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14.1. Scope. This chapter applies to the control of all animal (vertebrate and invertebrate) and plant pests, as defined below, on all units of the National Wildlife Refuge System (NWRS).

14.2 Policy. The policy of the Service is to engage in, the control of wildlife and plants within the NWRS to assure balanced wildlife and fish populations consistent with the optimum management of refuge habitat.

Control programs must be designed to maintain environmental quality and to conserve and protect the nation's wildlife resources. They will be based upon a broad, systematic approach utilizing all available information on the ecology of the plant or animal pest**,** the factors that increase or decrease its capacity for damage**,** the nature and extent of damage than can be tolerated, and the effects of various damage control options upon other organisms inhabiting the managed environment. An integrated pest management (IPM) approach will be adopted where practicable in refuge management activities.

No animal or plant that is a pest will be subject to control unless the following conditions are met:

A. The pest organism represents a threat to human health and well being, or private property, the acceptable level of damage by the pest has been exceeded, or State or local government have designated the pest as noxious;

B. The pest organism is detrimental to primary refuge objectives; and

C. The planned control program will not conflict with attainment of refuge objectives or the purposes for which the refuge is managed.

Population reduction methods are chosen on the basis of effectiveness, cost, and minimal ecological disruption, which includes minimum hazard to non-target organisms and the refuge environment. Chemical pesticides should be used only where practical physical, cultural, and biological alternatives, or combinations thereof, are impractical or incapable of providing adequate damage control. Furthermore, chemical pesticides will be used primarily to supplement, rather than as a substitute for, practical damage control measures of other types. Whenever a chemical is needed, the most narrowly specific pesticide available for the target organism in question should be chosen, unless considerations of persistence or other hazards would preclude that choice.

All uses of chemicals on refuges will conform with Environmental Protection Agency (EPA) regulations and registration information, label directions, State pesticide laws, and Department of Interior Pesticide Use Policy (517 DM 1, as revised July 14, 1981). (See Exhibit 1).

14.3 Objectives. The objectives of pest management activities in the NWRS are:

A. To protect human health and well being;

B. To prevent substantial damage to significant resources;

C. To protect newly introduced or re-established species;

D. To control exotic species and to allow normal populations of native species to exist (See 7 RM 8, Exotic Species Introduction and Management);

E. To prevent damage to private property; and

F. To provide individuals with quality wildlife-oriented recreational experiences.

14.4 Definitions.

A. Pest. Any terrestrial or aquatic plant or animal which interferes, or threatens to interfere, at an unacceptable level, with the attainment of refuge objectives or which poses a threat to human health.

B. Pest management. Any practice or combination of practices designed to manipulate pest or potential pest populations and to diminish pest injury or render them harmless.

C. Integrated pest management (IPM). A dynamic approach to pest management which utilizes a full knowledge of a pest problem through an understanding of the ecology of the pest and ecologically related organisms and through continuous monitoring of their populations. Once an acceptable level of pest damage is determined, control programs are carefully designed using a combination of compatible techniques to limit damage to that level.

D. Pesticide. Any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest or which is intended for use as a plant growth regulator, defoliant, or desiccant.

E. Trespass animals. Any unauthorized, domestic animal, such as a dog, cat or livestock, at large on a refuge.

F. Hazard. The risk that any organism, including humans, other than the target species may be killed or injured by a pesticide application.

G. Toxicity. The capacity of a pesticide to cause physiological injury or death.

14.5 Prohibited uses. The following are normally prohibited from use on refuge lands:

A. Pesticides for predatory mammals or birds.

B. Pesticides that cause secondary poisoning.

C. Leg hold traps fixed to the cop of pole.

D. Programs to control or that may adversely affect endangered or threatened species of wildlife or plants. Consultation is required in accordance with Section 7 of the Endangered Species Act (16 U.S.C. 1531-1543). (See 7 RM 2 Endangered Species Management, for Section 7 consultation procedures).

E. M-44s.

F. Denning.

Exceptions to the above prohibitions must be approved by the Director.

14.6 NEPA compliance. An environmental assessment (EA) must be prepared for all wildlife and plant control programs not categorically excluded by NERA (4 RM 5 Exhibit 3) and amendments unless such control is limited to minor habitat management techniques such as selective live trapping and transfer and physical or mechanical barriers (including electric fences).

