



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**WASHINGTON, D.C. 20460**

**OFFICE OF CHEMICAL SAFETY  
AND POLLUTION PREVENTION**

**MAY 14 2010**

James H. Lecky, Director  
Office of Protected Resources  
National Marine Fisheries Service  
13<sup>th</sup> Floor, 1315 East-West Highway  
Silver Spring, MD 20910

Dear Mr. Lecky:

This letter describes how EPA will implement the National Marine Fisheries Service (NMFS) biological opinion (BiOp) issued April 20, 2009. EPA will require the pesticide registrants to adopt pesticide use limitations for their products consistent with the purposes of the Reasonable and Prudent Alternatives and Measures in the BiOp. EPA intends to comply with the Endangered Species Act (ESA) by requiring changes to the registrations of the pesticides included in the BiOp to assure that registered use of these pesticides will not result in likely jeopardy to the continued existence of federally listed threatened or endangered species or destroy or adversely modify their designated critical habitat. EPA has developed implementation measures which will meet our obligations under section 7(a)(2) of the ESA.

The BiOp and EPA's implementation specifically focuses on three registered n-methyl carbamate or NMC pesticides (carbaryl, carbofuran, and methomyl) and their potential effects to 28 threatened or endangered Pacific salmon and steelhead species in the states of California, Idaho, Oregon, and Washington (Pacific Northwest states or PNW states). The NMFS' BiOp concluded that the continued use of carbaryl and carbofuran is likely to jeopardize the continued existence of 22 listed Pacific salmonids and destroy or adversely modify designated habitat for 20 of 26 listed salmonids if additional limitations are not imposed on their use. NMFS also concluded that the continued use of methomyl is likely to jeopardize the continued existence of 18 listed Pacific salmonids and destroy or adversely modify designated habitat for 16 of 26 listed salmonids if additional limitations on use are not imposed. In order to reduce pesticide exposure to a level where no likely jeopardy would be expected, NMFS recommended a Reasonable and Prudent Alternative (RPA) consisting of six specific items relative to the registration of the three NMC pesticides. The six items recommended by NMFS can be summarized as: 1) a requirement for spray drift buffers, 2) a wind speed restriction, 3) a soil moisture/48 hour storm restriction, 4) a fish mortality incident reporting requirement, 5) an effectiveness monitoring program for off-channel habitats, and 6) wind speed limitations and an effectiveness monitoring program specific to Washington State's 24 (c) registration of carbaryl for use on estuarine mudflats.

As summarized below and explained in more detail in the Technical Appendix to this letter, EPA plans to implement measures that will achieve the protections sought under the RPA items in the BiOp. EPA will achieve the protection goals of the first five items through the methods outlined by NMFS in the BiOp or by alternative methods that EPA's scientific analyses determined will achieve the same purpose. Items one through four would be accomplished by changes to pesticide labeling. By changing pesticide labeling to reflect new use limitations, those limitations become enforceable under

the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). EPA intends to work with NMFS to determine how best to achieve the goals of the monitoring study described in item 5. EPA will require the registrants of the affected products to fund and carry out the monitoring study. Item 6 is discussed further below. We anticipate these new use limitations will result in a significant reduction in use of NMC pesticides in the portions of California, Oregon, Washington, and Idaho that support Pacific salmon and steelhead for which NMFS has found jeopardy.

Because use limitations related to endangered species protection are geographically specific, EPA will use its Web accessible application (*Bulletins Live!*) to relay the new use limitations to pesticide users. The use limitations will be applicable to all freshwater<sup>1</sup>, estuarine, and near shore marine habitats including bays within the range of each species. EPA will use the ranges of the species as outlined by NMFS in their GIS files found at <http://www.nwr.noaa.gov/ESA-Salmon-Listings/Salmon-populations/Maps/Index.cfm>, to show pesticide users where the use limitations apply.

Below is a summary of how EPA intends to address each of the six RPA items to achieve the exposure reductions NMFS has determined are necessary to preclude jeopardy to the species. EPA intends to implement items #1 and #5 for the pesticide/species combinations for which NMFS declared jeopardy. Items #2 through #4, because they are elements of the RPA and also part of the Reasonable and Prudent Measures (RPMs) in the Biological Opinion, will be implemented for all 28 listed Pacific salmonids.

**ITEM #1 – Spray Drift Buffers:** NMFS recommended that use of carbaryl and carbofuran not be permitted within 200 feet to 600 feet (depending on application rate) of salmon and steelhead habitats when applied by ground or within 1000 feet when applied by air. NMFS also recommended that use of methomyl not be permitted within 50 feet of salmon and steelhead habitats when applied by ground or within 600 feet when applied by air. The BiOp further stated that buffers need not be employed for intermittent water bodies when there is no water present at the time of application. EPA intends to require spray drift buffers adjacent to salmon and steelhead habitat but will impose different width buffers depending upon several factors that affect how far a pesticide might drift from the application site. The buffers EPA intends to impose will vary depending on application rate, spray droplet size, and water body size. In no case will buffers to implement this BiOp be less than 25 feet or more than 1000 feet. Although NMFS did provide differential buffer sizes for a range of application rates, EPA refined this analysis and examined application rates on a finer scale. NMFS evaluated bins of application rates in pounds of active ingredient per acre or lb ai/acre (e.g., 0-1, ≥1-3, ≥3-5, ≥5-10, ≥10 lb ai/acre). EPA elected to look at application rates for each whole integer from 1 through 15 lb ai/acre. The buffers EPA will impose will achieve a reduction in the potential concentrations of each pesticide in water bodies comparable to that estimated using the most conservative buffer distance and application assumptions used by NMFS in their BiOp. (*SEE TECHNICAL APPENDIX – SECTION A*)

**ITEM #2 – Wind Speed Restriction:** NMFS recommended that applications of the three pesticides not be permitted when winds are >10 mph immediately prior to application. They further recommended that applications adjacent to salmon and steelhead habitat commence on the side of the field nearest the water and proceed away from the water. EPA will require these provisions as NMFS recommended them.

