## 2.8 Reasonable and Prudent Alternative

"Reasonable and prudent alternatives" refer to alternative actions identified during formal consultation that can be implemented in a manner consistent with the intended purpose of the action, that can be implemented consistent with the scope of the Federal agency's legal authority and jurisdiction, that are economically and technologically feasible, and that would avoid the likelihood of jeopardizing the continued existence of listed species or resulting in the destruction or adverse modification of critical habitat (50 CFR 402.02).

This opinion has concluded that FEMA's proposed action for implementation of the NFIP in Oregon is likely to jeopardize the continued existence of ESA-listed species under the jurisdiction of NMFS and is likely to result in the destruction or adverse modification of critical habitat that has been designated or proposed for these species. The phrase "jeopardize the continued existence of" means "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR 402.02).

### 2.8.1 Reasonable and Prudent Alternative Overview

Our analysis indicates that FEMA has not structured its proposed implementation of the NFIP in Oregon so that FEMA is positioned to know or reliably estimate the general and particular effects of the program on ESA-listed species or their designated critical habitat.

To satisfy its obligation pursuant to section 7(a)(2) of the Endangered Species Act of 1973, as amended, FEMA must place itself in a position to: (1) monitor the direct, indirect, and cumulative impacts of the activities implemented under the NFIP in Oregon, (2) effectively determine program compliance, (3) take timely and effective corrective actions when the consequences of NFIP activities exceed measurable standards and criteria, and (4) structure the program in a manner that allows assurances that floodplain activities will not jeopardize ESA-listed species or their designated critical habitat.

The reasonable and prudent alternative that follows contains six elements that are designed to achieve these outcomes.

1. **Notice, Education, and Outreach.** The first element of the reasonable and prudent alternative requires FEMA to develop an education andoutreach strategy for RPA implementation and to provide notice to all NFIP participating communities in Oregon regarding the outcome of the agency's consultation and the substance of the RPA.

2. **Interim Measures.** Given that most of the RPA elements will take a period of years to fully implement, the second element of the reasonable and prudent alternative includes measures for more immediate implementation that FEMA should promptly carry out to reduce the loss of floodplain habitat features and functions as the long-term measures are phased in.

These measures are intended to slow the rate at which development permanently alters habitat conditions that are otherwise necessary for species survival and recovery, but by themselves these measures are inadequate to avoid jeopardy and adverse modification over the long term.

3. **Mapping Flood and Flood-Related Hazard Areas.** The third element of the reasonable and prudent alternative requires FEMA to implement specific program standards to identify and map more comprehensively, accurately, and timely, both flood hazard areas, and flood-related erosion hazard areas.

4. **Floodplain Management Criteria.** The fourth element of the reasonable and prudent alternative includes revisions to FEMA's regulatory floodplain management criteria so as to avoid, minimize, and mitigate the adverse effects of floodplain development on remaining habitat functions and processes.

5. **Data Collection and Reporting.** The fifth element of the reasonable and prudent alternative requires FEMA to systematically monitor all participating communities and collect and report floodplain development information.

6. **Compliance and Enforcement.** The sixth element of the reasonable and prudent alternative requires FEMA to ensure that participating communities are compliant with the floodplain management criteria as revised by this RPA.

### 2.8.2 Reasonable and Prudent Alternative Specific Elements

This RPA applies to all river sub-basins (HUC 4) in Oregon that contain ESA-listed anadromous fish[146] determined in this opinion to be jeopardized by the implementation of the NFIP, or containing critical habitat determined to be destroyed or adversely modified by the implementation of the NFIP. The statutory authorities under which this RPA may proceed include: 42 U.S.C. 4001(e); 42 U.S.C. 4002(b)(3); 42 U.S.C. 4011(a)-(b); 42 U.S.C. 4022(a)(1); 42 U.S.C. 4024; 42 U.S.C. 4101;42 U.S.C. 4101a; 42 U.S.C. 4101b; 42 U.S.C. 4102(c); 42 U.S.C. 4104; 42 U.S.C. 4121(c); 42 U.S.C. 4128; and 16 U.S.C. 1536(a)(1)-(2).

When NMFS determines that a proposed Federal action is likely to violate the standards of ESA section 7(a)(2), NMFS is required to devise a Reasonable and Prudent Alternative (RPA) to the proposed action. An RPA is intended to provide an alternative to the proposed action that can be implemented consistent with the intended purpose of the proposed action, that can be implemented consistent with the scope of the Federal agency's legal authority and jurisdiction, that is economically and technologically feasible, and that will avoid jeopardy and adverse modification. Given that throughout the action area, some floodplains retain much of their natural condition, while others have been altered through extensive development, the RPA includes provisions to protect to existing habitat conditions and features. As explained in this opinion,

[146] We define the geographical scope of this RPA as HUC 4 river sub-basins in order to ensure that this RPA applies both to sub-basins containing listed salmonids and to sub-basins where listed salmonids are not present but where floodplain development results in downstream effects to natural floodplain functions and, consequently, to listed salmonids.

protection and restoration of floodplain habitat and functions are necessary in order for the listed salmonids, and Southern Resident killer whales, to survive and recover. FEMA's current implementation of the NFIP has contributed to and continues to exacerbate the existing existing degraded conditions.

This RPA recommends revisions to FEMA's implementation of the NFIP in Oregon intended to provide protections for floodplain functions and features that support listed salmonids. NMFS has framed these recommendations based upon lessons derived from extensive efforts by FEMA, NMFS, and local governments in western Washington to reshape the implementation of the NFIP in that region based upon NMFS' 2008 jeopardy opinion and RPA for Puget Sound, Washington. This RPA focuses on the same basic improvements as were recommended in the 2008 opinion, specifically: (1) updated maps to more accurately depict the floodplain; (2) updated development and mitigation standards to guide development away from the most sensitive habitat areas and to reduce the impacts of new development or redevelopment in floodplains; and (3) strengthened systems of accountability to track and report on RPA implementation.

FEMA's implementation of the Puget Sound RPA evolved into heavy reliance on local compliance, resting largely on the discretion of the enrolled communities to choose their preferred method of compliance, often on a permit-by-permit basis, and upon the ability of FEMA staff to provide significant technical assistance to those communities to support and track implementation. The results to date are mixed, with ongoing efforts by FEMA and NMFS to improve outreach and technical assistance to local communities and to improve reporting and tracking. However, the lack of local technical expertise in floodplain hydrology and function in some communities, highly mixed and ultimately unreliable reporting, and the inability of a small FEMA staff to track implementation across a wide geography, means that, despite FEMA's best efforts, NMFS remains concerned with the Puget Sound approach. The Puget Sound approach's reliance on local communities to discern effects to salmonid resources places a scientific burden upon many with limited capacity to implement such a standard successfully, making it uncertain that FEMA can ensure that NFIP implementation is, in fact, avoiding jeopardy.

The major difference in this RPA relative to the 2008 RPA is to clarify that the locus of accountability for these ESA duties rests upon FEMA to programmatically ensure that the NFIP in Oregon avoids jeopardy through strengthened NFIP standards, enhanced use of jointly developed guidance and technical support to assist local jurisdictions in complying with the revised standards, and strengthened partnership between FEMA and NMFS and with Oregon communities to protect important floodplain functions over the long term. Accordingly, this RPA articulates a set of specific recommendations on mapping, development, and mitigation standards to achieve the goal identified in FEMA's proposed action of "no net loss or a net beneficial gain" of floodplain functions through avoidance, minimization, and mitigation requirements.

Because NMFS anticipates that several years will be needed to incorporate and implement these programmatic revisions to the NFIP, this RPA recommends a phased approach to implementation. The first (interim) phase calls for FEMA and participating communities to implement improvements using existing guidance and administrative tools with substantially enhanced technical support from both FEMA and NMFS. The second phase calls for FEMA to

revise its floodplain management regulations and/or associated guidance and technical documents as needed to implement the RPA's mapping, development, mitigation, and reporting standards. NMFS notes that FEMA's Federal Register notice of May 16, 2012 (77 FR 28891), indicated that FEMA was preparing an EIS on the NFIP and stated that FEMA intends to "[m]odify the NFIP based upon changes identified through the evaluation process to enhance floodplain management standards including provisions to address endangered species and habitat concerns," providing an opportunity for FEMA to refine its regulations if needed to assure successful implementation of this RPA.

NMFS therefore strongly advises that FEMA revise its regulations, policies, procedures, and/or guidance to ensure that the mapping, floodplain management, reporting, and enforcement protocols identified in this RPA are effectively implemented for the state of Oregon at the programmatic level. These measures are identified as necessary to ensure that the NFIP avoids jeopardy to listed species and avoids destruction and adverse modification of critical habitat for those species.

Timeline: In order to meet the expected outcomes of this RPA, except as otherwise provided below, all changes to regulations, policies, procedures, and/or guidance as needed to implement this RPA must be in place by:

- **September 15, 2016**, for Element 1.
- **March 15, 2018**, for Element 2, Elements 3.A and 3.E, and Element 5.
- **January 1, 2019**, for any components of Element 4 that FEMA determines can be implemented without regulatory revisions.
- **September 15, 2019**, for any components of Elements 3.B, 3.C, 3.D, 3.F, 3.G, and 6 that FEMA determines can be implemented without regulatory revisions.
- **January 1, 2021**, for any components of this RPA that FEMA determines require regulatory revisions.

