

Draft Compatibility Determination for Cooperative Farming on Crab Orchard National Wildlife Refuge

Refuge Use Category

Agriculture, Aquaculture, and Silviculture

Refuge Use Type(s)

Farming (cooperative)

Refuge

Crab Orchard National Wildlife Refuge

Refuge Purpose(s) and Establishing and Acquisition Authority(ies)

Crab Orchard National Wildlife Refuge was established by Public Law 80-361 in 1947.

"... for the conservation of wildlife, and for the development of the agricultural, recreational, industrial, and related purposes..." (61 Stat. 770, dated Aug. 5, 1947)

"... suitable for - (1) incidental fish and wildlife oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species..." (16 U.S.C. § 460k-1)

"...the Secretary...may accept and use... real... property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors..." (16 U.S.C. § 460k-2 (Refuge Recreation Act (16 U.S.C. § 460k-460k-4), as amended))

"...to conserve (A) fish or wildlife which are listed as endangered or threatened species...or (B) plants..." (16 U.S.C. § 1534 (Endangered Species Act of 1973)

"... to secure for the American people of present and future generations the benefits of an enduring resource of wilderness...wilderness areas... shall be administered for the use and enjoyment of the American people in such manner as will leave them unimpaired for future use and enjoyment as wilderness, and so as to provide for the protection of these areas, the preservation of their wilderness character, and for the gathering and dissemination of information regarding their use and enjoyment as wilderness..." 16 U.S.C. § 1131 (Wilderness Act)

National Wildlife Refuge System Mission

The mission of the National Wildlife Refuge System (Refuge System) is to administer a national network of lands and waters for the conservation, management, and where

appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans (Pub. L. 105-57, 111 Stat. 1252).

Description of Use

Is this an existing use?

Yes. This compatibility determination reviews and replaces the October 31, 2016, compatibility determination for cooperative farming. Cooperative farming is used to meet the refuge's legislated purpose of agriculture. This use is being reevaluated because conditions under which the use is permitted have changed to include the use of genetically modified crops as part of the refuge's agricultural program and cooperative farming practices. The refuge agriculture program may include a combination of conventional and genetically modified crops as part of the refuge's integrated pest management. The cooperative farming use has been conducted on the refuge since the refuge was established on August 5, 1947. The use was evaluated in conjunction with and is consistent with the environmental impact statement and comprehensive conservation plan (USFWS 2007), the environmental assessment for the Crab Orchard National Wildlife Refuge agriculture program (USFWS 2018a) and the 2022 draft environmental assessment of the row crop program at Crab Orchard National Wildlife Refuge (in preparation) and was previously found to be compatible (USFWS 2016).

What is the use?

Farming (cooperative) is defined as the practice of agriculture, especially mechanically disturbing the soil and artificially introducing seeds or other plant parts periodically to produce stands of plants, for use primarily as food by wildlife, domestic animals or humans. This includes water delivery, irrigation and drainage. Cooperative farming is a refuge management economic use.

Is the use a priority public use?

No

Where would the use be conducted?

Approximately 4,000 acres of crop fields or 8.8% of the total refuge acreage (Figure 1) may be farmed across the northern half of the refuge, north of Grassy Road. Actual acreage may vary among years and is dependent on an assortment of factors that may influence the program such as weather or the discovery of unexploded ordnances. Cooperative farming will only occur in areas that have been previously farmed or disturbed.

A wide variety of resident and migratory wildlife and a broad suite of plants occur in or use these fields. The refuge has historically used agriculture to provide food and habitat for ducks, geese and other waterbirds during migration and wintering periods. Cooperative farmers may store equipment, such as tractor, combines, grain trucks, etc. on a temporary basis throughout the farming season (usually April-November). Equipment is generally stored within fields, usually at the field entrances, although there are several locations where equipment is staged temporarily. Other examples include roadside pull offs in the closed areas and abandoned or unused concrete or gravel pads distributed throughout the historic Illinois Ordnance Plant area.

No cooperative farming will occur in the wilderness area on Crab Orchard National Wildlife Refuge, and the wilderness area is located over two miles from the nearest row crop field.

When would the use be conducted?

The use would occur throughout the farming season, typically April through November, with special use permits issued to allow farmers access. Occasionally, weather, moisture content, flooding and plant maturity issues may extend the use into December, and at times, winter seeding and/or fertilization may be authorized. Although the refuge strives to provide no-till farming, some sites may be tilled prior to spring planting. Tilling requires 1-2 days per site. Some sites may also be treated with herbicide prior to planting requiring approximately less than one day per site. Planting is usually completed in one day or less on any individual site. Crops will grow continuously after planting until harvest. Crop harvesting usually takes 1-2 days and occurs in late September through early December.

Active farming practices will only occur during daylight hours (sunrise to sunset) unless specified in a special use permit.

How would the use be conducted?

Cooperative farming is the term used for agricultural cropping activities done by local farmers as directed and authorized by the refuge. Cooperators are selected through a bid process. Cooperating farmers use large, specialized machinery such as tractors, combines, tillage implements, spray equipment, seeders, mowers, hay rakes, hay balers, fertilizer buggies, hay airplanes and occasionally helicopters. Standard commercial agricultural practices like tilling, planting, fertilizing, applying herbicides and harvesting with an emphasis on no-till farming practices.

The refuge requires prior approval and a completed and approved pesticide use proposal before cooperators can use seed treatments or pesticides of any kind. All use of chemical pesticides on U.S. Fish and Wildlife Service lands and facilities must conform to Environmental Protection Agency regulations, chemical labels,

Material Safety Sheets and agency and Department of the Interior policies related to pest management and pesticide use (DOI 2007; USFWS 2009, 2010). Where applicable the refuge adheres to the Region 3 Farm Program Guidance (USFWS 2014b), the Region 3 National Wildlife Refuge System Pesticide Use Policy and Guidance (USFWS 2018c) and the U.S. Fish and Wildlife Service Headquarters Guidance for Pesticide Use Proposals (2013).