14.7 Pest control proposal. Except in emergency situations, a pest control proposal must be submitted and approved by the regional director before the initiation of any control program, regardless of the pest species involved (exceptions listed below). A separate past control proposal need not be submitted in cases where an EA is required; the required information may simply be incorporated into the EA. Whenever a chemical is to be used in the pest control program, a Pesticide

Use Proposal Form (Exhibit 2) must be submitted with the pest control proposal. Whenever possible proposals for the forthcoming calendar year will be submitted by December and will be reviewed during December and January. The proposals should be sent through the normal chain of command with final approval by the regional director. The pest control proposal (or EA) must fully incorporate the following:

A. Description. Description of the actual or potential problem, including the area involved, as well as species, numbers, history of the problem, damage, ecology of the species, and such factors as predators and parasites that may limit pest populations.

B. State consultation and assistance. Include a list of contacts made in an effort to consult and coordinate with others in order to decide upon the proposed action and to identify practical alternatives. The State fish and/or wildlife agency should be consulted on control problems and programs. Mosquito control activities performed by refuge personnel should be coordinated with efforts by local mosquito control agencies. Conformance with local regulations and State law is mandatory. Availability of assistance from the State and other Service divisions, as well as universities and other agencies, should be investigated.

C. Control methods recommended and alternatives. Discuss the proposed control program, including methods, materials needed, and dates. List all the practicable alternatives considered before the proposed action was chosen, and indicate why these alternatives were not selected. Also, identify the resulting environmental effects, especially the risks to non-target organisms, possible impacts upon endangered species, and disposal of carcasses (where appropriate).

Specific procedures, formats, and instructions for the annual review of pesticide use proposals will be issued from the regional office. These instructions are developed from Departmental instructions, and all field

stations must comply. The regional director has the authority to approve certain pesticide use patterns as called for in Departmental policy. In cases Departmental review is mandatory. Technical review is accomplished by regional environmental contaminant evaluation (ECE) specialists who should be consulted if questions arise.

D. Justification of pest control. Discuss related refuge objectives, the influence of control on refuge outputs, and expected results of the control program. Describe the on-refuge and off-refuge economical, sociological, and biological ramifications of the program.

E. Exceptions. A pest control proposal is not required for the following operations:

(1) Routine protection of refuge buildings, structures, and facilities not involving prohibited chemicals.

(2) The use of common household pesticides to curb flies, mosquitoes, ants, cockroaches, hornets, houseplant aphids, and clothes moths in offices and residences.

(3) Incidental control of exotic or feral animals that are not protected by either Federal or State laws except where chemicals may he used. Examples include starlings and house sparrows interfering with nesting wood ducks, mute swans or carp, which are or may be competing with waterfowl or other indigenous species. (See 7 RM 8, Exotic Species Introduction and Management).

(4) The use of routine habitat management techniques, selective trapping, on-refuge transfer, and physical and mechanical protection such as barriers and fences (including electric fences).

14.8 Emergencies. Section 18 of The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), as amended, provides for exemption of State or Federal agencies from all requirements in cases where the Governor or head of that agency requests and secures such an exemption. This constitutes declaration of official emergency conditions (such as an imminent human health hazard).

In contrast, approval for immediate pest control actions required for significant unforeseen pest problems normally may be obtained from the regional office.

Within two weeks following initiation of such "emergency" actions, a memorandum of justification that includes the elements of a pest control proposal must be submitted.

Executive order 11643, as amended, provides for the head of an agency to authorize the emergency use on Federal lands under his jurisdiction a chemical toxicant when an emergency exists that cannot be dealt with by means which do not involve use of chemical toxicants, and that such use is essential:

(1) To the protection of the health or safety of human life;

(2) To the preservation of one or more wildlife species threatened with extinction, or likely within the foreseeable future to become so threatened; or

(3) To the prevention of substantial irretrievable damage to nationally significant natural resources.

14.9 Vertebrate control. The basic principles of vertebrate control are essentially the same as for invertebrates. The emphasis in the control of vertebrate populations will be based, whenever possible, upon an IPM approach.