***RPA Element 1: Notice, Education, and Outreach***

FEMA will develop, with NMFS's assistance, an education and outreach strategy to assist the Oregon DLCD and Oregon NFIP communities in implementing both the interim and long-term measures contained in this RPA. As a first step in this strategy, FEMA and NMFS will prepare a notice for all Oregon NFIP participating communities subject to this RPA informing them of the results of the consultation and the objectives and contents of the RPA. The notice shall be provided to NFIP communities within 60 days of the issuance of this opinion and should include, at a minimum, the following information:

A. A summary of the opinion's conclusions and a description of the types of floodplain development activities that have been found to harm listed species (see RPA Element 4.F). The notice should inform communities that these activities impair *natural*

*floodplain functions*,*[147] and thereby negatively impact the survival and recovery of the ESA-listed species.

B. The list of interim measures for prompt implementation found at RPA Element 2 and FEMA and NMFS's joint recommendation that communities implement these measures at the earliest possible time.

C. FEMA and NMFS' joint recommendation that new *structures** placed in the SFHA should be elevated by methods other than fill, and that proponents of projects that involve adding fill exceeding 50 cubic yards should pursue CLOMR-Fs prior to LOMR-Fs to ensure ESA compliance. FEMA shall include appropriate guidance on how to elevate structures in a manner that minimizes adverse effects to natural floodplain functions.

D. Notice to the communities of a pending requirement to report to FEMA information on all new development occurring in floodplains (see RPA Element 5.A).

E. A recommendation that participating communities provide to FEMA within 120 days of the notice their available information, if any, on locally identified flood-related hazards due to erosion or inundation, including data on anticipated flooding patterns influenced by build-out, climate change, or sea level rise, which are not currently reflected on maps adopted by FEMA, per 44 CFR 65.1.

FEMA and NMFS will commence development of the education and outreach strategy as soon as possible upon the issuance of this opinion, utilizing the expertise of DLCD and other state and local partners as appropriate, with the objective of providing clear, concise, and timely information to Oregon NFIP participants on the need for and objectives of this RPA and how they may achieve and document compliance with both the interim and long-term measures.

***RPA Element 2: Interim Measures***

Given that FEMA's implementation of RPA Elements 3-6 may take several years, this RPA includes the following steps for interim implementation. These measures are intended to ensure that existing natural floodplain functions are maintained pending full RPA implementation. FEMA's PBA states that FEMA has already notified communities of their responsibility to comply with the ESA, including the requirement that they either: (1) prohibit all NFIP-related actions in the SFHA during the implementation phase, or (2) determine the presence of fish or critical habitat, assess permit applications for potential impacts to species and habitat, and require that any actions with potential adverse effects be fully mitigated with no net loss of habitat function. Accordingly, NMFS anticipates that FEMA and NFIP communities, with NMFS' support and assistance, will begin implementing the following measures as soon as possible, and that all communities will be implementing these measures within 2 years of the date of this opinion.

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[147] Italicized terms that are noted with an asterisk are defined in a glossary at part for their specific meaning as used in this document. The glossary is found at part 2.8.3.

A. Require that all development in the SFHA be mitigated to achieve no net loss of natural floodplain functions. Pending FEMA's completion of a long-term mitigation strategy (see RPA Element 4.F below), FEMA will require, through guidance or otherwise, mitigation per the ratios below[148]:
   i. In the larger of: the 25 year floodplain (where an FIS has been performed), the floodway (if designated), the *channel migration zone (CMZ)**(if designated); or, in FEMA's proposed *riparian buffer zone (RBZ)**; mitigate for lost flood storage and vegetation removal at the following ratios:
      a. 2 to 1 for lost flood storage (located and designed consistent with Element 4.F, below),
      b. 3 to 1 for trees of or exceeding 6 inch dbh.
   ii. In the remainder of the floodplain at the following ratios:
      a. 1.5 to 1 for lost flood storage (located and designed consistent with Element 4.F, below),
      b. 2 to 1 for trees of or exceeding 6 inch dbh.
   iii. Use pervious pavement where possible. Mitigate for the placement of new impervious surface (*e.g.*, roofs, driveways, sidewalks, roads, patios, etc.) in order of preferred method as follows:
      a. By removing an equal amount of impervious surface, and/or
      b. By infiltration of stormwater using *low impact development (LID)** or *green infrastructure** practices (*e.g.*, rain gardens, bioswales), or, where not possible because of impermeable soils or high water table, then
      c. Stormwater detention is required to ensure no increase in peak volume or flow, and treatment is required to minimize pollutant loading.
   iv. Exception. Where implementation of the mitigation standards set forth above is impracticable, a community may propose alternative mitigation standards, which will be acceptable if both FEMA and NMFS agree that the alternative standards provide resource protection equivalent to that provided by the measures above.

B. As described in FEMA's proposed action for this consultation, identify a riparian buffer zone (RBZ) measured 170 feet horizontally from the ordinary high water mark of perennial or intermittent streams, and limit the types of development allowed in the RBZ to: (1) *water-dependent uses**; (2) *habitat restoration activities**; (3) activities that result in a beneficial gain for the species or habitat; and (4) activities that will have no adverse effects on listed species or habitat, *i.e.*, activities that will not degrade or limit natural floodplain functions in any way[149] (FEMA PBA 2-41). Require mitigation per Element 2.A for development types (1) and (3) above.

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[148] These ratios were identified per the best available science concerning the use of mitigation to achieve "no net loss" of aquatic habitat resources, which indicates that in the United States and Canada, mitigation practices over the last 30 years have often been insufficient to replace the amount and function of the impaired resources (*e.g.* Harper and Quigley 2005).

[149] During consultation, FEMA provided a list of activities that would be considered to have "no adverse effect," as follows: (A) repairs or remodels of an existing structure provided that the repair/remodel are not a substantial improvement or a repair of substantial damage; (B) expansion of an existing structure that is no greater than 10% beyond its existing footprint provided the pairs or remodeling are not a substantial improvement or repair of substantial damage; also, if the structure is in the floodway, there shall be no change in the dimensions perpendicular to flow without a floodway analysis; (C) activities the sole purpose of which is to create, restore, or

C. For all SFHA development occurring 90 days or more after the issuance of this Biological Opinion, FEMA shall deny or decline to process requests for LOMR-Fs that fail to demonstrate to FEMA that all impacts of development to natural floodplain functions were avoided or mitigated,[150] *e.g.*, by restoration of flood storage, vegetation, and hydrologic processes, consistent with the ratios identified in Element 2.A above. Alternatively the applicant may demonstrate to FEMA that the ESA was otherwise satisfied separately via section 7, 10, or 4(d).

D. FEMA shall review all requests for CLOMRs and CLOMR-Fs and determine whether the proposed project will adversely affect natural floodplain functions. FEMA may seek NMFS' assistance in making this determination. If FEMA makes a positive determination, FEMA shall seek NMFS' assistance in identifying appropriate mitigation measures to ensure that the project does not adversely affect natural floodplain functions and require that such measures be carried out as a condition of CLOMR and future LOMR issuance.[151]

E. Track all permitted development activities and associated mitigation and report to FEMA per RPA Element 5 as soon as practicable. Reporting during the interim period may rely on FEMA Region X's newly revised reporting tool.

F. Where multiple repeat-damage buyout opportunities exist, FEMA, with NMFS's technical assistance, shall recommend that the State prioritize floodplain development buyouts based on presence of high priority salmonid populations.

These measures, while protective of habitat and listed species as interim measures, are a subset of, and less protective of important habitat features and processes than, the full RPA and are insufficient by themselves to avoid jeopardy or adverse modification over time. These requirements will sunset when Elements 3-6 are fully implemented and supersede these requirements to provide more permanent protections for the natural floodplain functions that serve ESA-listed species.

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enhance natural floodplain functions, provided the activities do not include structures, grading, fill, or impervious surfaces; (D) development of open space and recreational facilities, such as parks, trails, and hunting grounds, that do not include structures, fill impervious surfaces, or removal of more than 5% of native vegetation on that portion of the property within the SFHA; and (E) repair to on-site septic systems, so long as ground disturbance is kept to the minimum necessary. NMFS agrees with FEMA's description of activities that qualify as "no adverse effect" with one exception. For categories A and B, any expansion of the structure's existing footprint should be considered an adverse effect that requires mitigation, for the reasons discussed earlier in this opinion.

[150] "Given the nationwide trend in urbanization and higher peak flows, a true 1 percent floodplain is likely larger than a mapped effective floodplain. The LOMC standards and guidance should acknowledge this condition and at least scrutinize in more detail requests that lower floodplains, while continuing land development leads to increased runoff, higher flood flows, and increased flood damages, as well as loss of floodplain habitat." (Galloway *et al.* 2006.)

[151] See Galloway *et al.* 2006, pp. 122-127.

***RPA Element 3: Mapping Special Hazard Areas to Fully Identify Floodplain Resources***

As was noted in the hearings on HR 6525, the Flood Disaster Protection Act of 1973, which expanded the NFIP, "local officials in many flood-prone communities…like to think that a major flood is unlikely to happen to them, and thus they defer coming into the program until local developers have had a chance to build on the community's remaining undeveloped lands without land use controls."[152] FEMA noted in its 2001 report, that "[f]lood hazards may change significantly in areas experiencing urban growth or changes in physical conditions caused by such geologic processes as subsidence and erosion" (FEMA 2001a). FEMA's 2013 CRS Coordinator's Manual (p. 410-2) further explains that "[d]evelopment regulations need thorough and accurate mapping of Special Flood Hazard Areas (SFHAs) and related flood hazard data." FEMA's CRS Coordinator's Manual (p. 220-9) also notes that "[t]he faster an area grows, the more important it is to regulate development to prevent flood losses."

