



# SPECIAL PUBLIC NOTICE

**U.S. ARMY CORPS OF ENGINEERS  
SOUTH PACIFIC DIVISION**

**BUILDING STRONG®**

February 20, 2012

## **STANDARD OPERATING PROCEDURE FOR DETERMINATION OF MITIGATION RATIOS**

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**INTRODUCTION:** This informational public notice announces a recently established procedure for determining compensatory mitigation requirements as required for processing of Department of the Army (DA) permits under section 404 of the Clean Water Act, section 10 of the Rivers and Harbors Act, and section 103 of the Marine Protection, Research, and Sanctuaries Act.

This procedure applies to the Regulatory Program within South Pacific Division (SPD), including its four subordinate districts: Albuquerque District (SPA), Sacramento District (SPK), Los Angeles District (SPL), and San Francisco District (SPN). This procedure is applicable for all permit applications received after 20 April 2011 that require compensatory mitigation. Compensatory mitigation is the restoration (re-establishment or rehabilitation), establishment (i.e., creation), enhancement, and/or in certain circumstances preservation of aquatic resources for the purposes of offsetting unavoidable, adverse impacts that remain after all appropriate and practicable avoidance and minimization of aquatic resources has been achieved. The procedure was updated on January 23, 2012.

Historically, the SPD Regulatory Program has lacked a procedure or guidance for determining compensatory mitigation ratios as required for processing of Department of the Army (DA) permits under Section 404 of the Clean Water Act, Section 10 of the Rivers and Harbors Act, and Section 103 of the Marine Protection, Research, and Sanctuaries Act. In addition, the 2008 mitigation rule (33 C.F.R. Part 332) does not provide a detailed procedure for determining compensatory mitigation ratios. However, it does provide some general guidelines and requires that the rationale for the required replacement ratio must be documented in the administrative record for the permit action. To address this long-standing need, a multi-district team was formed to develop a regional procedure for determining and documenting compensatory mitigation ratios, as well as accompanying guidance for Regulatory project managers. The purpose of this new, regional procedure is to reduce inconsistency between project managers, offices, and districts in determining compensatory mitigation requirements, to incorporate

current scientific understanding of mitigation concepts, and to require documentation of these key decisions, thereby reducing uncertainty on behalf of the regulated community regarding compensatory mitigation requirements.

Benefits of the new procedure include:

- Provides a structured decision-making procedure while retaining flexibility;
- Allows for qualitative or quantitative assessments of impacts and mitigation;
- Results in a written rationale (decision document) for each ratio determination;
- Includes guidance (instructions) for each step of checklist; and
- Incorporates use of functional/condition assessments when available and/or required.

Factors considered as part of this procedure include:

- Impact-mitigation comparison (quantitative or qualitative);
- Mitigation site location;
- Net loss of aquatic resource surface area;
- Type conversion;
- Uncertainty of success; and
- Temporal loss.

Documents associated with the procedure (attached) include:

- Procedure document;
- Mitigation ratio setting checklist;
- Instructions;
- Examples; and
- Before-after mitigation-impact spreadsheet.

AVAILABILITY: This procedure is part of the U.S. Army Corps of Engineers Quality Management System (QMS). As such, it is not currently available for downloading by the public. In addition, this procedure may be updated periodically. To obtain the most recent version of these documents, please contact the Regulatory Division of the applicable SPD Corps district (contacts listed above).



*Regulatory Program Goals:*

- To provide strong protection of the Nation's aquatic environment, including wetlands.
- To ensure that the Corps provides the regulated public with fair and reasonable decisions.
- To enhance the efficiency of the Corps administration of its regulatory program.



US Army Corps  
of Engineers®

**12501-SPD  
REGULATORY PROGRAM  
STANDARD OPERATING PROCEDURE  
FOR DETERMINATION OF  
MITIGATION RATIOS**



**South Pacific  
Division**

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**1.0 Purpose.** The purpose of this document is to outline the process for determining compensatory mitigation requirements as required for processing of Department of the Army (DA) permits under Section 404 of the Clean Water Act, Section 10 of the Rivers and Harbors Act, and Section 103 of the Marine Protection, Research, and Sanctuaries Act. .

**2.0 Applicability.** This process applies to the Regulatory Program within South Pacific Division (SPD), including its four subordinate districts, Albuquerque District (SPA), Sacramento District (SPK), Los Angeles District (SPL), and San Francisco District (SPN). Subordinate offices or organizations shall not modify this procedure to form a specific procedure. This procedure is applicable for all permit applications received after 20 April 2011.

### 3.0 References.

Compensatory Mitigation for Losses of Aquatic Resources (33 C.F.R. Part 332).

Smith, R. D., D. R., A. Ammann, C. Bartoldus, M. M. Brinson. 1995. An Approach for Assessing Wetland Functions Using Hydrogeomorphic Classification, Reference Wetlands, and

***Current Approved Version: 1/23/2012. Printed copies are for "Information Only." The controlled version resides on the SPD QMS SharePoint Portal.***

Functional Indices., Wetlands Research Program Technical Report WRP-DE-9. U.S. Army Corps of Engineers, Waterways Experiment Station, Vicksburg, Mississippi.

Cowardin, L. M., V. Carter, F. C. Golet, E. T. LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States. U. S. Department of the Interior, Fish and Wildlife Service, Washington, D.C. Jamestown, ND: Northern Prairie Wildlife Research Center Home Page. <http://www.npwrc.usgs.gov/resource/1998/classwet/classwet.htm> (Version 04DEC98).

Collins, J.N., E.D. Stein, M. Sutula, R. Clark, A.E. Fetscher, L. Grenier, C. Grosso, and A. Wiskind. 2008. California Rapid Assessment Method (CRAM) for Wetlands. Version 5.0.2. 151 pp.

#### **4.0 Related Procedures.**

None.

#### **5.0 Definitions.**

**Compensatory mitigation** - The restoration (re-establishment or rehabilitation), establishment (creation), enhancement, and/or in certain circumstances preservation of aquatic resources for the purposes of offsetting unavoidable adverse impacts which remain after all appropriate and practicable avoidance and minimization has been achieved.

**Condition** - The relative ability of an aquatic resource to support and maintain a community of organisms having a species composition, diversity, and functional organization comparable to reference aquatic resources in the region.

**Enhancement** - The manipulation of the physical, chemical, or biological characteristics of an aquatic resource to heighten, intensify, or improve a specific aquatic resource function(s). Enhancement results in the gain of selected aquatic resource function(s), but may also lead to a decline in other aquatic resource function(s). Enhancement does not result in a gain in aquatic resource area.

**Establishment (creation)** - The manipulation of the physical, chemical, or biological characteristics present to develop an aquatic resource that did not previously exist at an upland site. Establishment results in a gain in aquatic resource area and functions.

**Functions** - The physical, chemical, and biological processes that occur in ecosystems.

**Impact** - Adverse effect.

**In-kind** - A resource of a similar structural and functional type to the impacted resource.

**In-lieu fee program** - A program involving the restoration, establishment, enhancement, and/or preservation of aquatic resources through funds paid to a governmental or non-profit natural resources management entity to satisfy compensatory mitigation requirements for DA permits.

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Similar to a mitigation bank, an in-lieu fee program sells compensatory mitigation credits to permittees whose obligation to provide compensatory mitigation is then transferred to the in-lieu program sponsor. However, the rules governing the operation and use of in-lieu fee programs are somewhat different from the rules governing operation and use of mitigation banks. The operation and use of an in-lieu fee program are governed by an in-lieu fee program instrument.

**Mitigation bank** - A site, or suite of sites, where resources (e.g., wetlands, streams, riparian areas) are restored, established, enhanced, and/or preserved for the purpose of providing compensatory mitigation for impacts authorized by DA permits. In general, a mitigation bank sells compensatory mitigation credits to permittees whose obligation to provide compensatory mitigation is then transferred to the mitigation bank sponsor. The operation and use of a mitigation bank are governed by a mitigation banking instrument.

**Out-of-kind** - A resource of a different structural and functional type from the impacted resource.

**Permittee-responsible mitigation** - An aquatic resource restoration, establishment, enhancement, and/or preservation activity undertaken by the permittee (or an authorized agent or contractor) to provide compensatory mitigation for which the permittee retains full responsibility.

**Preservation** - The removal of a threat to, or preventing the decline of, aquatic resources by an action in or near those aquatic resources. This term includes activities commonly associated with the protection and maintenance of aquatic resources through the implementation of appropriate legal and physical mechanisms. Preservation does not result in a gain of aquatic resource area or functions.

**Re-establishment** - The manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former aquatic resource. Re-establishment results in rebuilding a former aquatic resource and results in a gain in aquatic resource area and functions.

**Rehabilitation** - The manipulation of the physical, chemical, or biological characteristics of a site with the goal of repairing natural/historic functions to a degraded aquatic resource. Rehabilitation results in a gain in aquatic resource function, but does not result in a gain in aquatic resource area.

**Restoration** - The manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former or degraded aquatic resource. For the purpose of tracking net gains in aquatic resource area, restoration is divided into two categories: reestablishment and rehabilitation.

**Temporal loss** - The time lag between the loss of aquatic resource functions caused by the permitted impacts and the replacement of aquatic resource functions at the compensatory mitigation site. Higher compensation ratios may be required to compensate for temporal loss. When the compensatory mitigation project is initiated prior to, or concurrent with, the permitted

impacts, the district engineer may determine that compensation for temporal loss is not necessary, unless the resource has a long development time.

**Watershed** - A land area that drains to a common waterway, such as a stream, lake, estuary, wetland, or ultimately the ocean.

## **6.0 Responsibilities.**

**Regulatory Project Managers (PMs):** For any actions where the PM determines compensatory mitigation is necessary to offset unavoidable impacts to aquatic resources, he/she must follow the procedures provided herein to determine the amount of compensatory mitigation to replace lost aquatic resource functions, to the extent practicable. PMs must also complete the mitigation ratio checklist and include it in the administrative record.