---

<sup>1</sup> For purposes of these measures, “freshwater habitats” include flowing water and water that may be only temporally connected to flowing water including intermittent streams, off-channel habitats, drainages, ditches, and other man-made conveyances that lack salmonid exclusion devices.

**ITEM #3 - Soil Moisture/48 Hour Storm Restriction:** NMFS recommended that EPA require that the pesticide may not be applied when soil moisture is at field capacity or when a storm event likely to produce runoff is forecast by NOAA/ National Weather Service, (NWS) to occur within 48 hours after application. EPA intends to require these use limitations as recommended by NMFS.

**ITEM #4 - Fish Mortality Incident Reporting Requirement:** NMFS recommended that EPA require pesticide users to report all incidents of fish mortality that occur within four days of application and within the vicinity of the treatment area to EPA's Office of Pesticide Programs (OPP). EPA will require that these incidents be reported to the pesticide registrant who is already required to provide information regarding incidents to EPA through a system established under section 6(a)(2) of FIFRA. This will ensure that all incidents are reported within EPA's statutory framework and that all incidents receive appropriate treatment. (*SEE TECHNICAL APPENDIX – SECTION B*)

**ITEM #5 - Effectiveness Monitoring Program for Off-channel Habitats:** NMFS recommended EPA undertake an effectiveness monitoring program designed to determine whether the provisions in items one through four above are effective at limiting the amount of pesticide residues in the most vulnerable types of salmon and steelhead habitat. NMFS provided very specific parameters for such a monitoring program. EPA will work with NMFS to design a reasonable monitoring study which will allow the federal government to determine peak concentrations of the NMC pesticides in these vulnerable, off-channel habitats and at the same time provide information and data that might allow EPA to determine the effectiveness of its modeling in determining potential exposures in such habitats. EPA will also seek the input of the U.S. Geological Survey in developing such a protocol with NMFS. Finally, EPA will require that the registrants of the NMC pesticides fund and conduct the monitoring study once the protocol is developed and that they report the results of the monitoring study to EPA. (*SEE TECHNICAL APPENDIX – SECTION C*)

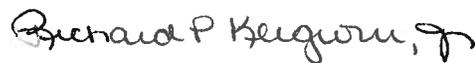
**ITEM #6 – Specific Limitations Relative to Willapa Bay and Grays Harbor, Washington:** NMFS indicated that only items 2 and 5 (wind speed limitations and effectiveness monitoring) were necessary to be implemented relative to a Washington State section 24(c) special local need registration of carbaryl. Item #6 of the RPA outlined NMFS recommended design for a monitoring program in Willapa Bay and Grays Harbor to determine salmonid health. The 24(c) registration allows the use of carbaryl in a program to control ghost shrimp (*Neotrypaea californiensis*) and mud shrimp (*Upogebia pugettensis*) in oyster beds in Willapa Bay and Grays Harbor, WA. In April 2003, the Willapa/Grays Harbor Oyster Growers Association (WGHOGA) agreed to settle a legal challenge to the National Pollution Discharge Elimination System Permit (NPDES) by the Washington Toxics Coalition and an ad-hoc Coalition. The provisions of the Settlement Agreement include: 1) that the amount of carbaryl used on oyster beds to be successively reduced by 10% each year for three years followed by a total termination of carbaryl use by 2012; 2) the implementation of a program to monitor the amount of carbaryl applied by the WGHOGA to tide flats in Willapa Bay and Grays Harbor; and 3) research of alternative burrowing shrimp controls and alternative oyster culture systems. Per the 2009 WGHOGA Burrowing Shrimp Annual Report, the terms of the agreement are being met - 2009 carbaryl use was below the agreed upon maximum base amount of 4,480 pounds, annual carbaryl application and water quality monitoring is occurring, and research is being done with both granular and liquid formulations of imidacloprid as an alternative to carbaryl use.

EPA believes the monitoring program specific to Willapa Bay and Grays Harbor recommended by NFMS would not serve to inform any potential use limitations since the entire use is already actively being phased out and monitored, and is scheduled to be terminated entirely by December 31, 2012.

Therefore, EPA will not pursue the suggested elements of the RPA relative to the specific use of carbaryl authorized via the Washington State 24(c) registration (registration number WA10001).

I will keep you informed as we proceed with implementation of the NMFS April 20, 2009 BiOp as outlined in this letter. Meanwhile, if you have any questions regarding the information contained in this letter please feel free to contact me. I can be reached on (703) 308-8000. The Agency looks forward to working with you and your staff as we continue through the implementation process.

Sincerely,



Richard P. Keigwin, Jr., Director  
Pesticide Re-evaluation Division

cc: Donald Brady, EFED OPP  
Arty Williams, EFED OPP  
Steven Bradbury, OPP  
Mark Dyner, OGC

## TECHNICAL APPENDIX

<b><u>SECTION</u></b>	<b><u>PAGE</u></b>
<b>SECTION A – Spray Drift Buffers (NMFS RPA Item #1) .....</b>	<b>6</b>
<b>SECTION B – Fish Mortality Incident Reporting (NMFS RPA Item #4) .....</b>	<b>19</b>
<b>SECTION C – Effectiveness Monitoring Program for Off-Channel Habitats (NMFS RPA Item #5) .....</b>	<b>20</b>

## SECTION A –Spray Drift Buffers (NMFS RPA Item #1)

*EPA intends to require differential spray drift buffers adjacent to waters within the range of the listed Pacific salmonids for which NMFS found likely jeopardy. The extent of such buffers will generally differ based on three factors: application rate, spray droplet spectrum, and water body size. Although NMFS did provide differential buffer sizes for a range of application rates, we have refined this analysis and examined application rates on a finer scale. NMFS evaluated bins of application rates in pounds active ingredient per acre or lb ai/acre (e.g., 0-1,  $\geq 1-3$ ,  $\geq 3-5$ ,  $\geq 5-10$ ,  $\geq 10$ ). EPA elected to look at application rates of each whole integer from 1 through 15 lb ai/acre. A distinction is made between the buffers EPA is pursuing relative to carbaryl & carbofuran vs. methomyl because NMFS established the same buffers for carbaryl & carbofuran while establishing different buffers for methomyl.*