As noted by FEMA, adoption of maps is prerequisite to effective management of flood-related hazard areas. "Outdated mapping hinders sound floodplain management. The map a community uses for floodplain management can and should be updated frequently to account for annexations, new divisions, site-by-site analyses, better ground elevation data, and incorporation of new hazard data. To make the map more useful and easier to use, it should include detailed topography, building footprints, natural features, and other data that can help relate the floodplain information to conditions on the ground and to other programs." 2013 CRS Coordinator's Manual at 440-2. NOAA Fisheries strongly concurs with these observations.

NMFS is in agreement with FEMA that incomplete, out of date, and/or inaccurate mapping of flood hazard prone areas prevents local government officials from understanding how severe flood risk is and thus from implementing restrictive zoning and land use regulations and comprehensive planning. Thus, this Element of the RPA provides program-level revisions to ensure that all *special hazard areas** (defined for this RPA to include the SFHA, *area of future conditions flood hazard* (AFCFH)*, and E Zones) are fully and accurately reflected on FEMA's maps, as these dictate where floodplain development restrictions and construction standards apply.

Accurate mapping of those areas likely to experience flood hazards, such as flood inundation and flood-related erosion, will provide valuable co-incidental information on, and protections for, floodplain functions and processes associated with important habitat features that support listed species. Accurate knowledge of important habitat features is essential to avoid jeopardy and to enable recovery. Thus flood hazard mapping must occur in both developed areas and areas of possible population growth, and should not be overly limited by the size of the watershed drainage area.

Therefore, in order to avoid the likelihood of jeopardy and the likelihood of adverse modification of designated critical habitat, this RPA calls for FEMA to ensure that all Oregon NFIP

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[152] Expansion of the National Flood Insurance Program, House of Representatives, Subcommittee on Housing, of the Committee on Banking and Currency, Tuesday May 8, 1973. 93rd Congress, 1st Session. Statement of George K. Bernstein, Federal Insurance Administrator, Department of Housing and Urban Development.

participating communities adopt FIRMs in accordance with the criteria below and meet the mapping benchmarks described in RPA Element 6.A(ii), Compliance Benchmarks. This is compatible with authorities at 42 U.S.C. 4101 (a)(1) ("to identify and publish information with respect to all floodplain areas within 5 years of August 1, 1968"), and (b) ("to accelerate the identification of risk zones within flood-prone and mudslide-prone areas...in order to make know the degree of hazard within each such zone at the earliest possible date"). Regulations which are applicable or pertinent to this RPA Element include: 44 CFR 59.1, 59.23, 60.1, 60.2(c), 60.3(d)(2), 60.5, 60.24-26, 64.1, 64.3(a)(2), 65.1-3, 65.6(a)(3), and 65.7.

NMFS provides these specific mapping recommendations in full recognition of the work of FEMA's Technical Mapping Advisory Committee (TMAC), which has fashioned a broader suite of recommended improvements to FEMA's mapping program. NMFS representatives to the TMAC have reviewed the recommendations below, and have indicate that they are more detailed than but consistent with the broader TMAC recommendations.

A. Modify Flood Hazard Mapping Protocols

FEMA's maps are intended to, based on the best available science, indicate the likelihood of exposure of certain lands to inundation in order to evaluate flood-related risks to life and property and thereby provide insurance for structures that are located in flood-prone areas, and discourage new construction in flood-prone areas. Therefore, consistent with 42 U.S.C. 4101(a)-(d) and with recommendations developed under 42 U.S.C. 4101a(d)(1)(A) and (d)(2), and obligations under the Biggert-Waters Act to identify, update, and maintain maps of all areas of possible population growth within both the 100 and 500-year floodplain, FEMA will incorporate when mapping, the best available data that indicates both current risk and reasonably anticipated future risk (see 42 U.S.C. 4101b(a), 4101b(b)(3)(C), and 4101b(c)(1)(ii)). To accomplish this, FEMA will implement the following measures:

i. Ensure that the models and methods used for mapping are based on the best available science and appropriate for the area being mapped, including:[153]
   a. Calibrate flood maps to historic flood events by using stage-discharge relationship at USGS gaging stations; or, where gage data is unavailable, to historic high water marks. This is an economical and efficient method to correct older maps.
   b. Use maximum probable roughness coefficient (e.g., Manning's n) during flood modeling that corresponds to the anticipated riparian vegetation condition, consistent with the land use zoning for the area, and the season of highest roughness. This is intended to ensure maps reflect vegetation maturation over the duration of the map, as mature riparian vegetation provides important habitat functions for listed species.
   c. Use unsteady-state hydraulic models, or an equally accurate modeling method, for conditions of significant floodplain storage and/or tidal flow. Areas of significant flood storage, and areas affected by tidal flooding both provide important areas for juvenile salmonid refuge/survival.

[153] NAS 2009; Galloway *et al.* 2006.

d. Use multi-dimensional hydraulic models, or an equally accurate modeling method, where site conditions have uncertain or changeable flow paths or complex overbank flow, and for locations where flows have significant lateral flow compression (e.g., bridges).

ii. To reduce the risk of reliance on BFE estimates that are too low and therefore underestimate likely flood levels, and consistent with the recommendation in Rosenbaum and Boulware (2006),[154] present the range of modeled BFE values in the FIS and use the 90th percentile value of the modeled 100 year flow as the BFE (see also 2013 CRS Coordinator's Manual at 410-18).

iii. When mapping or remapping, include all watersheds of 160 acres and larger, as small watersheds may have areas of largely intact floodplain function which provide important features for listed species.

iv. Depicting a larger floodway would reduce the amount and type of development that can be placed within the special flood hazard area near the river channel, and thus preserve natural floodplain functions upon which listed species depend. To better protect the important habitat functions and features adjacent to the waterway and to minimize channelization, scour, and erosion, define and depict the regulatory floodway as

a. The 1 foot rise floodway, expanded to include all locations where depths of flood water reach or exceed 3 feet, and all locations where the velocity of floodwater reaches or exceeds 3 feet per second (see 2013 CRS Coordinator's Manual at 410-21[155]), or

b. A 6-inch rise floodway.

B. Map Riverine Erosion Zones

The NFIA requires FEMA to depict flood hazards, and includes flood-related erosion within the definition of flood, and also requires that map updates include any relevant information on land subsidence and other flood-related hazards. Flood-related erosion areas pose high risk to human life and property and also provide important habitat forming processes that support listed salmonids. Thus, consistent with authorities at 42 U.S.C. 4101(a)-(f), 4101b, 4121(c); 44 CFR 9.7(b)(v)(B), 59.1, 60.2(a), 60.5, 64.3 (a)(2) and (b), 65.1; FEMA's 1999 Riverine Erosion Hazard Areas Mapping Feasibility Study; and the TMAC's 2015 Future Conditions Risk Assessment and Modeling Report Recommendation 4, FEMA will:

i. Identify the full range of flood-related erosion hazards on FIRMs, including CMZs, per Appendix 2.8-B, CMZ Mapping Priorities and Protocols, and designate as E Zones, using one of the following methods:

a. The mapping methodology identified by Rapp and Abbe 2003 (outlined in Appendix 2.8-B), or

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[154] Rosenbaum and Boulware (2006) recommend "using the upper limit of a 95-5 or 90-10 confidence interval in calculating the BFE" "to ensure that 1 percent chance protection is provided to most properties" (Recommendation DEI-5, pp. 24-25, 74).

[155] The Coordinator's Manual explains: "Because the entire SFHA benefits from the implementation of a more restrictive floodway surcharge, a FWS [floodway standard] includes the entire width of that reach of the SFHA, not just the area of the floodway. A higher floodway standard helps prevent development within the SFHA, thereby reducing increases in flood elevations on existing structures." 2013 Coordinator's Manual at 410-21.

b. Another methodology of comparable value (*e.g.*, Olson *et al.* 2014), or
c. A proxy using the method described in Appendix 2.8-B (based on Sikder 2012), or
d. Use the entire SFHA as the E Zone.

ii. Where the CMZ is disconnected by existing infrastructure and development in floodplains, as determined pursuant to a CMZ delineation methodology consistent with Rapp and Abbe (2003), or another methodology of comparable value (*e.g*, Olson *et al.* 2104), the disconnected area may be excluded from the CMZ/Zone E.

C. Depict the High Hazard Area on FIRMS

Per "Guidelines for Implementing EO 11988, Floodplain Management, and EO 13690, Establishing a Federal Flood Risk Management Standard," issued October 8, 2015:

> High-hazard areas are those portions of riverine and coastal floodplains nearest the source of flooding. These are the frequently flooded areas that become arenas of major flood dynamics during large floods. Here, floodwaters exert their maximum pressures, erosion is greatly accelerated, and the potential loss to lives and property is increased. Additionally, these are the areas of coastal and riverine floodplains within which many of the most critical floodplain values are concentrated. In riverine situations, the high-hazard area is that portion of the floodplain where impedance to flood flow resulting from human activity can increase flood heights and consequently the area subject to flooding. In coastal floodplains, the high-hazard area is usually confined to the beach area in front of high bluffs or the crest of primary or foredunes, where wave impact is the most significant inducing factor.

In light of the high potential for flood damages and the high likelihood of significant adverse effects to natural floodplain functions associated with development in areas closest to the flood source and at greatest risk of flood-related erosion, FEMA shall depict on FIRMs a subset of the floodplain referred to herein as the *high hazard area.** This will ensure that that local land use decisions are fully informed of risk and will aid in guiding development away from flood hazards, as provided in Element 4 of this RPA.