## **7.0 Procedures.**

Historically, the South Pacific Division (SPD) Regulatory Program has lacked a standardized process or guidance for determining compensatory mitigation ratios as required for processing of Department of the Army (DA) permits under Section 404 of the Clean Water Act, Section 10 of the Rivers and Harbors Act, and Section 103 of the Marine Protection, Research, and Sanctuaries Act. In addition, the 2008 mitigation rule (33 C.F.R. Part 332) does not provide a detailed process for determining compensatory mitigation ratios. However, it does provide some general guidelines and requires that the rationale for the required replacement ratio must be documented in the administrative record for the permit action. To address this long-standing need, a multi-district Project Delivery Team (PDT) was formed to develop a regional process for determining and documenting compensatory mitigation ratios, as well as accompanying guidance for Regulatory project managers. The purpose of this new, regional process is to reduce inconsistency between project managers, offices, and districts in determining compensatory mitigation requirements, to incorporate current scientific understanding of mitigation concepts, and to require documentation of these key decisions, thereby reducing uncertainty on behalf of the regulated community regarding compensatory mitigation requirements. In addition, this new process incorporates recommendations of various outside reports/studies calling for greater consistency and documentation in how mitigation ratios are determined.

7.1 A PM receives a complete permit application, including a statement describing how impacts to waters of the United States are to be compensated for (hereinafter referred to as a “compensatory mitigation proposal”) or a statement explaining why compensatory mitigation should not be required for the proposed impacts. At the applicant’s discretion, he/she may provide a conceptual mitigation plan as part of the permit application.

7.2 Upon evaluation of the permit application, a PM may determine compensatory mitigation is necessary to offset unavoidable impacts to aquatic resources, and shall review the compensatory mitigation proposal or plan, if provided (or request a proposal or plan for review, if none was provided). If the compensatory mitigation proposal or plan does not contain sufficient information to complete the checklist, or the proposed mitigation is not appropriate, the PM will request a revised compensatory mitigation proposal or plan (such plan being

conceptual, detailed or draft, as appropriate, for general permits (GP), and draft for standard individual permits).

7.3 The PM will complete the mitigation ratio checklist using the applicant's compensatory mitigation proposal or plan.

- A separate checklist shall be used for each impact site/type.
- Each mitigation site/type shall be entered into separate columns on the checklist.
- Additional mitigation shall be assessed if the compensatory mitigation proposal or plan does not sufficiently account for project impacts.
- PMs must enter a separate justification for each adjustment within the checklist.

7.3.1 For each impact site/type with one mitigation site/type, complete column "A."

7.3.2 For each impact site/type with multiple mitigation sites/types, complete columns for each mitigation site/type (columns A-B or A-C, for two or three mitigation site/types, respectively).

- The PM will complete the checklist for the first proposed mitigation site/type, using column "A", to determine the required compensatory mitigation ratio.
- The PM will then use column "B" to compare any remaining, unmitigated impact with a second mitigation site/type:
  - ✓ If a second site/type has been proposed by the applicant, or;
  - ✓ If the required ratio from column A is greater than that proposed by the applicant
- The PM will then use column "C" to compare remaining, unmitigated impact with a third mitigation site/type:
  - ✓ If a third mitigation site/type has been proposed by the applicant, or;
  - ✓ If the required ratio from column B is greater than that proposed by the applicant

7.3.3 If any impact remains unmitigated or more than three mitigation site/types have been proposed, complete additional checklists.

7.4 The PM will notify the applicant of the mitigation ratio determination. If the ratio(s) is (are) different than those proposed by the applicant, the applicant may either (a) agree to the Corps' mitigation ratio and submit a revised, draft mitigation plan that addresses the entire amount of compensatory mitigation for the Corps' review and approval; or (b) submit an alternative compensatory mitigation proposal/plan for evaluation by the PM. In the event the

applicant elects option “b,” the PM will prepare a new checklist.

7.5 Once a final mitigation ratio has been determined, the PM will then review and comment on the adequacy of the mitigation plan in accordance with 33 C.F.R. 332.4(c) and any subsequent mitigation and monitoring guidelines.

7.6 The final ratio must be included in the final mitigation plan, the decision document, and by special condition in the permit/final verification letter.

Note: The process outlined herein can also be used for determining compensatory mitigation requirements for unauthorized activities for which the Corps is the lead enforcement agency..

## **8.0 Records and Measurements.**

8.1 All documents listed above will be filed in the corresponding project files in accordance with [ES-QMS140, Records Management](#).

Type	Description	Responsible Office	Location	Record Media	Retention	Disposition
R	Mitigation Ratio Checklists	Regulatory Divisions within SPD Districts/Field Offices	Project file folders in filing cabinets Regulatory Divisions within SPD Districts; Electronic Checklists in ORM Database	P/E	7 years	Send to records holding

8.2 The SPD Regulatory Program Manager and District Regulatory Division management shall periodically inspect project files to ensure compliance with this guidance.

## **9.0 Attachments.**

9.1 [12501.1-SPD Mitigation Ratio Checklist](#)

9.2 [12501.2- SPD Instructions for Preparing Mitigation Ratio Setting Checklist](#)

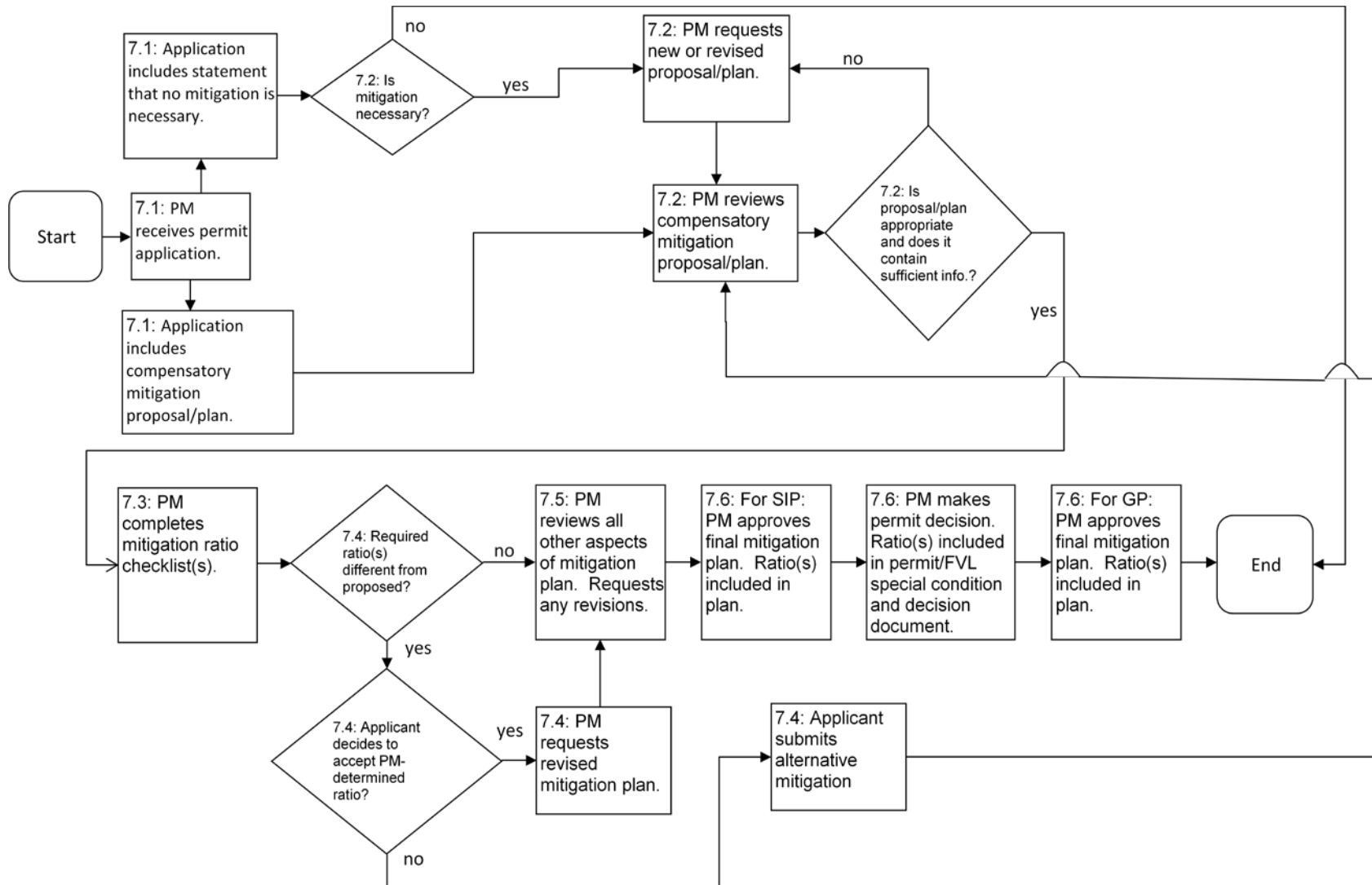
9.3 [12501.3-SPD Mitigation Ratio Checklist Examples](#)

9.4 [12501.4-SPD Before/After-Mitigation-Impact Spreadsheet – CRAM Example](#)

9.5 [12501.5-SPD Mitigation Ratio Training Presentation](#)