The Region 3 Farm Program Guidance (USFWS 2014b) dictates best management practices and monitoring protocols when utilizing seed treatments. Insecticide and fungicide seed treatments require review and approval from headquarters unless the region ensures that all treated seed will be incorporated beneath the soil surface and no treated seeds remain on the ground. The Region 3 National Wildlife Refuge System Pesticide Use Policy and Guidance (USFWS 2018c) and the U.S. Fish and Wildlife Service Integrated Pest Management Policy (USFWS 2010) outlines the process for pesticide use proposals. The refuge does not allow the use of neonicotinoid treated seeds. Some other types of treated seeds may be allowed on the refuge. If approved the cooperators would need to lightly disk or cultipack the field following planting of treated seeds in order to ensure seeds within the planting furrows are completely covered by soil.

All crop seeds treated with fungicides or other non-neonicotinoid chemicals must be planted (incorporated) beneath the soil surface due to having a high toxicity to birds and other wildlife. No residue seeds can be left above ground. Any treated seeds that are spilled and/or left above ground at the time of planting must be picked-up and removed or replanted underground immediately. The refuge must conduct random field spot checks at the time in which these treated seeds are planted to ensure that the treated seeds are planted beneath the soil surface. If using treated seed, the refuge must complete a Region 3 Treated Seed Incorporation Monitoring Statement. This statement documents that all treated seed has been incorporated beneath the soil surface, thus adhering to Service policy. Seed treatment chemicals cannot be mixed or applied to the crop seeds on refuge or district lands, and seeds must be treated off-site. Best management practices are outlined and attached annually to the Section 7 analysis of the Endangered Species Act (USFWS 2022c) and stored within the pesticide use proposal database. These best management practices are specific to each pesticide and are provided to cooperators every year with their special use permit.

Cooperative farming is done under the terms of a special use permit issued by the refuge manager. The terms of the special use permit ensure that all current agency and refuge policies are followed. The cooperating farmer agrees to the terms of the special use permit which specifies field locations, crop rotations, pre-approved herbicides, government shares and acreage of agricultural crops that must be planted and harvested. If the special use permit covers more than one year, the terms, such as crop type, acreage, herbicide use, and other conditions, may be modified by the

refuge. Changes in the special use permit must be made prior to planting season by an addendum, which is attached to, and becomes part of, the special use permit. The refuge receives a share of the crop and/or the cooperating farmer makes a direct payment to the United States Government. Stipulations of the special use permit require cooperating farmers to maintain recommended soil fertility and pH levels. Monitoring of soil fertility and pH is completed using soil sampling and soil tests conducted by the cooperating farmers or their contracted soil sampling service provider. Occasionally and on a limited basis, if certain crops such as corn are left in the field over winter, surplus corn may be harvested in the spring.

Currently the refuge has seven cooperating farmers who farm about 4,000 acres (8.8% of the refuge). The number of cooperators may be reduced at the next bid cycle to provide a higher quality opportunity to cooperators and to decrease the administrative burden of the program. The current three-year rotation is corn, soybeans, rest. In the future, additional, more diverse crop rotations may be instituted as needed to address issues involving wildlife depredation, pests and/or disease and herbicide resistant weeds such as waterhemp.

Genetically modified crops will be proposed by cooperators during the bid process and annually during development of crop rotation agreements. Proposed genetically modified crops will be scrutinized and analyzed by refuge staff. If a proposed crop is found to be suitable for planting and use, a pesticide use proposal and associated Intra-agency Section 7 biological evaluation will be developed for the pesticides used. These must be approved prior to their use on the refuge. Best management practices will also be developed for each herbicide and genetically modified crop approved for use on refuge. Special conditions will be included within special use permits that require cooperators to diversify the crop rotation such that a given genetically modified crop will only be used once per 5-year contract period in each crop field. This ensures the diversity of crops and provides for herbicide use that incorporates different chemical modes of action among years. Working within these parameters, there is reduced likelihood of continued chemical resistant weed development at the refuge and an increased likelihood of successful treatment and a reduction of existing resistant weed populations.

Rest years, although currently required, may be discontinued due to the issues with herbicide resistant weed proliferation and reduced need to supplement foods for Canada geese. In the fall, cooperating farmers are currently required to cut the vegetation grown in the rest year fields to provide suitable conditions for loafing and browsing by migrating and wintering waterfowl. In the future, fall mowing may be excluded from all or certain fields. This will provide habitat for migrating and wintering grassland birds and resident wildlife in upland fields that are not located adjacent to wetlands. Additionally, bottomland fields that are flooded for migrating and wintering waterfowl may not be mowed to provide food for those species in the form of annual moist soil plant seeds.

Why is this use being proposed or reevaluated?

Cooperative farming is an existing use on Crab Orchard National Wildlife Refuge and the existing cooperative farming compatibility determination (USFWS 2016) is being reevaluated to include the use of genetically modified crops in the refuge agriculture program as part of an integrated pest management strategy. The use of genetically modified crops will help mitigate the exponential increase in herbicide resistant weeds across refuge farm fields as well as provide a sustainable and competitive cooperative farming program that meets the refuge's legislated purposes. Use of genetically modified crops was previously allowed on the refuge but ceased in 2012 before they were phased out nationally in 2014 (USFWS 2014a). National refuge system guidance now allows the use of genetically modified crops on national wildlife refuges (USFWS 2018b) on a case-by-case basis if determined to be essential to fulfilling the purposes of the refuge and/or meet habitat objectives. With a proliferation of invasive and undesirable species, the refuge has noticed consistently low crop yields for wildlife food sources and increased use of potentially harmful pesticides (USFWS 2022a). To improve the ability to successfully fulfill the agricultural purpose of Crab Orchard National Wildlife Refuge and to meet wildlife management objectives, the refuge is proposing to again allow for genetically modified crops in the agricultural program. The refuge has prepared a draft environmental assessment (USFWS 2022a) with a preferred alternative of allowing cooperative farmers to resume use of genetically modified crops on the refuge in appropriate situations as needed to meet refuge objectives.

National Wildlife Refuges of the United States Fish and Wildlife Service have historically provided foraging habitat and sanctuary for the millions of waterfowl that migrate through and winter in North America. Many refuges use agriculture as a natural resource management tool to produce high-energy food sources for meeting waterfowl, migratory bird and other wildlife objectives, to control invasive species, and maintain maximum early-succession natural vegetation communities. Row crop agriculture is used on less than 10% of Crab Orchard National Wildlife Refuge lands to support these objectives. The refuge does not have the capacity to produce row crops utilizing refuge staff and, thus, cooperators have been the most efficient and effective way to meet the refuge's agricultural purpose (USFWS 2022a).