For this RPA, the high hazard area (HHA) is defined and measured by the furthest landward extent of:

i. Floodway (as defined by this RPA), and
ii. E Zones (as identified per Element 3.B., above).

D. Depict the Area of Future Conditions Flood Hazard

A report provided by AECOM (2013) indicates that in the Pacific Northwest the combination of shifting rainfall and snowfall patterns due to climate change, when coupled with future land use changes associated with increasing human population

growth, will significantly increase the BFEs of riverine areas in the next 85 years.[156] Thus FIRMs shall depict the AFCFH.

i. As required by the Biggert-Waters Act at section 100215(d)(2) and to meet the intended outcomes of this RPA, FEMA shall incorporate future conditions risk assessments in map revisions or updates, consistent with the TMAC report's recommendations on mapping future conditions, within 36 months of receiving the report. Consistent with the Biggert-Waters Act 2012, future conditions mapping shall be based upon the best available science, including projections for the year 2050 and to be updated to incorporate new data every 10 years thereafter, and shall include:
   a. Climate change in both coastal and riverine areas, and sea level rise in coastal areas (42 U.S.C. 4101b(b)(3)(D) and EO 13653; 42 U.S.C. 4101a(d)), and
   b. Build out/land cover change (42 U.S.C. 4101a(d)).

ii. If available data are inadequate to estimate future conditions, or if needed to address uncertainty, a 2-foot freeboard, or the 0.2 percent chance floodplain are acceptable proxies for the AFCFH, as identified by the Federal Flood Risk Management Standard. See also 42 U.S.C. 4101b(b)(1)(A)(ii).

E. Revise Map Adoption Procedures

Replacing outdated maps with more accurate maps is beneficial only if the updated maps are expeditiously adopted by communities and used as a basis for implementing the NFIP's requirements. Frequently, communities continue to rely on outdated maps long after new maps have been prepared, due to the lengthy process for appeals and general time lag between FEMA's issuance of a preliminary map and a letter of final determination (LFD). To ensure that floodplain management and concomitant habitat protections are applied based on the best information available, FEMA must ensure that all timelines provided in 42 U.S.C. 4104, 4104-1, and 44 CFR part 67 are adhered to, and:

i. Issue an LFD within 90 days of the date that any appeals process is resolved in favor of FEMA.

ii. When a new map is not appealed, issue an LFD within 45 days of the date upon which the appeal period expired.

F. Map Residual Flood Hazards and Risks Behind Levees

Consistent with FEMA's obligations under the Biggert-Waters Act to identify, update, and maintain maps of areas of residual risk that are protected by levees, dams, and other flood control structures, FEMA will apply the following criteria:

i. Do not omit any areas from the SFHA based on the presence of a non-accredited levee, as residual risk persists despite the presence of levees; and, do not delay the finalization of flood insurance rate maps, irrespective of the presence of non-accredited levees. Provisional accreditation of shall be limited to a single term of 18 months.

ii. Depict the level of residual risk behind accredited levees via methods selected by FEMA.

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[156] See opinion at Section 2.2 and section 2.4.3.2

iii. Ensure that there is coordination or consultation with NMFS prior to levee accreditation or approving map changes based on the construction of new levees or improvements to existing levees. Joint consultation with another federal entity such as the Corps of Engineers at the time of levee construction or levee improvements is preferred.

G. Provide Accurate Maps Based on the Best Available Data for All Oregon NFIP Communities

FEMA shall work with NMFS and the State of Oregon to develop a schedule for producing updated maps consistent with this Element for all Oregon NFIP communities subject to this RPA. The schedule shall be completed within one year of the issuance of this opinion, and FEMA will thereafter implement this RPA Element consistent with the agreed schedule. In addition to FEMA's existing prioritization factors to be considered in developing the schedule, FEMA shall include the prioritization factors for mapping/remapping provided in Appendix 2.8-A, ESA Mapping Priority, and Appendix 2.8-B, CMZ Mapping Priorities and Protocols. At a minimum, the schedule will provide for 10 new or updated maps completed per year until all requisite mapping has been completed.

***RPA Element 4: Floodplain Management Criteria for Special Hazard Areas that Avoid, Minimize, and Mitigate Program Level Impacts***

Once flood risks are mapped, restrictive land use and development standards are appropriate. Such restrictions achieve two positive outcomes: they reduce exposure of life and property to flood risk and preserve natural floodplain functions, as described in the CRS Coordinator's Manual at 120-6 and at 42 U.S.C. 4121(a)(12)(A)-(B), 44 CFR 9.4, and 44 CFR 9.10(d)(2).

The purpose of the NFIA is to "require States or local communities, as a condition of future Federal financial assistance, to participate in the flood insurance program and to adopt adequate flood plan [sic] ordinances with effective enforcement provisions consistent with Federal standards to reduce or avoid future flood losses" (42 U.S.C. 4002(b)(3)). As no flood insurance coverage is to be provided unless jurisdictions "have adopted adequate land use and control measures" (42 U.S.C. 4022(a)(1)), FEMA is authorized to establish comprehensive criteria for land management and use that states or local communities must adopt in order to participate in the NFIP. The criteria are intended to encourage communities to constrict the development of land exposed to flood damage, guide development away from flood hazard areas, reduce flood-related damage, and improve long-range land management and use of flood-prone areas. 42 U.S.C. 4102.

As stated by Congress, "A most important public purpose which the [NFIP] will serve will be to encourage State and local governments to adopt and enforce appropriate land use provisions to restrict future development of land which is exposed to flood hazard." H.R. Rep. No. 1585, reprinted in 1968 U.S.C.C.A.N. 2873, 2966. The NFIP's goal of reducing future damage to life and property and minimizing disaster costs co-incidentally preserves floodplain resources needed for the survival and recovery of listed fish. Conversely, standards that allow unmitigated

development throughout floodplains impair natural floodplain functions and are at odds with the goals of the Unified National Program for Floodplain Management and the ESA.

For this consultation, FEMA proposed to modify the NFIP floodplain management criteria for Oregon to better preserve floodplain habitat for listed species. FEMA's proposal consists of dividing the floodplain into two components: (1) a riparian buffer zone, measured 170-feet laterally from either side of a water course, and (2) the remainder of the floodplain. FEMA proposes that within the riparian buffer zone (RBZ) only certain types of development would be allowed, specifically: development that will not adversely affect listed species or critical habitat; functionally dependent uses; habitat restoration activities; and, activities that result in a beneficial gain for species or habitat. FEMA would require mitigation for any short-term adverse effects associated with these uses. FEMA proposes that in the remainder of the floodplain, mitigation would be required for all adverse effects to floodplain functions so that no net loss or a beneficial gain is achieved. Further, based on discussions with FEMA during this consultation, FEMA intends that the mitigation requirement include, sequentially, avoidance, minimization, and compensation for unavoidable impacts.

NMFS understands the underlying intent of FEMA's proposed measures to be "no adverse effects" to or "beneficial gain" of habitat functions within the riparian buffer zone and "no net loss" of functions within the remainder of the floodplain; NMFS strongly supports these objectives. NMFS also agrees with and supports FEMA's proposal for more stringent development limitations, including limits on acceptable types of development, within the RBZ. However, based on experience in Puget Sound, Washington and for the reasons explained previously and in Appendix 2.4-A of this opinion, NMFS has concerns regarding the ability of local communities to effectively implement these technically complex concepts absent greater specificity regarding acceptable uses, likely impacts on floodplain function, and appropriate mitigation requirements. Also, the state of Oregon DLCD has expressed its preference for clear and specific mitigation requirements to facilitate local implementation.

NMFS has developed the following modifications to FEMA's proposed action in order to ensure that development impacts will be avoided, minimized, and compensated for, as intended by FEMA. These criteria are similar to the standards that FEMA has been implementing in Puget Sound, Washington since September 2008, and to the higher regulatory standards advocated by FEMA in the 2013 CRS Coordinator's Manual. This RPA element is designed with the understanding that development in urbanized floodplains will incur less degradation and likely require less mitigation than development in floodplains with more rural characteristics, because fewer natural functions remain in previously developed locations.

In order for FEMA to meet the ESA's requirement that its program avoid jeopardy to listed species and adverse modification of critical habitat, FEMA must require that communities adopt the criteria outlined below as a condition of continued participation in the program, and FEMA must enforce community compliance, *i.e.*, by initiating probation/suspension for communities that fail to timely adopt and implement the criteria. Compliance with this RPA element will better guide the development of proposed future construction away from locations which are

threatened by flood and flood-related hazards,[157] and will protect and may reestablish some degree of natural and beneficial floodplain functions as defined by statute (42 U.S.C. 1421(12)), and by regulation (44 CFR 9.4), *e.g.*, "Natural values of floodplains...include but are not limited to (b) living resource values."

A. Regulatory Revisions to Enhance ESA Compliance

FEMA shall revise its regulations at 44 CFR part 60 to incorporate an ESA performance standard into the regulatory floodplain management criteria required as a condition of NFIP eligibility. NMFS understands that FEMA intends to initially implement an ESA performance standard through guidance, but ultimately will codify it as part of the regulatory floodplain management criteria (*e.g.*, see the proposed regulatory revision provided in Section 2.10, Conservation Recommendations). The ESA performance standard must be sufficiently detailed to allow FEMA to ensure community compliance with the floodplain management criteria set forth in this RPA Element through the issuance of additional guidance or otherwise. FEMA shall also craft guidance and provide technical support as needed for successful implementation of the ESA performance standard and this RPA Element.