## 10.0 Flow Chart.



## Attachment 12501.1 - SPD Mitigation Ratio Setting Checklist

1	<p>Date: _____ Corps file no.: _____ Project Manager: _____</p> <p>Impact site name: _____ ORM impact resource type: _____</p> <p>Impact Cowardin or HGM type: _____ Impact area (acres): _____ Impact distance (linear feet): _____</p> <table border="1" data-bbox="730 342 2003 496"> <tr> <td data-bbox="730 342 1213 496"> <b>Column A:</b>  Mitigation site name: _____  Mitigation type: _____  Resource type: _____  Cowardin/HGM type: _____ </td><td data-bbox="1213 342 1612 496"> <b>Column B (optional):</b>  Mitigation site name: _____  Mitigation type: _____  Resource type: _____  Cowardin/HGM type: _____ </td><td data-bbox="1612 342 2003 496"> <b>Column C (optional):</b>  Mitigation site name: _____  Mitigation type: _____  Resource type: _____  Cowardin/HGM type: _____ </td></tr> </table>				<b>Column A:</b> Mitigation site name: _____ Mitigation type: _____ Resource type: _____ Cowardin/HGM type: _____	<b>Column B (optional):</b> Mitigation site name: _____ Mitigation type: _____ Resource type: _____ Cowardin/HGM type: _____	<b>Column C (optional):</b> Mitigation site name: _____ Mitigation type: _____ Resource type: _____ Cowardin/HGM type: _____
<b>Column A:</b> Mitigation site name: _____ Mitigation type: _____ Resource type: _____ Cowardin/HGM type: _____	<b>Column B (optional):</b> Mitigation site name: _____ Mitigation type: _____ Resource type: _____ Cowardin/HGM type: _____	<b>Column C (optional):</b> Mitigation site name: _____ Mitigation type: _____ Resource type: _____ Cowardin/HGM type: _____					
2	<b>QUALITATIVE impact-mitigation comparison:</b>  Has a Corps-approved functional/condition assessment been obtained? If not, complete step 2; otherwise, complete step 3. Yes <input type="checkbox"/> No <input type="checkbox"/>	Note: steps 2 and 3 are mutually exclusive. If step 2 is used, then complete the rest of the checklist (steps 4-10).  Ratio adjustment: PM justification:	Ratio adjustment: PM justification:	Ratio adjustment: PM justification:			
3	<b>QUANTITATIVE impact-mitigation comparison:</b>  Use step 3 if a Corps-approved functional/condition assessment been obtained.  Use Before-After-Mitigation-Impact (BAMI) spreadsheet (attachment 12501.4) (if a district-approved functional/condition method is not available, use step 2 instead). See example in attachment 12501.2.	Note: steps 2 and 3 are mutually exclusive. If step 3 is used, steps 3 and 5 may also be mutually exclusive. If a functional/condition assessment method is used that explicitly accounts for area (such as HGM), steps 3 and 5 are mutually exclusive; however, if a method is used that does *not* explicitly account for area (such as CRAM), then both steps should be used. Complete the rest of the checklist (steps 4-10 or steps 4 and 6-10, as appropriate).  Ratio adjustment from BAMI procedure (attached):	Ratio adjustment from BAMI procedure (attached):	Ratio adjustment from BAMI procedure (attached):			
4	<b>Mitigation site location:</b>	Ratio adjustment: PM justification:	Ratio adjustment: PM justification:	Ratio adjustment: PM justification:			

5	<b>Net loss of aquatic resource surface area:</b>	Ratio adjustment: PM justification:	Ratio adjustment: PM justification:	Ratio adjustment: PM justification:
6	<b>Type conversion:</b>	Ratio adjustment: PM justification:	Ratio adjustment: PM justification:	Ratio adjustment: PM justification:
7	<b>Uncertainty:</b>	Ratio adjustment: PM justification:	Ratio adjustment: PM justification:	Ratio adjustment: PM justification:
8	<b>Temporal loss:</b>	Ratio adjustment: PM justification:	Ratio adjustment: PM justification:	Ratio adjustment: PM justification:
9	<b>Final mitigation ratio(s):</b>	Final ratio: ____ : 1 (column A)  Proposed impact (total): ____ acre ____ linear feet to Resource type: _____ Cowardin or HGM: _____  Required mitigation: ____ acre ____ linear feet of Resource type: _____ Cowardin or HGM: _____  Additional PM comments:	Final ratio: ____ : 1 (column B)  Remaining impact: _____  Required mitigation: ____ acre ____ linear feet of Resource type: _____ Cowardin or HGM: _____  Additional PM comments:	Final ratio: ____ : 1 (column C)  Remaining impact: _____  Required mitigation: ____ acre ____ linear feet of Resource type: _____ Cowardin or HGM: _____  Additional PM comments:
10	<b>Final compensatory mitigation requirements:</b>	PM summary:		

## Attachment 12501.2-SPD - Instructions for Completing Mitigation Ratio-Setting Checklist.

These instructions contain specific numeric adjustments (discrete, e.g., +1.0, or ranges, e.g., +0.25 to +4.0) that were determined by the PDT after assessing a variety of impact-mitigation scenarios and determining adjustments for each step that, in combination with other step adjustments, produce a reasonable range of final mitigation ratios. For steps where a range of adjustments is provided, PMs are directed to the attached examples for additional guidance. PMs **must** enter a separate justification for each adjustment within the checklist. PMs may deviate from the guidance provided herein if such deviations can be documented in the checklist with sufficient justification.

1	Date: _____ Corps file no.: _____ Project Manager: _____  Impact site name: _____ ORM impact resource type: _____ Cowardin or HGM type: _____ Impact area (acres): _____ Impact distance (linear feet): _____  For impact site name, multiple discrete (as entered in ORM) impacts are to be evaluated using multiple checklists; however, multiple impacts to one habitat type (Cowardin or HGM) could be lumped together to determine a mitigation ratio using one checklist. For each proposed impact to waters of the U.S., the project manager (PM) should consider each factor and, if applicable, document consideration in response column(s) using applicable procedures or guidelines. For mitigation proposals with multiple mitigation sites and/or types, see QMS procedure 12501 (section 7.3).		
	Column A: Mitigation site name: _____ Mitigation type: _____ Resource type: _____ Cowardin/HGM type: _____	Column B (optional): Mitigation site name: _____ Mitigation type: _____ Resource type: _____ Cowardin/HGM type: _____	Column C (optional): Mitigation site name: _____ Mitigation type: _____ Resource type: _____ Cowardin/HGM type: _____

2	<p><b>QUALITATIVE impact-mitigation comparison:</b></p> <p>Has a Corps-approved functional/condition assessment been obtained? If not, complete step 2; otherwise, complete step 3.</p> <p>Yes <input type="checkbox"/> No <input type="checkbox"/></p> <p>Qualitative assessment of functional loss at the impact site versus expected functional gain at the mitigation site may warrant a lower or higher mitigation ratio. Note: adjustments for preservation-only mitigation, which provides no functional gain, should generally fall towards the high end of the range (towards 4-5). Preservation-only of non-aquatic habitats (upland buffer) may warrant adjustments higher than 5.</p> <p>Using the list of functions below, compare impact (functional loss) and proposed mitigation (functional gain) at impact (I) and mitigation (M) sites. For most functions, if <math>I &lt; M</math>, then use adjustment less than 0 and equal or greater than -2.0; if <math>I = M</math>, then use adjustment of 0; or if <math>I &gt; M</math>, then use adjustment greater than 0 and less than or equal to 5. See examples in attachment 12501.3.</p> <p>Suite of potential functions from HGM (alternate lists of functions may be used):</p> <ul style="list-style-type: none"> <li>a. Short- or long-term surface water storage</li> <li>b. Subsurface water storage</li> <li>c. Moderation of groundwater flow or discharge</li> <li>d. Dissipation of energy</li> <li>e. Cycling of nutrients</li> <li>f. Removal of elements and compounds</li> <li>g. Retention of particulates</li> <li>h. Export of organic carbon</li> <li>i. Maintenance of plant and animal communities</li> </ul>	<p>Note: steps 2 and 3 are mutually exclusive. If step 2 is used, then complete the rest of the checklist (steps 4-10).</p> <p>Ratio adjustment:</p> <p>PM justification:</p>	<p>Ratio adjustment:</p> <p>PM justification:</p>	<p>Ratio adjustment:</p> <p>PM justification:</p>
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3	<p><b>QUANTITATIVE impact-mitigation comparison:</b></p> <p>Use step 3 if a Corps-approved functional/condition assessment been obtained.</p> <p>In general, project managers should consider requiring a functional/condition assessment and using step 3 for projects where total permanent impacts exceed 0.5 acre or 300 linear feet.</p> <p>Acceptable functional/condition assessment methods must be aquatic resource-based, standardized, comparable from site to site, peer-reviewed, unmodified, and approved by the applicable Corps District. If a district-approved method is not available, use step 2.</p> <p>Use Before-After-Mitigation-Impact (BAMI) spreadsheet (attachment 12501.4) (if a district-approved functional/condition method is not available, use step 2 instead). See example below.</p>	<p>Note: steps 2 and 3 are mutually exclusive. If step 3 is used, steps 3 and 5 may also be mutually exclusive. If a functional/condition assessment method is used that explicitly accounts for area (such as HGM), steps 3 and 5 are mutually exclusive; however, if a method is used that does *not* explicitly account for area (such as CRAM), then both steps should be used. Complete the rest of the checklist (steps 4-10 or steps 4 and 6-10, as appropriate).</p> <p>Ratio adjustment from BAMI spreadsheet (attached):</p>	Ratio adjustment from BAMI procedure (attached):	Ratio adjustment from BAMI procedure (attached):
4	<p><b>Mitigation site location:</b> Mitigation located outside impacted watershed generally warrants higher mitigation ratio. The PM will determine the appropriate Hydrologic Unit Code (HUC) to define the term “watershed” in this context. Is mitigation located outside of the impacted watershed? If yes, +1.0, if no, +0.</p>	<p>Ratio adjustment:</p> <p>PM justification:</p>	Ratio adjustment:  PM justification:	Ratio adjustment:  PM justification:
5	<p><b>Net loss of aquatic resource surface area:</b> Different types of mitigation result in varying net losses of aquatic resource area. For definitions of mitigation types, see mitigation rule at 33 C.F.R. 332.2.</p> <p>Re-establishment or establishment +0, Rehabilitation, enhancement, preservation +1.0 (these three mitigation types result in a loss of aquatic resource area).</p>	<p>Ratio adjustment:</p> <p>PM justification:</p>	Ratio adjustment:  PM justification:	Ratio adjustment:  PM justification:

6	<p><b>Type conversion:</b> Out-of-kind mitigation generally warrants a higher mitigation ratio. However, out-of-kind mitigation can be appropriate if the proposed mitigation habitat type serves the aquatic resource needs of the watershed/ecoregion. In considering out-of-kind mitigation, project managers should consider whether impacts or mitigation would consist of rare or regionally significant habitat types (e.g., vernal pools). PM will determine the relative values of different habitat types and document herein. Justification for the use of out-of-kind mitigation must be documented herein.</p> <p>Would mitigation result in: (A) conversion from a highly valuable and/or rare habitat type to a common type? Or (B) vice versa? Magnitude of adjustment should vary with value of habitats involved. Calculate ratio adjustment based on answers to questions (A) and (B): Y,N: +0.25 to +4.0; N,Y: -0.25 to -4.0; N,N: +0.</p>	<p>Ratio adjustment:</p> <p>PM justification:</p>	<p>Ratio adjustment:</p> <p>PM justification:</p>	<p>Ratio adjustment:</p> <p>PM justification:</p>
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7	<p><b>Uncertainty</b> Mitigation ratios should reflect the inherent uncertainty of mitigation. Factors to consider include: 1) Permittee-responsible mitigation; 2) mitigation site did not formerly support targeted aquatic resources; 3) difficult-to-replace resources (see 33 C.F.R. 332.3(e)(3) and (f)(2)); 4) modified hydrology (e.g., high-flow bypass); 5) artificial hydrology (e.g., pumped water source); 6) structures requiring long-term maintenance (e.g., outfalls, drop structures, weirs, bank stabilization structures); 7) planned vegetation maintenance (e.g., mowing, landclearing, fuel modification activities); 8) e.g., shallow, buried structures (riprap, clay liners), and 9) absence of long-term preservation mechanism. Note: this list is not all-inclusive.</p> <p>Each factor can range from +0.1 to +0.3 depending on the level of anticipated disturbance. Sum factor adjustments (+0 if no factors). Generally, uncertainty in banks and in lieu fee programs is accounted for in the credit release process.</p>	<p>Ratio adjustment:</p> <p>PM justification:</p>	<p>Ratio adjustment:</p> <p>PM justification:</p>	<p>Ratio adjustment:</p> <p>PM justification:</p>
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8	<p><b>Temporal loss:</b> Constructed habitats take time to mature and replace aquatic functions; this typically warrants a higher mitigation ratio in cases where a delay is planned between impacts and full replacement of functions. PM should estimate the time between when the authorized impacts occur and constructed mitigation is expected to replace lost functions, including the monitoring period. In cases where all performance standards are expected to be achieved prior to impacts, no temporal loss should be assessed (for Permittee-responsible only). Similarly, in cases where interim performance standards are expected to be achieved, a lower ratio adjustment may be appropriate. Unexpected delays should be handled as compliance actions.</p> <ul style="list-style-type: none"> <li>a. For scheduled, known delays between impacts and construction of mitigation: multiply delay (in months) by 0.05;</li> <li>b. To account for time required for full replacement of functions during monitoring period: generally, if mitigation is comprised of trees/woodlands or saltmarsh, +3; if shrubs, +2; if herbaceous, +1;</li> <li>c. Add adjustments from steps (a) and (b).</li> </ul>	<p>Ratio adjustment:</p> <p>PM justification:</p>	<p>Ratio adjustment:</p> <p>PM justification:</p>	<p>Ratio adjustment:</p> <p>PM justification:</p>
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<p>9</p>	<p><b>Final mitigation ratio(s):</b> Project manager should enter the final mitigation ratio(s) arrived at after consideration of the above factors (either qualitative OR quantitative). PM should enter the extent of authorized impacts and required mitigation by area (acreage) and distance (linear feet), as well as the corresponding resource type (lake, non-tidal wetland, other, pond, stream/river/ocean, tidal wetland) and Cowardin or Hydrogeomorphic Method (HGM) classification type.</p> <p>To obtain the final mitigation ratio, add ratio adjustments from steps 2-8. Minimum ratio = 1 if step 2 used rather than 3 (ratios can be less than 1 if a functional/condition assessment has been completed that justifies a ratio less than 1, in combination with the other steps of the checklist).</p> <p>In the final determination of required mitigation, indirect and/or cumulative impacts should be considered:</p> <ol style="list-style-type: none"> <li>Indirect impacts: Compensatory mitigation may be required to offset predictable indirect impacts. The PM should document any indirect impacts within Corps scope of analysis.</li> <li>Cumulative impacts: In rare cases where determined appropriate, cumulative impacts should be considered when determining mitigation requirements. The extent of cumulative impacts should be documented using available information, such as analyses or data associated with a Special Area Management Plan (SAMP), Watershed Management Plan, land use/land cover scenario assessment, hydrologic modeling, etc. The information used should be fully cited herein and in the decision document. Consistent with 40 C.F.R. 1508.7, the assessment must focus on the proposed action's impacts (i.e., incremental impact of the action) in the context of past, present, and reasonably foreseeable actions, regardless of the agency or person undertaking the action.</li> </ol>	<p>Final ratio: ____ : 1 (column A)</p> <p>Proposed impact (total):          ____ acre          ____ linear feet          to          Resource type: _____          Cowardin or HGM: _____</p> <p>Required mitigation:          ____ acre          ____ linear feet          of          Resource type: _____          Cowardin or HGM: _____</p> <p>Additional PM comments:</p>	<p>Final ratio: ____ : 1 (column B)</p> <p>Remaining impact: _____</p> <p>Required mitigation:          ____ acre          ____ linear feet          of          Resource type: _____          Cowardin or HGM: _____</p> <p>Additional PM comments:</p>	<p>Final ratio: ____ : 1 (column C)</p> <p>Remaining impact: _____</p> <p>Required mitigation:          ____ acre          ____ linear feet          of          Resource type: _____          Cowardin or HGM: _____</p> <p>Additional PM comments:</p>
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*Current Approved Version: 1/23/2012. Printed copies are for "Information Only." The controlled version resides on the SPD QMS SharePoint Portal.*

10	<b>Final compensatory mitigation requirements:.</b> PM should summarize the checklist results, combining all required mitigation for this impact site.	PM summary:
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### Step 3

#### Before-After-Mitigation-Impact (BAMI) procedure

#### (CRAM example)

Functions/conditions	Impact <sub>Before</sub>	Impact <sub>After</sub>	Impact <sub>delta</sub>	Mitigation <sub>Before</sub>	Mitigation <sub>After</sub>	Mitigation <sub>delta</sub>
<b>4.1 Buffer and Landscape Context</b>						
4.1.1 Landscape Connectivity	9	3	-6	6	6	0
4.1.2 Percent of AA with Buffer	12	6	-6	3	9	6
4.1.3 Average Buffer Width	3	3	0	3	12	9
4.1.4 Buffer Condition	6	6	0	3	9	6
<b>RAW SCORE</b>	<b>15.0</b>	<b>8.0</b>	<b>-7</b>	<b>9.0</b>	<b>15.7</b>	<b>7</b>
<b>FINAL SCORE</b>	<b>62.5</b>	<b>33.6</b>	<b>-29</b>	<b>37.5</b>	<b>65.3</b>	<b>28</b>
<b>4.2 Attribute 2: Hydrology</b>						
4.2.1 Water Source	6	6	0	6	6	0
4.2.2 Hydroperiod or Channel Stability	9	12	3	3	9	6
4.2.3 Hydrologic Connectivity	12	9	-3	3	12	9
<b>RAW SCORE</b>	<b>27.0</b>	<b>27.0</b>	<b>0</b>	<b>12.0</b>	<b>27.0</b>	<b>15</b>
<b>FINAL SCORE</b>	<b>75.0</b>	<b>75.0</b>	<b>0</b>	<b>33.4</b>	<b>75.0</b>	<b>42</b>
<b>4.3 Attribute 3: Physical Structure</b>						
4.3.1 Structural Patch Richness	6	3	-3	3	9	6
4.3.2 Topographic Complexity	6	3	-3	3	6	3
<b>RAW SCORE</b>	<b>12.0</b>	<b>6.0</b>	<b>-6</b>	<b>6.0</b>	<b>15.0</b>	<b>9</b>
<b>FINAL SCORE</b>	<b>50.0</b>	<b>25.0</b>	<b>-25</b>	<b>25.0</b>	<b>62.5</b>	<b>38</b>
<b>4.4 Attribute 4: Biotic Structure</b>						
4.4.1 Number of Plant Layers	12	9	-3	6	9	3
4.4.2 Co-Dominant Species	6	6	0	6	12	6
4.4.3 Percent Invasion	6	9	3	3	12	9
4.4.5 Interspersion/Zonation	9	3	-6	3	9	6
4.4.6 Vertical Structure	6	3	-3	3	6	3
<b>RAW SCORE</b>	<b>23</b>	<b>14</b>	<b>-9</b>	<b>11</b>	<b>26</b>	<b>15</b>
<b>FINAL SCORE</b>	<b>63.9</b>	<b>38.9</b>	<b>-25</b>	<b>30.6</b>	<b>72.3</b>	<b>42</b>
<b>OVERALL SCORE</b>	<b>65.0</b>	<b>46.0</b>	<b>-19</b>	<b>32.0</b>	<b>70.0</b>	<b>38</b>

Quotient=ABS(I/M) <sub>delta</sub> Itas <b>0.50</b>
Step 5 adjustment =log(quotient)*2.5 -0.75

Instructions:

1. Choose functional/condition assessment method. Acceptable functional assessment methods must be aquatic resource-based, standardized, comparable from site to site, peer-reviewed, and approved by the applicable Corps District.
2. List functions/condition categories in leftmost column.
3. Utilize BAMI procedure above to calculate function deltas.
4. Obtain absolute value (ABS\*) of quotient of impact-delta over mitigation-delta for overall score (if method has no overall score, use median of quotients for function categories or individual functions. \*Absolute value is the nonnegative number for any real number, so if your quotient is negative, simply drop the negative sign to get the ABS. For example: the ABS of  $-9/3 = 3$ ).
5. Compute log of quotient multiplied by 2.5 to obtain adjustment for step 3.
6. Input Step 3 adjustment into the checklist document.

Attachment 12501.3-SPD - Examples for SPD Mitigation Ratio Setting Checklist

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## Checklist Example 1: one impact site/type with two mitigation sites/types

**Impact(s):** The applicant is proposing to permanently impact 0.3 acre (870 linear feet) of intermittent stream with mature, native riparian vegetation (southern willow woodland).

**Proposed mitigation:** The applicant has proposed to mitigate through: 1) 0.3 acre of on-site, in-kind establishment of intermittent stream by re-aligning the existing stream such that the new alignment would be constructed across existing uplands (prior to grading to reduce elevations appropriately); and 2) 0.6 acre of off-site, out-of-kind enhancement of depressional wetland through a mitigation bank.

**Method:** The project manager has completed one checklist (see below), using column “A” for the on-site, proposed mitigation and column “B” for the off-site proposed mitigation.