A. Alternatives. In descending order of preference, the vertebrate control alternatives include, but are not limited to, the following:

(1) Environmental manipulation, i.e., biological control, habitat management techniques not involving chemicals lethal or injurious to vertebrates;

(2) Live trapping and transfer;

(3) Public harvest of target wildlife through public hunting, fishing, and trapping (see 8 RM 5, Hunting; 8 RM 6, Fishing; and 7 RM 15, Trapping);

(4) Repellants – non-lethal (see Section 14.11. below);

(5) Physical or mechanical protection (barriers, fences, etc.);

(6) Lethal reduction by means other than public harvest or poison; or

(7) Lethal reduction through the use of chemicals (Bee Section 14.11, below).

B. Control of trespass and feral animals and other animal control operations. Parts of 50 CFR 26, 28, and 30 govern the handling of trespass and feral animals on Federal lands (See 7 RM 13 for a general discussion of Collections, Donations, and Disposals. See also 50 CFR 31.14 for official animal control operations).

(1) Trespass animals. Managers must use extreme care in disposing of

trespass animals to ensure that unwarranted killing does not take place. Whenever possible, trespass animals should be captured and returned to their owners or transferred to humane societies or local animal shelters. Refer to 50 CFR 26.21 and 28.42. Title 50 CFR 28.43 authorizes the disposal of dogs and cats observed in the act of killing, injuring, harassing, or molesting humans or wildlife. A signed receipt showing disposition of the animal should be obtained and kept on file. The circumstances under which animals are shot in accordance with 50 CFR 28.43 should also be documented in refuge files.

(2) Feral animals. Disposal of feral animals must be accomplished by the most humane method available and in accordance with Service directives (Executive Order 11643, etc.). Refer to 50 CFR 30.11 and 30.12 concerning control and disposition of feral animals.

14.10 Invertebrate and plant control. The management of both invertebrate and plant pests shares many of the same principles and techniques. Again, the management emphasis will be based upon an IPM approach wherever possible.

14.11 Integrated pest management principles and methods. Most damaging pest outbreaks result from temporary ecological imbalances that permit the population of a native plant or animal species to increase abnormally. The introduction of an exotic organism into an established ecosystem can also cause such an imbalance.

Under pristine conditions, imbalances among established species are usually temporary and are soon corrected by responses of other ecosystem components. However, truly pristine conditions are rare. Most refuges consist of modified habitats, which are artificially managed to maintain predetermined conditions. Furthermore, exotic species are widespread and often represent

potential pests. Together, these two factors create the potential for pest problems in most refuge environments.

However, the IPM philosophy recognizes that the mere presence of a potential pest organism does not necessarily constitute a pest problem. Only when the organism does damage above an acceptable level is it a problem. The manager must identify the pests and the kind of damage they inflict, and determine a damage "threshold" (the level at which pest damage becomes unacceptable).

Before the initiation of any control program, monitoring programs must be conducted to determine the actual status of the pest population. This monitoring is a key factor lo the success of any IPM program. Periodic monitoring should be conducted throughout a control program to provide up-to-date information on all key organisms and to enable periodic evaluation of control techniques.

The manager must know the biology of pest organism and how they relate to other components of the managed ecosystem. Specifically, the key factors, which impinge, either favorably or unfavorably, upon these organisms must be identified. These may include biological factors such as natural enemies and availability of food or shelter, or physical factors such as temperature, water availability, or photoperiod.

Thus, in IPM, the pest is considered a component of a functioning ecosystem; actions are taken to restore, preserve, or augment checks and balances in the system, not to eliminate species. The diversity of the ecosystem should be enhanced whenever feasible. All possible pest control options for limiting pest damage must be fully considered before any action is taken. Eradication efforts should not be pursued; rather, the management program should be designed to utilize the best combination of control techniques to effectively limit pest damage to the desired level.

The techniques for dealing with pest problems are numerous. For example, they may include the following:

A. Cultural or agronomic methods.

(1) Resistant varieties of plants and animals
(2) Crop rotation
(3) Crop refuse destruction
(4) Soil tillage (i.e., plowing, discing)
(5) Variation in time of planting or harvesting
(6) Thinning or pruning

(7) Fertilization
(8) Sanitation
(9) Water management
(10) Planting of trap or lure crops

B. Mechanical methods.

(1) Hand destruction
(2) Exclusion by screens or barriers
(3) Trapping, suction devices, collecting machines
(4) Crushing and grinding
(5) Mowing

C. Physical methods.

(1) Heat
(2) Cold
(3) Humidity
(4) Energy-light traps, light regulation
(5) Sound
(6) Prescribed burning

D. Biological methods.

(1) Protection and encouragement of natural enemies
(2) Introduction, artificial increase, and colonization of specific parasites and predators (Refer to 7 RM 12, Propagation and Stocking, and 7 RM 8, Exotic Species Introduction and Management).
(3) Propagation and dissemination of specific bacterial, viral, fungal, and protozoan disease.

