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Office of Protected Resources (F/PR)
National Marine Fisheries Service
1315 East-West Highway
Silver Spring, MD 20910

Re: Expanded Comments on the Endangered Species Act Section 7 Consultation Draft Biological Opinion for the Environmental Protection Agency's Registration of Pesticides Containing Chlorpyrifos, Diazinon, and Malathion (Draft BiOp) Released on July 31, 2008, Docket No. EPA-HQ-OPP-2008-0654

To Whom It May Concern:

We submit these expanded comments on behalf of Northwest Coalition for Alternatives to Pesticides (NCAP), Pacific Coast Federation of Fishermen's Associations (PCFFA), and Institute for Fisheries Resources (IFR). These comments concern the Endangered Species Act Section 7 Consultation Draft Biological Opinion for the Environmental Protection Agency's Registration of Pesticides Containing Chlorpyrifos, Diazinon, and Malathion (Draft BiOp) that the National Marine Fisheries Service (NMFS) released on July 31, 2008. This letter supplements and expands upon comments that NCAP, PCFFA, and IFR submitted on September 15, 2008 (EPA-HQ-OPP-2008-0654-0012.1).

We are grateful for the considerable time and resources that NMFS has devoted to completing the Draft BiOp. We support NMFS's jeopardy conclusions and applaud its thorough review of the risks that the pesticides pose to salmonids. The agency's rigorous analysis is an encouraging step toward ensuring that pesticide registrations do not jeopardize the survival and recovery of protected salmonids.

In these expanded comments, we first review NMFS's methods and analysis in the Draft BiOp. Second, we discuss some of the flaws in EPA's prior methods for assessing risks to salmonids from pesticides that NMFS identified in the Draft BiOp. Third, we provide some additional information and suggestions for how NMFS could strengthen its assessment when it finalizes the biological opinion and decides what Reasonable and Prudent Alternatives (RPAs) are necessary to ensure that the EPA's registration of chlorpyrifos, diazinon, and malathion does not jeopardize the survival and recovery of listed salmonids.

Attached to this letter as Exhibit 1 is a list of references for studies published since 2006 that are not included in the Draft BiOp. These studies describe pesticide fate, transport, and

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toxicity for chlorpyrifos, diazinon, and malathion that will be useful in developing and calibrating more accurate exposure models and better understanding the factors that affect both individual and population-level effects that the pesticides have on salmonids. Exhibits 2 and 3 are declarations from experts regarding the risks that pesticides pose to salmonids.

I. THE ANALYSIS SUPPORTING NMFS'S JEOPARDY CONCLUSIONS IN THE DRAFT BIOP IS THOROUGH AND GROUNDED LARGELY IN THE BEST AVAILABLE SCIENCE.

We commend NMFS for its efforts to compile and use a variety of resources to conduct its assessment of the risks of chlorpyrifos, diazinon, and malathion registrations on listed salmonids. NMFS relied on a multitude of materials, including EPA-developed documents, peer reviewed literature, monitoring data, pesticide exposure models, and on-line toxicity databases. As a result, the multi-step process NMFS used to fulfill section 7 analysis is comprehensive. We are especially encouraged that NMFS considered the following aspects of risk from the pesticides:

a. The potential for the pesticides to contaminate off-channel habitats. We agree with NMFS's scientists about the importance of this evaluation.

b. The toxicity from nonlyphenols and related compounds. Nonlyphenol and nonlyphenol ethoxyltes are used as inert ingredients and are added after formulation to products containing these three pesticides. Nonlyphenols are also one of the most common organic wastewater contaminants in the United States. Draft BiOp at 233. "Inert ingredient" is a definitional term with little meaning except that it means a compound included in a pesticide product other than the active ingredient. It does not mean that the compound is biologically, chemically, or toxicologically inert. In fact, close to 400 so-called inert ingredients have been classified as hazardous under a variety of environmental laws including the Clean Air Act and Clean Water Act.[1]

c. The risks posed by degradates of the active ingredients. Going beyond EPA's initial look into degradates, NMFS examined the risk of long lasting degradates and degradates that might be a minor percent of the degradation products but are still toxicologically significant. Draft BiOp at 231. As NMFS discusses in the Draft BiOp, many of these degradates are more harmful to fish and wildlife than their parent compounds.