*EPA calculated target concentrations in water bodies based on the information provided in Table 83 and Table 84 in the NMFS Biological Opinion (BiOp) (page 491 and 492, respectively). The AgDrift model was used by EPA to calculate a range of spray drift buffers which, except for instances where the model distance is exceeded (e.g., 1000 feet), result in modeled concentrations in the water body that will not exceed the calculated target concentrations. Where a buffer of less than 25 feet would be required to reach the target concentration, EPA will require a 25 foot buffer to help account for any potential movement of the pesticide into water through run-off. Further, EPA established through the methomyl Re-registration Eligibility Decision (RED) that buffers of 25 feet for ground and 100 feet for aerial applications were appropriate to protect lakes, reservoirs, rivers, estuaries, commercial fish ponds and natural, permanent streams, marshes or natural permanent ponds. The RED also established a 450 foot buffer from these aquatic areas when undertaking aerial, ultra low volume applications. These buffers were established to more generally protect non-target species and habitats. As a result, EPA will continue to use these buffer distances as the minimum distances from the types of water bodies addressed in the RED.*

In the April 20, 2009 BiOp completed by NMFS for current registrations of carbaryl, carbofuran, and methomyl relative to listed Pacific salmonids NMFS proposed an RPA that specified ground and aerial buffers they deemed necessary to help eliminate likely jeopardy to listed salmon in the PNW states. The analysis resulted in a range of buffers (200 to 600 feet) for ground applications of carbaryl and carbofuran that varied depending upon application rate while the aerial buffer was 1,000 feet regardless of application rate. For methomyl NMFS proposed a ground buffer of 50 feet and an aerial buffer of 600 feet. The values for methomyl are not rate dependant as currently registered uses of methomyl are all  $\leq 1$  lb ai/acre. These buffers are summarized in Table 83 (page 491) of the April 20, 2009 NMFS BiOp. Table 84 (page 492) of the BiOp provides modeled concentrations given various buffer distances and assuming use bordering a 10 meter wide by 0.1 meter deep off-channel habitat and 1 lb ai/acre application rate, very fine to fine droplet spectra, low boom height, and 50<sup>th</sup> percentile output using the AgDrift model.

While EPA understands from earlier correspondence with NMFS that their recommended buffers are based in part on certain qualitative considerations and not water concentrations alone, NMFS' analyses were limited to evaluating the buffer distances from extremely sensitive habitats exclusively. EPA believes it is reasonable to extrapolate from NMFS' conclusions, appropriate buffer distances for various application parameters adjacent to habitats of varying sensitivity. Accordingly, EPA's implementation plan follows NMFS' recommendations for the habitats modeled by NMFS, but extrapolates from the most conservative result of NMFS' quantitative assessment to provide for variable buffer sizes adjacent to differentially sized water bodies and considering varying droplet spectra and application rates. Combining the buffers summarized in Table 83 of the April 20, 2009 BiOp with the resultant concentrations summarized in Table 84 yields a matrix of potential exposures that when exceeded result in a conclusion of likely jeopardy based on an application rate of 1 lb ai/acre. EPA expanded the exposure table presented in Table 84 to include the full range of application rates and then determined which combination yielded the lowest exposure (most protective) value below which jeopardy is not expected by NMFS. This analysis yields target concentrations of 2.568 ppb for carbaryl and carbofuran and 7.217 ppb for methomyl. EPA's analysis of alternative spray drift buffers uses these values as target concentrations. This approach is consistent with the analysis EPA completed in response to the previous NMFS BiOp for the three OP pesticides (chlorpyrifos, diazinon, and malathion). An explanation of the rationale and methodology applied for the response to the three OP pesticides may be found in the EPA letter to NMFS dated September 10, 2009.

In order to account for variable geometry of different water body types, EPA established "bins" of water bodies representing general classes of habitat including off-channel, drainage ditch/canals, and streams/rivers present throughout the PNW states. The "bins" are based on available data and each bin evaluated represents a percentile of size within each class. The off-channel habitat water body size (10 m wide by 0.1 m deep) would represent the most vulnerable water body as identified by NMFS in the BiOp; however alternate buffers would be established for additional water body sizes in order to represent the distribution of waters throughout the 4 state region -- thereby providing pesticide applicators with alternate spray drift buffers for applications that occur adjacent to larger waters, while still achieving the target concentration for no likely jeopardy. The evaluation of bins of aquatic habitats and establishment of these bins was described in detail in the Technical Appendix to OPP's September 10, 2009 letter regarding the OP BiOp, and has been applied without change to this evaluation.

NMFS' analysis in the NMC BiOp used the Tier I component of AgDrift and assumed a water body of 10 meters wide and 0.1 meters deep (inherent in AgDrift is an assumption that the length is 515.8 feet, or the equivalent of the edge of field for the EPA model farm pond and wetland). EPA modeled spray drift for a number of aquatic scenarios using AgDrift v 2.01. Using the Tier I aerial and Tier I ground scenarios, EPA evaluated the buffer distances required for various receiving water bodies using the carbaryl & carbofuran and methomyl target concentrations separately. For the Tier I ground applications, EPA assessed buffer zones for a low boom, ASAE Very Fine to Fine droplet size distributions at the 50<sup>th</sup> as modeled by NMFS. In addition, EPA modeled alternative Tier I AgDrift runs using the Fine to Medium/Coarse droplet size distributions for ground applications. For Tier I aerial applications, EPA assessed buffer

zones for ASAE Fine to Medium droplet size distributions as modeled by NMFS along with alternative settings using the Medium to Coarse, and Coarse to Very Coarse droplet size distributions. Application rates for carbaryl & carbofuran ranged from 1 to 15 lbs ai/acre in order to fully characterize the range of current uses. Only the 1 lb ai/acre application rate was assessed for methomyl because all current registered uses of methomyl are  $\leq$  1 lb ai/acre. Results of the analysis are presented in the tables 1 through 10 below. Tables 1 through 5 present the results for carbaryl & carbofuran while Tables 6 through 10 present the results for methomyl. There were instances where the AgDrift analysis indicated no buffer was needed to address exposure from spray drift for the selected application rate and water body geometry to remain below the targeted concentration. However, EPA will maintain a minimum 25 foot buffer for these pesticides to help account for any potential movement of the pesticide into water through run-off.

