# United States Department of the Interior

FISH AND WILDLIFE SERVICE
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In Reply Refer to:
FWS/R1/NWRS/NCR/BIO

JUL 09 2014

Memorandum

To: Refuge Project Leaders, Region 1

From: Regional Chief, National Wildlife Refuge System, Region 1 Kevin Foerster

Subject: Guidelines regarding the interim use and phase out of neonicotinoid insecticides to grow agricultural crops for wildlife on NWRs in the Pacific Region

The Pacific Region will begin a phased approach to eliminate the use of neonicotinoid insecticides (by any method) to grow agricultural crops for wildlife on National Wildlife Refuge System lands, effectively immediately. By January 2016, Region 1 will no longer use neonicotinoid pesticides in any agricultural activity. Please begin dialogue with cooperators operating under existing multi-year agreements to alert them to the banning of all neonicotinoid insecticides for agricultural purposes by January 2016. Though there will be some flexibility during the transition and we will take into account the availability of non-treated seed, Refuge managers are asked to exhaust all alternatives before allowing the use of neonicotinoids on National Wildlife Refuge System Lands in 2015.

Refuge managers will need to have an approved PUP and completed Section 7 documentation (where applicable) before using neonicotinoid pesticides, including the planting of neonicotinoid-treated seed to grow agricultural crops for wildlife on refuge lands in 2015. The PUP will become part of the official record and should clearly state the need to use treated seed during the transition period. Attachment 1 (*New Requirements for the Use of Chemically Treated Seeds on Refuge Lands in Region 1, effective March 28, 2014*) describes new mandatory requirements for all chemically treated seeds on refuge lands in the Pacific Region, including guidance on how to prepare a Pesticide Use Proposal for pesticides delivered by seed treatment.

**Background and Justification:** Neonicotinoids are insecticides that distribute systemically through many stages of plant development, can be effective against targeted pests, but may also adversely impact many non-target insects. The Service's Integrated Pest Management (IPM) policy (561 FW 1) directs us to use long-standing established IPM practices and methods that pose the lowest risk to fish, wildlife, and their habitats. The prophylactic use of neonicotinoids and the potential broad-spectrum adverse effects to non-target species do not meet the intent of IPM principles or the Service's Biological Integrity, Diversity, and Environmental Health (BIDEH) policy (601 FW 3). Attachment 2, *Neonicotinoid Information Sheet*, further outlines the scope and scale of the issue and potential non-target impacts as a result of neonicotinoid use, including as a seed treatment.

Neonicotinoids, applied as a seed treatment, are potentially being used on agricultural crops grown for wildlife within R1 National Wildlife Refuge System Lands. A total of 8,710 acres of agricultural crops were grown in 2013 (RAPP). At this time, we have not been able to determine how many programs, contracts, or cooperative agreements are using neonicotinoid-treated seeds. Project Leaders are encouraged to work with cooperators to develop innovative ways to meet refuge management objectives by developing agreements that reduce the amount and toxicity of chemical applications, but still maintain a fair return to our farming partners.

If you have any questions regarding this issue, please contact Bridgette Flanders-Wanner at (360) 604-2569.

Attachments

Attachment #1

**U.S. Fish & Wildlife Service**

**Pacific Region NWRS Integrated Pest Management Program** ***3/28/14***

***New Requirements for the Use of Chemically Treated Seeds on Refuge Agricultural Crops in Region 1***

**Audience:** Refuge Project Leaders, Managers, Biologists, and other affected Refuge staff

**Prepared By:** Bridgette Flanders-Wanner, Regional Refuge Biologist/IPM Coordinator

**Issue:** Recent scientific publications illustrate a correlation between the use of neonicotinoid insecticides and significant population declines in pollinators. Neonicotinoids are "systemic" (taken up by a plant's entire vascular system). Pollinators and other desirable insects are exposed through pollen, water droplets on the surface of the plant, and dust that is released into the air when coated seeds are planted. These effects cause significant problems for the health of individual bees, as well as the overall health of bee colonies. Consumption of small numbers of dressed seeds offers a route to direct mortality in birds and mammals. Neonicotinoids have now been determined to be persistent and there are concerns with bioaccumulation in soils and aquatic environments. Knowledge gaps remain, but current use is likely to be impacting a broad range of non-target taxa including pollinators and soil and aquatic invertebrates and hence threatens a range of ecosystem services. Recent field trials suggest that prophylactic seed treatments do not always provide a yield benefit, thereby challenging the true agronomic value of these treatments where the environmental costs may outweigh the agricultural benefits.