d. Uncertainty in evaluating the effects of the pesticides. Because EPA's pesticide use data and its methodology for evaluating pesticide risk falls well short of the

[1] Northwest Coalition for Alternatives to Pesticides, et al., Petition to Require Disclosure of Hazardous Inert Ingredients on Pesticide Product Labels. 2006. Available at http://www.pesticide.org/inertspetion2006.pdf (last viewed 9/13/2008).

standards for rigorous science, NMFS was forced to deal with some uncertainty in determining the effects that the pesticides have on salmonids. Given that the best available scientific data demonstrates significant harms from these pesticides, NMFS has appropriately taken a conservative approach to such uncertainty in the Draft BiOp.

As the above examples demonstrate, NMFS considered many important issues in the Draft BiOp bearing on the risks that pesticides pose to salmonids that EPA ignored in its assessments for chlorpyrifos, diazinon, and malathion. We urge NMFS and EPA to continue with this approach and adhere to the Precautionary Principle in developing RPAs for these registrations.

II. EPA MUST STRENGTHEN THE SCIENCE USED IN ITS EFFECT DETERMINATIONS.

In the Draft BiOp, NMFS makes it clear that EPA's methods for assessing risks of pesticides to salmonids are inadequate. NMFS has provided EPA with excellent recommendations on how EPA can improve its assessments of pesticide risks to avoid under-estimating the risks to salmonids from exposure and to comply with ESA mandates. EPA must now take that input and apply it when performing future pesticide effects determinations.

A. EPA Must Develop Methods for More Accurately Assessing the Toxicity of Pesticides to Salmonids.

In evaluating the potential harm to salmon from organophosphate pesticides, NMFS recognized several flaws in EPA's methodologies that resulted in an underestimation of the toxicity of the pesticides to salmonids. For example, multiple organophosphate pesticides contaminate salmon habitat. Recent research has shown that salmon responses to organophosphate pesticides, and other anticholinesterase pesticides, can be either additive or synergistic. NMFS used the dose-addition method to determine synergistic effects from these exposures; however, NMFS acknowledges that the decision to use dose-addition "is likely to under-predict toxicity for some mixtures." Draft BiOp at 274. Research also indicates that the toxicity of chlorpyrifos may be enhanced in the presence of its degradation product TCP.[2] To obtain a complete picture of the toxicity of the salmonid environment, these interactive effects must account for exposures to multiple pesticides that may cause toxic effects in an additive or synergistic way.

Over the next sixteen months, 15 more organophosphate and carbamate pesticides will undergo consultation. It is vital to the survival and recovery of salmonids that a full

[2] Caceres T, He W, Naidu R, Megharaj M. 2007. Toxicity of chlorpyrifos and TCP alone and in combination to Daphnia caranata: The influence of microbial degradation in natural water. Water Res 41: 4497–4503; Ashauer R., A. Boxall, and C. Brown, 2007, Modeling combined effects of pulsed exposure to carbaryl and chlorpyrifos on Gammarus pulex. Environ Sci Tech 41(15): 5535–41.

understanding of synergistic effects is incorporated into the effects determinations and biological opinions that result from these consultations.

Similarly, EPA's methodology for examining risks of pesticides to salmonids must include more accurate risk assessments of pesticide degradates. For example, the oxon forms of organophosphate pesticides are generally more toxic than their parent compounds; this increased toxicity must be accounted for in risk assessments. See Draft BiOp at 231.

