, the Regulatory Constraints factor would be 4, instead of 3, in which case preservation credits would not be appropriate.

For *perennial streams* on properties where one or more access and/or utility crossings would likely be permitted, the ADCM user may assign a *regulatory constraints factor* of 2 to the portion(s) of the *stream* that represent the most likely crossing site(s). Such determinations should be explained in a footnote on Spreadsheet 5a (see Appendix B).

Table 11: *Regulatory Constraints Factors* for *Subtidal*, *Intertidal*, *Waterbody*, *Wetland*, and *Upland Polygons*

Landform	*Polygon* Characteristics					*REV*	*Regulatory Constraints Factor*[1]
Any	non-*jurisdictional* aquatic area					as indicated by other applicable *landform* and *polygon* characteristics	1
	within footprint of existing, unexpired permit[2]						
	previous compensatory mitigation site	formally *preserved* as part of compensatory mitigation requirements[1]					4
		other					3
	park or similar site	designated to be managed for *preservation* /natural resources protection[3]					
		other					as indicated by other applicable *landform* and *polygon* characteristics
Subtidal Zone	*nearshore*					2	2
	offshore					3	
Intertidal Zone	*vegetated*					1	3
	unvegetated	*beluga whale concentration area*					
		water bird concentration area					
		other				2	2
Waterbody	*persistent*	*natural* or *naturalized*	>2500 sf or part of *mosaic*			1	3
			very small and *remote*			2	
		non-naturalized	>2500 sf or part of *mosaic*	remnant *natural* or *naturalized* shoreline		1	
				remainder of waterbody		2	
			very small and *remote*	remnant *natural* or *naturalized* shoreline			2
				remainder of waterbody[1]		3	
	seasonal	*natural* or *naturalized*	>2500 sf or part of *mosaic*			2	3
			very small and *remote*			3	2
		non-naturalized	>2500 sf or part of *mosaic*	remnant *natural* or *naturalized* shoreline		2	3
				remainder of waterbody		3	2
			very small and *remote*	remnant *natural* or *naturalized* shoreline			
				remainder of waterbody		4	
Wetlands	*inundated*	through the end of June	>2500 sf or part of *mosaic*	*natural* or *naturalized*		1	3
				non-naturalized		2	2
			very small and *remote*	*natural* or *naturalized*			
				non-naturalized		3	
		for at least two consecutive weeks in spring and/or autumn	>2500 sf or part of *mosaic*	*natural* or *naturalized*		2	3
				non-naturalized		3	2
			very small and *remote*	*natural* or *naturalized*			
				non-naturalized		4	
	rarely or never *inundated*	*quaking bog*				1	3
		inclusion in aquatic area that is…		*REV* 1			
				REV 2		2	
		setback for *waterway* or *waterbody* that is…		*REV* 1		1	
				REV 2		2	
				REV 3		3	same as *waterway* or *waterbody*
				REV 4		4	2
		buffer		inner 50 ft		2	3
				outer 250 ft			2
		other		*natural* or *naturalized*		3	
				non-naturalized		4	
	mosaic of *inundated* & non-*inundated wetlands*					same as *inundated wetlands*[4]	
Uplands	not *developed*	*inclusion* in aquatic area that is…		REV 1		1	2
				REV 2		2	
		setback that is…		required by the Municipality[5]		same as *waterway* or *waterbody*	
				not required by the Municipality			1
		buffer				2	
		other		*natural* or *naturalized*[6]		3	
				non-naturalized[6]		4	
	developed[1]						
Mosaic	mix of *wetlands* & uplands					same as *wetlands*[4]	
	mix of *wetlands* & *waterbodies*					same as *waterbodies*[4]	

[1] Polygons with a regulatory constraints factor of 4 are not eligible for preservation credits. Regulatory Constraints factors other than "1" apply only to jurisdictional areas and municipally regulated stream setbacks. The regulatory constraints for non-jurisdictional aquatic areas will typically be "1", as indicated in the first row of the table. Such determinations should be explained in a footnote on Spreadsheet 5 (see Appendix B).

[2] If the permit has expired, it may be appropriate, depending upon the amount of time elapsed and any changes in attendant circumstances and/or regulatory policies, to assign a different Regulatory Constraints factor, based on the other guidelines in this table. In such cases, the ADCM user should provide the rationale for the assignment as a notation on

[3] If the legal protections that apply to the park or similar site are sufficient to ensure permanent preservation of the polygons within it, the *Regulatory Constraints factor* would be 4, instead of 3, in which case *preservation* credits would not be appropriate.

[4] For *mosaics*, the size threshold used in determining *REV* applies to the entire *mosaic*, rather than to individual *inundated* areas.

[5] In uplands, the Municipality requires a *setback* of 50 feet for *perennial* and *intermittent streams*, 25 feet for *waterbodies* and 10 feet for *ephemeral streams* and *drainageways.*

[6] *Uplands* that are *REV* 3 or 4 will typically be eligible for *preservation credits* only when their *preservation* is necessary to facilitate an approved *restoration, enhancement* or *establishment* project. Such determinations should be explained in a footnote on Spreadsheet 5 (see Appendix B).

Table 12a: *Accessibility Factors* for *Preservation* Projects < 10 Acres in Size[1]

Length of Major Road Work Needed[2,3]	Maximum Length of Minor Road Work Needed[2,4]															
	None	25 ft	100 ft	120 ft	200 ft	300 ft	400 ft	500 ft	600 ft	750 ft	800 ft	1000 ft	1300 ft	1400 ft	1500 ft	> 1500 ft
None		1														
10 ft																
25 ft																
35 ft					2											
50 ft											3					
100 ft																
150 ft																
200 ft																
250 ft												4				
300 ft																
400 ft																
500 ft																
550 ft																
> 550 ft																

[1] The determinations in this section require coordination with the Municipality of Anchorage to ascertain the extent of road work they would require. The distance measurement should follow the most likely access route to the nearest boundary of the area that would be *preserved*. If the proposed *preservation* project involves only a portion of an existing parcel(s), measure the distance to the area that would be preserved.

[2] table may be assigned to the lower threshold.

[3] "Major" road work includes construction of new roads, as well as upgrading of existing roads where either a) the existing driving surface is < 75% of the required driving surface width or b) the upgrade will include storm drain installation. It does **not** include construction of separated grade crossings; see Glossary for instructions regarding separated grade crossings.

[4] "Minor" road work includes activities such as paving, landscaping, construction of sidewalks, acquisition/dedication of right-of-way, and widening of roads where the existing driving surface is at least 75% of the required driving surface width.

Table 12b: *Accessibility Factors* for *Preservation* Projects 10-25 Acres in Size[1]

Length of Major Road Work Needed[2,3]	Maximum Length of Minor Road Work Needed[2,4]																
	None	100 ft	200 ft	300 ft	450 ft	1000 ft	1500 ft	2000 ft	2200 ft	2400 ft	2800 ft	3000 ft	4000 ft	4300 ft	4500 ft	4800 ft	>4800 ft
None																	
25 ft			1														
50 ft																	
100 ft																	
150 ft				2							3						
200 ft																	
300 ft																	
500 ft																	
700 ft															4		
850 ft																	
900 ft																	
1700 ft																	
>1700 ft																	

[1] access route to the nearest boundary of the area that would be *preserved*. If the proposed *preservation* project involves only a portion of an existing parcel(s), measure the distance to the area(s) that would be *preserved*.

[2] assigned to the lower threshold.

[3] "Major" road work includes construction of new roads, as well as upgrading of existing roads where either a) the existing driving surface is < 75% of the required driving surface width or b) the upgrade will include storm drain installation. It does **not** include construction of separated grade crossings; see Glossary for instructions regarding separated grade crossings.

[4] "Minor" road work includes activities such as paving, landscaping, construction of sidewalks, acquisition/dedication of right-of-way, and widening of roads where the existing driving surface is at least 75% of the required driving surface width.

Table 12c: *Accessibility Factors* for *Preservation* Projects 25-75 Acres in Size

Length of Major Road Work Needed[2,3]	Maximum Length of Minor Road Work Needed[2,4]																				
	≤ 100 ft	150 ft	400 ft	500 ft	600 ft	750 ft	1000 ft	1250 ft	2000 ft	3000 ft	4000 ft	5000 ft	5500 ft	6000 ft	6500 ft	1.5 mi	2 mi	2.1 mi	2.3 mi	2.4 mi	2.5 mi	> 2.5 mi
None																						
50 ft																						
100 ft																						
150 ft			1																			
200 ft																						
250 ft																						
300 ft								2														
400 ft																3						
475 ft																						
500 ft																						
750 ft																						
1000 ft																						
1500 ft																				4		
2000 ft																						
2500 ft																						
3000 ft																						
4000 ft																						
5000 ft																						
> 5000 ft																						

[1] The determinations in this section require coordination with the Municipality of Anchorage to ascertain the extent of road work they would require. The distance measurement should follow the most likely access route to the nearest boundary of the area that would be *preserved*. If the proposed preservation project involves only a portion of an existing parcel(s), measure the distance to the area that would be *preserved.* If the proposed preservation project involves only a portion of an existing parcel(s), measure the distance to the area(s) that would be preserved.

[2] The lengths apply to access to the property, not potential road construction within it. Measure lengths only to the boundary of the preservation area. Lengths within 5% of the thresholds in the table may be assigned to the lower threshold.

[3] "Major" road work includes construction of new roads, as well as upgrading of existing roads where either a) the existing driving surface is < 75% of the required driving surface width or b) the upgrade will include storm drain installation. It does **not** include construction of separated grade crossings; see Glossary for instructions regarding separated grade crossings.

[4] "Minor" road work includes activities such as paving, landscaping, construction of sidewalks, acquisition/dedication of right-of-way, and widening of roads where the existing driving surface is at least 75% of the required driving surface width.

Section III. Appendices

Appendix A. Glossary

APPENDIX A: ANNOTATED GLOSSARY

This glossary describes the italicized terms used in the Anchorage Debit-Credit Method (ADCM). For each term, the glossary provides both a concise definition and a more extensive discussion of how it is used in the method's procedures.

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Electronic copies of the glossary include quick links for navigating around the document. Hyperlinks include the terms in the table of contents, as well as certain terms within the narratives. To jump to a term, place the cursor over it and press Ctrl-click to activate the hyperlink. The hyperlinked index below also appears after each term and facilitates navigating to the table of contents.

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-A-

Accessibility Factor

Definition: An estimate of the cost and difficulty involved in providing road access to a potential development property, with a factor of 1 representing the easiest/least expensive and 4 representing the most difficult/expensive.

Additional Information: *Accessibility* is one of two factors that define the level of development *threat* to a *polygon*, for purposes of determining *preservation credits*. The other factor is *regulatory constraints*. Although road access is only one component of the infrastructure considerations that affect how easily an area can be developed, the ADCM, for simplicity, uses it as the overriding infrastructure factor in characterizing the *threat* to a potential *preservation* parcel. The ADCM identifies four categories of accessibility (see Table 12) and considers properties with better accessibility to be under greater *threat* of development than those for which road access is more distant, more difficult, or more costly. *Polygons* within such properties have lower *credit ratios* (e.g., as low as 1.0 acre per *credit*), and accrue more *preservation credit* per unit area than *polygons* within less accessible properties.

The ADCM assigns an *accessibility factor* to a potential *preservation* property using a set of tables organized by property size. (See Tables 12a-d.) Within each table, the *accessibility factor* depends on the length of "major" and "minor" road work that likely development of the parcel would require, where:

- "major" road work includes not only construction of new roads, but also upgrade of existing roads where the existing driving surface is less than 75% of the required driving surface width and/or the upgrade will include installation of a storm drain system; and
- "minor" road work includes activities such as paving, landscaping, construction of sidewalks, acquisition/dedication of right-of-way, and widening of roads where the existing driving surface is at least 75% of the required driving surface width.

The breakdowns in the tables derive from a process that involved identifying a range of potential *preservation* properties, determining the costs of road construction, if any, that would be involved in accessing those properties for development—using the Municipality's 2008 cost estimating template—and dividing the cost by the acreage of the property. This process reflects the likelihood that development of larger parcels can accommodate greater access costs. The tables incorporate some rounding, but in general, the thresholds that the breakdowns represent are approximately $10,000 per acre of development property for an *accessibility factor* of 1, $50,000 per acre for an *accessibility factor* of 2, and $100,000 per acre for an *accessibility factor* of 3. An *accessibility factor* of 4 applies to properties for which access would likely cost more than $100,000 per acre of development. Thus, the ADCM considers properties that would require less work/cost to access for development to have a higher *threat* than those for which such access would be more costly.

CAUTIONS:

1) Determinations using Table 12 require coordination with the Municipality to identify both the most likely access route and the likely road standards they would require. When there is more than one potential route, use the shortest/least costly to assign an *accessibility factor*.

2) Table 12 does not incorporate costs associated with separated grade crossings such as bridges, underpasses, or tunnels. For *preservation* projects involving parcels that would require one or more separated grade crossings for access to the property, the ADCM user should consult with the Municipality, Alaska Department of Transportation, or other qualified entity to estimate costs for the crossing(s). Determine the additional cost per acre associated with the crossing(s) and assess whether the additional cost would be likely to warrant a different *accessibility factor* than indicated by the other road work needed, based on the thresholds identified above.

NOTE: The length measurements apply to the nearest boundary of the area that would be *preserved*. If the proposed *preservation* project involves only a portion of an existing parcel(s), assign the *accessibility factor* based on the boundaries of the area that would be *preserved*, not the entire parcel.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

Aggregate Existing/Post-Project Indirect Impact Factor

Definition: A multiplier used in *debit* and *credit* calculations to represent the extent to which the nature of existing disturbances and the overlapping of *indirect impact zones* from different disturbances reduce the *function* of *polygons* within and around a *project site*.

Additional Information: The *aggregate indirect impact factor* results from applying a site's *size factor* as an exponent to its *dominant indirect impact factor*. The result is that the ADCM treats *project sites* within the smaller *contiguous undeveloped areas* and within higher *disturbance categories* as having a lower level of *function* than those within larger *contiguous undeveloped areas* and/or lower disturbance categories. Projects in such sites produce fewer *debits* or *credits* than those in sites that are less exposed to indirect impacts from surrounding developments

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

Anadromous: see *Salmonid/Salmonid-bearing*

Artificial: see *Naturalized* and *Non-naturalized*

AWAM

Definition: The Anchorage Wetlands Assessment Method.

Additional Information: The Municipality of Anchorage developed the *AWAM* in coordination with an interagency team, and used it to assess the *habitat*, *hydrologic*, *social*, and *species occurrence functions* of most of Anchorage's freshwater *wetlands*, as part of the development of the *AWMP*. The ADCM uses the *AWAM* assessments in calculating *debits* and *credits* for situations in which there is no change in *REV*. *AWMP* Appendices B through K include a blank set of *AWAM* Data Sheets, as well as supporting information. Copies of individual *wetland* assessments are available from the Municipal Planning Department.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

AWMP

Definition: The Anchorage Wetlands Management Plan.

Additional Information: The Anchorage Assembly adopted the current *AWMP* in 1996 as an update to the original 1982 plan. The *AWMP* designates most of Anchorage's freshwater *wetlands* as "A," "B," or "C," with "A" *wetlands* having "the highest *wetland* resource values," "B" *wetlands* having "a

mixture of higher and lower values and *functions*," and "C" *wetlands* being the lowest value.

Except for large, heterogeneous sites, there is a fair amount of correlation between the *AWMP's wetland* designations and the ADCM's *REVs* (i.e., "A" *wetlands* are generally *REV* 1 and 2, while "C" *wetlands* are usually *REV* 3 or 4). Nearly 20 percent of Anchorage's *wetlands*, however, have the mixed-value designation of "B." In addition, more than three-fourths of our *wetland* acreage is in units of over 50 acres in size, many of which are also fairly heterogeneous. The ADCM provides a means for accommodating the heterogeneity in quantifying and comparing impacts to and benefits from *wetland* projects, as well as those in other types of aquatic areas.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

-B-

Bank(s)

Definition: A topographic feature that forms the wall or side of a *waterway* and is characterized by an abrupt change in ground slope that separates the channel from higher ground. (See Figure A-1.)

Additional Information: *Debits* generally accrue only for impacts to the *jurisdictional* portion of the *bank*. *Credit* calculations will generally include both the *jurisdictional* and non-*jurisdictional* portions of *restored*, *enhanced*, *established*, or *preserved bank.* In both instances, the size of the affected area is expressed in square feet.

For any calculations involving submerged *stream* channels, such as those beneath Westchester Lagoon, Campbell Lake, and beaver ponds, the term applies only to the *banks* of the original channel, not to the entire shoreline of the impoundment. When the average heights of the submerged *banks* are unknown, one can use the *banks* up- and/or downstream of the impoundment, measured from the *bed* to the top of the *banks*, to extrapolate an average height for the submerged *banks*.

NOTE: *Drainageways* may lack defined *banks*, but it is not necessary to differentiate between *banks* and *bed* when performing calculations.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

Bed

Definition: The bottom of a *waterway*. (See Figure A-1.)

Additional Information: For calculations involving submerged or impounded *stream* channels, such as those beneath Westchester Lagoon, Campbell Lake,

and beaver ponds, the term applies only to the bottom of the original channel, not the entire impounded area. When the width of the original channel bottom is unknown, one can use the bottom up- and/or downstream of the impoundment to extrapolate an average width for the submerged channel *bed*.

NOTE: *Drainageways* may lack a defined *bed*, but it is not necessary to differentiate between *bed* and *banks* when performing calculations.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

Beluga Whale Concentration Area

Definition: A term used to describe *unvegetated* areas of the *intertidal zone* that support concentrations of beluga whales.

Additional Information: The ADCM considers areas of *unvegetated intertidal zone* that support concentrations of beluga whales—such as the Eagle River estuary—to be *REV* 1. Documentation of such use may include surveys/reports by the National Marine Fisheries Service (NMFS) or other qualified entity. If such information does not currently exist and the area in question cannot be surveyed within the necessary timeframe, verbal consultation with NMFS may suffice. For additional information on Cook Inlet beluga whales, see *http://www.fakr.noaa.gov/protectedresources/whales/beluga.htm*.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

Best Management Practices (BMPs)

Definition: Measures required by a permit and/or employed by a project proponent to avoid and/or minimize adverse impacts associated with the work.

Additional Information: *BMPs* include actions such as scheduling construction activities to avoid nesting and spawning seasons, clearly delineating project boundaries to deter equipment operation and other disturbances beyond the authorized footprint, implementing erosion and sediment controls, using only non-invasive species native to the project area for revegetation, installing impermeable barriers in backfill material, etc. The ADCM's procedures for calculating *debits* for a project's *indirect impact zone* assume the permit authorizing a project will require implementation of appropriate *BMPs* to lessen offsite adverse impacts. Thus, *BMPs* typically reduce a project's *debits* only when they reduce the fill/disturbance footprint. Likewise, since ADCM *credits* correspond to an improvement in *function* and/or *REV*, *BMPs* typically earn *credits* only when they involve the *establishment*, *enhancement*, or *restoration* of *wetlands* or other aquatic resources (e.g., for stormwater attenuation).

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

Buffer

Definition: A 300-foot-wide area of land surrounding a *REV* 1 or 2 *stream*, *waterbody*, *intertidal zone*, or *inundated wetland* that protects it from existing or future physical, chemical, hydrologic, and other disturbances. (See Figure A-2.)

Additional Information: *Buffers* may be *wetlands*, *uplands*, or a combination thereof. They extend 300 feet in all directions from the edges of the aquatic area, unless truncated first by development (see below). Along *streams* and *waterbodies*, the innermost 25 to 100 feet of a *buffer* is also called a *setback*.

Due to their proximity to *surface water*, *buffers* typically provide higher value habitat than the same plant community would if located elsewhere. The ADCM considers most *buffers* to be *REV* 2. The *setback* portion of the *buffer* will have the same *REV* as the adjacent *stream* or *waterbody*, and thus, will sometimes be *REV* 1.

Activities and developments in *disturbance categories* 1 and 2, such as utility lines and non-motorized trails, usually do not truncate *buffers*, whereas those in *disturbance category* 3, such as two-lane or wider roads, typically do. Larger *non-naturalized* areas may also be mapped as *buffers*, so long as they function more to protect the *stream*, *waterbody*, *intertidal zone*, or *inundated wetland* than to create an *indirect impact zone* in it. For example, a historical fill that is not *developed* and has become well *vegetated* may function as a *buffer*, while one that is sparsely *vegetated* and eroding, and/or supports uses that generate more than incidental disturbances such as pollutants and noise, generally would not. (See Figure A-2.) The ADCM user should note the reasoning behind judgments on *buffer* existence or truncation in such situations on the appropriate spreadsheet.

Due to their lower level of *function*, w*aterbodies* and *inundated wetlands* that are both *remote* and very small (i.e., less than 2,500 square feet in size) typically will have only a 25-foot *setback*/*buffer*. Such waters may still be assigned a *REV* 1 or 2, but the *REV* assignment(s) for the surrounding lands would be based on existing condition, rather than location.

Work in *buffers* generally will not incur *debits* if it is not *jurisdictional*, unless the *buffer* is an *inclusion* and the work is closely associated with a *jurisdictional* project. Proposals involving the *restoration*, *enhancement*, and/or *preservation* of non-*jurisdictional buffers* may be eligible for *credits*, for both the *buffer* and, using Spreadsheet 4c, any adjacent *waterway*, so long as they satisfy the criteria for such projects.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

-C-

Channel Perimeter

Definition: A linear measurement of the cross-section of a *waterway*, extending from the top of one *bank*, down to and across the *bed*, and up to the top of the opposite *bank*. (See Figure A-1.)

Additional Information: The *channel perimeter*—measured in linear feet—is one of two components that determine the size of the affected area for projects involving the entire cross-section of a *waterway* (e.g., pipes, utility-line crossings, new channel construction). The other component is length, measured along the thalweg, or deepest part, of the affected channel segment. *Debits* generally accrue only for impacts to the *jurisdictional* portion of the *channel perimeter*. *Credit* calculations for projects that involve *REV improvement* will generally include both the *jurisdictional* and non-*jurisdictional* areas; *credits* for *enhancement* of some *functions* (e.g., fish passage, off-channel habitat) may apply to only the *jurisdictional* area (see Appendix D). Project proponents should seek a *jurisdictional* determination from the lead federal regulatory agency (i.e., Corps of Engineers or EPA).

For projects in which the affected length is more than a few feet, it is acceptable to use an average or representative figure(s) for *channel perimeter*, depending on the variability of the channel segment. Project proponents should consult with the lead federal agency (i.e., Corps of Engineers or EPA) in making determinations of average *channel perimeter*.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

Channelized: see *Non-naturalized*

Contiguous Undeveloped Area

Definition: The area of *wetlands*, other waters, and/or non-*developed uplands* that include and adjoin the *project site*. (See Figure A-3.)

Additional Information: The ADCM considers the size of the *contiguous undeveloped area* when determining the extent of disturbance, or *indirect impact factor(s)*, affecting the *project site*. The larger the *contiguous undeveloped area*, the less influence *indirect impact zones* have on the area's *functions*.

Except for snow disposal sites, utility substations and homes, activities and developments in *disturbance categories* 1 and 2 typically do not truncate the *contiguous undeveloped area*. The same can also be true of larger *non-naturalized* areas if their physical condition and existing use do not create an *indirect impact zone* in the other undeveloped areas.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

Creation: see *Establishment*

Credit(s) (cr/crs)

Definition: A unit of measure representing a gain of aquatic *function* (or the prevention of loss of *function* by means of *preservation*).

Additional Information: Project proponents may produce *credits* via *restoration*, *enhancement*, *establishment*, and/or *preservation* of aquatic resources and/or *functions*. They usually result from projects undertaken either directly by permittees or enforcement respondents to offset the adverse impacts of specific development activities, or, by in-lieu fee or similar programs that pool resources to offset impacts from multiple projects.

Credits offset *debits* on a one-to-one basis, so long as the lead federal regulatory agency (i.e., Corps of Engineers or EPA) has determined that the project producing the *credits* constitutes appropriate compensatory mitigation for the impacts represented by the *debits*. In most instances, it is unlikely that *REV* 3 or 4 *credits* would offset *REV* 1 or 2 *debits*.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

Credit Ratio

Definition: A unit of measure indicating the number of acres or square feet of *restoration*, *enhancement*, *establishment*, or *preservation* necessary to produce one *credit*.

Additional Information: For *restoration*, *enhancement*, and *establishment*, the *credit ratio* depends upon the extent to which the project would improve the area's *REV*. For *preservation*, the *credit ratio* considers both the *REV* of the area to be preserved, as well as the *threat* of development or substantial alteration. *Credit ratios* for *restoration*, *enhancement*, and *establishment* are listed in Table 9. Table 13 lists *credit ratios* for *preservation* projects.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

-D-

Debit(s) (db/dbs)

Definition: A unit of measure representing a loss of aquatic *function* at or adjacent to a *project site*.

Additional Information: Project *debits* account for both direct and secondary impacts, and take into consideration whether such impacts are likely to be

permanent or *temporary* in duration. *Debits* represent only impacts/losses that are unavoidable and cannot be further minimized, as determined by the lead federal regulatory agency (i.e., Corps of Engineers or EPA).

To offset *debits*, project proponents need to obtain appropriate *credits* on a minimum one-to-one basis, either by facilitating a specific aquatic area *restoration*, *enhancement*, *establishment*, and/or *preservation* activity, or by participating in an in-lieu fee or similar program. The lead federal regulatory agency will determine whether proposed *credits* represent appropriate compensatory mitigation for the impacts represented by a project's *debits*.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

Debit Ratio(s)

Definition: A unit of measure indicating the number of acres or square feet of *permanent* or *temporary impacts* or *new indirect impact zone* that produces one *debit*.

Additional Information: The *debit ratio* is based on the affected area's *REV*. Table 6 lists *debit ratios* for *waterway* and *wetland*/*waterbody*/ *intertidal zone* projects, respectively.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

De Minimis

Definition: A term referencing adverse impacts that are so inconsequential that they do not incur *debits*.

Additional Information: Consistent with Table 2 of Alaska District Regulatory Guidance Letter 09-01, most *jurisdictional* projects with *permanent* or *temporary impacts* to aquatic resources in the Municipality of Anchorage will require compensatory mitigation due to the extent of cumulative impacts that have already occurred in this area. For practicality, the ADCM does not apply this policyto projects that would result in less than 0.01 *debit* for their direct impacts (i.e., projects with *de minimis* impacts). The number of *debits* for a project's direct impacts depends on the size of the impacts, as well as the *REV* and the *aggregate existing indirect impact factor*(*s*) for the affected *polygon*(*s*). For simplicity, the ADCM uses just size and *REV* to establish thresholds for *de minimis* direct impacts. Table A-1 (next page) applies to *permanent impacts* and Table A-2 (next page) to *temporary impacts*.

Table A-1: Thresholds for *De Minimis Permanent* Direct Impacts

Landform	*REV*	Threshold
Waterway	1	20 sf
	2	30 sf
	3	40 sf
	4	50 sf
Other	1	0.010 ac
	2	0.015 ac
	3	0.020 ac
	4	0.025 ac

Larger projects may be *de minimis* if the *aggregate indirect impact factor* for the affected *polygon*(*s*) is less than 1.00. Such a determination requires completion of Steps 1 through 11 of Part B of the ADCM Procedures.

Table A-2: Thresholds for *De Minimis Temporary* Direct Impacts

Expected Time to Rectification	*Landform* and *REV* of Affected *Polygon*							
	Waterways (square feet)				Other *Landforms* (acres)			
	REV 1	*REV* 2	*REV* 3	*REV* 4	*REV* 1	*REV* 2	*REV* 3	*REV* 4
1 day	38,345	57,518	76,691	95,864	19.172	28.759	38.345	47.932
2 days	19,172	28,759	38,345	47,932	9.586	14.379	19.172	23.966
3 days	12,781	19,172	25,563	31,954	6.390	9.586	12.781	15.977
4 days	9,586	14,379	19,172	23,966	4.793	7.189	9.586	11.983
5 days	7,669	11,503	15,338	19,172	3.834	5.751	7.669	9.586
1 week	5,477	8,216	10,955	13,694	2.738	4.108	5.477	6.847
10 days	3,834	5,751	7,669	9,586	1.916	2.875	3.834	4.793
2 weeks	2,738	4,108	5,477	6,847	1.369	2.054	2.738	3.423
3 weeks	1,825	2,738	3,651	4,564	0.910	1.369	1.826	2.282
1 month	1,259	1,889	2,519	3,149	0.629	0.944	1.259	1.574
5 weeks	1,095	1,643	2,191	2,738	0.547	0.821	1.095	1.369
6 weeks	912	1,369	1,825	2,282	0.456	0.684	0.912	1.141
8 weeks	684	1,027	1,369	1,711	0.342	0.513	0.684	0.855
10 weeks	547	821	1,095	1,369	0.273	0.410	0.547	0.684
3 months	419	629	839	1,049	0.209	0.314	0.419	0.524
4 months	314	472	629	787	0.157	0.236	0.314	0.393
5 months	251	377	503	629	0.125	0.188	0.251	0.314
6 months	209	314	419	524	0.104	0.157	0.209	0.262
1 year	104	157	209	262	0.052	0.078	0.104	0.131
2 years	52	78	104	131	0.026	0.039	0.052	0.066
3 years	34	52	69	87	0.017	0.026	0.034	0.044
4 years	26	39	52	65	0.013	0.019	0.026	0.033
5 years	20	31	41	52	0.100	0.015	0.02	0.026

CAUTIONS: See next page.

CAUTIONS:

1) The size thresholds represent only direct impacts and include an assumption that corresponding indirect impacts will be minimal. The project authorization must include measures to avoid and minimize indirect impacts. Projects likely to cause more than minimal indirect impacts require *debit* calculations even if the project footprint is smaller than the threshold indicated in these tables.

2) These thresholds do not necessarily apply to modifications of previously authorized projects, for which the lead Federal agency may determine that *debit* calculations are necessary to address overall cumulative impacts, even if the footprint of the project modification is smaller than the threshold indicated in these tables.

3) The size thresholds in Table A-2 (next page) depend on a reasonable likelihood of successful site rectification within the selected time period and will not apply to all types of *polygons*. For example, the shortest time periods will apply only to unvegetated areas, because it would not be possible to confirm the success of revegetation in such short timeframes. Conversely, rectification of impacts to forested, spruce bog, and ericaceous shrub *wetlands* may not be possible within the five-year limit covered by the table, so projects in such areas either should use *financial assurance* or be treated as having *permanent impacts*.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

Developed

Definition: A term describing *uplands*—including former aquatic areas—that have been converted from their natural condition to support active human use. (See Figure A-3.)

Additional Information: *Developed* areas include structures, roads, regularly used parking areas, trails, lawns, playing fields, and similar areas. Areas that have been converted from their natural condition, but are still dominated by native vegetation (e.g., many utility-line corridors) generally are not classified as developed. *Developed* areas never qualify as *setbacks* or *buffers*. Through a lack of maintenance or active human use, *developed* areas may revert to a designation of *non-naturalized* *uplands*.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

Disturbance Category(ies)

Definition: A group of activities that have a similar level of indirect impacts.

Additional Information: The December 2000 version of the ADCM considered all activities to cause a ten percent reduction in *function* within their *disturbance shadows*. That reduction represented an average obtained by considering the best- and worst-case impacts of a variety of projects on the *AWAM* scores/*functions* of a subset of Anchorage Bowl *wetlands*. To provide for a more accurate quantification of existing and new indirect impacts, this update reflects an expanded analysis that included both a wider variety of project types and all wetlands that already have *AWAM* scores. Projects considered included a single-family home, a residential subdivision, a road, a railroad track, aviation facilities, multi-use and winter-only trails, sports fields, golfing facilities, playgrounds, parks, office facilities, restaurants, retail facilities of various sizes, materials extraction, processing and storage facilities, snow disposal sites, and both shallow and deep utilities. Potential impacts considered included changes to the hydrologic regime, erosion, sedimentation, turbitidy, runoff of fertilizers and other chemical pollutants, ad hoc activities such as clearing, dumping of waste, landscaping, and establishment of informal trails beyond the project footprint, the spread of exotic or invasive plants, and increased noise and visual disturbance.

The expanded analysis yielded three groupings of activities that this update characterizes as *disturbance categories* (see Table 3 of the Procedures):

- Category 1 activities, which produce the lowest level of indirect impacts (average 1% reduction in *AWAM* scores), including winter-only trails and existing utility-line corridors with no more than a ten-foot surface disturbance;
- Category 2 activities, which generally have a moderate level of indirect impacts (average 5% reduction in *AWAM* scores), and include single-family homes, multi-use trails, and existing utility-line corridors with more than a ten-foot surface disturbance; and
- Category 3, which have the highest indirect impacts (average 10% reduction in *function)* and include most commercial and industrial facilities, as well as residential subdivisions and roads.

The ADCM now differentiates between these categories in addressing *existing* and *new indirect impact zones*. For simplicity the ADCM assumes that the three categories would have similar levels of impact for all *landforms*, not just *wetlands*.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

Disturbance Shadow: see *Indirect Impact Zone*

Ditch

Definition: A constructed *waterway* that did not originate as a naturally occurring feature.

Additional Information: The origin of *ditches* differentiates them from *drainageways* and *streams*. *Ditches* are always constructed features that do not replace naturally occurring *waterways*, whereas *drainageways* and *streams* always originated as naturally occurring features. *Ditches* may have *perennial*, *intermittent*, or *ephemeral* flow. If they do not convey surface flow, the ADCM treats them as *waterbodies* or *wetlands*, instead of *waterways*.

Most, but not all, *ditches*, are *REV* 3 or 4. Since *naturalized ditches* typically provide better *hydrologic function*, the ADCM considers them to be *REV* 3, while *non-naturalized ditches* are *REV* 4. Salmonid-bearing *ditches*, such as some in the Old Girdwood townsite, are *REV* 2, due to the importance of that *function*.

Work in *ditches* typically will not incur *debits* if it is not *jurisdictional*, unless the *ditch* is an *inclusion* and the work is closely associated with a *jurisdictional* project. Work that is generally non-*jurisdictional* meets at least one of two criteria:

- the *ditch* was constructed entirely in *uplands*, is not tidally influenced, does not extend the *OHWM* of a water of the U.S., and drains only *uplands*; and/or
- the work is limited to maintenance of an existing drainage *ditch* to its original configuration and dimensions. Project proponents should seek a *jurisdictional* determination from the lead federal regulatory agency (i.e., Corps of Engineers or EPA) for projects involving *ditches*.

NOTE: Non-*jurisdictional* projects may still require municipal approval.

Enhancement of a *ditch's* ecological *functions* (e.g., by establishing vegetation to attenuate flow and filter pollutants) or *establishment* of a new *ditch* to replace a *ditch* or *drainageway* being eliminated may be eligible for *credits*, so long as the proposal satisfies the criteria for such projects, as described below. In appropriate circumstances, *enhancement* or *establishment* may qualify for *credits* even when the *ditch* is not *jurisdictional*.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

Dominant Indirect Impact Zone/Factor

Definition: The *indirect impact zone* that causes the greatest extent of indirect impacts in the affected area, producing the lowest *indirect impact factor*. The *indirect impact zone* and *factor* associated with *disturbance category* 3

activities are the most dominant, followed by those of *disturbance categories* 2 and 1, respectively.

Additional Information: When *indirect impact zones* overlap a *polygon* from different points of origin, there is a greater reduction in *function* than when a *polygon* is within only one *indirect impact zone*. It would be most accurate to apply each overlapping *indirect impact factor* to an affected *polygon* (e.g., a 0.90 for an existing road to one side of a *polygon* and a 0.95 for a single-family home to another side). However, in practice, that level of precision, particularly in an urbanized area like Anchorage, substantially increases the complexity and effort involved in mapping without having a significant effect on the overall *debit* or *credit* calculation. Therefore, the ADCM uses the *indirect impact zone* that has the greatest effect on the *polygon* (i.e., the *dominant indirect impact zone)*, in combination with *size factors*, which represent the degree of overlap, as a simplified approach to accounting for the presence of multiple *indirect impact zones*.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

Drainageway

Definition: A *waterway* that is—or was originally—a naturally occurring feature, has an *intermittent* or *ephemeral* flow regime, and lacks an *OHWM*.

Additional Information: *Drainageways* differ from *ditches* in origin, with *drainageways* being either naturally occurring *waterways* or constructed features that replace naturally occurring ones. *Drainageways* differ from *streams* in that they never convey *perennial* flow or exhibit an *OHWM*.

NOTE: The ADCM definition differs from that of the Municipal Hydrologic Classification System.

The ADCM considers most *drainageways* to be *REV* 3, unless they are *non-naturalized*, in which case, they will be *REV* 4. Drainageways are generally not *jurisdictional*, unless they also meet the definition of a *wetland*. Projects in non-*jurisdictional drainageways* generally will not incur *debits*, unless the *drainageway* is an *inclusion* and the work is closely associated with a *jurisdictional* project. The *enhancement*, *restoration*, or *preservation* of a *drainageway* may produce *credits*—even if the *drainageway* is not *jurisdictional*—so long as the proposal satisfies the criteria for such projects, as described below. Project proponents should seek a *jurisdictional* determination from the lead federal regulatory agency (i.e., Corps of Engineers or EPA) for projects involving *drainageways*.

NOTE: Non-*jurisdictional* projects may still require municipal approval.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

-E-

Ecological Unit: see *Landform* and *Polygon*

Enhancement (ENH)

Definition: Improving one or more *functions* of an existing *polygon* by altering the physical, chemical, and/or biological characteristics of either the area itself or the waters or land adjacent to it.

Additional Information: Some projects that the 2000 ADCM treated as "replacement of onsite hydrologic function" constitute *enhancement*. (Others may qualify as *establishment* or *restoration*.) *Enhancement* does not increase the areal extent of aquatic resources in an area. Examples of activities that may, in appropriate circumstances, generate *enhancement* *credits* include

- establishing open water in a *wetland* that currently lacks it, to improve wildlife habitat and species diversity;
- increasing the length of time that *surface water* is present in a *wetland*, to improve its value as waterbird nesting habitat;
- installing structural and/or vegetative visual/noise barriers adjacent to otherwise high-value habitat, to reduce disturbance to the habitat and increase its use by disturbance-sensitive wildlife;
- establishing robust herbaceous vegetation native to the Anchorage area in a *ditch*, or below a stormwater outfall, to provide flow attenuation for runoff;
- planting locally native trees and shrubs along a *stream* to to emulate nearby *natural polygons* and improve wildlife habitat and other riparian *functions*;
- placing features such as root wads and boulders in a *stream* channel, to improve *habitat function*;
- removing barriers to fish passage;
- providing educational or interpretive facilities describing the *functions* and values of an aquatic area; and
- constructing controlled access to an aquatic area to enhance public enjoyment of it and deter disruptive or inappropriate uses.

The publication "Streambank Revegetation and Protection: A Guide for Alaska" (http://www.sf.adfg.state.ak.us/sarr/restoration/techniques/techniques.cfm), published by the Alaska Departments of Fish and Game and Natural Resources, provides specific directions for several of types of *enhancement* projects.

Many *enhancement* activities improve only a portion of the overall *functions* of an aquatic area. The ADCM includes procedures for determining *credits* based on which *function(s)* an activity improves and to what extent it improves that *function(s)*. The ADCM also addresses calculating *credits* for

enhancement projects that do not improve an area's *REV*. Proposals that would convert one type of aquatic area to another of the same or lower *REV* (e.g., an *inundated wetland* to a *waterbody*, or certain *streams* or areas of *intertidal zone* to an impoundment) usually will not qualify for *credits*. Project proponents interested in such proposals should coordinate with the lead federal regulatory agency (i.e., Corps of Engineers or EPA) before making any irretrievable commitment of resources.

Some activities that, overall, constitute an *enhancement* may also produce *debits* during their implementation, reducing the net *credits* generated by the project. A new access point or interpretive trail, for example, may produce a *new indirect impact zone*, and could even involve a small amount of *permanent* or *temporary impact*. *Enhancement* involving the conversion of one type of aquatic area (e.g., *wetland*) to another (e.g., *waterbody*, *stream*) would also incur some *debits* for the permanent loss of existing aquatic *functions*. The ADCM procedures address determining *debits* in such situations. Projects in which the *debits* for loss of existing *function* would exceed the *credits* for *enhancement* (e.g., construction of a *waterbody* in a *REV* 1 or 2 *wetland*) likely would not receive the approval of the lead federal regulatory agency (i.e., Corps of Engineers or EPA).

CAUTION: As with other types of compensatory mitigation, a project proponent may use *enhancement credits* to offset *debits* only when the lead federal regulatory agency (i.e., Corps of Engineers or EPA) has determined that the adverse impacts of the development project are unavoidable and that the *enhancement* project would constitute appropriate compensatory mitigation for them. Activities necessary to avoid or minimize onsite devlopment impacts usually will not be eligible for *credits*.

To be eligible for *credits*, proposed *enhancement* projects must also provide the following information, at a level of detail commensurate with the scale and scope of the impacts, as required by the "final mitigation rule" (33 CFR 332.4(c)/230.94(c))

- include design plans that detail both existing and target site conditions (e.g., project area/component dimensions, site elevations/contours, vegetation, soil composition, hydrologic regime/water source);
- specify construction/installation, maintenance, and monitoring/reporting milestones;
- include *performance standards* and contingency plans addressing the target hydrologic regime and vegetation; and
- provide for permanent *preservation* of the *enhancement*/enhanced area (or for replacement, if all or part of it must be eliminated). This requirement typically includes the establishment of an entity (e.g., land trust, municipal or state agency, homeowners' association) that will be responsible for maintaining the site, as well as monitoring for and rectifying unauthorized or unanticipated disturbances to the preserved area. *Preservation* of *enhancements*/enhanced areas

themselves generally will not produce separate, additional *credits*; lands outside the footprint of the *enhancement* may be eligible for such *credits*.

Typically, *credits* for *enhancement* projects will not be available to offset *debits* until the specified *performance standards* have been met. For projects involving critical timing issues or a substantial commitment of financial resources, the lead federal regulatory agency (i.e., Corps of Engineers or EPA) may approve a phased release of *credits*, making up to one quarter of the anticipated total available upon approval of the *enhancement* plan, and up to a second quarter available upon completion of initial construction. When appropriate and practicable, permittees will need to establish a *financial assurance* to cover any up-front release of *credits*.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

Ephemeral

Definition: A term describing *waterway polygons* in which, during a typical year, water flows above the *bed* only during, and for a short duration after, individual rain and/or snow events. Precipitation is the primary direct source of water for *ephemeral waterways*, and flow duration is typically less than one month. *Waterways* that flow only during spring break-up generally fall into this category.

Additional Information: An *ephemeral stream* differs from an *ephemeral drainageway* in having an *OHWM*. The ADCM typically considers *ephemeral streams* to be a lower *REV* than *perennial streams*, because the shorter duration of flow limits the *habitat*, *hydrologic*, *species occurrence*, and *social function* and/or value. *Ephemeral streams* that are *natural* or *naturalized* are typically *REV* 3, while those that are *non-naturalized* are *REV* 4. Project proponents should seek a *jurisdictional* determination from the lead federal regulatory agency (i.e., Corps of Engineers or EPA) for projects involving *ephemeral streams*.

NOTE: Non-*jurisdictional* projects may still require municipal approval.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

Escrow Account: see *Financial Assurance*

Establishment (EST)

Definition: The creation of an aquatic resource where one did not formerly exist.

Additional Information: The term *establishment* replaces "creation," as used in the December 2000 version of the ADCM. Some projects that the 2000

ADCM treated as "replacement of onsite hydrologic function" constitute *establishment*. (Others may qualify as *enhancement* or *restoration*.) *Establishment* increases the areal extent of aquatic resources through the conversion of *uplands* to *waterway*, *wetland*, *waterbody*, or *intertidal zone*. *Establishment* projects generally should not occur in *uplands* of high ecological value. Projects that re-establish aquatic resources in previously filled areas constitute *restoration*, rather than *establishment*, whereas those that improve the *function(s)* of an existing aquatic resource represent *enhancement*.

CAUTION: As with other types of compensatory mitigation, a project proponent may use *establishment credits* to offset *debits* only when the lead federal regulatory agency (i.e., Corps of Engineers or EPA) has determined that the adverse impacts of the development project are unavoidable and that the *establishment* project would constitute appropriate compensatory mitigation for them.

To be eligible for *credits*, proposed *establishment* projects must also provide the following information, at a level of detail commensurate with the scale and scope of the impacts, as required by the "final mitigation rule" (33 CFR 332.4(c)/230.94(c))

- include design plans that detail both existing and target site conditions (e.g., project area/component dimensions, site elevations/contours, vegetation, soil composition, hydrologic regime/water source);
- specify construction, maintenance, and monitoring/reporting milestones;
- include *performance standards* and contingency plans addressing the target hydrologic regime and vegetation; and
- provide for permanent *preservation* of the project area (or for replacement, if all or part of it must be eliminated). This requirement typically includes the establishment of an entity (e.g., land trust, municipal or state agency, homeowners' association) that will be responsible for maintaining the site, as well as monitoring for and rectifying unauthorized or unanticipated disturbances to the preserved area. *Preservation* of established areas themselves generally will not produce separate, additional *credits*; lands outside the footprint of the established area may be eligible for such *credits*.

Typically, *credits* for *establishment* projects will not be available to offset *debits* until the specified *performance standards* have been met. For projects involving critical timing issues or a substantial commitment of financial resources to accomplish the *establishment*, the lead federal regulatory agency (i.e., Corps of Engineers or EPA) may approve a phased release of *credits*, making up to one quarter of the anticipated total available upon approval of the *establishment* plan, and up to a second quarter available upon completion of initial construction. When appropriate and practicable, permittees will need to establish and provide *financial assurance* to cover any up-front release of *credits*.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

Existing Indirect Impact Zone/Factor

Definition: The area and multiplier used in *debit* calculations to represent indirect impacts already in place at the site of proposed *permanent* or *temporary impacts*.

Additional Information: Through application of the *existing indirect impact factor* multiplier, *permanent* and *temporary impacts* within *existing indirect impact zones* incur fewer *debits* than those that occur where there are no *existing indirect impacts*. The lower number of *debits* accounts for reduced level of *function* in the *indirect impact zone(s)*. The extent of reduction in *function*—and *debits*—depends on the *disturbance category* for the activity creating the indirect impacts and the size of the *contiguous undeveloped area* that incorporates the *project site*.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

-F-

Financial Assurance

Definition: A term used to represent a suite of options available to a project proponent to provide a guarantee for the success of compensatory mitigation and/or rectification of *temporary impacts*. *Financial assurance* is a requirement, rather than an option, for projects involving slow-growing or difficult to replace plant communities such as forested, spruce bog and/or ericaceous shrub wetlands.

Additional Information: *Financial assurances* may include escrow accounts, performance bonds, letters of credit, promissory notes, refundable in-lieu fee payments, banked *credits*, and similar instruments/actions. For compensatory mitigation projects, such assurances will typically be necessary when the project proponent seeks a phased, or up-front, release of *credits* to offset *debits*. For such projects, the amount of *financial assurance* typically will be equivalent to the in-lieu fee representing the number of *credits* that would be released.

Financial assurances also allow for more site- and activity-specific assessment of *debits* for construction projects with *temporary impacts*. In such instances, the amount of *financial assurance* would equal the in-lieu fee amount necessary to offset the *debits* for expected *temporal impacts*, based on the anticipated timeline from start of work to rectification of the affected *polygon(s)*. The formula for determining the *debits* for temporal impacts (and the amount of *financial assurance* necessary) is

$$D_T = [(S/R) \times F \times (T/1826 \text{ days})]$$

where

D_T = the *debits* for *temporal impacts;*
S = the size of the *temporal impact* (in square feet for *waterways* or acres for other waters);
R = the *debit ratio* for the affected *polygon;*
F = the existing *indirect impact factor* for the *polygon*; and
T = the duration of the *temporal impacts* (i.e., the amount of time that elapses between the initiation of impacts and the determination that the rectification has satisfied the specified *performance standards*; to determine the amount of *financial assurance*, use the anticipated duration of impacts).

CAUTION: The formula uses 1826 days (i.e., five years) as the divisor for the duration of impacts because five years is the threshold that the ADCM uses to differentiate between *permanent* and *temporary impacts*. The 0.5 multiplier used for projects that do not include *financial assurance* equates to an impact of 2.5 years. Projects in which the impacts are expected to exceed 2.5 years in duration must use *financial assurance*, rather than having it as an option.

For projects that use *financial assurance*, the permit or other authorizing document would specify the duration of impacts used to calculate the *financial assurance*, as well as *performance standards* for rectification of the *temporary impacts*, emphasizing the return of affected *polygons* to their previous condition or one of higher *REV* (as opposed to achieving rapid revegetation with species that are fast-growing, but are not representative of the pre-project plant community). Mid-project changes in the anticipated duration of impacts would require additional *financial assurance*. Upon successful rectification, as confirmed by the lead federal regulatory agency (i.e., Corps of Engineers or EPA), a final calculation, using the actual duration of impacts will reveal the amount of refund/release due to, or additional in-lieu fee or other compensatory mitigation owed by, the permittee.

For projects that cause *temporary impacts* in *vegetated* areas during late autumn, winter, or early spring (i.e., mid-October through mid-April), when revegetation cannot begin immediately due to climatic conditions, the lead federal regulatory agency (i.e., Corps of Engineers or EPA) may stop the accumulation of time for "T" once inspection confirms that other elements of rectification (e.g., re-establishment of pre-project elevations and contours, implementation of erosion and sediment controls) have been completed. In such instances, the accumulation of time for "T" would resume the following mid-April.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

***Floating Aquatic Mat**: see Quaking Bog*

Flowing Waters: see *Waterways*

Function(s)

Definition: The physical, chemical, and biological processes that a *polygon* does or could perform that are of value to society and/or the environment.