Preventative or prophylactic use of broad-spectrum pesticides goes against the long-established principles of integrated pest management (IPM), and therefore conflicts with DOI and Service IPM policies, 517 DM 1 and 569 FW 1, respectively. In the Pacific Region, the primary objective for growing agricultural crops on National Wildlife Refuges is to produce food for wildlife. Project Leaders are encouraged to work with cooperators to develop innovative ways to meet these objectives by developing agreements that reduce the amount and toxicity of chemical applications, but still maintain a fair return to our cooperators.

**Scope and Scale:** An estimated 92 to 95 percent of corn acres (and 70% of soybeans) in United States and Canada are planted with seed coated with neonicotinoids. However, the number of crop types that are potentially impacted is broad. *Types of crops that are or have been grown on R1 NWRs that could be impacted by coated seeds include the following: corn, wheat, barley, buckwheat, millet, oats, sorghum, triticale, soybean, green bean, peas, and in the near future, alfalfa (a new supplemental label is pending).*

All chemically treated seed (e.g., neonicotinoids, fungicides, other pesticides) must be conspicuously colored with a dye or colorant that imparts an unnatural color to the seed and must be labeled in accordance with the requirements of the Federal Seed Act. Though conceivable, the likelihood that individual refuge cooperators are purchasing untreated seed and treating it themselves is low. Many of the neonicotinoid seed treatments are labeled for

use by commercial treaters only. Some, but not all labels clearly state, "Not for use in agricultural establishments or on-farm seed treatment applicators used at planting."

Neonicotinoids are a class of neuro-active insecticides chemically similar to nicotine. Acetamiprid, clothianidin, dinotefuran, imidacloprid, nithiazine, sulfoxaflor, thiacloprid, and thiamethoxam are all active ingredients that are included within the neonicotinoid class of insecticides. The most common active ingredients and trade names for neonicotinoid-treated seeds are:

- clothianidin (Poncho 600, Poncho VOTiVO)
- thiamethoxam (Cruiser 5FS, CruiserMaxx, Cruiser Extreme)
- imidacloprid (Gaucho XT, Gaucho 600, Gaucho 75 ST FS)

**New Mandatory Requirements:**

1. **Pesticide Use Proposal (PUP):** All chemically treated seeds (e.g., neonicotinoids, fungicides) planted on R1 refuge lands must be in compliance with the FWS' IPM policy (569 FW 1), which requires approval for any pesticide application on Service lands through the Pesticide Use Proposal system prior to application. *As directed by the National IPM Coordinator, starting immediately, all chemically treated seeds will require an approved PUP prior to planting.* The PUP will become part of the official record and should clearly justify the need to use neonicotinoid insecticide or other seed treatment.
2. **Section 7 Consultation:** Endangered Species Act (ESA) Section 7 review must be completed prior to submitting a PUP for listed and proposed species and proposed and designated critical habitat on or near any pesticide application, including reviews ending in a No Effect determination. Section 7 review has to be conducted on all seed treatment chemicals, just like any other chemical used on Service lands. *Starting in CY2014, where applicable, valid Section 7 compliance documentation must be uploaded to the PUP before it can be approved at the regional level.* Refer to the "Region 1 National Wildlife Refuge System Guidance for Section 7 Consultations" or contact Joe Engler (Refuge's liaison for Section 7 consultations) for support.

**Use Requirements and Important Considerations Prior to and During Planting:**

1. **Adjacent Pollinator Habitat:** Follow all precautions to reduce dust and drift, especially with respect to wind and weather conditions during planting. As stewards of the land, our cooperators play a significant role in the health of pollinators by reducing drift during corn planting. *Pollen sources are particularly vulnerable to drift of pesticides in exhausted dust when neonicotinoid-treated seeds are planted within 50 meters of such forage.*
2. **100% Below-Ground Incorporation:** All neonicotinoid-treated seed must be planted below ground due to having a high toxicity to granivorous birds and mammals. No residue seeds can be left above ground on refuge lands. Any spilled and/or treated seeds that are left above ground at the time of planting must be picked-up and removed or replanted underground immediately. *To ensure compliance, the refuge will conduct random field spot checks at time of planting to best ensure that the treated seeds are planted below ground.* For seeds planted in-furrow, pay special attention to the start of new rows, where the potential for above-ground seeds is highest.