In order to facilitate the transparency of this analysis for the end user EPA intends to create a web based program that will allow the user to input the specifics of the planned application and provide the relevant spray drift buffer. This application would be accessible to the user via the EPA's Endangered Species Protection Bulletins through the *Bulletins Live!* application at [www.epa.gov/espp](http://www.epa.gov/espp).

The BiOp indicates that the buffer distances should be measured from the edge of the water on the day of application and if no water is present on the day of application, no buffer would be necessary. EPA will adopt the concept that buffers are not required if no water is present at the time of application. However, as a general matter, EPA has chosen to require that the buffers be measured from the normal high water mark. While measuring from the normal high water mark may on limited occasions result in applications nearer to water than if measured from the edge of the water, it will in the vast majority of cases be more conservative than measuring from the edge of the water. Additionally, there are practical and enforcement considerations which support this approach.

First, normal high water mark is a location that most pesticide users will be able to easily ascertain. Second, it is a fixed point and therefore, provides the pesticide user with some certainty when planning for a pesticide application that may not take place for several months, regarding the geographic area in which the pesticide may not be used. EPA has been told such certainty is important in planning and contracting for pesticide applications. Finally, a fixed point from which to measure is critical for purposes of enforcement of the limitation. For example, if the point from which a buffer is measured changes from day to day and an investigation is undertaken regarding pesticide use practices that occurred two weeks ago, the inspector would not know from where the buffer should have been measured on the day of application.

<b>Table 1 Summary of Spray Drift Buffers from Various Water Body Types for Carbaryl &amp; Carbofuran Ground Applications</b> (Assuming Target Concentration of 2.568 ppb and AgDrift Model Inputs of ASAE Very Fine to Fine Droplet Spectra, Low Boom, 50 <sup>th</sup> Percentile Output)																	
Application Type	Width	Depth	Buffer Width (ft)														
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
			<b>Application Rate (lbs ai/acre)</b>														
			<b>Buffer Width (ft)</b>														
<b>Result Using NMFS Assumption for Off-channel Habitat Geometry</b>																	
Ground	32.8 ft (10 m)	0.33 ft (0.1 m)	200	425	650	850	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
<b>Results Using Alternate Assumptions for Off Channel Habitat Geometry</b>																	
Ground	32.8 ft (10 m)	0.49 ft (0.15 m)	125	275	450	575	725	850	975	1000	1000	1000	1000	1000	1000	1000	1000
Ground	32.8 ft (10 m)	0.66 ft (0.2 m)	75	200	325	425	550	650	750	850	950	1000	1000	1000	1000	1000	1000
Ground	32.8 ft (10 m)	3.28 ft (1 m)	25	25	50	50	75	100	125	150	175	200	225	250	275	300	325
<b>Results Using Alternate Assumptions for Irrigation Canal and Ditch Geometry</b>																	
Ground	4 ft	2 ft	25	50	100	125	175	225	250	300	325	375	400	450	475	525	550
Ground	10 ft	4 ft	25	25	50	50	75	100	100	125	150	175	200	200	225	250	275
Ground	18 ft	7 ft	25	25	25	25	25	50	50	50	75	75	100	100	125	125	150
Ground	34 ft	10 ft	25	25	25	25	25	25	25	25	50	50	50	50	75	75	75
<b>Results Using Alternate Assumptions for Stream and River Geometry</b>																	
Ground	35 ft	5 ft	25	25	25	25	50	50	75	100	100	125	125	150	175	175	175
Ground	60 ft	6 ft	25	25	25	25	25	25	50	50	75	75	100	100	125	125	150
Ground	90 ft	7 ft	25	25	25	25	25	25	25	25	50	50	50	75	75	100	100
Ground	155 ft	10 ft	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Ground	550 ft	20 ft	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25

Note 1 – Buffer widths have been rounded to the nearest 25 ft interval except for all buffers less than 25 feet have been assigned a width of 25 ft.

Note 2 – Yellow highlighted buffers of 1,000 ft represents the upper limit of AgDrift in Tier I mode.

**Table 2 Summary of Spray Drift Buffers from Various Water Body Types for Carbaryl & Carbofuran Aerial Applications**  
 (Assuming Target Concentration of 2.568 ppb and AgDrift Model Inputs of ASAE Fine to Medium Droplet Spectra)

Application Type	Width	Depth	Buffer Width (ft)															
			Application Rate (lbs ai/acre)															
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
aerial	32.8 ft (10 m)	0.33 ft (0.1 m)	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
<b>Result Using NMFS Assumption for Off-channel Habitat Geometry</b>																		
aerial	32.8 ft (10 m)	0.49 ft (0.15 m)	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
aerial	32.8 ft (10 m)	0.66 ft (0.2 m)	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
aerial	32.8 ft (10 m)	3.28 ft (1 m)	400	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
<b>Results Using Alternate Assumptions for Irrigation Canal and Ditch Geometry</b>																		
aerial	4 ft	2 ft	750	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
aerial	10 ft	4 ft	325	750	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
aerial	18 ft	7 ft	175	375	600	900	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
aerial	34 ft	10 ft	125	250	375	550	725	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
<b>Results Using Alternate Assumptions for Stream and River Geometry</b>																		
aerial	35 ft	5 ft	250	550	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
aerial	60 ft	6 ft	200	425	700	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
aerial	90 ft	7 ft	150	350	575	875	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
aerial	155 ft	10 ft	75	200	325	475	675	925	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
aerial	550 ft	20 ft	25	25	50	75	150	200	250	325	425	500	625	750	900	1000	1000	1000

Note 1 – Buffer widths have been rounded to the nearest 25 ft interval except for all buffers less than 25 feet have been assigned a width of 25 ft.