B. Avoid Impacts by Guiding Development Away from Land Which is Exposed to High Hazards[158]

Due to the importance of protecting riparian habitat and functions within the high hazard area, [159] apply the following criteria within the HHA:

i. Except as provided in paragraph (iv) below, allow no new development or substantial improvements (as defined by this RPA) in the high hazard area (see *e.g.*, 44 CFR 9.11(d)(1)).

ii. A designated floodway may not be redrawn for the purposes of accommodating new structures.[160]

iii. Designate the E-Zone setback "to create a safety buffer consisting of a natural vegetative or contour strip" as provided in 44 CFR 60.5(b)(2) as the greater of:
   a. The 60-year erosion setback (44 CFR 59.1) or,
   b. One-half again the distance of the depicted "high" or "severe" erosion risk.

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[157] Compliance with this RPA will co-incidentally satisfy the GAO recommendation in its climate change report that FEMA should consider amending the NFIP minimum standards to incorporate forward looking standards (GAO 2014).

[158] "Within the 1 percent floodplain, natural and beneficial functions are generally more prevalent closer to the stream where overbank flooding is frequent and complex habitat exists along the aquatic-terrestrial boundary. Disturbances to habitat are typically much greater from activities that occur closer to the stream channel than along the outer limits mapped for the 1 percent flood" (Galloway *et al.* 2006).

[159] "The preservation strategy focuses on the immediate impacts of the proposed floodplain actions. This strategy involves prevention of alteration to the natural and beneficial floodplain values or maintenance of the floodplain environment as close to its natural state as possible using all practicable means. This strategy is most effectively applied to floodplains showing little or no previous disruption by man, but may be appropriate for other floodplains. The best strategy for preserving and protecting the remaining natural values of floodplains is avoidance..." (FEMA 1986).

[160] "Disruption of natural floodplain terrain and vegetation within a floodway adjacent to the stream channel can affect some of the highest quality habitat and represents a significant impact to the natural and beneficial functions of floodplains" (Galloway *et al.* 2006).

c. Allowed uses within the safety buffer are those identified at 44 CFR 60.5(b)(2), *i.e.*," agricultural, forestry, outdoor recreation and wildlife habitat areas, and for other activities using temporary and portable structures only."

iv. Exceptions

a. The following uses may be allowed in the high hazard area: (1) *open space** uses (see CRS Coordinator's Manual at 420-6 to -7); (2) habitat restoration activities; (3) *low intensity recreational uses**; (4) *water-dependent uses*,** and (5) *bioengineered bank protection.** In that portion of the HHA outside of the 10 year floodplain, agriculture and forestry are additional uses that may be allowed.

b. Development that qualifies for grandfathering per Element 4.G may proceed despite being located in the high hazard area.

c. Any development allowed as an exception must meet the mitigation requirements of Elements 4.F, except for habitat restoration activities, which are considered self-mitigating and therefore do not require additional mitigation.

C. Minimize Impacts by Constricting the Development of Land Which Is Exposed to Flood Damage[161] – Division of Lots and Lot Coverage

FEMA shall, in consultation with the Oregon Department of Land Conservation and Development:

i. For properties that are located partially within special hazard areas, develop clear and measurable spatial standards,[162] governing the creation of new development parcels to ensure that newly created lots reserve sufficient land outside of special hazard areas to accommodate future construction and disallow partitioning that will create new parcels fully within special hazard areas.

ii. Develop clear and measurable spatial standards governing the minimum permissible size of new development parcels to minimize densification and preserve natural floodplain functions.

iii. Limit the footprint of new structures to 10% or less of total lot size for both residential and commercial development in order to reduce impervious surfaces in floodplains and minimize impacts to natural floodplain functions.

iv. Ensure that any lots or parcels created by division are able to accommodate development consistent with the applicable zoning and this RPA, including any necessary mitigation, without requiring any variance from local or state land-use requirements.

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[161] This language found at FEMA's legislative authorities 42 USC 4102(c)(2), and is part of the larger section, 4102, entitled "Criteria for land management and use." Section 4012 calls for the Administrator of FEMA to develop comprehensive criteria, which, to the maximum extent feasible, will constrict development of land, and guide development of proposed construction away from locations threatened by flood hazards.

[162] To avoid problems associated with the Puget Sound RPA's "lack of clarity, and…development standards [that] were not tailored to help communities understand their NFIP and ESA compliance obligations" (*NWF v FEMA*, 10/24/14), NMFS refers FEMA to the standards identified in the 2013 CRS Coordinator's Manual at 420-26 to -27 as an example of a clear and measurable standard. FEMA shall work in concert with DLCD and local authorities to develop a clear, measurable standard appropriate for Oregon.

v. Within urban growth boundaries in effect on January 1, 2019, the protective measures in paragraphs (i)-(iii) above may be met by employing alternative methods that preserve hyporheic function, riparian vegetation, and flood refugia for listed fish, such as or using *cluster development/open space zoning** that places development landward of the 50 year flood interval. A conservation easement or deed restriction shall be utilized to preserve unimpaired flood processes in the undeveloped area (see *e.g.*, 2014 CRS Manual at 420-21).

vi. Partitioning for the purpose of habitat restoration activities in special hazard areas is excluded from provisions (i)-(iii) above.

D. Minimize Impacts by Requiring Encroachment Analyses Prior to Floodway Development
An equal degree of encroachment analysis must occur prior to approval of floodplain development in any participating jurisdiction that lacks a mapped floodway,[163] to ensure that the de facto floodway that would be identified consistent with RPA Element 3.A(iv) is not encroached in a manner detrimental to natural floodplain values or functions.

E. Minimize Stormwater and Hyporheic Impacts from Impervious Surfaces
Minimize the impacts of new impervious surface in floodplains by requiring the use of pervious surface to the maximum extent feasible. Where use of pervious surface is not feasible, minimize impacts by requiring the removal of existing impervious surface up to an amount equal to the new impervious surface to the maximum extent feasible. Require mitigation per Element 4.F below for any remaining impacts.

F. Compensatory Mitigation for Adverse Impacts Associated with Floodplain Development
NMFS fully supports FEMA's objective for implementation of the NFIP in Oregon, that all development impacts to natural floodplain functions be fully mitigated. Accordingly, FEMA, with NMFS' technical assistance, will develop detailed mitigation standards, with the objective of achieving "no net loss or beneficial gain"[164] of natural floodplain functions, which take into consideration the following factors: the likelihood of underperformance; the timing of mitigation performance relative to the accrual of impacts and compensation for delayed realization; the value of on-site versus off-site mitigation; the value of in-kind versus out-of-kind mitigation; and, the need for assurances and performance monitoring to ensure that the mitigation will function in perpetuity.

i. The mitigation standards shall identify the specific development activities that require mitigation, including, at a minimum:

a. The addition of fill, structures, levees, and dikes, which reduces flood storage and fish refugia, impedes habitat forming processes, increases flow volume and velocity thereby eroding stream banks and beds, and alters peak flow timing thereby increasing risk of injury to redds, fry, and alevin;

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[163] FEMA 1979. Community Assistance Series No. 4: "The Floodway: A Guide for Community Permit Officials." See also 44 CFR 60.3(c)(10).

[164] See also Presidential Memorandum: Mitigating Impacts on Natural Resources from Development and Encouraging Related Private Investment, November 3, 2015. "Agencies' mitigation policies should establish a net benefit goal or, at a minimum, a no net loss goal for natural resources the agency manages that are important, scarce, or sensitive, or wherever doing so is consistent with agency mission and established natural resource objectives."

b. The addition of impervious surfaces, which reduces hyporheic function and stream recharge, increases storm water, pollutant loading, water temperature, velocity, and scour, and modifies peak and base flows;
c. Vegetation removal, which reduces shade, detrital input, velocity refuge, and habitat complexity and increases storm water and erosion; and
d. Bank armoring, which reduces instream habitat values and impedes habitat forming processes.

ii. If FEMA wishes to provide a variance process that allows communities to adopt alternative mitigation standards that differ from the standards developed by FEMA under Element 4.F(i), FEMA will ensure that such alternative standards are consistent with the intent of this RPA sub-element through one of the following procedures:
   a. Require that the community proposing the alternative obtain an ESA section 10 permit from NMFS; or
   b. Require that the community proposing the alternative provide its proposal to FEMA for a preliminary finding of adequacy. If FEMA finds that the proposal is adequate, FEMA shall seek NMFS' agreement that the alternative provides resource protection comparable with that provided by RPA Element 4.F(i). and determine whether additional steps are required for ESA compliance.

iii. Alternatively, or pending FEMA's completion of mitigation standards per Element 4.F(i), FEMA may utilize the criteria set forth below, as supplemented by Appendix 2.8-C, which NMFS considers adequate to offset development impacts.
   a. Location. Locate all mitigation on site, except when precluded by geomorphic or spatial constraints or when off-site mitigation will clearly provide a greater benefit to listed species; financial cost is not a basis for allowing required mitigation to occur at an off-site location.
   b. Assurances. Require the mitigation proponent to provide appropriate assurances that the mitigation will function in perpetuity, as provided in Appendix 2.8-C.
   c. Timing. Where delayed realization is anticipated, increase the required mitigation ratios, as provided in Appendix 2.8-C.
   d. Displaced flood volume. Provide compensatory storage for displacement of flood storage volume/loss of accessible floodplain refugia for listed fish due to fill or structural displacement. This balanced cut and fill requirement applies to all floodplain development except habitat restoration activities. When mitigating lost storage by creating compensatory storage, the compensatory storage must be:
      1. Hydrologically connected to the waterbody which is the flooding source,
      2. Designed so that there is no increase in velocity,
      3. Designed to fill and drain in a manner that does not trap fish,
      4. Within the same *hydraulic reach** as the proposed development to minimize impact to affected fish populations,
      5. Measured in one foot elevation increments relative to the amount and location of fill placed, and
      6. Provided at a 1.5 to one ratio laterally, or greater, in order to guarantee no loss of beneficial floodplain functions, including conveyance.

e. Increased impervious surface. Where minimization per Element 4.E above does not fully compensate for lost functions, mitigate any remaining impacts to natural floodplain functions from the increase of impervious surface by requiring the following measures:
   1. Incorporate low impact development (LID) features or methods in new structures,
   2. Incorporate green infrastructure development standards at the community planning scale,[165] and
   3. Require treatment for any storm water generated despite use of the above measures.

f. Decreased riparian vegetation. Mitigative planting must replace the lost vegetation in a manner that provides equivalent area, diversity, and function and must be located to benefit the same fish population(s) affected by the development.