3. **Treatment Buffers to Water:** Seeds treated with neonicotinoids are highly toxic to aquatic invertebrates. This raises the level of concern for soil water run-off. *The refuge must maintain a minimum of a 50-foot treatment buffer to water on all non-erodible refuge fields and a 100-foot treatment buffer to water on all erodible/highly erodible refuge fields that use neonicotinoid-treated seeds.* If refuge staff does not know if the refuge fields in question are classified as non-erodible verses erodible/highly erodible, please contact your local Soil Conservation Service. Soil erodibility represents both susceptibility of soil to erosion and the rate of runoff. Soils high in clay and coarse textured soils, such as sandy soils, have the lowest levels of soil erodibility/runoff. Medium textured soils, such as the silt loam soils, produce moderate runoff. Soils having high silt content are most erodible of all soils.

**Preparing a Pesticide Use Proposal:** All use of pesticides requires a PUP, including pesticides delivered by seed treatment. Stations that grow agricultural crops should submit PUPS when using pesticide-treated seeds. Pesticides used as seed coatings (e.g., neonicotinoids, fungicides) are not on the field-level approval list. All will require RO review and approval prior to use. Please consider using the suggested language in the PUP for sections outlined below.

*Management Action/Economic Threshold:*
Optional Sample Text: "Seed treatment/preventative – Most corn seed being distributed is treated with this insecticide and a number of fungicides. Cooperators have already purchased treated seed or were unable to purchase needed quantities of untreated seed prior to planting season, requiring the use of treated seed. Every effort will be made to exhaust all alternatives before allowing the use of neonicotinoid-treated seed in 2015.

*Application Rates applicable for Seed Treatment Delivery:*
Indicate *Method* as "Treated Seed" and *Equipment* as "Planter".

Just like any other PUP, you will need to calculate and provide an application rate. PUPs prepared in other regions tend to report applications rates for chemically treated seeds in ounces per acre, but other measurements are permissible, provided that the rate is specific to the active ingredient on the PUP. Estimates of mg a.i./seed are provided here (consult the specific label for further details). The refuge cooperator will need to provide an estimate of the number of seeds planted per acre to accurately derive an application rate.

**clothianidin (Poncho)**
Corn ≈ 1.25 mg a.i./kernel
Wheat & other Cereals ≈ 0.025 mg a.i./seed
Soybeans ≈ 0.13 mg a.i./seed

**thiamethoxam (Cruiser)**
Corn ≈ 0.8 mg a.i./kernel
Wheat & other Cereals ≈ 0.018 mg a.i./seed
Soybeans ≈ 0.0756 to 0.1512 mg a.i./seed
Alfalfa* ≈ 0.001 mg a.i./seed (**pending supplemental label that includes OR/WA*)

**imidacloprid (Gaucho)**

Corn ≈ 1.34 mg a.i./kernel
Wheat & other Cereals ≈ 0.033 mg a.i./seed

*Additional Best Management Practices:*

Include these four "Additional Best Management Practices" in the submitted PUP and in the conditions of any Special Use Permit or Cooperative Agreement to support mitigation of non-target impacts:

1. Follow all precautions to reduce dust and drift, especially with respect to wind and weather conditions during planting.
2. All neonicotinoid-treated seed must be planted below ground. No residue seeds can be left above ground on refuge lands. Any spilled and/or treated seeds that are left above ground at the time of planting must be picked-up and removed or replanted underground immediately. The refuge will conduct random field spot checks at the time in which these treated seeds are planted in order to best ensure that the treated seeds are planted below ground.
3. The refuge will maintain a minimum of a 50-foot treatment buffer to water on all non-erodible refuge fields and a 100-foot treatment buffer to water on all erodible/highly erodible refuge fields that use neonicotinoid-treated seeds.
4. Seed treatment chemicals cannot be mixed or applied to the crop seeds on refuge/district lands. Seeds must be treated off-site.