Additional Information: The term *function* replaces "functional component," as used in the 2000 ADCM. The ADCM uses the same four categories of *functions* considered by the *AWAM* and organized by it into four components: *hydrologic*, *habitat*, *species occurrence*, and *social function*. Appendix D describes the *Waterway Assessment Method for Anchorage*, or *WAMA*, an adaptation of the *AWAM* to *waterways*.

The ADCM generally considers most fill, grading, excavation, and *waterway* crossing activities to eliminate all of the *project site*'s natural *functions*, at least temporarily. Likewise, the ADCM generally assumes that projects that improve an area's *REV* (e.g., *establishment*, *restoration*) will also improve all the *functions* normally performed by that type of aquatic area.

Some construction activities may not adversely affect all of an area's natural *functions*. For example, clearing that does not disturb the vegetative mat may not eliminate an area's *hydrologic function* and clearing of only trees may allow for retention of some *habitat function*, as well. (Such clearing generally incurs *debits* only when it is a closely associated with a *jurisdictional* activity.) Likewise, a properly designed, installed, and maintained culvert may retain some or all of a waterway's *species occurrence function* and/or some *hydrologic function*.

Similarly, many *enhancement* projects and some *establishment* projects may not change an area's *REV* and/or may improve only one or two components of its overall *function*. For example:

- stormwater attenuation/filtering projects may provide only *hydrologic function*;
- a visual screen may improve only *species occurrence function*;
- interpretive facilities will provide only *social function*; and
- a culvert replacement project may improve only *hydrologic* and/or *species occurrence* function.

The ADCM assigns *debits* and *credits* for such projects based on the extent to which the project will reduce or improve the affected function(s), combined with its contribution to the aquatic area's overall *function*. In *wetlands*, *waterbodies*, and the *intertidal zone*, the calculations utilize the *AWAM*. For *waterways*, the ADCM includes procedures for calculating *credits* based on the extent of improvement for the affected *function(s)*, with each *function*

weighted equally as the others. The ADCM uses the same weighting to determine *debits* for projects that do not affect all *waterway functions*, applying the corresponding percentage to the number of *debits* that a complete loss of *function* would produce.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

Functional Component(s): see *Function(s)*

-H-

Habitat Function

Definition: The physical environment provided by the plant communities, substrate, and/or waters in or associated with an aquatic area that determine the extent to which the area is hospitable to fish and wildlife.

Additional Information: *Habitat function* is one of four broad categories of *function* the ADCM considers that aquatic areas provide. (The other three are *hydrologic function*, *species occurrence*, and *social function*. *Habitat function* differs from *species occurrence function* in that it represents the quality and complexity of the area itself, whereas *species occurrence function* considers the extent to which particular plant, fish, or wildlife species actually are present in or use the aquatic area.) To assess the quality of habitat provided by freshwater *wetlands* and associated waters, the *AWAM* considers physical attributes such as plant community structure and diversity, interspersion/edge effect, productivity, and proximity to, as well as interspersion, persistence, and size of, open water. The *AWAM's habitat function* assessment procedure constitutes Section 2 of the *AWMP's* Appendix B. For projects in *waterways*, the ADCM uses the *Waterway Assessment Method for Anchorage* or *WAMA*, which incorporates or adapts *habitat* assessment parameters from several sources (see Appendix D). The *WAMA* considers parameters such as the extent and duration of surface and hyporheic flow, water quality, suitability of substrate for fish and aquatic macroinvertebrates, and the diversity of available cover, pools/refugia, and food sources.

The ADCM generally considers that most fill, grading, and excavation activities completely eliminate the *project site's habitat function*, at least temporarily. The same is true for projects that replace a *waterway's* channel, *bed*, or *bank* with pipe, concrete, or similar materials and projects that temporarily eliminate habitat by redirecting flow or diverting the channel itself. Likewise, the ADCM generally assumes that projects that improve an area's *REV* (e.g., re-establishing locally native vegetation in a *non-naturalized* area, rebuilding a meandering channel for a *non-naturalized stream*) will result in a commensurate improvement in the area's *habitat function*.

A few construction activities (e.g., clearing that removes only trees but retains an area's shrub and herbaceous strata) can maintain some of the

project site's habitat function. (Such clearing generally incurs *debits* only when it is a closely associated with a *jurisdictional* activity such as a road fill or a utility-line trench.) Conversely, some *enhancement* projects (e.g., increasing plant community diversity, eliminating or providing treatment for a stormwater outfall) may improve *habitat function* without changing the area's *REV* and thus may be eligible for *credits*, so long as the proposal satisfies the criteria for *enhancement* projects, as defined herein. The ADCM assigns *debits* and *credits* based on the extent of diminution or improvement of the *habitat function* and its contribution to the area's overall *function*, as assessed by the *AWAM* or *WAMA*.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

Headwaters

Definition: The portions of a watershed drained by first- and second-order *streams* (i.e., *streams* that have no tributaries or only first-order tributaries, respectively). (See Figure A-4.)

Additional Information: The ADCM uses the term *headwaters* to define the areas in which *AWMP* policies indicate an 85-foot *setback* for *waterways* and *waterbodies* that do not support *salmonids*. Use of a wider *setback* in headwaters areas (i.e., 85 feet instead of the *AWMP's* general 65 feet for non-*anadromous* waters) recognizes their importance to the hydrologic and ecological processes of the overall *stream* (e.g., flow contribution/attenuation, food chain support, etc.). Since the mapping of *streams* and watersheds in Anchorage is an ongoing process, project proponents should coordinate with the lead federal regulatory agency (i.e., Corps of Engineers or EPA) in determining whether project area *waterways* and *waterbodies* lie within the headwaters. Municipal watershed maps may be found at http://wms.geonorth.com/library/LibraryMaps.aspx. *Stream* mapping found at http://munimaps.muni.org/mox52/advanced.cfm?&action=mox52_if_frameset may not be definitive, but can serve as a general indication of *stream* order.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

Heavily Impacted Watersheds

Definition: The watersheds of Chester, Fish, Furrow, Hood, and Little Campbell Creeks, as well as the stream that enters Campbell Lake just north of Olympic Drive ("Independence Creek"), the stream that enters Little Rabbit Creek at Bridgeview Drive ("White Horse Creek"), and the stream that flows along Eagle River Loop Drive, Farm Avenue and the Glenn Highway ("Clunie Creek").

Additional Information: This term comes into play in assigning *indirect impact factors*, which represent reduced *function* caused by the presence of one or more developments or other sources of disturbance within 300 feet of a *polygon*. It does not equate to waters listed as "impaired" under Section 303(d) of the Clean Water Act. Rather, the *heavily impacted watersheds* exhibit *wetland* loss, *stream* channel alteration and/or proportion of impervious surface at levels substantial enough to have markedly increased turbidity, sedimentation, flooding, erosion and/or similar degradations, and jeopardized *natural stream functions*. As a result, the importance of remaining aquatic areas in those watersheds, for *functions* such as flow attenuation, sediment retention and/or filtration, habitat and open space has increased, thus offsetting the reduction in *function* caused by disturbance. In those watersheds, the ADCM adjusts the *indirect impact factor* to reflect the increased importance of the remaining aquatic areas.

For purposes of this definition, "watershed" is not limited to any particular stream order and may be as small or large as is appropriate to the level of impact. However, when only a portion of a watershed—of whatever size—is *heavily impacted*, the ADCM will treat all watersheds upstream of that area as *heavily impacted* as well, to reflect the importance of the less altered areas in maintaining the remaining *functions* of the more impacted area. Examples of the application of this concept include Chester and Little Campbell Creeks, in which the *heavily impacted* areas are in the lower to middle third of the overall watershed, but the *heavily impacted* designation applies to the entire watershed upstream of there.

The watersheds of Alyeska, Campbell, Carol, and Elmore Creeks have levels of alteration just below those of the watersheds identified in the definition. The next update of the ADCM should consider whether additional those watersheds (or others) have reached a level of development equivalent to other *heavily impacted watersheds*.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

High Bird Use: see *Waterbird Concentration Area*

Highly Degraded: see *Non-naturalized*

Hydrologic Function

Definition: The physical, chemical, and biological processes that affect water quantity and quality.

Additional Information: *Hydrologic function* is one of four broad categories of *function* the ADCM considers that aquatic areas perform. (The other three are *habitat function*, *species occurrence*, and *social function*.) To assess the level of *hydrologic function* performed by a *wetland*, the *AWAM* considers the *wetland's* ability to detain or retain stormwater and flood flows, filter pollutants

from those flows, and provide protection against erosion. The *AWAM* also takes into account the relative importance of such actions to the drainage basin. The *AWAM's hydrologic function* assessment procedure constitutes Section 1 of the *AWMP's* Appendix B. Most of the *AWAM's* assessment criteria are also applicable to *waterways*; flow detention/retention, pollutant filtration, and erosion protection functions are higher in *natural* or *naturalized waterways* that, for example, have a well-vegetated floodplain bench below the top of *bank* (see Figure A-1) and are lower in many *piped stream* segments. Appendix D describes the *Waterway Assessment Method for Anchorage,* or *WAMA,* which is an adaptation of the *AWAM* that the ADCM uses for *waterways*. In addition to parameters it adopted from the *AWAM*, the *WAMA* also considers flow constriction, floodplain connectivity, sinuosity, and *bank* stability.

The ADCM generally considers that most fill, grading, and excavation activities completely eliminate the *project site's hydrologic function*, at least temporarily. Likewise, the ADCM generally assumes that projects that improve an area's *REV* will result in a commensurate improvement in the area's *hydrologic function*.

Some construction activities (e.g., clearing that does not disturb the vegetative mat, culverts that span a *waterway's banks*) can occur without substantially affecting the aquatic area's *hydrologic function* and receive a corresponding reduction in *debits*. (Clearing such as described generally incurs *debits* only when it is a closely associated with a *jurisdictional* activity.) Certain *establishment* and *enhancement* projects (e.g., construction of biofiltration swales, increasing the density of robust, locally native herbaceous vegetation to provide filtration, upgrading a culvert to facilitate construction of a floodplain bench within the pipe) may improve *hydrologic function* without changing the area's *REV* and thus may be eligible for *credits*, so long as the proposal satisfies the criteria for *enhancement* projects, as described herein. The ADCM assigns *debits* and *credits* based on the extent of diminution or improvement of the *hydrologic function* and its contribution to the area's overall *function*, as assessed by the *AWAM* or *WAMA*.

The December 2000 version of the ADCM included procedures to determine *credits* for the on-site replacement of existing *hydrologic function* through the construction of permanent stormwater controls such as detention basins and biofiltration swales. This update has eliminated that section and treats such actions as *enhancement* or *establishment* projects.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

-I-

Inactive Channel

Definition: A *stream* channel *polygon* that, under normal hydrologic conditions, no longer conveys surface *stream* flow. (See Figure A-2.)

Additional Information: An *inactive channel* is a former meander or other segment of *stream* that has been abandoned either because of natural forces or intentional diversion of flow. It may or may not have a surface connection to the active *stream* channel. A "connected" *inactive channel* receives *surface water* from the *stream* when flows are at bankfull discharge or less, whereas a "disconnected" channel never, under normal hydrologic conditions, receives surface flow from the *stream*.

Connected *inactive channels* perform *functions* similar to the *stream* itself. While some *functions* occur with less frequency in the *inactive channel*, they can also be of increased importance, because they occur at times of higher flow. Providing clear-water refugia for juvenile fish and flood storage capacity are two examples of such *functions*. Consequently, the ADCM typically assigns connected *inactive channels* the same *REV* as the *stream*. Disconnected *inactive channels* may appear as *waterbodies*, *wetlands*, *uplands*, or *drainageways*, with *functions* and *REV* assignments that correspond accordingly. In the spreadsheets, disconnected *inactive stream channels* may be combined with other *polygons* with which they share the necessary commonality of attributes (e.g., *REV*, *indirect impact factor*), but ADCM maps should specifically identify them as *inactive channels* to facilitate the evaluation of mitigation (i.e., avoidance, minimization, *restoration*, *enhancement*, and/or *preservation*) opportunities.

Work in *inactive channels* will not incur *debits* if it is not *jurisdictional*, unless the *inactive channel* is an *inclusion* and the work is closely associated with a *jurisdictional* project. Project proponents should seek a *jurisdictional* determination from the lead federal regulatory agency (i.e., Corps of Engineers or EPA) for projects involving *inactive channels*.

NOTE: Non-*jurisdictional* projects may still require municipal approval.

Reconnecting disconnected *inactive channels* may produce *credits* through *REV improvement* (of the *inactive channel*) and/or improvement in the *habitat function* of the active *stream* channel. (See Appendix D, section II.B.2f.)

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

Inclusion(s)

Definition: A small (i.e., less than two-acre) area of *uplands* and/or non-*inundated* *wetlands* that abuts a *REV* 1 or 2 *inundated wetland*, *waterbody*, and/or *intertidal zone* on at least 75 percent of its perimeter. (See Figure A-5.)

Additional Information: The term *inclusion* replaces the terms "*island*" and "peninsula" used in the December 2000 version of the ADCM. Although their plant communities and hydrologic regime are indicative of a *REV* 3, the ADCM assigns *inclusions* the same *REV* as the surrounding aquatic area. This assignment reflects the higher ecological value associated with the habitat diversity and "edge effect" resulting from their geographic context.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

Indirect Impact Factor

Definition: A multiplier used in *debit* and *credit* calculations to represent the loss of *function* resulting from disturbance (i.e., indirect or secondary impacts) at or adjacent to a *project site*.

Additional Information: The term *indirect impact factor* replaces "shadow factor," as used in the December 2000 version of the ADCM. Development and construction activities typically cause some measure of adverse indirect impacts beyond the project footprint (i.e., the *indirect impact zone*). Such impacts include changes in hydrologic/hydraulic regime, degradation of water quality, alteration of plant communities and other *habitat* qualities, disturbance or harassment of fish and wildlife, etc.

The *AWAM* considers a total of 48 factors that produce numerical scores representing the level of *hydrologic*, *habitat*, *species occurrence*, and *social functions* performed by a freshwater *wetland*. The scores for nearly half of the *AWAM* factors (e.g., *surface water* persistence, breeding bird diversity, degree of disturbance/aesthetic values) are susceptible to diminution as a result of indirect impacts.

An analysis of the likely effects of various activities on Anchorage *wetlands* indicates that they fall into three *disturbance categories*. Activities within the low-impact category of 1 will typically reduce *AWAM* scores/*functions* within the *indirect impact zone* by only about one percent, while category 2 and 3 activities will generally reduce *function* by five and ten percent, respectively. (NOTE: The analysis of reductions in *AWAM* scores assumed proper implementation of appropriate *best management practices* to avoid and minimize impacts to the extent practicable.)

As noted above, the ADCM*'s indirect impact factors* represent the average loss of *function* over the entire area inside an *indirect impact zone*. The impacts are actually more pronounced immediately adjacent to the disturbance and approach zero toward the outer edge of the *indirect impact zone* (see Figure A-6). In calculating *debits* for the *indirect impact zones* of new projects, the ADCM accommodates this gradation of impact by using a sliding scale of *indirect impact factors* based on the extent to which the new project would expand or extend an existing footprint or disturbance (see Table 7). Where the extent of expansion is not uniform along the outer edge of a

project site, the ADCM user may employ either the maximum width of the new disturbance, which simplifies the calculation, or the average width, which requires more analysis, but also more accurately reflects the extent of impact and will produce fewer *debits*.

The ADCM also takes into account the reduced level of *function* at proposed *project sites* that fall within one or more *indirect impact zones* at the time of project implementation (*existing indirect impact zones*) or shortly thereafter (*post-project indirect impact zones*). The procedure uses the *dominant indirect impact zone* and its associated *factor*, combined with *size factors*, which represent the degree of *impact zone* overlap, to produce an *aggregate existing* or *post-project indirect impact factor* for a *project site*.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

Indirect Impact Zone(s)

Definition: The area in which indirect adverse impacts of development and construction activities are most likely to occur. The *indirect impact zone* extends 300 feet from the edges of *developed* areas, construction zones, and certain other areas that cause indirect impacts to neighboring aquatic areas, as described below. (See Figure A-3.)

Additional Information: The term *indirect impact zone* replaces "disturbance shadow," as used in the December 2000 version of the ADCM. Adverse impacts in the *indirect impact zone* often result in changes in the hydrologic/hydraulic regime, degradation of water quality, alteration of plant communities, physical displacement of habitat, and reduction of habitat quality. Examples include changes in *stream* flow, flooding, excessive drainage, increased erosion, sedimentation and/or turbidity, clearing of vegetation beyond project/property boundaries, the spread of exotic or invasive plant species from adjacent lawns and landscaped or disturbed areas, disposal or storage of yard or construction materials and waste products, construction of fences, sheds, and other structures, the establishment of informal foot trails, increased noise, and harassment of wildlife by people or pets.

Most projects incur *debits* to account for the indirect/secondary impacts that occur within the *indirect impact zone* created by the new work (i.e., the *new indirect impact zone*). The ADCM also takes into account the presence of an *existing indirect impact zone* when calculating *debits* for new projects, and considers what *indirect impact zones* will be in place (i.e., "post-project *indirect impact zones*") upon completion of *credit*-producing projects (see *indirect impact factor*). For simplicity and consistency, the ADCM uses 300 feet as the *indirect impact zone* width for all projects and activities. This distance is intended to represent an average and derives from a review of scientific literature addressing the reach of disturbances such as those described above. Since each additional source of disturbance cumulatively impacts the overall *functions* of the remaining area, *debits* for *indirect impacts* accrue iteratively

(i.e., new development or construction activities continue to incur *debits* for *indirect impact*s even when the affected area is already within the zone of influence of a previously existing disturbance*).*

The ADCM also considers projects in *wetlands*, *waterbodies*, or the *intertidal zone* to create an *indirect impact zone* in nearby *waterways* when they encroach within the *waterway's setback* or *buffer*. The resulting *debits*, calculated in Spreadsheet 1c (see Appendix B), correspond to the extent of *setback* and/or *buffer* loss.

Indirect impact zones typically extend across relatively minor developments such as utility-line corridors and non-motorized trails, but not across sources of greater disturbance, such as two-lane or wider roads. Instream *indirect impact zones* usually do not extend beyond culverts up- or downstream of the *project site*.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

Intermittent

Definition: A term that, when used in the temporal sense, describes *waterway polygons* that, during a typical year, have flow above the *bed* only during periods when groundwater is high. Groundwater is the primary direct source of flow for temporally *intermittent streams*. Flow duration typically exceeds one month.

Additional Information: A temporally *intermittent stream* differs from a temporally *intermittent drainageway* in having an *OHWM*. The ADCM typically considers temporally *intermittent streams* to be a lower *REV* than *perennial streams*, because the shorter duration of flow limits *habitat*, *species occurrence*, and *social function* and/or value. Temporally *intermittent streams* that are *natural* or *naturalized* are typically *REV* 3, while those that are *non-naturalized* are *REV* 4.

Some *waterways* (e.g., Edmonds Creek, Craig Creek) are spatially *intermittent* by nature, with certain segments flowing underground and others on the surface. (The term "spatially *intermittent*" does not apply to *waterways* in which some segments have been *piped* or placed in a culvert.) Work in spatially *intermittent* segments of *waterway* will not incur *debits* if it is not *jurisdictional*, unless the *polygon* is an *inclusion* and the work is closely associated with a *jurisdictional* project). Project proponents should seek a *jurisdictional* determination from the lead federal regulatory agency (i.e., Corps of Engineers or EPA) for projects involving spatially *intermittent streams*.

NOTE: Non-*jurisdictional* projects may still require municipal approval.

For purposes of the ADCM, the *REV* for surface *polygons* of spatially *intermittent waterways* should be assigned based on the same factors as

other *waterways*. The *REV* of lands above sub-surface segments will generally depend on the surface conditions (e.g., *upland* versus *wetland*) and proximity to the surface *polygons* (e.g., *setback*, *buffer*, etc.).

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

Intertidal Zone

Definition: An area that is alternately flooded and exposed by tides.

Additional Information: In Anchorage, the *intertidal zone* includes salt marshes, mud flats, and rocky shores. The lower limit of the *intertidal zone* here is the elevation of mean lower low water (MLLW) and the upper limit is the high tide line (+34.4 feet, MLLW). (See Figure A-7 and *http://www.poa.usace.army.mil/reg/Tidalpercent20Data.pdf*). The ADCM divides the *intertidal zone* into *vegetated* (*REV* 1) and *unvegetated* areas, and further subdivides *unvegetated intertidal zones* into those that are *waterbird* or *beluga whale concentration areas* (*REV* 1) and those that are not (*REV* 2).

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

Inundated/Inundation

Definition: Covered with a measurable depth of *surface water*.

Additional Information: The term *inundated* replaces 2000 ADCM's term "ponded" and also incorporates "springs" and "seeps," where such features have *surface water*. The presence and persistence of inundation are key factors in determining the *REV* of *wetlands*, *waterbodies*, and *waterways*, based on the fundamental importance of water in ecological processes.The ADCM assigns a higher *REV* to *inundated wetlands* than those that are never *inundated*, and a higher *REV* to *wetlands*, *waterbodies* and *waterways* that have longer periods of *inundation* than those in which *inundation* is more transient.

Wetlands

Inundation through the end of June

For *wetlands*, the ADCM assigns a higher *REV* to *polygons* in which *inundation* is normally present from spring break-up through the end of June (formerly described as "*persistently inundated*"). *Wetlands* that normally have *inundation* through June generally provide higher value *hydrologic*, *habitat*, *species occurrence*, and *social function* than those that have *surface water* for a shorter period. In particular, the lengthier presence of *surface water* better enables such *wetlands* to support the full breeding cycle of waterbirds. Consequently, the ADCM considers most *wetlands* that are *inundated* through June to be *REV* 1.

Inundation only in Spring and/or Autumn

Wetlands that have *surface water* for at least two consecutive weeks between break-up and the end of June and/or between mid-August and the end of October (previously described as "*seasonally inundated"*) generally provide higher value *hydrologic*, *habitat*, *species occurrence*, and *social function* than *wetlands* with no *surface water* (e.g., for flood attenuation and/or bird migration)*,* but less than *wetlands* in which *surface water* persists for a longer portion of the breeding season. Springtime inundation provides important resting, feeding and/or staging habitat for migrating and/or summer resident waterbirds, as well as detention/retention of snowmelt and, in some cases, water quality maintenance through settling and/or filtration, The inclusion of an autumn timeframe recognizes the importance for *wetland*-specific *functions* such as flood attenuation. The ADCM considers most of these "seasonally inundated" *wetlands* to be *REV* 2.

Remote and Very Small Wetlands

For *inundated wetlands* that are both *remote* and very small (i.e., less than 2,500 square feet in size), the ADCM reduces the *REV* by one level (i.e., *REV* 2 if they are *inundated* through June or *REV* 3 if they are *inundated* only in the spring and/or autumn). The ADCM considers such *wetlands* too small to have high *habitat* or *social function*. The ADCM similarly reduces the *REV* for *inundated wetlands* that are *non-naturalized*. Such *wetlands* often result from stormwater discharges, and the corresponding changes in water quality and plant species diversity somewhat reduce the *habitat functions* of the affected *polygons*.

Out-of-Season Indicators of *Inundation*

When it is not possible to confirm the presence of *surface water* in the field, the ADCM user may infer *inundation* from other information, such as photography, familiarity with the site, and/or anecdotal reports. When field investigation is possible, but the visit must occur out of season and/or the season's climatic conditions differ from the norm (as established by historic rainfall and/or winter water storage records), the ADCM user can assume that *inundation* generally occurs in *polygons* that have:

1) a *mosaic* of complex microtopography such as strangmoor and/or hummocks, in conjunction with at least one of the last five indicators;

2) standing dead Betula papyrifera, Picea glauca and/or P. mariana, in conjunction with at least one of the following indicators;

3) ice above the soil surface;

4) an *OHWM*;

5) soil that is both exposed due to circumstances other than recent disturbance and saturated or cracked;

6) soil that is saturated to the surface between mid-July and freeze-up; or

7) a plant community in which one or a combination of the species in Table A-3 are well represented (i.e., more than incidental):

Table A-3: Plant Species Indicators of Inundation

Species	Indicates Inundation…	
	Through June	In Spring or Autumn
Alopecurus aequalis		x
Andromeda polifolia		x
Beckmannia syzigachne		x
Callitriche spp.	x	
Caltha palustris	x	
Cardamine pratensis		x
Carex aquatilis		x
C. atherodes	x	
C. canescens		x
C. capitata		x
C. chordorhiza		x
C. diandra		x
C. echinata (phyllomanica)	x	
C. gynocrates (dioica)		x
C. lasiocarpa	x	
C. lenticularis (kelloggii)		x
C. leptalea		x
C. limosa		x
C. livida		x
C. loliacea		x
C. lyngbyaei	x	
C. magellanica (paupercula)		x
C. pauciflora (microglochin)		x
C. pluriflora		x
C. rostrata	x	
C. rotundata	x	
C. sitchensis		x
C. utriculata (rhynchophysa)	x	
C. vaginata		x
Chamaedaphne calyculata		x
Cicuta spp.	x	
Drosera angustifolia		x
D. rotundifolia		x

Table A-3: Plant Species as Indicators of Inundation (continued)

Species	Indicates Inundation…	
	Through June	In Spring or Autumn
Eleocharis palustris	x	
Equisetum fluviatile		x
E. palustre		x
Eriophorum angustifolium		x
E. russeolum		x
E. scheuchzeri		x
E. viridicarinatum		x
Hippuris spp.	x	
Isoetes echinospora	x	
Juncus bufonius		x
Lemna minor	x	
Lysimachia thyrsiflora	x	
Malaxis paludosa		x
Menyanthes trifoliate	x	
Mimulus guttatus	x	
Myrica gale, < 6″ height	x	
M. gale, > 6″ height		x
Myriophyllum spp.	x	
Nuphar polysepalum (luteum)	x	
Nymphaea tetragona	x	
Pinguicula spp.		x
Polygonum amphibian	x	
Potamogeton spp.	x	
Potentilla palustris		x
Ranunculus gmelini	x	
R. hyperboreus	x	
R. trychophyllus	x	
Salix fuscescens		x
Scirpus validus	x	
Scutellaria galericulata		x
Sparganium spp.	x	
Sphagnum fuscum		x
S. squarrosum		x
S. warnstorfii	x	
Spiranthes romanzoffiana		x
Trichophorum (Eriophorum) alpinum		x
Trichophorum (Scirpus) caespitosum		x
Triglochin maritimum		x
T. palustris	x	
Typha latifolia	x	
Utricularia spp.	x	
Vaccinium oxycoccos (Oxycoccus microcarpus)		x

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

***Island**:* see *Inclusion*.

-J-

Jurisdictional

Definition: Subject to regulation under Section 404 of the Clean Water Act and/or Section 10 of the Rivers and Harbors Act of 1899.

Additional Information: The term applies to both activities and aquatic areas. Section 404 regulates the discharge of dredged, excavated, and fill materials into waters of the U.S., while Section 10 applies to structures or work in or affecting navigable waters. The *jurisdictional* status of activities and *project sites* strongly affects the extent to which development/construction activities incur *debits* and *enhancement*, *restoration*, and *preservation* projects generate *credits* pursuant to the ADCM.

Factors determining jurisdiction can be complex and are subject to change pursuant to judicial, legislative, and/or administrative action. Consequently, it is always advisable for project proponents to seek a *jurisdictional* determination from the lead federal regulatory agency (i.e., Corps of Engineers or EPA), at a minimum, before initiating activities involving clearing, grading, excavation, stockpiling, and/or placement of fill or backfill, or, ideally, early on in project-planning stages.

NOTE: Areas preserved under the requirements of a Corps of Engineers permit—including *uplands*—remain *jurisdictional* regardless of changes in the scope of the Clean Water Act, unless the Corps modifies the permit to provide for alternative compensatory mitigation.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

-L-

Lake: see *Waterbody*

Landform(s)

Definition: A broad mapping unit consisting of *polygons* that share the same basic environmental characteristics. (See Figure A-7.)

Additional Information: The term *landform* replaces "type of area," which the 2000 ADCM used, along with "other characteristics," to delineate "ecological units." For Anchorage, the ADCM identifies six *landforms*: the *subtidal zone*,

intertidal zone, *waterbodies*, *waterways*, *wetlands*, and *uplands*. The ADCM subdivides each *landform* by *relative ecological value*, or *REV*, based on distinguishing characteristics such as hydrologic regime, fish and wildlife use, landscape position, vegetation, and physical condition, as shown in Table 1. Examples of these *landform* units include *vegetated intertidal zone*, *natural perennial salmonid-bearing stream*, and *upland buffer*.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

-M-

Mosaic

Definition: A terrain in which two or more *landforms* or *polygon* types (e.g., *upland* and *wetland*, *wetland* and *waterbody*, or *inundated* and non-*inundated wetland*) are so intertwined as to render separate delineation or mapping difficult. (See Figure A-8.) The ADCM treats *mosaics* as a single unit for purposes of mapping and *debit*/*credit* calculation.

Additional Information: For purposes of the ADCM, *mosaics* include landscapes such as patterned ground/strangmoor, such as portions of Connors, Klatt and Turnagain Bogs, and hummock-and-hollow topography, such as *AWMP* unit #60 South and portions of the Campbell and Chester Creek riparian zones. Interspersion and complex microtopgraphy are key factors in identifying *mosaics* and the term does not apply to relatively uniform *polygons* with widely scattered features that are distinct from the matrix (e.g., geographically isolated micro-pools or *upland islands*) that the ADCM user could more easily map as separate *polygons*.

The habitat diversity resulting from the interspersion of plant communities and *surface water* creates a higher level of *wetland*-related *function* for the drier components of *mosaics* than they might exhibit in isolation. The non-*inundated* portions of patterned ground bogs, for instance, provide nest sites for the numerous species of waterbirds and other *wetland* avifauna that breed in that type of habitat. Forest and woodland *mosaics*, meanwhile, are often particularly attractive to *wetland*-dependent species such as greater yellowlegs, Bonaparte's gull, northern waterthrush, and rusty blackbird, the last of which (i.e., rusty blackbird) is a national species of concern. Wood frogs use both bog and forest *mosaics*, depending on the small pools for reproduction and the surrounding drier areas for all other life cycle needs. *Mosaics* also tend to exhibit higher plant species richness than other *polygons* due to the interspersion of growing conditions.

The ecological relationship between the *mosaic* components is a second reason (besides the aforementioned difficulty of mapping) that the ADCM treats *mosaics* as a single unit. *REV* assignments for *mosaics* correspond to the highest *REV* of the *mosaic's* components. For example, a *natural* or *naturalized mosaic* that is larger than 2,500 square feet and includes *wetlands* that

are *inundated* through June, as well as both non-*inundated wetlands* and *uplands* will have a *REV* of 1, due to the *inundated wetlands*. **NOTE:** In *mosaics, t*he size threshold applies to the entire *mosaic*, not individual *inundated* areas.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

-N-

Natural

Definition: A term applied to *waterways*, *waterbodies*, *wetlands*, and *uplands* with physical characteristics that are primarily the result of geologic, hydrologic, and/or climatic conditions/processes, rather than human alteration.

Additional Information:

Streams and *Drainageways*

In *natural polygons* of non-tidal *streams*, vegetation that is primarily native to the Anchorage area typically covers at least 50 percent of the *banks*. (See Figure A-9.) In *natural drainageway polygons*, such vegetation typically covers 50 percent of both the *bed* and *banks*. *Natural streams* generally perform several *functions* of high value to the public. Those that have *perennial* flow are *REV* 1 if they support *salmonids* and *REV* 2 if they do not. *Natural ephemeral* and *intermittent streams* are *REV* 3, as are *natural drainageways*.

Enhancement of a *natural stream polygon* may include planting additional overhanging vegetation that is native to the local area, or removing sediments that have smothered spawning gravels. *Restoration* could include returning flow from a previously excavated channel to a *natural inactive channel*. Such activities may be eligible for *credits*, so long as the proposal satisfies established criteria for *enhancement* and *restoration* projects, as described herein.

Waterbodies

For *lakes* and *ponds*, characterization as *natural* indicates not only origin, but also that at least 25 percent of the *waterbody's* shoreline consists of *floating aquatic mat*, emergent marsh, and/or an herbaceous, scrub-shrub, or forested plant community dominated by species native to the local area. (See Figure A-10.) The threshold is lower than for *streams* because the greater ratio of surface area to shoreline means the shoreline has less influence on the overall *function* of *waterbodies* than it does in *streams*. Where human activity (e.g., excavation) has

increased the size of a *waterbody*, the created area(s) would not be considered *natural*.

Natural *waterbodies* typically perform several *functions* of high value to the public. Most are considered *REV* 1 when their *surface water* is *persistent*, and *REV* 2 when it is *seasonal*. Consistent with the *AWMP*, *natural waterbodies* that are both *remote* and very small (i.e., less than 2,500 square feet in size, including contiguous *inundated wetlands* and *floating aquatic mat*) are considered too small to have high *habitat function*. They also generally do not support fish (unless stocked), and provide less *social function* than larger *waterbodies*. Thus, these small *waterbodies* generally are *REV* 2 when *persistent*, and *REV* 3 when *seasonal*.

Enhancement of a *natural waterbody* could occur through the planting of additional locally native vegetation along the shoreline or the installation of a visual screen between the *waterbody* and nearby development. Such activities may be eligible for *credits*, so long as the proposal satisfies the criteria for *enhancement* projects.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

Naturalized

Definition: A term applied to *waterways*, *waterbodies*, *uplands*, and non-*inundated wetlands* that were either created through or substantially altered by human activity (e.g., excavation, channelization, impoundment, fill, diversion of water, introduction of stormwater), but which have, as a result of either appropriate design and construction or the passage of time (often approximately 10 years in Anchorage), developed physical characteristics and *functions* similar to those of *natural* areas.

Additional Information: The 2000 ADCM identified "*naturalized*" as one type of *polygon* within the category of "artificial" *lakes* and *ponds*. This update eliminates that category and incorporates the human-altered characteristic into the definitions of "*naturalized*" and "*non-naturalized*." Specific application of the term *naturalized* to various *landforms* and *polygon* types follows:

Streams and *Drainageways*

The ADCM considers a previously altered *stream* or *drainageway polygon* to be *naturalized* when it meets two of the following three criteria:

- the channel size and shape are similar to an appropriate reference reach (e.g., *natural polygons* up- or downstream of the site);

- the channel sinuosity is similar to an appropriate reference reach (e.g., *natural polygons* up-or downstream of the site); and
- vegetation that is primarily native to *natural polygons* in the immediate area covers at least 50 percent of the *banks* (in the case of *streams*), or at least 50 percent of both the *bed* and *banks* (in the case of *drainageways*).

(See Figure A-9.) *Naturalized streams* generally perform several *functions* of high value to the public. Those which have *perennial* flow are *REV* 1 if they support *salmonids* and *REV* 2 if they do not. *Naturalized ephemeral* and *intermittent streams* are *REV* 3, as are *naturalized drainageways*.

Enhancement of a *naturalized* stream or drainageway polygon may include planting additional *bank* vegetation native to the local area, or removing sediments that have smothered spawning gravels. *Restoration* or *establishment* could include returning flow from a previously excavated channel to a natural *inactive channel*, constructing or re-establishing a floodplain, or constructing a new channel with physical characteristics similar to *natural polygons* above or below the site. Such activities may be eligible for *credits*, so long as the proposal satisfies the criteria for *establishment*, *enhancement*, and *restoration* projects, as described herein.

Ditches

The ADCM considers a *ditch polygon* to be *naturalized* when its *bed* and *banks* are generally stable and have at least 50 percent cover by rooted or floating vascular plants, moss, and/or lichens. (See Figure A-11.) Since *naturalized ditches* typically provide better *hydrologic function*, the ADCM considers them to be *REV* 3, compared to a *REV* of 4 for their *non-naturalized* counterparts. Establishing additional vegetation to improve the *function* of a *ditch* that has less than 100 percent cover may produce *credits*, so long as the proposal satisfies the criteria for *enhancement* projects.

Waterbodies

The ADCM considers a *created waterbody*—or enlargement of a *natural waterbody*—to be *naturalized* when at least 25 percent of the *waterbody's* shoreline (at *ordinary high water*), consists of *floating aquatic mat*, emergent marsh, and/or an herbaceous, scrub-shrub, or forested plant community dominated by species native to the local area. (See Figure A-10.) The threshold is lower than for *streams* because the greater ratio of surface area to shoreline means the shoreline has less influence on the overall *function* of *waterbodies* than it does in *streams*.

Naturalized waterbodies typically perform several *functions* of high value to the public. Most are considered *REV* 1 when their *surface water* is *persistent*, and *REV* 2 when it is *seasonal*. Consistent with the *AWMP*, *naturalized waterbodies* that are both *remote* and very small (i.e., less than 2,500 square feet in size, including contiguous *inundated wetlands* and *floating aquatic mat*) are considered too small to have high *habitat function*. They also generally do not support fish (unless stocked), and provide less *social function* than larger *waterbodies*. Thus, these small *waterbodies* generally are *REV* 2, when *persistent* and *REV* 3 when *seasonal*.

Enhancement of a *naturalized waterbody* could occur through the establishment of shoreline plant communities dominated by species native to the local area or installation of a visual screen between the *waterbody* and nearby development. *Restoration* or *establishment* could occur through the removal of fill and re-planting of emergent marsh or other locally native community along the shore or construction of a *waterbody* with physical characteristics that mimic *natural* ones. Such activities may be eligible for *credits*, so long as the proposal satisfies the criteria for *establishment*, *enhancement*, or *restoration* projects, as described herein.

Wetlands and *Uplands*

The ADCM considers previously altered *upland* and non-*inundated wetland polygons* to be *naturalized* when they are dominated by a plant community that is typical of *natural polygons* of the same type in the immediate area. The *REV* of *naturalized uplands* and *wetlands* will depend on their position is in relation to *waterways*, *waterbodies*, or *inundated wetlands*.

Examples of possible *enhancements* activities in *naturalized wetlands* include establishing an area(s) of *inundation* to improve wildlife habitat and species diversity and installing visual/noise barriers to reduce disturbance to the habitat and increase its use by disturbance-sensitive wildlife.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

New Indirect Impact Zone/Factor

Definition: The area and multiplier used in *debit* calculations to represent indirect impacts that will result from proposed *permanent* or *temporary impacts*.

Additional Information: Projects with *permanent* or *temporary impacts* will incur *debits* for indirect impacts when the *indirect impact zone* from the new

work extends into a *jurisdictional* area. The *new indirect impact factor* will depend both on the *disturbance category* of the new activity and on how far the new activity extends disturbance into or toward the aquatic area. (See Figure A-12.) The calculation also considers whether any *existing indirect impact zones* overlap the *new indirect impact zone*, but *debits* accrue regardless of any overlap, to account for cumulative effects.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

Non-naturalized

Definition: A term applied to *waterways*, *waterbodies*, *uplands*, and non-*inundated* *wetlands* that were either created through, or substantially altered, by human activity (e.g., excavation, channelization, impoundment, fill, diversion of water, introduction of stormwater) and that exhibit physical, chemical, and biological characteristics that differ markedly from those of *natural* areas.

Additional Information: The 2000 ADCM identified "*non-naturalized*" as one type of *polygon* within the category of "artificial" *lakes* and *ponds*. This update eliminates that category and incorporates the human-altered characteristic into the definitions of "*naturalized*" and "*non-naturalized*." Specific application of the term *non-naturalized* to various *landforms* and *polygon* types follows:

Streams and *Drainageways*

The term *non-naturalized* replaces "channelized" from the 2000 ADCM. *Non-naturalized stream* and *drainageway polygons* generally are straighter, and have a different cross-sectional geometry than *natural polygons*; have *banks* with slopes that are different from those along *natural polygons*; often are unstable; lack or are disconnected from any floodplain; have armored *banks*; and/or, in non-tidal areas, have locally native vegetation covering less than 50 percent of the segment's *banks* (for *streams*) or *bed* and *banks* (for *drainageways*). (See Figure A-9.) These characteristics impair many *waterway functions*. As a result, the ADCM considers *non-naturalized stream polygons* to have a *REV* one level lower than corresponding *natural* or *naturalized polygons* (i.e., *REV* 2 for *perennial streams* that support *salmonids*, *REV* 3 for those that do not, and *REV* 4 for *ephemeral* and *intermittent streams*). *Piped stream polygons* have the most reduced *function*, and are *REV* 4, regardless of other characteristics.

Enhancement of a *non-naturalized stream* or *drainageway polygon* may include activities such as

- modifying the channel to more closely mimic the size and shape of *natural polygons*;
- placing materials such as boulders, root wads, or spawning gravels in the channel to increase diversity and improve fish or macroinvertebrate habitat;
- using bioengineering techniques to stabilize an eroding *bank*;
- removing a barrier to fish passage;
- improving an impediment to flood conveyance *function*; or,
- replacing adjacent lawn, pavement, or bare ground with riparian vegetation native to the local area.

Restoration or *establishment* could include returning flow to a *natural inactive channel*, constructing or re-establishing a floodplain, or constructing a new channel with physical characteristics similar to *natural* segments above or below the site. Such activities may be eligible for *credits*, so long as the proposal satisfies the criteria for *establishment*, *enhancement,* and *restoration* projects, as described herein.

Ditches

Ditches that are primarily *unvegetated* or are dominated primarily by algae are less effective in performing their principal *functions* of attenuating flow and filtering pollutants than their *naturalized* counterparts that are primarily *vegetated* by rooted or floating vascular plants. (See Figure A-11.) Consequently, the ADCM typically assigns *non-naturalized ditches* a *REV* of 4, compared to a *REV* of 3 for those that are *naturalized*. Establishing vegetation in a *ditch* to improve its *function* may produce *credits*, so long as the proposal satisfies the criteria for *enhancement* projects.

Waterbodies

Non-naturalized waterbodies typically have less than 25 percent of the shoreline (at *ordinary high water*), occupied by *floating aquatic mat*, emergent marsh, and/or locally native herbaceous, scrub-shrub, or forested plant community, with the remainder of the shoreline being denuded, armored, or occupied by docks or other structures. (See Figure A-10.) The threshold is lower than for *streams* because the greater ratio of surface area to shoreline means the shoreline has less influence on the overall *function* of *waterbodies* than it does in *streams*. These characteristics tend to be associated with degraded water quality and impairment of many aquatic *functions*, such as waterbird nesting and fish habitat. As a result, the ADCM considers the *REV* of most *non-naturalized waterbodies* to be one lower than their *natural* or *naturalized* counterparts (i.e., *REV* 2 if their *surface water* is *persistent*, *REV* 3 if it is not, and *REV* 4 if they are both less than 2,500 square feet in size and located more than 300 feet from other *waterbodies* or *inundated wetlands*). An exception to the reduced *REVs* applies to projects

that would directly impact areas of remaining floating mat, emergent marsh, and/or other locally native shoreline plant community in *non-naturalized waterbodies*. In such instances, the *REV* for the affected remnant shoreline plant community would be the same as if the *waterbody* were *natural* or *naturalized*; the *REV* for the area of *waterbody* within the project's *indirect impact zone* would remain at the reduced (i.e., *non-naturalized*) level.

Enhancement of a *non-naturalized waterbody* may include activities such as

- establishing emergent marsh or other shoreline plant community dominated by species native to the local area;
- using bioengineering techniques to stabilize an eroding *bank*;
- replacing adjacent lawn, pavement, or bare ground with vegetation native to the local area; and/or
- installing a visual screen between the *waterbody* and nearby development.

Restoration or *establishment* could occur through removing fill and replanting emergent marsh or other locally native community along the shore or construction of a *waterbody* with physical characteristics that mimic *natural* ones. Such activities may be eligible for *credits*, so long as the proposal satisfies established criteria for *establishment*, *enhancement*, or *restoration* projects, as described herein.

Wetlands and *Uplands*

For *wetlands* and *uplands*, the term *non-naturalized* replaces the 2000 ADCM's term "highly degraded." *Non-naturalized wetlands* and *uplands* typically have a plant community, hydrologic regime and/or water quality that differ markedly from historical conditions. For example, past drainage efforts may have reduced soil saturation to a point that its frequency and duration are barely sufficient to establish *wetland* hydrology or the input of stormwater runoff may have increased the frequency or duration of *inundation* in a *wetland*, but may also have altered its nutrient regime. In any case, the primary indicator of a *non-naturalized wetland* or *upland* will be a plant community in which bluejoint reedgrass (Calamagrostis canadensis), reed canarygrass (Phalaris arundinacea), or non-native vegetation exceeds 25% total absolute cover. Common non-native species that are indicative of *non-naturalized* conditions include:

- bindweed (*Polygonum convolvulus),*
- dandelion (*Taraxacum* spp.),
- clover (*Trifolium* spp.),
- chickweed (*Cerastium vulgatum* and *Stellaria media*),
- Kentucky bluegrass (*Poa angustifolia* and *P. compressa*),

- knotweed (*Polygonum aviculare)*,
- purple loosestrife (*Lythrum salicaria*),
- spotted lady's thumb (*Polygonum persicaria*), and
- timothy (*Phleum pretense*).

Since they typically *function* at a level below that of *natural* areas*, non-naturalized wetlands* are typically one *REV* lower than than their *natural* or *naturalized* counterparts, unless they qualify as a *setback* or *buffer*. The ADCM assigns *non-naturalized uplands* a *REV* of 4, unless they quality as a *setback* or *buffer*. *Non-naturalized wetlands* and *uplands* can be good sites for *enhancement*, *restoration*, and/or *establishment* projects, such as

- revegetating with locally native plant species;
- establishing a *naturalized waterbody*;
- increasing the duration of soil saturation to establish or strengthen *wetland* hydrology; and/or
- daylighting a segment of *piped stream*.

Such activities may be eligible for *credits*, so long as the proposal satisfies the criteria for *establishment*, *enhancement*, and *restoration* projects, as described herein.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

-O-

OHWM (Ordinary High Water Mark)

Definition: The line on the *banks* of a *waterway* or shore of a *waterbody* that represents the highest commonly occurring water elevation. (See Figure A-1.)

Additional Information: The presence of an *OHWM* differentiates *streams* from *drainageways*. It is also the baseline from which *setbacks* and *buffers* are measured. The *OHWM* can usually be identified on site by physical characteristics such as shelving, changes in soil or vegetation, the presence of debris, and/or scour or deposition lines. The *OHWM* may be discontinuous as a result of naturally occurring or human-induced interruptions such as subsurface segments in spatially *intermittent streams*, pipes, rock outcroppings, and recent disturbances, including floods and construction. The Corps' Regulatory Guidance Letter 2005-05 provides further discussion on identifying the OHWM; see http://www.usace.army.mil/CECW/Documents/cecwo/reg/rgls/rgl05-05.pdf.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

Oxbow: see *Inactive Channel.*

-P-

Partial Impact

Definition: A term that applies to projects with *permanent impacts* that do not eliminate all *functions* of an aquatic area.

Additional Information: The ADCM treats most common projects, such as those that involve converting an aquatic area to *uplands* or clearing and grubbing of an aquatic area, as eliminating all aquatic *functions* of the affected waters or *upland inclusions*. For projects that eliminate all *functions* only temporarily, such as many involving excavation and backfill, the ADCM employs procedures that base *debits* on the duration of the impact. A third category of projects involves *permanent impacts*, but only to some aquatic *functions*. The ADCM refers to such projects as having "partial impact." Examples of such projects include placement of a culvert in a *waterway*, which may retain some of the *waterway's hydrologic* and *species occurrence functions*, and permanent or repetitive clearing of a *wetland's* woody vegetation, without grubbing, which may retain the *wetland's hydrologic function* and some of its *habitat*, *species occurrence*, and/or *social functions*.

The ADCM determines *debits* for the direct impacts of such projects based on the extent of diminution in *function*, as calculated using the *AWAM* or *WAMA*. Calculations for *indirect impacts* follow the same procedures as other projects. *Debit* calculations for the direct impacts of some projects, such as excavation and backfill in a forested *wetland*, may involve procedures for both *temporary* and *partial impacts*. The *partial impact* of such a project would result from the long-term loss of trees.

NOTE: Non-*jurisdictional* activities generally incur *debits* only when closely associated with *jurisdictional* ones.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

Part of Complex: see *Mosaic*

Patterned Ground: see *Mosaic*

Peninsula: see *Inclusion*

Perennial

Definition: A term describing *stream polygons* in which, under normal circumstances, the water table is above the *stream bed* throughout the year. The water in *perennial streams* may freeze solid in the winter.

Additional Information: Perennial *streams* generally provide a higher level of *habitat*, *species occurrence*, and *social function* than those that flow for a shorter period. As such, the ADCM considers *natural* or *naturalized perennial stream polygons* to be *REV* 1 when they support *salmonids* and *REV* 2 when they do not. *Non-naturalized polygons* of *perennial streams* are typically one *REV* lower than corresponding *natural* or *naturalized polygons* (i.e., *REV* 2 if they support *salmonids* and *REV* 3 if they do not).

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

Performance Standards

Definition: Observable or measurable attributes used to determine whether an *establishment*, *enhancement*, or *restoration* project, or a project to rectify *temporary impacts*, has achieved its objectives.

Additional Information: The term *performance standards* replaces "standards of success," as used in the 2000 ADCM. To be eligible for *credits*, all proposals for *establishment*, *enhancement*, and *restoration* projects must include a specific description of *performance standards*, approved by the lead federal regulatory agency (i.e., Corps of Engineers or EPA). Although the nature of such standards will vary by type of project, they must include objective and verifiable indicators of success or failure toward changing the *project site's REV*(s) and/or improving one or more of its *functions* (e.g., areal extent and duration of inundation, percent cover achieved through planting efforts, improvement in fish passage, etc.)

In addition to describing the attributes to be assessed, a project's description of *performance standards* also needs to address

- the timing and frequency of *performance standard* monitoring, as well as the reporting and duration of such efforts; and,
- long-term management of the site to ensure sustainability of the *established*, *enhanced*, or *restored REVs*/*functions*.

