DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
P. O. BOX 4970
JACKSONVILLE, FLORIDA 32232-0019

REPLY TO
ATTENTION OF

CESAJ-RD (1200A)

17 DEC 2014

MEMORANDUM FOR CESAJ-RD

SUBJECT: Local Guidance for the Assessment of Indirect and Secondary Effects and Impacts in Wetlands for Compensatory Mitigation under Section 404 of the Clean Water Act of 1972 (CWA)

1. Attached to this Memorandum for CESAJ-RD is *Jacksonville District, Regulatory Division Guidance for the Assessment of Indirect and Secondary Effects and Impacts in Wetlands for Compensatory Mitigation under the National Environmental Policy Act and Section 404 of the Clean Water Act of 1972* (Guidance).

2. The purpose of this Guidance is to provide an assessment method to determine the appropriate amount of wetland compensatory mitigation to offset functional losses resulting from indirect and secondary effects and impacts (indirect effects) in remaining adjacent wetlands for projects, as authorized by Department of the Army (DA) permits, issued under Section 404 CWA. The Guidance provides a tool to determine the sizes of wetlands to be assessed for wetland functional losses attributable to indirect and secondary effects and impacts.

3. CESAJ-RD staff should immediately implement use of this Guidance. Applicants for Department of the Army permits may submit for the Corps' consideration, alternative means to determine the appropriate amount of compensatory mitigation to offset indirect effects on remaining adjacent wetlands for a specific proposed project.

4. The points of contact for this memorandum are the following members of the Indirect Effects Project Delivery Team:

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Jacksonville District, Regulatory Division Guidance for the Assessment of Indirect and Secondary Effects and Impacts in Wetlands for Compensatory Mitigation under the National Environmental Policy Act and Section 404 of the Clean Water Act of 1972

I. Purpose: To provide guidance for the determination of compensatory mitigation to offset losses in wetland functions and values in remaining adjacent wetlands attributable to indirect and secondary effects and impacts associated with projects requiring Department of the Army permits issued under Section 404 of the Clean Water Act of 1972.

A. Background:

1. This guidance was developed by the Indirect Effects Project Development Team (PDT) comprised of staff from the Corps of Engineers, Jacksonville District, Regulatory Division (RD).

2. Implementation of the use of the Wetland Rapid Assessment Procedure (WRAP) in 1997 by RD provided an impetus and a framework for Corps staff to recognize, consider, and to quantify wetland functional losses attributable to indirect and secondary effects and impacts resulting from proposed projects on remaining adjacent wetlands. The common practice that developed in RD at that time based on WRAP was to assess remaining wetlands adjacent to the edge of direct on-the-ground impacts by establishing wetland polygons out 300' from the direct impact line. The resulting wetland polygons were assessed using WRAP to determine the loss of wetland functional value attributable to indirect and secondary effects and impacts of the wetland polygons between their pre-project and post-project conditions. Compensatory mitigation was then required to offset these losses.

3. In August 2013 RD management determined that RD staff has not been consistent in requiring nor in the methodology used for assessing wetland functional losses attributable to indirect and secondary effects and impacts from proposed projects requiring a DA permit.

4. The PDT was tasked by RD management in August 2013 to specifically develop guidance for RD staff to determine the size of wetland areas that should be assessed for wetland functional losses attributable to indirect and secondary effects and impacts in a consistent manner. Based on the assigned task the PDT developed the purpose above and the goals to meet the purpose, as listed in I.B below.

B. The following are the goals to meet the purpose:

1. To provide written guidance that is relatively simple, straightforward and flexible, and that allows professional judgment to take into account the wide variety of projects and ecological settings that may be evaluated for wetland functional losses attributable to indirect and secondary effects and impacts.

2. To determine the sizes of wetland areas to be assessed for wetland functional losses attributable to indirect and secondary effects and impacts.

3. To create a tool and describe how it can be used to determine the sizes of wetlands to be assessed for wetland functional losses attributable to indirect and secondary effects and impacts.

4. To allow for the use of existing wetland functional assessment methods to determine the relative loss of wetland functions attributable to indirect and secondary effects and impacts within wetland areas determined by the tool.

5. To set up the guidance as a "living document" that will be modified and updated, as experience is gained from its use by RD staff and others, and as new information becomes available.

II. The following provide the regulatory basis that wetland functional losses attributable to indirect and secondary effects and impacts should be considered, can be assessed, and that compensatory mitigation can be required to offset these wetland functional losses in wetlands adjacent to direct impact areas, associated with projects that require DA permits:

A. National Environmental Policy Act (NEPA) - Definitions of indirect and secondary effects and impacts from the "Questions and Answers for FHwA NEPA" website at http://www.environment.fhwa.dot.gov/projdev/qaimpact.asp:

How and where are direct, secondary, indirect, and cumulative effects and impacts defined?

> The CEQ regulations (40 CFR §§ 1500 -1508) define the impacts and effects that must be addressed and considered by Federal agencies in satisfying the requirements of the NEPA process. This includes direct, indirect and cumulative impacts:
>
> **Direct effects** are caused by the action and occur at the same time and place. (40 CFR § 1508.8)
>
> **Indirect effects** are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to

induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems. (40 CFR § 1508.8)

Cumulative impact is the impact on the environment, which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. (40 CFR § 1508.7)

The terms "effect" and "impact" are used synonymously in the CEQ regulations (40 CFR §1508.8). "Secondary impact" does not appear, nor is it defined in either the CEQ regulations or related CEQ guidance. However, the term is used in the FHWA's *Position Paper: Secondary and Cumulative Impact Assessment In the Highway Project Development Process* (April, 1992) but is defined with the CEQ definition of indirect impact (40 CFR § 1508.8). Some authors on this subject have distinguished secondary impacts from indirect impacts, while others; including the FHWA have used the terms interchangeably. For purposes of this guidance, secondary and indirect impacts mean the same thing.

B. References to indirect and secondary effects and impacts in the Corps's regulations at 33 CFR Parts 320 thru 332 (Corps's regulations) and in the Section 404(b)(1) Guidelines at 40 CFR Part 230 (Guidelines).