B. EPA Must Develop More Accurate Methods to Estimate Water Contamination From Pesticide Uses.

EPA's current methods for estimating environmental contamination resulting from pesticide uses is inadequate. For example, EPA's assessments fail to account for research establishing that urban development significantly increases runoff into natural receiving water bodies. Even low-density suburban areas increase runoff:

> [T]he drainage density was already about 25 percent higher than in the natural state where the impervious cover reached 5 percent of the total watershed area, a point at which streams began to show the effects of urbanization. It grew to 50 percent higher than natural where imperviousness increased to approximately 25 percent and began to exceed forest cover. This is a typical suburban condition. The maximum drainage density was almost 100 percent above natural and occurred with impervious cover just over 60 percent.[3]

Furthermore, the vast majority if not all the pesticides in urban runoff will end up in the receiving body:

> [T]he drainage system in residential and commercial areas of urban places is very likely to provide a short path between source and conduit, giving little opportunity for runoff contact with soil or vegetation, and to create swift flow directly to the stream or other receiving water. Hydrologically, that means that any water that becomes contaminated with a pesticide will not get subtracted from the flow through soil infiltration or evaporation. From a water quality standpoint, it means that pesticides in runoff will not have the opportunity to be removed from the water through some mechanism mediated by the atmosphere, soil, or vegetation (e.g., oxidation, adsorption to soil, filtering by vegetation, and others).[4]

Pesticide monitoring data underscore the importance of evaluating environmental contamination resulting from urban pesticide use. Urban streams are just as contaminated with pesticides as their agricultural counterparts. A recent government report found that over 90

[3] Declaration of Richard R. Horner (attached as Exhibit 2) at 7.

[4] Id. at 9-10.

percent of urban streams tested had pesticide residues.[5] The projected increases in population in the western states makes it even more important that NMFS and EPA develop a better understanding of how urban pesticide use contributes to environmental contamination.

Accordingly, to fully understand the risks that the registered pesticides pose to listed species of salmonids, EPA must develop more accurate methodologies for estimating the contamination of water caused by urban pesticide use as well as other non-crop uses. Indeed, when EPA released the first set of pesticide effect determinations for salmonids in 2002, it acknowledged a "significant weakness in modeling" because EPA had no mechanism to determine estimated environmental concentrations of pesticides caused by urban uses of the pesticides.[6] Five years have passed, and EPA has still not rectified this problem. In the Draft BiOp, NMFS noted that "[t]he absence of information on potential exposure of listed salmonids to non-crop uses of chlorpyrifos, diazinon and malathion contribute a significant amount of uncertainty with the proposed action." Draft BiOp at 211.

The need for EPA to develop better methods to determine exposure concentrations is clearly outlined in the Draft BiOp. For example, NMFS describes how EPA's PRZM-EXAMS model for estimating environmental concentrations of pesticides falls short of projecting worst-case scenarios for salmonids:

> To assess risk to individuals we need to consider the highest exposure any individual of the population are likely to be exposed to. However, several lines of evidence discussed below suggest that EECs in the BEs may underestimate exposure of some listed organisms and designated critical habitat.

Draft BiOp at 213. EPA's methods should incorporate information from a number of new studies evaluating actual concentrations of these pesticides in the environment, and their fate and/or toxicity, that have been conducted in the last ten years. Most of these studies are reviewed by NMFS and provide useful information that EPA could use to calibrate the PRZM-EXAMS model.

One specific area of recent research involves modeling the toxicological effects of pulsed exposures to pesticides that are almost certainly more common in natural waters than a constant concentration over a given time period. A mesocosm study evaluating the effects of just a single pulse of chlorpyrifos at 1 and 10 ug/L on macroinvertebrates showed significant decreases in abundance in treated mesocosms that were first noted at six hours after treatment; there was no

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[5] Gilliom, R. et al. 2006. The Quality of Our Nation's Waters. Pesticides in the Nation's Streams and Ground Water, 1992 – 2001. National Water-Quality Assessment Program. Circular 1291. p 42.