**Results:** After completing the checklist columns “A” and “B”, and after discussing the results with the applicant, the project manager has determined the final mitigation ratios to be 1:1 for on-site (0.3 acre, as proposed) and 4:1 for off-site (0.84 acre of enhancement credit). As part of this process, the applicant agreed to increase his/her off-site mitigation from 0.6 acre to 0.84 acre. The project manager then entered the final requirement on the last page of the checklist and added the completed checklist to the administrative record (either as a paper copy in the paper file or as an electronic file in ORM). Alternatively, the project manager and/or applicant could have proposed all on-site mitigation (0.99 acre of establishment) or all off-site mitigation (1.2 acre of enhancement) to mitigate for the proposed impact. Regardless of the outcome of any negotiations, the final mitigation ratio(s) and requirement(s) should be explicitly described in steps 9 and 10 of the checklist.

## SPD mitigation ratio setting checklist

1	<p>Date: <u>5/17/2010</u> Corps file no.: <u>2010-XYZ</u> Project Manager: <u>John Doe</u></p> <p>Impact site name: <u>Tullay Creek</u> ORM impact resource type: <u>stream</u></p> <p>Impact Cowardin or HGM type: <u>riverine-intermittent</u> Impact area (acres): <u>0.3</u> Impact distance (linear feet): <u>870</u></p> <table border="1" data-bbox="737 342 2003 526"> <tr> <td data-bbox="737 342 1220 526"> <p>Column A:</p> <p>Mitigation site name: <u>Tullay Creek</u></p> <p>Mitigation type: <u>establishment</u></p> <p>Resource type: <u>stream</u></p> <p>Cowardin/HGM type: <u>riverine-intermittent</u></p> </td><td data-bbox="1220 342 1619 526"> <p>Column B (optional):</p> <p>Mitigation site name: <u>WL bank</u></p> <p>Mitigation type: <u>enhancement</u></p> <p>Resource type: <u>non-tidal WL</u></p> <p>Cowardin/HGM type: <u>palustrine</u></p> </td><td data-bbox="1619 342 2003 526"> <p>Column C (optional):</p> <p>Mitigation site name: _____</p> <p>Mitigation type: _____</p> <p>Resource type: _____</p> <p>Cowardin/HGM type: _____</p> </td></tr> </table>				<p>Column A:</p> <p>Mitigation site name: <u>Tullay Creek</u></p> <p>Mitigation type: <u>establishment</u></p> <p>Resource type: <u>stream</u></p> <p>Cowardin/HGM type: <u>riverine-intermittent</u></p>	<p>Column B (optional):</p> <p>Mitigation site name: <u>WL bank</u></p> <p>Mitigation type: <u>enhancement</u></p> <p>Resource type: <u>non-tidal WL</u></p> <p>Cowardin/HGM type: <u>palustrine</u></p>	<p>Column C (optional):</p> <p>Mitigation site name: _____</p> <p>Mitigation type: _____</p> <p>Resource type: _____</p> <p>Cowardin/HGM type: _____</p>
<p>Column A:</p> <p>Mitigation site name: <u>Tullay Creek</u></p> <p>Mitigation type: <u>establishment</u></p> <p>Resource type: <u>stream</u></p> <p>Cowardin/HGM type: <u>riverine-intermittent</u></p>	<p>Column B (optional):</p> <p>Mitigation site name: <u>WL bank</u></p> <p>Mitigation type: <u>enhancement</u></p> <p>Resource type: <u>non-tidal WL</u></p> <p>Cowardin/HGM type: <u>palustrine</u></p>	<p>Column C (optional):</p> <p>Mitigation site name: _____</p> <p>Mitigation type: _____</p> <p>Resource type: _____</p> <p>Cowardin/HGM type: _____</p>					
2	<p><b>QUALITATIVE impact-mitigation comparison:</b></p> <p>Has a Corps-approved functional/condition assessment been obtained? If not, complete step 2; otherwise, complete step 3.</p> <p>Yes <input type="checkbox"/> No <input checked="" type="checkbox"/></p>	<p>Note: steps 2 and 3 are mutually exclusive. If step 2 is used, then complete the rest of the checklist (steps 4-10).</p> <p>Ratio adjustment: <u>0</u></p> <p>PM justification: <u>impact and mitigation are within the same water body, habitat type, etc., so functional gain and loss would be equal.</u></p>	<p>Ratio adjustment: <u>+3</u></p> <p>PM justification: <u>Functional loss is greater than functional gain since in this case, there is total functional loss and only gain of selected functions via enhancement.</u></p>	<p>Ratio adjustment: _____</p> <p>PM justification: _____</p>			
3	<p><b>QUANTITATIVE impact-mitigation comparison:</b></p> <p>Use step 3 if a Corps-approved functional/condition assessment been obtained.</p> <p>Use Before-After-Mitigation-Impact (BAMI) spreadsheet (attachment 12501.4) (if a district-approved functional/condition method is not available, use step 2 instead). See example in attachment 12501.2.</p>	<p>Note: steps 2 and 3 are mutually exclusive. If step 3 is used, steps 3 and 5 may also be mutually exclusive. If a functional/condition assessment method is used that explicitly accounts for area (such as HGM), steps 3 and 5 are mutually exclusive; however, if a method is used that does *not* explicitly account for area (such as CRAM), then both steps should be used. Complete the rest of the checklist (steps 4-10 or steps 4 and 6-10, as appropriate).</p> <p>Ratio adjustment from BAMI procedure (attached): _____</p>	<p>Ratio adjustment from BAMI procedure (attached): _____</p>	<p>Ratio adjustment from BAMI procedure (attached): _____</p>			



4	<b>Mitigation site location:</b>	Ratio adjustment: 0 PM justification: impact and mitigation would be within the same watershed	Ratio adjustment: 0 PM justification: impact and mitigation would be within the same watershed	Ratio adjustment: PM justification:
5	<b>Net loss of aquatic resource surface area:</b>	Ratio adjustment: 0 PM justification: establishment	Ratio adjustment: +1 PM justification: enhancement	Ratio adjustment: PM justification:
6	<b>Type conversion:</b>	Ratio adjustment: 0 PM justification: n,n: no difference between impact and mitigation types	Ratio adjustment: 0 PM justification: intermittent riparian (willow woodland) and depressional wetlands not substantially different in terms of relative value.	Ratio adjustment: PM justification:
7	<b>Uncertainty:</b>	Ratio adjustment: +0.3 PM justification: +0.1 for permittee-responsible mitigation, +0.2 as mitigation site did not formerly support target aquatic resource.	Ratio adjustment: 0 PM justification: mitigation bank, uncertainty factors not applicable.	Ratio adjustment: PM justification:
8	<b>Temporal loss:</b>	Ratio adjustment: +3 PM justification: a: No planned delay, impact and mitigation to be constructed simultaneously. b: Both to include mature willow canopy (trees/woodlands), +3 to account for time to achieve full functions.	Ratio adjustment: 0 PM justification: bank, no delay	Ratio adjustment: PM justification:

9	<b>Final mitigation ratio(s):</b>	<p>Final ratio: <u>  3.3  </u> : 1 (column A)</p> <p>Proposed impact (total):  <u>  0.3  </u> acre  <u>  870  </u> linear feet  to  Resource type: <u>  stream  </u>  Cowardin or HGM: <u>  riverine-intermittent  </u></p> <p>Required mitigation:  <u>  0.3*  </u> acre  <u>  900  </u> linear feet  of  Resource type: <u>  same  </u>  Cowardin or HGM: <u>  same  </u></p> <p>Additional PM comments:  *Applicant proposed alternate, off-site mitigation to account for difference between proposed (0.3 acre establishment, 1:1) and Corps assessment using checklist (0.99 acre establishment, 3.3:1). 0.69 acre of Corps assessment not met = <math>0.69/0.99 \times 100 = 70\%</math>. 70% of impact unmitigated = 0.21 acre of impact. See column B.</p>	<p>Final ratio: <u>  4.0  </u> : 1 (column B)</p> <p>Remaining impact: <u>  0.21  </u> acre</p> <p>Required mitigation:  <u>  0.84  </u> acre  <u>      </u> linear feet  of  Resource type: <u>  non-tidal WL  </u>  Cowardin or HGM: <u>  palustrine, depressional wetland  </u></p> <p>Additional PM comments:  Applicant originally proposed 0.6 acre of off-site enhancement via bank. Through checklist, I've determined requirement should be 0.84 acre. Applicant has agreed to provide 0.84 acre of wetland enhancement credit at XYZ bank.</p>	<p>Final ratio: <u>   </u> : 1 (column C)</p> <p>Remaining impact: <u>          </u></p> <p>Required mitigation:  <u>   </u> acre  <u>   </u> linear feet  of  Resource type: <u>          </u>  Cowardin or HGM: <u>          </u></p> <p>Additional PM comments:</p>
10	<b>Final compensatory mitigation requirements:</b>	<p>PM summary: The final compensatory mitigation requirement for this impact site is 0.3 acre (900 linear feet) of on-site riverine-intermittent stream (realignment of Tullay Creek, mature willow woodland) and 0.84 acre of off-site enhancement of depressional wetland through the XYZ mitigation bank.</p>		

## Checklist Example 2: one impact site/type with direct and indirect impacts to vernal pools

**Impact(s):** The applicant is proposing to directly impact 1.5 acres of high quality vernal pool habitat. Indirect impacts to 0.75 acre of high quality vernal pool habitat are also expected to occur.

**Proposed mitigation:** The applicant has proposed to mitigate direct impacts at a 1.3:1 ratio and indirect impacts at a 1:1 ratio through permittee-responsible re-establishment in the adjacent watershed.

**Method:** The project manager has completed one checklist (see below), using column “A” to calculate direct impact mitigation and column “B” for indirect impact mitigation. The qualitative analysis was utilized, as SPK does not yet have an approved functional assessment method.

**Results:** After completing the checklist columns “A” and “B”, the project manager determined the final mitigation ratios to be 2.6:1 for direct impacts and 2.1:1 for indirect impacts. The project manager then entered the final requirement on the last page of the checklist and added the completed checklist to the administrative record (either as a paper copy in the paper file or as an electronic file in ORM).