1. There are no references to "secondary" impacts and effects in the Corps's regulations. Rather the term "indirect" is used regarding environmental impacts, as shown below (Note: Only two other references to "indirect" in the Corps's regulations, one in reference to floodplain development and the other to cultural/historical resources):

a. **§ 320.4 General policies for evaluating permit applications.** (c) *Fish and wildlife.* In accordance with the Fish and Wildlife Coordination Act (paragraph 320.3(e) of this section) district engineers will consult with the Regional Director, U.S. Fish and Wildlife Service, the Regional Director, National Marine Fisheries Service, and the head of the agency responsible for fish and wildlife for the state in which work is to be performed, with a view to the conservation of wildlife resources by prevention of their direct and indirect loss and damage due to the activity proposed in a permit application. The Army will give full consideration to the views of those agencies on fish and wildlife matters in deciding on the issuance, denial, or conditioning of individual or general permits.

b. **§ 330.2 Definitions.** (f) *Filled area* means the area within jurisdictional waters which is eliminated or covered as a direct result of the

discharge (*i.e.*, the area actually covered by the discharged material). It does not include areas excavated nor areas impacted as an indirect effect of the fill.

2. The Guidelines use the term "secondary", but do not use the term "indirect." The Guidelines use both "effects" and "impacts" with the term "secondary":

a. **§ 230.11 Factual determinations.** (h) *Determination of secondary effects on the aquatic ecosystem.* (1) Secondary effects are effects on an aquatic ecosystem that are associated with a discharge of dredged or fill materials, but do not result from the actual placement of the dredged or fill material. Information about secondary effects on aquatic ecosystems shall be considered prior to the time final section 404 action is taken by permitting authorities. (2) Some examples of secondary effects on an aquatic ecosystem are fluctuating water levels in an impoundment and downstream associated with the operation of a dam, septic tank leaching and surface runoff from residential or commercial developments on fill, and leachate and runoff from a sanitary landfill located in waters of the U.S. Activities to be conducted on fast land created by the discharge of dredged or fill material in waters of the United States may have secondary impacts within those waters which should be considered in evaluating the impact of creating those fast lands.

b. **§ 230.41 Wetlands.** (b) Possible loss of values: The discharge of dredged or fill material in wetlands is likely to damage or destroy habitat and adversely affect the biological productivity of wetlands ecosystems by smothering, by dewatering, by permanently flooding, or by altering substrate elevation or periodicity of water movement. The addition of dredged or fill material may destroy wetland vegetation or result in advancement of succession to dry land species. It may reduce or eliminate nutrient exchange by a reduction of the system's productivity, or by altering current patterns and velocities. Disruption or elimination of the wetland system can degrade water quality by obstructing circulation patterns that flush large expanses of wetland systems, by interfering with the filtration function of wetlands, or by changing the aquifer recharge capability of a wetland. Discharges can also change the wetland habitat value for fish and wildlife as discussed in subpart D. When disruptions in flow and circulation patterns occur, apparently minor loss of wetland acreage may result in major losses through secondary impacts. Discharging fill material in wetlands as part of municipal, industrial or recreational development may modify the capacity of wetlands to retain and store floodwaters and to serve as a buffer zone shielding upland areas from wave actions, storm damage and erosion.

C. Based on paragraphs I.A and I.B above, for the purposes of this guidance, the terms "indirect" and "secondary" are synonymous, and the terms "effects" and "impacts" are synonymous. For the remainder of this guidance the term "indirect effects" will be used for indirect and secondary effects and impacts.

D. Definition of "mitigation" from the Corps's regulations found at **33 CFR 320.4(r):**

(r) *Mitigation.* [1] (1) Mitigation is an important aspect of the review and balancing process on many Department of the Army permit applications. Consideration of mitigation will occur throughout the permit application review process and includes avoiding, minimizing, rectifying, reducing, or **compensating** for resource losses. Losses will be avoided to the extent practicable. Compensation may occur on-site or at an off-site location. Mitigation requirements generally fall into three categories.

(i) Project modifications to minimize adverse project impacts should be discussed with the applicant at pre-application meetings and during application processing. As a result of these discussions and as the district engineer's evaluation proceeds, the district engineer may require minor project modifications. Minor project modifications are those that are considered feasible (cost, constructability, etc.) to the applicant and that, if adopted, will result in a project that generally meets the applicant's purpose and need. Such modifications can include reductions in scope and size; changes in construction methods, materials or timing; and operation and maintenance practices or other similar modifications that reflect a sensitivity to environmental quality within the context of the work proposed. For example, erosion control features could be required on a fill project to reduce sedimentation impacts or a pier could be reoriented to minimize navigational problems even though those projects may satisfy all legal requirements (paragraph (r)(1)(ii) of this section) and the public interest review test (paragraph (r)(1)(iii) of this section) without such modifications.

(ii) Further mitigation measures may be required to satisfy legal requirements. For Section 404 applications, mitigation shall be required to ensure that the project complies with the 404(b)(1) Guidelines. Some mitigation measures are enumerated at 40 CFR 230.70 through 40 CFR 230.77 (Subpart H of the 404(b)(1) Guidelines).

(iii) Mitigation measures in addition to those under paragraphs (r)(1) (i) and (ii) of this section may be required as a result of the public interest review process. (See 33 CFR 325.4(a).) Mitigation should be developed and incorporated within the public interest review process to the extent that the mitigation is found by the district engineer to be reasonable

and justified. Only those measures required to ensure that the project is not contrary to the public interest may be required under this subparagraph.

(2) All compensatory mitigation will be for significant resource losses which are specifically identifiable, reasonably likely to occur, and of importance to the human or aquatic environment. Also, all mitigation will be directly related to the impacts of the proposal, appropriate to the scope and degree of those impacts, and reasonably enforceable. District engineers will require all forms of mitigation, including compensatory mitigation, only as provided in paragraphs (r)(1) (i) through (iii) of this section. Additional mitigation may be added at the applicants' request.

Footnote(s):

[1] This is a general statement of mitigation policy which applies to all Corps of Engineers regulatory authorities covered by these regulations (33 CFR parts 320-330). It is not a substitute for the mitigation requirements necessary to ensure that a permit action under section 404 of the Clean Water Act complies with the section 404(b)(1) Guidelines. There is currently an interagency Working Group formed to develop guidance on implementing mitigation requirements of the Guidelines.

E. From the "Background" section of the preamble of 33 CFR Part 332 (73 FR 19687, April 10, 2008); *Compensatory Mitigation for Losses of Aquatic Resources*:

"Compensatory mitigation involves actions taken to offset unavoidable adverse impacts to wetlands, streams and other aquatic resources authorized by Clean Water Act section 404 permits and other Department of the Army (DA) permits. As such, compensatory mitigation is a critical tool in helping the federal government to meet the longstanding national goal of "no net loss" of wetland acreage and function."