Attachment #2

## NEONICOTINOID INFORMATION SHEET

### What are Neonicotinoids?

A. Neonicotinoids (or neonics) are a class of insecticides that distribute systemically throughout a plant and affect the nervous system of invertebrates, leading to paralysis and death. These neurotoxins are non-specific and persistent and therefore have the potential to affect a broad-spectrum of invertebrates similarly. Generally, they are less toxic to vertebrates than other insecticides. [1,5]

B. Neonics are one of the most available and commonly used insecticides world-wide. They are widely used in agricultural situations to deal with crop insect pests, but are also the most common insecticides available to the home consumer. Six neonicotinoid insecticides are used on agricultural crops and nursery plants - imidacloprid, acetamiprid, clothianidin, thiamethoxam, thiacloprid, and dinotefuran. [1,3,5,15]

### What are the concerns?

A. **Non-Target Impacts:** Severe declines in bee fauna have been a driving force behind the growing concern with neonics, as they may be one contributing factor in declines. Honey bee declines especially have been the target species of much research on neonicotinoid impacts. Recently, studies are also focusing on native bees. Many species, such as bumble bees, are considered to be declining. Other study has occurred with earthworms, beetles, flies, and aquatic invertebrates. However, little to no study has occurred with other invertebrate groups, although they could be similarly affected.
[1,8,9,11,12,27,29,31,32,34,35,36,37,39,40]

B. **Systemic Mode of Action:** Neonicotinoids distribute systemically throughout the plant allowing the active ingredient to be available to a broad spectrum of non-target insects and other species via plant tissue (pollen, nectar, guttation).[6, 7]

C. **Persistence in the Environment:** Neonicotinoids are persistent and, therefore, can become pervasive in the environment. In time, leaching and runoff can move neonics to wildlife habitats adjacent to the treatment site.

D. **Non-Reversible Binding Action:** Neonics are toxic by creating a non-reversible binding action in the nervous system of the invertebrate or vertebrate. Neonics bind to the cell's nicotinic acetylcholine receptors and once cells are stimulated, the neonics inhibit acetylcholinesterase from stopping the neural transmission and cell stimulation. As a result, over time, chronic, sub-lethal impacts or multiple non-lethal exposures can have lethal effects. [1,41,]

E. **Prophylactic Use of Pesticides**: The prophylactic use of a broad-spectrum pesticide before the principles of IPM are implemented goes against the long-established principles of integrated pest management (IPM), and also conflicts with DOI and Service's IPM policies.

### Exposure Pathways

A. Neonics are produced and formulated for a variety of pest insect applications, but are more commonly utilized for their systemic and persistent properties, which provide long-term control. Application options include foliar contact sprays, soil drenches, direct injection into the plant, and seed coatings. [1,5,6, 23]

B. Because of their systemic properties, neonics distribute through all parts of the plant: roots, stems, leaves, nectar, pollen, and guttation droplets; thereby potentially affecting invertebrates that feed directly on plant parts and nectar, feed indirectly by collecting pollen, or drinking guttation droplets. [1,3,6,7]

C. Neonics are also documented moving to non-target sites through spray drift. More commonly, neonic-laden talc drifts from agricultural seeders during the planting and/or equipment cleaning processes. Talc can drift long distances and may contain measurable levels of neonics. Drifting talc can then 'treat' non-target landscapes providing a direct route of exposure to non-target insects or by uptake through soils and into native plants. Due to persistence in soils and subsequent leaching, neonics have been found in water bodies adjacent to agricultural areas and have resulted in impacts to aquatic invertebrates. [5,6,16,17,21,22,23,24,26]

D. Due to their persistence in soils and plants, some neonics can be effective for several years, thereby, affecting both target and non-target insects. It is estimated that over 90% of the active ingredient on seed coatings remains in the soil, leading to uptake in subsequent crops and other plants, as well as leaching into water bodies. [5]

**Toxicity**

A. Neonics are highly toxic to target and non-target insects alike. While the acute toxicity affects are well-documented through lab experiments, the chronic affects are less understood. Toxicity depends on the type of exposure, with oral ingestion generally being the most toxic. Chronic exposure is one of a suite of insults that work to contribute to impacts. [10,11,12]