Availability of Resources

Adequate resources, including financial, personnel, facilities and other infrastructure already exist on the refuge and can be provided by the agency to properly develop, operate and maintain cooperative farming in a way that will not materially interfere with or detract from fulfillment of the refuge purpose(s) and the National Wildlife

Refuge System mission. The staff time for administration of the cooperative farming program as described here is already committed and available. The time needed to coordinate issuance and oversight of the needed special use permits is significant but within existing refuge resources. Typically, the cooperative farming operations are administered by the refuge biology staff. Cooperating farmers use the existing network of state, county and refuge roads to access the fields. Occasionally the refuge does work to facilitate access, such as road improvement, tree trimming, culvert replacement or bridge repair. The refuge expends about \$110,000 annually in labor and administrative costs, monitoring and maintenance activities related to cooperative farming. Funds necessary to administer this program are normally available through refuge staffing, operations accounts, and the refuge's industrial and agricultural account.

During the bid process, applicants can propose off-setting revenues in the form of supplies and services that will be included as part of their bid, they may choose to bid only with a cash rent payment or a combination of the two. The refuge receives payment in the form of a check and/or by provision of the agreed upon supplies and services. Examples of supplies and services may include but are not limited to, roadside mowing, roadside tree trimming, chemical sidecuts, adding gravel to access routes, replacing degraded infrastructure, such as road culverts, clearing of invasive trees, shrubs, or other vegetation encroaching on field edges, rehabilitation of a given field, interseeding, reseeding, repair of road washouts, planting and maintenance of refuge crop shares for wildlife and maintenance or repair of field and access route drainage systems. Although each year produces differing suites of problems and program needs, estimated expenditures and off-setting revenues are summarized in Table 1. Next page.

Table 1. 2021 Estimated Costs to Administer and Manage Cooperative Farming

| Category and Itemization | One-time Cost | Recurring Annual Expenses |
|---|----------------------|----------------------------------|
| Develop farm plan, rotation agreements, bid packages, special use permits, pesticide use proposals, National Environmental Policy Act documents, etc. | - | \$20,000 |
| Maintain facilities | - | \$25,000 |
| Conduct compliance checks and monitoring | - | \$5,000 |
| Staff time (law enforcement, administration and management) | - | \$60,000 |
| Total one-time expenses | - | - |
| Total recurring annual expenses | - | \$110,000 |
| Offsetting revenues | - | -\$210,000 |
| Total expenses | - | \$100,000 |

Anticipated Impacts of the Use

The agriculture program on the refuge was found to have no significant impact on the human environment (USFWS 2018a) during a 2018 environmental review that evaluated modifications to management strategies outlined in the refuge’s comprehensive conservation plan (USFWS 2007). Cooperative farming was recently reevaluated in the Crab Orchard National Wildlife Refuge row crop program environmental assessment (USFWS 2022a). Potential impacts of row-crop farming on the refuge include those associated with conventional row-crop farming and with row-crop farming using genetically modified crops. The effect on refuge resources can vary substantially based on the crop-type and agricultural practices used. The analyses below are supplemental to the impact assessments described in the previously referenced refuge documents. An additional evaluation of impacts can be found in the row crop program environmental assessment (USFWS 2022a).

The effects and impacts of the proposed use to refuge resources, whether adverse or beneficial, are those that are reasonably foreseeable and have a reasonably close causal relationship to the proposed use. This compatibility determination includes the written analyses of the environmental consequences on a resource only when the

impacts on that resource could be more than negligible and therefore considered an “affected resource” (Table 2). Floodplains, wilderness areas and cultural resources will not be more than negligibly impacted by the action.

Potential impacts of a proposed use on the refuge's purpose(s) and the Refuge System mission

Cooperative farming will result in both positive and negative impacts to resident and migratory wildlife. These impacts are described in the following documents:

- Crab Orchard National Wildlife Refuge: Comprehensive conservation plan and environmental impact statement (USFWS 2007),
- Crab Orchard National Wildlife Refuge compatibility determination for cooperative farming (USFWS 2016),
- Environmental assessment for the Crab Orchard National Wildlife Refuge agriculture program (USFWS 2018a),
- Environmental assessment of row crop program at Crab Orchard National Wildlife Refuge (USFWS 2022a),
- Intra-agency Section 7 biological evaluation for the environmental assessment of row crop program at Crab Orchard National Wildlife Refuge (USFWS 2022b),
- Intra-agency Section 7 biological evaluation for the use of agricultural pesticides at Crab Orchard National Wildlife Refuge (USFWS 2022c).

Short-term Impacts

Wildlife and Aquatic Species

Cooperative farming will result in both positive and negative impacts to resident and migratory wildlife. Farming can help meet the refuge purposes and objectives by creating habitat for grassland species, providing food for resident and migrating waterfowl, managing moist-soil wetlands and controlling invasive species. The refuge gives greater emphasis to resilience and adaptive capacity rather than seeking to maximize efficiency of agricultural production (USFWS 2022a). Where possible, the refuge will implement conservation tillage and no-till agriculture practices to maximize the benefits of agriculture on the landscape and to wildlife but may use conventional tillage in some instances depending on the type and availability of crops.

The use of agricultural crops to benefit waterfowl has been well documented in the scientific literature (Bellrose 1980; Baldassarre and Bolen 1984; Delnicki and Reinecke 1986; Ringelman 1990; Combs and Fredrickson 1996; Heitmeyer 2006) and can be especially beneficial where it may be difficult to restore native vegetation.

Supplementary, planted foods can be valuable for a wide variety of waterfowl and other game and nongame species (Donalby et al. 2003) depending on the availability of

native foods in the area. Foods that are high in carbohydrates, such as corn, rice, soybean, millet and milo, can provide the energy needed for ducks wintering on the refuge so that they arrive on the breeding grounds in good condition (Ringelman 1990; Checkett et al. 2002; Kaminski et al. 2003). Agricultural practices, including crop production, provide an efficient and practical way to meet waterfowl objectives on a limited land base, control invasive species and set back succession to benefit waterfowl and other wildlife (Gray et al. 2013). The refuge currently has waterfowl objectives of providing approximately 6.4 million use days in the comprehensive conservation plan (USFWS 2007).

The use of wildlife-friendly farming such as cover cropping, leaving crops unharvested, no-till, conservation tillage and low-tillage farming can benefit resident, migratory and game species when compared to conventional farming (Koford and Best 1996). Fallow fields and planted cover crops provide habitat for grassland birds, pollinators, deer, rabbits, turkeys and other species.