F. *Compensatory Mitigation for Losses of Aquatic Resources* was added to the Guidelines, as Subpart J in 2008 (73 FR 19687, April 10, 2008).

G. The citations above in reference to NEPA, the CEQ regulations, the Corps's regulations and the Guidelines support the following conclusions: Indirect effects on the remaining, surrounding aquatic environment are a consequence of the direct impacts of a permitted project. Indirect effects can result in functional losses in the surrounding aquatic environment, including functional losses in remaining adjacent wetlands. Wetland functional losses within remaining adjacent wetlands are the result of various changes caused by a project's direct impacts, such as changes to water quality, hydrology, degree of habitat fragmentation, introduction and spread of invasive and exotic species, and other impacts on fish and wildlife. Wetland functional losses resulting from indirect effects should be considered, can be assessed, and compensatory mitigation can be required to offset these wetland functional losses.

III. Terms used in this assessment method:

A. Indirect effects: "Indirect effects" are losses of wetland functions in wetlands adjacent to areas of direct impacts in wetlands and uplands, as further clarified in paragraphs III.B and III.C below. Such effects are a subset of the full range of indirect effects described in Section II above.

B. Scope of action: The "scope of action", as determined in the scope of analysis, includes remaining adjacent wetlands that are subject to a wetland functional assessment to determine the amount of wetland functional loss attributable to indirect effects that would result from a project under evaluation for a DA permit.

C. Scope of effects: The "scope of effects" identifies the specific indirect effects to consider and evaluate, and guides the determination of the areas in remaining adjacent wetlands that will be assessed for wetland functional losses attributable to indirect effects. The scope of effects aids in the determination of the distance into an adjacent wetland where indirect effects will occur. This distance establishes the size of the wetland that will be assessed. The scope of effects of the indirect effects into adjacent wetlands begins at the outer edge of the limits of direct impacts on both wetlands and uplands within the scope of action. Generally, this outer edge of direct effects in wetlands and/or uplands within the scope of action is the line of construction and/or ground disturbance.

D. Indirect effects wetland assessment area: An "indirect effects wetland assessment area" (WAA) is a specific wetland polygon established by the scope of effects, and is assessed for wetland functional losses resulting from indirect effects. The indirect effects on the wetland functions of the WAA will be determined using an appropriate wetland functional assessment tool, such as WRAP or Florida's Uniform Mitigation Assessment Method (UMAM).

E. Buffers: "Buffers" are preserved upland areas or manmade structures located between the edge of the line of direct impacts and remaining adjacent wetlands. Buffers, depending on many factors, including execution of protective covenants/conservation easements and habitat type/composition, can minimize the intensity of adverse indirect effects on adjacent wetlands. The resulting effect of an appropriately situated buffer, consisting of habitat or material reasonably anticipated to avoid, minimize, arrest or attenuate the effects of construction and operation of the proposed project, should be identified and discussed in the Corps's effects analysis. An appropriate buffer can reduce adverse indirect effects, and thus reduce the amount of wetland functional loss in remaining adjacent wetlands. See Fischer and Fischenich, 2000 and Fischer, 2001 for additional information regarding vegetated buffers.

IV. Potential indirect effects on remaining adjacent wetlands reasonably anticipated to occur as a result of the direct impacts associated with activities

authorized by the Corps include those in the four lists below. These four lists were compiled by the PDT from its review of the literature cited in Section VIII of this guidance. These lists can be used as a checklist to assist in identifying potential indirect effects associated with a specific project. Additional indirect effects not identified below, can be added to the lists, as deemed appropriate for a specific project. The PDT combined the first two of the lists together and with the two remaining lists identified three categories of potential indirect effects: (1) Hydrology and Water Quality, (2) Vegetative Community, and (3) Fish, Wildlife and Habitats.

A. Potential indirect hydrological effects in the remaining adjacent wetland (Hydrology and Water Quality):

1. Changes in drainage characteristics or flow patterns.
2. Changes in water levels.
3. Changes in the retention time of water in the wetland.
4. Changes in the seasonal duration of wetland saturation, ponding or flooding.
5. Changes in water velocity within the wetland.
6. Changes in the association of the wetland with a watercourse or other waterbody.
7. Changes in the defined or constricted outlet of the wetland.
8. Changes in the volume of water reaching the wetland via infiltration or surface runoff.
9. Changes in the ability of the wetland to receive floodflow from surrounding uplands or wetlands.
10. Other: _____

B. Potential indirect water quality effects in the remaining adjacent wetland (Hydrology and Water Quality):

1. Changes in the temperature or biochemical characteristics of water in the wetland.
2. Changes in the water chemistry within the wetland.
3. Changes in water quality within the wetland.
4. Changes in the input of sediment or toxicants to the wetland.
5. Changes in the discharge of nutrients to the wetland.
6. Changes in sediment load or turbidity.
7. Changes in the timing characteristics of water saturation, flow, ponding or flooding in the wetland.
8. Other: _____

C. Potential indirect vegetative community effects in the remaining adjacent wetland (Vegetative Community):

1. Changes in the density or type of vegetation within the wetland.
2. Changes in the degree of interspersion of vegetation classes or communities.

3. Changes in the dominant wetland class.
4. Changes in wetland vegetation density.
5. Changes in wetland plant diversity.
6. Creates conditions to likely to introduce invasive plants.
7. Other: _____

D. Potential indirect fish and wildlife effects and indirect wildlife habitat effects in the remaining adjacent wetland (Fish, Wildlife and Habitats):

1. Changes in wildlife usage of the wetland.
2. Fragments the wetland.
3. Creates a barrier between other wetland systems.
4. Creates a barrier to wildlife movement between the wetland and uplands.
5. Changes in the availability of wildlife food sources.
6. Changes in detritus development and/or transport.
7. Changes in the abundance or diversity of insects.
8. Introduces a new noise source with the potential to affect adjacent areas.
9. Creates a canopy gap that could affect microclimate
10. Changes in shading streamside vegetation.
11. Affects critical habitat for a listed T&E species within the wetland.
12. Affects migration of T&E species within a wetland, or between wetland and upland habitats.
13. Affects the supply of food resources for T&E species using the wetland.
14. Affects wildlife mortality.
15. Introduces light as a disturbance factor.
16. Other: _____

V. Determination of the scope of effects into remaining adjacent wetlands:

A. A key component of the assessment of indirect effects in remaining adjacent wetlands is reliance on professional experience and judgment to ensure an appropriate level of consideration has been given for affected resources and that reasonably anticipated effects on those affected resources are accurately identified. Therefore, this section suggests, but does not dictate, the scope of effects to assess indirect effects in remaining adjacent wetlands.