## SPD mitigation ratio setting checklist

1	<p>Date: <u>5/24/2010</u> Corps file no.: <u>2010-XYZ</u> Project Manager: <u>John Doe</u></p> <p>Impact site name: <u>Placer 530</u> ORM impact resource type: <u>wetlands adjacent to non-RPWs</u></p> <p>Impact Cowardin or HGM type: <u>depressional</u> Impact area (acres): <u>1.5 direct, 0.75 indirect</u> Impact distance (linear feet): <u>N/A</u></p>	<p>Column A: <u>Direct Impact</u></p> <p>Mitigation site name: <u>Limnanthes Ranch</u></p> <p>Mitigation type: <u>re-establishment</u></p> <p>Resource type: <u>wetlands adj. to non-RPWs</u></p> <p>HGM type: <u>depressional</u></p>	<p>Column B: <u>Indirect Impact</u></p> <p>Mitigation site name: <u>Limnanthes Ranch</u></p> <p>Mitigation type: <u>re-establishment</u></p> <p>Resource type: <u>wetlands adj. to non-RPWs</u></p> <p>HGM type: <u>depressional</u></p>	<p>Column C (optional):</p> <p>Mitigation site name: _____</p> <p>Mitigation type: _____</p> <p>Resource type: _____</p> <p>Cowardin/HGM type: _____</p>
2	<p><b>QUALITATIVE impact-mitigation comparison:</b></p> <p>Has a Corps-approved functional/condition assessment been obtained? If not, complete step 2; otherwise, complete step 3.</p> <p>Yes <input type="checkbox"/> No <input checked="" type="checkbox"/></p>	<p>Note: steps 2 and 3 are mutually exclusive. If step 2 is used, then complete the rest of the checklist (steps 4-10).</p> <p>Ratio adjustment: <u>0.2</u></p> <p>PM justification: <u>Due to differences between vernal pool inoculum in the different locations, the mitigation site is not expected to maintain the range of plant and animal communities (habitat functions) provided by the pre-project impact site.</u></p>	<p>Ratio adjustment: <u>-0.3</u></p> <p>PM justification: <u>Indirectly impacted vernal pools are expected to have an approximately 50% decline in functions. Due to differences between vernal pool inoculum in the different locations, the mitigation site is not expected to maintain the range of plant and animal communities (habitat functions) provided by the pre-project impact site.</u></p>	<p>Ratio adjustment: _____</p> <p>PM justification: _____</p>

3	<b>QUANTITATIVE impact-mitigation comparison:</b>  Use step 3 if a Corps-approved functional/condition assessment been obtained. Use Before-After-Mitigation-Impact (BAMI) spreadsheet (attachment 12501.4) (if a district-approved functional/condition method is not available, use step 2 instead). See example in attachment 12501.2.	Note: steps 2 and 3 are mutually exclusive. If step 3 is used, steps 3 and 5 may also be mutually exclusive. If a functional/condition assessment method is used that explicitly accounts for area (such as HGM), steps 3 and 5 are mutually exclusive; however, if a method is used that does *not* explicitly account for area (such as CRAM), then both steps should be used. Complete the rest of the checklist (steps 4-10 or steps 4 and 6-10, as appropriate).  Ratio adjustment from BAMI procedure (attached):	Ratio adjustment from BAMI procedure (attached):	Ratio adjustment from BAMI procedure (attached):
4	<b>Mitigation site location:</b>	Ratio adjustment: 1 PM justification: Mitigation will occur outside of the watershed	Ratio adjustment: 1 PM justification: Mitigation will occur outside of the watershed	Ratio adjustment: PM justification:
5	<b>Net loss of aquatic resource surface area:</b>	Ratio adjustment: 0 PM justification: re-establishment	Ratio adjustment: 0 PM justification: re-establishment	Ratio adjustment: PM justification:
6	<b>Type conversion:</b>	Ratio adjustment: 0 PM justification: mitigation will be in-kind	Ratio adjustment: 0 PM justification: mitigation will be in-kind	Ratio adjustment: PM justification:
7	<b>Uncertainty:</b>	Ratio adjustment: +0.4 PM justification: +0.2 for permittee-responsible mitigation, +0.2 for difficult to replace resources	Ratio adjustment: +0.4 PM justification: +0.2 for permittee-responsible mitigation, +0.2 for difficult to replace resources	Ratio adjustment: PM justification:
8	<b>Temporal loss:</b>	Ratio adjustment: +1 PM justification: mitigation will occur at time of impact, herbaceous species	Ratio adjustment: +1 PM justification: mitigation will occur at time of impact, herbaceous species	Ratio adjustment: PM justification:

9	<b>Final mitigation ratio(s):</b>	<p>Final ratio: <u>  2.6  </u> : 1 (column A)</p> <p>Proposed impact (total):  <u>  1.5  </u> acre  _____ linear feet  to  Resource type: <u>  wetland  </u>  Cowardin or HGM: <u>  depressional  </u></p> <p>Required mitigation:  <u>  3.9  </u> acre  _____ linear feet  of  Resource type: <u>  wetland  </u>  Cowardin or HGM: <u>  depressional  </u></p> <p>Additional PM comments:  <u>Total direct impacts</u></p>	<p>Final ratio: <u>  2.1  </u> : 1 (column B)</p> <p>Remaining impact: <u>  0.75  </u> acre</p> <p>Required mitigation:  <u>  1.6  </u> acre  _____ linear feet  of  Resource type: <u>  wetland  </u>  Cowardin or HGM: <u>  depressional  </u></p> <p>Additional PM comments:  <u>Remaining 0.75 acre of impacts are indirect impacts to vernal pool habitat</u></p>	<p>Final ratio: <u>   </u> : 1 (column C)</p> <p>Remaining impact: _____</p> <p>Required mitigation:  _____ acre  _____ linear feet  of  Resource type: _____  Cowardin or HGM: _____</p> <p>Additional PM comments:</p>
10	<b>Final compensatory mitigation requirements:</b>	PM summary: <u>The final compensatory mitigation requirement for this impact site is 5.5 acres of vernal pool habitat at the proposed off-site location. This is an increase of 2.8 acres over the 2.7 acres proposed.</u>		

### Checklist Example 3: shallow seasonal wetland, one impact site/type with two mitigation sites/types

**Impact(s):** The applicant is proposing to permanently impact 0.4 acre of shallow seasonal wetlands, which contain no vernal pool species.

**Proposed mitigation:** The applicant has proposed to mitigate through either: 1) on-site, in-kind establishment of seasonal wetlands constructed in existing uplands (prior to grading to reduce elevations appropriately); or 2) off-site, in-kind mitigation bank.

**Method:** The project manager has completed one checklist (see below), using column “A” for the on-site, proposed mitigation and column “B” for the off-site proposed mitigation.

**Results:** After completing the checklist columns “A” and “B”, and after discussing the results with the applicant, the project manager has determined the final mitigation ratios to be 1.65:1 for on-site seasonal wetland establishment **OR** 1:1 for off-site seasonal wetland mitigation bank establishment credit.

## SPD mitigation ratio setting checklist

1	<p>Date: <u>5/17/2010</u> Corps file no.: <u>2010-XYZ</u> Project Manager: <u>John Doe</u></p> <p>Impact site name: <u>SF Impacted Wetland</u> ORM impact resource type: <u>seasonal wetland</u></p> <p>Impact Cowardin or HGM type: <u>palustrine - emergent</u> Impact area (acres): <u>0.4</u> Impact distance (linear feet): <u>n/a</u></p> <table border="1" data-bbox="737 342 2003 527"> <tr> <td data-bbox="737 342 1220 527"> <p>Column A:</p> <p>Mitigation site name: <u>Project site</u></p> <p>Mitigation type: <u>establishment</u></p> <p>Resource type: <u>seasonal wetland</u></p> <p>Cowardin/HGM type: <u>palustrine emergent</u></p> </td><td data-bbox="1220 342 1619 527"> <p>Column B (optional):</p> <p>Mitigation site name: <u>SF bank</u></p> <p>Mitigation type: <u>establishment</u></p> <p>Resource type: <u>seasonal wetland</u></p> <p>Cowardin/HGM type: <u>palustrine estuarine</u></p> </td><td data-bbox="1619 342 2003 527"> <p>Column C (optional):</p> <p>Mitigation site name: _____</p> <p>Mitigation type: _____</p> <p>Resource type: _____</p> <p>Cowardin/HGM type: _____</p> </td></tr> </table>				<p>Column A:</p> <p>Mitigation site name: <u>Project site</u></p> <p>Mitigation type: <u>establishment</u></p> <p>Resource type: <u>seasonal wetland</u></p> <p>Cowardin/HGM type: <u>palustrine emergent</u></p>	<p>Column B (optional):</p> <p>Mitigation site name: <u>SF bank</u></p> <p>Mitigation type: <u>establishment</u></p> <p>Resource type: <u>seasonal wetland</u></p> <p>Cowardin/HGM type: <u>palustrine estuarine</u></p>	<p>Column C (optional):</p> <p>Mitigation site name: _____</p> <p>Mitigation type: _____</p> <p>Resource type: _____</p> <p>Cowardin/HGM type: _____</p>
<p>Column A:</p> <p>Mitigation site name: <u>Project site</u></p> <p>Mitigation type: <u>establishment</u></p> <p>Resource type: <u>seasonal wetland</u></p> <p>Cowardin/HGM type: <u>palustrine emergent</u></p>	<p>Column B (optional):</p> <p>Mitigation site name: <u>SF bank</u></p> <p>Mitigation type: <u>establishment</u></p> <p>Resource type: <u>seasonal wetland</u></p> <p>Cowardin/HGM type: <u>palustrine estuarine</u></p>	<p>Column C (optional):</p> <p>Mitigation site name: _____</p> <p>Mitigation type: _____</p> <p>Resource type: _____</p> <p>Cowardin/HGM type: _____</p>					
2	<p><b>QUALITATIVE impact-mitigation comparison:</b></p> <p>Has a Corps-approved functional/condition assessment been obtained? If not, complete step 2; otherwise, complete step 3.</p> <p>Yes <input type="checkbox"/> No <input checked="" type="checkbox"/></p>	<p>Note: steps 2 and 3 are mutually exclusive. If step 2 is used, then complete the rest of the checklist (steps 4-10).</p> <p>Ratio adjustment: <u>0</u></p> <p>PM justification: <u>impacts and mitigation sites are the same habitat type, so functional gain and loss would be equal.</u></p>	<p>Ratio adjustment: <u>0</u></p> <p>PM justification: <u>impacts and mitigation sites are the same habitat type, so functional gain and loss would be equal.</u></p>	<p>Ratio adjustment:</p> <p>PM justification:</p>			
3	<p><b>QUANTITATIVE impact-mitigation comparison:</b></p> <p>Use step 3 if a Corps-approved functional/condition assessment been obtained.</p> <p>Use Before-After-Mitigation-Impact (BAMI) spreadsheet (attachment 12501.4) (if a district-approved functional/condition method is not available, use step 2 instead). See example in attachment 12501.2.</p>	<p>Note: steps 2 and 3 are mutually exclusive. If step 3 is used, steps 3 and 5 may also be mutually exclusive. If a functional/condition assessment method is used that explicitly accounts for area (such as HGM), steps 3 and 5 are mutually exclusive; however, if a method is used that does *not* explicitly account for area (such as CRAM), then both steps should be used. Complete the rest of the checklist (steps 4-10 or steps 4 and 6-10, as appropriate).</p> <p>Ratio adjustment from BAMI procedure (attached):</p>	<p>Ratio adjustment from BAMI procedure (attached):</p>	<p>Ratio adjustment from BAMI procedure (attached):</p>			