Note 2 – Yellow highlighted buffers of 1,000 ft represents the upper limit of AgDrift in Tier I mode.

Table 3 Summary of Spray Drift Buffers from Various Water Body Types for Carbaryl & Carbofuran Ground Applications (Assuming Target Concentration of 2.568 ppb and AgDrift Model Inputs of ASAE Fine to Medium/Coarse Droplet Spectra, Low Boom, 50 <sup>th</sup> Percentile Output)																	
Application Type	Width	Depth	Buffer Width (ft)														
			Application Rate (lbs ai/acre)														
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
<b>Result Using NMFS Assumption for Off-channel Habitat Geometry</b>																	
Ground	32.8 ft (10 m)	0.33 ft (0.1 m)	100	225	350	500	600	725	850	950	1000	1000	1000	1000	1000	1000	1000
<b>Results Using Alternate Assumptions for Off Channel Habitat Geometry</b>																	
Ground	32.8 ft (10 m)	0.49 ft (0.15 m)	50	150	225	325	400	500	575	650	725	800	875	950	1000	1000	1000
Ground	32.8 ft (10 m)	0.66 ft (0.2 m)	25	100	150	225	300	350	425	500	550	600	675	725	775	850	900
Ground	32.8 ft (10 m)	3.28 ft (1 m)	25	25	25	25	25	50	50	75	75	100	100	125	125	150	150
<b>Results Using Alternate Assumptions of Irrigation Canal and Ditch Geometry</b>																	
Ground	4 ft	2 ft	25	25	50	50	75	100	125	150	175	200	225	225	250	275	300
Ground	10 ft	4 ft	25	25	25	25	25	50	50	50	75	75	100	100	100	125	125
Ground	18 ft	7 ft	25	25	25	25	25	25	25	25	25	25	50	50	50	50	50
Ground	34 ft	10 ft	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
<b>Results Using Alternate Assumptions for Stream and River Geometry</b>																	
Ground	35 ft	5 ft	25	25	25	25	25	25	25	25	25	50	50	75	75	75	100
Ground	60 ft	6 ft	25	25	25	25	25	25	25	25	25	25	25	50	50	50	50
Ground	90 ft	7 ft	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Ground	155 ft	10 ft	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Ground	550 ft	20 ft	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25

Note 1 – Buffer widths have been rounded to the nearest 25 ft interval except for all buffers less than 25 feet have been assigned a width of 25 ft.

Note 2 – Yellow highlighted buffers of 1,000 ft represents the upper limit of AgDrift in Tier I mode.

**Table 4 Summary of Spray Drift Buffers from Various Water Body Types for Carbaryl & Carbofuran Aerial Applications**  
 (Assuming Target Concentration of 2.568 ppb and AgDrift Model Inputs of ASAE Medium to Coarse Droplet Spectra)

Application Type	Width	Depth	Buffer Width (ft)																	
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15			
			<b>Application Rate (lbs ai/acre)</b>																	
			<b>Result Using NMFS Assumption for Off-channel Habitat Geometry</b>																	
Aerial	32.8 ft (10 m)	0.33 ft (0.1 m)	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
			<b>Results Using Alternate Assumptions for Off Channel Habitat Geometry</b>																	
Aerial	32.8 ft (10 m)	0.49 ft (0.15 m)	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Aerial	32.8 ft (10 m)	0.66 ft (0.2 m)	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Aerial	32.8 ft (10 m)	3.28 ft (1 m)	200	375	600	900	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
			<b>Results Using Alternate Assumptions for Irrigation Canal and Ditch Geometry</b>																	
Aerial	4 ft	2 ft	325	675	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Aerial	10 ft	4 ft	175	325	475	675	975	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Aerial	18 ft	7 ft	100	200	275	350	450	550	675	825	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Aerial	34 ft	10 ft	75	125	200	250	300	350	425	500	575	675	775	900	1000	1000	1000	1000	1000	1000
			<b>Results Using Alternate Assumptions for Stream and River Geometry</b>																	
Aerial	35 ft	5 ft	125	250	350	500	675	900	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Aerial	60 ft	6 ft	100	200	300	400	500	650	825	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Aerial	90 ft	7 ft	75	175	250	325	400	525	650	800	975	1000	1000	1000	1000	1000	1000	1000	1000	1000
Aerial	155 ft	10 ft	25	100	150	200	250	300	375	450	525	600	700	825	950	1000	1000	1000	1000	1000
Aerial	550 ft	20 ft	25	25	25	25	25	50	75	100	100	125	150	175	200	225	250	275	275	275

Note 1 – Buffer widths have been rounded to the nearest 25 ft interval except for all buffers less than 25 feet have been assigned a width of 25 ft.

Note 2 – Yellow highlighted buffers of 1,000 ft represents the upper limit of AgDrift in Tier I mode.