B. The "Scope of Effects Tool" (Enclosure 1):

1. The Scope of Effects Tool (tool) aids in the determination of the scope of effects and determines the distance into, and therefore the size, of the remaining adjacent wetland to be assessed, based on the selection of "Action Type" (e.g., residential, commercial, utility lines, etc.) and on an evaluation of the anticipated relative intensities of the indirect effects on the wetland as being

"substantially affected," "moderately affected," "minimally affected," or "inconsequential effect" for the three categories of potential indirect effects, as identified in Section IV above.

2. "Wetland Number" is provided in the tool for entry of the identification number or name of the wetland under consideration.

3. Identification of the "Habitat Type" (Forested or Herbaceous) for the wetland under consideration is provided in the tool for informational purposes, and is not used in the calculation of the distance into the wetland under consideration.

4. Evaluations of the anticipated indirect effects are done by the user of the tool for the three categories of potential indirect effects: (1) Hydrology and Water Quality, (2) Vegetative Community, and (3) Fish, Wildlife and Habitats. The indirect effects evaluations should represent the overall perceived intensities of the identified indirect effects for the three categories of indirect effects, as applicable to the wetland under review. The perceived intensity of indirect effects is not merely a summation of the number of identified indirect effects for a particular category, but rather the number and relative intensity of the identified indirect effects combined together. While indirect effects associated with direct impacts to the environment are generally adverse in nature, it is possible that there could be beneficial indirect effects, which should be considered along with the potential adverse indirect effects. Also, the potential ameliorating effects of buffers, best management practices, or other efforts to decrease the potential indirect effects of a project should be considered. The three categories and their lists of potential indirect effects are included in the tool. Indirect effects that apply to the wetland under consideration should be checked in the tool. The tool allows the listing of additional indirect effects that should be considered in the evaluation of indirect effects for the particular wetland under evaluation. The tool provides in feet the distance into the wetland to establish the area of the wetland to be assessed.

5. The tool allows for the entry of the size in acres and the relative loss of wetland function to calculate the wetland functional loss of the wetland under consideration.

6. The tool allows for the assessment of up to three wetlands per sheet. Additional sheets can be used for projects with more than three wetlands requiring an assessment.

7. The "Scope of Effect Tool – Exploded View"(Enclosure 2) is provided as background information regarding the tool. It is an "exploded" view of the tool and the contents of the drop-down boxes. The exploded view shows all of the Habitat Types, Action Types, the three categories of potential indirect effects, the indirect effects listed for each category, the four relative intensities for

each category, the values assigned to the Action Types and relative intensities, and the sums of the values used to calculate the distance into a wetland.

8. Rationale for values and distance calculation: Most of the literature that the PDT collected and reviewed, as listed in Section VIII of this guidance, pertained to the use of buffers to either eliminate or minimize the potential for losses of wetland functions from impacts occurring on adjacent uplands or wetlands, or pertained specifically to the effects that the construction and operation of roads would have on adjacent uplands and wetlands. After much discussion, the PDT members, based on their review of the literature, and on their individual professional experiences, decided for simplicity that only one wetland polygon should be established using the three categories of indirect effects for the assessment of the relative loss of wetland functional value attributable to all of the identified indirect effects. The literature had a wide range of potential distances that indirect effects could extend into wetlands, and in the width of buffers to minimize or eliminate adverse effects in wetlands or uplands. The PDT decided that a 300-foot maximum distance would be a reasonable and conservative compromise that would not result in over-estimation of wetland functional losses attributable to indirect effects. The PDT decided to base the calculation of the distance that indirect effects could extend into a wetland on a combination of the relative magnitude of adverse environmental impacts associated with broad categories of types of projects, i.e. Action Types; and on the relative intensity of the suite of indirect effects associated with the three categories of indirect effects, as described in Section IV above. The PDT assigned values of 1, 2 or 3 to the various Action Types, and values of 0, 1, 2 or 3 to the descriptors of the relative intensities of the indirect effects. The team established a linear correlation from 0 to 300 feet to the possible sums of the values of the Action Types and the three relative intensities of indirect effects with a minimum sum of 2 correlating with 50 feet to a maximum sum of 12 correlating to 300 feet. The team determined that if all three relative intensities were evaluated to be "inconsequential" (value of 0), then no matter the Action Type, the distance would be 0 feet.

C. Adjust the scope of effects where literature or local knowledge provides information relevant to the specific circumstances of the wetland under consideration. The enclosed "Section V Table" (Enclosure 3) provides examples from the literature assembled to date. Updates to the Section Table V, as well as the literature referenced in the table and in Section VIII below, will be maintained in Regulatory Division's internal library (Sharepoint), as well as made available to users outside of RD.

VI. Procedure for the assessment of indirect effects in remaining adjacent wetlands for compensatory mitigation using the Scope of Effects Tool:

A. Only wetlands under the Corps' jurisdiction should be assessed for indirect effects for the determination of wetland compensatory mitigation. Note:

Evaluation of non-jurisdictional wetlands for purposes other than the determination of wetland compensatory mitigation may be required by the Corps' regulatory program, such as compliance with the Endangered Species Act.

B. Determine the limits of the outer edge of direct impacts in wetlands and uplands within the scope of action of the proposed project. Generally, this outer edge is the line of construction and/or ground disturbance.

C. Identify and label wetlands that would remain if the project were completed as proposed, and which could be subject to this assessment of indirect effects due to their proximity to the outer edge of construction and/or ground disturbance, as described in paragraph VI.B above. Do not include any wetlands that are subject to the proposed project's compensatory mitigation plan, since these wetlands will be assessed separately as part of the evaluation of the proposed project's compensatory mitigation plan.

D. Enter the identity of the wetland to be assessed in the Wetland Number space.

E. Choose the Action Type that most closely describes the proposed project or would be most similar in anticipated impacts due to the nature and size of the proposed project.

F. Determine the appropriate scope of effects, as described in Section V above.

G. If buffers, as defined in paragraph III.E above, will be preserved, the width of the buffer can be subtracted from the suggested scope of effects. The ecological value and effectiveness of the buffer to minimize adverse indirect effects in the remaining adjacent wetland should be considered in the wetland functional assessment, as described in paragraph VI.J below.