Disturbance caused by farming equipment, or the alteration of habitat could temporarily displace wildlife. Conventional tillage can increase soil disturbance, erosion and residual cover, which results in decreased habitat and food available to insectivorous birds (USFWS 2022a). Compared to conventional tillage, no-till and conservation tillage may offer better habitat resources for birds (Holland 2004) because crop residue provides nesting cover and foraging substrate (Field et al. 2007). No-till and conservation tillage systems would promote native earthworm populations (House and Parmelee 1985) and enhance nocturnal wintering habitat for American woodcock (Berdeen and Krementz 1998).

Most mammals that occur in crop fields feed on the crops after maturity and may use fields during the growing season for forage or cover. The high-energy crops left for wildlife on refuges provide an important food source for species such as white-tailed deer, raccoons and other mammal species. Conventional tillage can decrease residual cover and potential habitat for small mammals and the insects they prey upon. The increased crop residue from no-till and conservation tillage can provide habitat for insects and other arthropods, which increases prey for mammalian insect predators (APHIS 2013a). Regional and refuge best management practices, agency policies and agricultural practices guidance will be followed to avoid negative effects to wildlife.

The effect of agriculture on reptiles and amphibians depends on the type of tillage, pesticide use and habitat availability and structure. Tillage that is more intensive can reduce wildlife habitat and contribute to increased sedimentation and transport of pollutants in runoff to nearby surface waters affecting water quality and amphibian and reptile habitat. No-till and conservation tillage can increase residual cover, which will increase potential habitat for amphibians, reptiles and insect prey. Fewer

agricultural inputs in the form of pesticide applications and less frequent mechanical disturbance could also decrease potential negative effects on these populations and will be implemented where possible to benefit reptile and amphibian species.

Beneficial insect species may be impacted by broad-spectrum insecticides, but these impacts are likely short term and localized and will be minimized by following agency best management practices and integrated pest management.

Aquatic ecosystems potentially impacted by agricultural activities include water bodies adjacent to or downstream from agriculture fields including ponds, lakes, stream, rivers, moist soil units, marshes and ephemeral wetlands. Run-off from crop fields carrying pesticides, excess soil nutrients and sediments could adversely affect aquatic wildlife such as freshwater fish, invertebrates and amphibians, however, additional research suggests that agricultural lands may support diverse and compositionally different aquatic invertebrate communities when compared to nearby urbanized areas (Lenat and Crawford 1994, Wang et al. 2000, Stepenuck et al. 2002). The effects of agriculture on aquatic ecosystems and species will be minimized using agency best management practices and best management practices associated with both non-genetically modified and genetically modified crops (USFWS 2022a). The refuge requires 25 to 250-foot spray buffers from roads, ditches and surface water along with vegetated filter borders in and around crop fields to mitigate and reduce non-target effects of pesticide use. Crab Orchard National Wildlife Refuge has adopted buffer requirement best management practices that are more conservative than Environmental Protection Agency chemical application label instructions. Using conservation tillage and no-till practices where feasible can reduce soil erosion and disturbance and increase crop residue, which benefits aquatic species. The refuge is also exploring alternatives to reduce the number and amount of pesticides used in agricultural practices to minimize the potential for ecological harm and reduce potential for impacts to surface and subsurface waters (USFWS 2022a).

Threatened and Endangered Species and Other Special Status Species

Crab Orchard National Wildlife Refuge has already completed consultation requirements under Section 7 of the Endangered Species Act regarding annual pesticide use on the refuge and the proposal to use genetically modified crops as part of the cooperative farming program. Both consultations have resulted in determinations of “no effect” to listed species or “not likely to adversely affect” listed species (USFWS 2022b, 2022c). The information below summarizes the analyses and concurrence of the U.S. Fish and Wildlife Service ecological services evaluation. The refuge engaged in development of Section 7 documentation for the use of GMCs in agricultural practices on the refuge for all species except the tricolored bat. The

refuge is currently in consultation regarding tricolored bats, and the process will be completed and considered in the Service's decision on this proposed action.

Gray bat, Indiana bat, northern long-eared bat and whooping crane are federally listed species that can be found on the refuge. Tricolored bat is proposed to be listed as endangered and the Monarch butterfly is a candidate species that also occur within Crab Orchard National Wildlife Refuge.

Multiple primary Indiana bat maternity roosts were located and identified southeast of the intersection of Ogden Road and Highway 148. Other maternity roosts are expected to exist in forested areas with high prevalence of greater than 5-inch diameter at breast height trees. There are no known tricolored, gray bat, or Northern long-eared bat summer maternity roosts on the refuge, but these bat species occasionally fly over crop fields on refuge lands. All bat species will mostly use aquatic habitats to forage on insects but may also forage in the understory of forested areas and over fields or other open areas during evening hours when insect production is high.

Best management practices and label instructions will be followed to minimize and mitigate the potential indirect effects of chemical use on listed or proposed bat species. Where label and best management practice recommendations do not match, the more restrictive approach will be followed. None of the application routes for infrastructure maintenance, crop fields or habitat management activities are located near the known Indiana bat maternity roosts. Indiana, gray, tricolored and Northern long-eared bats would not likely be negatively impacted by the proposed actions.

To reduce the potential impacts to listed bat species, herbicides will be applied according to their labels and best management practices including those outlined in the programmatic biological opinion for the Crab Orchard National Wildlife Refuge 2006 comprehensive conservation plan (USFWS 2007) and within annual intra-agency Section 7 of the Endangered Species Act biological evaluations for pesticides (USFWS 2022b, 2022c). Herbicides will generally be applied between April and December. There may be temporary reduction or shifts in insect production in areas after an herbicide treatment due to changes in vegetation structure. Any short-term reduction in insect populations due to row cropping, habitat management or maintenance operations will be offset by additional suitable foraging habitat available on the refuge.

Pesticides will be used to control invasive species, maintain infrastructure and crops and in habitat management situations as needed across the farm units throughout the year. Best management practices for farming on the refuge include use of no-tillage, crop rotations, pesticide spraying rotations and pesticide no-spray buffer distances to surface water. Only insects that are having a direct, negative impact on crops or

facilities will be treated. Pesticide applications will occur in low winds to prevent drift into forested areas and only during daylight hours. No treatment will occur from dusk to sunrise to minimize the impact to foraging bats.