[6] Turner, L. 2002. Bensulide, Analysis of Risks to Endangered and Threatened Salmon and Steelhead. Environmental Field Branch, Office of Pesticide Programs, U.S. Environmental Protection Agency. p 5.

evidence of recovery of the populations after 124 days.[7] Other researchers have developed a model that more effectively accounts for exposures to pesticide pulses and compared the modeled results to actual laboratory observations of toxicity. The data indicate that pulsed, sequential exposures to different pesticides may have very different toxicological effects compared to a constant exposure to a single pesticide. Data also indicate that accounting for flow regimes is critical to accurate modeling.[8] And researchers have evaluated the effects of stream flow, soil types, surface runoff, and pesticide use patterns on modeled and actual concentrations of diazinon and chlorpyrifos loads in the northern San Joaquin Valley watershed.[9]

NMFS and EPA should carefully evaluate the above-mentioned studies, along with the other studies cited in Exhibit 1 of this letter, with a goal of incorporating more sophisticated exposure parameters such as pesticide pulses, flow parameters, and exposures to multiple pesticides into the models EPA currently uses to assess the risks of pesticide use. We recognize that incorporating more sophisticated algorithms into EPA's models for aquatic exposure assessment will take time, but are also acutely aware of the need for prompt action. We thus encourage NMFS and EPA to adopt strong mitigation measures that will ensure no jeopardy to the species while adequate methodologies are being developed.

C. EPA Must Maintain and Provide Access to Pesticide Use Data and Master Labels for All Pesticide Active Ingredients.

In the Draft BiOp, NMFS clearly states that EPA needs to collect and provide spatial and temporal data regarding uses of registered pesticide formulations. Without that data NMFS found it "difficult to place an exact number on the percentage of a population that is affected or how frequently a population is affected . . . ." Draft BiOp at 291.

Likewise, EPA must maintain and provide access to master labels for all pesticide active ingredients. Without access to a master label for each pesticide, NMFS was unable to comprehensively describe and analyze the registration of each pesticide active ingredient. See Draft BiOp at 17. Labels provide critical information relevant to assessing pesticide risks. For example, they list what other chemicals might be added to the product in a tank mix, indicate if other pesticides are included in the product, outline any specific restrictions on use, and are a

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[7] Colville A, Jones P, Pablo F, Krassoi, F, Hose G, Lim R, 2008, Effects of chlorpyrifos on macroinvertebrate communities in coastal stream mesocosms, Ecotoxicology 17(3): 173–180 (Exh. 1); Ashauer R., A. Boxall, and C. Brown, 2007, Modeling combined effects of pulsed exposure to carbaryl and chlorpyrifos on Gammarus pulex. Environ Sci Tech 41(15): 5535–41 (Exh. 1).

[8] Schiff K, Sutula M. 2004, Organophosphorus pesticides in storm-water runoff from southern California (USA). Environ Toxicol Chem. 23(8):1815-21.

[9] Luo, Y, Zhang, X, Ficklin, LX, Zhang, M, 2008, Dynamic modeling of organophosphate pesticide load in surface water in the northern San Joaquin Valley watershed of California, Environ Pollut, in press, doi: 10.1016/j.envpol.2008.04.005.

direct link to what inert ingredients might be contained in the product. Accordingly, the lack of data on full product formulations and labeled uses potentially results in considerable underestimation of the potential risk that EPA's pesticide registrations pose to salmonids. See Draft BiOp at 280-81.

D. EPA Must Require Full Disclosure of Inert Ingredients So That NMFS's Biological Opinions Can Include a Complete Impact Assessment of Formulated Products.

As discussed earlier, "inert ingredients" are not necessarily biologically or toxicologically inert. In fact, more than 500 inert ingredients have been or are currently used as active ingredients.[10] EPA acknowledges that 50 percent or more of all inert ingredients are at least moderately risky.[11] Additionally, only half of the required (or conditionally required) tests of environmental fate use the formulated product, as do only a quarter of the tests for effects on wildlife and nontarget plants.[12]

The courts have made it clear that the public has the right to information on inert ingredients. See NCAP v. Browner, 941 F. Supp. 197, 201-05 (D.D.C. 1996). The need for data regarding inert ingredients contained in pesticide products (full formulations) was evident in the Draft BiOp; NMFS was unable to include an evaluation of full formulations in part because EPA did not provide NMFS with the inert profiles of the products at issue. See Draft BiOp 232 and 234.

Evaluating chemical mixtures, such as combinations of inert and active pesticide ingredients typically contained in pesticide formulations, is an expanding area of research. A recent review of ecotoxicology tools "identified mixtures as one of the top three challenges in assessing environmental contamination."[13] The lack of public access to product-specific information about inert ingredients has stymied independent assessment of the hazards of the mixtures found in pesticide formulations.