B. Experimental studies show that neonicotinoid toxicity can result in a variety of affects to bees, including: reduced fitness; reduced production of new queens and workers; decreasing production of females (more than decreasing the production of males); increased parasite loads; suppressed response to diseases and parasites; reduced feeding and/or impaired feeding behavior; delayed nest building; fewer eggs; reduced life span and worker biomass; altered learning ability and orientation/navigation. [3,6,8,9,10,11,12,1,14,19,20,25,27,28,29]

C. Most studies have occurred in lab or other controlled situations, however, more semi-field and field studies are being conducted. Due to the complexities of accounting for all confounding factors, study results tend to be mixed. Exposure method, rate, duration, neonic compound used, bee activity, chemical metabolism, and avoidance mechanisms are important factors that will contribute to study results and, therefore, are difficult to duplicate in field-based studies. The preponderance of laboratory studies to date are a result of US EPA mandated studies, as the agency requires standard laboratory analyses and results for all chemicals that they review for pesticide registration, as well as for setting air, soil, and water standards to protect human health, and fish and wildlife. [3,19]

D. An advantage of neonicotinoids is their relatively low toxicity to vertebrates during laboratory testing. However, neonicotinoid-treated seed can be acutely toxic when ingested by granivorous birds or mammals due to the high concentration of active ingredient on individual seeds. The concentration of active ingredient on seed can differ depending on the crop type, and some crop seeds have been shown in testing to approach or exceed the $LD_{50}$ for small mammals and birds. Therefore, just a few seeds can potentially deliver a lethal dose to a small-bodied animal. The US EPA estimates that ~0.5-1% of drilled

seed remains accessible to wildlife on the soil surface. It is important to note that many species have the ability to scrape and dig for planted seed. [5,38,42]

**Relevance to Region 1 Refuges**

A. Refuges in general do not use insecticides during the course of their management. Neonics have been used inadvertently on some Refuges that grow agricultural crops for wildlife, as much of the seed available for waterfowl crops are routinely treated with fungicide/neonicotinoid seed coatings. [6,7,17,18]
B. Refuges also may be inadvertently introducing neonics onto their Refuges during restoration projects, as nursery stock may be similarly treated with neonic sprays to combat insect pests in order to provide a "higher quality" product to the consumer. The prevalence in native seed/plant sources generally used in restorations is unknown. [15]
C. While the use of neonics on Refuges is limited, the persistence and systemic action have the long-term potential to adversely impact Refuge invertebrates, especially native bee fauna and other pollinators. The multiple routes of exposure, persistence, and systemic properties of neonics may have negative consequences for the health of individuals and of the faunal and floral communities on the Refuge, as community-level effects have not been well studied. These potential impacts can transcend all habitats, not just croplands, due to drift and leaching.
D. In general, invertebrate populations have a tremendous ability to re-colonize after population declines. However, some studies have shown that invertebrates with single annual reproductive cycles are less able to recover than species with annual multiple reproductive cycles. Short-term, neonic-induced declines may be particularly problematic for rare and listed species, and/or the plants they pollinate.
E. Refuge resources may be susceptible to neonic use off-refuge, adjacent agricultural lands or residential areas. Some invertebrates, such as bumble bees, can travel two or more miles during their foraging forays and routinely exploit the most efficient plant resources available, which may include crops.

**Crop Yields**

A. Refuges that grow crops for wildlife often use cooperative farmers to do so, due to the cost-benefit. Many cultivated wildlife crops on Refuges include corn and grains and these seeds are generally treated prior to purchase with neonicotinoid seed coatings.
B. Various studies have occurred to assess crop yields with respect to the efficacy of seed treatments. In general, these studies are somewhat contradictory and it is generally acknowledged that the many influencing and confounding factors are difficult to assess collectively. [20]
C. Neonics are known to increase crop yields in crops that have a high susceptibility to and occurrence of pest insects; conversely, when insect pest populations are low or their impacts inconsequential, neonics have been shown to do little with bolstering crop yields. Understanding insect life cycles, population levels, weather patterns that affect insect recruitment/survival, all factors that delay or compromise plant growth and nutrient uptake, are some of the many variables that affect crop yields, but are rarely studied in total. [18,30]

References available upon Request; Contact Joe Engler at 360-604-2561.