As part of the environmental review process, the Animal and Plant Health Inspection Service thoroughly reviews all genetically modified crop product information and data to inform an agency's effects analysis of the Endangered Species Act in its as well as the agency's Endangered Species Act biological assessment of actions proposed under the National Environment Policy Act. The Animal and Plant Health Inspection Service completed environmental assessments of the use of genetically modified crops on threatened and endangered species, species proposed for listing, designated critical habitat and habitat proposed for designation and has not identified any stressor that could affect the reproduction, numbers, distribution, or critical habitat (APHIS 2007, 2013a, 2013b, 2014a, 2014b, 2016). Genetically modified crops, if proposed in a cooperator's rotation, will be analyzed along with their associated pesticides, and a determination made if they are suitable for use on Crab Orchard National Wildlife Refuge. If they are found suitable for use, best management practices, a Section 7 consultation, and pesticide use proposals will be developed and approved prior to their use. Once determinations and approvals are in place, a list of pre-approved genetically modified crops may be provided to the cooperators.

Monarch butterflies have been documented widely across the entire refuge. Use of herbicides for management of invasive, noxious and crop pest species may have both beneficial and adverse effects on monarch butterflies. Invasive plants can degrade monarch habitat by displacing valuable nectar plants and milkweed, so use of herbicides has the potential to benefit this type of habitat. Studies show most monarchs produced in the Midwest originate in cornfields or other agricultural habitats with heavy use of milkweeds in corn and soybean fields throughout the breeding season (Oberhauser et al 2001). Their research suggests that per plant densities of monarchs in agricultural fields is equal to or greater than in nonagricultural habitats, and agricultural fields produce approximately 75 times more monarchs than other habitats. The extensive corn, soybean and associated edge habitats, in combination with the lack of neonicotinoid use at the refuge, offers an immense potential to benefit the species.

On the other hand, nonselective herbicides have non-target effects that can reduce the quality of habitat for this species, by removing some native forbs, especially milkweeds. Areas treated with herbicide are a small portion across the refuge landscape however, and the adverse effects would not be widespread enough to jeopardize this species. In addition, impacts can be reduced by implementing best management practices that have been developed to reduce or eliminate the potentials for herbicide exposure and adverse effects due to herbicide treatments such as limiting use of non-selective herbicides, using herbicides as efficiently as

possible to limit the amount used, reducing off site movement and limiting direct exposure when possible (USFWS 2022b, 2022c).

There is continuing concern that increased use of herbicides reduces larval food plants for some butterflies, such as milkweed which supports monarch caterpillars. The National Academies of Sciences, Engineering and Medicine Committee concluded that studies and analyses at the time of their 2016 publication did not demonstrate that the reduction of milkweed by glyphosate, a non-selective herbicide, caused monarch decline. The committee went further, however, to state that the cause-effect relationship between lower abundance of milkweed and the decline of overwintering monarchs remains uncertain. Regardless, the National Academies of Sciences, Engineering and Medicine Committee recognized a continuing lack of scientific consensus on whether there is no association between monarch declines and increased use of glyphosate. Regardless of the debate regarding the role of glyphosate in supporting milkweed and other larval food plants for butterflies, the refuge requires 50-foot spray buffers (or larger) and other vegetated filter borders in and around crop fields to mitigate any unknown problems with glyphosate use.

There are eight known bald eagle nests on the refuge. Although the bald eagle has been de-listed, habitat management activities will be conducted in a manner conducive to the National Bald Eagle Management Guidelines. None of the application routes are within the nest protection buffer zones of 330 feet. Most row cropping activities occur outside of the sensitive period for bald eagle nesting activities.

Habitat and Vegetation

Agricultural practices can potentially affect natural habitat resources and acreage on a refuge in a variety of ways. They can be used to restore native grasslands, manage moist-soil units and control invasive species.

Agriculture has increased structural, species and habitat diversity across the refuge. The diverse grasslands are managed for their inherent ecological integrity and diversity to benefit grassland-dependent wildlife, such as Henslow's sparrows, northern bobwhite, grasshopper sparrows, dickcissels, Eastern meadowlarks and monarch butterflies and to protect endemic species (USFWS 2022a). Fields of introduced cool-season grasses and grass-legume mixtures, such as fescue-clover, are considered important for some non-game, grassland specialist bird species like grasshopper sparrows and Eastern meadowlarks (Herkert et al. 1996; Scott and Lima 2004).

Moist soil units, floodable row crop fields and other seasonally flooded impoundments produce an abundance of seeds and invertebrates as food sources for resident and migratory waterbirds and other wetland dependent species. When

conditions are too dry, grain crops such as corn, milo or millet may be planted by cooperative farming to provide food for wildlife and prevent the growth of plants that are less beneficial (i.e., cocklebur; USFWS 2022a). The refuge also uses agriculture as a management strategy in moist-soil units to control invasive plants, set back plant succession and improve seed production as authorized by the 2018 environmental assessment for the Crab Orchard National Wildlife Refuge agriculture program (USFWS 2018a).

Geology and Soils

Current agronomic practices associated with conventional and genetically modified crop production, such as tillage, agricultural inputs (i.e., weed management and soil supplication), crop rotations and cover crops have the potential to impact soil quality. Tillage practices and agronomic inputs may affect soil fertility and microorganisms, increase erosion and cause off-site transport of sediments into aquatic ecosystems consequently affecting soil quality. Various agricultural practices affect the biological, physical and chemical properties of soil differently, including soil fertility and sustainable use (USFWS 2022a).

Tillage practices vary based on the types of crops that are planted. Conventional tillage practices can cause soil erosion, soil compaction, reduction in soil bacteria and reduction in crop residue (Towery and Werblow 2010). No-till and conservation tillage methods reduce erosion and runoff to preserve soil organic matter, beneficial biota and nutrients; improve water-retention capacity and require less time and labor to prepare a field for planting (Roger-Estrade et al. 2010, He et al. 2011, Sharma and Abrol 2012, Van Eerd et al. 2014). No-till and conservation tillage also may increase soil organic matter and plant residues. Where possible, no-till and conservation tillage will be used on the refuge, and agency best management practices will be used to minimize the effects of conventional tilling practices.