**Table 5 Summary of Spray Drift Buffers from Various Water Body Types for Carbaryl & Carbofuran Aerial Applications**  
 (Assuming Target Concentration of 2.568 ppb and AgDrift Model Inputs of ASAE Coarse to Very Coarse Droplet Spectra)

Application Type	Width	Depth	Buffer Width (ft)														
			Application Rate (lbs ai/acre)														
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
<b>Result Using NMFS Assumption for Off-channel Habitat Geometry</b>																	
Aerial	32.8 ft (10 m)	0.33 ft (0.1 m)	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
<b>Results Using Alternate Assumptions for Off Channel Habitat Geometry</b>																	
Aerial	32.8 ft (10 m)	0.49 ft (0.15 m)	800	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Aerial	32.8 ft (10 m)	0.66 ft (0.2 m)	575	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Aerial	32.8 ft (10 m)	3.28 ft (1 m)	125	225	350	475	575	700	850	1000	1000	1000	1000	1000	1000	1000	1000
<b>Results Using Alternate Assumptions for Irrigation Canal and Ditch Geometry</b>																	
Aerial	4 ft	2 ft	225	400	575	800	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Aerial	10 ft	4 ft	125	200	300	400	500	575	675	800	925	1000	1000	1000	1000	1000	1000
Aerial	18 ft	7 ft	75	125	175	225	275	325	375	450	500	550	600	650	725	775	875
Aerial	34 ft	10 ft	50	100	125	175	200	225	250	300	350	375	425	450	500	550	575
<b>Results Using Alternate Assumptions for Stream and River Geometry</b>																	
Aerial	35 ft	5 ft	100	175	225	300	375	450	550	600	675	775	875	1000	1000	1000	1000
Aerial	60 ft	6 ft	75	125	175	250	300	375	425	500	550	625	675	775	850	950	1000
Aerial	90 ft	7 ft	50	100	150	200	250	300	350	400	475	525	575	625	675	750	825
Aerial	155 ft	10 ft	25	50	75	125	150	175	200	250	275	325	375	400	450	475	525
Aerial	550 ft	20 ft	25	25	25	25	25	25	25	25	50	50	75	75	100	100	125

Note 1 – Buffer widths have been rounded to the nearest 25 ft interval except for all buffers less than 25 feet have been assigned a width of 25 ft.

Note 2 – Yellow highlighted buffers of 1,000 ft represents the upper limit of AgDrift in Tier I mode.

<b>Table 6 Summary of Spray Drift Buffers from Various Water Body Types for Methomyl</b> <b>Ground Applications</b> <b>(Assuming Target Concentration of 7.217 ppb and AgDrift Model Inputs of ASAE Very Fine to Fine Droplet Spectra, Low Boom Height and 50<sup>th</sup> Percentile Output)</b>				
Application Type	Width	Depth	Target Concentration (ppb)	Buffer Width (ft) @ Application Rate Of 1 lbs a/acre
<b>Result Using NMFS Assumption for Off-Channel Habitat Geometry</b>				
Ground	32.8 ft (10 m)	0.33 ft (0.1 m)	7.217 ppb	50
<b>Results Using Alternate Assumptions for Off-Channel Habitat Geometry</b>				
Ground	32.8 ft (10 m)	0.49 ft (0.15 m)	7.217 ppb	25
Ground	32.8 ft (10 m)	0.66 ft (0.15 m)	7.217 ppb	25
Ground	32.8 ft (10 m)	3.286 ft (1 m)	7.217 ppb	25
<b>Results Using Alternate Assumptions for Irrigation Canal and Ditch Geometry</b>				
Ground	4 ft	2 ft	7.217 ppb	25
Ground	10 ft	4 ft	7.217 ppb	25
Ground	18 ft	7 ft	7.217 ppb	25
Ground	34 ft	10 ft	7.217 ppb	25
<b>Results Using Alternate Assumptions for Stream and River Geometry</b>				
Ground	any width	any depth		25

Note 1 – Buffer widths have been rounded to the nearest 25 ft interval except for all buffers less than 25 feet have been assigned a width of 25 ft.

Note 2 – EPA is maintaining the existing 25 ft buffer from streams and rivers described in the Methomyl Reregistration Eligibility Decision (RED) dated December 1998. This buffer requirement was determined to be necessary to generally protect non-target species in aquatic environments adjacent to methomyl use sites. This buffer, which will be maintained as a label requirement for methomyl products, applies to lakes, reservoirs, rivers, permanent streams, marshes or natural ponds, estuaries, and commercial fish ponds.

<b>Table 7 Summary of Spray Drift Buffers from Various Water Body Types for Methomyl Aerial Applications</b> (Assuming Target Concentration of 7.217 ppb and AgDrift Model Inputs of ASAE Fine to Medium Droplet Spectra)				
<b>Application Type</b>	<b>Width</b>	<b>Depth</b>	<b>Target Concentration (ppb)</b>	<b>Buffer Width (ft) @ Application Rate Of 1 lbs ai/acre</b>
<b>Result Using NMFS Assumptions for Off-Channel Habitat Geometry</b>				
Aerial	32.8 ft (10 m)	0.33 ft (0.1 m)	7.217 ppb	1000
<b>Results Using Alternate Assumptions for Off-Channel Habitat Geometry</b>				
Aerial	32.8 ft (10 m)	0.49 ft (0.15 m)	7.217 ppb	1000
Aerial	32.8 ft (10 m)	0.66 ft (0.15 m)	7.217 ppb	825
Aerial	32.8 ft (10 m)	3.286 ft (1 m)	7.217 ppb	125
<b>Results Using Alternate Assumptions for Irrigation Canal and Ditch Geometry</b>				
Aerial	4 ft	2 ft	7.217 ppb	225
Aerial	10 ft	4 ft	7.217 ppb	125
Aerial	18 ft	7 ft	7.217 ppb	50
Aerial	34 ft	10 ft	7.217 ppb	25
<b>Results using Alternate Assumptions for Stream and River Geometry</b>				
Aerial	any width	any depth		100 or 450 for ultra low volume applications

Note 1 – Buffer widths have been rounded to the nearest 25 ft interval except for all buffers less than 25 feet have been assigned a width of 25 ft.

Note 2 – Yellow highlighted buffers of 1,000 ft represents the upper limit of AgDrift in Tier I mode.