4	<b>Mitigation site location:</b>	Ratio adjustment: 0 PM justification: impact and mitigation would be within the same watershed	Ratio adjustment: 0 PM justification: impact and mitigation would be within the same watershed	Ratio adjustment: PM justification:
5	<b>Net loss of aquatic resource surface area:</b>	Ratio adjustment: 0 PM justification: establishment	Ratio adjustment: 0 PM justification: establishment	Ratio adjustment: PM justification:
6	<b>Type conversion:</b>	Ratio adjustment: 0 PM justification: n,n: no difference between impact and mitigation types	Ratio adjustment: 0 PM justification: n,n: no difference between impact and mitigation types	Ratio adjustment: PM justification:
7	<b>Uncertainty:</b>	Ratio adjustment: +0.4 PM justification: +0.1 for permittee-responsible mitigation, +0.2 as mitigation site did not formerly support target aquatic resource, +0.1 for planned vegetation maintenance	Ratio adjustment: 0 PM justification: mitigation bank, uncertainty factors not applicable.	Ratio adjustment: PM justification:
8	<b>Temporal loss:</b>	Ratio adjustment: +1.25 PM justification: Delay of 5 months between impact and mitigation construction, mitigation = herbaceous.	Ratio adjustment: 0 PM justification: bank, no delay	Ratio adjustment: PM justification:
9	<b>Final mitigation ratio(s):</b>	<p>Final ratio: 1.65 : 1 (column A)</p> <p>Proposed impact (total): 0.4 acre n/a linear feet to Resource type: seasonal wetland Cowardin or HGM: palustrine-emergent</p> <p>Required mitigation: 0.66 acre n/a linear feet of Resource type: same Cowardin or HGM: same</p> <p>Additional PM comments: On-site mitigation of same type</p>	<p>Final ratio: 1 : 1 (column B)</p> <p>Remaining impact: 0.4 acre</p> <p>Required mitigation: 0.4 acre n/a linear feet of Resource type: seasonal wetland Cowardin or HGM: palustrine-emergent</p> <p>Additional PM comments: Mitigation bank (as an alternative mitigation option). 1:1 used since step 5 was not used.</p>	<p>Final ratio: : 1 (column C)</p> <p>Remaining impact: _____</p> <p>Required mitigation: acre linear feet of Resource type: _____ Cowardin or HGM: _____</p> <p>Additional PM comments:</p>

10	<b>Final compensatory mitigation requirements:</b>	<p>PM summary: The impact to 0.4 acre of fill in a shallow seasonal wetland can be mitigated by either on-site wetland establishment, <b>OR</b> by purchasing credits in a wetland establishment bank in the same watershed/service area. The amount required for on-site establishment is 0.66 acre to satisfy the mitigation requirements. The amount for off-site wetland bank credits is 0.4 acre of establishment credits.</p> <p>After further communication with applicant, the final requirement will be for on-site establishment of 0.66 acre.</p>
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#### **Checklist Example 4: Scenario: ephemeral stream, one impact site and one mitigation site (ILF)**

**Impact(s):** The applicant is proposing to permanently impact 0.3 acre (1276 linear feet) of ephemeral stream with mature, native xeroriparian vegetation (mesquite, palo verde, etc).

**Proposed mitigation:** The applicant has proposed to mitigate through: 1) 0.3 acre of off-site, out-of-kind restoration of riparian gallery with cottonwood, willows and adjacent wetlands at an in-lieu fee program.

**Method:** The project manager has completed one checklist (see below)

**Results:** After completing the checklist column “A”, and after discussing the results with the applicant, the project manager has determined the final mitigation ratio to be 1:1 (0.3 acre, as proposed).

## SPD mitigation ratio setting checklist

1	Date: <u>6/2/2010</u> Corps file no.: <u>2010-XYZ</u> Project Manager: <u>Jane Dough</u> Impact site name: <u>Unnamed wash</u> ORM impact resource type: <u>ephemeral stream</u> Impact Cowardin or HGM type: <u>riverine</u> Impact area (acres): <u>0.3</u> Impact distance (linear feet): _____			
		Column A: Mitigation site name: <u>Powers Butte site</u> Mitigation type: <u>restoration</u> Resource type: <u>stream &amp; adjacent wetland</u> Cowardin/HGM type: <u>riverine (riparian gallery with cottonwood, willows and adjacent wetlands)</u>	Column B (optional): Mitigation site name: _____ Mitigation type: _____ Resource type: _____ Cowardin/HGM type: _____	Column C (optional): Mitigation site name: _____ Mitigation type: _____ Resource type: _____ Cowardin/HGM type: _____
2	<b>QUALITATIVE impact-mitigation comparison:</b>  Has a Corps-approved functional/condition assessment been obtained? If not, complete step 2; otherwise, complete step 3.  Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Note: steps 2 and 3 are mutually exclusive. If step 2 is used, then complete the rest of the checklist (steps 4-10).  Ratio adjustment: <u>-0.5</u> PM justification: <u>The mitigation site generally provides more functions than the impact site. Therefore the adjustment was set at -0.5.</u>	Ratio adjustment: PM justification:	Ratio adjustment: PM justification:

3	<p><b>QUANTITATIVE impact-mitigation comparison:</b></p> <p>Use step 3 if a Corps-approved functional/condition assessment been obtained. Use Before-After-Mitigation-Impact (BAMI) spreadsheet (attachment 12501.4) (if a district-approved functional/condition method is not available, use step 2 instead). See example in attachment 12501.2.</p>	<p>Note: steps 2 and 3 are mutually exclusive. If step 3 is used, steps 3 and 5 may also be mutually exclusive. If a functional/condition assessment method is used that explicitly accounts for area (such as HGM), steps 3 and 5 are mutually exclusive; however, if a method is used that does *not* explicitly account for area (such as CRAM), then both steps should be used. Complete the rest of the checklist (steps 4-10 or steps 4 and 6-10, as appropriate).</p> <p>Ratio adjustment from BAMI procedure (attached):</p>	Ratio adjustment from BAMI procedure (attached):	Ratio adjustment from BAMI procedure (attached):
4	<b>Mitigation site location:</b>	<p>Ratio adjustment: 0</p> <p>PM justification: impact and mitigation would be within the same watershed</p>	Ratio adjustment: PM justification:	Ratio adjustment: PM justification:
5	<b>Net loss of aquatic resource surface area:</b>	<p>Ratio adjustment: 0</p> <p>PM justification: The mitigation is focused on restoration or re-establishment of the aquatic resources</p>	Ratio adjustment: PM justification:	Ratio adjustment: PM justification:
6	<b>Type conversion:</b>	<p>Ratio adjustment: 0</p> <p>PM justification: There is a slight difference in the functions at the impact and mitigation sites; however neither site supports highly valuable or rare habitat types.</p>	Ratio adjustment: PM justification:	Ratio adjustment: PM justification:
7	<b>Uncertainty:</b>	<p>Ratio adjustment: 0</p> <p>PM justification: Uncertainty for in-lieu fee programs has already been factored in to the proposal and the cost per acre.</p>	Ratio adjustment: PM justification:	Ratio adjustment: PM justification:

8	<b>Temporal loss:</b>	Ratio adjustment: 0 PM justification: Mitigation would occur prior to impacts. Much of the vegetation at the mitigation site has already begun to be established.	Ratio adjustment: PM justification:	Ratio adjustment: PM justification:
9	<b>Final mitigation ratio(s):</b>	Final ratio: 1 : 1 (column A)  Proposed impact (total): 0.3 acre 1276 linear feet to Resource type: stream Cowardin or HGM: riverine, ephemeral  Required mitigation: 0.3 acre n/a linear feet of Resource type: river Cowardin or HGM: riverine, intermittent  Additional PM comments: The calculated ratio came out as 0.5:1, but without a functional assessment, 1:1 is the minimum ratio allowed under the 2008 mitigation rule.	Final ratio: ____ : 1 (column B)  Remaining impact: _____  Required mitigation: ____ acre ____ linear feet of Resource type: _____ Cowardin or HGM: _____  Additional PM comments:	Final ratio: ____ : 1 (column C)  Remaining impact: _____  Required mitigation: ____ acre ____ linear feet of Resource type: _____ Cowardin or HGM: _____  Additional PM comments:
10	<b>Final compensatory mitigation requirements:</b>	PM summary: 1:1 ratio used, as step 5 was not completed (no functional/condition assessment). The final compensatory mitigation requirement for this impact site is 0.3 acre of restoration at the Powers Butte in-lieu fee program site.		

### Checklist Example 5: impact to fen habitat, one impact site with one mitigation site

**Impact(s):** The applicant proposes to permanently impact 0.26 acre of fen wetland.

**Proposed mitigation:** The applicant has proposed to mitigate through rehabilitation of 0.6 acre of filled fen wetland.

**Method:** The project manager has completed one checklist.

**Results:** After completing the checklist and after discussing the results with the applicant, the project manager has determined the final mitigation ratio to be 4.8:1 for the fen impacts. After consultation with the applicant, the applicant agreed to rehabilitate an additional 0.65 acre of fen wetland within the ski resort area to offset impacts. The project manager then entered the final requirement on the last page of the checklist and added the completed checklist to the administrative record (either as a paper copy in the paper file or as an electronic file in ORM).