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[10] U.S. Environmental Protection Agency. 2006. Substance Registry System. Available at: http://www.epa.gov.srs/ (last viewed 4/12/2006).

[11] U.S. Environmental Protection Agency. 2002. The Office of Pesticide Program's Guidance Document on Methodology for Determining the Data Needed and the Types of Assessments Necessary to Make FFDCA Section 408 Safety Determinations for Lower Toxicity Pesticide Chemicals. Available at: http://www.epa.gov/oppfead1/cb/csb_page/updates/lowertox.pdf (last viewed 10/3/2008).

[12] U.S. Environmental Protection Agency. 2005. Data Requirements for Registration. 40 C.F.R. § 158 (parts 158.290, 158.340, 158.490). Available at: http://www.access.gop.gov/nara/cfr/waisidx_05/40cfr158-05.html (last viewed: 9/28/2006).

[13] Eggen, et al. 2003. The potential of mechanism-based bioanalytical tools in ecotoxicological exposure and effect assessment. Anal Bioanal Chem 377:386-396.

Clearly, inert ingredients and full formulations must be a part of pesticide-related Endangered Species Act consultations. In order to facilitate such evaluation, EPA and NMFS must mandate full disclosure of product ingredients.

E. EPA Must Maintain and Provide Access to Complete Dose-Response Information.

The slope of a dose-response curve is critical to understanding the toxicity of any compound. If the slope is steep "small changes in concentrations elicit large changes in observed toxicity." Draft BiOp at 274.

In March 2008, NMFS requested dose-response information from EPA. On April 3, 2008, EPA provided NMFS with some of the data requested but did not provide dose-response curves and instead suggested that NMFS use a default slope. Draft BiOp at 15. EPA's failure to provide complete dose-response information prevented NMFS from conducting more precise risk assessments and as a result, the Draft BiOp likely underestimates the effects of these pesticides on salmonids.

III. ADDITIONAL ELEMENTS NECESSARY TO FULLY ADDRESS THE RISKS OF CHLORPYRIFOS, DIAZINON, AND MALATHION USES ON SALMONIDS

As mentioned above, we are generally encouraged by the thoughtfulness and thoroughness of the Draft BiOp. We urge NMFS to consider the following factors in finalizing the biological opinion and identifying the mitigation measures necessary to avoid jeopardy to the salmonids:

A. The Final Biological Opinion Should Include Assessment of Risk From Post-Application Drift and Runoff.

After pesticides are applied, they can contaminate wildlife habitat when they drift in the air and runoff in water. In the Draft BiOp, NMFS used AgDrift version 2.0.05 to evaluate potential contamination of off-channel habitat. Draft BiOp at 222. While significant contamination was estimated from primary drift using this model, this likely represents an underestimation of the actual level of contamination from drift because it does not consider post-application drift, which is a major component of drift. Post-application drift can result from volatilization or wind driven transportation of pesticide-contaminated dust.

Such off-channel modeling also does not account for runoff. Draft BiOp at 222. Water quality monitoring efforts often find the heaviest load of pesticide contamination at the initiation of a rain event. Since runoff is a significant route for contaminants to enter water, this method under-represents possible contamination of this critical part of salmonid habitat.

B. The Final Biological Opinion Should Adopt RPAs That Fully Address the Concerns Faced by Pacific Salmon From Pesticides, the Enormous Economic Benefits That Salmon Represent, and the Human Health Implications Stemming From Pesticide Contamination of This Important Human Food Source.

Salmon are an important national economic resource. In 1988, for instance, salmon harvesting (both sport and commercial) contributed more than $1.25 billion in personal income to the U.S. economy from Washington, Oregon, Idaho, and northern California – an economic boon that supported an estimated 62,750 family wage jobs.[14] In recent years, however, these economically important salmon runs have suffered serious declines, and much of this economic benefit is now threatened, just as many once-abundant salmon runs are threatened with extinction. Successful salmon recovery efforts thus equates to economic recovery in many Tribal, coastal, and inland fishing-dependent communities.