H. Determine the wetland polygons bounded by the scope of effects. On-site wetlands will generally have been delineated for jurisdiction, as part of the permit application evaluation. Delineation of off-site wetlands can be approximated by use of remote sensing tools and resources (aerial photographs, soils maps, NWI maps, etc.) with ground-truthing, as appropriate and practicable. These wetland polygons constitute the WAAs.

I. Determine the size (acres) of the WAAs.

J. Use an appropriate wetland functional assessment method to determine the pre-project and post-project wetland functional values of the WAAs.

1. Similar WAAs can be lumped together and assessed together, as deemed appropriate.

2. For each WAA or group of similar WAAs use the lists in Section IV above, and as provided in the tool, to identify the indirect effects to consider in assessing the wetland functional values of the pre-project and post-project WAAs.

3. Assess the pre-project wetland functional value of the WAA. Assess the post-project wetland functional value of the WAA in consideration of the magnitude of the project's identified indirect effects on the WAA.

K. Subtract the post-project wetland functional value from the pre-project wetland functional value to determine the relative functional loss (RFL) of the WAA. Multiply the RFL by the number of acres within the WAA to determine the functional loss (FL) for the WAA. The RFL and the number of acres for each WAA can be entered into the Scope of Effects Tool. The tool will calculate the FL for the WAA.

L. Determine FLs from indirect effects for all of the WAAs for the project. Sum the FL's for WAAs of similar habitat type, as deemed appropriate.

M. The sums calculated in paragraph VI.I above represent together the loss of wetland functional value caused by indirect effects on remaining adjacent wetlands to be offset by compensatory mitigation.

N. The use of the tool to determine of the scope of effects, the extent of indirect effects, and the distance into the wetland to be assessed; and the determination of the relative loss of wetland functions, should be clearly described and discussed in the impact analysis section of the decision document to ensure that impacts and any measures to offset the impacts are roughly proportional.

VII. Conclusion: This guidance provides relatively simple procedures and a tool to approximate wetland functional losses associated with indirect effects in remaining adjacent wetlands within the limited timeframes and resources typical for regulatory evaluations. This guidance provides increased consistency throughout Regulatory Division in determining compensatory mitigation to offset functional losses resulting from indirect effects on adjacent remaining wetlands. It is based on consideration of the literature, as cited in Section VIII below. This guidance is structured to allow flexibility and best professional judgment. Adjustments can be made to the suggested scope of effects for a specific project, as deemed appropriate. This guidance can be used with any appropriate wetland functional assessment method. It is a "living document" that can be modified and updated, as experience is gained in its use and new literature becomes available.

VIII. References and background literature. The list below includes literature specifically referenced in this guidance and background literature that served to aid in the development of this guidance:

1. Barron, R. (1999). *Calculating Mitigation*, Presentation at public workshops, posted at http://www.saj.usace.army.mil/Missions/Regulatory/SourceBook.aspx, Regulatory Division, Jacksonville District, U.S. Army Corps of Engineers, Jacksonville, FL.

2. Biglin, K. and Dupigny-Giroux, L. (2006). *Mapping the Road-Effect Zone to Assess Impacts of Proposed Road Segments*, Journal of Conservation Planning, Vol. 2.

3. Brown, M.T., Schaefer, J. and Brandt, K. (1990). *Buffer Zones for Water, Wetlands, and Wildlife in East Central Florida*, Prepared for East Central Florida Regional Planning Council, CFW Publication #990-07, Florida Agricultural Experiment Stations Journal Series No. T-00061, Gainesville, FL.

4. Brown, M.T., C.S. Luthin, J. Tucker, R. Hamann, 1. Schaefer, L. Wayne and Dickinson, M. 1990. *Econlockhatchee River Basin Natural Resources Development and Protection Plan*, Report to the SJRWMD. Publ. No. SJ 91-SP1, St. Johns River Water Management District, Palatka, FL.

5. Brown, M.T. and Hamann, R. (2000). *Calculating Buffer Zone Widths for Protection of Wetlands and Other Environmentally Sensitive Lands in St. Johns County*, Report to St. Johns County Planning Department, St. Augustine, FL.

6. Castelle, A.J., Conolly, C., Emers, M., Metz, E.D., Meyer, S., Witter, M., Mauermann, S., Erickson, T. and Cooke, S.S. (1992). *Wetland Buffers: Use and Effectiveness,* Publ. 92-10. Adolfson Association for Shorelands and Coastal Zone Management Program, Washington Department of Ecology, Olympia, WA.

7. Castelle, A.J., Johnson, A.W. and Conolly, C. (1994). *Wetland and Stream Buffer Size Requirements - A Review,* Journal of Environmental Quality, Vol. 23.

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Scope of Effects Tool - Enclosure 1 (Version December 2014)

Wetland Number	1	2	3

Factors

Habitat Type (picklist)*	Forested	Forested	Herbaceous
Action Type (picklist)	Utility Lines (addition) 1	Utility Lines (addition) 1	Institutional (e.g. schools) 3
Indirect Effects: Hydrology and Water Quality (picklist)	inconsequential effect 0	inconsequential effect 0	inconsequential effect 0
Indirect Effects: Vegetative Community (picklist)	inconsequential effect 0	inconsequential effect 0	inconsequential effect 0
Indirect Effects: Fish, Wildlife and Habitats (picklist)	inconsequential effect 0	inconsequential effect 0	inconsequential effect 0
Scope of Effect (Feet)	0	0	0

Functional Loss

Functional Value (Pre-Post delta) from assessment forms	0.00	0.00	0.00
Acres of wetlands within Scope of Effect	0.00	0.00	0.00
Functional Loss	0.00	0.00	0.00

Indirect effects considerations for Hydrology and Water Quality.

Changes in drainage characteristics or flow patterns.			
Changes in water levels.			
Changes in the retention time of water in the wetland.			
Changes in the seasonal duration of wetland saturation, ponding or flooding.			
Changes in water velocity within the wetland.			
Changes in the association of the wetland with a watercourse or other waterbody.			
Changes in the defined or constricted outlet of the wetland.			
Changes in the volume of water reaching the wetland via infiltration or surface runoff.			
Changes in the ability of the wetland to receive floodflow from surrounding uplands or wetlands.			
Changes in the temperature or biochemical characteristics of water in the			
Change the water chemistry within the wetland.			
Changes in water quality within the wetland.			
Changes in the input of sediment or toxicants to the wetland.			
Changes in the discharge of nutrients to the wetland.			
Changes in sediment load or change turbidity.			
Changes in the timing characteristics of water saturation, flow, ponding or flooding in wetland.			
Other:			

Indirect effects considerations for Vegetative Community.