Air Quality

Agronomic practices such as tillage, pesticide applications (i.e., drift and diffusion), fossil fuel burning equipment and nitrous oxide emissions from nitrogen fertilizer have the potential to affect air quality on the refuge (USFWS 2022a). The primary sources that affect air quality from crop production include soil particulates (i.e., dust) from tillage and wind erosion, exhaust from farming equipment and spraying of pesticides (Madden et al. 2009). Adhering to Environmental Protection Agency label restrictions, agency best management practices and reducing tillage where possible will help minimize the impact of farming on air quality.

Water Quality

Agronomic practices associated with crop production that have potential to impact water quantity and quality include tillage, agricultural inputs and irrigation.

Conventional tillage has the potential to increase sediment input into streams and surface runoff and increase the amplitude of stream hydrographs (Towery and Werblow 2010) and can result in decreased water quality. Pesticide application used with conventional crops has the potential to leach into groundwater. Following Environmental Protection Agency label restrictions and agency best management practices along with increasing buffers can help mitigate and protect water quality affected by conventional tillage (USFWS 2022a). Using genetically modified crops can also reduce the total volume of pesticides used in a farming operation. These crops are generally paired with use of pesticides with much lower toxicities and pose much lower risks of ecological harm.

A diverse rotation of conventional no-till crops and no-till genetically modified crops, when combined with cover cropping and adequate buffers, can help reduce the effects of agriculture on water quality. Compared to conventional tillage, no-till and conservation tillage reduces the sediment input into streams, decreases surface runoff, reduces the use of agricultural chemical and fertilizers, decreases irrigation water use and reduces the amplitude of stream hydrographs (Towery and Werblow 2010, Shipitalo and Owens 2011). Conservation tillage and no-till systems in which herbicide-tolerant crops are planted can help increase water quality consistent with the goals and objectives outlined in the refuge's comprehensive conservation plan (USFWS 2007). No-till and conservation tillage will be used on the refuge, when possible, to reduce the impacts of conventional tillage practices.

Visitor Use and Experience

Crab Orchard National Wildlife Refuge also has a legislated recreation purpose and receives about one million visitors per year for a variety of outdoor activities.

Occurrence of concentrated populations of waterfowl and other wildlife species on the refuge makes it a popular destination for wildlife dependent recreation enthusiasts. The refuge is also a popular destination for hunters and anglers. Crop fields are spread throughout the northern 20,000-acre former Illinois ordnance plant. This area is also the location of most public use areas, and many crop fields are immediately adjacent to high use public areas such as trails, roads used for biking and running, hunting areas, fishing ponds or lakes and the auto tour.

During pesticide application, some of these high-use areas need to be temporarily closed under restricted-entry intervals. Restricted-entry intervals are the time immediately after a pesticide application when entry into the treated area is

restricted per federal law as outlined within each pesticide product's label.

Cultural Resources

Cooperative farming will only occur in areas that have been previously farmed or disturbed, reducing the likelihood that cultural resources will be impacted. Since most of the agricultural activities have resulted in ongoing ground disturbance, any additional effects to cultural or historic resources are likely to be minor or non-existent. If farming is proposed in any new areas, then clearance will be obtained from the Regional Historic Preservation Officer to confirm negligible to no impacts on cultural resources prior to any action.

Refuge Management and Operations

The cost of administering the refuge's agriculture program comes out of the refuge's annual budget. Maintenance and biology staff annually address infrastructure issues, road washouts, and levee repairs; however, the row crop cooperators provide in-kind services to address the majority of issues that arise annually. The refuge has a cash bid process for each agricultural unit where in-kind services can be completed in lieu of cash payment. Approximately 40% of annual roadside mowing is conducted by cooperators and is priced into existing bids for each unit.

Staff regularly deal with beaver dams and beaver control within streams or ponds affecting row crop fields. Compliance checks on cooperator operations, such as testing for presence of genetically modified traits in row crops, ensuring herbicide applications are approved and follow best management practices and other policies and verifying crops and cover crops are planted and harvested in accordance with established agreements all require substantial time and involvement from multiple staff members. The refuge agricultural program as presented here is within current refuge management and operations capability.

Socioeconomics

Cooperative farming partnerships provide substantial funding to local economies while helping the refuge meet its objectives and accomplish the agricultural and wildlife purposes for which it was established. The refuge does not have an objective of profiting from row cropping but needs to balance revenue with the costs of running the program. Additionally, cooperators have an inherent need to produce a profit from their efforts.

The row crop program on the refuge provided 5.29% of the available row crop acreage for Williamson County in 2017 (USDA 2017). This generated approximately \$1,301,391.17 annually to the local economy. Annual rent payments from row crop

cooperators totaled \$186,410.39 in 2021. In 2007, the economic value of crops produced on the refuge was more than ten percent of the total economic value of all Williamson County crops. Sustaining refuge partnerships with local cooperative farmers bolsters the local economy, provides an economically efficient means of natural resource management and enables the refuge to accomplish a broad assortment of wildlife management objectives.

Additionally, the refuge is an attraction for anglers, hunters, campers, boaters, bird watchers and other outdoor enthusiasts. Refuge visitors spend money on a wide variety of goods and services in local communities. Trip-related expenditures may include expenses for food, lodging and transportation. According to research on economic effects, hunting on the refuge resulted in \$684,000 in hunting expenditures for both travel-related goods and services and activity related equipment purchases (USFWS 2019).

Long-term Impacts

Wildlife and Aquatic Species

Cooperative farming will result in long-term impacts to wildlife and aquatic species. Farming will provide positive benefits to a variety of species. Resident game species, such as deer, raccoon, squirrel, turkey and dove are particularly benefited over the long-term by agriculture. Increased food availability that occurs with row cropping can lead to increased body condition of reproductively aged wildlife and increase overall fecundity rates. Agricultural crops can also benefit waterfowl and other waterbirds over the long term. Many species exhibit high levels of site fidelity when food resources are abundant and available over consecutive years. Foods that are high in carbohydrates, such as corn, rice, soybean, millet and milo, in addition to native plant sources, can provide the energy needed for ducks wintering and migrating through the refuge so that they arrive on the breeding grounds in good condition (Ringelman 1990; Checkett et al. 2002; Kaminski et al. 2003). Long-term positive impacts may include increased fecundity and survival of ducks, and other waterbirds on their breeding grounds. This could lead to increased populations over time of waterfowl or other waterbirds on both the refuge and breeding grounds.