The true test of whether the final biological opinion is strong enough to enable the survival and recovery of threatened and endangered species, and protect this valuable economic resource, are the mitigation measures or RPAs prescribed in the final biological opinion. While the Draft BiOp does not provide draft RPAs, past consultations and EPA restrictions provide some indication of what mitigation measures are needed to protect salmonids from pesticides.

We urge NMFS and EPA to consider the full range of potential mitigation measures, including cancellation of pesticide uses that are particularly harmful to salmonids. Short of cancellation, there are a number of mitigation measures that may help to reduce risk. For example, in the past, EPA has reduced application rates in order to minimize risks from pesticides. EPA has also restricted how often pesticide applications may occur. These mitigation strategies are often based on the maximum allowable applications on pesticide labels — they do not address real-world application practices. Monitoring data of actual in-field practices demonstrates that real-world application methods, not merely maximum allowable applications, are resulting in environmental contamination and harm to salmonids. Accordingly, if NMFS elects to adopt application frequency and rate restrictions as RPAs, it must ensure that those restrictions reduce actual application rates and frequency.[15]

In addition, the RPAs adopted in the final biological opinion should not rely on adjustments to the timing of pesticide applications to mitigate risk to salmonids. There is

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[14] Data from The Economic Imperative of Protecting Riverine Habitat in the Pacific Northwest, Pacific Rivers Council, Research Report No. 5 (January 1992), based on federal and state landing statistics.

[15] NMFS can access data on actual application rates, by crop, through the California Pesticide Use Reporting program. See California Pesticide Information Portal, http://calpip.cdpr.ca.gov/cfdocs/calpip/prod/main.cfm (last viewed Sept. 16, 2008). However, because use practices and crops differ throughout salmonid habitat, the California data will not provide the full picture.

significant evidence that pesticides and their degradates are present in soils months after application and move off site and into streams only after an initial rain event. Accordingly, merely adjusting the timing of pesticide applications so as to not coincide with salmonid presence in rivers and streams will not guarantee salmonids are not exposed or even necessarily result in reduced exposures. Also, in many river systems, one or another salmonid species are present year round, often in juvenile stages that are most vulnerable to pesticides. Coho salmon, for instance, overwinter for up to 18 months as juveniles in inland streams before migrating as smolts to the sea. Coho are thus particularly sensitive to chemical impacts because they are exposed to inland in-stream conditions for longer periods of time than typical chinook or steelhead. Additionally, juvenile salmonids of *all* species are typically more chemically sensitive than adults of those same species, as well as more chemically sensitive than most non-salmonid fish on whom pesticide toxicity studies are usually done.

The Draft BiOp mentions that no-spray buffers (or setbacks from streams) could reduce water contamination. Draft BiOp at 222. While we agree, and encourage the prohibition of pesticide application near salmonid habitat, such setbacks will not control runoff from agricultural ditches that ultimately drain into local stream systems and salmonid habitat. Agricultural ditches often collect runoff from large surface areas falling outside of the no-spray buffers and can concentrate contaminants applied to the field's area into a relatively small volume of water. In the final biological opinion, NMFS should prescribe mitigation measures to address this contamination pathway.

The RPAs prescribed in the final biological opinion must also reduce contamination caused by urban and other non-agricultural pesticide uses. As noted above, urban pesticide use is contributing substantially to the harm that pesticides pose to salmonids. Malathion has the most non-crop registered uses. It is also possible that existing stocks of chlorpyrifos and diazinon are still being used in urban areas. Compounding the problem of pesticide contamination of urban streams is the fact that urban streams often have elevated temperatures, which causes a host of other concerns for salmonids and can make salmonids more susceptible to the effects of pesticide exposure. The toxicity of chlorpyrifos, for example, has been shown to increase with increased temperatures. Draft BiOp at 270.