Changes in the density or type of vegetation within the wetland.			
Changes in the degree of interspersion of vegetation classes or communities.			
Changes in the dominant wetland class.			
Changes in wetland vegetation density.			
Changes in wetland plant diversity.			
Creates conditions to likely to introduce invasive plants.			
Other:			

Indirect effects considerations for Fish, Wildlife and Habitats.

Changes in wildlife usage of the wetland.			
Fragments the wetland.			
Create a barrier between other wetland systems.			
Creates a barrier to wildlife movement between the wetland and uplands.			
Changes in the availability of wildlife food sources.			
Changes in detritus development and/or transport.			
Changes in the abundance or diversity of insects.			
Introduces new noise source with the potential to affect adjacent areas.			
Creates a canopy gap that could affect microclimate.			
Changes in shading streamside vegetation.			
Affects critical habitat for a listed T&E Species within the wetland.			
Affects migration of T&E species within a wetland, or between wetland and upland habitats.			
Affects the supply of food resources for T&E species using the wetland.			
Affects wildlife mortality.			
Introduces light as a disturbance factor.			
Other:			

*** Note: To wrap text please go to the "Home Tab" then select "Format" then select "AutoFit row Height"**

Enclosure 2 - Scope of Effects Tool - Exploded View (Version: Dec 2014)

Wetland Number

Habitat Type

- [ ] Forested
- [ ] Herbaceous

Action Type

- [ ] Industrial 3
- [ ] Mines 3
- [ ] Large Commercial 3
- [ ] Apartment Complexes 3
- [ ] Institutional (e.g. schools) 3
- [ ] Recreational - no open areas (e.g. ball parks) 3
- [ ] Mixed Use 3
- [ ] Linear Transportation (new) 3
- [ ] Linear Transportation (addition) 2
- [ ] Recreational W/ open areas (e.g. golf courses) 2
- [ ] Single-Family Residential Subdivision 2
- [ ] Utility Lines (new) 2
- [ ] Utility Lines (addition) 1
- [ ] Single-Family Residential 1

Indirect Effects:

Hydrology and Water Quality

- [ ] substantially affected 3
- [ ] moderately affected 2
- [ ] minimally affected 1
- [ ] inconsequential effect 0

Vegetative Community

- [ ] substantially affected 3
- [ ] moderately affected 2
- [ ] minimally affected 1
- [ ] inconsequential effect 0

Fish, Wildlife and Habitats

- [ ] substantially affected 3
- [ ] moderately affected 2
- [ ] minimally affected 1
- [ ] inconsequential effect 0

- [ ] If all 3 indirect effects "inconsequential effect", then Scope of Effects = 0 ft

Scope of Effects (ft)

Sum of Action + Impact

[ ]	2	50
[ ]	3	75
[ ]	4	100
[ ]	5	125
[ ]	6	150
[ ]	7	175
[ ]	8	200
[ ]	9	225
[ ]	10	250
[ ]	11	275
[ ]	12	300

Functional Loss

Fuctional Value (Pre-Post delta)	0.00
Acres of wetlands within Scope of Effects	0.00
Functional Loss	0.00

Indirect effects considerations for Hydrology and Water Quality

- [ ] Changes in drainage characteristics or flow patterns.
- [ ] Changes in water levels.
- [ ] Changes in the retention time of water in the wetland.
- [ ] Changes in the seasonal duration of wetland saturation, ponding or flooding.
- [ ] Changes in water velocity within the wetland.
- [ ] Changes in the association of the wetland with a watercourse or other waterbody.
- [ ] Changes in the defined or constricted outlet of the wetland.
- [ ] Changes in the volume of water reaching the wetland via infiltration or surface runoff.
- [ ] Changes in the ability of the wetland to receive floodflow from surrounding uplands or wetlands.
- [ ] Changes in the temperature or biochemical characteristics of water in the wetland.
- [ ] Changes in the water chemistry within the wetland.
- [ ] Changes in water quality within the wetland.
- [ ] Changes in the input of sediment or toxicants to the wetland.
- [ ] Changes in the discharge of nutrients to the wetland.
- [ ] Changes in sediment load or change turbidity.
- [ ] Changes in timing characteristics of water saturation, flow, ponding or flooding in wetland.
- [ ] Other: _____

Indirect effects considerations for Vegetative Community.

- [ ] Changes in the density or type of vegetation within the wetland.
- [ ] Changes in the degree of interspersion of vegetation classes or communities.
- [ ] Changes in the dominant wetland class.
- [ ] Changes in th wetland vegetation density.
- [ ] Changes in wetland plant diversity.
- [ ] Creates conditions to likely to introduce invasive plants.
- [ ] Other: _____

Indirect effects considerations for Fish, Wildlife and Habitats.

- [ ] Changes in wildlife usage of the wetland.
- [ ] Fragments the wetland.
- [ ] Creates a barrier between other wetland systems.
- [ ] Creates a barrier to wildlife movement between the wetland and uplands.
- [ ] Changes in the availability of wildlife food sources.
- [ ] Changes in detritus development and/or transport.
- [ ] Changes in the abundance or diversity of insects.
- [ ] Introduces new noise source with the potential to affect adjacent areas.
- [ ] Creates a canopy gap that could affect microclimate.
- [ ] Changes in shading streamside vegetation.
- [ ] Affects critical habitat for a listed T&E Species within the wetland.
- [ ] Affects migration of T&E species within a wetland, or between wetland and upland habitats.
- [ ] Affects the supply of food resources for T&E species using the wetland.
- [ ] Affects wildlife mortality.
- [ ] Introduces light as a disturbance factor.
- [ ] Other: _____