The release of *credits* for *establishment*, *enhancement*, and *restoration* projects typically will not occur until the *performance standards* verify success. The number of *credits* produced by the project will also depend upon the extent of success demonstrated by the *performance standards*. For projects involving critical timing issues or a substantial commitment of financial resources to accomplish the *establishment*, *enhancement*, or *restoration*, the lead federal regulatory agency may approve a phased release of *credits*, making up to one quarter of the anticipated total available upon approval of the *establishment*, *enhancement*, or *restoration* plan, and up to a second quarter available upon completion of initial construction. When appropriate and practicable, project proponents will need to provide *financial assurance* to cover any up-front release of *credits*.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

Permanent Impact(s)

Definition: Construction or other activity that will eliminate or diminish an aquatic area's existing natural *functions* for the foreseeable future.

Additional Information: The term *permanent impact* replaces "permanent development," as used in the December 2000 version of the ADCM. *Permanent impacts* include activities such as replacing an aquatic area with fill, installing a culvert, re-routing a *stream*, and repetitive clearing or other manipulation of vegetation. Such activities will usually incur *debits* when they are subject to the Corps of Engineers' jurisdiction.

Some *establishment*, *restoration*, and *enhancement* projects will incur *debits* as part of their overall improvement. For example, re-establishing *stream* meanders might involve filling portions of the existing *channelized stream*, an activity which would likely incur some *debits*. *Enhancement* involving the conversion of one type of aquatic area (e.g., *wetland*) to another (e.g., *waterbody*, *stream*) would also incur some *debits* for the permanent loss of existing aquatic *functions*. Projects in which the *debits* for permanent impact would exceed the *credits* for *enhancement* (e.g., construction of a *waterbody* in a *REV* 1 or 2 *wetland*) likely would not receive the approval of the lead federal regulatory agency (i.e., Corps of Engineers or EPA).

In *waterways*, the area of permanent impact equates to the total square feet of *bed* and/or *bank* eliminated or replaced by the project. In other waters, the footprint of the area directly affected is expressed in acres.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

Persistent

Definition: A term describing *waterbodies* in which *surface water* is normally present through the end of June.

Additional Information: *Lakes* and *ponds* with *persistent surface water* generally provide higher value *habitat*, *species occurrence*, and *social function* than those that have *surface water* for a shorter period. In particular, *waterbodies* with *persistent surface water* are capable of supporting nesting and rearing waterbirds, and more consistent recreational use, then those that dry up or drain earlier in the year. As such, the ADCM considers most persistent *waterbodies* to be *REV* 1 when *natural* or *naturalized* and *REV* 2 when *non-naturalized*. Persistent *waterbodies* that are both *remote* very small (i.e., less than 2,500 square feet in size) are *REV* 2 when *natural* or *naturalized* and *REV* 3 when not.

When it is not possible to confirm normal *surface water* persistence in the field, the ADCM user should infer normal *surface water* persistence from other information, such as photography, gauge data, previous experience with the site, and anecdotal reports. When field investigation is possible, but the visit cannot occur in late June and/or the season's climatic conditions differ from the norm (as established by historic rainfall and/or winter water storage records), the ADCM user can assume that *persistent surface water* regularly occurs in areas that either are dominated by obligate *wetland* plant species, have exposed soil that is saturated or cracked and is not the result of recent disturbance, or exhibit other evidence of water persistence (e.g., high water marks, water staining, debris lines, shelving).

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

Persistently Inundated*: see *Inundated

Piped

Definition: A term describing *waterway polygons* that pass through a culvert, pipe, or comparable structure.

Additional Information: *Piped waterway polygons* typically perform all or several *functions* (i.e., *hydrologic habitat*, *species occurrence*, and *social function*) at a level well below that of open channels, if at all. To reflect these circumstances, the ADCM assigns *piped waterway polygons* a *REV* of 4. When designed and installed properly, new culverts may allow retention of some *hydrologic* and/or *species occurrence functions*, which would reduce the *debits* incurred for installation of brand-new culverts or produce *credits* for replacement of existing culverts.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

Polygon(s)

Definition: A mapping unit encompassing an area with characteristics and/or circumstances that differ from those of neighboring areas. (See Figure A-13.)

Additional Information: ADCM mapping produces *polygons* by overlaying multiple features on a map or photo of the *project site* and its surrounding area. Layers include the periphery of proposed *permanent* or *temporary impact* and/or proposed *restoration*, *enhancement*, *establishment*, or *preservation* projects, the limits of existing and *new indirect impact zones*, the margins of *landforms*, and the various physical, hydrological, and biological factors that determine *REV*. When superimposed on each other through this layering process, the boundaries of these features typically form several *polygons*.

On the ADCM spreadsheets (see Appendix B), entries in the column for *polygon* descriptions include the distinguishing characteristics that substantiate each *REV* assignment (e.g., *perennial*, *inundated* through June, *naturalized*, *setback*, *salmonid-bearing*). These descriptions derive from Tables 1 and 2 in the ADCM Procedures. For simplicity, *polygons* with the same characteristics can often be grouped together on the same row, rather than listed individually. For example, Spreadsheets 1a and 1b can accommodate calculations for direct and *indirect impacts* on the same row, so long as the affected *polygons* all have the same description and *indirect impact factors*, and will all have the same type of impacts (i.e., *permanent* or *temporary*; for *temporary impacts*, grouped *polygons* must also all be subject to the same approach with regard to *financial assurance*). For Spreadsheet 5, grouping requires the same *polygon* description and *indirect impact factors*, as well as the same *regulatory constraints* and *accessibility factors*. Spreadsheets 4a and 4b have additional factors that *polygons* must share in order to be grouped (e.g., both pre- and post-project descriptions and *REVs*, *functions* improved, etc.). Whenever *polygons* are grouped, the spreadsheet and *debit-credit* map should include identifying numbers (or letters) for each individual *polygon*. In such instances, the ADCM user should list each *polygon* and its size separately on Spreadsheet 2a or 2b (Appendix B) to facilitate tracking and potential changes to spreadsheet entries.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

Pond: see *Waterbody*

Post-project Indirect Impact Zone/Factor

Definition: The area and multiplier used in *credit* calculations to represent both any *indirect impact zones* that already overlap a proposed *restoration*, *enhancement*, *establishment*, or *preservation* site, as well as any *indirect impact zones* expected to overlap the site in the immediate future.

Additional Information: Through application of the *post-project indirect impact factor* multiplier, projects within *existing* or reasonably forseeable *indirect impact zones* produce fewer *credits* than those in areas with no indirect impacts. The lower number of *credits* accounts for reduced level of *function* in the *indirect impact zone(s)*. The extent of reduction in *function*—and *credits*—depends on the *disturbance category* for the activity creating the indirect impacts and the size of the *contiguous undeveloped area* that incorporates the *project site*. For purposes of the ADCM, "reasonably forseeable" equates to "imminent" and would extend to projects that had begun the regulatory approval process—including the pre-application process—prior to finalization of *credits.*

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

Preservation

Definition: The permanent protection of existing, ecologically important aquatic resources and their *functions*.

Additional Information: The primary focus of *preservation* projects must be *REV* 1 or *REV* 2 *polygons,* except when areas of lower *REV* must first be preserved to facilitate an approved *restoration*, *enhancement*, or *establishment* project. Other areas will usually not be eligible for *preservation credits*. *Preservation* projects involving sites with no need for *restoration* or *enhancement* should be limited to protection of high value aquatic resources both important to the long-term maintenance of watershed health and under demonstrable *threat* of loss or degradation from human activities.

To be eligible for *credits*, *preservation* projects must permanently remove the *threat* of loss or degradation of the area through completion of an appropriate and binding real estate or other legal instrument (e.g., conservation easement, transfer of ownership to a land conservation trust or similar entity). This instrument must

- specify the entity(ies) (e.g., land trust, government agency, homeowners' association) responsible for long-term maintenance of the preserved site, including monitoring for, deterring, and rectifying unauthorized or unanticipated disturbances to it;
- affirm that each responsible party has the financial capacity to perform the described duties;
- acknowledge that the aforementioned responsibilities, while transferable with Corps of Engineers' approval, are irrevocable;
- prohibit potential land uses that would be incompatible with the purposes of the *preservation* project, including maintaining the ecological integrity of the preserved area; and,
- require Corps approval (with resource agency consultation) for potentially compatible land uses. For uses that would reduce the number of *credits* associated with the *preservation*, including those that would introduce a *new* *indirect impact zone*, the project proponent must provide additional *credits* to offset the reduction.

Deed restrictions, plat notes, platted easements, permit conditions, and similar measures typically will not satisfy these requirements, and areas protected only by such measures generally will not be eligible for *preservation credits*. In circumstances in which there is a strong interest in preserving an otherwise eligible area, but a conservation easement or similarly protective mechanism cannot be secured, *preservation credits* may still be available if the project proponent and lead federal regulatory agency (i.e., Corps of Engineers or EPA) address the requirements outlined above by establishing multiple other protective mechanisms. Accruing *preservation credits* through such alternative measures should be the exception, not the rule.

Typically, *credits* for *preservation* projects will not be available to offset *debits* until the specified mechanism(s) for permanent protection and maintenance are in place. For projects involving critical timing issues or a substantial commitment of financial resources to complete the *preservation*, the lead federal regulatory agency (i.e., Corps of Engineers or EPA) may approve a phased release of *credits*, making up to the first quarter of the calculated *credits* available upon completion of a milestone such as acquisition or transfer of the property to be preserved, attainment of a written agreement for purchase or transfer thereof, or Corps approval of a conservation easement or similar instrument containing the elements outlined above. When appropriate and practicable, permittees will need to provide *financial assurance* (e.g., a refundable in-lieu fee payment) to cover such an up-front release of *credits*.

CAUTION: As with other types of compensatory mitigation, a project proponent may use *preservation credits* to offset *debits* only when the lead federal regulatory agency (i.e., Corps of Engineers or EPA) has determined that the adverse impacts of the development project are unavoidable and that the *preservation* project would constitute appropriate compensatory mitigation for those unavoidable impacts. Activities necessary to avoid or minimize on-site development impacts usually will not be eligible for *credits*.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

Project Site

Definition: The area(s) in which *permanent* and/or *temporary impacts*, *restoration*, *enhancement*, *establishment*, and/or *preservation* are proposed.

Additional Information: With regard to *permanent* and *temporary impacts*, the *project site* encompasses all proposed clearing, grading, excavation, stockpiling, and/or placement of fill or backfill in *jurisdictional* aquatic areas, including temporary access roads and pads, staging and equipment operation areas, footings and other foundational features, utility lines, drainage and visibility improvements, stormwater systems and outfalls, fencing, and landscaping.

NOTE: Non-*jurisdictional* activities generally incur *debits* only when closely associated with *jurisdictional* ones.

For *preservation* proposals, the *project site* is defined by the boundaries of the area that would be permanently protected. Also relatively simple are *establishment* and *restoration*, in which the *project site* constitutes the footprint of the newly constructed or re-established aquatic area(s).

NOTE: Except for *buffers* and *inclusions*, *uplands* and low value aquatic areas within the *project site* may not be eligible for *credits*; see discussion of *preservation*.

For *enhancement* activities, the *project site* consists of the location(s) at which work would occur and, in some instances, the additional area(s) in which the *REV* and/or the *function* is expected to improve. Examples include

- the area of *wetland* converted to *waterbody* or or in which the period of *inundation* is lengthened;
- the footprint of revegetated or stabilized *wetland*, *stream bank*, or *set-back*;
- the area of *existing indirect impact zone* reduced by a visual barrier; and
- the area of *stream* in which an appropriately high concentration of root wads or similar habitat improvements is placed.

Establishment, *restoration*, and *enhancement* activities may also include work that constitutes *permanent impacts* and/or *temporary impacts*. In such instances, the *project site* would also include those activities.

To facilitate calculation of *debits* and *credits*, plans depicting the *project site(s)* must

- be at a scale no smaller than 1 inch = 500 feet;
- show the locations and boundaries of all *waterways*, *wetlands*, and other aquatic areas within the *project site*; and
- include either the dimensions of all areas of clearing, grading, excavation and backfill, stockpiling, and placement of fill in *jurisdictional* waters, or, have a graphic scale.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

-Q-

Quaking Bog

Definition: A type of *wetland* characterized by a floating mat of peat and vegetation that sinks or quivers under weight, producing depressions that quickly fill with water.

Additional Information: In Anchorage, *quaking bogs* typically occur around the margins of *waterbodies* and as mats across former *waterbodies* and other topographic depressions. They may cover a large area, such as in Postmark Bog and the eastern part of Connors Bog. *Quaking bogs* are generally very wet and may also meet the definition of *inundated wetlands*, but in some, *surface water* may not appear until the investigator steps onto the mat. *Quaking bog* plant communities exhibit some variation. Low shrubs, especially Myrica gale, Andromeda polifolia, and Vaccinium oxycoccos, may be common in some, while others may lack shrubs and have sedges, cottongrass, buckbean, marsh five-finger and/or horsetail as dominants; mosses such as

Sphagnum spp., often in a thick mat, may be the dominant type of vegetation in others. Trees and taller shrubs will be absent or widely scattered.

Quaking bogs generally perform a number of high-level *functions* (e.g., flood attenuation, pollutant retention and/or filtration, shoreline stabilization, waterbird nesting, and habitat for rare plants). Consequently, the ADCM considers them to be *REV* 1. Many of them would also be *REV* 1 as *inundated wetlands* and/or *setbacks*.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

-R-

Regulatory Constraints Factor

Definition: An estimate of the likelihood that a project proponent would be able to obtain the necessary federal, state, and local approvals for development or substantial alteration of a particular *polygon*, ranging from 1 for the least constrained *polygons* to 4 for the most constrained.

Additional Information: *Regulatory constraints factor* replaces the term "relative level of threat" from the December 2000 ADCM. It is now, together with *accessibility*, one of two factors that determine the development *threat* to a parcel for purposes of calculating *preservation credits*. *Polygons* with fewer *regulatory constraints* have lower *credit ratios* (e.g., as low as 1.0 acre per *credit*), and accrue more *preservation credit* per unit area than *polygons* with greater *regulatory constraints*.

A factor of 1 represents the highest *threat* in terms of *regulatory constraints*, and applies to *polygons* for which no approvals are required or are few and relatively routine. A *regulatory constraints factor* of 1 typically applies to *uplands* and non-*jurisdictional* aquatic areas outside the municipality's 25-foot *stream* protection *setback*, as well as to *piped stream polygons*. It also applies to *jurisdictional* aquatic areas for which the project proponent already has obtained the necessary approvals, unless such approvals have expired. In such cases, the estimate of *regulatory constraints* should consider any changes in circumstances that have arisen since the original authorization(s) were granted.

A *regulatory constraints factor* of 2 applies to *polygons* for which development approvals would be reasonably easy to obtain, whereas a factor of 3 applies to *polygons* for which it would be difficult or unlikely to obtain such approvals. The r*egulatory constraints factors* of 2 and 3 in *REV*-based Tables 10 and 11 constitute judgments guided by recent permitting history. Site-specific circumstances could warrant assignment of a different level of constraints. For example, where a potential *preservation* site includes otherwise developable non-*jurisdictional* or low *REV* areas surrounded by regulated high *REV* areas, it could be considered likely that approvals for access and utilities

would be granted. In such a situation, it may be more appropriate to assign a *regulatory constraints factor* of 2, rather than the 3 indicated in Tables 10 and 11, to the *polygon(s)* that occupy the footprint of the access and utility corridors most likely to be authorized. Such determinations should be explained in a footnote on Spreadsheet 5 (see Appendix B).

The lowest *threat*, in terms of *regulatory constraints* (i.e., factor of 4), pertains to two types of areas: those which already are legally or administratively protected from development and substantial alteration, and, those for which it would be extremely unlikely that such activities would be approved. *Polygons* with a *regulatory constraints factor* of 4 are not eligible for *preservation credits*. The first category, already protected areas, includes those subject to an existing conservation easement; it may also include areas over which other instruments or requirements normally would be expected to prevent development or substantial alteration. Examples could include areas that previously issued Corps of Engineers or municipal approvals required to be preserved, retained, maintained, avoided, etc., municipal parks or other parcels with restrictive patents (e.g., Far North Bicentennial Park, the lower Glacier Creek floodplain), and lands designated as natural resource use areas pursuant to the municipality's 2006 Anchorage Bowl Parks Plan. Determination of the *regulatory constraints factor* for such areas will depend upon the specific language in and enforceability of the protective document.

The other *polygons* to which the ADCM usually assigns a *regulatory constraints factor* of 4 are *perennial streams* that are *natural*, *naturalized*, and/or support *salmonids*. Again, the rationale is that, with the exception of unavoidable crossings for access, transportation, trails, and/or utilities, projects that would involve substantial alteration of such *streams* are very unlikely to receive the necessary federal, state, and/or local approvals. For potential *preservation* projects involving otherwise developable property that includes a *perennial natural*, *naturalized*, and/or *anadromous stream*, the ADCM user may assign a *regulatory constraints factor* of 2 (instead of 4) to a portion(s) of the *stream* when there appear to be no less damaging alternatives to crossing it for access or utilities for the site. The lower factor would apply only to the segment(s) of the *stream* affected by the crossing(s) most likely to be permitted. Such determinations should be explained in a footnote on Spreadsheet 5 (see Appendix B).

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

Relative Ecological Value: see *REV*.

Relative Level of Threat: see *Regulatory Constraints Factor*

Relative Threat-Value Index: see *Regulatory Constraints Factor*

Remote

Definition: A term used to describe *waterbodies* and *inundated wetlands* located more than 300 feet from other *inundated* areas, including *subtidal* and *intertidal* areas and *waterways*.

Additional Information: Consistent with the *AWMP*, the ADCM considers *waterbodies* and *inundated wetlands* that are very small (i.e., less than 2,500 square feet, including *floating aquatic mat*) to have less *habitat*, *species occurrence*, and *social function* than larger *inundated* waters because, for example, they generally cannot support nesting by more than one species or more than a few pairs of the same species, generally do not support fish (unless stocked), and do not support more than incidental recreational boating. Their smaller size also reduces *hydrologic function*, due to their correspondingly smaller detention/retention capacity. The lower level of *function*, however, does not apply when the small *inundated* area is *part of a complex* of *inundated* waters, which the ADCM defines as being within 300 feet of such waters.

Very small *waterbodies* and *inundated wetlands* that are *remote* are one *REV* lower than their counterparts that are larger or *part of a complex* of *inundated* waters. The ADCM also assigns very small and *remote* waters a much smaller *buffer* (i.e., 25 feet) than their larger or less *remote* counterparts.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

Replacement: see *Enhancement, Establishment* and *Restoration*

Restoration (RES)

Definition: The re-establishment of an aquatic *polygon(s)* that had ceased to exist as a result of natural changes and/or human activities.

Additional Information: Some projects that the 2000 ADCM treated as "replacement of onsite hydrologic function" constitute *restoration*. (Others may qualify as *enhancement* or *establishment*.) *Restoration* increases the overall areal extent of aquatic resources by returning an area that has become *upland* (e.g., as a result of filling or drainage activities, diversion of flow, etc.) to the same, or very similar, conditions that previously existed. Projects that improve the *functions* of an existing aquatic resource or convert one type of aquatic area to another type do not constitute *restoration*, but may be *enhancement*. Projects that convert *natural uplands* to an aquatic area or convert *uplands* to a different type of aquatic area than previously existed constitute *establishment*.

Examples of activities that may, in appropriate circumstances, generate *restoration* *credits* include

- daylighting a segment of *stream* that currently flows through a pipe or culvert;
- diverting flow from a *non-naturalized* *stream* into a channel that appropriately mimics the conditions of a reference reach for the *stream* (e.g., an existing unconnected *inactive channel* or a *naturalized* channel constructed in fill);
- installing bioengineered *bank*/shoreline stabilization measures such as willow bundles/stakes, coir logs, etc., to decrease erosion and/or improve *habitat function*;
- removing fill from a former *wetland*, *waterbody*, *intertidal zone*, *setback*, or *buffer* and re-establishing a hydrologic regime and locally native vegetation similar to what previously existed; and
- re-establishing *wetland* hydrologic conditions in a former *wetland* from which surface or shallow groundwater has been drained or diverted.

CAUTION: As with other types of compensatory mitigation, a project proponent may use *restoration* *credits* to offset *debits* only when the lead federal regulatory agency (i.e., Corps of Engineers or EPA) has determined that the adverse impacts of the development project are unavoidable and that the *restoration* project would constitute appropriate compensatory mitigation for those unavoidable impacts.

To qualify for *credits*, proposed *restoration* projects must also provide the following information, at a level of detail commensurate with the scale and scope of the impacts, as required by the "final mitigation rule" (33 CFR 332.4(c)/230.94(c))

- include design plans that detail both existing and target site conditions (e.g., project area/component dimensions, site elevations/contours, vegetation, soil composition, hydrologic regime/water source);
- specify construction, maintenance, and monitoring/reporting milestones;
- include *performance standards* and contingency plans for hydrologic conditions and vegetation; and
- provide for permanent *preservation* of the project area (or for replacement, if all or part of it must be eliminated). This requirement typically includes the establishment of an entity (e.g., land trust, municipal or state agency, homeowners' association) that will be responsible for maintaining the site, as well as monitoring for and rectifying unauthorized or unanticipated disturbances to the preserved area. *Preservation* of restored areas does not produce separate, additional *credits*; lands outside the footprint of the restored area may be eligible for such *credits*.

Some components of *restoration* projects may produce *debits*. Clearing or filling in *wetlands* necessary for the operation of equipment to construct a new *stream* channel, for example, would cause at least *temporary impacts* that would incur some *debits*. *Debits* associated with such impacts would reduce the net *credits* generated by the project. The ADCM procedures address determining *debits* in such situations.

Typically, *credits* for *restoration* projects will not be available to offset *debits* until the specified *performance standards* have been met. For projects involving critical timing issues or a substantial commitment of financial resources, the lead federal regulatory agency (i.e., Corp of Engineers or EPA) may approve a phased release of *credits*, making up to one quarter of the anticipated total available upon approval of the *restoration* plan, and up to a second quarter available upon completion of initial construction. When appropriate and practicable, permittees will need to provide *financial assurances* to cover any up-front release of *credits*.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

REV(s)

Definition: A term that indicates the level of ecological *function* typically performed or provided by a particular *polygon*.

Additional Information: The ADCM divides the various types of *landforms* found in the Municipality of Anchorage into a four-tier hierarchy of *REV*, based on factors involving position, hydrologic regime, plant community, fish and wildlife use, and/or extent of degradation. The *REV* 1 tier encompasses *polygons* that generally have the highest ecological value (e.g., *persistent natural* or *naturalized waterbodies*, *perennial natural* or *naturalized salmonid-bearing streams*), with *REV* 4 being the lowest ecological value (e.g., *developed* areas, *non-naturalized ditches*). Tables 1 and 2 of the ADCM present this hierarchy. The definitions of the various terms in the table provide rationale for the *REV* breakdown. Except for large, heterogeneous sites, there is a fair amount of correlation between the ADCM's *REVs* and the *AWMP's wetland* designations (i.e., "A" *wetlands* are generally *REV* 1 and 2, while "C" *wetlands* are usually *REV* 3 or 4). The *AWMP's* role as a management, rather than purely functional, classification also contributes to some discrepancies. For purposes of the ADCM, it is not necessary to perform an in-depth functional analysis of a *project site*, but only to obtain sufficient information to determine the position, hydrologic regime, plant community, fish and wildlife use, and/or extent of degradation of the site's *polygons*.

If a *polygon* is part of a *setback* or *buffer*, that fact typically will determine its *REV* assignment, regardless of the other factors. The primary exception is for *restoration*, *establishment*, or *enhancement* projects intended to improve a *polygon's function* through alteration of its hydrologic regime, plant community, or other physical conditions. In such cases, pre-project *REV*

assignments should consider only the *polygon's* existing physical and biological characteristics, rather than its geographical context; the target post-project *REV* would normally be determined by both factors. For example, for a *restoration* project that would involve removing fill from within the *setback* for a *REV* 1 *stream* and revegetating the area with locally native riparian species, the *polygon* represented by the filled (i.e., *developed*) area would, according to Tables 1 and 2, have a pre-project *REV* of 4, with a target post-project *REV* of 1 (i.e., once returned to appropriate contours and vegetation). The ADCM also provides for determining *credits* for projects—usually *enhancement*—that improve a *polygon's function*, but not its *REV*.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

REV Improvement

Definition: The extent to which a *restoration*, *enhancement*, or *establishment* project upgrades the *REV* of a *project site's* existing *polygons*.

Additional Information: The ADCM uses *REV improvement* as the basis for determining the *credit ratio* for *restoration*, *enhancement*, or *establishment* projects. Projects that result in the greatest improvement in *REV* (i.e., from *REV* 4 to *REV* 1) produce *credits* at a higher rate per unit area. Some projects may be eligible for *credits* even if they do not result in a *REV improvement;* see the discussions of *enhancement* and *function(s)*.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

RTVI: see *Regulatory Constraints Factor*

-S-

Salmonid/Salmonid-bearing

Definition: Adjectives used to describe waters that support fish from the family Salmonidae.

Additional Information: The terms *salmonid* and *salmonid-bearing* replace "anadromous," as used in the December 2000 version of the ADCM. For purposes of the ADCM, the terms apply to Anchorage waters that support Chinook, coho, chum, pink, and sockeye salmon, as well as rainbow trout and Dolly Varden. The presence of *salmonids* in a segment of *waterway* is a factor in determining the *REV* of that segment, as well as the *REV* and size of its *setback*. Determinations about the presence of *salmonids* in a *waterway* should rely on the most current Alaska Department of Fish and Game (ADFG) Catalog of Waters Important for Spawning, Rearing, or Migration of Anadromous Fishes, ADFG sportfishing regulations, project-specific or previous

sampling efforts, or other resources, as appropriate. Additional information on the catalog and sampling is available from ADFG.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

Seasonal

Definition: A term describing *waterbodies* in which *surface water* normally is present for at least two consecutive weeks after break-up, but gone before the end of June.

Additional Information: Since they generally do not have *surface water* through the entire waterbird breeding cycle, the ADCM typically considers *waterbodies* with only *seasonal surface water* to provide lower value *habitat*, *species occurrence*, and *social function* than those that have *surface water* for a longer period. Consequently, *seasonal waterbodies* are usually *REV* 2 when *natural* or *naturalized* and *REV* 3 when *non-naturalized*. Seasonal *waterbodies* that are both *remote* and very small (i.e., less than 2,500-square-foot) are *REV* 3 when *natural* or *naturalized* and *REV* 4 when not.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

Seasonally Inundated: see *Inundated*

Seeps: see *Inundated* and *Waterways*

Setback

Definition: The inner portion of a *buffer*, closest to a *waterway* or *waterbody*. (See Figure A-2.)

Additional Information: *Setbacks* may be *wetlands*, *uplands*, or a combination thereof. Their widths vary by location, ranging from 25 to 100 feet, measured from the *OHWM*, unless truncated first by development (see below). Due to its close proximity, the *setback* portion of a *buffer* is of particular importance in contributing to, maintaining, and protecting the *functions* of the neighboring *waterway* or *waterbody*. For the same reason, *setbacks* also tend to provide higher value *habitat*, *hydrologic*, *social*, and *species occurrence functions* than the same plant community would if located elsewhere. Thus, the ADCM considers the *setback* portion of a *buffer* to be *REV* 1, instead of *REV* 2, when the neighboring *waterway* or *waterbody* is *REV* 1. *Setbacks* will also be *REV* 1 when they consist of *wetlands* that normally are *inundated* through June.

To determine applicable *setback* widths, the ADCM follows the general concepts of the *AWMP* and the Corps of Engineers' Anchorage General Permits (http://www.poa.usace.army.mil/reg/SPN_Scanned/SPN-05-05.pdf), wherein *setback* widths are greater for categories of *waterways* and *waterbodies* that

have higher *functions* and values and/or are particularly vulnerable to disturbance. In some instances, the *AWMP* applies a larger *setback* than indicated by the general categories. The *setbacks* identified in the *AWMP* apply only to *wetlands*, with municipal ordinance (21.45.210) establishing smaller *setback* distances in *uplands* (i.e., 50 feet for *perennial* and *intermittent streams*, 25 feet for *waterbodies* and 10 feet for *ephemeral streams* and *drainageways*). For simplicity, the ADCM uses a standardized, four-tiered approach to establishing *setback polygons*. The *setback* distances, which apply to both *wetlands* and *uplands*, are:

- 100 feet for both *waterbodies* and *waterway polygons* that support *salmonids* (based on cataloguing or other documentation);
- 85 feet for both *waterbodies* and *waterway polygons* that do not support *salmonids*, but are located in the *headwaters* of the watershed;
- 65 feet for both *waterbodies* and *waterway polygons* that do neither support *salmonids*, nor are located in the *headwaters* of the watershed; and
- 25 feet for *drainageways*, as well as *waterbodies* that are less than 2,500 square feet in size and do not support *salmonids*.

The ADCM does use the smaller municipally required *setback* distances in calculating *credits* for *preservation* of *upland setbacks*. Specifically, the ADCM considers the portion of the *upland setback* that is required by the municipality (i.e., either 10, 25 or 50 feet, depending on the type of aquatic area in question) to have a lower *threat* than the remaining *setback*.

In situations where the *setback* is steeply sloped, the ADCM and lead federal regulatory agency (i.e., Corps of Engineers or EPA) should ensure that the *setback* limits depicted on the *debit-credit* maps and those marked in the field are the same.

Work in *setbacks* will incur *debits* only when it is *jurisdictional* (including work in *upland* areas preserved under the requirements of a previous Corps of Engineers permit), unless the area is an *inclusion* and the work is closely associated with a *jurisdictional* project. Proposals involving the *restoration*, *enhancement*, and/or *preservation* of non-*jurisdictional setbacks* may be eligible for *credits*, for both the *setback* and, using Spreadsheet 4c, any adjacent *waterway*, so long as they satisfy the criteria for such projects, as described herein. Project proponents should seek a *jurisdictional* determination from the lead federal regulatory agency (i.e., Corps of Engineers or EPA).

NOTE: Non-*jurisdictional* projects may still require municipal approval.

Activities and developments in *disturbance categories* 1 and 2, such as utility lines and non-motorized trails, usually do not truncate *setbacks*, whereas those in *disturbance category* 3, such as two-lane or wider roads, typically do. Larger *non-naturalized* areas may also be mapped as *setbacks*, so long

as they serve more to protect the *waterway* or *waterbody* than to cause *indirect impacts* in it. For example, a old fill that is not *developed* and has become well *vegetated* may function as a *setback*, while one that is sparsely *vegetated* and eroding, and/or supports uses that generate more than incidental disturbances such as pollutants and noise, generally do not. The ADCM user should note the reasoning behind judgments on *buffer* existence or truncation in such situations on the appropriate spreadsheet.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

Shadow: see *Indirect Impact Zone*

Shadow Factor: see *Indirect Impact Factor*

Size Factor

Definition: A number used to account for the effect of overlapping *indirect impact zones* on the *functions* of a *polygon*.

Additional Information: The ADCM considers the reduction in *function* caused by *indirect impact zones* to be greater when *zones* overlap a *polygon* from different directions. Mathematically, the ADCM represents the overlap effect as a product of the *indirect impact factors* and the ADCM uses the *size factor* as an exponent applied to the *dominant indirect impact factor* to calculate the *aggregate indirect impact factor*. For example, a *polygon* with two *indirect impact zones* of *disturbance category* 3 overlapping it from different directions would have a *size factor* of 2 applied to the *dominant indirect impact factor* of 0.90 to produce an *aggregate indirect impact factor* of 0.81 (i.e., 0.90^2), representing a 9% reduction from a *polygon* with only one *indirect impact zone* (i.e., *size factor* of 1, producing an *aggregate indirect impact factor* = 0.90^1 = 0.90) and a 19% reduction in *function* from a *polygon* unaffected by any *indirect impact zone* (i.e., *size factor* of 0, producing an *aggregate indirect impact factor* = 0.90^0 = 1.00).

While it is possible—and would be most accurate—to map *polygons* and calculate the overlap-based effect on *function* on a purely site-specific basis, the ADCM incorporates *size factor* to as one of two simplifications to reduce mapping effort without substantially altering the calculations. (The other simplification is using the *dominant indirect impact factor*.) For *size factor*, the simplification involved determining a range of sizes of *contiguous undeveloped area* for which the average overlap would be the same round number and conducting that analysis using a square as the shape of the representative *contiguous undeveloped area*. In other words, with the ADCM's 300-foot *indirect impact zone*, any *polygon* within a 600-foot square (i.e., 8.26-acre) *contiguous undeveloped area* would have two *indirect impact zones* overlapping it, so the *size factor* for an 8.26-acre *contiguous undeveloped area* would be 2 and the *aggregate indirect impact factor* for every *polygon* in that *contiguous undeveloped area* would be 0.81 (i.e., 0.90^2).

Likewise, any *polygon* within a 300-foot square (i.e., 2.07-acre) *contiguous undeveloped area* would have four overlapping *indirect impact zones* (i.e., one from each side), producing a *size factor* of 4 and an *aggregate indirect impact factor* of of 0.66 (i.e., 0.90^4). Table 5 in the Procedures reflects the range of sizes that produce the same average number of overlaps, with the sizes rounded to the nearest 0.25 acre. The table decreases the *size factor* for each range by one in *heavily impacted watersheds*, to reflect the relatively greater importance of remaining aquatic areas in those watersheds.

Table 5 has a number of *size factors* greater than 4, applying to *contiguous undeveloped areas* less than 1.75 acre. These factors represent the increase in adverse effects that occurs in closer proximity to the source of an *indirect impact zone*. As seen in Figure A-6, the area of greatest influence is within the first 25 feet from the source of disturbance. As the size of a square *contiguous undeveloped area* drops below a 300-foot square, the proportion of that area that is within 25 feet of the edge begins to increases substantially. The larger *size factors* applied to smaller size ranges reflects that increase. It would be most accurate to apply *size factors polygon*-by-*polygon*, based on the proximity of each to the source of disturbance, but as with the other simplifications, using the *contiguous undeveloped area* size, as in Table 5, greatly reduces the mapping effort, without substantially changing the overall outcome of the calculations.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

Social Function

Definition: The recreational and educational uses and/or opportunities and aesthetic qualities provided by an aquatic area.

Additional Information: *Social function* is one of four broad categories of *function* the ADCM considers that aquatic areas perform. (The other three *functions* are *habitat*, *hydrologic*, and *species occurrence*.) For freshwater *wetlands* and associated waters, the *AWAM* assesses the level of *social function* by evaluating factors such as the types and intensity of existing aquatic uses (e.g., boating, fishing, hunting, passive recreation), the potential for future use, ownership/accessibility, and the types and degree of disturbance. The *AWAM's social function* assessment procedure constitutes Section 4 of the *AWMP's* Appendix B. For projects in *waterways*, the ADCM uses a slightly modified form of the *AWAM* called the *Waterway Assessment Method for Anchorage* or *WAMA* (see Appendix D).

The ADCM generally considers that most fill, grading, excavation, and *waterway* crossing or diversion activities completely eliminate the *project site's social functions*, at least temporarily. Likewise, the ADCM generally assumes that projects that improve an area's *REV* will result in a commensurate improvement in the area's *social function*.

Certain clearing activities can maintain some of the *project site's social function.* Such projects include roadside clearing that removes only trees, but retains the shrub and herbaceous strata, and winter trails that involve only cutting of woody vegetation, with no change to the vegetative mat. (Such clearing generally incurs *debits* only when it is a closely associated with a *jurisdictional* activity such as a road fill or a utility-line trench.) Conversely, some *enhancement* projects (e.g., installing interpretive facilities related to one or more aspects of the aquatic area) may improve *social function* without changing the area's *REV.* The ADCM assigns *debits* and *credits* for such projects based on the extent of change in the *polygon's* existing social function and the contribution of *social function* to the area's overall *function*.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

Species Occurrence Function

Definition: A measure of the extent to which an aquatic area supports organisms of particular interest in the Municipality of Anchorage.

Additional Information: *Species occurrence* is one of four broad categories of *function* the ADCM considers that aquatic areas provide. (The other three are *habitat function*, *hydrologic function*, and *social function*. *Species occurrence* considers the extent to which particular plant, fish or wildlife species are present in or use an aquatic area, whereas *habitat function* represents the quality and complexity of the area itself.)

The *AWAM* assesses the *species occurrence* function of freshwater *wetlands* and associated waters based on factors such as

- the presence of rare or unique plant species (listed in *AWMP* Appendices I and J);
- the extent of use by Chinook, coho, or sockeye salmon for spawning or rearing;
- use by unique, rare, limited, or sensitive bird species (listed in *AWMP* Appendix K); and
- the extent of use by other water- and migratory birds.

The *AWAM's species occurrence function* assessment procedure constitutes Section 3 of the *AWMP's* Appendix B. The *WAMA* (see Appendix D) adopts the *AWAM* parameters that are applicable to *waterways*, and adds four others that are specific to the ability of fish and other biota to move up- and downstream.

The ADCM generally considers that most fill, grading, and excavation activities completely eliminate the *project site's species occurrence function*, at least temporarily. Likewise, the ADCM generally assumes that projects that improve an area's *REV* (e.g., increasing the period of *inundation* in *wetlands*, daylighting a *piped stream*, removing a total, non-natural barrier

to fish passage to return a stream to its former *salmonid-bearing* status) will result in a commensurate improvement in the area's *species occurrence function*.

A few construction activities that can maintain some of the *project site's species occurrence function* (e.g., clearing that removes only trees but retains an area's shrub and herbaceous strata, installation of a culvert that retains the *natural* channel dimensions, slope, and flow velocity) warrant a reduction in *debits*. (NOTE: Clearing such as described above generally incurs *debits* only when it is closely associated with a *jurisdictional* activity such as a road fill or a utility-line trench.) Conversely, some projects that do not improve an area's *REV* may still warrant *credits* for *enhancing* its *species occurrence function*, so long as they satisfy the criteria for enhancement projects, as described herein. Examples include installing a visual screen to reduce disturbance of sensitive species and correcting a partial barrier to fish passage. (**CAUTION:** Correction of a fish passage barrier that is in violation of permit terms and conditions generally will not be eligible for *credits*.

The ADCM assigns *debits* and *credits* based on the extent of diminution or improvement of the *species occurrence function* and its contribution to the area's overall *function*. For *wetlands* and associated waters, the ADCM uses the *AWAM* to assess the project's positive or negative effect on *function*. For projects in *waterways*, the ADCM uses the *WAMA* (see Appendix D).

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

Springs: see *Inundated* and *Waterways*

Standards of Success: see *Performance Standards*

Still Waters: see *Waterbodies* and *Wetlands*

Stream

Definition: A *waterway* that is—or was originally—a naturally occurring feature and that exhibits an *OHWM* or conveys *perennial* flow.

Additional Information: *Streams* differ from *ditches* in origin, with *streams* being either naturally occurring *waterways* or constructed features that replace naturally occurring ones. They differ from *drainageways* by having a more prolonged, more frequent, and/or higher-volume flow regime, which manifests itself either as *perennial* flow or as an *OHWM*. The *OHWM* may be discontinuous as a result of naturally occurring or human-induced interruptions such as subsurface segments in spatially *intermittent streams*, pipes, rock outcroppings, and recent disturbances, including floods and construction. When they convey *perennial* flow, the ADCM considers channels that emanate from constructed outfalls to be "naturally occurring" and treats them as *streams*, rather than *drainageways*.

NOTE: The ADCM definition of *stream* differs from that of the Municipal Hydrologic Classification System.

REVs

To assign *REV* to *streams*, the ADCM considers duration of flow (i.e., *perennial* versus *intermittent* or *ephemeral*), condition (i.e., *natural*, *naturalized*, *non-naturalized*, or *piped*), and use by *salmonid* fish species. Since *perennial*, *natural*, or *naturalized streams* that support *salmonids* typically have substantial *functions* and values, the ADCM generally considers them to be *REV* 1. *Perennial*, *natural*, or *naturalized streams* that do not support *salmonids* usually are *REV* 2. *Non-naturalized polygons* of *perennial streams* are one *REV* lower than a corresponding *natural* or *naturalized polygon* would be (i.e., *REV* 2 if they support *salmonids* and *REV* 3 if they do not). *Piped stream polygons* are *REV* 4. *Intermittent* and *ephemeral stream polygons* are usually *REV* 3 if they are *natural* or *naturalized* and *REV* 4 if they are *non-naturalized*. The *REV* of *inactive channels* depends on whether they are connected to the active *stream* when flow is at or below bankfull discharge.

Impoundments

When a *project site* or *indirect impact zone* occurs within a submerged *stream* channel, such as those beneath Westchester Lagoon, Campbell Lake, and beaver ponds, the ADCM uses Spreadsheets 1a, 1c, and 4a (see Appendix B) to calculate the *debits* and *credits* for that area. (Calculations for any *debits* or *credits* outside the submerged channel would utilize Spreadsheets 1b and 4b.) The ADCM user should determine the *channel perimeter* of the submerged channel by consulting available survey data and historical records (including aerial photographs) and/or extrapolating the channel dimensions from unaffected up- or downstream segments, as appropriate. *REV* assignment for submerged channels follows the steps for *waterways* in Table 1, except that the distinction between *natural*/*naturalized* and *non-naturalized* will depend on the normal circumstances of the *waterbody*. In other words, for submerged channels within "permanent" *waterbodies* such as Westchester Lagoon and Campbell Lake, the determination of *natural*/*naturalized* versus *non-naturalized* would be the same as for the *waterbody*. For newer impoundments, such as many beaver ponds, the distinction should derive from the condition of the *stream* prior to completion of the dam.

Intertidal Zone

For tidally influenced *stream polygons*, the ADCM uses Spreadsheets 1a, 1c, and 4a (see Appendix B) to calculate the *debits* and *credits*

only for that portion of the *channel perimeter* located below the *OHWM*. Calculations of *debits* or *credits* for areas above that level would be as for the *intertidal zone*; once the elevation of the channel *bed* descends below mean lower low water, the ADCM treats the channel as part of the *subtidal zone*.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

***Stream Bank**:* see *Bank*.

***Stream Bed**:* see *Bed*.

Subtidal Zone

Definition: The continuously submerged part of marine and estuarine areas, immediately below the *intertidal zone*. (See Figure A-7.)

Additional Information: The ADCM divides the *subtidal zone* into shallow and deep *polygons*. The shallow *subtidal zone* extends from the mean lower low water elevation (MLLW) to -30 feet MLLW, while the deep *subtidal zone* is the area below -30 feet MLLW. The ADCM considers the shallow *subtidal zone* to be of higher *REV* than the deep *subtidal zone*, because it supports use by both deepwater species (i.e., fish and marine mammals) and shallow water species, including waterbirds. Due to current velocity and turbidity, and the resulting lack of marine flora, species diversity in Anchorage's shallow *subtidal zone* is not as high as in the *intertidal zone*, which supports terrestrial, as well as aquatic, fauna. Thus, the ADCM considers the shallow *subtidal zone REV* 2 and the deep *subtidal zone REV* 3.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

Surface Water

Definition: An area with a measurable depth of water standing or flowing above the ground.

Additional Information: The presence and persistence of *surface water* are key factors in determining the *REV* of *waterbodies*, *waterways*, and *wetlands*, based on the fundamental importance of water in ecological processes. The ADCM assigns a higher *REV* to aquatic areas with s*urface water* than to those that lack it. Likewise, areas where *surface water* exists for longer periods of time receive higher *REVs* than areas where its duration is shorter. Proximity to *surface water* also increases the *REV* of some *polygons*. This approach reflects the fact that areas with *surface water* typically perform a number of *functions* of high value to the public, such as providing fish and waterbird habitat and opportunities for fishing, wildlife viewing, boating, and other water-based recreation.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

-T-

Temporal/Temporary Impact(s)

Definition: Construction or other activity that will eliminate or diminish an aquatic area's existing natural *functions* for a limited period of time, up to five years.

Additional Information: *Temporary impacts* typically result from construction activities outside the footprint of an area being *developed*. Determination of whether an impact is *temporary* or *permanent* will depend on the length of time necessary for the affected area to regain its previous *function*. The ADCM generally treats a variety of construction-related activities as *temporary impacts* when, due to the nature of the affected area and the *BMPs* being employed by the project proponent, there is a reasonable likelihood that the affected *polygon(s)* will regain its previous *functions* within a short period of time, not to exceed five years. Activities that may meet these criteria, depending on the nature of the affected area, include construction-related stockpiling, *stream* diversion for placement of a culvert, installation of buried utilities, and placement of fill for construction equipment access and operation. *BMPs* must include, as appropriate, measures to ensure removal of all temporary fills (e.g., placement of geotextile material), re-establishment of preexisting contours, and bioengineered stabilization/revegetation of disturbed *polygons* to match their previous condition.

In *polygons* dominated by fast-growing or easily replanted vegetation (e.g., sedges, grasses, willows, alders), construction-related clearing may be considered a *temporary impact*. In slow-growing or difficult to replace plant communities (e.g., forested, spruce bog and/or ericaceous shrub wetlands), the impacts of clearing are more likely to be *permanent*. When such projects incorporate specific measures to re-establish the pre-clearing plant community within five years, the *debit* calculation may utilize the alternative *temporary impact p*rocedure described below. In all types of communities, the ADCM typically considers cleared *polygons* to retain their *hydrologic function*, so long as the activity does not include grubbing, or otherwise destroy the vegetative mat.

The ADCM includes two alternative procedures to calculate *debits* for *temporary impacts*. The simplest procedure applies a multiplier of 0.5 to the *debits* that would accrue if the impacts were *permanent*. This multiplier is intended both to account for temporal impacts and to represent an assumption that, on average, construction-related impacts will degrade the *functions* of affected *polygons* by 50 percent. This assumption stems from field staff experience that recovery of affected *polygons* varies both in degree of and time for success, depending on a number of factors. The simpler procedure is not

applicable to projects that involve direct impacts to slow-growing or difficult to replace plant communities (e.g., forested, spruce bog, ericaceous shrub).

The alternative procedure for calculating *temporary impact debits* is more site- and activity-specific, and can result in a lower *debit* balance. It requires that the project proponent provide *financial assurance* equivalent to the in-lieu fee necessary to offset the *debits* for the expected *temporal impacts*, based on the anticipated timeline from start of work to rectification of the affected *polygon(s)*, up to a maximum of five years. The permit or other authorizing document would specify the duration of impacts used to calculate the *financial assurance*, as well as *performance standards* for rectification of the *temporary impacts*, emphasizing the return of affected *polygons* to their previous condition or one of higher *REV* (as opposed to achieving rapid revegetation with species that are fast-growing, but are not representative of the pre-project plant community). Mid-project changes in the anticipated duration of impacts would require additional *financial assurance*. Upon successful rectification, as confirmed by the lead federal regulatory agency (i.e., Corps of Engineers or EPA), a final calculation, using the actual duration of impacts will reveal the amount of refund/release due to, or additional in-lieu fee or other compensatory mitigation owed by, the permittee. In circumstances when providing *financial assurance* for rectification of *temporary impacts* is inappropriate and/or impracticable, the calculation will use the simpler procedure described in the previous paragraph.

For projects that cause *temporary impacts* in *vegetated* areas during late autumn, winter, or early spring (i.e., mid-October through mid-April), when revegetation cannot begin immediately due to climatic conditions, the lead federal agency regulatory agency (i.e., Corps of Engineers or EPA) may stop the accumulation of time for calculation of *temporal impacts debits* once inspection confirms that other elements of rectification (e.g., re-establishment of pre-project elevations and contours, implementation of erosion and sediment controls) have been completed. In such instances, the accumulation of time would resume in mid-April.

In *waterways*, the area of *temporary impact* equates to the total square feet of *bed* and/or *bank* temporarily eliminated or replaced by the project. In other waters, the footprint of the area directly affected is expressed in acres.

Most projects with *temporary impacts* will also incur *debits* for *indirect impacts* to account for both the temporal and potentially permanent loss of *function* resulting from the activity. The basic calculation is the same as for *permanent* development, with the addition of the same two options described for addressing the temporary nature of the disturbance. Minor repair and replacement work typically will not incur *debits* for *indirect impacts*, when the project occurs entirely within the footprint of the original work (e.g., previously cleared or excavated area) and will not change the nature or extent of impacts (e.g., will utilize the same backfill material).

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

Threat

Definition: An estimate of the likelihood that an area will be *developed* or degraded.

Additional Information: The ADCM uses *threat*, along with *REV*, in determining the *credit ratio* for *preservation* projects. The December 2000 version of the ADCM established four levels of *threat*, based on the *regulatory constraints* expected to apply to a particular parcel. The "relative threat-value index (RTVI)" combined the level of threat with *REV* to determine the *credit ratio* for each *polygon*. This update retains the four-tier assessment of *regulatory constraints*, but has included an additional component to reflect the role of *accessibility* in *threat* of development. Table 13 of the updated ADCM incorporates both of these factors, along with *REV*, to generate *preservation credit ratios* for the various *polygons* found in the Municipality of Anchorage. Due to the layout of the Table 13, the ADCM no longer needs the the "RTVI."

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

-U-

Unvegetated

Definition: A term that, when applied to the *intertidal zone*, describes areas with less than 50 percent cover by vascular plants and/or cryptogams.

Additional Information: In the *intertidal zone*, the ADCM generally considers most large (i.e., more than two acres), uniformly unvegetated areas to perform fewer, or lower-level, *functions* than areas dominated by vascular plants, algae, and/or aquatic mosses, unless documentation shows that the *polygon* is a *waterbird* or *beluga whale concentration area*. Areas of unvegetated *intertidal zone* that support such wildlife concentrations will be *REV* 1. Others will generally be *REV* 2. Establishing vegetation in the *intertidal zone*—where needed to improve the area's *function*—may produce *credits*, so long as the proposal satisfies the criteria for *enhancement* projects.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

Upland(s)

Definition: An area that does not meet the definition of *wetland*, *waterbody*, *waterway*, *intertidal zone*, or *subtidal zone*.