G. Grandfathering

Development for which the *start of construction** occurs on or before September 15, 2016 is grandfathered. However, when a grandfathered structure is substantially damaged or substantially improved, the structure must come into compliance with Elements 4.B-4.F as applicable, *e.g.*, mitigation is required for any adverse impacts to natural floodplain functions associated with the substantial improvement (expanded footprint, vegetation removal, placement of fill, etc.). Substantial damage and substantial improvement shall be calculated at 50% of the value of the structure, measured cumulatively over a 10 year time frame. Also, improvements that increase the footprint of the structure 10% or more (based on the square feet of the lowest floor) measured cumulatively over 10 years shall constitute "substantial improvement" (See 2013 CRS Coordinator's Manual at 430-1).

H. Alternative Compliance for Special Circumstances

If a community demonstrates to FEMA that full compliance with Element 4 is impracticable due to exceptional circumstances (*e.g.*, geomorphic constraints, wildfire risk, or community located fully within the floodplain), a community may propose an alternative scheme (through regulations or enforceable procedures) for complying with the intended outcomes of Element 4 through one of the procedures described below. NMFS expects that such situations will be extremely limited and that alternative compliance will only be approved by FEMA where the community clearly demonstrates that the intended protective outcomes of Element 4 will be achieved through the proposed alternative.

i. A community may propose an alternative scheme to FEMA; FEMA will make an initial determination whether the alternative is consistent with Element 4, and if FEMA makes a positive determination, FEMA will seek NMFS' agreement that the alternative provides comparable resource protection prior to approving the alternative.

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[165] "Green stormwater infrastructure or similar pollution prevention methods should be incorporated to the maximal extent practicable, at the watershed scale, for all future development and redevelopment projects, particularly those involving transportation infrastructure" (Spromberg *et al.* 2016).

ii. A community may seek an incidental take permit from NMFS under ESA section 10; if NMFS grants the permit, FEMA may accept the associated habitat conservation plan as the alternative method of compliance.
iii. A community may pursue authorization under ESA section 4(d), Limit 12 (50 CFR 223.203(b)(12)).

***RPA Element 5: Data Collection and Reporting***

"Water and the adjacent floodplain exist in nature in a state of dynamic equilibrium; when coastal or riverine systems are disturbed, the environmental effects may affect areas far from the original site of the disturbance and can last for decades. Thus, floodplain actions must be viewed with caution and a careful assessment made of their impact on natural and beneficial floodplain values."[166]

In order to document that FEMA is carrying out the NFIP, and NFIP participating communities complying with NFIP minimum standards are managing floodplain development in a manner that preserves natural floodplain functions to meet the objectives of this RPA, FEMA must systematically collect and analyze information from all participating communities in Oregon so as to document impacts, including: (a) how many floodplain development activities are permitted by participating communities subject to this RPA; (b) where and when the development occurs; (c) a basic description of the development, including mitigation; (d) the impact of the development on natural floodplain functions,[167] and (e) information that allows an evaluation of community compliance with the NFIP requirements as modified by this RPA. NMFS is aware of the difficulties in tracking implementation of the Puget Sound RPA reliably and is therefore seeking to strengthen the tracking and accountability mechanisms in this RPA. NMFS desires a speedy and efficient system of tracking and reporting and will work with FEMA, Oregon's DLCD, and local authorities towards this end.

A. Permit Reporting
FEMA shall require that participating communities report to FEMA on each permit issued for development in special hazard areas, including the following information:
i. The amount of fill or structural displacement of flood storage, and the amount of compensatory storage measured by volume and area (both surface area and cross sectional area). This reporting element effectively describes loss of refugia for rearing fish, and indicates factors that increase the BFE and flood velocities.
ii. The amount of new impervious surface (indicates loss of hyporheic function) and any projected change in the timing, velocity, or peak flows of storm water runoff and the types and amounts (if applicable) of mitigation provided.
iii. The area in which clearing and/or grading occurred (*e.g.*, within the HHA, SFHA, or AFCFH)

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[166] FEMA 2015. Guidelines for implementing EO 11988 Floodplain Management, and EO 13690 Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input. 80 FR 64008; Oct. 22, 2015.

[167] "Where location in the floodplain is the only practicable alternative, care must be taken to identify both the beneficial and the adverse impacts to existing natural and beneficial floodplain values and to design or modify the action to avoid or minimize potential harm to or within the floodplain." FEMA 1986.

iv. The number of trees equal to or greater than 6" dbh removed (indicates loss of riparian function and reduction of source of large wood recruitment) and the number and timing of trees planted to meet mitigation requirement (indicative of the duration of lost functions).

v. If a project disconnects land from the floodplain (*e.g.*, by accreditation of levees or recognition of non-accredited levees), identify the type of project and the amount of land disconnected from the floodplain. This reporting element effectively describes loss of refugia for rearing fish, and indicates factors that increase the BFE and flood velocities.

vi. If a project reconnects land to the floodplain (*e.g.*, by the removal or setback of a levee) identify the type of project and amount of land reconnected to the floodplain. This reporting element is indicative of effectiveness of mitigation or of beneficial habitat restoration actions.

vii. The location of the project and of the corresponding mitigation (*e.g.*, within the high hazard area, the SFHA, or AFCFH); for projects in the HHA identify which exception from Element 4.B(iv) applies. This reporting element indicates the quality of mitigation based on the relative role the mitigation area performs in terms of inundation frequency.

FEMA, with NMFS' assistance, will finalize a reporting form or electronic reporting system incorporating the requirements above by March 15, 2018, so that reporting by NFIP communities may commence by July 1, 2018. Thereafter, FEMA will require that communities submit a quarterly report to FEMA indicating issuance of each floodplain development permit in the reporting period. FEMA may develop its own standardized reporting form, or NMFS has prepared a Google Form that could be used for reporting as required by this component of the RPA. NMFS estimates that communities could complete the form in fewer than 10 minutes for each permit issued.

B. Annual Reporting

FEMA will prepare and submit a report to NMFS annually, based on the calendar year, on RPA implementation status. NMFS recommends that these annual reports be publically available so that the public can track efforts to protect public health and safety and important floodplain functions and other indicators of the successful implementation of this RPA. FEMA will:

i. Confer with NMFS to mutually agree upon a due date for submission of the annual report, but no later than September 1 of each year. The first report shall be prepared for calendar year 2017.

ii. Annually meet with NMFS to review the most recent report and program performance. The interagency meeting purpose will be to discuss program compliance, identify what additional actions by FEMA are warranted, and determine whether re-initiation of this consultation is warranted.

iii. Include in the report, at a minimum, the following:

   a. A list of communities that have adopted ordinances or enforceable procedures that implement the revised floodplain management criteria required by this RPA.

   b. A list of completed maps that comply with RPA Element 2.

c. The mapping status of each Oregon NFIP participating community (*i.e.*, dates of effective maps, status of preliminary maps including status of any appeals, and anticipated dates for Letters of Final Determination).
d. The number of CLOMCs (specify how many are CLOMR-Fs) and LOMCs (specify how many are LOMR-Fs) issued by FEMA.
e. Sum by participating community: fill area and volume values based on the community reported fill placed within special hazard areas excluding fill associated with habitat restoration activities.
f. Sum by participating community: the number of times and amount of mitigation required for loss of riparian vegetation.
g. Sum by participating community: increase in impervious surface.
h. Sum by participating community: the amount of floodplain disconnected and/or reconnected to the floodplain.
i. A summary of items (e)-(h) aggregated by county.
j. A summary of the CAVs initiated and completed that year, including the community progress toward compliance benchmarks (below).
k. A brief description of any compliance problems or issues and resulting FEMA enforcement actions.

***RPA Element 6: Compliance and Enforcement***

In order for this RPA to function as intended, it is critical that FEMA effectively monitor community implementation of and compliance with these amended criteria and promptly undertake appropriate enforcement actions if needed to ensure community compliance. FEMA must ensure both that communities adopt the required ordinances and/or enforceable procedures and that communities enforce their ordinances/procedures so as to achieve the intended outcomes of this RPA, *i.e.*, preservation of all remaining natural floodplain functions.