Maintaining forest fragmented by agricultural fields can negatively affect forest interior species, especially forest interior birds. These effects have been minimized by the implementation of the comprehensive conservation plan (USFWS 2007). Approximately 616 acres of farm fields that fell within the boundaries of the forest blocks were reforested, either actively or through natural regeneration. Only three row crop fields currently exist within the contiguous forest blocks, at 17, 19, and 20

acres and totaling 56 acres. Two of those fields are at the edges of the forest blocks and do not contribute to fragmentation, with one field on the east forest block that does. The remainder of the landscape, outside of the 13,500-acre west forest block and the 1,700-acre east forest block, consists of highly fragmented habitats composed of forests, grasslands, wetlands, lakes, ponds, industrial, administrative, crop, hay, and recreational lands. Not all effects are negative though, as forest edge species benefit from these conditions in a mosaic landscape (Terraube et al. 2016), which occurs throughout the northern half of the refuge.

Low or no-till farming practices leave much more residue in the field versus disking it under. This can have positive impacts over time that may prove beneficial for pollinator species, especially during the early season when these fields provide abundant spring and early summer nectar resources. Nesting cover and foraging substrate (Field et al. 2007) for birds are also better provided in low or no-till operations. No-till and conservation tillage systems would promote earthworm populations (House and Parmelee 1985) which can increase availability of this important food resource over time. Earthworms are important food resources for a broad array of birds, mammals, reptiles and amphibians, and could contribute to increases in population densities. The use of conventional tillage should decrease over time leading to increases in residual cover and potential habitat and cover for small mammals and their insect prey.

Long-term effects of increased nutrient and pesticide inputs into aquatic habitats are largely mitigated by adequate management of buffers surrounding water bodies, waterways and by following best management practices and chemical label instructions.

Threatened and Endangered Species and Other Special Status Species

No-long-term negative effects are expected to affect any threatened, endangered or other special status species. The long-term maintenance of open foraging areas surrounding wetlands associated with farm fields may benefit populations of Indiana and Northern long-eared bats.

Habitat and Vegetation

Agricultural practices can potentially affect natural habitat resources and acreage on a refuge in a variety of ways. They can be used to restore native grasslands, manage moist-soil units and control invasive species. The refuge's agricultural fields are widely distributed across the northern half of the refuge, contributing to widespread heterogeneity of habitats at the landscape scale. That heterogeneity can benefit a variety of plant species and the wildlife that use them. However, heterogeneity also

translates into fragmentation on the landscape. Long-term effects of fragmentation on the refuge include reduction in potential for certain area-sensitive species such as forest interior birds and some grassland birds. As previously described, Terraube et al. (2016) found that effects between open habitats and adjacent forest may support bird functional guilds producing important ecosystem services to forests in persistently fragmented landscapes. Additionally, some agricultural practices lead to habitat destruction that can be detrimental to nesting grassland birds such as haying or harvesting of small grain or cereal crops during the nesting period. Long-term repetitive actions, such as annual cutting of cover crops or permanent clover fields, may reduce certain bird populations while increasing others. The refuge's increased focus on provision and management of contiguous blocks of forest and grasslands provides mitigation for these effects.

Visitor Use and Experience

Long-term impacts to visitor use and experience are expected to be positive as a result of cooperative farming. Forage for wildlife provided by the cooperative farming program is projected to increase the abundance of game species and waterbirds on the refuge, which will provide higher quality opportunities for hunting, wildlife observation and wildlife photography.

Additional long-term positive impacts include a reduction in invasive and pest plant species. Cooperators assist the refuge in treating invasive species within farm units and accomplish treatments, especially surrounding roadsides and forested edges of fields, that would not be feasible without cooperator assistance. These treatments can increase the quality of visitor experiences and uses on the refuge in several ways. Reduction of invasive shrubs, such as autumn olive, surrounding fields, forested edges and along roadsides, increases visibility, is more aesthetically pleasing and increases access for activities such as wildlife viewing, photography and hunting.

Refuge Management and Operations

The refuge has a bid process where cooperative farmers can provide in-kind services in lieu of cash payment. Future bids will include a greater amount of in-kind services to address a backlog of deferred maintenance needs. Over the long-term, refuge management and operations should be positively impacted by cooperative farming because farmers will be able to assist with a greater proportion of maintenance needs. Cooperators depend on most of the approximate 520 miles of roads, access lanes, and levees that occur on the refuge to access agricultural fields. Fish and wildlife cooperative farming policy. With routine maintenance, mowing and other activities within farm units largely managed by cooperators, it is expected that refuge

staff will have more availability to address the backlog of infrastructure, maintenance and habitat management needs at the refuge. Region 3 issued farm program guidance in 2014 that defines in-kind services and outlines acceptable in-kind services. In-kind services are defined by Region 3 as “actions required of the permittee outside of the actual farming process of site preparation, planting, tending, and harvesting of crops that would typically be covered by station funds”. Acceptable in-kind services included, but were not limited to, maintenance of refuge farm fields such as mowing or spraying field edges to reduce noxious weeds, maintenance of farm roads and access points, and establishment of grass waterways, buffer strips, and fire breaks (USFWS 2014b).

Socioeconomics

Sustaining refuge partnerships with local cooperative farmers bolsters the local economy, provides an economically efficient means of natural resource management and enables the refuge to accomplish a broad assortment of wildlife management objectives over the long-term. Positive long-term impacts to local economies may be realized through increased opportunities and quality of recreational uses, such as hunting and wildlife observation, as a result of increased abundance waterfowl and game species on the refuge.

Public Review and Comment

The draft compatibility determination will be available for public review and comment for 30 days from September 26 to October 25, 2022. The public will be made aware of this comment opportunity through media releases sent to newspapers, radio, and television and through postings at local libraries, farm bureaus and agriculturally related retail outlets. A hard copy of this document will be posted at the Refuge Headquarters at 6987 Headquarters Road, Marion, IL 62959. It will be made available electronically on the refuge website, accessible at: https://www.fws.gov/refuge/crab_orchard/. Please let us know if you need the document in an alternative format. Concerns expressed during the public comment period will be addressed in the final.

Determination

Is the use compatible?