Additional Information: *Uplands* include *natural* areas, permitted fills, and *developed* areas. They also include areas that were formerly *wetlands, waterbodies, waterways, intertidal zone*, or *subtidal zone*, but no longer meet

the definitions thereof, as a result of either natural processes or human alteration.

The ADCM assigns *REVs* to all *uplands* within the *project site* and *indirect impact zone*, based on both geographical context (i.e., whether it is a *setback*, *buffer*, and/or *inclusion*) and condition (i.e., whether it is *natural, naturalized, non-naturalized*, or *developed*). Disconnected *inactive stream channels* may be *uplands*, but should also be identified as *inactive channels* on ADCM maps to facilitate the evaluation of mitigation (i.e., avoidance, minimization, *restoration*, *enhancement*, and/or *preservation*) opportunities. For development projects, *uplands* resulting from unauthorized activities should be assigned a *REV* based on their previous condition and geographical context.

Work in *upland polygons* will incur *debits* only in relatively rare instances. These situations occur primarily when the area is an *upland inclusion* within an aquatic area; it could not reasonably be *developed* without activities that require CWA authorization; and the areal extent of the project's direct aquatic impacts would exceed the footprint of the *upland* impacts. Projects will also incur *debits* for work in *uplands* when those *uplands* were previously preserved for *credits* and/or under the requirements of another Corps permit.

Some projects involving *uplands* may be eligible for *credits*. Examples include

- *restoration* of a former aquatic area that is currently *upland* (except where enforcement action is the appropriate resolution);
- *enhancement* of an *upland* area, when the work would improve the protection and/or *function* of an adjacent aquatic area;
- *establishment* of an aquatic area in an *upland* of lower value; and
- *preservation* of *uplands* that either are an integral component of an aquatic ecosystem (e.g., *upland inclusions*) or provide a *buffer* for a high value aquatic area.

For *restoration*, *enhancement*, and *establishment* projects involving *uplands*, the pre-project *REV* assignment should consider only the area's existing physical and biological characteristics and not its geographical context (i.e., whether it is a *setback* or *buffer*). Post-project *REV* assignment considers both factors.

CAUTION: As with other types of compensatory mitigation, a project proponent may use *upland credits* to offset *debits* only when the lead federal regulatory agency (i.e., Corps of Engineers or EPA) has determined that the adverse impacts of the development project are unavoidable and that the *upland credits* would constitute appropriate compensatory mitigation for those unavoidable impacts. Most *REV* 3 or 4 *uplands* will not be eligible for *credits*.

-V-

Vegetated

Definition: A term describing areas with more than 50 percent cover by plant species that support or protect aquatic *functions*.

Additional Information: *Vegetated* areas of the *intertidal zone* (e.g., salt marshes, rockweed beds, algal mats) generally perform a number of high-level *functions* (e.g., shoreline stabilization, pollutant filtration, fish and wildlife habitat/use, and recreational/educational/aesthetic uses). Consequently, the ADCM considers areas of *vegetated intertidal zone*—including unvegetated *inclusions*—to be *REV* 1. Establishing additional vegetation to improve the *function* of an area of *intertidal zone* that has less than 100 percent cover may produce *credits*, so long as the proposal satisfies the criteria for *enhancement* projects, as described herein.

Vegetated areas may perform sufficient *functions* to be mapped as part of a *setback*, *buffer*, and/or *contiguous undeveloped area*, even when they are *non-naturalized*. Generally, such a determination also requires that the *polygons* do not support types or intensities of human use that outweigh the *functions* provided by the vegetation, as with lawns, dog parks, and sports fields. The *REV* for *non-naturalized* but *vegetated* areas that qualify as *setbacks* and *buffers* will be the same as for the remainder of the *setback* or *buffer*; otherwise, they will be *REV* 4.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

-W-

Waterbird Concentration Area

Definition: A term used to describe *unvegetated* areas of *intertidal zone* that support substantial numbers and/or diversity of waterbirds for feeding, staging, and/or molting.

Additional Information: For purposes of the ADCM, the term "waterbirds" refers to waterfowl, cranes, shorebirds, gulls, and/or terns. The ADCM considers areas of *unvegetated intertidal zone* that support concentrations of waterbirds—such as the mudflats between Fish Creek and Ship Creek—to be *REV* 1. Documentation of such use may include surveys/reports by the U.S. Fish and Wildlife Service (907-271-2888 or 907-786-3443, ak_mbm@fws.gov or ak_fisheries@fws.gov), Anchorage Audubon Society (907-338-2473, info@anchorageaudubon.org), or other qualified entity. When such information does not currently exist and the area in question cannot be surveyed within the necessary timeframe, verbal consultation with

one or more representatives of the aforementioned groups or another qualified individual may suffice.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

Waterbody(ies)

Definition: An area of open fresh water that exists frequently enough and persists long enough to establish an *OHWM* and is either still or has imperceptible flow.

Additional Information: The term *waterbody* incorporates both "lakes" (*waterbodies* larger than 20 acres) and "ponds" (*waterbodies* smaller than 20 acres) from the 2000 ADCM and, along with *wetlands*, replaces the term "still waters." *Waterbodies* may be either naturally occurring or constructed. To assign *REV* to *waterbodies*, the ADCM considers both the duration of *surface water* (i.e., *persistent* versus *seasonal*) and the condition/use of the *waterbody* and its shoreline (i.e., *natural*, *naturalized*, or *non-naturalized*).

Most *persistent*, *natural*, or *naturalized waterbodies* are *REV* 1, since they typically perform several *functions* of high value to the public. Most *waterbodies* that are *persistent* but *non-naturalized* are *REV* 2; however, when a proposed project would affect—either directly or indirectly—an area of remnant shoreline plant community, those *polygons* will be *REV* 1, to reflect their increased level of *function*. The remainder of the *waterbody* would still be *REV* 2.

Waterbodies or portions thereof with *seasonal surface water* have a *REV* one level lower than their *persistent* counterparts (i.e., *REV* 2 if they are *natural* or *naturalized* and *REV* 3 if they are *non-naturalized*). When a proposed project would have direct or indirect impacts on an area of remnant shoreline plant community in a *non-naturalized seasonal waterbody*, those *polygons* will be *REV* 2. The rest of the *waterbody* would still be *REV* 3.

Consistent with the *AWMP*, the ADCM considers *waterbodies* that are both very small (i.e., less than 2,500 square feet in size, including contiguous *inundated wetlands* and *floating aquatic mat*) and located more than 300 feet from other *waterbodies* or *inundated wetlands* to be too small to have high *habitat function*. Such small waters also generally do not support fish (unless stocked) and provide less *social function* than larger *waterbodies*. Thus, the ADCM generally assigns a *REV* one level lower than their larger counterparts would have (i.e., *REV* 2 if *persistent* and *natural* or *naturalized*, *REV* 3 if *seasonal* and *natural* or *naturalized* or *persistent* and *non-naturalized*, and *REV* 4 if *seasonal* and *non-naturalized*). In addition, the ADCM assigns only a 25-foot *setback*/*buffer* to small *waterbodies*.

Not all *waterbodies* will be *jurisdictional*. Project proponents should seek a *jurisdictional* determination from the lead federal regulatory agency (i.e., Corps

of Engineers or EPA), particularly for *waterbodies* that were constructed from *uplands* for purposes such as water quality treatment or irrigation. Only *jurisdictional* projects will incur *debits*. Proposals involving the *restoration*, *enhancement*, and/or *preservation* of non-*jurisdictional waterbodies* may be eligible for *credits*, so long as they satisfy the criteria for such projects.

NOTE: Non-*jurisdictional* projects may still require municipal approval.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

Waterbody Setback: see *Setback*

Waterway(s)

Definition: A linear feature that conveys freshwater flow.

Additional Information: The term *waterway* replaces "streams and other flowing waters" from the 2000 ADCM. It also incorporates the 2000 ADCM's terms "springs" and "seeps," where such features meet the definition. For purposes of the ADCM, the term encompasses the area below the top of the *banks* of *streams*, *drainageways*, and *ditches*. (See Figure A-1.) It encompasses both naturally occurring and constructed features, and includes spatially *intermittent* surface conveyances with segments of underground flow. Linear aquatic features that do not convey surface flow are *waterbodies* or *wetlands*, instead of *waterways*. The ADCM calculates both *debits* and *credits* for *waterways* based on the square footage of the affected area of *bed* and/or *bank* (as opposed to acreage). For projects that impact the entire channel (e.g., pipes, utility-line crossings, diversions), *debit* calculations use both the length of the affected channel (measured along the thalweg, or deepest part) and its *wetted perimeter*, plus any additional *jurisdictional* area of *bank* above the *OHWM*. *Credit* calculations for many projects that affect the entire channel (e.g., construction of a new channel) generally will use *channel perimeter*, instead of *wetted perimeter*; some (e.g., improvement of fish passage, construction of off-channel habitat) will use *wetted perimeter* (see Appendix D).

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

WAMA

Definition: The Waterway Assessment Method for Anchorage.

Additional Information: The *WAMA* is an adaptation of the *AWAM* that the ADCM uses to assess the effects of projects on the *habitat*, *hydrologic*, *social*, and *species occurrence functions* of Anchorage's *waterways*, for purposes of calculating *debits* and *credits* for situations in which there is no change in *REV*. ADCM Appendix D provides a narrative of the *WAMA* parameters and projects that may impact them, as well as a blank set of *WAMA* Data Sheets.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

Wetland(s)

Definition: For purposes of the ADCM, the term *wetlands* applies to areas outside the *intertidal zone* that are *inundated* or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.

Additional Information: The term *wetlands* incorporates both "patterned ground and other ponded wetlands" and "other wetlands" from the 2000 ADCM and, along with *waterbodies*, replaces the term "still waters." The ADCM places tidally influenced wetlands in the *intertidal zone*. There is no distinction in the ADCM between *wetlands* that are naturally occurring and those that were purposefully constructed or recently formed as a result of construction or other changes in the landscape. The ADCM handles linear *wetlands* that function primarily to convey surface runoff (e.g., *wetland ditches* and *drainageways*) as *waterways*. Other linear features, such as *wetland* remnants that convey little to no surface runoff and natural components of larger *wetland* complexes (e.g., the flarks in patterned ground bogs) are treated as *wetlands*, regardless of their shape.

To assign *REV* to *wetlands*, the ADCM considers the presence and duration of *surface water*, as well as the *wetland's* position (i.e., whether it is an *inclusion* or part of a *setback* or *buffer*) and its condition (i.e., its dominant vegetation and/or whether it is *natural*/*naturalized* or *non-naturalized*). The ADCM considers most *inundated wetlands* that have *surface water* through June to be *REV* 1, since they typically perform several *functions* of high value to the public. *Wetlands* with a shorted period of *inundation* generally are *REV* 2.

The ADCM considers *inundated wetlands* that are very small (i.e., less than 2,500 square feet in size) and located more than 300 feet from other *inundated wetlands* or *waterbodies* to be too small to have high *habitat function* or *species occurrence function* and provide less *social function* than larger *wetlands*. Thus, the ADCM generally assigns these small *wetlands* a *REV* one level lower than indicated by their hydrologic regime (i.e., *REV* 2 when *inundated* through June and *REV* 3 when *inundated* only in the spring and/or autumn). These small *wetlands* also typically will have only a 25-foot *buffer*.

The *REV* of *wetlands* that are not *inundated* will depend on whether they are an *inclusion*, are part of a *setback* or *buffer*, or are *non-naturalized*. The *REV* of *inclusion* and *setback wetlands* will be the same as the corresponding *inundated wetlands*, *waterway*, or *waterbody*. Non-*inundated buffer wetlands* always have a *REV* of 2. *Non-naturalized wetlands* generally have a *REV* of 4,

unless they qualify as a *setback* or *buffer*. Non-*inundated wetlands* that do not fall under any of these categories (i.e., "other" *wetlands*) are *REV* 3.

For *restoration*, *enhancement*, and *establishment* projects involving *wetlands*, the pre-project *REV* assignment should consider only the area's existing physical and biological characteristics and not its geographical context (i.e., whether it is a *setback* or *buffer*). Post-project *REV* assignment considers both factors.

Not all *wetlands* will be *jurisdictional*. Project proponents should seek a *jurisdictional* determination from the lead federal regulatory agency (i.e., Corps of Engineers or EPA), particularly for freshwater *wetlands* not adjacent to *waterbodies* or *waterways*. Only *jurisdictional* projects will incur *debits*. Proposals involving the *restoration*, *enhancement*, and/or *preservation* of non-jurisdictional *wetlands* may be eligible for *credits*, so long as they satisfy the criteria for such projects.

NOTE: Non-*jurisdictional* projects may still require municipal approval.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

Wetted Perimeter

Definition: A linear measurement of the cross-section of the portion of a *waterway* located below its *OHWM*, extending down one *bank*, across the *bed*, and up the opposite *bank*. (See Figure A-1.)

Additional Information: Except when there are *wetlands* below the top of *bank*, the *wetted perimeter*—measured in linear feet—is one of two components that will determine the size of the affected area when calculating *debits* for projects that will impact the entire cross-section of a *waterway* (e.g., pipes, utility-line crossings, diversions). The other component is length, measured along the thalweg, or deepest part, of the affected channel segment. For projects in which the affected length is more than a few feet, it is acceptable to use an average or representative figure(s) for *channel perimeter*, depending on the variability of the channel segment. Project proponents should consult with the lead federal agency (i.e., Corps of Engineers or EPA) in making determinations of average *channel perimeter*. Most projects that produce *credits* via *REV improvement* will use *channel perimeter* in determining area, but some projects that improve only certain *functions* (e.g., fish passage, off-channel habitat) will use *wetted pereimeter* (see Appendix D).

For calculations involving submerged channels, such as those beneath Westchester Lagoon, Campbell Lake, and beaver ponds, the term applies only to the *bed* and *banks* of the original channel, measured to the top of *bank* (see Figure A-1), not the entire impoundment. When the dimensions of the original channel are unknown, one can use an appropriate segment of channel up- or downstream of the impoundment as a reference.

A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W

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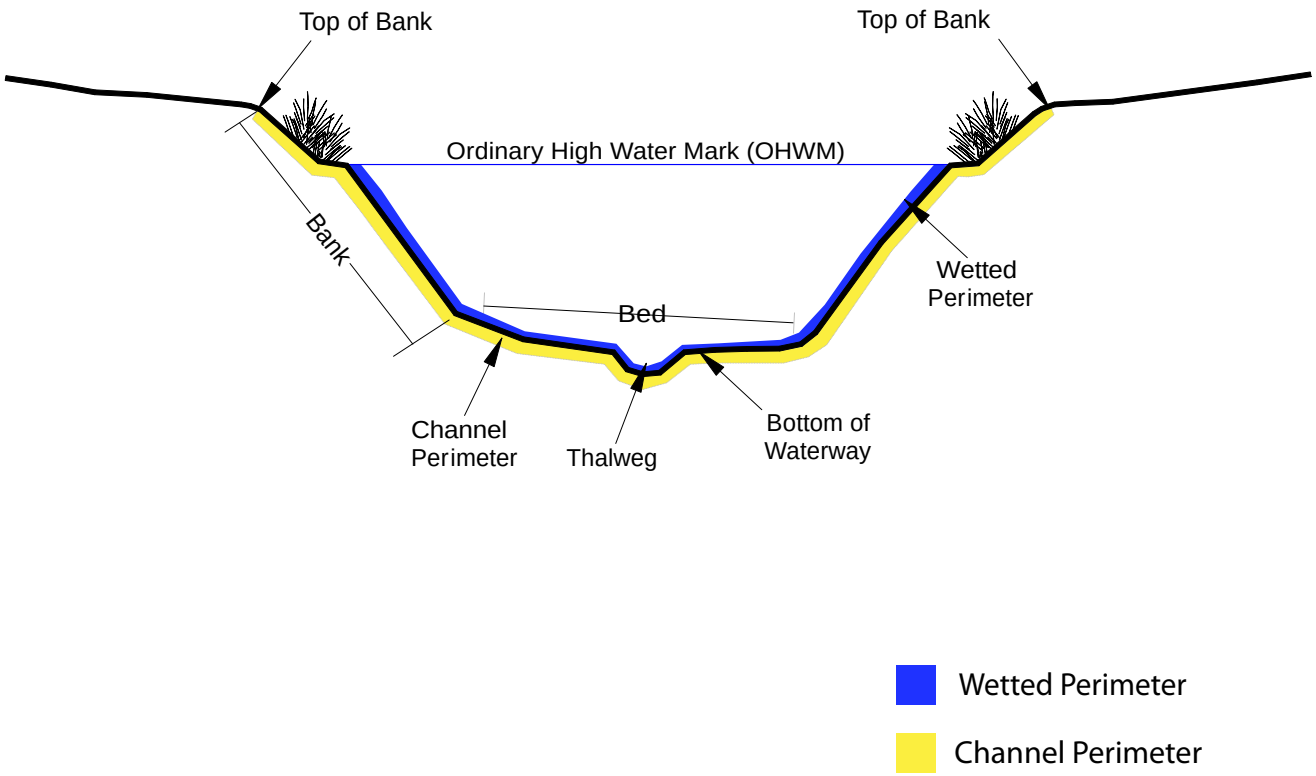
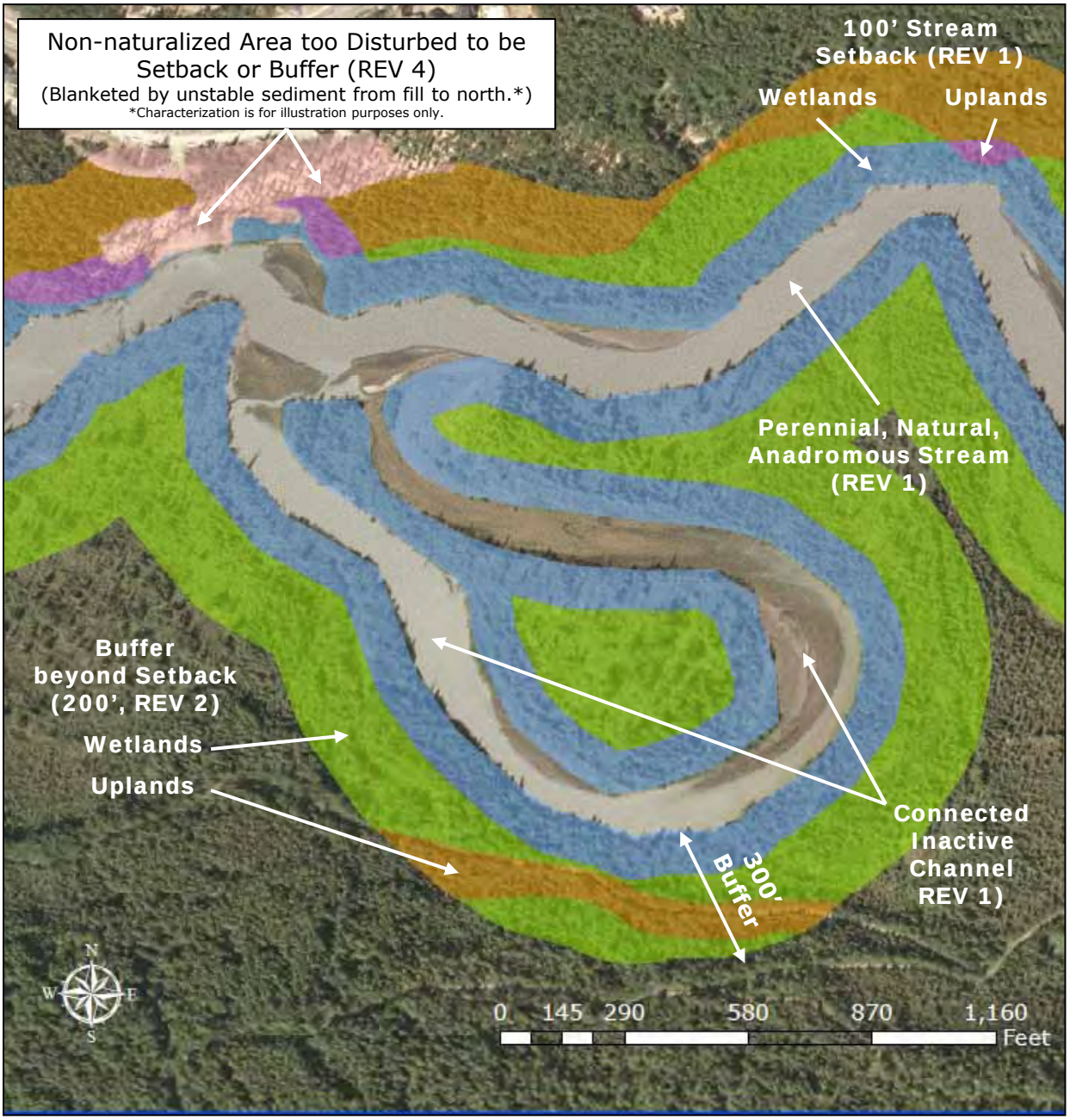
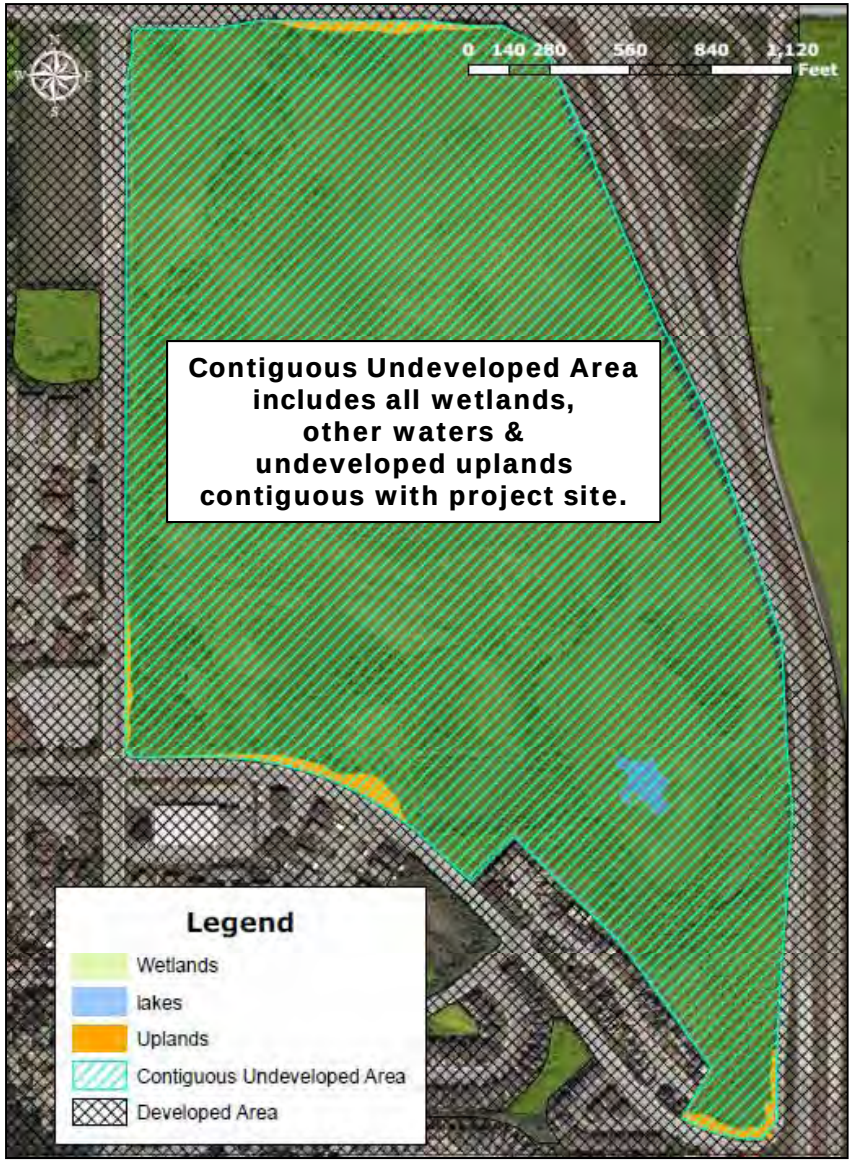
A-B-C-D-E-F-H-I-J-L-M-N-O-P-Q-R-S-T-U-V-W



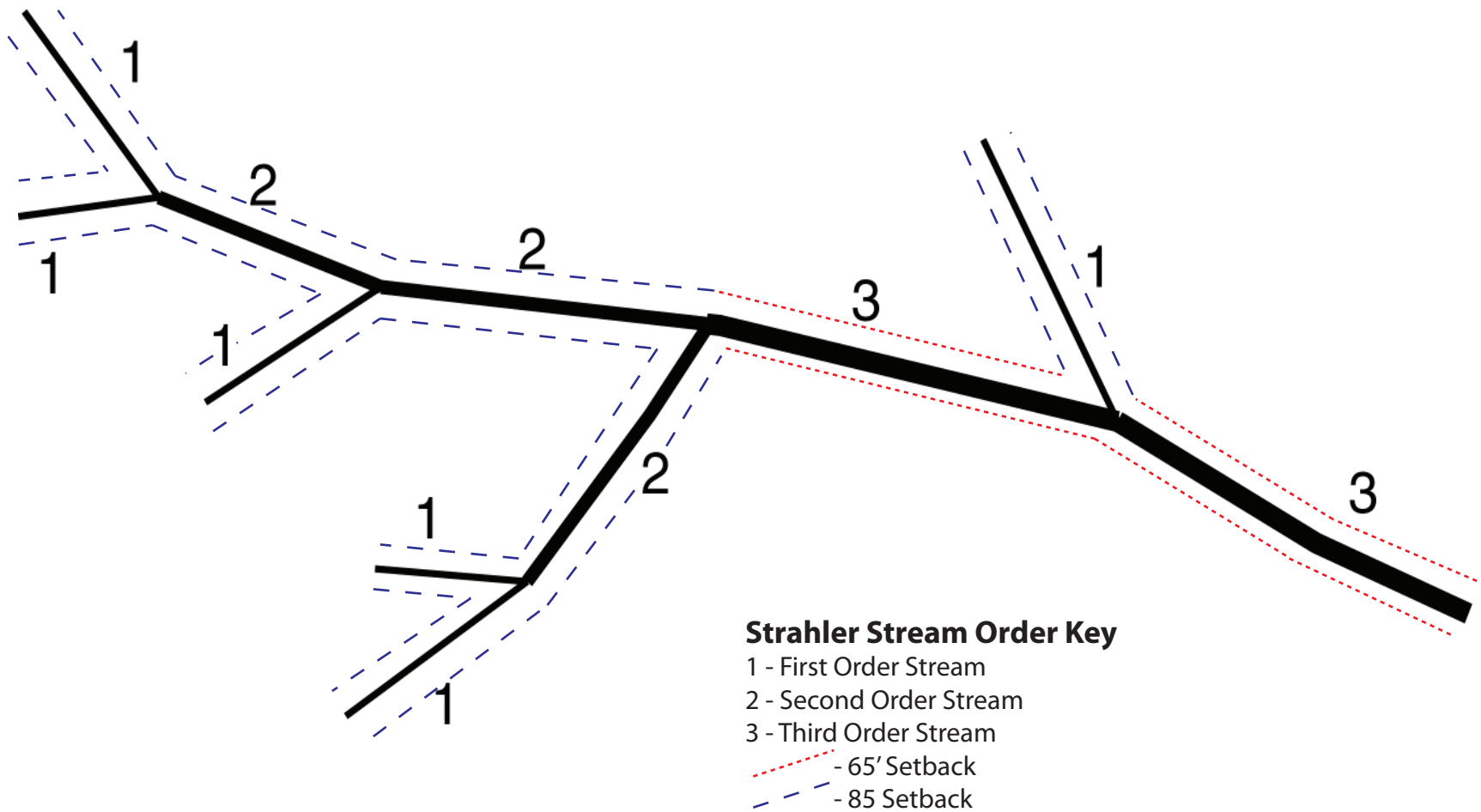
WATERWAY CROSS-SECTION | Figure A-1



SETBACK, BUFFER & INACTIVE CHANNEL | Figure A-2



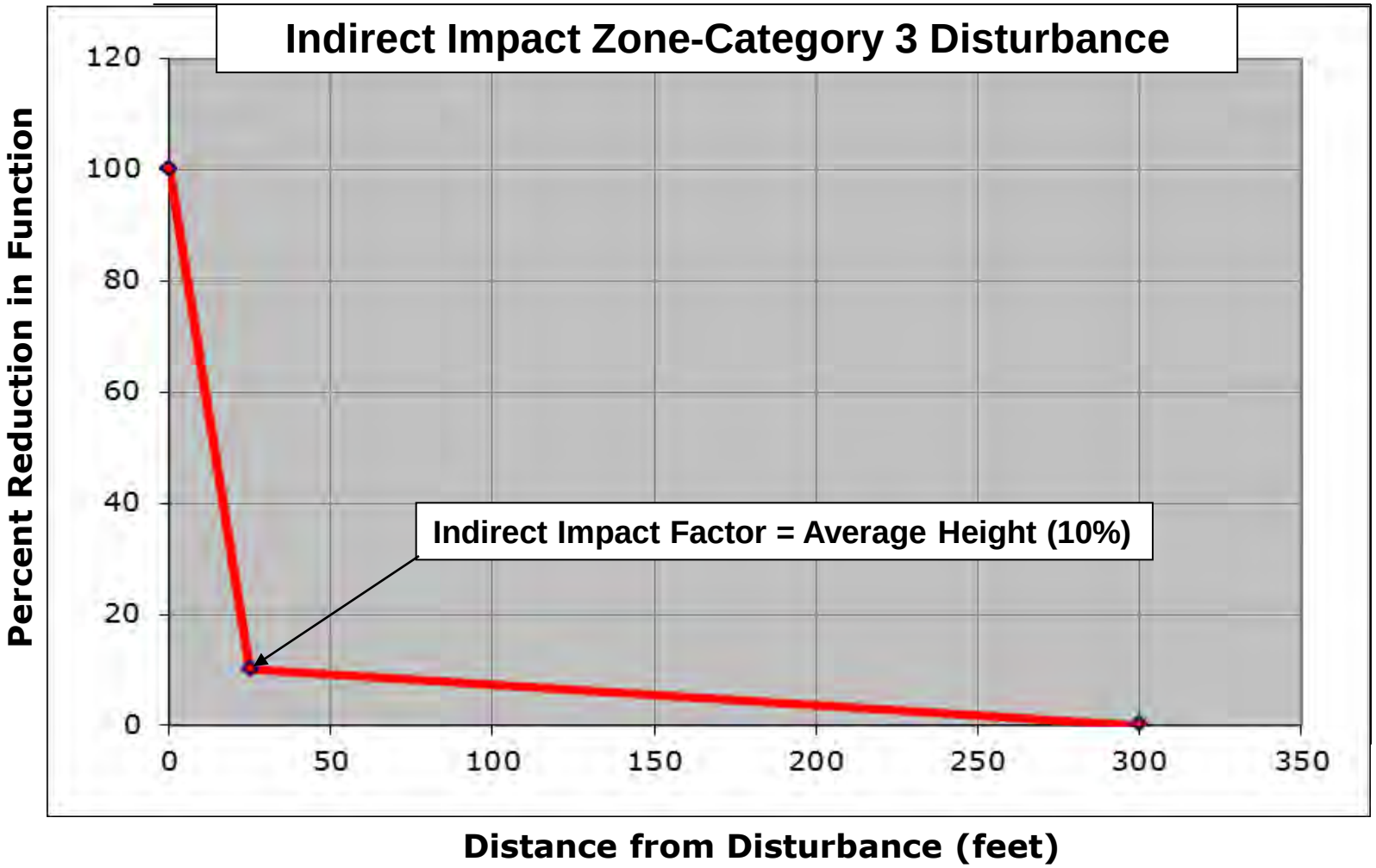
CONTIGUOUS UNDEVELOPED AREA, DEVELOPED, INDIRECT IMPACT ZONE	Figure A-3



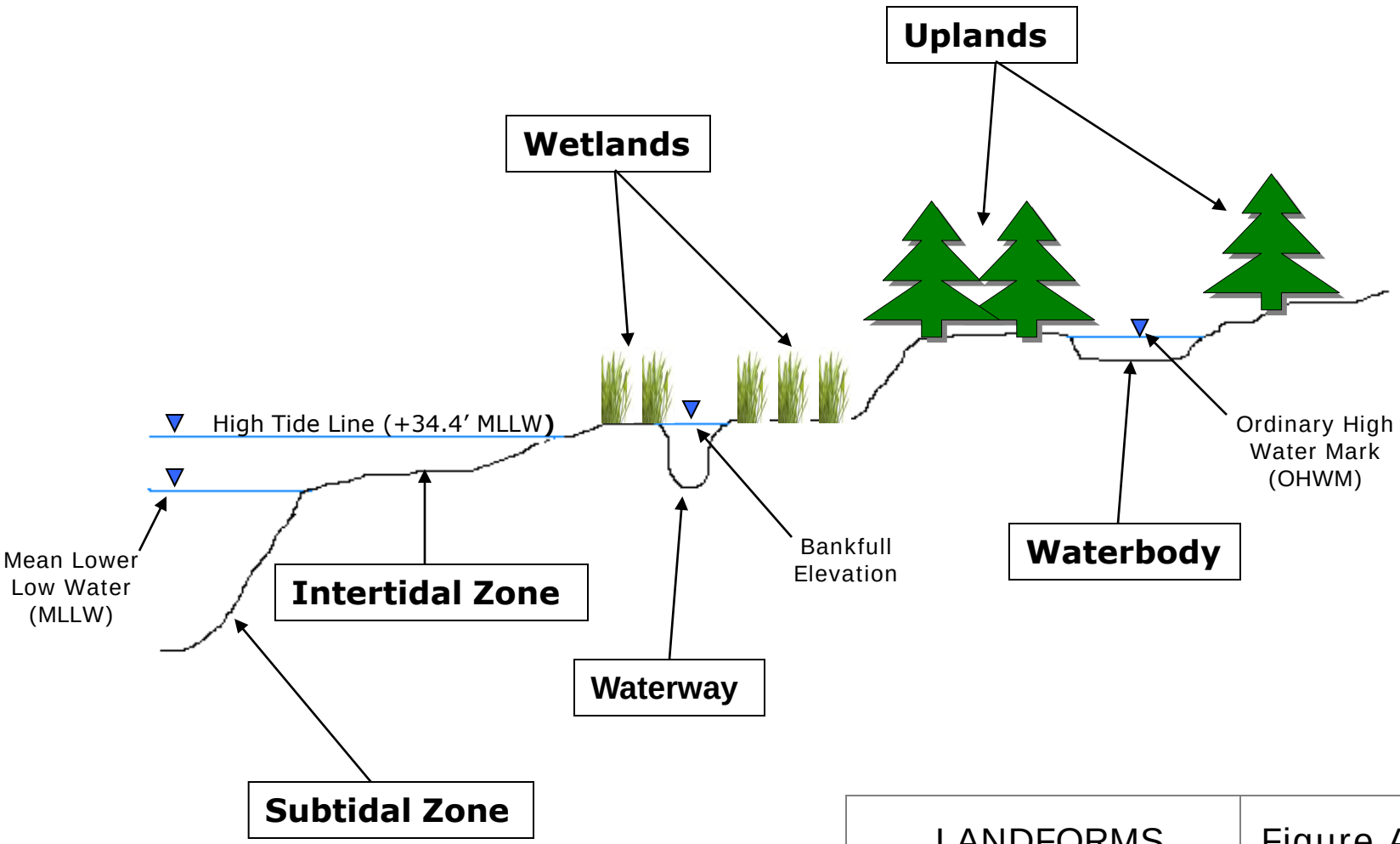
*Note that setbacks shown apply to non-anadromous streams only;
all anadromous streams require 100' setbacks.

HEADWATERS | Figure A-4

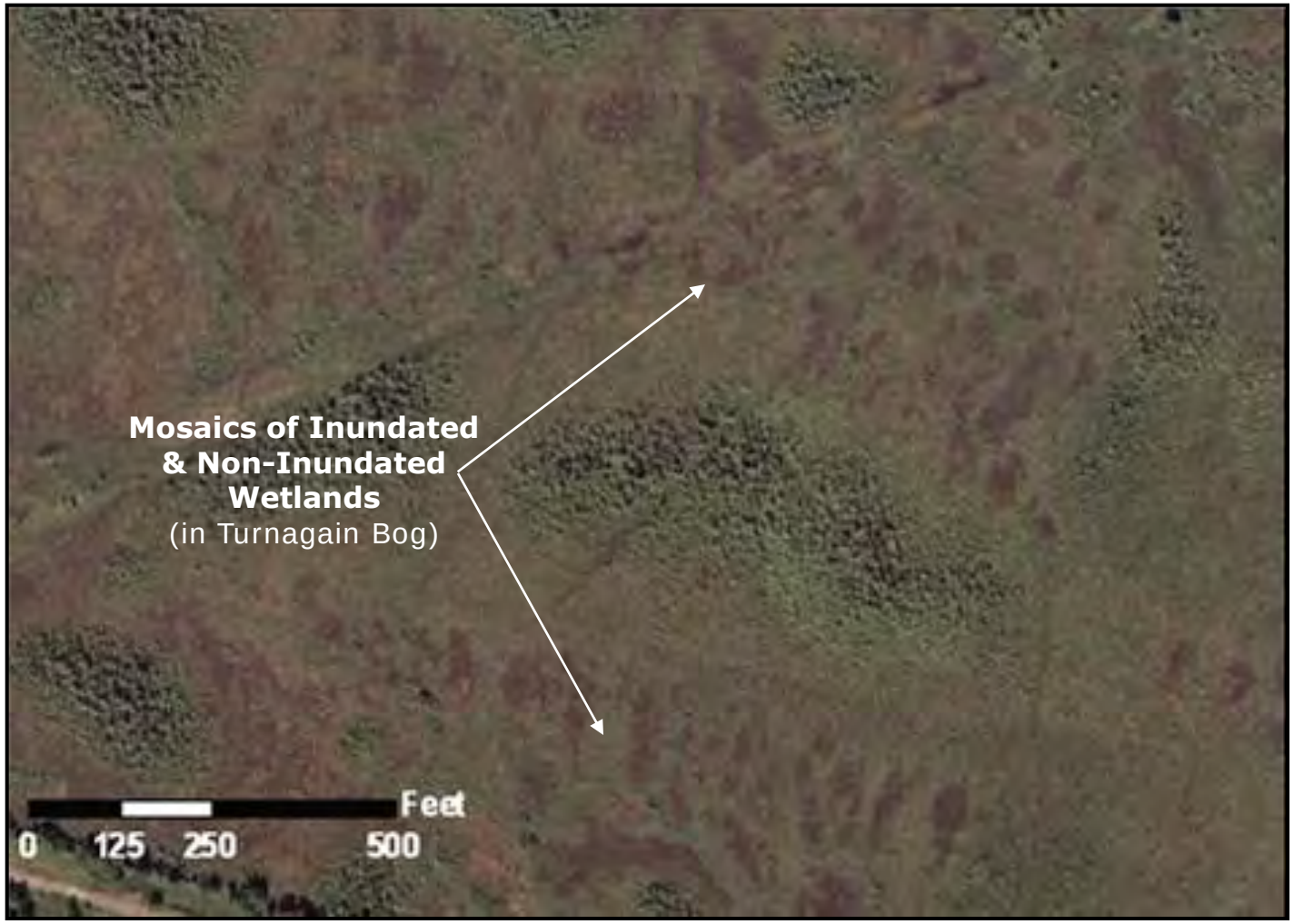
INCLUSION	Figure A-5



INDIRECT IMPACT FACTOR	Figure A-6



LANDFORMS | Figure A-7



MOSAIC—INUNDATED/NON-INUNDATED WETLAND	Figure A-8

Natural. Vegetation that is primarily native to Anchorage covers ≥50% of the banks.

Non-naturalized. 1) Channel is wider & shallower; & 2) straighter than reference reach; & 3) banks are denuded.

Naturalized. Meets 2 of 3 criteria: 1) channel size & shape similar to reference reach; 2) sinuosity similar to reference reach; &/or 3) vegetation primarily native to Anchorage covers ≥ 50% of the banks.

NATURAL, NATURALIZED & NON-NATURALIZED STREAMS

Figure A-9

Natural & Naturalized: ≥25% of shoreline is floating aquatic mat, emergent marsh &/or herbaceous, scrub-shrub, or forested community dominated by locally native species.

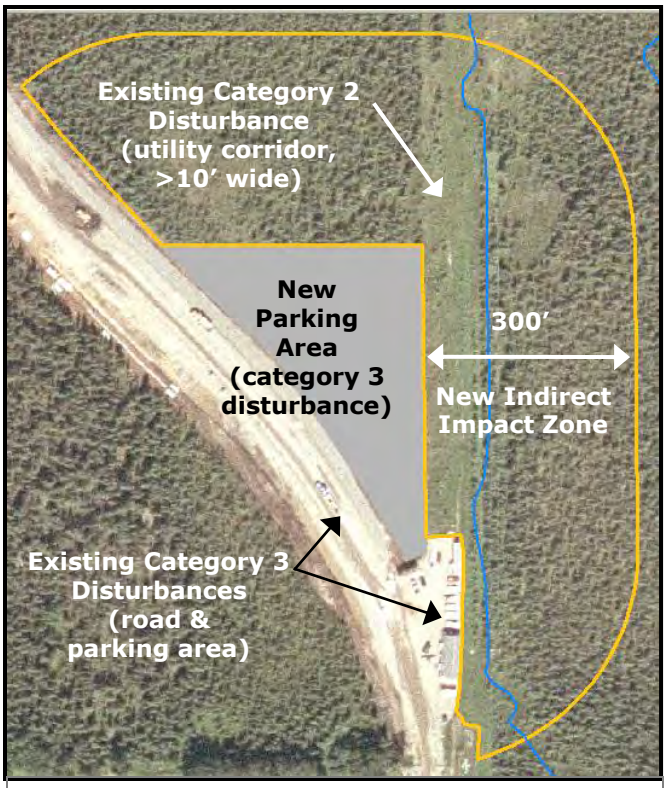
Note: Waterbodies below are naturalized, but if >75% of shoreline was denuded as in foreground, they would be non-naturalized.

NATURAL, NATURALIZED & NON-NATURALIZED WATERBODIES | Figure A-10

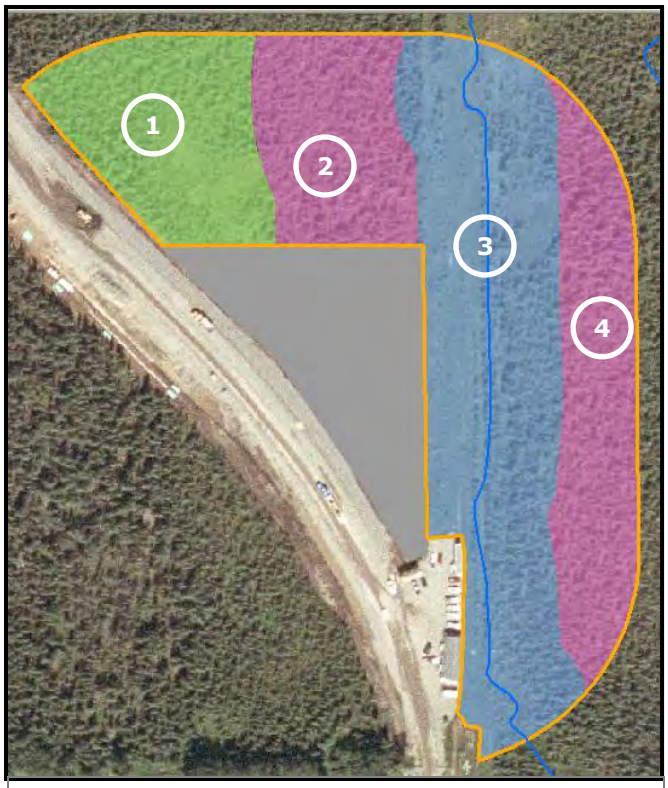
Naturalized: bed & banks are generally stable & have ≥50% cover by rooted or floating vascular plants, moss &/or lichens.

Non-naturalized: ≥50% of bed &/or banks either unvegetated or dominated by algae

NATURALIZED & NON-NATURALIZED DITCHES | Figure A-11

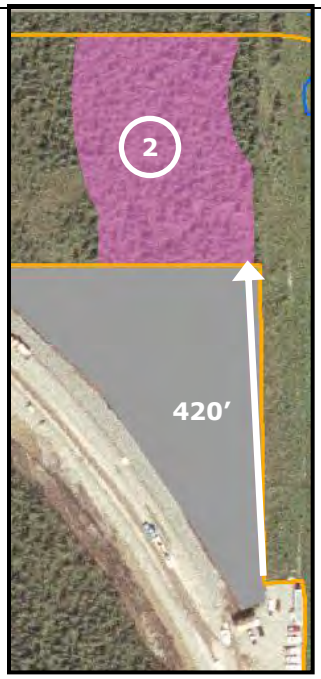


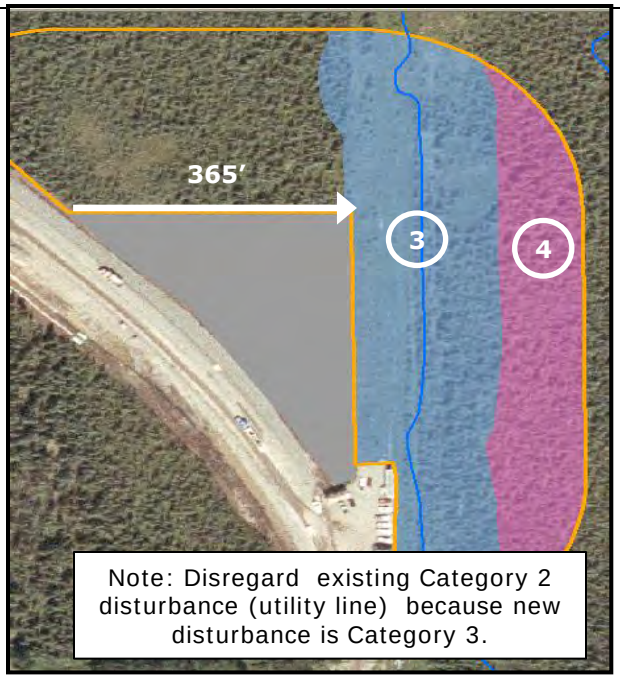
First, identify existing & new disturbances & new indirect impact zone.



Second, identify polygons in new Indirect Impact Zone

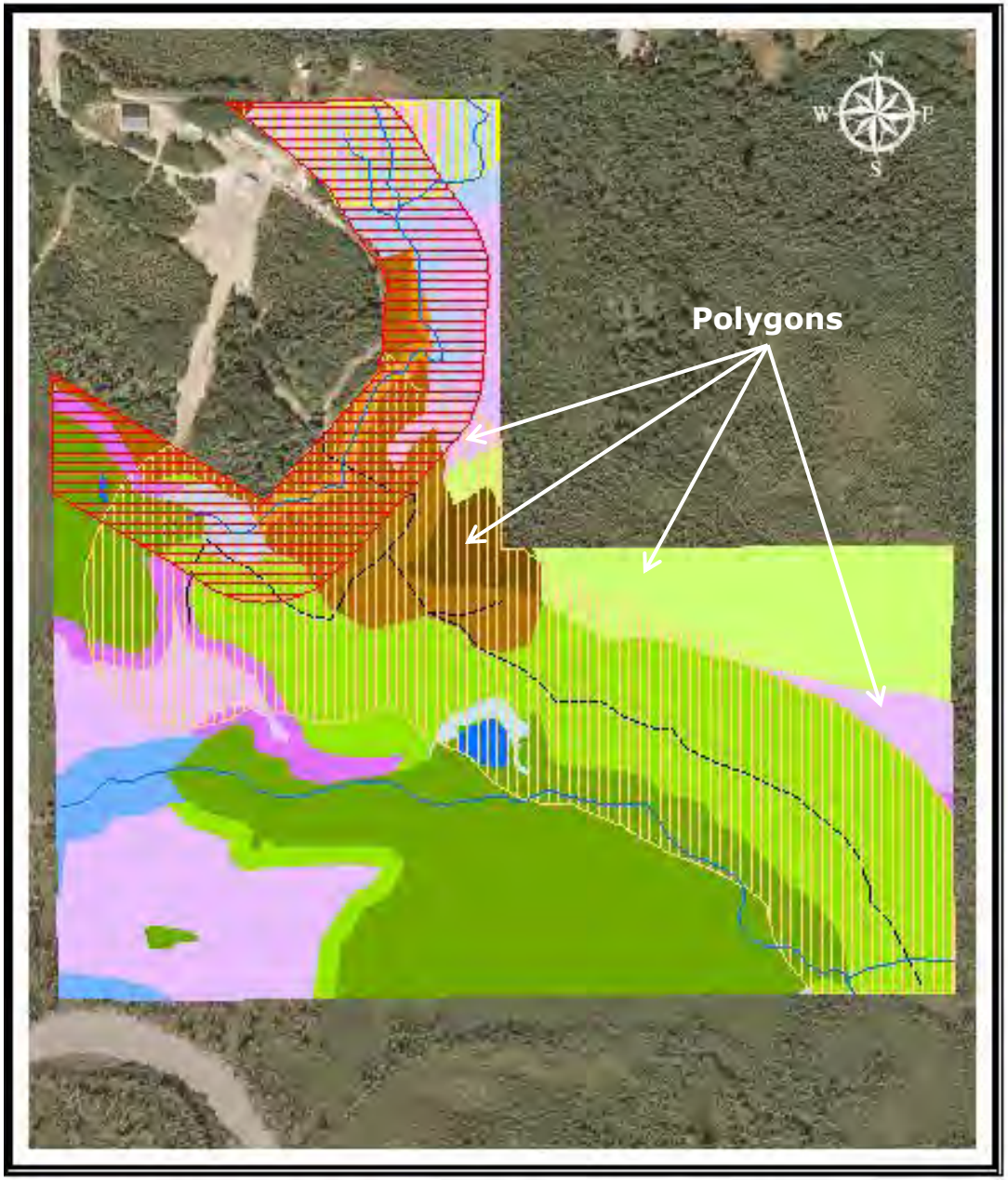
Finally, determine maximum distance from previous to new edge of Category 3 disturbance for each polygon. Note: May use average distance instead.