A. Community Implementation
   i. Early Implementation Incentive. Because compliance with this RPA will prevent destruction and adverse modification of critical habitat by reducing or avoiding degradation and loss of floodplains and natural floodplain functions; and because the preservation of floodplains and natural floodplain functions will avoid the likelihood of jeopardy to listed species; in order to encourage jurisdictions to independently pursue compliance with the RPA in advance of stated timelines, which would confer an early and permanent benefit to the listed species and their habitat, this RPA directs FEMA, as authorized by 42 U.S.C. 4022(b), to modify the CRS so that when, prior to FEMA's own compliance with the provisions of this RPA, a community:
      a. Adopts a regulatory floodway per RPA Element 3.A(iv), it receives 200 points under CRS part 410.
      b. Adopts a map depicting flood related erosion zones or uses an accepted scientific method to confirm no CMZ is present per RPA Element 3.B, it receives 100 points under CRS part 410.
      c. Adopts a map depicting the HHA per RPA Element 3.C, it receives 100 points under CRS part 410.

d. Adopts a map depicting the AFCFH per RPA Element 3.D, it receives 100 points under CRS part 410.
e. Regulates to a preliminary map even though the letter of final determination has not yet been issued, it receives 100 points under CRS parts 430 and 510.
f. Adopts a zero rise/zero increase in velocity standard for development receives 100 points under CRS parts 430.
g. Restricts division of lots per RPA Element 4.C, it receives 150 points under CRS parts 420 and 430.
h. Requires use of LID and/or green infrastructure for all new development per RPA Element 4.F, it receives 200 points under CRS part 450.
i. Limits new development in the HHA per RPA Element 4.B, it receives 300 points under CRS parts 420 and 430.

ii. Compliance Benchmarks. To demonstrate that it is achieving the expected outcomes of this RPA, FEMA must ensure that participating communities adopt maps and regulate development corollary to those maps. Thus, FEMA may demonstrate that this RPA is being successfully implemented by showing that:
a. Within 18 months of the date of this opinion, FEMA shall demonstrate substantial progress on any guidance materials needed to implement this RPA.
b. For any regulatory revisions that FEMA determines are necessary to implement this RPA, FEMA shall provide proposed rule for public comment within 2 years of the date of this opinion.
c. Within 18 months of a LFD indicating a community's revised FIRM, the jurisdiction shall have revised its code to meet all minimum criteria consistent with hazards identified on that FIRM.
d. By September 1, 2024, FEMA must demonstrate that all NFIP participating jurisdictions in Oregon subject to this consultation have adopted and implemented all requirements from Elements 3 and 4 of this RPA. This deadline also applies to any jurisdiction pursuing alternative compliance per RPA Element 4.G.

B. Enforcement. In order to meet the requirements of this RPA, by September 1, 2024, FEMA will demonstrate full program compliance by those communities subject to this RPA, based on the data from local permits reported to FEMA and from CAVs or comparable means of auditing community compliance. FEMA must conduct CAVs or otherwise audit compliance with this RPA in 25 communities each year beginning in 2023. NMFS further recommends that FEMA prioritize for CAVs for or otherwise audits those communities which:
i. FEMA is aware or has reason to believe (*e.g.*, based on permit reporting data) are not fully implementing the RPA requirements.
ii. Have mapped floodplains that retain low density characteristics and are subject to possible population growth.
iii. Show an increasing number of floodplain development permits.
iv. Have growth boundaries, comprehensive plans, or zoning that allow development in special hazard areas.

FEMA shall implement appropriate compliance efforts directed at those communities that do not achieve and maintain compliance with the above benchmarks. For example, when development reporting reveals that a jurisdiction has permitted development within special hazard areas without mitigation, then FEMA will put that jurisdiction on notice for probation within 12 months of the date of the violation unless corrective action has been taken. Communities automatically out of compliance are those that fail to have in place ordinances and other enforceable procedures that comply with the revised floodplain management criteria in this RPA. Should a participating community placed on probation fail to come into substantial compliance within 24 months of being placed on probation, FEMA will suspend the community from the NFIP, and the community's take coverage shall lapse.

### 2.8.3 Glossary of Terms as Used in this RPA

*Area of future conditions flood hazard (AFCFH)* – The land area that would be inundated by the 1-percent-annual-chance (100-year) flood based on future conditions hydrology (44 CFR 59.1), inclusive changes due to climate change.

*Avulsion* – "Described by Allen (1965 5:119) as 'the sudden abandonment of a part or the whole of a meander belt by a stream for some new course.' Channels may avulse into an abandoned channel or create a new channel depending on the pre-existing boundary conditions that initiate the avulsion" (Rapp and Abbe 2003).

*Avulsion hazard zone (AHZ)* – "The area not included in the Historic Migration Zone that is at risk of avulsion over the timeline of the channel migration zone" (refer to Section 4.2 of Rapp and Abbe 2003).

*Bioengineered bank protection* – Methods of stream bank or shoreline protection, other than rip-rap bank armoring, which incorporate fish habitat design elements or fish habitat features. See, *e.g. http://www.fema.gov/pdf/about/regions/regionx/Engineering_With_Nature_Web.pdf*; and *http://www.fs.fed.us/publications/soil-bio-guide/guide/chapter5.pdf*.

*Channel migration zone (CMZ)* – "The area where a stream or river is susceptible to channel erosion" (refer to Rapp and Abbe 2003). The CMZ may extend beyond the 100-year floodplain. Where the delineated CMZ extends beyond artificial revetments, bulkheads, and levees, all such areas are included within the CMZ unless they are designated as disconnected migration areas, as these structures have a high risk of failure.

*Cluster development/open space zoning* – An alternative site planning technique that concentrates dwelling units in a compact area to reserve undeveloped space elsewhere on the site. In this technique, lot sizes, setbacks, and frontage distances are minimized to allow for open space. The basic principle of cluster development is to group new homes onto part of the development parcel, so that the remainder can be preserved as unbuilt open space. See http://water.epa.gov/polwaste/nps/openspace.cfm.

*Development* – Any man-made change to improved or unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation or

drilling operations, storage of equipment or materials (44 CFR 59.1), and expanded for the purpose of this RPA to include removal of vegetation or other alteration of natural site characteristics (including any remnant natural characteristics existing in a degraded site). For this RPA, development does not include the maintenance, repair, or remodel of existing buildings, facilities, and utilities within their existing footprints (except for substantial repairs and improvements); resurfacing of roads; lawn care, gardening, removal of noxious weeds, replacement of non-native vegetation with native vegetation, or removal of hazard trees; or, plowing and similar agricultural practices that do not involve filling, grading, or construction of levees or structures.

*Erosion hazard area (EHA)* – "The area, not included in the HMZ, or the AHZ, that is at risk of bank erosion from stream flow or mass wasting over the timeline of the CMZ. The EHA has two components: the Erosion Setback (ES) and the Geotechnical Setback (GS). The ES is the area at risk of future bank erosion by stream flow; the GS is defined by channel and terrace banks that are at risk of mass wasting (due to erosion of the toe). The GS projects from the ES at a side slope angle that forms a stable bank configuration, thereby accounting for mass wasting processes that will promote a stable angle of repose" (refer to Sections 4.3 and 4.5 of Rapp and Abbe 2003). At a minimum, that portion of the Coastal and Riverine Erosion Zones posing "high" and "severe" risk of subsidence, avulsion, or channel migration – identified using protocols from Rapp and Abbe (2003) Section 4.5, must be included in the EHA.

*Extreme high tide* – The elevation of the highest predicted astronomical tide expected to occur at a specific tide station over the National Tidal Datum Epoch.

*Future-conditions hydrology* – The flood discharges associated with projected land-use conditions based on a community's zoning maps and/or comprehensive land-use plans and without consideration of projected future construction of flood detention structures or projected future hydraulic modifications within a stream or other waterway, such as bridge and culvert construction, fill, and excavation (44 CFR 59.1), and expanded for the purpose of this RPA to include projected changes in future riverine hydrology associated with climate change and changes in sea level, storm surge, and wave heights due to climate change as of 2100.

*Green Infrastructure* – Use of natural hydrologic features to manage water, and provide environmental and community benefits. Green infrastructure uses management approaches and technologies that utilize, enhance, and/or mimic the natural hydrologic cycle processes of infiltration, evapotranspiration, and reuse. At a large scale, green infrastructure is an "interconnected network of green space that conserves natural systems and provides assorted benefits to human populations" (See McMahon and Benedict, 2006). At a local scale, green infrastructure manages stormwater by infiltrating it in the ground where it is generated using vegetation or porous surfaces, or by capturing it for later reuse. See additional information available at *http://www.epa.gov/smartgrowth/green-infrastructure.html*; Benedict, Mark A. and McMahon, Edward T. Green Infrastructure: Linking Landscapes and Communities. Benedict, Mark A. and McMahon. Washington, D.C., Island Press, 2006; see also McIntyre *et al.* (2014) re biological improvements from use of green infrastructure.

*Habitat* – All habitat used by or that supports listed species, not only habitat designated as critical habitat.

*Habitat restoration activities* – Includes those actions that re-establish or improve natural conditions and functions of aquatic and floodplain areas, including, but not limited to, side channels, oxbows, and adjacent wetlands. Restoration does not include those activities the primary purpose of which is to provide, or repair, flood or erosion protection structures, even when those activities include habitat enhancement features. See Fish-Habitat Relationships and the Effectiveness of Habitat Restoration (Roni et al 2014). Available at: http://www.nwfsc.noaa.gov/assets/25/7422_08122014_141405_FishHabRelationshipsTM127WebFinal.pdf.

*High hazard area (HHA)* – The area comprised of and measured to the furthest landward extent of: (1) V zones; (2) LiMWA; (3) floodway (as revised by this RPA); and (4) E Zones (as revised by this RPA).