Note 3 - EPA is maintaining the existing 100 ft buffer (and 450 ft for ultra low volume applications) from streams and rivers described in the Methomyl Reregistration Eligibility Decision (RED) dated December 1998. This buffer requirement was determined to be necessary to generally protect non-target species in aquatic environments adjacent to methomyl use sites. This buffer, which will be maintained as a label requirement for methomyl products, applies to lakes, reservoirs, rivers, permanent streams, marshes or natural ponds, estuaries, and commercial fish ponds.

**Table 8 Summary of Spray Drift Buffers from Various Water Body Types for Methomyl**

**Ground Applications**

(Assuming Target Concentration of 7.217 ppb and AgDrift Model Inputs of ASAE Fine to Medium/Coarse Droplet Spectra, Low Boom Height and 50<sup>th</sup> Percentile Output)

Application Type	Width	Depth	Target Concentration (ppb)	Buffer Width (ft) @ Application Rate Of 1 lbs ai/acre
<b>Result Using NMFS Assumptions for Off-channel Habitat Geometry</b>				
Ground	32.8 ft (10 m)	0.33 ft (0.1 m)	7.217 ppb	25
<b>Results Using Alternate Assumptions for Off Channel Habitat Geometry</b>				
Ground	32.8 ft (10 m)	0.49 ft (0.15 m)	7.217 ppb	25
Ground	32.8 ft (10 m)	0.66 ft (0.2 m)	7.217 ppb	25
Ground	32.8 ft (10 m)	3.28 ft (1 m)	7.217 ppb	25
<b>Results Using Alternate Assumptions for Irrigation Canal and Ditch Geometry</b>				
Ground	4 ft	2 ft	7.217 ppb	25
Ground	10 ft	4 ft	7.217 ppb	25
Ground	18 ft	7 ft	7.217 ppb	25
Ground	34 ft	10 ft	7.217 ppb	25
<b>Results Using Alternate Assumptions for Stream and River Geometry</b>				
Ground	any width	any depth		25

Note 1 – Buffer widths have been rounded to the nearest 25 ft interval except for all buffers less than 25 feet have been assigned a width of 25 ft.

Note 2 – EPA is maintaining the existing 25 ft buffer from streams and rivers described in the Methomyl Reregistration Eligibility Decision (RED) dated December 1998. This buffer requirement was determined to be necessary to generally protect non-target species in aquatic environments adjacent to methomyl use sites. This buffer, which will be maintained as a label requirement for methomyl products, applies to lakes, reservoirs, rivers, permanent streams, marshes or natural ponds, estuaries, and commercial fish ponds.

**Table 9 Summary of Spray Drift Buffers from Various Water Body Types for Methomyl**

(Assuming Target Concentration of 7.217 ppb and AgDrift Model Inputs of ASAE Medium to Coarse Droplet Aerial Applications Spectra)

Application Type	Width	Depth	Target Concentration (ppb)	Buffer Width (ft) @ Application Rate Of 1 lbs ai/acre
<b>Result Using NMFS Assumptions for Off-channel Habitat Geometry</b>				
Aerial	32.8 ft (10 m)	0.33 ft (0.1 m)	7.217 ppb	750
<b>Results Using Alternate Assumptions for Off Channel Habitat Geometry</b>				
Aerial	32.8 ft (10 m)	0.49 ft (0.15 m)	7.217 ppb	450
Aerial	32.8 ft (10 m)	0.66 ft (0.2 m)	7.217 ppb	325
Aerial	32.8 ft (10 m)	3.28 ft (1 m)	7.217 ppb	75
<b>Results Using Alternate Assumptions for Irrigation Canal and Ditch Geometry</b>				
Aerial	4 ft	2 ft	7.217 ppb	125
Aerial	10 ft	4 ft	7.217 ppb	75
Aerial	18 ft	7 ft	7.217 ppb	25
Aerial	34 ft	10 ft	7.217 ppb	25
<b>Results Using Alternate Assumptions for Stream and River Geometry</b>				
Aerial	any width	any depth		100 or 450 for ultra low volume applications

Note 1 – Buffer widths have been rounded to the nearest 25 ft interval except for all buffers less than 25 feet have been assigned a width of 25 ft.

Note 2 - EPA is maintaining the existing 100 ft buffer (and 450 ft for ultra low volume applications) from streams and rivers described in the Methomyl Reregistration Eligibility Decision (RED) dated December 1998. This buffer requirement was determined to be necessary to generally protect non-target species in aquatic environments adjacent to methomyl use sites. This buffer, which will be maintained as a label requirement for methomyl products, applies to lakes, reservoirs, rivers, permanent streams, marshes or natural ponds, estuaries, and commercial fish ponds.

**Table 10 Summary of Spray Drift Buffers from Various Water Body Types for Methomyl**

**Aerial Applications**

(Assuming Target Concentration of 7.217 ppb and AgDrift Model Inputs of ASAE Coarse to Very Coarse Droplet Spectra)

Application Type	Width	Depth	Target Concentration (ppb)	Buffer Width (ft) @ Application Rate Of 1 lbs ai/acre
<b>Results Using NMFS Assumptions for Off-channel Habitat Geometry</b>				
Aerial	32.8 ft (10 m)	0.33 ft (0.1 m)	7.217 ppb	425
<b>Results Using Alternate Assumptions for Off Channel Habitat Geometry</b>				
Aerial	32.8 ft (10 m)	0.49 ft (0.15 m)	7.217 ppb	275
Aerial	32.8 ft (10 m)	0.66 ft (0.2 m)	7.217 ppb	200
Aerial	32.8 ft (10 m)	3.28 ft (1 m)	7.217 ppb	50
<b>Results Using Alternate Assumptions for Irrigation Canal and Ditch Geometry</b>				
Aerial	4 ft	2 ft	7.217 ppb	100
Aerial	10 ft	4 ft	7.217 ppb	50
Aerial	18 ft	7 ft	7.217 ppb	25
Aerial	34 ft	10 ft	7.217 ppb	25
<b>Results Using Alternate Assumptions for Stream and River Geometry</b>				
Aerial	any width	any depth		100 or 450 for ultra low volume applications

Note 1 – Buffer widths have been rounded to the nearest 25 ft interval except for all buffers less than 25 feet have been assigned a width of 25 ft.