E. Chemical methods. (Pesticides)

F. Genetic methods. (Propagation and release of sterile or genetically incompatible pests)

G. Regulatory methods.

(1) Plant and animal quarantines

(2) Suppression groups

The techniques chosen should be directed as narrowly as possible at the weak points in the armor of the target pests. Broad impacts on the ecosystem should be avoided.

The nature and severity of pest problems vary from place to place; they may also vary from year to year in a particular location. A control program that worked well last year may be inappropriate for this year's pest problem. Therefore, management programs must be designed to reflect the dynamic nature of managed ecosystems and must be adaptable to periodic changes in conditions.

In short, IPM parallels conventional wildlife management in that managers use an understanding of the ecological position of the species in question and its relationship to its environment to manipulate the habitat so that populations react as desired.

A good IPM program requires a rather detailed knowledge of the ecology of the pest and familiarity with a wide range of damage control techniques, as well as pre- and post-treatment monitoring of the effects of control efforts. Therefore, most successful programs are developed with the extensive assistance of professional pest management specialists, who include entomologists, biologists, and other scientists that specialize in control of pests. These are not to be confused with local representatives (in name or otherwise) of chemical manufactures and distributors.

Advice and assistance in developing ecologically sound pest management programs should be sought at colleges and universities. Valuable assistance can also be obtained from a growing number of professional pest management consultants (as distinguished from pesticide salesmen). For a more comprehensive treatment of IPM, refer to the May 1977 document entitled, "A Source Book on Integrated Pest Management," by Mary Louise Flint and Robert van den Bosch (University of California, Berkeley, Natural Resource College, Division of Biological Control).

14.12 Pesticide uses on refuges. Pesticides have a place in IPM; they are simply one of many techniques available (See Section 14.2, above).

A. Certification of personnel. On refuges where pesticides are used, the refuge manager and appropriate staff must be trained and certified. Federal or State laws require certification only for applying or supervising the application of restricted use pesticides. However, as even general use pesticides may be hazardous if misused, training and certification is required where any pesticides are used.

B. Selection of the proper chemicals. Only Federally registered chemicals may be used in normal refuge operations. Valuable information on registered chemicals and their uses may be found in the four-volume (soft-bound) set entitled, "Agricultural Chemicals," by W. T. Thomson (Thomson Publications, P.O. Box 9335, Fresno, CA 93791). These volumes provide up-to-date, comprehensive listings of insecticides, herbicides, rodenticides, fungicides, fumigants, growth regulators, repellents and others. Refuge managers who commonly deal with pest problems that may involve chemicals should obtain copies for reference.

In addition, chemical use on refuges must comply with all Federal restrictions and prohibitions. The USDI list of prohibited and restricted use pesticides provided in Exhibit 3. Regional offices will supply new copies of these lists to field stations as they are updated. Refuge managers should contact the regional office (ECE) for guidance in the application of restricted use pesticides.

When pesticides are considered for pest control, broad-spectrum pesticides, such as many commonly timed insecticides, must be distinguished from those that are highly specific, which are often of biological origin, such as *Bacillus thuringiensis* or milky spore disease. If a broadly toxic pesticide is deemed necessary, a final decision will not be made without a full consideration of adverse effects upon such elements of the ecosystem as non-target organisms, including natural enemies or desirable wildlife and plant species, soil microorganisms, water quality, long term persistence, or possible magnification in the food chain. All precautions, label directions, and proper techniques and timing of application must be followed in order to minimize such effects.

The evolution of pest management techniques and the development of new products are proceeding rapidly. No chemical should be selected without a thorough investigation of what is currently available and recommended for the pest in question. Professional assistance should always be sought, at least from the Service Industrial Hygienist, the local Cooperative Extension

Service, the county agents, and/or subject matter specialists at State land grant universities. The Extension Service is a readily accessible source of information on Federal (and sometimes State) registration status, efficacy, and procedures to protect personnel. Additional valuable information may be found on the container label or in other "labeling" literature from manufactures and distributors.