Note: Disregard existing Category 2 disturbance (utility line) because new disturbance is Category 3.

DETERMINING NEW INDIRECT IMPACT FACTOR Figure A-12



Legend

- Stream
- Category 1
- Category 2
- Category 3
- Existing Trails
- Persistent Natural Waterbody
- 100' Wetland Setback
- 85' Wetland Setback
- 65' Wetland Setback
- Persistently Inundated Wetlands
- Seasonally Inundated Wetlands
- Other Wetlands
- Wetland Buffer-Inner
- Wetland Buffer-Outer
- 25' Upland Setback
- Upland Buffer
- Other Uplands

0 175 350 700 1,050 1,400 Feet

POLYGONS	Figure A-13

Appendix B. Spreadsheets

Appendix C. Waterway Assessment Method for Anchorage (WAMA)

APPENDIX C: ADCM *WATERWAY ASSESSMENT METHOD FOR ANCHORAGE* (*WAMA*)

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Electronic copies of the *WAMA* include quick links for navigating around the document. Hyperlinks include the terms in the table of contents, as well as certain items within the narratives. To jump to a term, place the cursor over it and press Ctrl-click to activate the hyperlink.

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I. INTRODUCTION

As described in Step 6 of both Section II, Parts C.1.a. and b. of the Procedures, and the discussion of *enhancement* in the Glossary (Appendix A), the ADCM provides for determining *credits* for projects that improve an area's *function*, even when such projects do not improve the area's *REV*. The December 2000 version of the ADCM included procedures for calculating *credits* for such *enhancement* projects involving all aquatic areas (and associated *uplands*), except for *waterways*. Those procedures utilized the *AWAM* (*Anchorage Wetlands Assessment Method*) for quantifying both the extent of improvement in *function* and the contribution of that *function* to the overall *function* of the area. To similarly calculate *credits* for *enhancement* projects in *waterways*, this update has adapted the *AWAM* to create the *Waterway Assessment Method for Anchorage*, or *WAMA*.

> **CAUTION:** The purpose of the *WAMA* is to facilitate before and after comparison of *enhancement* projects in a particular *waterway polygon(s)*. It was not developed, and should not be used, to compare different *polygons* or different *waterways*. In addition, the *WAMA* does not apply to projects that will result in a *REV improvement*.

The *WAMA* applies many of the *AWAM* parameters, without change; it modifies or substitutes for other parameters that do not apply directly to *waterways* and omits parameters for which there was not an appropriate *waterway*-specific modification. The *WAMA* also adopts the same percent contribution of *functions* to the overall *function* as did the *AWAM*. Specifically, in both assessment methods, the average percent contribution of the highest possible scores for *hydrologic*, *habitat*, *species occurrence*, and *social function* are approximately 26 percent, 33 percent, 25 percent, and 16 percent of overall *function*, respectively. With the exception of *habitat function*, the method also retains the same percent contribution for individual parameters to each *function*. For example, a maximum score of 10 for *AWAM* parameter 1.1 constitutes approximately eight percent of the average maximum *AWAM* score for *hydrologic function*, which is the same approximate contribution of the *WAMA*'s parameter 1a, which is a minor modification of 1.1. Due to the substantial adaptation and substitution necessary to enable the method to characterize the *habitat function* of *waterways* instead of *wetlands*, the weighting of individual parameters for that function did not retain the *AWAM* relationships. See Section II.B for additional information on *habitat* parameter weighting.

For consistency, this appendix repeats, verbatim, the applicable portions of the *AWAM's* parameter descriptions that the *WAMA* has adopted without change (except for exchanging the term "*waterway*" for the term "*wetland*"). The descriptions of parameters which the *WAMA* modified only slightly either reiterate the *AWAM* narrative or follow it very closely. To reduce confusion, the *WAMA* begins numbering parameters at 1a, to differentiate them from the *AWAM* parameters, which begin with 1.1.

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II. Description and Application of Parameters

In addition to describing the *WAMA* parameters, this section addresses how—or whether—they apply to proposed *enhancement* projects. For those parameters that are subject to improvement, the discussion also provides guidance on how to determine the size of area to use in calculating *credits*. Section III contains the data sheets for scoring.

A. Hydrological Assessment

1a. Source of Stormwater Input (Minor Modification of *AWAM* Parameter 1.1, Type of Stormwater that Wetland Detains)

Description: If the subject *waterway* detains or receives stormwater, then the type or quality of that water must be determined. A *waterway* that detains or receives and filters poor quality waters or storm drain runoff (e.g., via a well-vegetated floodplain bench) is of more value to a basin's water quality than an area that receives no runoff or one that only receives natural, and presumably cleaner, flows. This is especially true for Anchorage, where most stormwater systems dump runoff into *stream* channels and where water quality is a problem. Floodplain benches and similar features are particularly important along *waterways* that receive direct runoff from storm drain culverts. Areas that receive storm runoff also provide flood abatement.

How to Assess: Determine whether there are any storm water outfalls within the *polygon* or 300 feet upstream of it and establish whether the discharge is entirely from *developed* areas, entirely from natural sources, or a combination thereof. In addition, determine whether the lands along the *waterway* flow into it and make the same assessment regarding the source(s) of that flow. The municipality's Advanced Mapper application (http://munimaps.muni.org/mox52/advanced.cfm?&action=mox52_if_frameset) has a layer for topographic contours, to assist in assessing runoff from adjacent lands. The Municipal Wetlands Atlases depict municipally mapped storm drains; shapefiles for them are available from the municipality (http://wms.geonorth.com/library/LibraryData.aspx). Municipal mapping does not include storm drains associated with state roads, the airport or the military bases; consult the Alaska Department of Transportation and Public Facilities' Central Region, Fort Richardson's Directorate of Public Works, or Elmendorf Air Force Base's Environmental Flight for storm drains in those areas.

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1b. POSITION IN WATERSHED (*AWAM* PARAMETER 1.2, POSITION OF WETLANDS WITHIN WATERSHED)

Description: The position of a subject *waterway polygon* within a drainage basin is most important to that *polygon's* value in flood attenuation and water quality within the watershed. It is generally felt that the higher up in the watershed a *waterway* is, the greater its role in flood control and water quality maintenance. Of course, the size of a particular *waterway* and its connectivity to floodplains modify this function.

How to Assess: For purposes of this parameter, the term "watershed" applies to the entire area that drains to a *waterway* that empties into Cook Inlet (e.g., Chester Creek and all its forks and tributaries). Maps of watershed boundaries are available at: http://wms.geonorth.com/library/LibraryMaps.aspx and shapefiles are available at (http://wms.geonorth.com/library/LibraryData.aspx). Estimate the position of the *polygon* within the watershed, using the *waterway* as the axis of the watershed.

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1c. VULNERABILITY TO FLOODING (ADAPTATION OF *AWAM* PARAMETER 1.3, LAND USE ALONG WATERWAY OR WETLANDS FOR 0.5 MILE BELOW THE WETLAND)

Description: Land use along and downstream of a *waterway* usually has a direct bearing on the value of flood detention and water quality maintenance *functions*. If land use is highly *developed*, then such *functions* are of inherently higher value than if the area is undeveloped. The presence of *salmonid* habitat also has a bearing on this parameter, since flood flows, with their higher velocities and sediment loads, can damage or destroy spawning gravels, cause mortality of eggs or juveniles, and/or prevent use of an area by juveniles.

How to Assess: Determine whether there are any *developed* areas within the *waterway's* 500-year floodplain, either along the *polygon* or within 0.5 mile downstream of it (the same distance used by the *AWAM*). Use the same reach for *salmonid* habitat. Federal Emergency Management Agency Flood Insurance Rate Maps depict the 500-year floodplain for portions of Anchorage and are available from the municipality at http://wms.geonorth.com/library/LibraryMapsFEMA.aspx. Consult the Alaska Department of Fish and Game's (ADFG's) anadromous fish streams maps (http://gis.sf.adfg.state.ak.us/AWC_IMS/viewer.htm) to ascertain whether they have documented *salmonid* spawning or rearing in the

reach that encompasses the *polygon(s)* in question. If not, sampling approved by ADFG may suffice.

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1d. BANKFULL WIDTH CONSTRICTION RATIO (ADAPTATION OF *AWAM* PARAMETER 1.4, SIZE EVALUATION)

Description: This adapted parameter assesses the degree to which anthropogenic or episodic natural alterations of a channel (e.g., installation of an undersized culvert or accumulation of flood-borne debris, respectively) constrain the flow of the bankfull discharge. With regard to *hydrologic function*, such constrictions alter the hydraulic regime of the channel and impair the *waterway's* ability to convey flood flows, thus leading to localized flooding. Constrictions may also increase erosive forces of flows, leading to loss of property and riparian habitat, degradation of aquatic habitat and damage to instream or nearby structures. Thus, channels that are not constricted have higher value for flood flow conveyance than those that are constricted. In adapting the *AWAM's* assignment of points, the *WAMA* splits the points associated with *AWAM* parameter 1.4 evenly between this parameter and 1e, because they are both representations of channel size.

How to Assess: This parameter requires field investigation to measure the ratio of bankfull width in the *polygon* of interest to that in an upstream reference *polygon* (e.g., the channel immediately upstream of an undersized culvert). "Bankfull width" is the width of the stream at the elevation of the 1.5- to two-year flood, considered by many fluvial geomorphologists to be the dominant channel-forming flow. (See Figure C-1.) For purposes of this assessment, "constrictions" do not include naturally occurring features such as riparian vegetation or instream habitat structures.

Potential Improvements in *Function*: Projects that construct floodplain below bankfull elevation from *developed* or *non-naturalized polygons* may produce *credits* as a result of *restoration*, *establishment*, or *REV improvement*, using the square footage of new floodplain—including new *bank(s)*, up to bankfull elevation—as the size of the new *polygon(s)*. The *WAMA* does not apply to such calculations. Projects such as culvert upgrades that increase pipe diameter, however, may produce *credits* by increasing the *WAMA* score for this parameter, reflecting an *enhancement* of *hydrologic function*. For such projects, the size entered in Spreadsheet 4-ENH would be the interior surface area of that portion of the culvert located below the *waterway's* bankfull elevation.

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1e. CHANNEL SINUOSITY (ADAPTATION OF *AWAM* PARAMETER 1.4, SIZE EVALUATION)

Description: This adapted parameter represents the length component of a *waterway's* size. More sinuous channels have greater storage capacity per valley length than straighter channels, generally providing more opportunity for both flood flow and pollutant attenuation. In addition, the bends associated with sinuous channels absorb energy, thus protecting the *stream* from excessive erosion and flooding. In adapting the *AWAM's* assignment of points, the *WAMA* splits the points associated with *AWAM* parameter 1.4 evenly between this parameter and 1d., because they are both representations of channel size.

How to Assess: The numerical expression of sinuosity derives from dividing the length of a reach by the corresponding valley length. For projects that would change the sinuosity of a *polygon*, use the pre- and post-project sinuosity of the *polygon*, itself. For all other projects, use the sinuosity of the entire sub-reach that incorporates the *polygon*, as delineated by the municipality's Watershed Management Section. The municipality's *streams* shapefile is available at http://wms.geonorth.com/library/LibraryData.aspx. It includes data on sinuosity for almost half of the mapped streams. Its categories correspond to the *WAMA's* ranges; "1" equates to sinuosity of < 1.2, "2" to sinuosity of 1.2 to 1.4, and "3" to sinuosity ≥ 1.4. For nearly all of the sub-reaches in which the shapefile lacks a rating for sinuosity (i.e., lists a "0" or "-999"), it does include channel length, which the *WAMA* user may divide by a map measurement of valley length to estimate sinuosity. The same is true for mapped *drainageways* and *ditches*, for which a shapefile is also available at the above address. For unmapped *waterways*, field or aerial photo measurement of channel and valley length will be necessary. Use the municipality's definition of sub-reach, at http://wms.geonorth.com/library/Documents/Data/META/NAD27/MOAStreamsMETA.pdf, to establish what segment of *waterway* to use in determining sinuosity.

Potential Improvements in *Function*: Projects that increase the sinuosity of altered *waterways* may be eligible for *credits* via *REV improvement*, using the length of the new *polygon* and its *channel perimeter*. (The *WAMA* does not apply to such calculations.)

CAUTION: Some *streams* (e.g., many higher-elevation first-order *streams*) have a low sinuosity (i.e., less than 1.2) in their *natural* condition. The ADCM limits *credit* production for increasing the sinuosity of a *stream* or *drainageway polygon* to projects that improve the *polygon's REV* (i.e., by converting it from *non-*

naturalized to *naturalized*). Thus, the ADCM does not allow for the production of *credits* through increasing a *natural waterway's* sinuosity or for increasing the sinuosity of a *naturalized* or *non-naturalized stream* or *drainageway polygon* beyond that of an appropriate reference reach (i.e., *natural* or *naturalized polygon* or historical condition).

For *ditches*, which have no reference reaches, sinuosity may play a role in *credit* production either through *REV* improvement (i.e., as part of a project that converts a *non-naturalized ditch* to a *naturalized* condition) or, if the *ditch* is already *naturalized*, through improvement of *hydrologic function*.

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1f. SENSITIVITY TO WATER QUALITY DEGRADATION (MINOR MODIFICATION OF *AWAM* PARAMETER 1.8, SENSITIVE AREAS BELOW SUBJECT WETLANDS)

Description: The relative value of a subject *waterway* to water quality is in part based on what lies below the *waterway polygon*. Many of Anchorage's smaller *streams* have few or no fish populations and empty into the silty waters of Knik Arm. Thus, the *polygon's* position in the watershed, and the uses immediately downstream, play the most significant role in this equation.

How to Assess: Determine whether there is any fish spawning or rearing, sportfishing, potable water source, contact water recreation and/or high value waterbird nesting within the *polygon* or 300 feet downstream. For spawning and rearing, consult ADFG's anadromous fish streams maps (http://gis.sf.adfg.state.ak.us/AWC_IMS/viewer.htm); sampling approved by ADFG may suffice. The ADFG maps do not catalog stickleback spawning or rearing areas; documented presence of that species is sufficient to assume that spawning occurs in the area.

Eklutna Lake and the Ship Creek reservoir are the only two surface sources of potable water currently known to the municipality. Contact the Anchorage Water and Wastewater Utility to confirm other suspected surface water sources. "Contact water recreation" includes activities such as swimming, fishing, boating, and wading.

"High value waterbird nesting" references loons and grebes, in addition to waterfowl, cranes, shorebirds, gulls, and terns. Municipal shapefiles with data on loon, waterfowl, and shorebird nesting locations in the Anchorage Bowl is available at http://www.muni.org/Departments/it/GIS2/Pages/MOAGISData.aspx. For other species (i.e., grebes, cranes, gulls, and terns) or for locations outside the Anchorage Bowl, document nesting either through

direct observation by or consultation with a qualified individual. Consult the U.S. Fish and Wildlife Service (907-271-2888 or 907-786-3443, ak_mbm@fws.gov or ak_fisheries@fws.gov) or the Anchorage Audubon Society (907-338-2473, info@anchorageaudubon.org) for assistance in identifying qualified individuals.

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1g. POLLUTANT UPTAKE AND FILTRATION (MINOR MODIFICATION OF *AWAM* PARAMETER 1.9, ACTUAL WETLANDS AREA DOMINATED BY ROBUST EMERGENTS AND SUBMERGENTS)

Description: The ability of a *waterway* to filter pollutants and to absorb nutrients depends to a great extent on the plant types, if any, located below the top of a channel's *banks*. Emergent and submergent species are well known to provide efficient filtering and uptake of nutrients and pollutants in water (references cited in *AWAM* narrative). Nutrient uptake is related to plant type, which, in turn, influences primary productivity.

How to Assess: This parameter requires field investigation to assess the presence of emergents or submergents on the *waterway's banks*. For projects that would change plant coverage, use the pre- and post-project coverage to assign points. For all other projects, use the overall coverage within the *polygon*.

Potential Improvements in *Function*: Planting projects sufficient to change a *polygon(s)* from a *non-naturalized* to a *naturalized* condition may produce *credits* via *REV improvement*. The *WAMA* does not apply to such calculations. Planting that does not change *REV* may still produce *credits* by increasing the *WAMA* score for this parameter, reflecting an *enhancement* of *hydrologic function*. In such instances, the size entered in Spreadsheet 4-ENH would represent the area for which the planting increased the percent cover of robust emergent and/or submergent vegetation.

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1h. LAND USE IN CATCHMENT BASIN (*AWAM* PARAMETER 1.10, GENERALIZED LAND USE IN THE CATCHMENT BASIN)

Description: The type of land use within the catchment basin of a *waterway polygon* is important to the water quality and flood potential for the drainage area. Undeveloped and fully vegetated areas within the drainage basin provide for greater water quality maintenance and flood control than do developed commercial or residential areas. However, the greater the development and the more industrial the land use, the greater the possibility exists for introduction of polluted

waters and increased runoff volumes and velocities. Thus, the ability of a *waterway polygon* within a developed commercial or industrial area to attenuate flood flows and pollutants (e.g., via a well-vegetated floodplain bench) is of value to a watershed's water quality and local flood control.

How to Assess: Identify the boundaries of the catchment basin(s) that drain or discharge to the *polygon* or within 300 feet upstream of it. Shapefiles for municipally mapped catchment (i.e., drainage) basins and storm drains are available from the municipality (http://wms.geonorth.com/library/LibraryData.aspx). Municipal mapping does not include storm drains associated with state roads, the airport or the military bases; consult the Alaska Department of Transportation and Public Facilities' Central Region, Fort Richardson's Directorate of Public Works, or Elmendorf Air Force Base's Environmental Flight for mapping of those areas. If the pollutant sources within that catchment basin(s) fall within more than one of the categories on the data sheet, use the average of the points applicable to those categories. For example, a mix of commercial land use and open space would score four points, which is the average of seven, for commercial, and one, for open space.

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1i. ENTRENCHMENT RATIO (ADAPTATION OF *AWAM* PARAMETER 1.12, WATER QUALITY MAINTENANCE)

Description: *AWAM* parameter 1.12 assesses the quality of inflow into a wetland, as well as the flow detention time in, storage capacity of, and nutrient uptake capability of the wetland. The *WAMA* uses parameters 1a, h, and j to assess inflow quality and substitutes "entrenchment ratio" to represent the storage capacity and nutrient uptake capability of the *waterway*. (Parameters 1d, e and g also address capacity and uptake.) The entrenchment ratio for a *waterway polygon* is a measure of the channel's vertical confinement (i.e., connectivity to its floodplain). *Waterways* with a higher entrenchment ratio (i.e., a connected floodplain) provide more flow and pollutant attenuation than channels that are incised (i.e., vertically confined).

How to Assess: The entrenchment ratio of a *waterway* equals its floodprone width (i.e., width at twice bankfull depth) divided by its bankfull width (i.e., width at bankfull depth). (See Figure C-1.) For purposes of the ADCM, "bankfull depth" is the height from the bottom of the *polygon's* thalweg to the elevation of the 1.5- to two-year flood, considered by many fluvial geomorphologists to be the dominant channel-forming flow. A description of field indicators to use in determining bankfull depth is available at EPA's Watershed Assessment of River Stability and Sediment Supply website

(http://www.epa.gov/warsss/pla/box03.htm); if necessary, the *WAMA* use may substitute depth at the *OHWM*.

For projects that would change the entrenchment ratio of a *polygon*, use the pre- and post-project ratios to assign points. For all other projects, use the entrenchment ratio of the entire sub-reach that incorporates the *polygon(s)* in question, as delineated by the municipality's Watershed Management Section. The municipality's *streams* shapefile is available at http://wms.geonorth.com/library/LibraryData.aspx. It includes measurements of both the floodprone and bankfull widths for just under one half of the mapped streams, with which the *WAMA* user can calculate the entrenchment ratio. (The shapefile's data on entrenchment ratio does not include the decimal places necessary for use in the *WAMA*.) For other *waterways*, it will be necessary to determine entrenchment ratio in the field or with other map resources, using the municipality's definition of sub-reach, at http://wms.geonorth.com/library/Documents/Data/META/NAD27/MOAStreamsMETA.pdf, to establish what segment of *waterway* to use.

Potential Improvements in *Function*: Projects that increase a *polygon's* entrenchment ratio, for example, by constructing a floodplain below bankfull elevation from *developed* or *non-naturalized polygons*, may produce *credits* as a result of *restoration*, *establishment*, or *REV improvement*, using the square footage of the new floodplain—including new *bank(s)*, up to bankfull elevation—as the size of the new *polygon(s)*. The *WAMA* does not apply to such calculations. Projects such as culvert upgrades that facilitate construction of a floodplain inside the pipe do not change *REV*, but may produce *credits* by increasing the *WAMA* score for this parameter, reflecting an *enhancement* of *hydrologic function*. For such projects, the size entered in Spreadsheet 4-ENH would be the area of floodplain created.

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1j. *BANK* STABILITY (SUBSTITUTION FOR *AWAM* PARAMETER 1.13, EROSION BUFFER)

Description: *AWAM* parameter 1.13 assesses the ability of riverine and lacustrine wetlands to protect against erosion, based on the dominant form of vegetation present. The *WAMA* instead considers the extent to which anthropogenic forces have altered a *waterway's* flow regime, as represented by the presence of destabilized *banks*. This parameter serves to identify sources of increased turbidity and sedimentation that can degrade *habitat*, *species occurrence*, and *social functions* of a waterway, and to identify *waterways* in which *restoration* and/or *enhancement* activities would be appropriate.

How to Assess: This parameter requires field investigation of the subject *polygon*. In many instances, the anthropogenic source of *bank* destabilization will be obvious (e.g., stormwater outfall, heavy foot traffic), but in other cases, it may require comparison of the *polygon* in question to *natural* or *naturalized polygons* up- or downstream to determine whether *bank* erosion is a *natural* process in that *stream* or is the result of anthropogenic sources.

For projects that would change plant coverage, use the pre- and post-project coverage to assign points. For all other projects, use the overall coverage within the *polygon*.

Potential Improvements in *Function*: *Bank* stabilization projects that change a *polygon(s)* from a *non-naturalized* to a *naturalized* condition may produce *credits* via *REV improvement*. The *WAMA* does not apply to such calculations. Bioengineered stabilization projects produce *credits*, even without changing *REV*, by increasing the *WAMA* score for this parameter, reflecting an *enhancement* of *hydrologic function*. In such instances, the size entered in Spreadsheet 4-ENH would represent the area for which the planting increased the percent cover of robust emergent and/or submergent vegetation, up to the top of *bank*. (The ADCM calculates *credits* for projects above the top of *bank* on the "Wetlands" or "Uplands" section of Spreadsheet 4-ENH.) *Bank* stabilization projects that produce a *non-naturalized polygon(s)* (e.g., most riprap, gabions, bulkheads) will produce *debits*, rather than *credits*.

The *WAMA* did not adapt or substitute for *AWAM* parameters 1.5 through 1.7 or 1.11. Parameters 1.5 and 1.6 assess a wetland's relationship to flood control as represented by the size of the wetland in relation to the catchment basin and to any other wetlands in the basin, respectively. Such parameters could not be adapted to *waterways* (or at least not to *streams* or *drainageways*); however, since they relate to channel size, *WAMA* parameters 1d (Flow Constriction), 1e (Channel Sinuosity), and 1i (Entrenchment Ratio), which adapt other *AWAM* parameters, do still represent flood control function.

AWAM parameters 1.7 and 1.11 relate to water quality maintenance, with parameter 1.7 assigning a higher level of function to riverine and lacustrine wetlands than to palustrine wetlands and parameter 1.11 equating organic soils to more effective nutrient detention than mineral soils. For *waterways*, such functions are better represented by parameters 1e (Channel Sinuosity), 1g (Pollutant Uptake and Filtration), and 1i (Entrenchment Ratio), which all reflect the extent to which the condition of a *waterway polygon* facilitates opportunities for pollutant attenuation.

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B. HABITAT ASSESSMENT

The habitat component of the *WAMA* required far more adaptation of the *AWAM* than did the assessment of other *functions*. While both methods assess factors such as habitat diversity, productivity and size, the parameters differ substantially. For example, half of the fourteen *AWAM* habitat parameters (i.e., 2.1-2.3 and 2.6-2.9) address some aspect of plant communities that are not applicable to an assessment of *stream* habitat. In fact, only two of the *AWAM* habitat parameters (i.e., 2.11 and 2.12) could apply directly to *streams* without substantial modification. As a result, the *WAMA*'s parameters for habitat function instead derive primarily from Rapid Bioassessment Protocols (RBPs) for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates, and Fish, Second Edition (http://www.epa.gov/OWOW/monitoring/rbp/index.html#Table percent20of percent20Contents). [1] One of the parameters (2h) is an adaptation from both the *AWAM* (parameter 2.11) and the RBPs; it also incorporates considerations from the Oregon Streamflow Duration Assessment Method (http://www.oregon.gov/DSL/PERMITS/docs/osdam_march_2009.pdf).[2] In addition to the seven parameters adopted (or adapted) from the RBPs (i.e., 2a through e, 2g, and 2h), the *WAMA* includes three others: an adaptation of *AWAM* parameter 2.12, which does not have an equivalent in the RBPs and two new parameters to address the diversity provided by off-channel habitat and the impact of water quality on habitat *function*. The descriptions of the parameters adopted from the RBPs repeat the applicable portions of the descriptions in the RBPs, Chapter 5, Part B.

As described in the Introduction, the *WAMA*'s weighting of habitat parameters differs from that of the *AWAM*, primarily due to the extent of modification needed to adapt the *AWAM* parameters to *waterways*. For example, while "Vegetation Community Structure," *AWAM* parameter 2.1, could equate to a *waterway*-specific RBP factor such as "Diversity of Channel Form" (Waterway Assessment parameter 2a.), it could also compare to "Density of Instream Habitat Structures" (Waterway Assessment parameter 2e). Likewise, "Diversity of Channel Form" could also substitute for *AWAM* parameter 2.2, "Number of Wetland Plant Communities." There are many other such examples. Therefore, the *WAMA* adopted the RBP's approach of weighting all parameters equally and simply adjusted the maximum number of possible points per parameter so that the maximum possible habitat score would have the same relationship to the other three *functions* as it does in the *AWAM* (i.e., 33 percent of the total).

[1] Barbour, M.T., J. Gerritsen, B.D. Snyder, and J.B. Stribling, EPA publication #841-B-99-002, 1999.
[2] U.S. Environmental Protection Agency, Oregon Operations Office, Region 10, and Office of Wetlands, Oceans and Watersheds, U.S. Army Corps of Engineers, Portland District, Interim Version, March 2009.

A few of the RBP parameters differentiate between high- and low-gradient *streams*, to reflect inherent differences in habitat based on channel slope. The *WAMA* has adopted that differentiation and uses a channel slope of four percent, based on sub-reach, as the threshold between low- and high-gradient *waterway polygons*. For municipally mapped *streams WAMA* users can identify the sub-reach that incorporates the *polygon(s)* in question and obtain the slope of that sub-reach from the municipality's *stream* shapefile, available at http://wms.geonorth.com/library/LibraryData.aspx. For *drainageways* and *ditches*, as well as *streams* that the municipality has not yet mapped, use the municipality's definition of sub-reach, at http://wms.geonorth.com/library/Documents/Data/META/NAD27/MOAStreamsMETA.pdf, to establish what segment of *waterway* to use in determining slope.

> **CAUTION:** Most of the habitat parameters apply or relate to the suitability of *waterways* for fish. Thus, *credits* for projects that improve one or more habitat parameters without changing *REV* are limited to those involving *waterways* that either currently support fish or are likely to in the near future.

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2a. DIVERSITY OF CHANNEL FORM/POOL DIVERSITY (RBP PARAMETERS 3A, VELOCITY/DEPTH COMBINATIONS AND 3B, POOL VARIABILITY)

Description: This is one of the RBP parameters that differentiate between high- and low-gradient *waterways*, delineated at a slope of four percent. The parameter for high-gradient *streams* assesses the habitat diversity provided by the *waterway's* patterns of velocity and depth. The greatest habitat diversity occurs when all four combinations of velocity and depth (i.e., slow and deep, slow and shallow, fast and deep, and fast and shallow) are present within a *polygon*.

For low-gradient *streams*, the RBPs also identify four channel forms—distinguished by the combination of pool size and depth—and consider reaches that include an even mix of all four types to have the most habitat diversity. The four combinations in this protocol are large and shallow, large and deep, small and shallow, and small and deep.

How to Assess: For both high- and low-gradient *waterways*, conduct a separate assessment for each *polygon* affected by the proposed project. For example, if the project would affect a *perennial*, *natural*, *salmonid*-supporting *stream polygon* and an adjoining *perennial*, *non-naturalized*, *salmonid*-supporting *stream polygon*, there would be two separate assessments for this parameter. For high-gradient *waterways*, determine how many of the four possible channel forms are present within each *polygon*, using a flow rate of 0.3 m/sec to separate "slow" from "fast" and a depth of 0.5 m to differentiate "shallow"

from "deep." In low-gradient *waterways*, use 1 m as the threshold between "shallow" and "deep" pools; for size, any pool dimension greater than one half of the *bed* width renders the pool "large."

Potential Improvements in *Function*: *Credits* for projects that increase channel form/pool diversity in a previously altered *waterway* would most likely result from *REV improvement*, to which the *WAMA* does not apply.

CAUTION: Altering channel form/pool diversity in a *natural polygon(s)* would not produce *credits*.

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2b. FREQUENCY OF RIFFLES OR BENDS/SINUOSITY (RBP PARAMETERS 7A, FREQUENCY OF RIFFLES (OR BENDS) AND 7B, CHANNEL SINUOSITY)

Description: This RBP parameter also distinguishes between high- and low-gradient *waterways*, and is also a measure of habitat diversity. Since riffles are a source of high-quality habitat and diverse fauna, an increased frequency of occurrence greatly enhances the diversity of the *waterway* community. For high-gradient *waterways* where distinct riffles are uncommon, the assessment uses sinuosity instead. In headwaters, riffles are usually continuous and the presence of cascades or boulders provides a form of sinuosity and enhances the structure of the *waterway*.

In low-gradient, and some high-gradient, *waterways*, this parameter evaluates the sinuosity of the channel. A high degree of sinuosity provides for diverse habitat and fauna and the *waterway* is less vulnerable to surges resulting from storm flows. Channel bends also provide refugia for benthic invertebrates and fish during storm events.

How to Assess: For high-gradient *waterways*, determine first whether riffles are continuous, common or uncommon in the sub-reach, as delineated/defined by the municipality (see paragraph three, Section II.B). Riffles are relatively shallow areas where water moves rapidly over a coarse substrate, resulting in a turbulent surface. For sub-reaches in which riffles are continuous, determine whether there are large obstructions, such as cascades or boulders, that diversify the habitat. Where riffles are common, but not continuous, determine the average distance between riffles and then the ratio of that distance to the average *bed* width of the channel. If riffles are uncommon, determine the average distance between channel bends and the ratio of that distance to the average *bed* width of the channel. In low-gradient

waterways, determine channel sinuosity, as described for parameter 1e.

Potential Improvements in *Function*: *Credits* for projects that increase sinuosity or the frequency of riffles or bends in a previously altered channel would most likely result from *REV improvement*, to which the *WAMA* does not apply.

CAUTION: Altering this parameter to a condition that exceeds that of *natural polygons* in the *waterway* would not produce *credits*.

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2c. DENSITY OF INSTREAM HABITAT STRUCTURES (RBP PARAMETER #1, EPIFAUNAL SUBSTRATE/ AVAILABLE COVER)

Description: This parameter measures the relative quantity and variety of natural structures in the *waterway* available for use as refugia, feeding, spawning, and/or nursery sites for aquatic macrofauna. A wide variety and/or abundance of submerged structures in a *waterway* provide macroinvertebrates and fish with a large number of niches, thus increasing habitat diversity. As variety and abundance of cover decrease, habitat structure becomes monotonous, diversity decreases, and the potential for recovery following disturbance decreases. Riffles and runs are critical not only for maintaining a variety and abundance of insects in most high-gradient *waterways*, but also for serving as spawning and feeding areas for certain fish. Snags and submerged logs are among the most productive habitat structures for macroinvertebrate colonization and fish refugia in low-gradient *waterways*.

How to Assess: "Natural structures" include cobbles (riffles), large rocks, fallen trees, logs, and branches, as well as undercut *banks*. This parameter differentiates between high- and low-gradient *waterways* only insofar as the thresholds between "high," "medium," and "low" function. For both high- and low-gradient *waterways*, conduct a separate assessment for each *polygon* affected by the proposed project.

Potential Improvements in *Function*: Many projects that increase the density of instream habitat structures will likely be eligible for *credits* as a result of *REV improvement*, to which the *WAMA* does not apply. In contrast, altering the density of structures in *natural polygon(s)* will not produce *credits*. Projects that improve the *WAMA* score for this parameter in *naturalized* or *non-naturalized polygons*, including *piped streams*, may produce *credits* for improving *habitat function*, even if they do not change the *REV* of the *polygon(s)*. For such

projects, the size entered in Spreadsheet 4-ENH would be the area of *bed* over which the habitat structure density increases.

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2d. EMBEDDEDNESS/SUITABILITY OF POOL SUBSTRATE (RBP PARAMETERS #2A, EMBEDDEDNESS AND 2B, POOL SUBSTRATE CHARACTERIZATION)

Description: This slope-dependent RBP parameter is a measure of both habitat diversity and potential productivity, and differentiates between high- and low-gradient *waterways*. For high-gradient *waterways*, the parameter measures embeddedness, which is a result of large-scale sediment movement and deposition. Generally, as embeddedness increases, the areas available to macroinvertebrates and fish for use as shelter, for spawning, and/or during egg incubation decreases

In low-gradient *waterways*, this parameter evaluates the type and condition of bottom substrates found in pools. Firmer sediment types (e.g., gravel, sand) and rooted aquatic plants support a wider variety of organisms than a pool substrate dominated by mud or bedrock and no plants. In addition, a *stream* that has a uniform substrate in its pools will support far fewer types of organisms than a *stream* that has a variety of substrate types.

How to Assess: For both high- and low-gradient *waterways*, conduct a separate assessment for each *polygon* affected by the proposed project. In high-gradient *waterways*, visually estimate the average percent embeddedness for each *polygon*. "Embeddedness" refers to the extent to which rocks (i.e., gravel, cobble, and boulders) and snags are covered or sunken into silt, sand, or mud on the *bed*. For purposes of the ADCM, observations of embeddedness should be taken in the upstream and central portions of riffles and cobble substrate areas. For low-gradient *waterways*, determine whether the pool substrate is covered entirely with rooted vegetation; if not, estimate whether the representative substrate in the pools is sand or larger particles, a mix of sand and smaller particles, entirely smaller particles than sand, or hardpan, bedrock, concrete, or metal.

Potential Improvements in *Function*: Many projects that improve substrate characteristics will likely be eligible for *credits* as a result of *REV improvement*, to which the *WAMA* does not apply. Projects that improve the *WAMA* score for this parameter in *naturalized* or *non-naturalized polygons*, including *piped streams*, may produce *credits* for improving *habitat function*, even if they do not change the *REV* of the *polygon(s)*. For such projects, the size entered in Spreadsheet 4-ENH would be the area of *stream bed* in which the substrate characteristics are improved.

CAUTION: Altering the substrate of *natural polygon(s)* will not produce *credits*.

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2e. AVERAGE WIDTH OF *BUFFER* (ADAPTATION OF RBP PARAMETER 10, RIPARIAN VEGETATIVE ZONE WIDTH

Description: Since *buffers* filter pollutants from runoff, control erosion, contribute nutrients, and provide shade and cover, *waterways* with intact *buffers* typically have higher quality habitat than those with smaller *buffers*. The *WAMA* determines the average *buffer* width for each *bank* of the *polygon* (right and left) and uses the cumulative score for this parameter.

How to Assess: Assess this parameter separately for each *polygon* affected by the proposed project.

Potential Improvements in *Function*: Projects that *restore* or *enhance* a *waterway's setback* or *buffer* will generally produce *credits* via *restoration*, *establishment*, or *REV improvement*, to which the *WAMA* does not apply. For such projects, the size entered in Spreadsheet 4-RES or 4-ENH would be the area of *bed* and *bank* (up to the top of *bank*) bounded by the *restored* or *enhanced buffer*.

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2f. AVAILABILITY OF OFF-CHANNEL REFUGE HABITAT

Description: This parameter assigns a higher level of habitat function to *waterway polygons* that are connected or proximate to off-channel habitat such as oxbows and inactive channels. Such areas not only contribute to habitat diversity, but also provide refugia from main channel conditions, such as high turbidity and flow velocity that may be detrimental or even lethal, particularly to juvenile fish and aquatic macroinvertebrates. The off-channel habitat needs to be accessible only during bankfull discharges (i.e., 1.5- to two-year flood events), since such flows typically coincide with the occurrence of poor conditions in the main channel.

How to Assess: Assess this parameter separately for each *polygon* affected by the proposed project. Determine whether there are any oxbows or other *inactive channels*, *wetlands*, or *waterbodies* that fish could access from the *polygon* when flow is at bankfull discharge or lower.

Potential Improvements in *Function*: Many projects that construct or reconnect off-channel habitat will be eligible for *credits* via *restoration*, *establishment*, or *REV improvement* (e.g., by constructing off-channel habitat for a *REV* 1 or 2 *stream* in a *REV* 3 or 4 *upland* or *wetland*, or by reconnecting a disconnected *inactive channel* to a *stream* of higher *REV*). In such instances, the size entered in Spreadsheet 4-ENH will be that of the *polygon(s)* of off-channel habitat constructed, using length and *wetted perimeter*. The *WAMA* does not apply to calculation of those *credits*; it would, however, be relevant to calculating *credits* for improvement in the *habitat function* of the *waterway* to which the off-channel habitat connected, through an increase in the *WAMA* score for this parameter. For such calculations, the ADCM considers the area improved to extend 300 linear feet up- and downstream of the new habitat or to the nearest total barrier to fish passage, whichever is closer. The size calculation for this parameter uses the *wetted perimeter* of the *stream* channel.

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2g. EXTENT OF *BANK* VEGETATION (MINOR MODIFICATION OF RBP PARAMETER #9, *BANK* VEGETATIVE PROTECTION)

Description: This parameter measures the extent of vegetation on the *stream banks* and the near-stream portion of the riparian zone and supplies information on nutrient uptake, control of instream scouring, and *stream* shading. *Banks* that have full, natural plant growth are better for fish and macroinvertebrates than *banks* without vegetative protection or those shored up with concrete or riprap. This parameter is made more effective by defining the "natural plant growth" as being dominated by species that are native to the immediate area.

How to Assess: For projects that would change bank vegetation, use the pre- and post-project coverage of the affected area. For all other projects, use the overall coverage within the *polygon*.

Potential Improvements in *Function*: Planting projects sufficient to change a *polygon(s)* from a *non-naturalized* to a *naturalized* condition may produce *credits* via *REV improvement*. It is not necessary to use the *WAMA* to calculate *credits* for such projects. Planting that does not change *REV*, however, may still produce *credits* by increasing the *WAMA* score for this parameter, reflecting an *enhancement* of *habitat function*. In such instances, the size entered in Spreadsheet 4-ENH would represent the area of *bank* (up to the top of *bank*) for which the planting increased the percent cover of vegetation characteristic of *natural polygons* in the immediate area, plus the area of *stream bank* and *bed* that abut the revegetation project (but not the opposite *bank*). The ADCM calculates *credits* for planting above the top of *bank* in the "Wetlands" or "Uplands" section of Spreadsheet 4-ENH.

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2h. PERSISTENCE AND SEASONALITY OF SURFACE AND HYPORHEIC FLOW

(ADAPTATION OF *AWAM* PARAMETER 2.11, SURFACE WATER PERSISTENCE, AND RBP PARAMETER #5, CHANNEL FLOW STATUS)

Description: This adapted parameter assesses how long *surface water* fills the channel and whether there is water below the *stream bed* when *surface water* is absent. When water does not cover much of the *stream bed*, the amount of suitable substrate for aquatic organisms is limited. In high-gradient *streams*, riffles and cobble substrate are exposed; in low-gradient *streams*, the decrease in water level exposes logs and snags, thereby reducing the areas of good habitat. When *surface water* is not present in the *stream*, flow in the hyporheic zone, below the *stream bed*, can sustain aquatic macroinvertebrates and salmonid eggs, maintaining temperatures, supplying oxygen, and removing waste products.

How to Assess: Determinations regarding the persistence of surface flow must take into account whether conditions at the time of observation are typical, as opposed to being unusually dry or wet. In the winter, snow and/or ice may completely obscure views of the channel. In such situations, if flow is not audible, it may be necessary to use an augur or similar tool to confirm whether there is surface flow. Checking for the presence of water in the hyporheic zone involves making a hole in the *stream bed* and monitoring whether it fills with water. Riffle tails and pools, if present, are generally the most appropriate locations for such a hole, and methods should focus on minimizing disturbance to the channel (e.g., by using an augur instead of a shovel).

Potential Improvements in *Function*: Projects that increase the duration of *surface water* in a *stream* by correcting past actions that reduced it (e.g., channel alterations, water diversions) generally would be eligible for *credits* via *REV improvement* (using length and *wetted perimeter*), which would not require use of the *WAMA*. Projects that increase overwintering habitat in *naturalized* or *non-naturalized polygons* may be eligible for *credits* as a result of increasing the *WAMA* score for this parameter. The size entered in Spreadsheet 4-ENH would be the square footage of the new habitat, using the portion of *wetted perimeter* below winter low-flow depth.

CAUTION: Increases in the duration of *surface water* beyond that of *natural polygons* will not produce *credits*.

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2i. ***WETTED PERIMETER*** (ADAPTATION OF *AWAM* PARAMETER 2.12, WATER BODY SIZE)

Description: This adapted parameter simply assesses the size of the channel, or more specifically the interface between the *bed* and *bank* substrate and the water, as a measure of the extent of habitat provided by the *waterway*.

How to Assess: Determine the average *bank* heights and *bed* width for the *polygon*. For this parameter, the upper limit for *bank* height is the *OHWM*.

Potential Improvements in *Function*: Projects that change the *wetted perimeter* of a *naturalized* or *non-naturalized waterway polygon* to more closely match that of *natural polygons* will likely be eligible for *credits* via *REV improvement*, to which the *WAMA* does not apply. (In most cases, the change will be to the geometry of the *wetted perimeter*, rather than its extent.)

CAUTION: Increasing the *wetted perimeter* of *stream polygons* simply to increase the *WAMA* score for this parameter, without actually improving *habitat* or other *function*, will not produce *credits*.

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2j. POLLUTANT INPUTS FROM ANTHROPOGENIC SOURCES

Description: This parameter is an indirect assessment of water quality within the *waterway polygon*, using the presence of direct pollutant sources to indicate potential habitat degradation resulting from such inputs.

How to Assess: Determine whether there are any anthropogenic pollutant sources within the *polygon* or 300 feet upstream of it. Anthropogenic sources include direct discharges to the *stream* from storm water and cooling water outfalls (which may be inside culverts), impervious surfaces, and *banks* that are eroding as a direct result of human alteration (e.g., concentrated flow from outfalls or runoff, foot traffic, etc.). Outfalls for groundwater collection systems do not constitute pollutant sources, unless the effluent is causing bank erosion.

Potential Improvements in *Function*: Projects that correct an eroding *bank* by changing it from a *non-naturalized* to a *naturalized* condition would likely be eligible for *credits* via *REV improvement*. "Disconnecting" a stormwater outfall by setting it back further from the *stream* and revegetating the area in between to match *natural polygons* in the immediate area may also produce *credits* through *REV improvement*. The *WAMA* does not apply to such calculations.

The size entered in Spreadsheet 4-RES or 4-EST for such projects would be the area of *bank* improved, plus the area of *stream bed* and *bank* that abut the improved *polygon* (but not the opposite *bank*).

Projects that do not change *REV* (e.g., because the pre-project *polygon* meets the definition of *naturalized* or the post-project *polygon* will not meet that definition) may still produce *credits* by increasing the *WAMA* score for this parameter, reflecting an *enhancement* of *habitat function*. In such instances, the size entered in Spreadsheet 4-ENH would be the square footage of *bank* improved, plus the area of *waterway* for which the project increases the *WAMA* score, using the *wetted perimeter* and 300 linear feet of channel or the length to the next downstream pollutant source, whichever is shorter.

The *WAMA* does not include channel gradient as a parameter for habitat assessment. While channel gradient affects what type of, if any, fish habitat a *waterway* provides, higher gradient *stream polygons* that are devoid of fish nonetheless often play a crucial role in supporting downstream fish habitat, for example, by contributing organic matter and macroinvertebrates to the food chain, often in quantities disproportionate to their size. Thus, for purposes of habitat assessment, the *WAMA* treats channel gradient as neutral by not including it as a parameter.

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C. Species Occurrence Assessment

The narrative describing the *AWAM's* assessment of *species occurrence* notes that the plant, fish, and wildlife species it considered are "rare or significant species that… elevate the site's value because of their presence" and that many of the species are "similar to 'indicator species'" used to "represent 'healthy' or ideal communities." Finally, it describes the species considered "endangered, rare, endemic, [of] high visual/public quality, or at the limits of their range." The vast majority of the 43 plant and 25 bird species that the *AWAM* considered are unlikely to be associated regularly with *waterways*. As a result, the *WAMA* has adopted only three of the *AWAM* parameters for assessing *species occurrence*. The *WAMA* has added a new parameter more typically associated with *stream*, rather than *wetland*, assessment. Increasing the score of any of the four *WAMA* parameters would most likely be the result of *REV improvement*; however, projects that improve partial barriers to aquatic life movement would *enhance species occurrence* by increasing the ability of species to use that *polygon*(s) without changing the *polygon's REV*. To facilitate calculation of *credits* in such instances, the *WAMA* uses four different parameters, 3e through 3h, which apply only to those types of projects.

3a. HABITAT FOR MUNICIPALLY SIGNIFICANT FISH AND WILDLIFE (MINOR MODIFICATION OF *AWAM* PARAMETER 3.2, BREEDING, FEEDING, SPAWNING, OR REARING HABITAT FOR BIRD OR ANADROMOUS FISH SPECIES SIGNIFICANT TO THE MUNICIPALITY OF ANCHORAGE)

Description: This parameter differs from the *AWAM* only insofar as many of the species to which the *AWAM* parameter applies (identified in *AWAM* Appendix K) typically do not use *waterways*. Specifically, for *waterways*, this parameter is likely not to include any species besides Chinook, coho, and sockeye salmon, American dipper, belted kingfisher, and possibly sandhill crane. The *AWAM* narrative reports that ADFG considered the three salmonid species on the list to be the key fish species that fit the criteria of rarity/scarcity and public importance in this category. The presence of these species contributes to a *waterway's* score for this parameter, regardless of the nature or extent of their use of the *waterway*.

With regard to birds, the *AWAM* narrative states that the species that appear in Appendix K include those that are particularly sensitive, specialized in their habitat requirements, and generally very localized (e.g., sandhill crane, belted kingfisher, and American dipper). A species would contribute to a *waterway's* score for this parameter if it has used the *waterway* for one or more stages of its lifecycle within the previous five years, a time period that is applicable since some of the species do not nest annually. Most of the species are considered of unique value as well and are sought after by local and visiting birders and natural history enthusiasts.

How to Assess: Consult ADFG's anadromous fish streams maps (http://gis.sf.adfg.state.ak.us/AWC_IMS/viewer.htm) to ascertain whether they have documented use by Chinook, coho and/or sockeye both up- and downstream of the *polygon(s)* in question. If not, sampling approved by ADFG may suffice. For the avian species, use must be for the *polygon* itself and must be documented through direct observation by a qualified individual. As with other parameters in this category, the question applies to actual use, not simply whether the habitat is suitable.

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3b. SIGNIFICANCE FOR FISH SPAWNING (*AWAM* PARAMETER 3.10)

Description: In Anchorage, the following fish species are known to spawn: Dolly Varden, grayling, rainbow trout (introduced), stickleback, and coho, Chinook, sockeye, chum, and pink salmon. *Waterways* that provide spawning habitat for more than five species of fish (or the majority of the nine species known to occur in Anchorage) are considered of significant value, and these receive the highest points.

No distinction was made for large concentrations of one or a few species of fish versus an area with low numbers of many species.

How to Assess: Consult ADFG's anadromous fish streams maps (http://gis.sf.adfg.state.ak.us/AWC_IMS/viewer.htm) to ascertain whether they have documented spawning by *salmonids* in the reach that encompasses the *polygon(s)* in question (i.e., both up- and downstream of it). If not, sampling approved by ADFG may suffice. The ADFG maps do not catalog stickleback spawning areas; documented presence of that species is sufficient to assume that spawning occurs in the *polygon*.

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3c. SIGNIFICANCE FOR FISH REARING (ADAPTATION OF *AWAM* PARAMETER 3.11)

Description: Many *waterway polygons* that do not support spawning are utilized by salmonids and Dolly Varden juveniles for rearing habitat. Some such *polygons* may also support overwintering use. Rearing activity is fairly well documented for many of Anchorage's *waterways*. Although the *AWAM* narrative notes that rearing habitat is equally as important to fish populations as spawning habitat, and thus, that the *AWAM* used the same numerical breakdown for both parameters, the *WAMA* assigns only half as many points to rearing and assigns the other half to a rearing-related parameter that was not a part of the *AWAM*, specifically, parameter 3d.