Section	Project	Reference	SubReference	Narrative	Distance	Activity	Landcover	Impact
IV.A. Potential hydrological impacts in the remaining abutting/adjacent wetland (UMAM Water Environment).								
	If the Project's culvert is found to have not been provided for a slope							
		27. Rheinhardt et al (2001). HGM Guidebook.	- -	The reach of the adjacent area flooded or starved can be estimated by the variable "Surface Water Flow" in the HGM Guidebook for Pine Flatwoods Mineral Soils. Page 29-30 (page 43 to 44 of the PDF)	Calculated	- -	- -	Flooding
	If the project is intercepting a wide expanse of sheet flow and then discharging as a point (end of the culvert), therefore wetlands on downstream shadow of the fill will have alterned hydropatterns (those at outlet flooded and those laterally distant starved).							
		- -	- -	Will usually be localized near the outlet.				
	If the project is proximate to a stream, may reduce function of stream.							
		13. Fischer and Fischenich (2000).	(listed in reference)	Table 4. General Riparian Buffer Strip Width Guidelines. "Functions: Flood Attenuation. Recommended Width: 20 to 150 m. Description: Riparian buffers promote floodplain storage due to backwater effects, they intercept overland flow and increase travel time, resulting in reduced flood peaks."	66 to 492	- -	Riparian	Flow Attenuation
	<future addition>							
		- -	- -	- -	- -	- -	- -	
	<future addition>							
		- -	- -	- -	- -	- -	- -	
IV.B. Potential water quality impacts in the remaining adjacent wetland (UMAM Water Environment).								
	Project whose fill is placed that runoff will flow directly into the adjacent wetland, the reach of the adjacent area affected can be estimated by referring to various literature describing the buffer width needed to treat/remove nutrients and sediment based on the source of runoff (land use) and vegetative cover and roughness of the buffer.							
		36. Corps (2013). AEIS.	(listed in reference)	The buffer width to protect a stream is measured beginning at the top of the bank or at the level of bank full discharge. Recommended widths for buffers to protect stream water quality have ranged from 30 feet to 150 feet, depending on the condition of the stream targeted for protection and the characteristics of the 28 buffer (Castelle et al., 1994; Fischer and Fischenich, 2000; NRCS, 2012b).	30 to 150ft	- -	Riparian	Water Quality
		36. Corps (2013). AEIS.	- -	"Current phosphate mining operations in the CFPD include the use of ditch and berm systems, which are installed along the entire outer perimeter of the mine property and adjacent to streams and wetlands within the mine that are to be avoided. *** As such, the ditch and berm system itself serves as a buffer by providing water quality protection for streams and wetlands within and outside the mine property. The berm of the ditch and berm system is set back approximately 135 feet to 150 feet from the edge of a stream or wetland; the ditch is between the berm and the mining/reclamation area."	135 to 150	Phosphate Mining	- -	Water Qualtiy
		36. Corps (2013). AEIS.	- -	"Under the mitigation framework, a buffer width in the range of 30 feet to 100 feet is proposed to be considered for the purpose of minimizing impacts to the water quality of perennial and intermittent streams. This buffer width range is considered adequate to provide a reasonable balance between water quality protection and mining. Wider buffers should be considered when the waters of the U.S. downstream of the mining area have been listed as impaired under CWA Section 303(d) for pollutants likely to be generated in the mining area."	30 to 100 (wider if impaired waterbody)	- -	- -	Water Quality
	Projects proximate to a stream, may reduce function of stream.							
		13. Fischer and Fischenich (2000).	(listed in reference)	Table 4. General Riparian Buffer Strip Width Guidelines. "Function: Water Quality Protection. Recommended Width: 5 to 30 m. Description: Buffers, especially dense grassy or herbaceous buffers on gradual slopes, intercept overland runoff, trap sediments, remove pollutants, and promote ground water recharge. For low to moderate slopes, most filtering occurs within the first 10 m, but greater widths are necessary for steeper slopes, buffers comprised of mainly shrubs and trees, where soils have low permeability, or where NPSP loads are particularly high."	16 to 98 ft	- -	Riparian	Treat Runoff
	Project runoff with sediment and nutrients.							

Section	Project	Reference	SubReference	Narrative	Distance	Activity	Landcover	Impact
		6. Castelle et al (1992).	(listed in reference)	Details on pages 8 to 9. Page 6 says: "Buffer widths effective in preventing significant water quality impacts to wetlands are generally 100 feet or greater. Sensitive wetland systems will require greater distances and degraded systems with low habitat value will require less. The literature indicates effective buffers for water quality range from 12 to 860 feet depending on the type of disturbance (e.g., feedlot, silviculture) and the measure of effectiveness utilized by the author. For those studies that measured effectiveness according to removal efficiency, findings ranged from 50 to 92% removal in ranges of 62 to 288 feet. Studies that measured effectiveness according to environmental indicators such as levels of benthic invertebrates and salmonid egg development in the receiving water generally found that 98-foot buffers adjacent to streams were effective. These latter buffer distances may be conservative for wetlands, where lower water velocities and presence of vegetation result in increased sediment deposition and accumulation."	100 + (range from 12 to 860)	- -	- -	Treat Runoff
		9. Environmental Law Institute (2003).	(listed in reference)	See "Sediment Removal", "Nutrient/Pollutant Removal" section of studies tabulated Appendix E (Riparian Buffer) and graphed on page 22	10 to 400	- -	Riparian	Treat Runoff
	<future addition>							
		- -	- -	- -	- -	- -	- -	
	<future addition>							
		- -	- -	- -	- -	- -	- -	
IV.C. Potential vegetative community impacts in the remaining adjacent wetland (UMAM Community Structure).								
	Typical projects.							
				If these characteristics are present, the distance of effect may be as little as 10 to 30 feet. First, that if the fill is in forested cover this is creating a fresh cut that introduces light penetration (by removal of the canopy) that will change the vegetation structure. Second, the adjacent wetland has lost some detrital or nutrient input from the wetland that has been filled.	- -	- -	- -	- -
	The project is a road							
		25. Mittaga (2005).	(listed in reference)	Slide shows various distances and draws a suggestion of 300 feet.	- -	- -	- -	- -
	Project located in East Central Florida							
		3. Brown et al (1990). Buffers East Central Florida.	(listed in reference)	Set of calculations based on species, soil, etc. characteristic of this region.	- -	- -	- -	- -
	Project removes the minimum width of vegetation providing detrital export will affect the adjacent aquatic resource.							
		13. Fischer and Fischenich (2000).	(listed in reference)	Table 4. General Riparian Buffer Strip Width Guidelines. "Function: Detrital Input. Recommended Width: 3 to 10 m. Description: Leaves, twigs and branches that fall from riparian forest canopies into the stream are an important source of nutrients and habitat."	10 to 32	- -	Riparian	Nutrient
		9. Environmental Law Institute (2003).	(listed in reference)	See "Detrital Input" setion of studies tabulated Appendix E (Riparian Buffer) and graphed on page 22	10 to 262	- -	Riparian	Nutrient
	Project affecting adjacent microclimate.							
		6. Castelle et al (1992).	(listed in reference)	Details on pages 9 to 10, starting with: "Forested buffers adjacent to wetlands function to provide cover, thereby helping to maintain lower water temperatures in summer and lessen temperature decreases in winter. The ability of forested buffer strips to maintain lower water temperatures in the summer months has been investigated by several researchers."	50 to 98 to 150	- -	- -	Temperature
		9. Environmental Law Institute (2003).	(listed in reference)	One of the "Edge Influences" listed in studies tabulated Appendix D (section "Abiotic") and graphed on page 18	26 to 787	- -	- -	Temperature and Light