Note 2 - EPA is maintaining the existing 100 ft buffer (and 450 ft for ultra low volume applications) from streams and rivers described in the Methomyl Reregistration Eligibility Decision (RED) dated December 1998. This buffer requirement was determined to be necessary to generally protect non-target species in aquatic environments adjacent to methomyl use sites. This buffer, which will be maintained as a label requirement for methomyl products, applies to lakes, reservoirs, rivers, permanent streams, marshes or natural ponds, estuaries, and commercial fish ponds.

## **SECTION B –Fish Mortality Incident Reporting (NMFS RPA Item #4)**

*EPA intends to require that registrants of any pesticide whose active ingredients include one of the three NMC pesticides, treat reported incidents involving fish from use of their pesticide in CA, OR, WA or ID, as individual reportable incidents under FIFRA section 6(a)(2) with a requirement that such incidents be reported to EPA within 15 days of the registrant learning of the alleged incident. EPA also intends to require through pesticide labeling that pesticide applicators report any fish kills of which they are aware to have occurred within or adjacent to the treatment area, and which occurred within four days of treatment, to the pesticide registrant of the product that was used.*

In the April 20, 2009 BiOp completed by NMFS for current registrations of carbaryl, carbofuran, and methomyl relative to listed Pacific salmonids NMFS proposed an RPA that specified EPA should require pesticide users to “report all incidents of fish mortality that occur within four days of application and within the vicinity of the treatment area to EPA Office of Pesticide Programs (703-305-7695).” This element is identical to an element of the RPA for a previously issued BiOp from NMFS which addressed chlorpyrifos, diazinon, and malathion (November 18, 2008). In discussions with NMFS regarding this item of the RPA relative to the November 18, 2008 BiOp, NMFS expressed that the means of obtaining such incident information was not as critical as actually obtaining relatively “real-time” information. Further, NMFS clarified what was meant by “vicinity” in the context of this item and provided in a July 2, 2009 e-mail, that vicinity means “in surface waters within and adjacent to application areas.”

In order to ensure appropriate handling of fish incident information relative to the use of the three NMC pesticides in CA, OR, WA, and ID, and to ensure federal resources are not spent putting in place duplicative processes, it is EPA’s intent to require that individual incidents be reported to EPA’s FIFRA §6(a)(2) incident system. EPA has several options to accomplish this including requiring such reporting as a condition of registration or utilizing its existing FIFRA §6(a)(2) procedures to ensure timely knowledge of alleged incidents. FIFRA §6(a)(2) requires pesticide registrants to submit to the Agency, additional factual information regarding unreasonable adverse effects on the environment. EPA’s regulations at 40 CFR Part 159 limit routine reporting of incidents to the types of information EPA determined were most likely to be significant. However, 40 CFR §159.195(c) requires submission of additional adverse effects information if the registrant has been informed by EPA that such additional information has the potential to raise questions about the continued registration of a product or about the appropriate terms and conditions of registration of a product. After review of the NMFS April 20, 2009 BiOp, additional information regarding fish incidents associated with the use of pesticides containing any of the three NMC pesticides has potential to raise questions about the appropriate terms and conditions of registration of such products. As a result, EPA intends to require that registrants of pesticides whose active ingredients include carbaryl, carbofuran, or methomyl, treat reported incidents to fish from use of their pesticide in CA, OR, WA and ID, as individual reportable incidents (non-aggregated) under FIFRA section 6(a)(2) and that such incidents be reported within 15 days of the registrant learning of the alleged incident. Further, EPA intends to require that the labeling of such products carry a statement that would compel the pesticide user within the geographic scope addressed by the BiOp to report such incidents that occur within or adjacent to the treatment area, and which occur within four days of treatment, to the pesticide registrant of the product that was used.

## **SECTION C –Effectiveness Monitoring Program for Off-Channel Habitats (NMFS RPA Item #5)**

*EPA will work with NMFS, and will seek input from the U.S. Geological Survey, to design a reasonable monitoring study which will allow the federal government to determine peak concentrations of the NMC pesticides in off-channel habitat and will provide information and data that might allow EPA to forego monitoring each and every time mitigation is recommended relative to concentrations of pesticides in water and particularly in off-channel habitat. EPA intends to require for products containing any of the three NMC pesticides, the registrants fund and conduct the monitoring study once the protocol is approved and that results of the monitoring study be reported to EPA.*

From discussions with NMFS relative to the November 18, 2008 BiOp, it appears the interest in this item is to determine whether the measures in the BiOp are serving to ensure certain levels are not attained in off-channel habitats by measuring for peak concentrations. Discussions with NMFS relative to the November 18, 2008 BiOp resulted in agreement to work with EPA to define a monitoring approach that would achieve this objective while at the same time providing information and data that might be used by EPA to forego monitoring each and every time mitigation is recommended relative to concentrations of a pesticide in water.

To meet this need, OPP proposes to develop with NMFS and with input from the U.S. Geological Survey, a more modest monitoring program that would achieve the result of determining peak concentrations in off-channel habitat but also would show how accurately EPA modeling predicts environmental concentrations in off-channel habitat by measuring peak exposures in such habitats and comparing them to predicted estimated environmental concentrations predicted through modeling. Such “calibrations” would result in a better ability to rely on modeling in the future for the remainder of the salmonid assessments and in addition enhance assessment methods for other aquatic species that rely on these types of habitat throughout the country. OPP intends to impose on the registrants the obligation to fund and conduct such monitoring.