Data from extension and industry sources seldom address chemical side effects in sufficient detail to permit refuge personnel to assess environmental aspects of pesticide use. The Service is a principal source of information on non-target effects of pesticides. The contact is the regional ECE specialist.

C. Pesticide use by non-refuge personnel. The refuge manager, not the cooperator, is responsible for the consequences of each treatment and should be prepared to suggest better alternatives if any are available. A proposal by a refuge cooperator or permittee should be subjected, by the refuge staff, to the same scrutiny that a force account proposal would receive.

D. Pesticide use review and approval. Except for the exceptions specifically listed in Section 14.7, above, the use of pesticides on refuges require prior written approval of the regional office.

E. Application of pesticides. All precautions in the selection and application of pesticides are directed toward hazard assessment. Hazard depends upon toxicity, chemical formulation, and the time, place, and manner of application. Detailed information is best obtained from labels and labeling. The pesticide label identifies legal target organisms, treatment sites, and sometimes season of use. Additionally, it contains a broad warning about potential danger to applicators and to fish and wildlife. However, labeling does not delineate sensitive habitats or other conditions in the treatment areas that require special precautions.

Proper protective equipment must be provided to and worn by those who are involved.

Regional ECE specialists will assist in locating and interpreting information needed in planning refuge chemical use programs.

F. Record keeping. Refuge managers should maintain records of all pesticides applied on lands or waters under refuge jurisdiction and the names of all persons involved. This includes pesticides applied by cooperators with Service permission. Records should include common and chemical name, formulation(s), application rates, target pests, degree of control, and treatment sites. This may be accomplished by keeping a copy of completed Pesticide Use Proposal Form from pest years and the revised form (Exhibit 2) for future years. In addition, complete records of all pest-monitoring activities should be retained for future reference. These records should include the noted side effects from chemicals used to aid in future selection of chemicals.

14.13 Legal considerations in chemical use. The development, marketing, and application of pesticides are regulated by Federal and State law. It is incumbent on refuge personnel involved with pesticide application to be familiar with these portions of the laws and regulations that affect refuge use of pesticides.

A. Federal.

(1) Federal Insecticide, Fungicide and Rodenticide Act (FIFRA). This 1972 law, amended in 1975 and 1978, regulates almost everything having to do with pesticides, including development, registration and classification, production, storage and transport, and, perhaps most important of all, applications. FIFRA is administered by the U.S. Environmental Protection Agency. The law is complex and many sections are not relevant to refuge operations (See 1 RM 5 for a complete citation). However, refuge personnel should be familiar with FIFRA and specifically with the following sections (or applicable parts thereof):

Section 2: Definitions.

Section 3: Registration of pesticides. Especially 3(d) classification for general use or restricted use.

Section 4: Use of restricted use pesticides and certification of applicators.

Section 5: Experimental use permits.

Section 12: Unlawful acts. Especially 12(a)(2)(g) which states “It shall be unlawful for any person to use any registered pesticide in a manner inconsistent with its labeling.”

Section 18: Exemption of Federal agencies.

Section 19: Disposal and transportation.

A copy of FIFRA, as amended, and applicable regulations should be part of the active file of every station where pesticides are used.

(2) Department of the Interior Policy on Pesticides (517 DM 1, as revised 1981). The policy governs pesticide use in all Service programs. Interior policy mandates that use of pesticides in Service, hence refuge, programs must conform with all applicable previsions of Federal and State pesticide law

(See Exhibit 1).

B. State.

(1) State pesticide regulatory law. Within the framework of FIFRA, all States have pesticide (or economic poison) regulatory statutes. State laws (and regulations) may not be more permissive than FIFRA but may be, and sometimes are, more restrictive. Refuge personnel should contact the State lead agency (usually the State Department of Agriculture) for copies of current laws and regulations.

(2) Pollution control and public health laws. Certain pesticide use practices may be subject to regulation under State pollution or public health laws and regulations. Examples could include disposal of surplus pesticides or containers and chemical treatment of sites that might impact potable water supplies.