Section	Project	Reference	SubReference	Narrative	Distance	Activity	Landcover	Impact
		9. Environmental Law Institute (2003).	(listed in reference)	See "Temperature and MicroClimate" section of studies tabulated Appendix E (Riparian Buffer) and graphed on page 22	3 to 984	- -	Riparian	Temperature and Climate
	<future addition>							
		- -	- -	- -	- -	- -	- -	
	<future addition>							
		- -	- -	- -	- -	- -	- -	
IV.D. Potential fish and wildlife impacts in the remaining adjacent wetland (UMAM Location and Landscape Structure).								
	Typical projects.							
		- -	- -	If these characteristics are present, the distance of effect will be highly dependent on the species present. First, the fill will introduce noise and provide access to predators that will result in some wildlife shying away from that edge, reducing the function of that area as habitat. Second, that the fill diminishes the total spatial extent of habitat thereby reducing the function of the remaining "patch" of wetland.	- -	- -	- -	- -
	If the project is a road located on the fringe of a large wetland, the primary effect may be only noise, therefore the distance may be based on literature or observations relevant to the species at the project location vis a vis effectiveness of the vegetation at screening the noise.							
		25. Mittaga (2005).	(listed in reference)	Slide shows various distances.	- -	Roads	- -	- -
		6. Castelle et al (1992).	(listed in reference)	Details on pages 10-11. Summary on page 6: "Studies indicate that buffers from 50 to 150 feet are necessary to protect a wetland from direct human disturbance in the form of human encroachment (e.g., trampling, debris). The appropriate width to prevent direct human disturbance depends on the type of vegetation, the slope, and the adjacent land use. Some wetlands are more sensitive to direct disturbance than others."	50-150	- -	- -	Encroachment
		9. Environmental Law Institute (2003).	(listed in reference)	"Flushing distance" is one of the "Edge Influences" listed in studies tabulated Appendix D (sections "Birds" and "Mammals") and graphed on page 18	53 to 2,952	- -	- -	Encroachment
	If the project is a residential development on the fringe of a large wetland, this will introduce other disturbances such as feral cats and the reach will vary based on the proportion of the perimeter of the remaining/unfilled wetland adjacent to residences.							
		3. Brown et al (1990). Buffers East Central Florida.	(listed in reference)	Set of calculations based on species, soil, etc. characteristic of this region.	- -	- -	- -	- -
	IF the project is cutting through the middle of a wetland for whatever reason, this may fragment the remaining wetlands into patches be too small or disconnected for the life history needs of the species at the project location.							
		21. Kalla (1993). Florida Keys Wetland Wetland Assessment Method.	(listed in reference)	Minimum connected habitat area based on target species for different parts of the Keys.	3 to 30 acres	- -	- -	Life History
		9. Environmental Law Institute (2003).	(listed in reference)	"Patch Area" studies tabulated Appendix Dand graphed on page 18	430 sq ft to 198 acres 6,916 acres	- -	- -	Life History
		27. Rheinhardt et al (2001). HGM Guidebook.	(listed in reference)	Variable "Continuous Habitat", in the HGM Guidebook for Pine Flatwoods Mineral Soils. Page 70-71 (page 83 to 84 of the PDF)	247 acres	- -	Pine Flatwoods	Life History
	If the project is proximate to a stream, may reduce function of stream.							
		13. Fischer and Fischenich (2000).	(listed in reference)	Table 4. General Riparian Buffer Strip Width Guidelines. "Function: Riparian Habitat. Recommended Width: 30 to 500 m +. Description: Buffers, particularly diverse stands of shrubs and trees, provide food and shelter for a wide variety of riparian and aquatic wildlife."	98 to 1640	- -	Riparian	Wildlife

Section	Project	Reference	SubReference	Narrative	Distance	Activity	Landcover	Impact
		36. Corps (2013). AEIS.	(listed in reference)	"Recommended widths for buffers to protect wildlife have ranged from less than 100 feet to more than 1,000 feet, depending on regional ecology and the species targeted for protection. (Castelle, et al., 1994; Fischer and Fischenich, 2000; NRCS, 2012b). The maximum forested riparian buffer width used by NRCS for protection of wildlife is 150 feet."	100 to 1,000	- -	- -	Habitat
		36. Corps (2013). AEIS.	- -	"Under the mitigation framework, a buffer width in the range of 100 feet to 300 feet is proposed to be considered for the purpose of minimizing impacts to wildlife. This buffer width range is considered adequate to provide a reasonable balance between wildlife protection and mining."	100 to 300	Phosphate Mining	- -	Willdlife
		9. Environmental Law Institute (2003).	- -	See "Wildlife and Plant Species" section of studies tabulated Appendix E (Riparian Buffer) and graphed on page 22	32 to 328 to 5,248	- -	Riparian	Wildlife
	If project crosses critical fish passage.							
		19. Hotchkiss et al (2007).	- -	Provides examples. No table	- -	- -	Stream	Fish
	If project in the Econlockhatchee River Basin							
		4. Brown et al (1990). Econlockhatchee Plan.	- -	Page 3-39 (page 134 of the PDF), figure 3.1: "Home ranges of various wildlife species overlaid . . . Proposed protection zone designations." Narrative pages 122 to 133 of PDF. Specific information on species provided Tables C-16 to C18 on pages 208 to 224 of the PDF).	550 to 1100	- -	Stream	Home Ranges
	If the project is a road.							
		31. Trombulak et al (2000).	(listed in reference)	Section titled "Modification of Animal Behavior" describes distances from various studies	by species	- -	- -	Wildlife
	<future addition>							
		- -	- -	- -	- -	- -	- -	
	<future addition>							
		- -	- -	- -	- -	- -	- -	