*Historical migration zone* – The collective area the channel occupied in the historical record (refer to Section 4.1 of Rapp and Abbe 2003).

*Hydraulic reach* – The reach of a stream between the nearest features controlling the flood water elevations upstream and downstream from the proposed development site. In the absence of determining the flood elevation controlling features, a default length equivalent to 14 times the bankfull channel width of the stream or river at the project site may be used.

*Limit of moderate wave action (LiMWA)* – The inland limit of the area affected by waves greater than 1.5 feet (covered by Procedure Memorandum 50).

*Low impact development (LID)* – LID is an approach to land development (or re-development) that works with nature to manage stormwater as close to its source as possible. LID employs principles such as preserving and recreating natural landscape features, minimizing effective imperviousness to create functional and appealing site drainage that treat stormwater as a resource rather than a waste product. LID refers to designing and implementing practices that can be employed at the site-level to control stormwater and strive to replicate the pre-development hydrology of the site. See http://water.epa.gov/polwaste/green/; see also EPA 841-R-13-004 (2013).

*Low intensity recreational use* – Includes pedestrian trails, natural turf ball fields, tent camping, temporary/transient structures such as campers/trailers.

*Mitigation* – All steps necessary to minimize the potentially adverse effects of the proposed action, and to restore and preserve the natural and beneficial floodplain values (44 CFR 9.4). Mitigation requires sequential implementation of measures that first avoid effects to the degree possibile, then minimize remaining effects, then replace and/or otherwise compensate for, offset, or rectify the residual adverse effects to natural floodplain functions.

*Natural floodplain functions* – All natural floodplain functions which support fish and wildlife, including the listed species subject to this consultation. Natural floodplain functions include all functions associated with the natural undisturbed floodplain that moderate flooding; retain flood waters; reduce erosion and sedimentation; mitigate the effect of waves and storm surges; maintain water quality and recharge of ground water; and provide fish and wildlife habitat. Natural floodplain functions include large wood recruitment and other habitat forming processes. See, *e.g.*, 42 U.S.C. 4121(a)(12).

*Open space* – Used as a descriptive term; includes areas legally designated and encumbered as open space, but may also include other land use designations or zoning districts or overlays that restrict development and maintain areas in a condition that is largely devoid of structures or infrastructure regardless of ownership or access (private or public). For example, open space may include the follow provided development is indefinitely set aside:

1. A natural area containing only minor improvements.
2. A park that was "reclaimed" from a previously developed area.
3. A playground or playfields with natural turf.
4. An agricultural field or pasture.

*Riparian buffer zone (RBZ)* – As defined in FEMA's proposed action for this consultation, the outer boundary of the RBZ is measured from the ordinary high water line of a fresh waterbody (lake; pond; ephemeral, intermittent, or perennial stream[168]) or mean higher-high water line of a marine shoreline or tidally influenced river reach to 170 feet horizontally on each side of the stream. The RBZ includes the area between these outer boundaries on each side of the stream, including the stream channel.

*Riparian vegetation* – Native vegetation, especially trees, within 200 feet of the ordinary high water mark.

*Special hazard area* – An area having special flood, mudslide (*i.e.*, mudflow), or flood-related erosion hazards, and shown on an FHBM or FIRM as Zone A, AO, A1-30, AE, AR, AR/A1-30, AR/AE, AR/AO, AR/AH, AR/A, A99, AH, VO, V1-30, VE, V, M, or E (44 CFR 59.1), and expanded for the purpose of this RPA to include the AFCFH.

*Start of construction* – Includes substantial improvement, and means the date the building permit was issued, provided the actual start of construction, repair, reconstruction, rehabilitation, addition placement, or other improvement was within 180 days of the permit date. The actual start means either the first placement of permanent construction of a structure on a site, such as the pouring of slab or footings, the installation of piles, the construction of columns, or any work beyond the stage of excavation; or the placement of a manufactured home on a foundation. Permanent construction does not include land preparation, such as clearing, grading and filling; nor does it include the installation of streets and/or walkways; nor does it include excavation for

[168] Perennial Stream: A stream that flows year round, even during periods of no rainfall. Intermittent Stream: A stream that flows only during certain times of the year, including ephemeral streams.

a basement, footings, piers, or foundations or the erection of temporary forms; nor does it include the installation on the property of accessory buildings, such as garages or sheds not occupied as dwelling units or not part of the main structure. For a substantial improvement, the actual start of construction means the first alteration of any wall, ceiling, floor, or other structural part of a building, whether or not that alteration affects the external dimensions of the building (44 CFR 59.1).

*Structure* – A walled and roofed building, including a gas or liquid storage tank, that is principally above ground, as well as a manufactured home (44 CFR 59.1).

*Water-dependent uses* – As defined in FEMA's proposed action, a use that cannot perform its intended purpose unless located or carried out in proximity to water (*e.g.*, pier, bridges). For NFIP insurable structures, "[t]he term includes only docking facilities, port facilities that are necessary for the loading and unloading of cargo or passengers, and ship-building and ship repair facilities, but does not include long-term storage or related manufacturing facilities" (44 CFR Part 59.1). For structures other than NFIP insurable buildings (*e.g.*, utility crossings, bridges), the locational dependence is determined by two tests (Interagency Task Force on Floodplain Management, 1984). First, is the purpose of the activity involved directly in the business of inserting and extracting goods into and out of waterborne vessels or inserting and extracting the vehicles themselves to and from the water, or to provide public access and use of the shoreline for recreation? Second, for an industry classified as functionally-dependent under the first question, is an individual structure vital to day-to-day production?

### 2.8.4 Findings on the Reasonable and Prudent Alternative

As stated in the introduction of Section 2.8 above, a reasonable and prudent alternative to the proposed action is one that avoids jeopardy by ensuring that the action is undertaken in a manner so that its effects do not appreciably reduce the species' likelihood of survival or the species' potential for recovery (50 CFR 402.02). It also must avoid destruction or adverse modification of designated critical habitat.

This RPA is designed to address the deficiencies of the NFIP as implemented in Oregon and identified in this opinion – these deficiencies contribute to the degradation of critical habitat for listed species, reduce the likelihood of survival, and increase the likelihood of extinction of listed species. By addressing deficiencies in FEMA's mapping protocols and development standards, the RPA will significantly reduce the effects of future floodplain development and thus avoid adverse effects on anadromous fish and their habitat in the action area. Compliance with the NFIP revisions proposed by the RPA will also ensure that any adverse impacts to relevant habitat features are mitigated. By doing so, the RPA would prevent the exacerbation of identified limiting factors for listed anadromous fish and avoid the future loss of population abundance and productivity caused by the direct, indirect, and cumulative effects of floodplain development. Similarly, the RPA will prevent additional loss of critical habitat quality and function resulting from floodplain development. Implementation of the RPA will avoid jeopardy to SRKW because, for those listed fish species that are prey for SRKW and the subject of this opinion, the RPA will ensure that the impacts of the proposed action are minimized and mitigated so as not to increase the salmonid species' risk of extinction.

A reasonable and prudent alternative must: (1) be consistent with the intended purpose of the proposed action; (2) be within the scope of the Federal agency's legal authority and jurisdiction; (3) be economically and technologically feasible; and (4) avoid the likelihood of jeopardizing the continued existence of listed species or resulting in the destruction or adverse modification of their critical habitat (50 CFR 402.02). As explained in the preamble to the ESA consultation regulations:

> An alternative, to be reasonable and prudent, should be formulated in such a way that it can be implemented by a Federal agency consistent with the scope of its legal authority and jurisdiction. However, the Service notes that a Federal agency's responsibility under section 7(a)(2) permeates the full range of discretionary authority held by that agency; i.e., the Service can specify a reasonable and prudent alternative that involves the maximum exercise of Federal agency authority when to do so is necessary, in the opinion of the Service, to avoid jeopardy.

51 FR 19926, 19937 (June 3, 1976).

#### 2.8.4.1. Collectively, the Elements of the RPA Will Avoid Jeopardy

The six elements of the RPA work together to minimize habitat degradation associated with FEMA's current implementation of the NFIP, avoiding jeopardy and advese modification of designated critical habitat by:

- Making affected communities aware of the consultation outcome, and their need to avoid detrimental effects to floodplain habitats from development (RPA Element 1). Although NMFS cannot predict how much beneficial impact will result from community notification, education, and outreach, we expect that raising awareness among community permitting and planning officials of the link between floodplain function and the conservation of listed species will result in some additional protection of natural floodplain functions.
- Providing interim measures to put in place habitat protections through development restrictions and mitigation requirements for all floodplain development impacts to natural floodplain functions (RPA Element 2). Element 2 establishes minimum mitigation requirements for floodplain development and limits FEMA's authorization of map revisions that do not comply with the mitigation standards. We expect the measures in Element 2 to result in fewer impacts to natural floodplain functions until the more protective requirements of Elements 3-6 can be fully implemented.
- Improving the accuracy, thoroughness, and timeliness of FEMA's mapping activities to ensure that habitat features need to support listed salmonids are identified and protected (RPA Element 3). Correctly identifying flood-prone and flood-related hazard prone areas, and reducing the risk that such areas are not identified and protected, when coupled with the remaining elements of the RPA, will avoid most adverse effects in areas identified as high hazard areas, which are the areas that, due to their frequency of inundation and pattern of erosion, serve the most valuable habitat functions for salmonids. Accurate mapping required by Element 2, together with limits on division of property and