## SPD mitigation ratio setting checklist

1	<p>Date: <u>6/17/2010</u> Corps file no.: <u>2010-123-JBD</u> Project Manager: <u>Jane B. Doe</u></p> <p>Impact site name: <u>Yowza Fen</u> ORM impact resource type: <u>non-tidal wetland</u></p> <p>Impact Cowardin or HGM type: <u>palustrine</u> Impact area (acres): <u>0.26</u> Impact distance (linear feet): _____</p> <table border="1" data-bbox="735 341 2005 495"> <tr> <td data-bbox="735 341 1218 495"> <p>Column A:</p> <p>Mitigation site name: <u>Ski Area Filled Fen</u></p> <p>Mitigation type: <u>rehabilitation</u></p> <p>Resource type: <u>non-tidal wetland</u></p> <p>Cowardin/HGM type: <u>palustrine</u></p> </td><td data-bbox="1218 341 1617 495"> <p>Column B (optional):</p> <p>Mitigation site name: _____</p> <p>Mitigation type: _____</p> <p>Resource type: _____</p> <p>Cowardin/HGM type: _____</p> </td><td data-bbox="1617 341 2005 495"> <p>Column C (optional):</p> <p>Mitigation site name: _____</p> <p>Mitigation type: _____</p> <p>Resource type: _____</p> <p>Cowardin/HGM type: _____</p> </td></tr> </table>				<p>Column A:</p> <p>Mitigation site name: <u>Ski Area Filled Fen</u></p> <p>Mitigation type: <u>rehabilitation</u></p> <p>Resource type: <u>non-tidal wetland</u></p> <p>Cowardin/HGM type: <u>palustrine</u></p>	<p>Column B (optional):</p> <p>Mitigation site name: _____</p> <p>Mitigation type: _____</p> <p>Resource type: _____</p> <p>Cowardin/HGM type: _____</p>	<p>Column C (optional):</p> <p>Mitigation site name: _____</p> <p>Mitigation type: _____</p> <p>Resource type: _____</p> <p>Cowardin/HGM type: _____</p>
<p>Column A:</p> <p>Mitigation site name: <u>Ski Area Filled Fen</u></p> <p>Mitigation type: <u>rehabilitation</u></p> <p>Resource type: <u>non-tidal wetland</u></p> <p>Cowardin/HGM type: <u>palustrine</u></p>	<p>Column B (optional):</p> <p>Mitigation site name: _____</p> <p>Mitigation type: _____</p> <p>Resource type: _____</p> <p>Cowardin/HGM type: _____</p>	<p>Column C (optional):</p> <p>Mitigation site name: _____</p> <p>Mitigation type: _____</p> <p>Resource type: _____</p> <p>Cowardin/HGM type: _____</p>					
2	<p><b>QUALITATIVE impact-mitigation comparison:</b></p> <p>Has a Corps-approved functional/condition assessment been obtained? If not, complete step 2; otherwise, complete step 3.</p> <p>Yes <input type="checkbox"/> No <input checked="" type="checkbox"/></p>	<p>Note: steps 2 and 3 are mutually exclusive. If step 2 is used, then complete the rest of the checklist (steps 4-10).</p> <p>Ratio adjustment: <u>+2</u></p> <p>PM justification: <u>impact and mitigation are within the same watershed, habitat type, etc., but rehabilitation would result in partial functional gain compared with total functional loss at impact site, so functional loss would be greater than functional gain.</u></p>	<p>Ratio adjustment: _____</p> <p>PM justification: _____</p>	<p>Ratio adjustment: _____</p> <p>PM justification: _____</p>			



3	<b>QUANTITATIVE impact-mitigation comparison:</b>  Use step 3 if a Corps-approved functional/condition assessment been obtained. Use Before-After-Mitigation-Impact (BAMI) spreadsheet (attachment 12501.4) (if a district-approved functional/condition method is not available, use step 2 instead). See example in attachment 12501.2.	Note: steps 2 and 3 are mutually exclusive. If step 3 is used, steps 3 and 5 may also be mutually exclusive. If a functional/condition assessment method is used that explicitly accounts for area (such as HGM), steps 3 and 5 are mutually exclusive; however, if a method is used that does *not* explicitly account for area (such as CRAM), then both steps should be used. Complete the rest of the checklist (steps 4-10 or steps 4 and 6-10, as appropriate).  Ratio adjustment from BAMI procedure (attached):	Ratio adjustment from BAMI procedure (attached):	Ratio adjustment from BAMI procedure (attached):
4	<b>Mitigation site location:</b>	Ratio adjustment: 0 PM justification: impact and mitigation would be within the same watershed	Ratio adjustment: PM justification:	Ratio adjustment: PM justification:
5	<b>Net loss of aquatic resource surface area:</b>	Ratio adjustment: +1 PM justification: rehabilitation	Ratio adjustment: PM justification:	Ratio adjustment: PM justification:
6	<b>Type conversion:</b>	Ratio adjustment: 0 PM justification: n,n: no difference between impact and mitigation types	Ratio adjustment: PM justification:	Ratio adjustment: PM justification:
7	<b>Uncertainty:</b>	Ratio adjustment: +0.4 PM justification: +0.1 for permittee-responsible mitigation, +0.3 mitigation site difficult-to-replace resource.	Ratio adjustment: PM justification:	Ratio adjustment: PM justification:
8	<b>Temporal loss:</b>	Ratio adjustment: +1.4 PM justification: Delay of 8 months +0.4, herbaceous, +1.	Ratio adjustment: 0 PM justification:	Ratio adjustment: PM justification:

9	<b>Final mitigation ratio(s):</b>	Final ratio: <u>4.8</u> : 1 (column A)  Proposed impact (total): <u>0.26</u> acre ____ linear feet to Resource type: <u>non-tidal wetland</u> Cowardin or HGM: <u>palustrine</u>  Required mitigation: <u>1.25</u> acre ____ linear feet of Resource type: <u>same</u> Cowardin or HGM: <u>same</u>  Additional PM comments:	Final ratio: ____ : 1 (column B)  Remaining impact: ____  Required mitigation: ____ acre ____ linear feet of Resource type: ____ Cowardin or HGM: ____ Additional PM comments:	Final ratio: ____ : 1 (column C)  Remaining impact: ____  Required mitigation: ____ acre ____ linear feet of Resource type: ____ Cowardin or HGM: ____  Additional PM comments:
10	<b>Final compensatory mitigation requirements:</b>	PM summary: The final compensatory mitigation requirement for this impact site is 1.25 acres. Applicant will rehabilitate 1.25 acres of fen wetland previously filled within the resort area.		

**Attachment 12501.4-SPD - Before-After-Mitigation-Impact (BAMI) procedure**
**(CRAM example)**

Functions/conditions

 Impact<sub>Before</sub>

 Impact<sub>After</sub>

 Impact<sub>delta</sub>

 Mitigation<sub>Before</sub>

 Mitigation<sub>After</sub>

 Mitigation<sub>delta</sub>

Current to 1/23/2012

**4.1 Buffer and Landscape Context**

4.1.1 Landscape Connectivity	9	3	-6	6	6	0
4.1.2 Percent of AA with Buffer	12	6	-6	3	9	6
4.1.3 Average Buffer Width	3	3	0	3	12	9
4.1.4 Buffer Condition	6	6	0	3	9	6
<b>RAW SCORE</b>	<b>15.0</b>	<b>8.0</b>	<b>-7</b>	<b>9.0</b>	<b>15.7</b>	<b>7</b>
<b>FINAL SCORE</b>	<b>62.5</b>	<b>33.6</b>	<b>-29</b>	<b>37.5</b>	<b>65.3</b>	<b>28</b>

**4.2 Attribute 2: Hydrology**

4.2.1 Water Source	6	6	0	6	6	0
4.2.2 Hydroperiod or Channel Stability	9	12	3	3	9	6
4.2.3 Hydrologic Connectivity	12	9	-3	3	12	9
<b>RAW SCORE</b>	<b>27.0</b>	<b>27.0</b>	<b>0</b>	<b>12.0</b>	<b>27.0</b>	<b>15</b>
<b>FINAL SCORE</b>	<b>75.0</b>	<b>75.0</b>	<b>0</b>	<b>33.4</b>	<b>75.0</b>	<b>42</b>

**4.3 Attribute 3: Physical Structure**

4.3.1 Structural Patch Richness	6	3	-3	3	9	6
4.3.2 Topographic Complexity	6	3	-3	3	6	3
<b>RAW SCORE</b>	<b>12.0</b>	<b>6.0</b>	<b>-6</b>	<b>6.0</b>	<b>15.0</b>	<b>9</b>
<b>FINAL SCORE</b>	<b>50.0</b>	<b>25.0</b>	<b>-25</b>	<b>25.0</b>	<b>62.5</b>	<b>38</b>

**4.4 Attribute 4: Biotic Structure**

4.4.1 Number of Plant Layers	12	9	-3	6	9	3
4.4.2 Co-Dominant Species	6	6	0	6	12	6
4.4.3 Percent Invasion	6	9	3	3	12	9
4.4.5 Interspersion/Zonation	9	3	-6	3	9	6
4.4.6 Vertical Structure	6	3	-3	3	6	3
<b>RAW SCORE</b>	<b>23</b>	<b>14</b>	<b>-9</b>	<b>11</b>	<b>26</b>	<b>15</b>

<b>FINAL SCORE</b>	<b>63.9</b>	<b>38.9</b>	<b>-25</b>	<b>30.6</b>	<b>72.3</b>	<b>42</b>
<b>OVERALL SCORE</b>	<b>65.0</b>	<b>46.0</b>	<b>-19</b>	<b>32.0</b>	<b>70.0</b>	<b>38</b>

 Quotient=ABS(I/M)<sub>deltas</sub>
**0.50**

 Step 5 adjustment  
 =log(quotient)\*2.5  
 -0.75

Instructions:

1. choose functional method. Acceptable functional assessment methods must be aquatic resource-based, standardized, comparable from site to site, peer-reviewed, and must be approved by the applicable Corps District.
2. list functions/condition categories in leftmost column
3. utilize Before-After-Mitigation-Impact (BAMI) procedure above to calculate function deltas
4. obtain absolute value (ABS\*) of quotient of impact-delta over mitigation-delta for overall score (if method has no overall score, use median of quotients for function categories or individual functions. \*Absolute value is the nonnegative number for any real number, so if your quotient is negative, simply drop the negative sign to get the ABS. For example: the ABS of -9/3 = 3.
5. compute log of quotient multiplied by 2.5 to obtain adjustment for step 4
6. input Step 4 adjustment into the checklist document