Yes

Stipulations Necessary to Ensure Compatibility

1. All cooperative farmers and special use permits will comply with the Region 3

- Farming Program Guidelines, including the prohibited use of neonicotinoid treated crop seeds. See number 7 regarding use of genetically modified crops.
2. Cooperating farmers will be subject to U.S. Fish and Wildlife Service policy and regulations regarding use of pesticides. Pesticide use is restricted by type and only the minimum amount necessary is to be applied.
 3. An approved pesticide use proposal is required before pesticide application and cooperating farmers are required to follow the associated best management practices outlined in annual pesticide Section 7 documents.
 4. The use of treated seeds must be pre-approved by the refuge via the pesticide use proposal process. Cooperators must adhere to regional and national policies and guidance documents.
 5. The cooperating farmer must provide an annual pesticide use report by December 31st.
 6. Farming activity must contribute to the established purposes of the refuge.
 7. The use of genetically modified crops will be permitted under the issuance of special use permits. Special conditions of special use permits will address unique local conditions and restrictions as applicable.
 8. Cooperative farmers will follow the best management practices and special conditions of the special use permit as established by the refuge.
 9. Planting and harvest activities are restricted to minimize disturbance of wildlife species.

Justification

Cooperative farming directly supports the agriculture and wildlife conservation purposes for which the refuge was established. It also indirectly supports the recreation purpose by providing wildlife observation and hunting opportunities. The stipulations outlined above would help ensure that the use is compatible at Crab Orchard National Wildlife Refuge. Cooperative farming, as outlined in this compatibility determination, would not conflict with the national policy to maintain the biological diversity, integrity and environmental health of the refuge. Based on available science and best professional judgement, the agency has determined that the cooperative farming at Crab Orchard National Wildlife Refuge, in accordance with the stipulations provided here, would not materially interfere with or detract from the fulfillment of the National Wildlife Refuge System mission or the purposes of the Crab Orchard National Wildlife Refuge. Rather, appropriate and compatible cooperative farming provides an opportunity at Crab Orchard National Wildlife Refuge through which the public can develop an appreciation for wildlife, wild lands and the refuge's agricultural purpose.

Signature of Determination

Refuge Manager Signature and Date

Signature of Concurrence

Assistant Regional Director Signature and Date

Mandatory Reevaluation Date

2032

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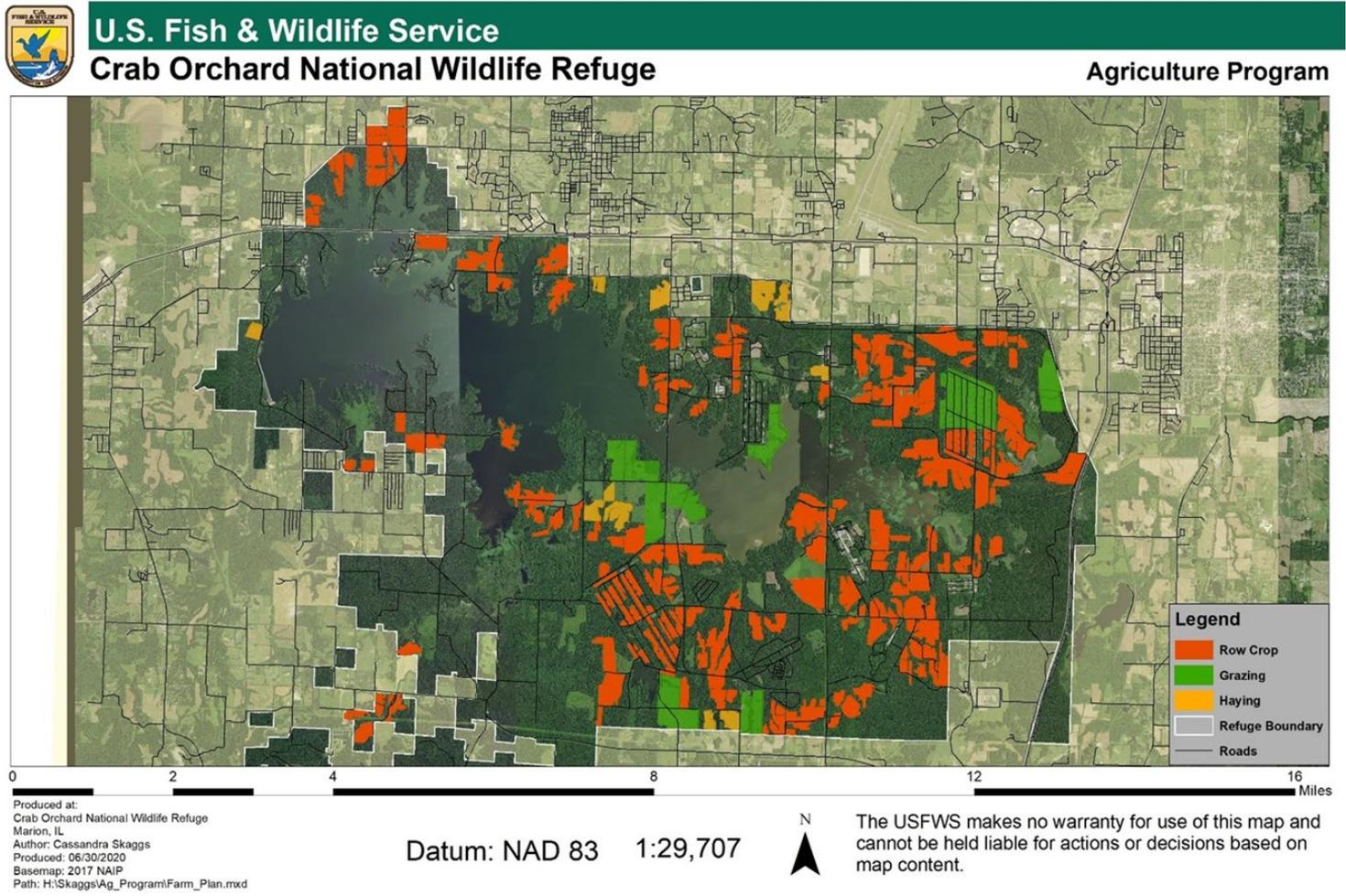
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Figure 1. Map of the Crab Orchard National Wildlife Refuge agriculture program.



A map that outlines all the areas within Crab Orchard National Wildlife Refuge that are involved in the refuge's agriculture program. Orange-colored areas represent acres in the row crop program, green-colored areas represent

acres in the grazing program and yellow-colored areas represent acres in the haying program. White lines delineate refuge boundaries. Black lines represent roads. This map is current as of June 30, 2020.