How to Assess: Consult ADFG's anadromous fish streams maps (http://gis.sf.adfg.state.ak.us/AWC_IMS/viewer.htm) to ascertain whether they have documented rearing by *salmonids* in the reach that encompasses the *polygon(s)* in question (i.e., both up- and downstream of it). If not, sampling approved by ADFG may suffice. The ADFG maps do not catalog stickleback rearing areas; documented presence of that species is sufficient to assume that rearing occurs in the *polygon*.

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3d. AQUATIC MACROINVERTEBRATES: EPT TAXA RICHNESS

Description: This parameter assesses the presence and diversity of three macroinvertebrate genera that are well-established as indicators of *stream* health. Known collectively as "EPT," they are Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies). These genera are not only a food source for fish; they are also particularly sensitive to water quality degradation. EPT taxa richness measures the number of species of the three genera

collected during sampling of a *polygon*. It is a standard parameter in *stream* assessments and already has a history of use in Anchorage by the U.S. Geological Survey and the University of Alaska Anchorage's Environment and Natural Resources Institute (ENRI).

How to Assess: This parameter specifically applies to the *polygon(s)* in question. ADCM users may follow the procedures of ENRI's Educational Level Water Quality Monitoring Field Guide, available at http://aquatic.uaa.alaska.edu/pdfs/EducationLevelBioMonitoringMethods.pdf.

As described, the *WAMA* did not use *AWAM* parameters that have little, if any, applicability to *waterways*, specifically parameters 3.1 and 3.3 through 3.9.

For projects that improve *species occurrence* by increasing the ability of fish and other aquatic life to use a *polygon*—and only for such projects—the ADCM employs parameters 3e through 3h, described below.

CAUTION: To earn *credits* for improving any of these four parameters, a project must be approved by ADFG.

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3e. Channel Constriction Ratio

Description: This parameter assesses the extent to which human alteration of the channel (e.g., a culvert) impairs the passage of aquatic wildlife by narrowing the channel, thus increasing flow velocity and making it more difficult for some organisms, such as juvenile fish, to migrate upstream.

How to Assess: This parameter is a numerical value that equals the width of the constriction (e.g., the culvert diameter) divided by the channel width, at the *OHWM*, immediately upstream of the constriction. For many culverts, the *WAMA* user may obtain the channel constriction ratio from ADFG's fish passage inventory (http://gis.sf.adfg.state.ak.us/CULVERT_IMS/viewer.htm[3]); otherwise, or if the ADFG information is outdated, the project proponent must determine the value from field measurements. If the existing ratio is 1.00 or greater, this parameter does not apply and the *WAMA* user should enter no value for it on Spreadsheet 3a.

Potential Improvements in *Function*: Projects such as daylighting a *stream* or lengthening a bridge constitute *restoration* and would be

[3] Select the "identify" tool, click on the culvert of interest, and note the figure under "constriction ratio" in the table that appears.

eligible for *credits* through *REV improvement*, using the square footage of new channel constructed, up to the top of *bank*. (*Credits* for *restored* areas above the top of *bank* use the "Wetlands" or "Uplands" section of Spreadsheet 4-RES, 4-ENH or 4-EST.) The *WAMA* does not apply to such calculations. Projects such as culvert upgrades that increase pipe diameter do not change *REV*, but may produce *credits* by improving the ability of fish and other aquatic life to pass through (i.e., occur within) the *piped polygon*. For such projects, the size entered in Spreadsheet 4-ENH would be the pre-project culvert length multiplied by the *wetted perimeter*. Projects will not earn *credits* for increasing the constriction ratio beyond 1.00. Projects that increase culvert length would incur *debits*, not *credits*, for the newly *piped* channel.

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3f. *BED* GRADIENT

Description: This parameter assesses the slope of the *bed* of the *non-naturalized polygon(s)* (e.g., culvert). ADFG considers slopes greater than one percent (i.e., 0.01) to create flow velocities high enough to impede the passage of juvenile fish.

How to Assess: This parameter equals the vertical drop from the upstream to the downstream ends of the *non-naturalized polygon* divided by the length of the *polygon*, measured along the thalweg. For many culverts, the *WAMA* user may obtain this value from ADFG's fish passage inventory (http://gis.sf.adfg.state.ak.us/CULVERT_IMS/viewer.htm[4]); otherwise, or if the ADFG information is outdated, the project proponent must determine the value from field measurements.

Potential Improvements in *Function*: Projects that improve bed gradient by rebuilding a *non-naturalized* channel to more closely match the slope of adjoining *natural* or *naturalized polygons* would likely earn *credits* via *REV improvement*, a calculation to which the *WAMA* does not apply. For such projects, the size entered on Spreadsheet 4-ENH would be the length of new channel multiplied by the new *channel perimeter*. Projects that improve bed gradient without changing *REV* (e.g., by replacing or resetting a culvert) may produce *credits* by improving the ability of fish and other aquatic life to pass through (i.e., occur within) the *piped polygon*. For such projects, the size entered in Spreadsheet 4-ENH would be the pre-project culvert length multiplied by the post-project *wetter perimeter* inside the culvert. Projects will not earn *credits* for producing slopes that are flatter than

[4] Select the "identify" tool, click on the culvert of interest, and note the figure under "gradient" in the table that appears.

natural or *naturalized polygons* immediately up- or downstream of the *project site*. Projects that increase culvert length would incur *debits*, not *credits*, for the newly *piped* channel.

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3g. Low Flow Depth

Description: This parameter measures the depth of water in the human-altered *polygon(s)* during low flow. Water less than two inches deep reduces the swimming efficiency of juvenile salmonids and thus impairs their ability to migrate through the *polygon*.

How to Assess: This parameter is potentially applicable to both culverts and other *non-naturalized polygons* in which flow is too shallow as a result of human alterations. The entry in Spreadsheet 3a should be in inches. For some culverts, the *WAMA* user may obtain low flow depth from ADFG's fish passage inventory (http://gis.sf.adfg.state.ak.us/CULVERT_IMS/viewer.htm). Using the "identify" tool, click on the culvert of interest, and note the "perch height" in the table that appears. A negative number indicates that the culvert was perched at the time of the ADFG survey, in which case parameter 3h applies, instead of 3g. A positive number less than 0.17 (feet) represents a water depth of two inches or less at the time of the survey. It is important to note that the ADFG surveys did not necessarily occur at times of low flow. Where the data is not representative of low flow conditions for the *polygon* in question, or if the project involves a *polygon* other than a culvert (but will not change the *REV*), the project proponent must determine the value from field measurements and document that the low flow conditions observed represent normal circumstances for the *polygon*.

Potential Improvements in *Function*: Projects that improve low flow depth by rebuilding a *non-naturalized* channel to more closely match the dimensions of adjoining *natural* or *naturalized polygons* would likely earn *credits* via *REV improvement*, a calculation to which the *WAMA* does not apply. For such projects, the size entered on Spreadsheet 4-ENH would be the length of new channel multiplied by the new *channel perimeter*. Projects that improve low flow depth without changing *REV* (e.g., by replacing or resetting a culvert) may produce *credits* by improving the ability of fish and other aquatic life to pass through (i.e., occur within) the *piped polygon*. For such projects, the size entered in Spreadsheet 4-ENH would be the pre-project culvert length multiplied by the post-project *wetted perimeter* inside the culvert. Projects will not earn *credits* for creating a low flow depth deeper than that of *natural* or *naturalized polygons* immediately up- or downstream of the *project site*. Projects that increase culvert length would incur *debits*, not *credits*, for the newly *piped* channel.

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3h. Perch Height

Description: This parameter measures the vertical distance from the *bed* or bottom of the altered *polygon(s)* (e.g., bottom of culvert, top of weir) to the top of the water surface immediately downstream of the alteration, at low flow. ADFG considers a perch height of four inches or more to impede the passage of juvenile salmonids.

How to Assess: This parameter is potentially applicable to culverts, weirs, and other alterations that raise the *bed* elevation. For some culverts, the *WAMA* user may obtain perch height from ADFG's fish passage inventory (http://gis.sf.adfg.state.ak.us/CULVERT_IMS/viewer.htm). Using the "identify" tool, click on the culvert of interest, and note the "perch height" in the table that appears. A positive number indicates that the culvert was not perched at the time of the ADFG survey; however, the ADFG surveys did not necessarily occur at times of low flow. Where the data does not accurately represent a known perch, or if the project involves a *polygon* other than a culvert (but will not change the *REV*), the project proponent must determine the value from field measurements and document that the perch height observed represents normal low flow conditions for the *polygon*.

Potential Improvements in *Function*: Projects that involve removing a perched feature and rebuilding the channel would be eligible for *credits* via *REV improvement*, a calculation to which the *WAMA* does not apply. For such projects, the size entered on Spreadsheet 4-RES or 4-ENH would be the length of new channel multiplied by the new *channel perimeter*. Projects that eliminate a perch without changing *REV* (e.g., by replacing or resetting a culvert) may produce *credits* by improving the ability of fish and other aquatic life to pass through (i.e., occur within) the *polygon*. For such projects, the post-project perch height entered in Spreadsheet 3a would be zero and the size entered in Spreadsheet 4-ENH would be the pre-project length of the perched feature multiplied by its post-project *wetted perimeter*. Projects will not earn *credits* for lowering the *bed* or bottom of the altered *polygon(s)* below the *bed* of the *polygons* immediately up- and downstream of the *project site*. Projects that increase culvert length would incur *debits*, not *credits*, for the newly *piped* channel.

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D. Social Assessment

4a. Existing Recreational Use (Adaptation of *AWAM* Parameter 4.1, Type of Wetland-Associated Use)

Description: As does the *AWAM* original, this adapted parameter assesses the diversity of recreational uses of a *waterway* and measures each based on the intensity of the use. The primary difference arises in the variety of uses, with the *WAMA* specifically adopting only fishing, boating, and "other" recreational uses from the *AWAM*.

How to Assess: This parameter applies to the specific *polygon(s)* in question, rather than to the entire *waterway*. The categories of use are:

- High = use in several seasons by numerous individuals and/or groups.
- Moderate = use in one or two seasons by a few individual and/or a single group.
- Low = irregular use by a very few individuals.

Potential Improvements in *Function*: Projects that provide facilities for fishing, boating, or other recreation would improve the *WAMA* score for this parameter and may be eligible for *credits* for *enhancing social function*. (See cautionary statement below.) Absent monitoring and documentation of actual post-project levels of use, calculations should assume that the project will change use to the next highest level (e.g., from "low" to "moderate use"). For Spreadsheet 4-ENH the size of the area improved will depend on the type of project. Specifically:

- for fishing facilities, the area improved equals the wetted perimeter multiplied by 150 linear feet up- and downstream;
- for boating facilities, the area improved equals the channel width, at *OHWM*, multiplied by the distance, in feet, measured along the channel, to the next downstream put-in/take-out location; and
- for facilities associated with viewing of the *waterway*, the area improved equals the average channel width, at *OHWM*, plus *bank* heights between *OHWM* and the top of *bank*, multiplied by the length of channel visible from the new facility. (The ADCM would calculate *credits* for the area above the top of *bank*, if appropriate, in the "Wetlands" or "Uplands" section of Spreadsheet 4-ENH.)

CAUTION: Eligibility for *credits* will depend on a determination by the lead federal regulatory agency (i.e., Corps of Engineers or

EPA) that the project would be appropriate compensatory mitigation to offset *debits*.

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4b. EDUCATIONAL USE (*AWAM* PARAMETER 4.2)

Description: This category recognizes the public's use of a *waterway* for educational activities. Points are given based on the frequency of use by groups of people. Minor points are assigned to an area if that site is in close proximity to a school(s) and therefore has educational potential.

How to Assess: This parameter applies to the specific *polygon(s)* in question, rather than to the entire *waterway*. The categories of use are:

- Frequent use = used by schools, clubs and/or tour groups five or more times a year.
- Occasional use = used by such groups two to five times a year.
- Infrequent use = sites used only once a year.
- No known use, but close to schools.
- No known or potential use.

Potential Improvements in *Function*: Projects that provide increased educational use would improve the *WAMA* score for this parameter and may be eligible for *credits* for *enhancing social function*. (See cautionary statement below.) Absent monitoring and documentation of actual post-project levels of use, calculations should assume that the project will change use to the next highest level (e.g., from "in-frequent" to "occasional use"). For Spreadsheet 4-ENH the size of the area improved will be specific to the type of educational facili-ty/information provided. For example, for facilities providing educa-tion about salmon, the improvement would be to the area of channel (i.e., channel width, at *OHWM*, multiplied by channel length) in which salmon are visible from the facility.

CAUTION: Eligibility for *credits* will depend on a determination by the lead federal regulatory agency (i.e., Corps of Engineers or EPA) that the project would be appropriate compensatory mitigation to offset *debits*.

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4c. FACILITIES AND PROGRAMS (*AWAM* PARAMETER 4.3)

Description: *Waterways* with official or formal educational programs, staff, or brochures and interpretive trails have higher public value

than sites that have no developed or organized educational activity. Few Anchorage *waterways* have such programs.

How to Assess: This parameter applies to the specific *polygon(s)* in question, rather than to the entire *waterway*.

Potential Improvements in *Function*: Projects that provide educational or interpretive facilities would improve the *WAMA* score for this parameter and could earn *credits* for *enhancing social function*, if the lead federal regulatory agency (i.e., Corps of Engineers or EPA) determines that the project would be appropriate compensatory mitigation to offset *debits*. As with parameter 4c, the size of the area improved will be specific to the type of facility/information provided.

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4d. TYPE OF AESTHETIC DISTURBANCE (*AWAM* PARAMETER 4.5, TYPES OF DISTURBANCE)

Description: All significant or detracting disturbances to the *bed* or *banks* of a *waterway* are to be identified. One point for each type of disturbance is then subtracted from the total points for the Social Component. All of the disturbances listed are considered detriments to a *waterway*: disturbances are known to reduce species diversity, increase undesirable species, increase contamination and lowered water quality, and reduce public values (references cited in *AWAM* narrative). Disturbance must be interpreted by the field user of this method since quantification is difficult. A disturbance must be recognizable to be included.

How to Assess: This parameter applies to the specific *polygon(s)* in question, rather than to the entire *waterway*. A culvert, in and of itself, would generally incur two reductions (i.e., for road/trail and channelization), and possibly a third (i.e., for filling, if the culvert is narrower than the channel). Most of the other reductions would apply to open channels. A reduction for water pollution may could apply to either *piped* or open channels, if the pollution is visible within the *polygon(s)* (e.g., turbidity) or has been documented within the *waterway* reach that includes the *polygon(s)*.

Potential Improvements in *Function*: Most projects that increase the *WAMA* score for this parameter would likely be eligible for *credits* via *REV improvement*. It is not necessary to use the *WAMA* to calculate *credits* for such projects. Projects that focus solely on correcting water pollution issues may not change *REV*, but may still increase the *WAMA* score and earn *credits* for *enhancing social function*, if the lead federal regulatory agency (i.e., Corps of Engineers or EPA) determines that the project would be appropriate compensatory mitigation

to offset *debits*. The size entered in Spreadsheet 4-ENH for such projects would include at least the area of *waterway* for which the project increases the *WAMA* score, using the *wetted perimeter* and 300 linear feet of channel or the length to the next downstream pollutant source, whichever is shorter. Depending on the project, it may also include an area of *bank* (below the top of *bank*; any improvement above the top of *bank* would accrue *credits*, if appropriate, in the "Wetlands" or "Uplands" section of Spreadsheet 4-ENH).

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4e. EXTENT OF AESTHETIC DISTURBANCE (*AWAM* PARAMETER 4.6, DEGREE OF DISTURBANCE/AESTHETIC VALUES)

Description: This category attempts to identify the degree to which a *waterway* is disturbed. The emphasis is placed on water quality and water pollution. The less the disturbance, the more points a *waterway* will receive.

How to Assess: This parameter applies to the specific *polygon(s)* in question, rather than to the entire *waterway*. For culverts, the extent of disturbance will generally be "extremely intense;" it will vary for open channels.

Potential Improvements in *Function*: Most projects that increase the *WAMA* score for this parameter would likely be eligible for *credits* via *REV improvement*. It is not necessary to use the *WAMA* to calculate *credits* for such projects. Projects that focus solely on correcting water pollution issues may not change *REV*, but may still increase the *WAMA* score and earn *credits* for *enhancing social function*, if the lead federal regulatory agency (i.e., Corps of Engineers or EPA) determines that the project would be appropriate compensatory mitigation to offset *debits*. The size entered in Spreadsheet 4-ENH for such projects would include at least the area of *waterway* for which the project increases the *WAMA* score, using the *wetted perimeter* and 300 linear feet of channel or the length to the next downstream pollutant source, whichever is shorter. Depending on the project, it may also include an area of *bank* (below the top of *bank*; any improvement above the top of *bank* would accrue *credits*, if appropriate, in the "Wetlands" or "Uplands" section of Spreadsheet 4-ENH).

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4f. EXISTING RESEARCH/STUDIES (*AWAM* PARAMETER 4.9)

Description: A *waterway* that has reports or articles written about it is of value to the public since some aspect of the area has been portrayed in a public forum. Thus the public, and specifically the local

neighborhoods, can better relate to an area and can better understand the values onsite. Such articles also contribute to management, planning decisions, and educational values.

How to Assess: This parameter applies to the reach of *waterway* that incorporates the *polygon(s)* in question, as delineated by the municipality's Watershed Management Section. For *drainageways* and *ditches*, as well as *streams* that the municipality has not yet mapped, use the municipality's definition of reach, at http://wms.geonorth.com/library/Documents/Data/META/NAD27/MOAStreamsMETA.pdf, to establish what segment to use in determining the extent of existing research or studies, if any, conducted on the *waterway*.

Potential Improvements in *Function*: Many Anchorage *streams* would already earn the maximum possible points for this parameter. For other *waterways*, conducting a research project or study and reporting the results would improve the *WAMA* score for this parameter and could earn *credits* for *enhancing social function*, if the lead federal regulatory agency (i.e., Corps of Engineers or EPA) determines that the project would be appropriate compensatory mitigation to offset *debits*. The size of the area improved by such a project would be specific to the research/study.

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4g. IDENTIFICATION AS PARKLAND (MODIFICATION OF *AWAM* PARAMETER 4.8, LAND IDENTIFICATION AS PARKLAND)

Description: This modified parameter assigns points to a *waterway polygon* if the land abutting it is, or has the potential to become, parkland or land of similar value to the public. As described in its narrative, the *AWAM* included this parameter simply to differentiate between areas of public value and those slated for development or in private ownership, noting that existing and potential future parks (or similar areas) are of high value in the public's eye. The *WAMA's* modification to this parameter is to update the language in the *AWAM* points categories specifically to include not only existing and potential municipal parks, but also areas of similar value to the public, such as the Anchorage Coastal Wildlife Refuge (ACWR), Chugach State Park (CSP), Chugach National Forest (CNF), and, due to their status as being permanently *preserved* for their natural values, conservation easements. The modification also updated the *AWAM* points category of land "identified [as a] Municipal selection from [the] State or [that] is in [the] Heritage Land Bank and of little commercial value" to more broadly include any undeveloped, publicly owned land that has a reasonable potential to become a park or something similar.

How to Assess: This parameter applies to the specific *polygon(s)* in question, rather than to a longer segment of the *waterway*. Shapefiles for municipal parks, CSP, CNF, and generalized land use are available from the municipality, at http://www.muni.org/Departments/it/GIS2/Pages/MOAGISData.aspx. The municipality's Advanced Mapper application (http://munimaps.muni.org/mox52/advanced.cfm?&action=mox52_if_frameset) has layers for municipal parks, the ACWR, CSP, and land use available for viewing. Ownership information is also available, using the "identify" tool in Advanced Mapper. Ascertaining whether a parcel is subject to a Conservation Easement, or has been identified as a potential future park, should begin with contacting the municipality's Physical Planning Division.

Potential Improvements in *Function*: The only projects that could potentially earn *credits* for increasing the *WAMA* score for this parameter are those that earn the maximum number of points (i.e., 3) for, and also include *preservation* of, the land in question. As with other projects, the accrual of *credits* is subject to the approval of the lead federal regulatory agency (i.e., Corps of Engineers or EPA). For Spreadsheet 4-ENH, the size of area improved will be the area of *bank* (below the top of *bank*) *preserved* plus the area of *waterway* (i.e., *wetted perimeter* multiplied by channel length) abutting the *preserved* land. (The ADCM calculates *preservation credits* for the area above the top of *bank* in the "Wetlands" or "Uplands" section of Spreadsheet 5.)

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4h. OWNERSHIP/ACCESSIBILITY (*AWAM* PARAMETER 4.10)

Description: This parameter matches accessibility of a *waterway* with the current ownership patterns. Points are awarded based on ease of access and restriction by ownership. Ownership and accessibility have a direct bearing on the value of a *waterway* to the Anchorage public. Benefits of use by the public of a particular *waterway* vary from direct access for active recreation, to open space, to public health and safety. Private ownership and difficult access are direct public use restrictions of a *waterway* and render such sites of lower value. This category highlights a *waterway's* value to the public only and does not consider private owners' benefits. Easily accessed *waterways* are of more social value than any restricted areas.

How to Assess: The ownership component of this parameter applies to lands abutting the *waterway polygon(s)* in question. Ownership information is available using the "identify" tool in the municipality's Advanced Mapper application

(http://munimaps.muni.org/mox52/advanced.cfm?&action=mox52_if_frameset). If different categories of ownership and/or accessibility apply to different boundaries of the *polygon*, assign the highest number of points applicable.

Potential Improvements in *Function*: Projects that improve the accessibility of a *waterway polygon(s)* (e.g., through construction of a trail, fishing or viewing platform, or boat launch) would improve the *WAMA* score for this parameter and could earn *credits* for *enhancing social function*, if the lead federal regulatory agency (i.e., Corps of Engineers or EPA) determines that the project would be appropriate compensatory mitigation to offset *debits*. For Spreadsheet 4-ENH the size of the area improved would depend on the type of project. Specifically:

- for fishing facilities, the area improved equals the wetted perimeter multiplied by 150 linear feet up- and downstream;
- for boating facilities, the area improved equals the channel width, at *OHWM*, multiplied by the distance, in feet, measured along the channel, to the next downstream put-in/take-out location; and
- for facilities associated with viewing of the *waterway*, the area improved equals the average channel width, at *OHWM*, plus *bank* heights between *OHWM* and the top of *bank*, multiplied by the length of channel visible from the new facility. (The ADCM would calculate *credits* for the area above the top of *bank*, if appropriate, in the "Wetlands" or "Uplands" Spreadsheet 4-ENH.)

Change in ownership of the land abutting the *waterway*, or changes in restrictions on access through the property to the *waterway*, could also potentially produce *credits* for *enhancement* of *social function* of the *waterway*, so long as such changes are accompanied by *preservation* of the land in question and the lead federal agency (i.e., Corps of Engineers or EPA) concurs that *credits* would be appropriate compensatory mitigation for *debits*. For Spreadsheet 4-ENH, the size of area improved by such a project would be the area of *bank preserved* plus the area of *waterway* (i.e., *wetted perimeter* multiplied by channel length) abutting the *preserved* land. (The ADCM calculates *preservation credits* for the area above the top of *bank* in the "Wetlands" or "Uplands" Spreadsheet 5.)

There are two *AWAM* parameters that the *WAMA* did not incorporate: parameters 4.4, Landscape Distinctness, and 4.7, Public Use/Open Space Value. The *AWAM* narrative for parameter 4.4 describes *wetlands* that are "notably distinct within [their] surrounding environment" as having more social value than "typical landscapes" because the public is "always more aware of distinct landscapes than more uniform appearing sites." The

WAMA did not adopt this parameter because the highest category, "clearly distinct," would apply to most *streams*, because they tend to draw public attention, often regardless of their physical condition. As a result, the parameter would not be subject to improvement and would provide little context for others that are. The *WAMA* did not adopt parameter 4.7 because it applies strictly to land, rather than *waterways*, since it assesses the need for parkland in the immediate area.

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III. **DATA SHEETS**

Appendix D. Using the *Anchorage Wetlands Assessment Method* (*AWAM*) in *Debit* and *Credit* Calculations

APPENDIX D: USING THE *ANCHORAGE WETLANDS ASSESSMENT METHOD* (*AWAM*) IN *DEBIT* AND *CREDIT* CALCULATIONS

Electronic copies of this appendix include quick links for navigating around the document. Hyperlinks include the terms in the table of contents, as well as certain items within the narratives. To jump to a term, place the cursor over it and press Ctrl-click to activate the hyperlink.

CAUTION: These procedures apply only to *enhancement* projects that will not result in a *REV improvement*. They do not apply to *preservation*, *restoration* or *establishment* projects, nor to *enhancement* projects that result in a *REV improvement*.

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I. INTRODUCTION

As described in Step 6 of both Section II, Parts C.1.a. and b. of the Procedures, and the discussion of *enhancement* in the Glossary (Appendix A), the ADCM provides for determining *credits* for projects that improve an area's *function*, even when such projects do not improve the area's *REV*. The December 2000 version of the ADCM included procedures for calculating *credits* for such *enhancement* projects involving all aquatic areas (and associated *uplands*), using the *AWAM* (*Anchorage Wetlands Assessment Method*) for quantifying both the extent of improvement in *function* and the contribution of that *function* to the overall *function* of the area. This appendix provides direction on how to use the *AWAM* in calculating *debits* and *credits*.

CAUTION: These procedures apply only to *enhancement* projects that will result in a *REV improvement*. They do not apply to *preservation*, *restoration* or *establishment* projects, or to *enhancement* projects that result in a *REV improvement*.

Using "An Evaluation System for Wetlands of Ontario South of the Precambrian Shield" (i.e., the "Ontario method," Environment Canada 1984) as a base, the Municipality of Anchorage developed the *AWAM* in 1991, in consultation with a variety of resource agencies, for use in updating the *Anchorage Wetlands Management Plan* (*AWMP*). The science of *wetland functional* assessment has advanced in the last twenty years and there likely could be several improvements to the *AWAM*. Pending any such updates, the ADCM will continue to use the *AWAM*, as published, with only slight modifications to correct mistakes in the original, clarify intent, or facilitate use of current tools. The discussion of individual parameters notes any such changes in their application. The most important change is more general: for purposes of calculating *debits* or *credits*, the ADCM user should apply the *AWAM* to *contiguous undeveloped wetlands* and *wetland/upland mosaics* in their entirety, rather than to just the proposed *project site* or to an entire *AWMP* unit (if it is not contiguous) or to an *AWMP* unit that is only a portion of a larger *contiguous undeveloped wetland*, regardless of how the *AWMP* applied the *AWAM* in those instances. This appendix uses the term "subject *wetland/mosaic*" to describe the area of assessment.

REMEMBER: Most *disturbance category* 1 and 2 activities do not truncate a *contiguous undeveloped area* (see Glossary).

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II. DESCRIPTION AND ASSESSMENT OF PARAMETERS

The parameter numbers are the same as in the AWAM, but the ADCM has shortened some of the parameter titles. The Description of Parameters repeats, verbatim (except for grammatical errors), the descriptions included in the *AWAM's* 27 December 1991 "Methodology Narrative." Where the ADCM

has modified *AWAM* parameters, a discussion of the modification follows the description. In addition to describing the *AWAM* parameters, this section addresses how—or whether—they apply to proposed *enhancement* projects. For those parameters that are subject to improvement, the discussion also provides guidance on how to determine the size of area to use in calculating *credits*.

A. Hydrological Assessment

1.1 Source of Stormwater Input

Description: If the subject *wetland* detains or receives stormwater, then the type or quality of that water must be determined. A *wetland* that detains or receives and filters poor quality waters or storm drain runoff is of more value to a basin's water quality than an area that receives no runoff or one that only receives natural, and presumably cleaner, flows. This is especially true for Anchorage, where most stormwater systems dump runoff into *stream* channels and where water quality is a problem. *Wetlands* that act as snow disposal sites are considered of high value, as are areas that receive direct runoff from storm drain culverts. Areas that receive storm runoff also provide flood abatement.

How to Assess: Determine whether any storm water outfalls or runoff flow into the subject *wetland* and establish whether the discharge is entirely from *developed* areas, entirely from natural sources, or a combination thereof. The municipality's Advanced Mapper application (http://munimaps.muni.org/mox52/advanced.cfm?&action=mox52_if_frameset) has a layer for topographic contours, to assist in assessing runoff from adjacent properties. The Municipal Wetlands Atlases depict municipally mapped storm drains. Shapefiles for storm drains are available from the municipality (http://wms.geonorth.com/library/LibraryData.aspx). Municipal mapping does not include storm drains associated with state roads, the airport or the military bases; consult the Alaska Department of Transportation and Public Facilities' Central Region, Fort Richardson's Directorate of Public Works, or Elmendorf Air Force Base's Environmental Flight for storm drains in those areas.

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1.2 Position in Watershed

Description: The position of a subject *wetland* within a drainage basin is most important to that parcel's value in flood attenuation and water quality in the watershed. It is generally felt that the higher up in the watershed a *wetland* is, the greater its role in flood control and water

quality maintenance. Of course, the size of a particular *wetland* and its location relative to floodplains modify this function.

How to Assess: For purposes of this parameter, the term "watershed" applies to the entire area that drains to a *waterway* that empties into Cook Inlet (e.g., Chester Creek and all its forks and tributaries). Maps of watershed boundaries are available at: http://wms.geonorth.com/library/LibraryMaps.aspx and shapefiles are available at (http://wms.geonorth.com/library/LibraryData.aspx). Estimate the position of the *wetland* within the watershed, using the *waterway* as the axis of the watershed.

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1.3 Down-Gradient Land Use

Description: Land use within 0.5 mile of the *wetland* usually has a direct bearing on a subject *wetland's* value to flood detention and on local water quality. Of particular interest in this category is the land use below or down gradient of a *wetland* area. If land use below the wetland is highly *developed*, then the subject parcel is of inherently higher value to flood detention than it might be to undeveloped areas downstream. This category does not qualify the extent of additional detention areas downstream of the subject parcel.

How to Assess: Determine whether there are any *developed* areas, *waterbodies*, *streams*, or other *wetlands* down gradient of the subject *wetland/mosaic* and, for *developed* areas, determine their distance—along the flow line—from the *wetland's* outflow.

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1.4 *Wetland/Mosaic* Size

Description: A given wetland area will have inherent values to flood detention and water quality based simply on its size. The table used for this parameter, as developed in the Ontario method (Environment Canada 1984), attempts to place a value on a wetland based on size. Larger wetlands are of inherently higher value because of their increased surface area and capacities to hold greater volumes of runoff.

How to Assess: Use the size of the entire *contiguous undeveloped wetland/mosaic*, not just the size to the proposed *project site*. Do not include adjacent *uplands*, except where they are part of a *mosaic* or a *disturbance category* 1 or 2 activity (which do not truncate a *contiguous undeveloped area*).

Potential Improvements in *Function*: Projects that increase the size of a *wetland* by excavating, inundating or saturating adjacent *uplands* may produce *credits* as a result of *restoration*, *establishment*, or *enhancement* with *REV improvement.* This appendix does not apply to such calculations.

CAUTION: Eligibility for *credits* will depend on a determination by the lead federal regulatory agency (i.e., Corps of Engineers or EPA) that the project would be appropriate compensatory mitigation to offset *debits*. Projects that produce *REV* 3 or 4 *wetlands* generally are not high priority for compensatory mitigation *credits* and the loss of *function* associated with converting *REV* 1 or 2 *uplands* to *wetlands* may not be warranted.

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1.5 FLOW AUGMENTATION

Description: This parameter relates size of *wetlands* area to total size of the catchment basin within which the parcel is located. A table from the Ontario method (Environment Canada 1984) is used to assign points based on the *wetlands* area as a percent of the total catchment basin size. The higher this percentage, the higher value a *wetland* has to flood control in the system. This question makes the assumption that a *wetland* has inherent storage capacity within the basin. Many Anchorage area drainage plans call out the importance of undisturbed *wetlands* in the role of flood control.

How to Assess: Shapefiles for municipally mapped sub-drainage (or sub-) basins and wetlands are available from the municipality (http://wms.geonorth.com/library/LibraryData.aspx). Identify the sub-basin(s) that encompass the subject *wetlands* and determine the basin size. Determine the *contiguous undeveloped* size of the *wetland* that includes the *project site* and divide that figure by the size of the sub-basin. For *mosaics* of *wetlands* and *uplands*, use the approximate acreage of *wetlands* in the *mosaic*.

Potential Improvements in *Function*: Projects that increase the size of a *wetland* by excavating, inundating or saturating adjacent *developed* or *non-naturalized uplands* may produce *credits* for *restoration*, *establishment*, or *enhancement* with *REV improvement.* This appendix does not apply to such calculations.

CAUTION: Eligibility for *credits* will depend on a determination by the lead federal regulatory agency (i.e., Corps of Engineers or EPA) that the project would be appropriate compensatory mitigation to offset *debits*. Projects that produce *REV* 3 or

4 *wetlands* generally are not high priority for compensatory mitigation *credits* and the loss of *function* associated with converting *REV* 1 or 2 *uplands* to *wetlands* may not be warranted.

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1.6 EXTENT OF *WETLANDS* IN SUB-BASIN

Description: Given the ability of *wetland* sites, especially those within the upper two-thirds of a watershed, to attenuate high water flows, the relative size of a subject *wetland* to the total *wetland* coverage within a watershed is important. Although this question assumes that the *wetland* receives and/or contains runoff prior to its entrance into a *stream* or *drainageway*, the larger the percentage the *wetland* represents the more potential and/or realized its role in stormwater attenuation. Novitski (1978) has shown that flood peaks are significantly lower in drainage basins with undisturbed *wetland* areas than in basins with little *wetland* area. Several studies have also strongly correlated *wetlands* coverage in watersheds to water quality issues, notably sediment retention (Hindall 1975). This function is important to both the entire basin and to more localized, small-scale drainage, glaciation, and other related high water situations.

How to Assess: Identify the sub-drainage (or sub-) basin(s) that encompass the subject *wetlands*. Determine the total *wetland* acreage within that sub-basin(s) and divide the *contiguous undeveloped* size of the *wetland* that includes the *project site* by that total. For *mosaics* of *wetlands* and *uplands*, use the approximate acreage of *wetlands* in the *mosaic*. Shapefiles for municipally mapped sub-basins and wetlands are available from the municipality (http://wms.geonorth.com/library/LibraryData.aspx).

Potential Improvements in *Function*: Projects that increase the size of a *wetland* by excavating, inundating or saturating adjacent *uplands* may produce *credits* for *restoration*, *establishment*, or *REV improvement.* This appendix does not apply to such calculations.

CAUTION: Eligibility for *credits* will depend on a determination by the lead federal regulatory agency (i.e., Corps of Engineers or EPA) that the project would be appropriate compensatory mitigation to offset *debits*. Projects that produce *REV* 3 or 4 *wetlands* generally are not high priority for compensatory mitigation *credits* and the loss of *function* associated with converting *REV* 1 or 2 *uplands* to *wetlands* may not be warranted.

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1.7 WETLAND LOCATION

Description: Site type is of value to water quality since runoff, storm flows, or groundwater presumably flow through and are detained in a subject *wetland*. *Wetlands* that receive direct surface flows and are dominated by emergents and submergents are of more value in this category than isolated areas or *wetlands* that have little or no surface flows (Brown and Stark 1989). This section identifies a wetland's relative filtering capability. The original wetlands study in preparation for the *AWMP* evaluated various *wetland* types for water quality and flood attenuation functions. Differences were noted for each *wetland* type (Ertec 1981).

Modification: The original *AWAM* data sheets provided five different choices for this parameter, all of which were sub-categories of Cowardin classification. Three of the five choices are either lacustrine or riverine "wetlands," which have very little overlap with what the Corps of Engineers and EPA identify as *wetlands* under the Clean Water Act. In its use of the *AWAM*, the municipality has not applied the terms as defined by Cowardin; therefore, the ADCM has replaced the Cowardin-based references with descriptions that reflect the municipality's application, assessing whether the subject *wetland* plays (or could play) a role in intercepting runoff before it enters a *perennial stream*, a *persistent waterbody*, or the Municipal drainage system.

How to Assess: Determine whether the subject *wetland* is contiguous with a *perennial stream* or *persistent waterbody*. If not, determine whether it is hydrologically connected, via surface or shallow subsurface, to a *waterbody* or *stream* or the *intertidal* or *subtidal zone*).

Potential Improvements in *Function*: Projects that *restore* or *create wetlands* from *developed* or *non-naturalized uplands* may produce *credits* as a result of *REV improvement.* This appendix does not apply to such calculations. Projects that establish a *wetland* pollutant interception *function* without improving *REV* may still produce *credits* by increasing the *AWAM* score for this parameter, reflecting an *enhancement* of *hydrologic function*. In such instances, the size entered in SS 4-ENH would represent the area of *restored* or *created wetland*.

CAUTION: Eligibility for *credits* will depend on a determination by the lead federal regulatory agency (i.e., Corps of Engineers or EPA) that the project would be appropriate compensatory mitigation to offset *debits*. Projects that utilize existing *REV* 1 or 2 *polygons* for pollutant interception may not qualify.

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1.8 Sensitivity to Water Quality Degradation

Description: The relative value of a subject *wetland* to water quality is in part based on what lies below the *wetland* and/or its receiving waters. Many of Anchorage's smaller *streams* have few or no fish populations and empty into the silty waters of Knik Arm. Thus, the *wetland's* position in the watershed, and the uses immediately down gradient, play the most significant role in this equation.

How to Assess: Determine whether there is any fish spawning or rearing, sportfishing, potable water source, contact water recreation and/or high value waterbird nesting within the subject *wetland* or in the *waterway*, *waterbody*, or *intertidal* or *subtidal zone* to which the *wetland* drains. For spawning and rearing, consult the Alaska Department of Fish and Game's (ADFG's) anadromous fish streams maps (http://gis.sf.adfg.state.ak.us/AWC_IMS/viewer.htm); sampling approved by ADFG may suffice. The ADFG maps do not catalog stickleback spawning or rearing areas; documented presence of that species is sufficient to assume that spawning occurs in the area.

Eklutna Lake and the Ship Creek reservoir are the only two surface sources of potable water currently known to the municipality. Contact the Anchorage Water and Wastewater Utility to confirm other suspected surface water sources. "Contact water recreation" includes activities such as swimming, fishing, boating, and wading.

"High value waterbird nesting" references loons and grebes, in addition to waterfowl, cranes, shorebirds, gulls, and terns. Municipal shapefiles with data on loon, waterfowl, and shorebird nesting locations in the Anchorage Bowl is available at http://www.muni.org/Departments/it/GIS2/Pages/MOAGISData.aspx. For other species (i.e., grebes, cranes, gulls, and terns) or for locations outside the Anchorage Bowl, document nesting either through direct observation by or consultation with a qualified individual. Consult the U.S. Fish and Wildlife Service (907-271-2888 or 907-786-3443, ak_mbm@fws.gov or ak_fisheries@fws.gov) or the Anchorage Audubon Society (907-338-2473, info@anchorageaudubon.org) for assistance in identifying qualified individuals.

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1.9 Pollutant Uptake and Filtration

Description: The efficiency of a *wetland* to filter pollutants and to absorb nutrients depends to a great extent on the plant types within the wetland. Emergent and submergent species are well known as providing efficient filtering and uptake of nutrients and pollutants in

water (Greeson et al. 1978, Meyer 1985). Amounts and type of open water in a wetland were not differentiated in this category; rather, simply the presence of emergents or submergents was noted. Nutrient uptake is related to plant type, which influences primary productivity.

How to Assess: This parameter requires field investigation to assess the presence of emergents or submergents in the subject *wetland/mosaic*. For projects that would change the coverage of robust emergents and/or submergents, use the pre- and post-project coverage of the affected area to assign points. For all other projects, use the overall coverage within the subject *wetland/mosaic*.

Potential Improvements in *Function*: Planting projects sufficient to change a *polygon(s)* from a *non-naturalized* to a *naturalized* condition may produce *credits* via *REV improvement*. This appendix does not apply to such calculations. Planting that does not change *REV* may still produce *credits* by increasing the *AWAM* score for this parameter, reflecting an *enhancement* of *hydrologic function*. In such instances, the size entered in SS 4-ENH would represent the area for which the planting increased the percent cover of robust emergent and/or submergent vegetation.

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1.10 POLLUTANT SOURCES IN SUB-BASIN

Description: The type of land use in a *wetland* sub-basin is important to the water quality and flood potential for the drainage area. Undeveloped and fully vegetated areas within the drainage basin provide for greater water quality maintenance and flood control than do developed commercial or residential areas. However, the greater the development and the more industrial the use, the greater the possibility exists for introduction of polluted waters and increased runoff volumes. Thus, a *wetland* within a developed commercial or industrial area is of higher value to a watershed's water quality and local flood control.

How to Assess: Shapefiles for municipally mapped sub-basins and land use are available from the municipality (http://wms.geonorth.com/library/LibraryData.aspx and http://www.muni.org/Departments/it/GIS2/Pages/MOAGISData.aspx, respectively). Identify the sub-basin(s) that encompass the subject *wetlands*. Use the land use layer only as a guide to identify the nature of existing *developed* areas; count *undeveloped* land as open space, regardless of its land use designation. Also beware that development may have occurred on vacant land since the last update of the land use layer. If the land uses within the sub-basin(s) fall within

more than one of the categories on the data sheet, use the average of the points applicable to those categories. For example, a mix of commercial land use and open space would score five points, which is the average of nine, for commercial, and one, for parks/open space.

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1.11 LONG-TERM NUTRIENT RETENTION

Description: Organic soils hold nutrients longer and more effectively than mineral soils (Friedman and DeWitt 1978). Wetlands located at the inlet of a watercourse or that regularly receive nutrient-laden waters are of more value for nutrient buildup, nutrient recycling, and for primary productivity (Krebs 1978).

Modification: The municipality used the term "organic" soils to encompass both histosols and histic mineral soils (i.e., mineral soils with a histic epipedon). The Corps and EPA consider only histosols to be organic soils; therefore, the ADCM has changed the term to match the federal definitions.

How to Assess: Identify the soil(s) underlying the subject *wetland*/*mosaic* and determine whether histosols and/or histic mineral soils (i.e., mineral soils with a epipedon) occur beneath fifty percent or more of it. If field mapping of the soils beneath the subject *wetland*/ *mosaic* is unavailable, use the Natural Resource Conservation Service's (NRCS's) Anchorage Soil Survey, available at: http://soildatamart.nrcs.usda.gov/Manuscripts/AK605/0/Anchorage.pdf.

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1.12 WATER QUALITY MAINTENANCE

Description: This category correlates the quality of water that enters a *wetland* with the length of detention time in the subject *wetland*. Detention time can be estimated by variables such as size, soils, *wetland* shape, and distance from outlet waters, and plant types. A *wetland* area is more valuable to water quality if it accepts poor quality water but also detains this water and filters out sediments (Boto and Patrick 1978). The presence of emergents and submergents enhances an area's filtering capabilities (Greeson et al. 1978, Meyer 1985). Low water flow through a wetland is essential for net accumulation of phosphorus in litter and plants (Van der Valk et al. 1978).

Modification: The *AWAM* provided four choices for level of *function* to assign to a subject *wetland*, most of which covered four different components of water quality maintenance, specifically, the quality/

presence of inflow, detention time, storage capacity, and nutrient uptake/pollutant filtration ability. The highest scoring choice applied to *wetlands* with poor-quality inflow and high detention time, storage capacity, and uptake/filtration ability. Moderate capacities applied to the second and third choices, which the *AWAM* differentiated only by quality of inflow, with one being slightly worse than the other. The lowest scoring choice applied to *wetlands* with either essentially no inflow or low detention/filtration capacities.

The ADCM has provided for additional combinations of need and capacity, to address situations in which there may be a mix of high-, moderate-, and/or low-scoring components, assigning component points based on the *AWAM's* original totals. The modification also provides more specificity to clarify the need and capacity choices, using land use for areas that drain to the subject *wetland* to represent quality of inflow, *wetland* slope and/or shape and soil permeability for detention time and storage capacity, and percent cover by robust emergents and submergents (i.e., parameter 1.9) for nutrient uptake/pollutant filtration. The modification does not include *wetland* size as a component because, although size does affect detention time and storage capacity, three other *hydrologic function* assessment parameters (i.e., parameters 1.4, 1.5, and 1.6) already account for it.

How to Assess: For each of the four components of the parameter, indicate which description and associated points applies to the subject *wetland*/*mosaic*. Table D-1 describes the sources of runoff that apply to each of the rating categories for the "inflow" component:

Table D-1: Inflow Quality Rating Categories

Rating	Source of Runoff to Subject *Wetland*/*Mosaic*
poor quality	industrial development, roads, snow disposal sites, or similar areas
fair quality	mostly commercial or residential areas
good quality	primarily undeveloped parks, open space or undeveloped land
N/A	none beyond boundaries of subject *wetland*/*mosaic*

Use the municipal shapefiles for sub-basin boundaries and land use, available at http://wms.geonorth.com/library/LibraryData.aspx and http://www.muni.org/Departments/it/GIS2/Pages/MOAGISData.aspx, respectively, to assist in discerning extent and nature of inflow sources.

The second component, "slope/shape," assigns points based on the topography of the subject *wetland*/*mosaic*. Make sure to use the slope of the *wetland*/*mosaic*, itself, rather than the area surrounding it. For this component, "outlet" refers to either a *waterway* or an

upland topographic feature through which surface flow leaves a depressional *wetland*, whereas "closed" applies to depressional *wetlands* without any such outlet.

The terms for the third component, "soil permeability," derive from the representative profiles in the "Detailed Soil Map Units" descriptions of the NRCS's Anchorage Soil Survey (http://soildatamart.nrcs.usda.gov/Manuscripts/AK605/0/Anchorage.pdf). Using the most accurate soil mapping available, determine what soil series underlies the subject *wetland*/*mosaic* and refer to the soil survey to ascertain its permeability class. When there is more than one soil underlying the subject *wetland*/*mosaic* and/or the soil profile includes more than one category of permeability, use the areal extent of each soil and the layer thicknesses, respectively, to determine which category best represents the area. Table D-2 provides the representative permeability classes for Anchorage's currently mapped hydric soil series.

Table D-2: Hydric Soil Series Permeability Classes

Soil Series	Permeability
Clam Gulch	slow
Cryosaprists (i.e., soil unit 404)	moderately rapid
Disappear	moderate
Doroshin	moderately rapid
Histic Cryaquepts (soil units 421 and 422)	moderately rapid
Icknuun	moderately rapid
Jacobsen	moderately rapid
Moose River	moderate
Niklavar	moderately rapid (half moderate and half rapid)
Salamatof	rapid
Typic Cryaquents and Typic Cryaquepts (i.e., soil unit 462)	moderate

The fourth component of parameter 1.12, "nutrient uptake/pollutant filtration," utilizes the score for parameter 1.9 to represent the subject *wetland*/*mosaic's* capacity to perform this *function*. Table D-3 (next page) quantifies the rating categories for this component.

Table D-3: Nutrient Uptake/Pollutant Filtration Rating Categories

Rating	Score for Parameter 1.9
high	15 points
moderately high	6 or 10 points
moderately low	3 points
low	1 or 2 points

Potential Improvements in *Function*: Projects that direct good quality inflow to a subject *wetland*/*mosaic* that currently lacks inflow may earn *credits* through either *REV improvement* or *enhancement* of *hydrologic function* (i.e., increase in the score for this parameter). It is very unlikely that projects to introduce poorer quality flow to a *REV* 1 or 2 aquatic area would qualify for *credits*. The same is true for projects that would involve changing the slope, shape or soils of a *natural* or *naturalized wetland*.

Planting projects sufficient to change a *polygon(s)* from a *non-naturalized* to a *naturalized* condition may produce *credits* via *REV improvement*. This appendix does not apply to such calculations. Planting that does not change *REV* may still produce *credits* by increasing the *AWAM* score for this parameter, reflecting an *enhancement* of *hydrologic function*. In such instances, the size entered in SS 4-ENH would represent the area for which the planting increased the percent cover of robust emergent and/or submergent vegetation.

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1.13 Erosion Buffering

Description: Bailey et al. (1978) and Dean (1979) have quantified data that relates wetlands to shoreline protection and erosion control. Gray (1977) has shown that wetland vegetation controls terrestrial slope erosion by soil reinforcement with roots and by interception of surface water and depletion of soil water. If the subject wetland abuts a *waterway*, then its ability to reduce erosive forces is based on the principal vegetation form found in the parcel. Forms considered most valuable are trees, shrubs, emergents, or submergents. For this category, only the plant forms that come into regular contact with flowing or storm event waters are identified. Trees are known to provide efficient erosion protection because of deep and extensive root systems; riparian and wetland trees and shrubs are known to also reestablish quickly after floods (Seibert 1968).

Modification: The *AWAM* applies this parameter to lacustrine and riverine "wetlands" only, ostensibly referencing the Cowardin classifications. The ADCM has replaced that reference because there is extremely little overlap between what the Cowardin classification

describes as lacustrine and riverine "wetlands" and what the Corps of Engineers and EPA identify as *wetlands* under the Clean Water Act. In its use of the *AWAM*, the municipality has not applied the terms as defined by Cowardin; therefore, the ADCM has replaced the Cowardin-based references with descriptions that reflect the municipality's application, assessing whether the subject *wetland*/*mosaic* provides erosion protection along a *perennial stream* or *waterbody*.
How to Assess: Determine whether the subject *wetland*/*mosaic* is contiguous with or in the 100-year floodplain of a *perennial stream* or *persistent waterbody*. If not, this parameter does not apply. Where it is applicable, it generally requires field investigation to determine the principal form of vegetation, if any, in the floodplain and/or the area that comes into contact with high flows or waves along a *stream bank* or *waterbody* shoreline. For purposes of this parameter, "principal" defines the vegetation form (or lack thereof) that best represents, or is most common for, the area in question.