NMFS also demonstrated the significant risk of water contamination from drift. A commonly prescribed remedy for drift is increased droplet size. This is not an acceptable remedy in this context as the increased size often increases application rates and leaves more product available for runoff.[16]

Finally, RPAs should include monitoring to determine the efficacy of the other mitigation measures employed. Monitoring techniques must be uniform and timed to detect pesticides present in water when off site movement is most likely (i.e. immediately after use and after first irrigation or a rain event).

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[16] Declaration of D. Ken Giles (Exhibit 3) at 11.

C. The Final Biological Opinion Should Recognize the Importance of Applying the Precautionary Principle in Efforts to Protect ESA-Listed Species.

Much has been written about the Precautionary Principle over the past several years. In the context of protecting species and biodiversity, the Precautionary Principle requires decision makers to put the burden of proof on those who would disrupt a species' habitat or take actions that would affect species' survival and recovery to demonstrate that their action will not cause harm, and not require the species itself or its protectors to demonstrate that harm will result from a proposed action. This protective posture is well justified because of the inherent irreversibility of extinction.[17]

Congress affirmed the Precautionary Principle when it enacted the Endangered Species Act in 1973. See Tennessee Valley Authority v. Hill, 437 U.S. 153, 184 (1978) ("The plain intent of Congress in enacting this statute was to halt and reverse the trend toward species extinction, whatever the cost."). In section 7 of the ESA, for example, Congress required that federal agencies, through consultation with NMFS and the United States Fish and Wildlife Service, "insure" that agency actions do not jeopardize the survival and recovery of threatened and endangered species. 16 U.S.C. § 1536(a)(2). The ESA also requires that decisions made pursuant to section 7 of the Act be based upon the "best scientific and commercial data available." Id. These section 7 mandates epitomize the ESA's precautionary approach. See, e.g., National Wildlife Federation v. NMFS, 524 F.3d 917, 936 (9th Cir. 2008) ("It is only logical to require that the agency know roughly at what point survival and recovery will be placed at risk before it may conclude that no harm will result from 'significant' impairments to habitat that is already severely degraded."); see also Sierra Club v. Marsh, 816 F.2d 1376, 1389 (9th Cir. 1987) (noting the "institutionalized caution mandated by section 7").

As NMFS finalizes the biological opinion and crafts its RPAs, it should keep the Precautionary Principle firmly in mind and apply it when appropriate and required. Accordingly, for example, NMFS should adopt RPAs with the objective of preventing harm to the most sensitive life stages of the most vulnerable salmonid stocks, such as the habitat-sensitive coho, which must remain instream (and thus exposed to pesticides) longer than other salmonid species now listed. Also, for example, if there is uncertainty in determining the size of buffers or the appropriate application rates needed to protect salmonids and their habitat, NMFS should err on the side of requiring over-protective measures rather than risk extinction of salmonids through continuation of current pesticide use practices, small buffer zones, or excessive application rates.

* * *

The Draft BiOp is perhaps the most comprehensive assessment of the risks to salmonids from pesticides conducted to date. It analyzes the very complex agency actions involving EPA's registration of hundreds or potentially thousands of pesticide products and it correctly concludes that registered uses of these pesticides are jeopardizing the survival and recovery of salmonid

[17] See National Research Council, Science and the Endangered Species Act, at 167-169 (1995).

populations. We believe that the Draft BiOp forms the basis for strong, protective RPAs. We urge NMFS to consider strengthening its analysis in finalizing the biological opinion. As discussed above, some of EPA's and perhaps even NMFS's analyses still underestimate the risks that chlorpyrifos, diazinon, and malathion pose to salmonids. We encourage NMFS to work with EPA to address these remaining concerns and, when there is uncertainty regarding the risks to salmonids from the pesticide registration, to employ the Precautionary Principle in finalizing the biological opinion and crafting RPAs.

We look forward to reading the final biological opinion. Feel free to call or email us if you would like to discuss the contents of this comment letter or any other issues surrounding the finalization of the biological opinion.

Sincerely,

Joshua Osborne-Klein
Stephen D. Mashuda
On Behalf of Northwest Coalition for Alternatives to Pesticides (NCAP), Pacific Coast Federation of Fishermen's Associations (PCFFA), and Institute for Fisheries Resources (IFR)