Potential Improvements in *Function*: Projects below the top of *bank* would use the *WAMA*, rather than this appendix. Projects that change a *polygon(s)* above the top of *bank* or along a *waterbody* shoreline from a *non-naturalized* to a *naturalized* condition may produce *credits* via *REV improvement*. This appendix does not apply to such calculations.

Increasing locally native tree/shrub or, for *polygons* along *waterways*, emergent vegetation may produce *credits*, even without changing *REV*, by increasing the *AWAM* score for this parameter, reflecting an *enhancement* of *hydrologic function*. In such instances, the size entered in SS 4-ENH would represent the area for which the planting changed the dominant plant form.

CAUTION: Eligibility for *credits* will depend on a determination by the lead federal regulatory agency (i.e., Corps of Engineers or EPA) that the project would be appropriate compensatory mitigation to offset *debits*. Increasing tree, shrub or emergent vegetation—even if locally native—may not qualify in *REV* 1 or 2 *polygons* for which a lower scoring plant form (e.g., a *floating aquatic mat* along a *lake* shore) represents the *natural* condition.

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B. HABITAT ASSESSMENT

2.1 VEGETATION COMMUNITY STRUCTURE

Description: Vegetation community structure is a measure of diversity based on dominant plant forms. Plant forms are identified and counted per vegetation community and assigned different points based on complexity of community structure. A community is defined as an assemblage of species having similar vegetation forms. Form is the physical structure or shape of a plant. Minimum valid plant community size was 0.25 acre. Form definition follows that of the Ontario method (Environment Canada 1984). A form is considered valid within a community if it covers > 25% of the community.

The physical structure of plant vegetation strongly influences species richness and numbers of species that will use a habitat. Kessel (1979) correlated bird species with known avian habitats throughout Alaska. Several studies found a positive correlation between foliage height (vertical stratification) and foliage diversity with bird species diversity (Karr and Roth 1971, Willson 1974, Short 1984).

Modification: The ADCM has dropped the *AWAM's* 0.25-acre minimum size threshold for identification of plant communities, because the municipality has not applied it historically. In addition, the *AWAM* narrative and data sheets gave conflicting instructions regarding a threshold for minimum cover by plant forms; the ADCM has adopted the threshold from the data sheets, as it is the one the municipality has historically applied.

How to Assess: Complete parameter 2.2 first, to identify the plant communities in the subject *wetland/mosaic*. Both parameters require field investigation. Refer to Figure D-1 and identify the number of plant forms that exist in each community identified for parameter 2.2. List the communities and associated plant forms in the appropriate section(s) of the data sheets, based on number of plant forms per community. Consistent with the *AWAM*, do not count plant forms that have less than 5% total cover within a community.

Potential Improvements in *Function*: Planting projects sufficient to change a *polygon(s)* from a *non-naturalized* to a *naturalized* condition may produce *credits* via *REV improvement*. This appendix does not apply to such calculations. Planting that does not change *REV* may still produce *credits* by increasing the *AWAM* score for this parameter, reflecting an *enhancement* of *habitat function*. In such instances, the size entered in SS 4-ENH would represent the *polygon(s)* for which the planting increased the number of plant communities and/or forms.

CAUTION: Eligibility for *credits* will depend on a determination by the lead federal regulatory agency (i.e., Corps of Engineers or EPA) that the project would be appropriate compensatory mitigation to offset *debits*. Altering *natural* or *naturalized REV* 1 or 2 plant communities would be unlikely to qualify.

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2.2 PLANT COMMUNITY DIVERSITY

Description: As another indicator of diversity, this category measures the number of plant communities in a subject *wetland/mosaic*. Communities are defined (and modified) based on those identified in Viereck (1992)." The more plant communities an area contains, the greater the potential for higher wildlife and plant diversity. Productivity is generally higher in wetlands with multiple communities. An Anchorage area study found that wetland sites with greater number of plant communities generally had both higher bird diversity and densities than areas with few communities (Hogan and Tande 1983). Other studies found similar relations between the number of communities and bird species and density and diversity (Golet 1976, Greeson et al. 1978).

Modification: The *AWAM* differentiated between plant communities using a list of community types (*AWMP* Appendix E) applied in Hogan and Tande (1983), which, in turn, followed the protocol of Viereck, et al. (1982). The ADCM will switch to the 1992 update of the "Viereck" classification (Viereck, et al. 1992, http://www.fs.fed.us/pnw/publications/pnw_gtr286/), since that is what most practitioners in the area now use.

How to Assess: This parameter requires field investigation of the subject *wetland/mosaic*. Consistent with the *AWAM*, delineate plant communities to Viereck level III, listed in Table D-4 (next page).

Table D-4: Level III Plant Communities

Level I	Level II	Level III
I. Forest	A. Needleleaf Forest	(1) Closed Needleleaf Forest
		(2) Open Needleleaf Forest
		(3) Needleleaf Woodland
	B. Broadleaf Forest	(1) Closed Broadleaf Forest
		(2) Open Broadleaf Forest
		(3) Broadleaf Woodland
	C. Mixed Forest	(1) Closed Mixed Forest
		(2) Open Mixed Forest
		(3) Mixed Woodland
II. Scrub	A. Dwarf Tree Scrub	(1) Closed Dwarf Tree Scrub
		(2) Open Dwarf Tree Scrub
		(3) Dwarf Tree Scrub Woodland
	B. Tall Scrub	(1) Closed Tall Scrub
		(2) Open Tall Scrub
	C. Low Scrub	(1) Closed Low Scrub
		(2) Open Low Scrub
	D. Dwarf Scrub	(1) Dryas Dwarf Scrub
		(2) Ericaceous Dwarf Scrub
		(3) Willow Dwarf Scrub
III. Herbaceous	A. Graminoid Herbaceous	(1) Dry Graminoid Herbaceous
		(2) Mesic Graminoid Herbaceous
		(3) Wet Graminoid Herbaceous
	B. Forb Herbaceous	(1) Dry Forb Herbaceous
		(2) Mesic Forb Herbaceous
		(3) Wet Forb Herbaceous
	C. Bryoid Herbaceous	(1) Mosses
		(2) Lichens
	D. Aquatic Herbaceous	(1) Freshwater Aquatic Herbaceous
		(2) Brackish Water Aquatic Herbaceous
		(3) Marine Aquatic Herbaceous

Potential Improvements in *Function*: Planting projects sufficient to change a *polygon(s)* from a *non-naturalized* to a *naturalized* condition may produce *credits* via *REV improvement*. This appendix does not apply to such calculations. Projects that increase the number of plant communities in a *natural* or *naturalized polygon* without changing the *REV* may still produce *credits* by increasing the *AWAM* score for this parameter, reflecting an *enhancement* of *habitat function*. In such instances, the size entered in SS 4-ENH would represent the entire subject *wetland/mosaic*.

CAUTION: Eligibility for *credits* will depend on a determination by the lead federal regulatory agency (i.e., Corps of Engineers or EPA) that the project would be appropriate compensatory

mitigation to offset *debits*. Altering *natural* or *naturalized REV* 1 or 2 plant communities would be unlikely to qualify.

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2.3 PLANT COMMUNITY INTERSPERSION

Description: Interspersion is a measure of the shape and edge length of the various plant communities in a *wetland*. Species numbers and diversity are closely tied to the total length and number of plant community edges (Golet 1976). The edge effect also defines the ability of a *wetland* to provide for a diversity of both nesting and feeding habitat (Golet and Larson 1974). An edge type is valid if the border between certain plant forms or plant communities is more than 100 meters. Most of the plant communities in Anchorage *wetlands* are of low to medium diversity. Interspersion diversifies a habitat or an entire *wetland*, especially since most bird species depend upon more than one habitat type (Lensink and Derksen 1986).

Modification: In addition to modifying this parameter to reference the updated Viereck classification, as discussed under parameter 2.2, the ADCM has also eliminated the *AWAM* narrative's directions to disregard plant communities that have a perimeter of less than 300 feet, because the municipality has not applied this threshold in its historical use of the *AWAM*.

How to Assess: This parameter requires field investigation, unless the plant communities are clearly visible in photography. In contrast to the previous two parameters and in keeping with the *AWAM*, delineate plant communities to Viereck level II, rather than III (e.g., needleleaf forest, dwarf scrub, graminoid herbaceous, see Table D-4, parameter 2.2). Consult Figure D-2 and identify the interspersion type that most closely resembles the Level II plant communities in the subject *wetland*/*mosaic*.

Potential Improvements in *Function*: Planting projects that change a *polygon(s)* from a *non-naturalized* to a *naturalized* condition may produce *credits* via *REV improvement*. This appendix does not apply to such calculations. Projects that increase plant community interspersion in a *natural* or *naturalized polygon* without changing the *REV* may still produce *credits* by increasing the *AWAM* score for this parameter, reflecting an *enhancement* of *habitat function*. In such instances, the size entered in SS 4-ENH would represent the entire subject *wetland*/*mosaic*.

CAUTION: Eligibility for *credits* will depend on a determination by the lead federal regulatory agency (i.e., Corps of

Engineers or EPA) that the project would be appropriate compensatory mitigation to offset *debits*. Altering *natural* or *naturalized REV* 1 or 2 plant communities would be unlikely to qualify.

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2.4 DIVERSITY OF SURROUNDING HABITAT

Description: Several major habitat types and landscape uses are listed and all that exist within 0.25 miles of the subject site are checked. The total number that is assignable to an area is then added to the Habitat points totals. The idea for this category is that no *wetland* can be considered in isolation from surrounding habitats and land uses; habitat types are interconnected at least simply by their proximity. This category allows us to measure any connection that the subject *wetland* might have to surrounding habitats. Many species within the subject *wetland* may rely on surrounding areas or habitats for needs for some stage of their life cycle. Surrounding habitat types make a *wetland* more or less valuable.

Surrounding communities and additional habitats may limit the suitability of the subject *wetland* if migratory corridors do not exist between areas necessary for a species' or a group of species' life history requirements. Several studies address this migratory corridor theory and the importance of including surrounding landscape in habitat assessments (Noss and Harris 1986, Forman and Godron 1986).

How to Assess: Examine the area within 0.25 mile of the subject *wetland/mosaic* and determine whether it includes any *waterways*, *waterbodies*, mixed forest, undulating, undeveloped terrain (i.e., an area of marked vertical diversity, such as a bluff; it need not be vegetated), wooded ravines, pastures/open fields/sod farms (i.e., flat, grassy areas; must be vegetated), or urban residential development (i.e., residential areas that may provide habitat or food sources via native or ornamental trees or shrubs or bird feeders). For scoring, count each type of area only once, regardless of how many times that category occurs within the 0.25-mile radius and do not count the same feature in more than one category (e.g., do not count an area as both mixed forest and wooded ravine or undulating, undeveloped terrain).

Potential Improvements in *Function*: Projects that *restore* or *establish waterbodies* or *waterways* within 0.25 mile of an existing *wetland(s)* could earn additional *credits* (i.e., beyond that for the *REV improvement*, which this appendix does not address) by increasing that *wetland's AWAM* score for this parameter, reflecting an *enhancement* of

that *wetland's habitat function*. In such instances, the size entered in SS 4-ENH would represent the entire subject *wetland*/*mosaic*.

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2.5 PROXIMITY TO OTHER AQUATIC HABITATS

Description: This category attempts to evaluate habitat connectivity in terms of hydrology and vegetation. Points are awarded based on type of hydrological connection the subject *wetland* has to another *wetland* or *waterbody* and the distance between each. This is another measure of habitat diversity and it identifies migratory corridors for wildlife and indirectly shows connections for nutrient cycling. Smaller, less diverse *wetlands* areas can thus be of higher value if they are connected by *surface water*, or if they are in close proximity to other *wetlands*.

How to Assess: Examine the area within 0.5 mile of the subject *wetland*/*mosaic* and determine whether it includes any *subtidal* or *intertidal zone*, *waterways*, *waterbodies*, or other *wetlands*. Next, determine whether there is a *surface water* connection between the subject *wetland* and the other aquatic habitat, either up or down gradient. Subsurface flows do not apply to this parameter, but unconfined surface flows (e.g., sheet flow) do.

Consult Table D-4 (parameter 2.2) and determine whether the other *wetland*, if any, is of the same or different type as the subject *wetland*/*mosaic*, defined as Viereck level I (i.e., forest, scrub or herbaceous). Finally, determine the straight line distance between the subject *wetland*/*mosaic* and the other habitat. Select the highest-scoring description that applies to the subject *wetland*/*mosaic*.

Potential Improvements in *Function*: Projects that *create* or *restore* a *surface water* connection between the subject *wetland* and another aquatic habitat or that *create* or *restore* an aquatic habitat to which the subject *wetland* has a *surface water* connection may be eligible for *credits* for the *creation* or *restoration*. This appendix does not apply to such calculations. Such projects could, however, earn additional *credits* for increasing the subject *wetland's AWAM* score for this parameter, reflecting an *enhancement* of that *wetland's habitat function*. In such instances, the size entered in SS 4-ENH would represent the entire subject *wetland*/*mosaic*. Projects that would change a *natural* or *naturalized wetland* to a different type likely would not be eligible for *credits*.

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2.6 OPEN WATER TYPES

Description: This category measures the edge effect and configuration of open water areas and relates that to vegetated areas. The greater the variety of ponds or pool size and patterns in a *wetland*, the greater the habitat is diversified. An area with open water in pools of varying sizes, which are separated by numerous vegetated islands and plant communities, is considered highly diverse and valuable to wildlife. This variable is more relevant for water bird species and may be less germane for other species. Some authors have identified a 50:50 ratio of cover to open water as optimal for avian diversity (Weller and Spatcher 1965, Golet and Larson 1974). Primary productivity and carrying capacity for numerous species are greatly enhanced by the presence of high interspersion of ponds and plant communities. Most Anchorage area *wetlands* with ponds or other waterbodies have higher species diversities simply because they provide required rearing and molting habitats for waterfowl.

This question also addresses, at least indirectly, the total length of shoreline which has been shown to be a major determinant in waterfowl breeding density (Hochbaum 1944).

How to Assess: Consult Figure D-3 and determine which drawing most closely resembles the pattern of *surface water* (i.e., *waterbodies* and/or *inundated wetlands*) in the subject *wetland/mosaic*. Note that the figure includes floating and submerged plant communities as part of the *surface water* feature.

Potential Improvements in *Function*: Projects that *create* or *restore surface water* features (i.e., *waterbodies* or *inundated wetlands*) may be eligible for *credits* via *REV improvement*, as may *enhancement* projects that improve *REV* by increasing the extent of *surface water* in an *existing* non-*inundated wetland*. This appendix does not apply to such calculations. Such projects could, however, earn additional *credits* (i.e., beyond that for the *REV improvement*) by increasing the entire subject *wetland's AWAM* score for this parameter, reflecting an *enhancement* of the entire *wetland's habitat function*. In such instances, the size entered in SS 4-ENH would represent the entire subject *wetland/mosaic*.

The placement of fill and/or the lowering of *surface water* levels could also increase the *AWAM* score for this parameter, by increasing the extent of littoral zone or *surface water* interspersion. The ADCM typically would consider such projects to be an *enhancement*—and thus eligible for *credits*—only when the pre-project *polygon* is *non-naturalized*. If such a project results in a *REV improvement*, this appendix does not apply. If not, then the project could still earn *credits*

by increasing the *AWAM* score for this parameter, using the entire *waterbody* as the size of area *enhanced* for SS 4-ENH.

CAUTION: Eligibility for *credits* will depend both on *enhancement* of *habitat function* and on a determination by the lead federal regulatory agency (i.e., Corps of Engineers or EPA) that the project would be appropriate compensatory mitigation to offset *debits*. Projects involving *natural* or *naturalized waterbodies* or *inundated wetlands* that are already *REV* 1 or 2 likely will not qualify.

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2.7 HARDINESS ZONE

Description: Hardiness zones were taken from a map devised for the municipality's "Plant Selection Guide" (Land Design North 1980). This category attempts to measure a *wetland's* biological productivity based on growing conditions. Primary production (as affected by weather and growing conditions) is a good indicator of a *wetland's* ability to support wildlife diversity. Productivity of primary producers in a community, as determined by hardiness zone, directly limits wildlife population sizes (Westman 1985). Hardiness zones directly affect patterns of primary productivity, nutrient and energy transfer, and biological functions of local food webs (Livingston and Loucks 1978). The longer and the better the growing conditions, the more productive a *wetland* can be. Most *wetlands* were within the same hardiness zone. Hogan and Tande (1983) found reduced numbers of bird species richness in the Chugach foothills, where they surmised cooler spring and late summer temperatures likely reduced productivity.

Modification: The *AWMP* includes a map of the three hardiness zones (i.e., 2 through 4) in the Anchorage Bowl (*AWMP* Appendix C/ADCM Figure D-4). The original *AWAM* instructs the user to "extrapolate" the mapped zones for "outlying areas." The ADCM has provided that extrapolation, based on the parameters used in the Anchorage Bowl map and available climatic data. In addition, the ADCM has clarified the location of hardiness zone 5, an original *AWAM* choice that does not occur within the Anchorage Bowl.

How to Assess: For projects located in the Anchorage Bowl, consult Figure D-4 to determine the hardiness zone (2 through 4). Elsewhere, differentiate hardiness zones 2 through 5 as described in Table D-5 (next page).

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Table D-5: Hardiness Zones for Sites Outside the Anchorage Bowl

Sub-Area	Description of Locations		Hardiness Zone
	Elevation	Geographic Location	
North of Anchorage Bowl	< 250 ft	along the Knik River	2
		elsewhere	3
	250-750 ft	< 1.25 mile up-gradient of Cook Inlet	
		> 1.25 mile up-gradient of Cook Inlet	2
	750-1000 ft	along the Eklutna River	
		elsewhere	3
	> 1,000 ft	South Fork, Eagle River valley	
		elsewhere	4
South of Anchorage Bowl	< 500 ft	N/A	5
	>500 ft		4

2.8 Soil Type

Description: Soils content and type are well known components of a *wetland's* productivity and value. Most mineral soils are considered to be of more value to productivity than organic soils, since nutrients are more readily available to a larger variety of plants and groundwater levels fluctuate, which allows a more diverse soils invertebrate fauna and plant assemblages. Determined by field examination and/or soils maps. In Anchorage, peat soils, especially in bogs, have a wide diversity of species, but lower productivity and biomass than non-peat *wetlands* (Hogan and Tande 1983).

Modification: The municipality used the term "organic soils" to encompass both histosols and mineral soils with a histic epipedon. The Corps and EPA consider only histosols to be organic soils; therefore, the ADCM has changed the term to match the federal definitions. The ADCM has also replaced the *AWAM's* term "clay" with "high clay content" citing two specific Natural Resource Conservation Service (NRCS) hydric soil units that have relatively high clay content in the upper five feet of soil. The NRCS does not map any true "clay" soils in Anchorage.

How to Assess: Identify the soil(s) underlying the subject *wetland/mosaic*. If field mapping is unavailable, use the Natural Resource Conservation Service's (NRCS's) Anchorage Soil Survey, available at: http://soildatamart.nrcs.usda.gov/Manuscripts/AK605/0/Anchorage.pdf or http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx. Determine the percent of the subject *wetland/mosaic* underlain by each of three general types of soil, as described in Table D-6 (next page) and enter the percentage for each type in the corresponding row of the data sheet.

Table D-6: Soil Types

Soil Type			Example NRCS Hydric Soil Series (& Unit #)
Organic			Doroshin (417), Icknuun (424), Salamatof (446)
Mineral	with Histic Epipedon		Disappear (425), Jacobsen (425)
	without Histic Epipedon…	High Clay Content	Clam Gulch (402), Typic Cryaquepts (462)
		Little to No Clay Content	Moose River (438), Niklavar (453)

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2.9 AQUATIC HABITAT TYPE

Description: *Wetland* type definitions follow standard descriptions under the USFWS classification. *Wetland* type directly modifies a site's value to wildlife diversity, habitat potential, and biological productivity. Hogan and Tande (1983) found some correlation between certain *wetland* types and habitat values for bird densities, diversities, and species richness. Biological productivity is generally higher along riverine *wetlands*, where there is the greatest mix of habitat and potential for nutrient mixing. Productivity is also modified by dominant species, hardiness zone, and time in growing season. Richardson (1978) found that cattail, reed, and sedge stands had high net primary productivity, while bog forests (e.g., isolated palustrine woods) were generally less productive.

Modification: The original *AWAM* data sheets used Cowardin classification to define *wetland* "type," with "riverine" *wetlands* located at the mouth of the waterway scoring highest, followed by other "riverine" *wetlands* and "lacustrine" *wetlands* located next to the lake. "Palustrine" *wetlands* with an "outflow" scored moderately low, followed by "isolated palustrine" *wetlands* and "open water lacustrine" *wetlands*. The ADCM has modified the choices because there is extremely little overlap between what the Cowardin classification describes as lacustrine and riverine "wetlands" and what the Corps of Engineers and EPA identify as *wetlands* under the Clean Water Act. The revised categories used in the ADCM follow the approach applied by the municipality.

The ADCM has also dropped the *AWAM's* minimum size threshold of 4,000 square feet for different types of "wetlands." The municipality has not historically applied that threshold.

How to Assess: In contrast to parameter 1.7, a *wetland/mosaic* does not need to be contiguous with a *perennial stream* or *persistent waterbody* in order to score highly on this parameter. Consistent with the *AWAM* narrative, the subject area need only be located "proximate to" the *stream* or *waterbody*. These terms equate to close physical proximity, but do not require a physical or hydrologic connection, as can be pertinent to *jurisdiction*. If the subject *wetland/mosaic* is not proximate to a *perennial stream* or *persistent waterbody*, determine whether there is *surface water* flow—either channelized or overland—from it to another aquatic habitat.

If the *wetland/mosaic* fits more than one description, select the highest scoring category. If the subject *wetland/mosaic* is proximate to a *persistent waterbody*, enter the percent areal extent of *waterbody* and the highest scoring *wetland* description in the corresponding rows on the data sheet. If the *wetland/mosaic* is not proximate to a *persistent waterbody*, enter "100%" in the highest scoring category applicable to it.

Potential Improvements in *Function*: Projects that *restore* or *create wetlands*, *waterbodies*, or *waterways* from *developed* or *non-naturalized uplands* may produce *credits* as a result of *REV improvement* for the *restored* or *created polygon(s)*, as well as the existing *wetlands* that become *setback* and/or *buffer* as a result of the work. This appendix does not apply to such calculations; however, such projects could earn additional *credits* by increasing the *AWAM* score of existing *wetlands* that are proximate to the *waterbody* or *stream*, but outside the *buffer* for this parameter, reflecting an *enhancement* of its *habitat function*. The same is true for projects that *restore* or *establish* surface flow from a *wetland* to another aquatic habitat. In the first instance, the size entered in SS 4-ENH would represent the area of *wetland/mosaic* that is in close proximity to the newly *restored* or *created waterbody* or *waterway*, outside the *buffer*; in the latter case, it would be the size of the *wetland/mosaic* from which the project established a surface flow connection, outside any *setback/buffer*. Excavating a *waterbody* in a *natural* or *naturalized wetland* likely would not be eligible for *credits*. Projects that *restore* or *establish* surface flow between a *wetland* and another aquatic habitat will not be eligible for *credits* if they adversely impact the hydrologic regime of the *wetland*.

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2.10 NUTRIENT STATUS OF SURFACE WATER

Description: Measured as Total Dissolved Solids (TDS). Water with charged dissolved solids and nutrients is more fertile and can produce more biomass than nutrient-poor waters. *Wetlands* with TDS measurements of 100-500 are considered of highest value and most

productive. *Wetlands* with little or no surface inflow are of generally lower value in this category. Murphy et al. (1984) found that several limnological variables were directly influenced by *waterbody* connectedness and that especially ions and inorganic nutrients affected the biotic content of the ponds. They directly correlated pond nutrient levels and duck use.

Modification: The ADCM has dropped this parameter because the municipality has reported that their application of it has been problematic. It is not a parameter that would have been subject to *enhancement*.

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2.11 *SURFACE WATER* PERSISTENCE

Description: The persistence of open water through the breeding bird season (April-July) is the most important factor that influences an area's suitability for water bird nesting and brood rearing (Lensink and Dersksen 1986, Bergman et al. 1977). Many Anchorage area *wetlands* are *seasonal* and dry out by mid-June. Sites in Anchorage and on the Kenai Peninsula that have *persistent ponds* or pools provide suitable nesting habitat beyond the critical period for waterfowl (especially island nesters) and shorebirds. (Hogan and Tande 1983, Rosenberg 1986). Red-necked phalaropes and short-billed dowitchers require shallow ponded areas with sedge fringes for nesting, for instance. Even shallow *pond* persistence into the growing season can influence plant diversity and productivity. *Surface water* persistence was found to be a key variable for many water-dependent species in most USFWS Habitat Suitability Index models.

Modification: The ADCM has clarified that the start and end dates for this parameter are spring break-up and the end of June. In addition, the *AWAM* data sheets erroneously instructed that the percentages applied to the "probability" that *surface water* would be present during that period from April to July; the ADCM has clarified that they relate, instead, to the length of time that *surface water* is present.

How to Assess: Determine the current persistence of *surface water* in the subject *wetland*/*mosaic* and ascertain whether the current situation represents the normal circumstance. When it is not possible to confirm the presence of *surface water* in the field, the ADCM user may infer *inundation* from other information, such as photography, familiarity with the site, and/or anecdotal reports. When field investigation is possible, but the visit must occur out of season and/or the season's climatic conditions differ from the norm (as established by historic rainfall and/or winter water storage records), refer to the "out of season indicators" in the Glossary.

Potential Improvements in *Function*: Projects that increase *surface water* persistence sufficiently to change *REV* may be eligible for *credits* via *REV improvement*, to which this appendix does not apply. Increasing *surface water* persistence without improving *REV* may produce *credits* by increasing the subject *wetland/mosaic's* score for this parameter, representing an *enhancement* of *habitat function*. In such instances, the size entered in SS 4-ENH would be the entire *wetland/mosaic*. However, since the ADCM applies the *AWAM* to *contiguous undeveloped wetlands/mosaics* in their entirety, there would be no increase in score—or *enhancement credits* for this parameter—if another portion of the *wetland* already had *surface water* for a longer period of time than the *project site*.

CAUTION: Eligibility for *credits* will depend on a determination by the lead federal regulatory agency (i.e., Corps of Engineers or EPA) that the project would be appropriate compensatory mitigation to offset *debits*.

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2.12 SIZE OF *WATERBODY/INUNDATED WETLANDS*

Description: A *waterbody's* size directly correlates with species richness. Larger waterbodies are usually able to provide feeding and nesting habitat for several bird species. The largest *waterbodies* also provide adequate room and edge for waterfowl brood rearing and migratory habitat. During the *AWAM* Task Group meetings (22-23 May 1991), it was agreed that certain breaks in *waterbody* size could be based on needs of certain species: 400 square feet of surface area was sufficient for red-necked phalarope nesting; 0.5 acre of surface was sufficient for mallard and other dabbling ducks' nesting needs; and 4 acres was the minimum required for nesting Pacific loons and red-necked grebes. These sizes were then used as cutoffs for this question. *Waterbody* size has similar correlations to species density and diversity as does general *wetland* size.

Modification: The ADCM has provided clarification that, as used in this parameter of the *AWAM*, the term "waterbody" included *inundated wetlands*. In addition, the ADCM has corrected the *AWAM* instructions erroneous indication that the score depended on the size of the "smallest" *waterbody* present; they should have said "largest."

How to Assess: Since it primarily addresses *waterbird* nesting and brood rearing habitat, this parameter applies to *waterbodies* or *inundated wetlands* with which the subject *wetland/mosaic* is contiguous. For *inundated wetlands*, determine the size of the single largest, *inundated* area.

Potential Improvements in *Function*: This appendix does not apply to projects that increase the size of a *waterbody* via *restoration* or *establishment* or that convert *REV* 3 or 4 *wetlands* to a *waterbody* of higher *REV*. Even without *REV improvement*, conversion of very small, remote or *non-naturalized wetlands* to *waterbody* may produce *credits* by increasing the *AWAM* score for this parameter, representing an *enhancement* of *habitat function.* Increasing the size of a *waterbody* through conversion of *REV* 1 or 2 *wetlands* likely will not produce *credits*. The same is true for conversion of *natural* or *naturalized REV* 3 *wetlands* to *waterbody*.

CAUTION: Eligibility for *credits* will depend on will depend on a determination by the lead Federal regulatory agency (i.e., Corps of Engineers or EPA.

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2.13 CONTIGUITY WITH *STREAM* OR *WATERBODY*

Description: *Wetland* areas contiguous with flowing *streams* or *lakes* are considered of higher habitat value than isolated sites. Such a connection can positively correlate with nutrient flow, flow maintenance, fish habitat, and other hydrologic components. Several studies found this correlation for both fish and birds (Elliot and Finn 1984, Hogan and Tande 1983, Murphy et al. 1984, Rosenberg 1986). *Wetlands* with *streams* or *lakes* within them were considered higher value since the *wetland* likely contributes to base flow or recharges the *waterbody* and it serves as a nutrient contributor. There is also evidence that the continuous changes brought on by storm event inflows to *wetlands*, especially adjacent to creeks, are necessary for *wetlands'* consistently high productivity (Livingston and Loucks 1978).

Modification: The ADCM has provided clarification that the *AWAM* choice of "lies within" is equivalent to the *wetland's* being contiguous with the *stream* or *waterbody* and that "drains/is connected to" equates to a either a surface or shallow subsurface hydrologic connection between the subject *wetland* and the *stream* or *waterbody*.

How to Assess: Determine whether the subject *wetland*/*mosaic* is contiguous to a *stream* or *waterbody* or has a surface or shallow subsurface hydrologic connection to the other aquatic area, based on field investigation, well monitoring, soil survey information, or the like.

Potential Improvements in *Function*: Projects that *establish* or *restore* either contiguity or a *surface water* connection between the subject *wetland* and a *waterbody* or *waterway* may be eligible for *credits* via

REV improvement for the *restored* or *created polygon(s)*, as well as the existing *wetlands* that become *setback* and/or *buffer* as a result of the work. This appendix does not apply to such calculations; however, such projects could earn additional *credits* earn additional *credits* by increasing the *AWAM* score for existing *wetlands* outside the *buffer*, reflecting an *enhancement* of that *wetland's habitat function*. In such instances, the size entered in SS 4-ENH would represent the entire subject *wetland*/*mosaic*, outside the *setback*/*buffer*.

CAUTION: Projects that connect a *wetland* to a *waterbody* or *waterway* will not be eligible for *credits* if they adversely impact the hydrologic regime of the *wetland*.

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2.14 SIZE EVALUATION

Description: The overall size of an area is one of the key determinants of species richness and habitat value. This relationship was first revealed in biological studies of islands (MacArthur and Wilson 1967) and later applied to *uplands* (Robbins 1979) and *wetlands* (Brown and Dinsmore 1986). In Anchorage, Hogan and Tande (1983) found a positive relationship between *wetland* size and number of bird species found there. Studies have also found that larger *wetlands* contain species which also occur in smaller sites, but not the reverse.

Several rare bird species that nest in Anchorage *wetlands* require large nesting territories (e.g., Hudsonian godwit, northern harrier) and these only occur in the largest *wetland* complexes. Larger *wetlands* have both more unique species and greater numbers of individuals. Generally, species that require larger *wetland* acreages are more sensitive to disturbance and less adaptable to change and disturbance. Larger *wetlands* nearly always contain a higher diversity of plant and open water regimes and are inherently of greater biological value.

How to Assess: Use the size of the entire *contiguous undeveloped wetland*/*mosaic*. Do not limit the size to the proposed *project site*, but do not include adjacent *uplands*, either, except where they are part of a *mosaic* (which *function* as a unit with the *wetland*) or a *disturbance category* 1 or 2 activity (which do not truncate *contiguous undeveloped area*). Pair this size with the total number of points accrued for parameters 2.1 through 2.13 to determine the points for this parameter, from the table in the data sheets.

Potential Improvements in *Function*: Projects that increase the size of a *wetland* by may produce *credits* for *restoration*, *establishment*, and/or as a result of *REV improvement*, to which this appendix does

not apply. *Enhancement* projects that increase the score for other Habitat parameters—without improving *REV*–would also increase the score for this parameter, producing *credits* for *enhancement* of *habitat function*. In such instances, the size entered in SS 4-ENH would represent the entire subject *wetland*/*mosaic*.

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C. Species Occurrence Assessment

This section contains two subcategories, Rarity/Scarcity and Significant Features. The second category is included to account for and evaluate an area's importance based on the presence of significant wildlife or plant species. Much of this section is subjective, but the output is related fairly directly to the probability that certain important features will occur in a *wetland*. One outcome of this section is the identification of "red flag species." These are rare or significant species that are found in a subject *wetland* and elevate the site's value because of their presence. Much of the information (and the species used) in this section is based on results from the working group workshop and unpublished information gathered during our own field assessments and related work.

Many of the species are "similar to 'indicator species," as used by other authors in habitat assessments. These species represent "healthy" or ideal communities. Habitats in varying stages of disturbance usually lose these sensitive species first. Species included for this section include those that are endangered, rare, endemic, high visual/public quality, or at the limits of their range. None of these questions, and therefore, the presence of species from these lists, will garner enough points to alone raise the score for a particular wetland artificially. Rather, it is more important that the presence of a species from these lists be called out in the assessment, so that management decisions can be made accordingly. Species on these lists are found in Tables D-6 through 8, 12, and 13.

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3.1 Plant Species of Statewide Significance

Description: This question refers to species listed in a University of Alaska publication on threatened or endangered plant species (Murray and Lipkin 1987). These species garner points because of their extreme scarcity and need for protection. The presence of one of these species in a subject *wetland* would make that site of outstanding value. It is not likely that species on this list would be found with any regularity in the Anchorage area. This section does not include bird or mammal species, since no endangered bird or mammal species breed in the Anchorage area.

Modification: The *AWAM* used a 1987 publication (Murray and Lipkin 1987) to identify plants for this parameter. The Alaska Natural Heritage Program, one of the entities who sponsored the 1987 publication, now maintains a statewide list of plant species of conservation concern (see http://aknhp.uaa.alaska.edu/botany/rare-plants-species-lists/). The ADCM will use this regularly updated list.

How to Assess: Most of the listed species are endemic to other parts of the state. Any such species found in the Anchorage area must be within the boundaries of the subject *wetland*/*mosaic* in order to earn points under this parameter.

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3.2 Municipally Significant Fish and Wildlife

Description: This question aims at identifying the presence of certain bird or fish species in a subject *wetland*. This list is more subjective, since there is no official list of threatened or endangered birds or fish for Anchorage. Species are included here if: the species requires large breeding territories and there is a history of local decline to a point of near extirpation (e.g., Hudsonian godwit, northern harrier, short-eared owl); if the species reaches its extreme edge of range and is found in very small numbers and is therefore locally vulnerable (e.g., gadwall, blue-winged teal, killdeer, song sparrow, American tree sparrow, red-winged blackbird); if the species is particularly sensitive, specialized in its habitat requirements, and generally very localized (e.g., loons, red-necked and horned grebe, trumpeter swan, sandhill crane, solitary sandpiper, short-billed dowitcher, red-necked phalarope, belted kingfisher and American dipper). Most of these species are indicators of high value *wetlands*.

Reviewers of the *AWAM* from the State and federal resource agencies agreed with these species lists. A species can be included if it has used the subject *wetland* for one or more stages of its lifecycle within the previous five years. This is valid since many of these do not nest annually and recruitment of new individuals is not always automatic to known habitats. Most of these species are considered of unique value as well and are sought after by local and visiting birders and natural history enthusiasts.

The Alaska Department of Fish and Game biologists felt that the three salmonids on the list (i.e., Chinook, coho, sockeye) are the key fish species that fit the criteria of rarity and scarcity and public importance in this category. If one or more of these species are present in a subject *wetland*, then the area is presumed to support some stage of the species' lifecycle.

How to Assess: If the subject *wetland* is adjacent to a *waterway* or *waterbody*, consult ADFG's anadromous fish streams maps (http://gis.sf.adfg.state.ak.us/AWC_IMS/viewer.htm) to ascertain whether they have documented use by Chinook, coho and/or sockeye in the adjacent reach. If not, sampling approved by ADFG may suffice.

Table D-7 lists the avian species of interest. This parameter awards points for use of either the subject *wetland*/*mosaic* or an adjacent *waterway* or *waterbody* by any such species within the previous five years. As with other parameters in this category, the question applies to actual use, not simply whether the habitat is suitable. Use must be documented through direct observation by or consultation with a qualified individual. Consult the U.S. Fish and Wildlife Service (907-271-2888 or 907-786-3443, ak_mbm@fws.gov or ak_fisheries@fws.gov) or the Anchorage Audubon Society (907-338-2473, info@anchorageaudubon.org) for assistance in identifying qualified individuals.

Table D-7: Municipally Significant Bird Species

Shading	
Red-throated Loon	Killdeer
Pacific Loon	Solitary Sandpiper
Common Loon	Hudsonian Godwit
Horned Grebe	Short-billed Dowitcher
Red-necked Grebe	Red-necked Phalarope
Trumpeter Swan	Short-eared Owl
Blue-winged Teal	Belted Kingfisher
Gadwall	Black-backed Woodpecker
Canvasback	American Dipper
Redhead	American Tree Sparrow
Ring-necked Duck	Song Sparrow
Northern Harrier	Red-winged Blackbird
Sandhill Crane	

Potential Improvements in *Function*: Projects that *create* or *restore* an *anadromous* fish *stream* would likely change the *REV* of the adjacent *wetland* and earn *credits* via *REV improvement*, to which this appendix does not apply. Certain *stream enhancement* projects could produce *credits* without changing the *REV*; Appendix D addresses those calculations. With monitoring practices sufficient to document before and after use by the *salmonid* species of interest, such projects could earn additional *credits* by increasing the subject *wetland's AWAM* score for parameter 3.2, reflecting an *enhancement* of the *wetland's species occurrence function*. In such instances, the size entered in SS 4-ENH would represent the entire subject *wetland*/*mosaic*.

Most projects likely to attract avian species to a subject *wetland* or adjacent *waterway* or *waterbody* would also likely be associated with a *REV improvement* and not subject to this appendix. Species-specific *enhancements* that do not change *REV* (e.g., loon nesting platforms) could, with appropriate before and after documentation and monitoring, produce *credits* by increasing the *AWAM* score for this parameter. the size entered in SS 4-ENH would represent the entire *waterbody* and its adjacent *wetlands*.

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3.3 MUNICIPALLY SIGNIFICANT PLANT SPECIES

Description: Similar to the previous question, this identifies the presence of rare or significant plant species from a subject *wetland*. This list includes species of public interest such as sundew and ladyslipper, as well as species that either reach their Alaska distribution limits here or are more or less endemic to Upper Cook Inlet. Many of these species are restricted to the region and to specific plant communities. This section for plants receives fewer points than the previous, since most of these species are more widespread than most of the bird species and birds have a higher public recognition value.

Modification: The ADCM has updated the scientific names of species listed in the *AWAM*. In addition, the ADCM has removed Typha latifolia from the list because, since the *AWAM* was first implemented, that species has substantially expanded its presence in Anchorage and the Corps, EPA, and the Municipality now recognize it as potentially invasive. Finally, since the municipality completed the *AWAM*, investigators have discovered an additional rare plant in Anchorage wetlands. The ADCM has added that species (Pinguicula vulgaris) to the *AWAM's* original list.

How to Assess: Table D-8 (next page) lists the municipally significant plant species. This parameter requires field confirmation—either by the ADCM user or a previous investigator—of species presence in the subject *wetland*/*mosaic*.

Table D-8: Municipally Significant Plant Species

Species	
Symphyotrichum boreale (formerly Aster junciformis	E. viridicarinatum
Calamagrostis nutkaensis	Gymnocarpium robertianum
Carex viridula	Juncus supiniformis
C. echinata ssp. phyllomanica (formerly C. phyllomanica)	Lysimachia thyrsiflora
C. ramenskii	Mitella pentandra
C. rariflora	Pedicularis parviflora
Elliottia pyroliflora (formerly Cladothamnus pyrolaeflorus)	Pinguicula vulgaris
Cypripedium guttatum	Agrostis humilis (formerly Podagrostis thurberiana)
Danthonia intermedia	Potamogeton friesii
Drosera anglica	Rhynchospora alba
Eleocharis kamtschatica	Sanguisorba menziesii
Eriophorum gracile	Scirpus microcarpus
Sparganium natans (formerly S. minimum)	

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3.4 Scarcity Value

Description: This question measures the subject *wetland* type as a percent of that *wetland* type in the catchment basin. The rarer the *wetland* type in the basin, the greater its importance in a local perspective, i.e., if it were filled, what would be the resultant change in the total acreage of that type in the municipality. This question attempts to identify the cumulative losses of each *wetland* type in a catchment basin. The municipality recognizes that each basin has its own unique biodiversity, based in part on which *wetland* types are present. The value of a *wetland* within its catchment basin is at least partially based on total coverage.

Modification: As described for parameter 2.9, the ADCM has replaced the *AWAM's* reference to Cowardin classifications with type descriptions that match the municipality's historic application of this parameter.

How to Assess: As with parameter 2.9, scoring for parameter 3.4 depends on the physical proximity of a *wetland/mosaic* a *perennial stream* or *persistent waterbody*, which does not necessitate a hydrologic or physical connection. If the subject *wetland/mosaic* is not proximate to a *perennial stream* or *persistent waterbody*, determine whether there is *surface water* flow—either channelized or overland—from it to another aquatic habitat.

Potential Improvements in *Function*: Projects that *restore* or *create wetlands*, *waterbodies*, or *waterways* from *developed* or *non-naturalized uplands* may produce *credits* as a result of *REV improvement* for the *restored* or *created polygon(s)*, as well as any pre-existing *wetlands* that become *setback* and/or *buffer* as a result of the work. This appendix does not apply to such calculations; however, projects that *restore* or *create* a *perennial stream* or a *persistent waterbody* to which existing *wetlands* would be physically proximate may earn additional *credits* by increasing the *AWAM* score for pre-existing *wetlands* outside the *buffer*, reflecting an *enhancement* of its *species occurrence function*. The same is true for projects that *restore* or *establish* surface flow from a *wetland* to another aquatic habitat. In the first instance, the size entered in SS 4-ENH would represent the area of *wetland*/*mosaic* that is physically proximate to the newly *restored* or *created waterbody* or *waterway*, outside the *buffer*; in the latter case, it would be the size of the *wetland*/*mosaic* from which the project established a surface flow connection, outside any *setback* or *buffer*. Projects involving excavation of a *waterbody* in a *natural* or *naturalized wetland* likely would not be eligible for *credits*. Projects that *restore* or *establish* surface flow between a *wetland* and another aquatic habitat will not be eligible for *credits* if they adversely impact the hydrologic regime of the *wetland*.

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3.5 USE BY COLONIAL WATERBIRDS

Description: Colonial waterbirds are those water-dependent species that nest in colonies or aggregations, or in association with other species. The *AWAM* identifies red-necked grebe, Canada goose, several gull species, and Arctic tern as the local colonial species. Colonial species require specific habitat types and sizes that are fast diminishing in the region. These colonies are also quite vulnerable to disturbance, and habitat loss quickly reduces a population. Some *wetlands* are traditional feeding or molting sites of significance and this aspect is recognized in this category. Colonial nesting species are highly visible to the public and are of additional value for this.

Modification: The ADCM has added a species—Arctic tern—that the *AWAM* inadvertently omitted.

How to Assess: Table D-9 lists the municipality's colonial waterbird species. This parameter awards points for use of the subject *wetland*/*mosaic* and/or a contiguous *intertidal zone*, *waterway* or *waterbody*. Select the highest scoring use category applicable to the site. Some of the categories acknowledge use within the previous five years. As with other parameters in this category, the question applies to actual use, not simply whether the habitat is suitable. Use must be

documented through direct observation by or consultation with a qualified individual. Consult the U.S. Fish and Wildlife Service (907-271-2888 or 907-786-3443, ak_mbm@fws.gov or ak_fisheries@fws.gov) or the Anchorage Audubon Society (907-338-2473, info@anchorageaudubon.org) for assistance in identifying qualified individuals.

Table D-9: Anchorage's Colonial Waterbirds

Species
Red-necked Grebe
Canada Goose
Bonaparte's Gull
Mew Gull
Herring Gull
Glaucous-winged Gull
Arctic Tern

Potential Improvements in *Function*: Most projects likely to attract colonial waterbird species to a subject *wetland* or adjacent *waterbody* for nesting would also likely be associated with a *REV improvement* and not subject to this appendix. Species-specific *enhancements* that do not change *REV* (e.g., nesting islands or platforms) could, with appropriate before and after documentation and monitoring, produce *credits* by increasing the *AWAM* score for this parameter. For such projects, the size entered in SS 4-ENH would represent the entire subject *wetland*/*mosaic* and any contiguous *waterbody* for which the *enhancements* changed the waterbird use category. Projects that involve direct impacts to aquatic areas (e.g., fill for nesting islands) would also incur *debits*; projects for which the *debits* outnumber *credits* likely would not be considered as compensatory mitigation.

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3.6 WATERFOWL STAGING

Description: Some *wetlands* serve as major staging areas for migrant waterfowl. This value may be on a statewide basis for large numbers or for a large portion of a particular population, or a *wetland* may provide staging value for species on a very localized level. This level is considered of highest importance if species of statewide significance (snow goose, "tule" white-fronted goose) or if very large numbers of individuals and several species utilize an area. Studies in Anchorage show that roughly 6 to 14 species of waterfowl utilize Anchorage area *wetlands* in migration regularly. Known high use *wetlands*, like Connors Bog (Hogan and Tande 1983), Potter Marsh (AK Dept. fo Fish and Game unpubl. reports) and Business Park Wetlands

provide migratory habitat for 8+ species in good numbers annually; this constitutes a rationale for a "high importance" site.

Most freshwater Anchorage *wetlands* provide only moderate importance to staging waterfowl; their value comes from their support of a diversity of species.

How to Assess: This parameter assesses only use by waterfowl (i.e., swans, geese and ducks); other parameters consider use by other waterbirds, including loons and grebes. The parameter awards points for use of either the subject *wetland/mosaic* or a contiguous *intertidal zone* or *waterbody*. As with other parameters in this category, the question applies to actual use, not simply whether the habitat is suitable. Use must be documented through direct observation by or consultation with a qualified individual. Consult the U.S. Fish and Wildlife Service (907-271-2888 or 907-786-3443, ak_mbm@fws.gov or ak_fisheries@fws.gov) or the Anchorage Audubon Society (907-338-2473, info@anchorageaudubon.org) for assistance in identifying qualified individuals.

The *AWAM* defined the three categories of importance, based on level of use during migration (i.e., 1 April through 1 June and/or 1 September through freeze-up) and described in Table D-10:

Table D-10: Waterfowl Staging Rating Categories

Rating	Description
high	supports > 8 species and > 150 individuals can be seen regularly at one time
moderate	supports 4 to 8 species and 75 to 150 individuals can be seen regularly at one time in migration
very local	supports only 1 to 4 species and 75 individuals can be seen regularly or sporadically at one time in migration

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3.7 Waterbird Production

Description: Certain *wetlands* are important to production of young and those that support populations of breeding non-waterfowl waterbirds are identified in this category. *Wetlands* where rare species nest or where waterbirds nest in numbers that are significant on a regional level are of highest value. The importance categories reflect findings of bird studies of Anchorage and Kenai *wetlands* (Hogan and Tande 1983, Rosenberg 1986). The higher value sites had at least 6-8 waterbird species nesting regularly.

Modification: The *AWAM* narrative inadvertently used the term "waterfowl" interchangeably with "waterbirds;" the ADCM has clarified

that the municipality intended this parameter to apply only to non-waterfowl species.

How to Assess: This parameter assesses use by non-waterfowl aquatic bird species (i.e., loons, grebes, cranes, shorebirds, gulls, and terns). It awards points for use of either the subject *wetland*/*mosaic* or a contiguous *intertidal zone*, *waterway*, or *waterbody*. As with other parameters in this category, the question applies to actual use, not simply whether the habitat is suitable. Use must be documented through direct observation by or consultation with a qualified individual. Consult the U.S. Fish and Wildlife Service (907-271-2888 or 907-786-3443, ak_mbm@fws.gov or ak_fisheries@fws.gov) or the Anchorage Audubon Society (907-338-2473, info@anchorageaudubon.org) for assistance in identifying qualified individuals.

Table D-11 describes the *AWAM's* the three categories of importance:

Table D-11: Waterbird Production Rating Categories

Rating	Description
high	produces several broods of > 6 species
moderate	produces broods of 2-6 species
minimal	produces broods occasionally of no more than 1 or 2 species

Potential Improvements in *Function*: Most projects likely to attract nesting waterbirds to a subject *wetland* or adjacent *waterbody* would also likely be associated with a *REV improvement* and not subject to this appendix. Species-specific *enhancements* that do not change *REV* (e.g., nesting islands or platforms) could, with appropriate before and after documentation and monitoring, produce *credits* by increasing the *AWAM* score for this parameter. For such projects, the size entered in SS 4-ENH would represent the entire subject *wetland*/*mosaic* and any contiguous *waterbody* for which the *enhancements* changed the waterbird production category. Projects that involve direct impacts to aquatic areas (e.g., fill for nesting islands) would also incur *debits*; projects for which the *debits* outnumber *credits* likely would not be considered as compensatory mitigation.

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3.8 Breeding Bird Diversity

Description: The *AWAM* includes this category to reflect the relative value of a *wetland* for breeding habitat for obligate *wetland* species and total species of all groups of birds combined.

Modification: The ADCM has included a list (Table D-13) of Anchorage's obligate *wetland* bird species.

How to Assess: This parameter awards points for use of the subject *wetland/mosaic* and/or a contiguous *intertidal zone*, *waterway*, or *waterbody*. Use must be documented through direct observation by or consultation with a qualified individual. Consult the U.S. Fish and Wildlife Service (907-271-2888 or 907-786-3443, ak_mbm@fws.gov or ak_fisheries@fws.gov) or the Anchorage Audubon Society (907-338-2473, info@anchorageaudubon.org) for assistance in identifying qualified individuals.

Table D-12 describes the *AWAM's* the three categories of importance:

Table D-12: Breeding Bird Diversity Rating Categories

Rating	Description
high	> 8 obligate *wetland* species or > 15 total species are known to nest or probably nest
moderate	supports nesting of 4-8 obligate wetland species or 8-15 total species
low	supports nesting of < 4 obligate wetland species and < 8 total species

Table D-13 lists Anchorage's obligate *wetland* bird species.

Table D-13: Anchorage's Obligate Wetland Bird Species

Species		
Red-throated Loon	Ring-necked Duck	Short-billed Dowitcher
Pacific Loon	Greater Scaup	Wilson's Snipe
Common Loon	Lesser Scaup	Red-necked Phalarope
Horned Grebe	Long-tailed Duck	Bonaparte's Gull
Red-necked Grebe	Common Goldeneye	Mew Gull
Trumpeter Swan	Barrow's Goldeneye	Herring Gull
Canada Goose	Northern Harrier	Glaucous-winged Gull
Green-winged Teal	Sandhill Crane	Arctic Tern
Mallard	Semipalmated Plover	Belted Kingfisher
Northern Pintail	Greater Yellowlegs	American Dipper
Northern Shoveler	Lesser Yellowlegs	Northern Waterthrush
Gadwall	Solitary Sandpiper	Song Sparrow
American Wigeon	Spotted Sandpiper	Lincoln's Sparrow
Canvasback	Hudsonian Godwit	Red-winged Blackbird
Redhead	Least Sandpiper	Rusty Blackbird

Potential Improvements in *Function*: Most projects likely to attract obligate *wetland* bird species to a subject *wetland* or adjacent *waterbody* for nesting would also likely be associated with a *REV improvement* and not subject to this appendix. Species-specific

enhancements that do not change *REV* (e.g., nesting platforms, islands, or boxes) could, with appropriate before and after documentation and monitoring, produce *credits* by increasing the *AWAM* score for this parameter. For such projects, the size entered in SS 4-ENH would represent the entire *waterbody* and its adjacent *wetlands*. Projects that involve direct impacts to aquatic areas (e.g., fill for nesting islands) would also incur *debits*; projects for which the *debits* outnumber *credits* likely would not be considered as compensatory mitigation.

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3.9 MIGRATORY BIRD STAGING

Description: This category provides for evaluation of a subject *wetland's* role in supplying migratory or staging habitat for non-waterfowl species. Most freshwater *wetlands* in the Anchorage area provide only moderate such habitat, but many *wetlands* in Anchorage represent the only available local migratory habitat to passage birds. There are roughly 65 species that regularly migrate through the Anchorage area. Of this group of regular migrants, roughly 25-30 species are common and widespread in good numbers. Although few data exist for migrant bird use of Anchorage wetlands, it is easy to obtain such information, especially in spring.

How to Assess: This parameter assesses use by non-waterfowl species, identified in Table D-14 (next page). As with other parameters in this category, the question applies to actual use, not simply whether the habitat is suitable. Use must be documented through direct observation by or consultation with a qualified individual. Consult the U.S. Fish and Wildlife Service (907-271-2888 or 907-786-3443, ak_mbm@fws.gov or ak_fisheries@fws.gov) or the Anchorage Audubon Society (907-338-2473, info@anchorageaudubon.org) for assistance in identifying qualified individuals.

Table D-14: Anchorage's Regular
Non-Waterfowl Migratory Bird Species

Species	
Pacific Loon	Olive-sided Flycatcher
Horned Grebe	Western Wood-pewee
Red-necked Grebe	Alder Flycatcher
Bald Eagle	Tree Swallow
Northern Harrier	Violet-green Swallow
Sharp-shinned Hawk	Bank Swallow
Red-tailed Hawk	Cliff Swallow
Merlin	Ruby-crowned Kinglet
Sandhill Crane	Swainson's Thrush
Semipalmated Plover	Hermit Thrush
Greater Yellowlegs	American Robin
Lesser Yellowlegs	Varied Thrush
Solitary Sandpiper	American Pipit
Spotted Sandpiper	Orange-crowned Warbler
Whimbrel	Yellow Warbler
Hudsonian Godwit	Yellow-rumped Warbler
Western Sandpiper	Blackpoll Warbler
Least Sandpiper	Northern Waterthrush
Pectoral Sandpiper	Wilson's Warbler
Short-billed Dowitcher	Savannah Sparrow
Long-billed Dowitcher	Fox Sparrow
Wilson's Snipe	Lincoln's Sparrow
Red-necked Phalarope	Golden-crowned Sparrow
Bonaparte's Gull	White-crowned Sparrow
Mew Gull	Dark-eyed Junco
Glaucous-winged Gull	Lapland Longspur
Arctic Tern	Rusty Blackbird
Belted Kingfisher	Common Redpoll
Pine Siskin	

The *AWAM* defined the categories of importance based on the total number of species known to use an area regularly during migration (i.e., 1 April through 1 June and/or 1 September through freeze-up). Table D-15 describes the *AWAM's* the three categories of importance:

Table D-15: Migratory Bird Staging Rating Categories

Rating	Description
high	used annually by > 25 species
moderate	used annually by 10-25 species
minimal	used annually by < 10 species

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3.10 FISH SPAWNING

Description: Many *wetlands* or *waterways*/*waterbodies* adjacent and connected to a subject *wetland* are important to spawning activities of several fish species. In Anchorage, the following fish species are known to spawn: Dolly Varden, grayling, rainbow trout (introduced), stickleback, coho, Chinook, sockeye, chum, and pink salmon. *Wetlands* or their adjacent *waterways* or *waterbodies* that provide spawning habitat for more than five species of fish (or the majority of the nine species known to occur in Anchorage) are considered of significant value, and these receive the highest points. No distinction was made for large concentrations of one or a few species of fish versus an area with low numbers of many species.

How to Assess: If the subject *wetland* is adjacent to a *waterway* or *waterbody*, consult ADFG's anadromous fish streams maps (http://gis.sf.adfg.state.ak.us/AWC_IMS/viewer.htm) to ascertain whether they have documented spawning by *salmonids* in the adjacent reach. If not, sampling approved by ADFG may suffice. The ADFG maps do not catalog stickleback spawning areas; documented presence of that species is sufficient to assume that spawning occurs in the *polygon*.

Potential Improvements in *Function*: Projects that *create* or *restore* fish spawning habitat would likely change the *REV* of the adjacent *wetland* and earn *credits* via *REV improvement*, to which this appendix does not apply. Appendix D addresses *credits* for projects that *enhance* fish use within a *stream*, without changing the *REV*. With monitoring practices sufficient to document before and after spawning, projects that increase the number of spawning species could earn additional *credits* by increasing the adjacent *wetland's AWAM* score for parameter 3.10, reflecting an *enhancement* of that *wetland's species occurrence function*. In such instances, the size entered in SS 4-ENH would represent the entire subject *wetland*/*mosaic*.

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3.11 FISH REARING

Description: Many Anchorage area *wetlands* have interconnected channels and ponds as tributaries to larger creeks and *streams*. Many of these areas are utilized by salmonids and Dolly Varden juveniles in summer as rearing habitat. Potentially some areas are deep enough that overwintering activity can also occur. This rearing activity is fairly well documented for many of the Anchorage *wetlands*. Rearing habitat is equally as important to fish populations as spawning habitat. The same numerical breakdown is used here as for the previous question.

How to Assess: If the subject *wetland* is adjacent to a *waterway* or *waterbody*, consult ADFG's anadromous fish streams maps (http://gis.sf.adfg.state.ak.us/AWC_IMS/viewer.htm) to ascertain whether they have documented rearing by *salmonids* in the adjacent reach. If not, sampling approved by ADFG may suffice. The ADFG maps do not catalog stickleback rearing areas; documented presence of that species is sufficient to assume that rearing occurs in the *polygon*.

Potential Improvements in *Function*: Projects that *create* or *restore* fish rearing habitat would likely change the *REV* of the adjacent *wetland* and earn *credits* via *REV improvement*, to which this appendix does not apply. Appendix D addresses *credits* for projects that *enhance* fish use within a *stream*, without changing the *REV*. With monitoring practices sufficient to document before and after rearing, projects that increase the number of rearing species could earn additional *credits* by increasing the adjacent *wetland's AWAM* score for parameter 3.11, reflecting an *enhancement* of that *wetland's species occurrence function*. In such instances, the size entered in SS 4-ENH would represent the entire subject *wetland/mosaic*.

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D. Social Assessment

Past wetland assessment methodologies have aimed to evaluate social values based mostly on actual monetary valuations. These valuations concentrated on *wetlands'* worth to society by, for instance, production of crops and other commercial by-products (Gosselink et al. 1973). This Anchorage method, rather, pursues *wetland* social functions based on non-economic uses such as passive recreation and public benefits. For Anchorage, these are more realistic parameters since there is little commercial or monetary benefit generated from local *wetlands*.

4.1 Existing Recreational Use

Description: This category outlines all recreational uses of a *wetland* and measures each based on intensity of use. The measure of intensity is subjective, since little of this is documented. An attempt is made to restrict uses to water-dependent or water-related activities only.

How to Assess: This parameter applies to the specific *wetland/mosaic* in question, as well as any contiguous *waterways* or *waterbodies*. Table D-16 (next page) describes the *AWAM's* categories for intensity of use.

Table D-16: Existing Recreational Use Rating Categories

Rating	Description
high	used in several seasons by numerous individuals and/or groups
moderate	used in one or two seasons by a few individual and/or a single group
low	used irregularly by a very few individuals

Potential Improvements in *Function*: Projects that provide facilities for fishing, boating, hunting, or other recreation would improve the *AWAM* score for this parameter and may be eligible for *credits* for *enhancing social function*. (See cautionary statement below.) Absent monitoring and documentation of actual post-project levels of use, calculations should not assume that the project will increase use more than to the next highest level (e.g., from "low" to "moderate use"). For SS 4-ENH the size of the area improved will be the entire subject *wetland/mosaic* and, if part of the recreational *enhancement* project, the *waterbody* contiguous with it. The ADCM does not apply this parameter to projects in the *intertidal* or *subtidal zones*, because recreational use in those areas is already high. Appendix D addresses *credits* for increasing the *social function* of *waterways*.

CAUTION: Eligibility for *credits* will depend on a determination by the lead federal regulatory agency (i.e., Corps of Engineers or EPA) that the project would be appropriate compensatory mitigation to offset *debits*. Projects that involve direct impacts to aquatic areas (e.g., fill for access) would also incur *debits*; projects for which the *debits* outnumber *credits* likely would not be considered as compensatory mitigation.

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4.2 Educational Use

Description: This category recognizes the public's use of a *wetland* site for educational activities. Points are given based on the frequency of use by groups of people. Minor points are assigned to an area if that site is in close proximity to a school(s) and therefore has educational potential.

How to Assess: This parameter applies to the *wetland/mosaic* in question, as well as contiguous—and visible—*intertidal* and *subtidal zones*, *waterways*, or *waterbodies*. Table D-17 (next page) describes the *AWAM's* categories for intensity of use.

Table D-17: Educational Use Rating Categories

Rating	Description
frequent	used by schools, clubs and/or tour groups ≥ 5 times a year
occasional	used by such groups 2-5 times a year
infrequent	sites used only once a year
potential	no current known use, but close to schools
none	no known or potential use

Potential Improvements in *Function*: Projects that provide increased educational use would improve the *AWAM* score for this parameter and could earn *credits* for *enhancing social function*. (See cautionary statement below.) Absent monitoring and documentation of actual post-project levels of use, calculations should not assume that the project will increase use more than to the next highest level (e.g., from "infrequent" to "occasional use"). For SS 4-ENH the size of the area improved will be the entire subject *wetland*/*mosaic* and, if part of the educational *enhancement* project, that portion of the contiguous—and visible—*waterbody*, *intertidal* and/or *subtidal zone* located within 300 feet of the educational *enhancement* feature(s). Appendix D addresses *credits* for increasing the *social function* of *waterways*.

CAUTION: Eligibility for *credits* will depend on a determination by the lead federal regulatory agency (i.e., Corps of Engineers or EPA) that the project would be appropriate compensatory mitigation to offset *debits*. Projects that involve direct impacts to aquatic areas (e.g., fill for access) would also incur *debits*; projects for which the *debits* outnumber *credits* likely would not be considered as compensatory mitigation.

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4.3 Existing Facilities/Programs

Description: *Wetland* areas with official or formal educational programs, staff, or brochures and interpretive trails have higher public value than sites that have no developed or organized educational activity. Few Anchorage *waterways* have such programs.

How to Assess: This parameter applies to the specific *wetland*/*mosaic* in question, as well as contiguous—and visible—*intertidal* and *subtidal zones*, *waterways* and/or *waterbodies*. The educational/interpretive features must be specific to the *functions* and services of the aquatic area.

Potential Improvements in *Function*: Projects that provide *wetland*-specific educational or interpretive facilities such as interpretive kiosks, trails and/or brochures would improve the *AWAM* score for this parameter and may be eligible for *credits* for *enhancing social function*. (See cautionary statement below.) For SS 4-ENH, the size of the area improved will be the entire subject *wetland*/*mosaic* and, if part of the educational *enhancement* project, that portion of the contiguous—and visible—*waterbody*, *intertidal* and/or *subtidal zone* located within 300 feet of the *enhancement* feature(s). Appendix D addresses *credits* for increasing the *social function* of *waterways*.

CAUTION: Eligibility for *credits* will depend on a determination by the lead federal regulatory agency (i.e., Corps of Engineers or EPA) that the project would be appropriate compensatory mitigation to offset *debits*. Projects that involve direct impacts to aquatic areas (e.g., fill for access) would also incur *debits*; projects for which the *debits* outnumber *credits* likely would not be considered as compensatory mitigation.

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4.4 VIEWSHED VALUES

Description: If a *wetland* is notably distinct within its surrounding environment, then it is considered to have more social value than typical landscapes. The public is always more aware of distinct landscapes than more uniform appearing sites. From an ecological aesthetics perspective, it is clear that *wetlands* can be visually and educationally "rich" environments (Smardon 1978). Most Anchorage *wetlands* provide a unique addition to local viewsheds. The *AWAM* attempts to allow for differentiation of landscapes within rural and urban areas.

Modification: The ADCM has dropped the *AWAM's* use of the term "clearly," because it has not been critical in the municipality's application of this parameter. The ADCM has also provided further explanation of the municipality's rating categories.

How to Assess: This parameter applies to the specific *wetland*/*mosaic* in question, as well as contiguous—and visible—*waterbodies*. It may require field investigation to assess the viewshed(s) that include the subject aquatic areas. Table D-18 (next page) describes the rating categories.

Table D-18: Viewshed Rating Categories

Distinctiveness	Description	Nature of Viewshed	Description
distinct	visible from one or more readily accessible viewing points, including trails	urban	viewshed that includes the *wetland* is mostly (i.e., > 50%) developed, with either lots that are < 0.5 acre in size or larger lots that include little native vegetation
		rural	viewshed that includes the *wetland* is mostly (i.e., > 50%) *undeveloped* or, if developed, is mostly large (i.e., > 0.5-acre) lots that include substantial coverage by native vegetation
indistinct	not visible from readily accessible viewing points, including trails	N/A	

Potential Improvements in *Function*: This appendix does not apply to projects that increase the *AWAM* score for this parameter through *restoration* or *creation*. Projects that establish a new viewpoint of a *wetland* that previously qualified as "indistinct" may be eligible for *credits* for *enhancing* the *social function* of the *wetland*. (See cautionary statement below.) For such projects, the size entered in SS 4-ENH would be that portion of the subject *wetland*/*mosaic* and contiguous *waterbody* that is visible from the new viewpoint. The area of improvement would not include contiguous *intertidal* or *subtidal zone*, because those areas are already highly visible. Cutting of trees in *natural* or *naturalized polygons* to make a *wetland* or *waterbody* visible from an existing, potential viewpoint would not be eligible for *credits*.

CAUTION: Eligibility for *credits* will depend on a determination by the lead federal regulatory agency (i.e., Corps of Engineers or EPA) that the project would be appropriate compensatory mitigation to offset *debits*. Projects that involve direct impacts to aquatic areas (e.g., trails) would also incur *debits*; projects for which the *debits* outnumber *credits* likely would not be considered as compensatory mitigation.

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4.5 TYPES OF AESTHETIC DISTURBANCE

Description: All significant or detracting disturbances within a *wetland* are to be identified. The total number is then subtracted from the points addition for the Social Component. All of the disturbances listed are considered as detriments to a *wetlands area*; disturbances are known to reduce species diversity, increase undesirable species, increase contamination and lowered water quality, and reduce public values (Jaworski and Raphael 1978). Disturbance must be interpreted by the field user of this method since quantification is difficult. A disturbance must be recognizable to be included.

Modification: The ADCM has added another type of disturbance, solid waste disposal, that is frequently encountered in Anchorage's *wetlands*, but which the other categories did not clearly include.

How to Assess: The pre-project assessment of this parameter applies to the entire *wetland*/*mosaic* in question, as well as contiguous—and visible—areas of *intertidal zone*, *waterway* and/or *waterbody*. The same is true for the post-project assessment for projects that do not involve changing the *wetland's* score for this parameter. For projects that involve removing or correcting disturbances, the post-project assessment would apply only to the project area, even if similar disturbances still exist elsewhere in the *wetland*, *waterbody*, or *intertidal zone*. For example, removing all of the solid waste from a portion of a *wetland* would eliminate this parameter's one-point deduction for that portion of the *wetland*, even if there were still solid waste present elsewhere in the *wetland*.

Potential Improvements in *Function*: Projects that involve removing fill would likely be eligible for *credits* for *restoration*, as would projects that correct past drainage efforts sufficiently to increase the period of *inundation* or *enhance* disturbed *polygons* sufficiently to change them from *non-naturalized* to *naturalized* (e.g., revegetating utility corridors, ORV trails or cleared areas). Projects that reestablish meanders in channelized *streams*, would also likely improve the *REV* of not only the *stream*, but the adjacent *wetlands*, as well. This appendix does not apply directly to *such* projects; they may, however, earn additional *credits* by increasing the *AWAM* score for *wetlands*, *waterbodies*, or *intertidal zone* outside the area of *restoration* or *REV improvement*, reflecting an *enhancement* in the *social function* of those areas. Projects that focus on water pollution or solid waste disposal may earn *credits* in the same manner. (See cautionary statement below.)

For *enhancement* projects with no *REV improvement* whatsoever, the size entered in SS 4-ENH would be the footprint of the direct *enhancement* (e.g., area(s) of solid waste removal) plus that portion of

contiguous—and visible—*wetlands*, *waterbody* and/or *intertidal zone* in which there is no such disturbance, up to a distance of 300 feet of the *enhancement* work. For projects where the *enhancement* work produces a *REV improvement*, use only the size of the up to 300-foot wide zone around the *project site*; the area of *REV improvement* would go on another row or spreadsheet.

CAUTION: Eligibility for *credits* will depend on a determination by the lead federal regulatory agency (i.e., Corps of Engineers or EPA) that the project would be appropriate compensatory mitigation to offset *debits*.

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4.6 Extent of Aesthetic Disturbance

Description: This category attempts to identify the degree to which a *wetland* is disturbed. The emphasis is placed on water quality and water pollution in a *wetland*. The less the disturbance, the more points an area will receive.

Modification: The ADCM has clarified the Municipality's intent with regard to the scoring categories. The next section describes the revised categories.

How to Assess: The pre-project assessment of this parameter applies to the entire *wetland/mosaic* in question, as well as contiguous—and visible—areas of *intertidal zone*, *waterway* and/or *waterbody*. The same is true for the post-project assessment for projects that do not involve changing the *wetland's* score for this parameter. For projects that involve removing or correcting disturbances, the post-project assessment would apply only to the project area, even if there are still disturbances elsewhere in the *wetland*, *waterbody*, or *intertidal zone*. For example, if there were extensive solid waste disposal in several areas of a *wetland* and a project proposed to remove all of the waste from one or more, but not all of the areas, the pre-project assessment would rate the extent of disturbance in the *wetland* as a whole (e.g., "impaired natural quality is intense in some areas"), whereas the post-project assessment would assign a rating to just the area(s) of waste removal (e.g., "human disturbance absent or de minimis"). Table D-19 (next page) explains all of the rating categories.

Table D-19: Extent of Disturbance Rating Categories

Rating	Explanation
absent or *de minimis*	includes incidental disturbances such as small amounts of garbage
minor/localized/scattered	disturbances to the vegetation, ground surface, and/or hydrologic regime that occupy a relatively small area
moderate	larger or more severe alterations of the vegetation, ground surface, and/or hydrologic regime; also, small areas or very short-term occurrences of degraded water quality
intense in some areas	large areas of extensive disturbance to the vegetation, ground surface, and/or hydrologic regime; also, areas of compromised water quality that are more pronounced, more chronic and/or larger than the previous category, but which do not encompass the entire *surface water*
extremely intense or widespread	disturbances that encompass the entirety of a *wetland*; also, areas of chronically degraded water quality that encompass most of the *surface water*

Potential Improvements in *Function*: Projects that remove fill, revegetate *non-naturalized polygons*, or reestablish more *natural inundation* or *stream* meander patterns would likely be eligible for *credits* via *REV improvement* for both the project footprint and any pre-existing *wetlands* that become *setback* or *buffer* as a result of the work. This appendix does not apply to such projects; however, they may earn additional *credits* by increasing the *AWAM* score for *wetlands*, *waterbodies*, or *intertidal zone* outside the area of *REV improvement*, reflecting an *enhancement* in the *social function* of those areas. Projects that focus on water pollution or solid waste disposal may earn *credits* in the same manner. (See cautionary statement below.)

For projects with no *REV improvement* whatsoever, the size entered in SS 4-ENH would be the footprint of the direct *enhancement* (e.g., area(s) of solid waste removal) plus that portion of contiguous—and visible—*wetlands*, *waterbody* and/or *intertidal zone* located within 300 feet of the *enhancement* work, so long as that area has the same or better rating for this parameter. For projects where the *enhancement* produces a *REV improvement*, enter just the size of the 300-foot zone around the *project site*; the area of *REV improvement* would go on another row or spreadsheet. For example, with a project involving reestablishment of *stream* meanders, use the size of the new *stream's* 300-foot *buffer* minus its new *setback* (which would

likely earn *credits* for *REV improvement*, rather than through the procedures of this appendix).

CAUTION: Eligibility for *credits* will depend on a determination by the lead federal regulatory agency (i.e., Corps of Engineers or EPA) that the project would be appropriate compensatory mitigation to offset *debits*.

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4.7 PUBLIC USE/OPEN SPACE POTENTIAL

Description: This section awards points to a *wetland* based on its distance to sub-regions within the municipality where parklands are deficient by municipal standards. A *wetland* immediately within a region of the municipality where park space is currently below standards has potential or recognized value to the public. Since little remaining land is available for future park expansion, undeveloped *wetlands* often represent the only possibilities for new parks. Points are assigned based on distance from known deficient areas. Value is attributed to a subject *wetland* if it also provides direct access to existing parkland.

Modification: The ADCM has clarified that this parameter applies only to parcels that are not already designated as parkland and that the reference to public "lands" in the scoring categories pertains only to "parkland," defined as land owned by the municipal Parks and Recreation Department, Chugach State Park (CSP), the Anchorage Coastal Wildlife Refuge (ACWR), Chugach National Forest (CNF), or similar entities, rather than all lands owned by a public entity.

How to Assess: This parameter applies only to parcels that are not already parkland, as defined above.

Access. This parameter likely requires field investigation to determine whether the subject *wetland/mosaic* currently provides or could provide access to a municipal park, CSP, the ACWR, CNF, or a similar area. The rating depends on actual use, regardless of whether such use is sanctioned by the landowner.

Shapefiles for municipal parks, CSP, and CNF are available from the municipality, at http://www.muni.org/Departments/it/GIS2/Pages/MOAGISData.aspx. The municipality's Advanced Mapper application (http://munimaps.muni.org/mox52/advanced.cfm?&action=mox52_if_frameset) has layers for the ACWR (in the "Environmental" folder), as well as for municipal parks and CSP.

CAUTION: Cross-reference park identifications from these sources with ownership information, which is available using the "identify" tool in Advanced Mapper. Some areas identified as park (e.g., Little Campbell Lake, north Connors Bog) do not qualify as parkland for this parameter, due to ownership.

The draft CSP Access Plan includes maps that identify existing and potential access points to the park (see http://dnr.alaska.gov/parks/units/chugach/chugachaccess.htm). The 1991 ACWR Management Plan includes a map that identifies the "major public access points" for the refuge (see http://www.wc.adfg.state.ak.us/refuge/pdfs/anch_coastal.pdf). The discussion of "Public Access" on page A-26 of the ACWR plan identifies potential areas of improvement. Consult with the Alaska Department of Natural Resources and ADFG, respectively, to confirm conclusions drawn from these sources.

Parkland Deficiencies. If the subject *wetland/mosaic* did not score in the highest category for access, determine whether it is in an area that the municipality has identified as being deficient in parkland. Resources for making that determination depend on municipal sub-area:

For the Anchorage Bowl, maps 2, 3 and 4 of the 2006 Anchorage Bowl Park, Natural Resource and Recreation Facility Plan identify areas that are deficient in different types of parks (see http://www.muni.org/Departments/OCPD/Planning/Publications/ParkPlan_2006/PPM%202.pdf, http://www.muni.org/Departments/OCPD/Planning/Publications/ParkPlan_2006/PPM%203.pdf, and http://www.muni.org/Departments/OCPD/Planning/Publications/ParkPlan_2006/PPM%204.pdf).

The 2009 Turnagain Arm Comprehensive Plan, the 1985 Turnagain Arm volume of the Anchorage Park, Greenbelt and Recreation Facility Plan, and the 1995 Girdwood Area Plan address park deficiencies in Rainbow, Indian, Bird Creek, Girdwood, and Portage (see http://www.muni.org/Departments/OCPD/Planning/Publications/Documents/TurnagainArmCompPlan-2009Adopted.pdf, http://www.muni.org/Departments/OCPD/Planning/Publications/Documents/AncPrkGrnbltRecFacPlan-Vol3-TurnagainArm.pdf, and http://www.muni.org/Departments/OCPD/Planning/Documents/GAP8-PublicFacilityPlan.pdf, respectively). Consult with municipal planning staff to confirm conclusions drawn from these sources.

The 1985 Chugiak-Eagle River-Eklutna volume of the Anchorage Park, Greenbelt and Recreation Facility Plan addresses the communities north of Anchorage. It is not available electronically. Consult with municipal planning staff to assign a level of deficiency to the subject *wetland*/*mosaic*.

Potential Improvements in *Function*: This appendix does not apply to projects that provide parkland or access through *preservation*; such projects may be eligible for *credits* under Part II.C.2 of the ADCM Procedures. With appropriate measures to ensure long-term sustainability of the improvement, projects that change the extent to which the subject *wetland*/*mosaic* provides access to public lands may increase the *AWAM* score for this parameter and may be eligible for *credits* for *enhancing social function*. (See cautionary statement below.) The size entered in SS 4-ENH for such projects would be the entire subject *wetland*/*mosaic* for which the project changed the level of access. Access improvements that involve fill or other loss of *function* would also incur *debits*; projects for which the *debits* outnumber the *credits* likely would not be considered as compensatory mitigation.

CAUTION: Eligibility for *credits* will depend on a determination by the lead federal regulatory agency (i.e., Corps of Engineers or EPA) that the project would be appropriate compensatory mitigation to offset *debits*.

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4.8 IDENTIFICATION AS PARKLAND

Description: This category awards points to a *wetland*/*mosaic* if it has been identified in a municipal document has having future or potential public values, mainly as parkland. The municipality felt it was necessary to give points to an area if that area is officially identified for public use. These points are minimal and are acknowledged simply to differentiate between areas of public value and those *wetlands* slated for development or in private ownership. For planning purposes and in the public's eye, such sites are of high value.

Modification: The ADCM has clarified that the term "parkland" applies not only to existing and potential municipal parks, but also to areas of similar value to the public, such as the Anchorage Coastal Wildlife Refuge (ACWR), Chugach State Park (CSP), Chugach National Forest (CNF), and, due to their status as being permanently *preserved* for their natural values, conservation easements. The ADCM has also updated the *AWAM* points category of "identified Municipal selection from State or is in Heritage Land Bank and of little commercial value" to more broadly include any undeveloped, municipally owned land

that has a reasonable potential to become a park or something similar.

How to Assess: Determine whether the subject *wetland/mosaic* is already part of a dedicated municipal park, the ACWR, CSP, or CNF. Shapefiles for municipal parks, CSP, and CNF are available from the municipality, at http://www.muni.org/Departments/it/GIS2/Pages/MOAGISData.aspx. The municipality's Advanced Mapper application (http://munimaps.muni.org/mox52/advanced.cfm?&action=mox52_if_frameset) has layers for the ACWR (in the "Environmental" folder), as well as municipal parks and CSP. Cross-reference these layers with ownership information, using the "identify" tool in Advanced Mapper, to determine whether the parcel in question is a dedicated park, rather than an in-holding or leased area. Consult with municipal parks or planning staff to confirm conclusions drawn from these sources. Planning staff can also advise the ADCM user on the location of Conservation Easements.

If the subject *wetland/mosaic* is not part of a dedicated park or similar area, determine whether any agency planning documents identify it as a potential future park. For municipal parks, consult municipal parks, planning and/or Heritage Land Bank staff. The draft CSP Access Plan includes maps that identify "parcels of opportunity" (see http://dnr.alaska.gov/parks/units/chugach/chugachaccess.htm) and the 1991 ACWR Management Plan references the opportunity to acquire in-holdings within the refuge boundary (see http://www.wc.adfg.state.ak.us/refuge/pdfs/anch_coastal.pdf, page A-42). Consult with the Alaska Department of Natural Resources and ADFG, respectively, to confirm conclusions drawn from these sources.

For the third rating category, cross-reference undeveloped areas with the ownership and land use information available through Advanced Mapper.

Potential Improvements in *Function*: *Preservation* projects that result in the parcel becoming part of a municipal park, CSP, the ACWR, or CNF may earn additional *credits* for increasing the *AWAM* score for this parameter, reflecting an *enhancement* of *social function*. (See cautionary statement below.) For SS 4-ENH, the size of area improved will be the extent of *wetland/mosaic*, *waterbody*, *intertidal zone*, and/or *upland setback* or *buffer* newly dedicated as parkland.

CAUTION: Eligibility for *credits* will depend on a determination by the lead federal regulatory agency (i.e., Corps of Engineers or EPA) that the project would be appropriate compensatory mitigation to offset *debits*.

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4.9 EXISTING RESEARCH AND STUDIES

Description: A *wetland* that has reports or articles written about it is of value to the public since some aspect of the area has been portrayed in a public forum. Thus the public, and specifically the local neighborhoods, can better relate to an area and can better understand the values onsite. Such articles also contribute to management, planning decisions, and educational values.

How to Assess: This parameter applies to the subject *wetland*/*mosaic* in question, as well as any *waterbodies* contiguous with it.

Potential Improvements in *Function*: Conducting a research project or study and reporting the results would improve the *AWAM* score for this parameter and may be eligible for *credits* for *enhancing social function*, if the lead federal regulatory agency (i.e., Corps of Engineers or EPA) determines that the project would be appropriate compensatory mitigation to offset *debits*. The size of the area improved by such a project would be specific to the research/study.

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4.10 OWNERSHIP AND ACCESSIBILITY

Description: This section matches accessibility of a *wetland* parcel with the current ownership patterns. Points are awarded based on ease of access and restriction by ownership. Ownership and accessibility have a direct bearing on the value of a *wetland* to the Anchorage public. Benefits of use by the public of a particular *wetland* vary from direct access for active recreation, to open space, to public health and safety. Private ownership and difficult access are direct public use restrictions of a *wetland* and render such sites of lower value. This category highlights a *wetland's* value to the public only and does not consider private owners' benefits. Easily accessed *wetlands* are of more social value than any restricted areas.

How to Assess: This parameter may require field investigation to determine ease of and/or restrictions on access to the subject *wetland*/*mosaic* and contiguous *waterbodies*. The ease of access component applies to the edge of the subject aquatic area, rather than the boundary of any larger parcels that encompass it. Select the highest scoring category that applies. The ownership/access restrictions component applies to both the contiguous aquatic area, as well as any *uplands* through which the indicated access occurs. Within the applicable row for ease of access, indicate the percentage of the total

acreage of aquatic area and *upland* access parcel(s) that meets each category of ownership and access restrictions. Ownership information is available using the "identify" tool in the municipality's Advanced Mapper application (http://munimaps.muni.org/mox52/advanced.cfm?&action=mox52_if_frameset).

Potential Improvements in *Function*: Projects that change the ownership of a *wetland/mosaic*, *waterbody*, or *upland* access area may be eligible for *preservation credits* pursuant to Part II.C.2 of the ADCM Procedures. This appendix does not apply to such projects. Projects that improve the ease of access to an aquatic area (e.g., through construction of a trail, fishing or viewing platform, or boat launch) and/or reduce or eliminate access restrictions would improve the *AWAM* score for this parameter and may be eligible for *credits* for *enhancing social function*. (See cautionary statement below.) For SS 4-ENH, the size of the area improved by such projects will be the entire subject *wetland/mosaic* and, if directly affected by the improvement project, the contiguous *waterbody*, as well. For the *inter-* and *subtidal zones*, enter the size of the area located within 300 feet of the access improvement.

CAUTION: Eligibility for *credits* will depend on a determination by the lead federal regulatory agency (i.e., Corps of Engineers or EPA) that the project would be appropriate compensatory mitigation to offset *debits*. Projects that involve direct impacts to aquatic areas (e.g., fill for access) would also incur *debits*; projects for which the *debits* outnumber *credits* likely would not be considered as compensatory mitigation.

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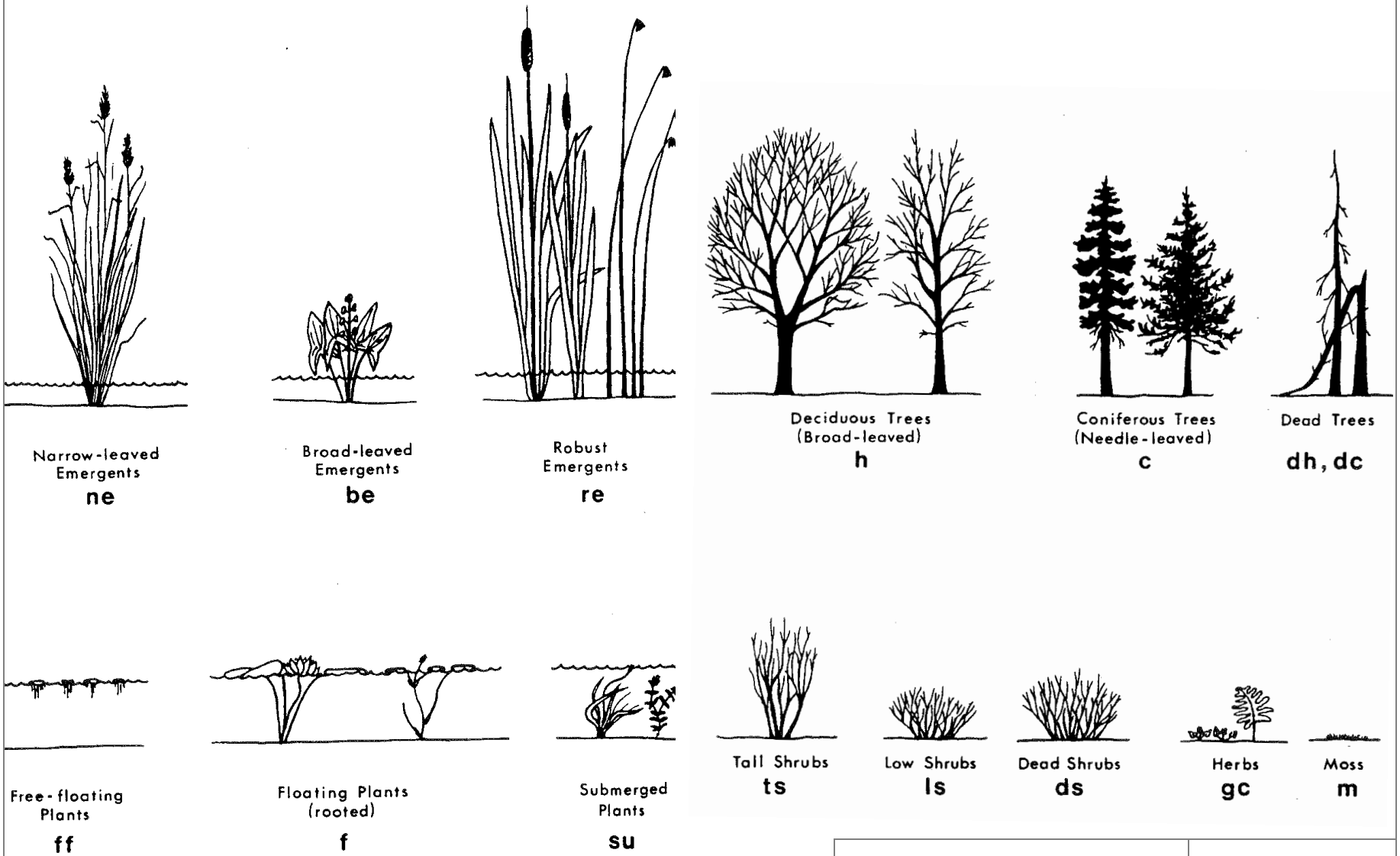
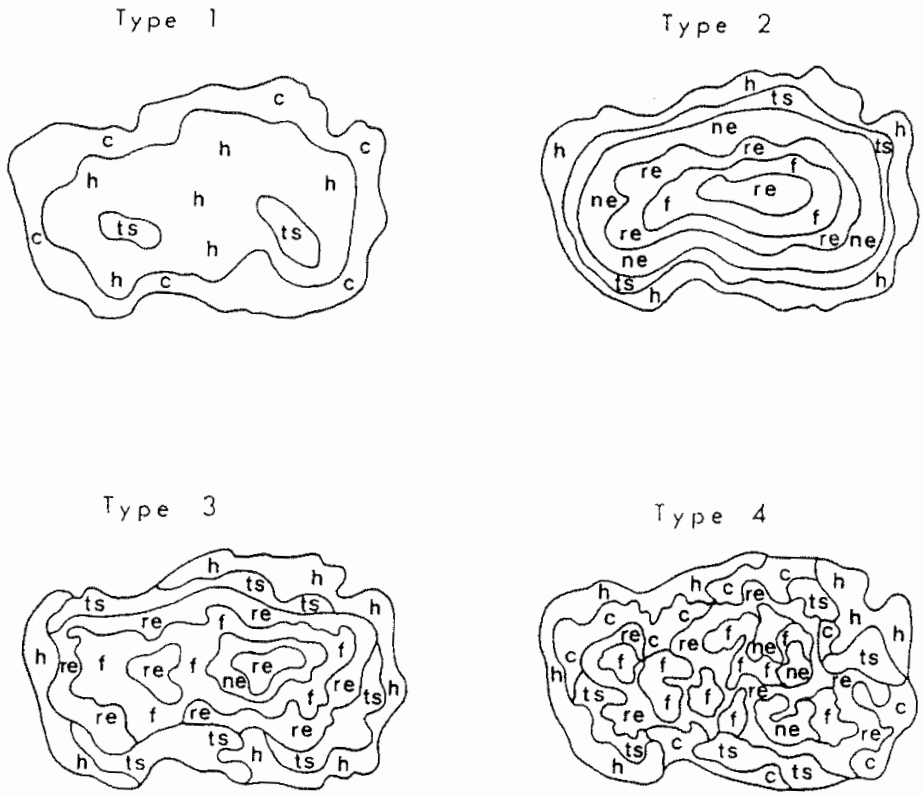


Source: 1996 AWMP

PLANT FORMS

Figure D-1



KEY

c – Coniferous Trees

h – Deciduous Trees

ts – Tall Shrubs

ne – Narrow-leaved Emergents

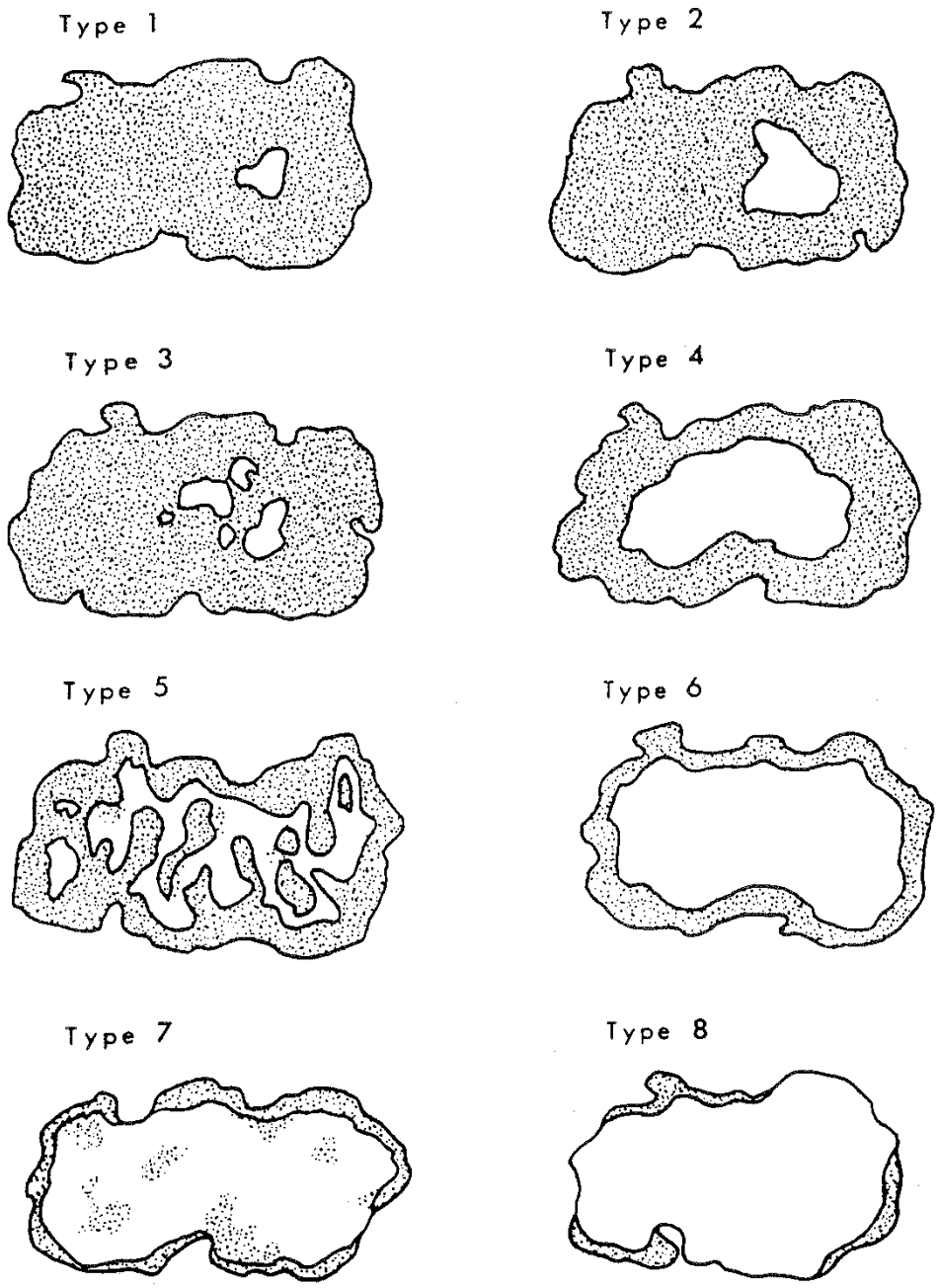
re – Robust Emergents

f – Floating Plants (rooted)

Source: 1996 AWMP,
Adapted from Golet, 1976

PLANT COMMUNITY INTERSPERSION TYPES	Figure D-2

White areas indicate open water (including floating and submerged pl
Stippled areas indicate emergents, shrubs and trees.



Source: 1996 AWMP,
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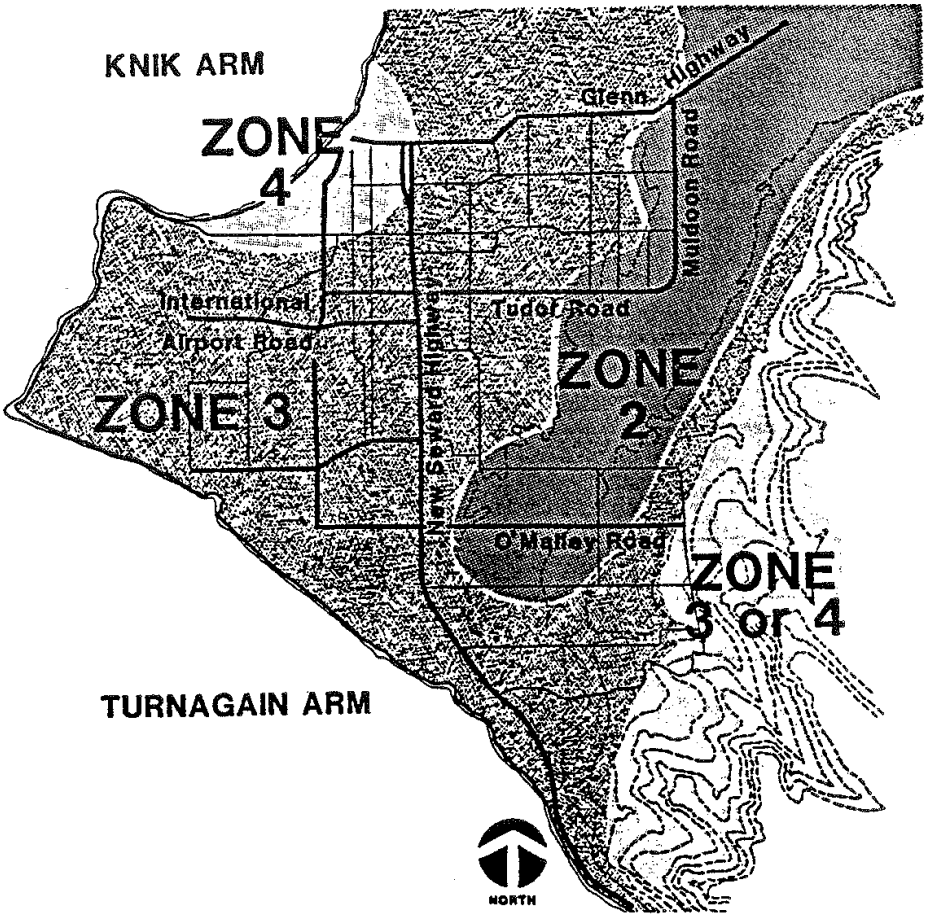
OPEN WATER TYPES	Figure D-3

Anchorage Bowl Hardiness Zone Map

See narrative for areas outside Anchorage Bowl.



ZONE 2 **Cold-Air Basin**

A cold-air basin is formed at the base of the Chugach Mountains from the downhill flow of cold air, and intensified by channelled winter winds from the North.

ZONE 3 **Predominant Climate**

Zone 3 is the predominant and average climate for the Anchorage Bowl.

ZONE 4 **Milder Pockets**

Two micro-climates exhibit Zone 4 temperatures: a coastal pocket near the Knik Arm with milder winters, cooler summers, and a longer growing season; and a hillside thermal belt above the cold-air basin with milder winters, but a significantly shorter growing season.

Source: 1996 AWMP

HARDINESS ZONES	Figure D-4

Table 12d: *Accessibility Factors* for *Preservation* Projects > 75 Acres in Size[1]

Length of Major Road Work Needed[2,3]	Maximum Length of Minor Road Work Needed[2,4]																		
	None	1000 ft	2000 ft	3000 ft	4000 ft	1 mi	2 mi	3 mi	4 mi	4.5 mi	5 mi	5.25 mi	6 mi	8 mi	9 mi	10 mi	10.25 mi	10.5 mi	10.75 mi	> 10.75 mi
None																				
400 ft																				
500 ft			1																	
750 ft																				
1000 ft																				
1500 ft							2													
2000 ft																				
3000 ft																				
4000 ft																				
1 mi																				
1.5 mi																				
1.75 mi																				
2 mi																				
3 mi																				
3.75 mi																				
> 3.75 mi																				

[1] The determinations in this section require coordination with the Municipality of Anchorage to ascertain the extent of road work they would require. The distance measurement should follow the most likely access route to the nearest boundary of the area that would be *preserved*. If the proposed preservation project involves only a portion of an existing parcel(s), measure the distance to the area that would be *preserved.* If the proposed preservation project involves only a portion of an existing parcel(s), measure the distance to the area(s) that would be preserved.

[2] The lengths address access to the property, not potential road construction within it. Measure lengths only to the boundary of the preservation area. Lengths within 5% of the thresholds in the table may be assigned to the lower threshold.

[3] "Major" road work includes construction of new roads, as well as upgrading of existing roads where either a) the existing driving surface is < 75% of the required driving surface width or b) the upgrade will include storm drain installation. It does **not** include construction of separated grade crossings; see Glossary for instructions regarding separated grade crossings.

[4] "Minor" road work includes activities such as paving, landscaping, construction of sidewalks, acquisition/dedication of right-of-way, and widening of roads where the existing driving surface is at least 75% of the required driving surface width.